

Inventory Control & Costing

In

Risk Assessment

In

Small Scale Industry

With Reference To Selected Units

**A Thesis submitted to
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by

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M E S S A G E S O F T H A N K S

It is said that it is ingratitude to thank hastily for the obligations received. I must, nevertheless, do it.

In completing this research, I owe much to a few individuals. Among them, I am very much indebted for invaluable advice, very helpful supervision, encouragement and guidance, at all stages of my research, to Professor Manubhai M. Shah, M.Com, M.Sc(Econ) London, Head of the Post-Graduate Department of Commerce and the Hon. Director of Shri Gordhanbhai Hathibhai Patel Post-Graduate Institute of Business Management, Sardar Patel University, who is well-known to the economics profession in India.

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I N T R O D U C T I O N

I could have, undoubtedly, explored the subject matter of this thesis in an assortment of avenues and from different perspectives depending on one's disciplinary interests. I have, however, found it rewarding as well as realistic to study it from an integrative interdisciplinary point of view so as to confirm the thrust of my thesis and judgments.

GENESIS

A word, first, as to why the units studied belong to the Small Scale Industrial (SSI) Sector. The *raison d'etre* for this is not only their primacy in the economy but a variety of other reasons as well. To Dr. E.F. Schumacher, economist and the originator of the concept of Intermediate Technology, "Small is Beautiful". Professor Leopold Kohr of the University of Wales feels, "Small-scale operations, no matter how numerous, are always less likely to be harmful to the natural environment than large-scale ones", showing thereby its relevance to the economics of permanence. I fully concur with Prof. Paul Ehrlich's judgment that our entire economic system, based on Thorstein Veblen's conspicuous consumption, must be supplanted by the forethought what scale is appropriate. It depends on what we are trying to do. The question of scale is

extremely crucial in today's idolatry of giantism.

Even in highly industrialised countries where mass production is the rule, many small units exist and thrive as ancillaries to large units in sophisticated production lines.

In Britain, at the end of 1982, there were 1.3 million small firms, representing more than 95% of the total number of all businesses and providing employment for more than 30% of the working population and more than 20% of the GNP. Available statistics indicate that approximately 10,000 new small business start each month. The Bolton Committee regarded the two functions of this sector, "as a breeding ground of new industries and the source of dynamic competition," of crucial importance. The Wilson Committee too considered, in its brief, the financing of small firms and the Macmillan Gap. The small-firm sector in the U.K. is significantly smaller than in other advanced countries.

Japan has twice as many small companies as the U.S.A. has and nearly ten times as many as Britain. For the last three decades in particular, they have been the critical first stage of the economic rocket that has made Japan a by-word for industrial competition. In 1981 there were about 6.4 million small companies in Japan. Koji Omi, Director-General of the Ministry of International Trade, observes that in Japan small enterprises boast of

contributing 57% of the nation's output as against 47% in the U.S.A. and 15% in the U.K. In Japan the small sector employs 70% of the work force, while in the U.S.A. it is 65% and in the Federal Republic of Germany it is 27%. In Japan, the role of the SSI sector is clearly defined by market logic as sub-contractors and ancillaries to the parent large enterprise. As a direct result of this relationship, there is a lot of technology transfer, R & D facilities, benefits of managerial experience and technical specialisation by the small firm reducing, in other words, the penumbra zone between big and small industries. The industrial structure thus is pyramidal in form with a wide base of small enterprises and a small apex of large corporations like Hitachi, Toshiba, Fujitsu, Sumitomo, Toyota, Nissan and others. The pay scales are, however, naturally, lower on an average by about 30% in the SSI sector compared to the scales in big industry. Unionisation is quite low in the SSI sector, being below 25%. For these reasons, the cost of labour in the SSI product is low. The diffusion rate of mechatronic equipment (robots, machining centres and other such computer & microprocessor controlled equipment) is at present 19% (as against 70% for big enterprises) but it is predicted that about 60% of small businesses will introduce mechatronic equipment within the next three years or so.

In the U.S.A., small business constitutes 90% of all business and 9% of the manufacturing sector. In an illuminating study by Catherine Armington and Marjorie Odle in The Brookings Review (Winter 1982), it has been pointed out that the contribution of small business sector to net job growth is about proportional to its share of the American labour force.

In the Republic of Korea, the small industry constitutes 75% of the manufacturing sector and provides 50% of manufacturing employment. Korea also boasts of a Small and Medium Industry Bank which is the main financier of small industries.

After this global tour de force, we come inexorably to India. In India, at the end of 1982, the SSI sector provided employment to 70 lac persons, recording 21 persons employed on an average for an investment of Rs.1 lac. It is nearly four times the corresponding employment for the same level of investment in Medium or Large Scale sectors. The number of registered SSI units at the end of 1982 was around 6 lacs with an investment of Rs.1,900 crores and an output of Rs.20,930 crores constituting 40% of total industrial output of the country. Its exports amounted to 25% of the total exports (the Pearson Report considers the expansion of exports the main criterion of success for developing countries). The number of items to be exclusively purchased from the SSI sector by the Government is 401 and its share

in Government purchases works out to 45.6%.* The volume of bank finance to this sector is in the region of Rs.3,000 crores.

The advantages which radiate from the SSI sector are creation of larger employment opportunities; promotion of decentralisation of activity; wider dispersal of industries; better distribution of income; improvement in the skills of artisans; providing consumer goods without a long gestation period and contribution to the structural flexibility in an economy.

We see, therefore, that the role of the SSI sector in national development and in the comprehensive concept of "steady growth equilibrium" called the Optimum Golden Age (which combines the elements of the Von Neumann Path, the natural rate of growth defined by Sir Roy Harrod and the Golden Age analysed by Prof. Joan Robinson) is by no means small.

Shortage of funds for Working Capital has been possibly the biggest cause of business failures in recent years. Two of the most celebrated victims of Working Capital shortages, Rolls-Royce and Upper Clyde Shipbuilders, illustrate the seriousness of the management problem and the need for priority action. In spite of an international reputation for technological excellence, the best brand name in the world and a continuing history of reported profitability, Rolls-Royce could not survive when the money ran out. The Upper Clyde Shipbuilders failure demonstrated that Working Capital was a more pressing priority than full order books and notable

* David Trippier, Mrs. M. Thatcher's minister in charge of Small Business in the U.K., supports public sector purchase from small firms.

advances in productivity and industrial relations. The experience of these world-famous companies has been mirrored by all too many medium and small sized firms.

And it was against the background of these that the subject matter of my thesis was culled.

Surveys usually involve the collection of relatively large amounts of information. The correlational data yielded by survey research contribute to the identification of the factors. One problem of surveys involves the adequacy of samples. Good tests should have a reliability coefficient of atleast 0.7, which represents 49% agreement (square the coefficient and convert into percentage). It is impossible or impractical to survey all the SSI units, so ten samples which are representative have been selected, going by the Law of Statistical Regularity, on the basis of Purposive Stratified Random Sampling from the 44,136 SSI units at the end of December 1982 in the State of Tamilnadu. Over 110 units were contacted and surveyed for the purpose of this study. To avoid duplication of study and findings, these ten units were purposely delinked for this research. It may be noted here that few of the concepts change when applied to the larger firm, although they usually become more sophisticated in design and more complicated to administer. The regression results of the in-depth study of these

ten units, from the clinical point of view, generally confirm the validity of this neoliberal thesis. The names of the units, of course, have been altered to preserve anonymity.

Today, the persistent sickness of industrial units is one of the overriding problems confronting our industrial sector. This is not a new phenomenon, but has assumed quantum jumps in recent years. The resultant effect is loss of production and displacement of labour from the macro angle and the jeopardy of the Bank's advances. To Indian Institute of Management faculty Prof. S.K. Chakraborty, "an unit would be sick if cash losses were suffered by it for more than or equal to 50% of the duration of the business cycle for that industry for two successive cycles". The number of sick SSI units at the end of December 1981 were 23,975 and the outstanding bank credit stuck Rs.500 crores. While according to official estimates 20% of SSI units are sick, my study revealed, that the actual percentage varies between 40% and 50%, if we consider an unit as sick when it works at 20% or below of its capacity.

I have, therefore, dwelt on an Empirical Model to predict corporate failure in my study and also assigned a successful Nursing Programme in the ten empirical cases given.

OBJECTIVES

1. To investigate the polychromatic aspects of Inventory Control & Costing in Risk Assessment by Banks especially in the SSI sector.
2. To evaluate the techniques and aspects above.
3. To recommend emphatic peremptory measures, including an explicitly dynamic, multi-sector intertemporally consistent empirical Model paradigm , for better multitherapeutic /Risk Assessment and control by Banks in the SSI sector.

METHODOLOGY

- a. Primary and Secondary data were gleaned from published and submitted data by the units in the normal course of administration.
- b. Direct observation: This involved the observation of the units with a minimum of interference from the observer. Observation is an important method and, without doubt, it is the most important step in strategies of scientific enquiry. Observations suggest hypotheses and are also used to test hypotheses.

While there is some variation, the main steps in scientific enquiry are: (i) observation and assessment; (ii) the categorisation and

- classification of observations; (iii) the formulation of hypotheses, models or theories to link observations (the Linkage Thesis) and explain them and (iv) the derivation of objectively testable predictions in order to validate or test hypotheses, models and theories. Baseline surveys were conducted.
- c. Clinical interviews with Government officials concerned with the SSI sector; entrepreneurs; bank officials and officials of the units were conducted. In all, 250 respondents were interviewed.
 - d. Reports: These were based on observations or informal conversations. They were usually incomplete and biased, but in certain cases useful. "Beware of documents", counselled Clemenceau rightly.
 - e. The postal questionnaire system was found to be unsatisfactory producing hardly any replies.
 - f. Asking questions by telephone did not prove a good method because I found a biased sample.
 - g. Specific case studies were undertaken for detailed enquiry. The enormous mass of data thus collected, which proved my labour of Sisyphus, was then edited; tabulated; comparison of averages done; tested for accuracy against errors; and then analysed to get interpretations.

CHAPTERISATION SCHEME

The dissertation has been divided into 3 parts and 7 chapters as follows:

Part I consisting of 5 chapters, deals with important aspects against the backdrop of SSI financing. Chapters 1 and 2 wrap:

1. Definitions and
2. Synoptical overview of financing of SSI units.

Then chapters 3 and 4 set out the prismatic theoretical dimensions of Inventory Control and Costing relevant to Bank financing.

And finally, chapter 5 jells the dichromatic committees set up by the Government of India from time to time and the determination of "norms" for "size" of inventories.

Part II (Chapter 6) includes ten empirical case studies from the angle of the subject of the thesis and includes a Nursing Programme, viz., Boston Pharmas. Recommendations and findings in respect of each unit are given at the end of each respectively.

Part III (Chapter 7) reviews the major findings and assigns a number of peremptory recommendations.

To provide a catalytic step on the long journey, I have tried to present a codified and simplified vision

of the uniqueness of SSI financing behaviour, against a canvas of enormous range of facts and swift modulations. However, it cannot be too strongly emphasised that no two banking propositions are alike and each has to be dealt with on its merits. To concoct the financing panorama further, the figures supplied to a banker, like Nabokov's prose, conceal more than they reveal. But, then, this is a Rashomon Phenomenon where everyone sees things from one's own angle only. Any attempt to grasp bank financing realities through statistics alone, as Dyer, Clemens and Pitcher would acquiesce, is like wrestling with ectoplasm. You have to know the people behind the show. For, in the words of Sir Anthony Tuke of Barclays Bank, "at the end of the day a banker is concerned about people". And, contemplate the juxtaposition of two or more consummate possibilities realising fully, as the Chinese sage Chuang Tzu said, "the blended harmony of the Yin and Yang".

The paradoxical nature of Pascal and Neumann's Law of Probability is shared by bank-lending propositions in that you can predict with uncanny precision the overall result of a larger number of individual cases, but each of them is in itself unpredictable. So, we are, as Prof. Harry Johnson of London School of Economics puts it, "Still confused, but at a much higher level of understanding". We must, nonetheless, in the words of

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C H A P T E R 1

DYNAMICS OF SMALL INDUSTRY FINANCING - THE GLOBAL BACKDROP

DEFINITIONS:

Few observers agree on the definition of a small unit, and economists are constantly disagreeing over the pro's and con's of various size measures, which range from the flow concept (such as turnover, various profit and income measures, etc.) to stock concepts (such as various asset measures, employment, etc.)

There are different ways of defining small companies, hence precise comparisons are difficult.

In the United Kingdom the standard definition of a Small Business is "fewer than 200 employees or a turnover of £ 2 million or less."

In Japan, small companies are those with less than 300 employees or less than Y-100 million worth of capital. (Japanese Yen 100 = Rs.3.75 approx.)

In the U.S.A., as Columbia University Professor of Banking D. Carson points out, definition of Small Business is usually done in terms of annual dollar volume of sales, total investment, number of employees. But, as Professor Carson adds, all these are changed by economic and technological changes.

This, I must admit, looks at the issue from a new slant and is more apt in the inflationary times ahead.

In India, a Small Scale Industrial unit means any industrial undertaking in respect of which an affidavit or a certificate is furnished by the owners that the investment in plant and machinery (excluding jigs, tools, dies, moulds) is not in excess of Rs.20 lacs and is engaged in manufacturing, processing, preservation of goods or functioning as servicing and repair workshops in specified lines or as custom service units. Under the Income-tax Act, an SSI unit is one which employs 10 or more workers in a manufacturing process carried on with the aid of power or 20 or more workers without the aid of power. It does not use secondhand machinery more than 20% of total plant and machinery. Plant includes, apart from the usual concept of plant, scientific apparatus, books, drawings used for business.

A Small Scale Ancillary Unit is defined as one which produces parts, components, sub-assemblies and tooling or renders 50% of production for supply against known or anticipated demand of other units and the

investments in plant and machinery of which is not in excess of Rs.25 lacs.

A Tiny Unit is an undertaking having investment in fixed assets in plant and machinery not exceeding Rs.2 lacs and is situated in towns and villages with a population of less than 50,000 as per 1971 census.

Small Business includes individuals and firms managing a business enterprise established mainly for the purpose of providing any service other than professional services whose original cost price of the equipment used for the purpose of business does not exceed Rs.2 lacs with working capital limits of Rs.1 lac or less and who are eligible for DICGC cover.

No undertaking will be considered as a small scale industry unit if it is a subsidiary or is owned or controlled by any other undertaking.

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CHAPTER 2

FINANCING OF SMALL-SCALE INDUSTRIES: A PROFILE

During the last decade and a half, special efforts have been made to enlarge the flow of institutional credit to the small scale industries, which have been designated as one of the priority sectors for deployment of bank credit. According to the target laid down by the Government of India, advances to priority sector by the public sector banks are to reach a level of one-third (raised to 40% by 1985) of their outstanding credit. A countrywide effective sample survey of 12356 small scale industrial units assisted by the banks was organised by the RBI in collaboration with commercial banks in 1977-78.*

The main findings were: An overall view of the small scale industrial units assisted by the banks revealed that internal resources formed a small proportion of total net assets (28.2%) for small scale units than for medium and large public limited companies (41.1%). Borrowings and trade credit were higher at 42.0% and 29.3% of total net assets than 33.8% and 25.1% respectively, in the case of public limited companies. Small Scale industrial units, as a whole, were net providers of trade credit unlike medium and large public limited companies which were net recipients of trade credit.

* Report of the sub-group on "Credit requirements of Small Scale Industries (1978)" - Working Group on Small Scale Industries for the Five Year Plan 1978-83.

Institutional credit as a proportion of total borrowings (including deposits) was lower for small scale units at 63.0% than 72.0% for medium and large scale public limited companies. However, the role of institutional credit in the financing of total net assets was not materially different at 26.4% for small scale units compared with 24.3% for medium and large public limited companies. Short-term bank credit as a proportion of inventories plus sundry debtors minus sundry creditors was not very different for small scale industries compared with that for medium and large public limited companies.

Within the small scale industrial sector, the use of institutional credit was more in the case of larger units (ie., those with investments in plant and machinery amounting to more than Rs.1 lac) at 73.9% of total borrowings as against 63.8% for the smaller units. Short-term bank credit as a proportion of inventories plus sundry debtors minus sundry creditors was much higher in the case of the larger units. In fact, this ratio showed a progressive increase along with the increase in the size of the units.

Classified according to the type of organisation, private limited companies managed with relatively low internal resources, which accounted for 19.7% of total

net assets, against 31.0% for partnership firms and 32.9% for proprietary concerns. Resort to non-institutional sources to meet their credit requirements was more in the case of partnership firms than in the cases of private limited companies and proprietary concerns.

The main features of the deployment of institutional credit to the Small Scale Industrial Sector assisted by banks, as revealed by the survey, are indicated below:

1. According to the size of the credit, outstanding credit to the Small Scale Industry in amounts of Rs.1 lac and above accounted for 82.2% of the total institutional credit. Those above Rs.10 lacs alone accounted for 32.5%.
2. For all Small Scale Industrial Units assisted by banks, the proportion of institutional credit to total borrowings (excluding deposits) came to 70.9%.
3. Classified according to the original value of plant and machinery, 69% of the institutional credit was channelled to the larger units, i.e., units with original value of plant and machinery above Rs.1 lac. This group accounted for only 10.9% of the total number of units and 38.3% of all the persons employed by the assisted Small Scale units. This group, however, accounted for 55.9% of the total value of gross output of the Small Scale units covered

by the survey. In their borrowings, the very small units appear to get a smaller proportion of their requirements from institutional sources than the larger units. Thus, while institutional credit formed 68.6 to 75.2% of the total institutional and non-institutional credit in the case of units with investments in plant and machinery in the ranges above Rs.10,000, in the range upto Rs.1,000, it formed only 61.2% and in the range Rs.1,000 to Rs.10,000 it was 65.1%.

4. Classified according to the number of persons employed, units employing 21 persons and above accounted for 61.7% of the total institutional credit to the Small Scale sector. These units formed only 11.8% of the total number of units but accounted for 62.9% of the total value of gross output and 70.8% of all the persons employed. Institutional credit formed 77.5% to 86.5% of the total institutional and non-institutional credit in the case of the units employing up to 5 persons as against 65.7 to 72.9% in the case of those employing 6 persons or more.
5. According to the type of organisation, 51.1% of the total institutional credit was found advanced to partnership concerns, 26.5% to private limited companies, 18.2% to proprietary concerns, and the rest to the others. It may be mentioned here that partnership concerns accounted for only 27.7% of the number of units but

their share of the total value of gross output amounted to 60.8% and that of the number of employees to 49.9%.

6. Small Scale units located in centres with population up to 10,000 accounted for 14.7% of total institutional credit, those in centres with population of 10,000 to 1 lac for 25.4%, those in centres with population of 1 lac to 10 lacs for 27.3%, and those in centres with population above 10 lacs for 32.7%. The use of non-institutional credit was less in the case of the units assisted by banks in rural and semi-urban areas than in those in urban and metropolitan areas.
7. Only 18.4% of the total institutional credit was deployed in industrially backward districts. The units in backward districts financed by banks accounted for 46.7% of the total number of assisted units, 31.0% of the number of employees, and 18.6% of the total value of gross output.
8. Conventional Small Scale industries such as grain mills and oil mills resorted to non-institutional credit to a greater extent than other Small Scale industries.

Consequent to the Puri Committee recommendations, there is now standardisation of Application and Appraisal Forms, being one set of forms for advances up to Rs.25,000, another set for those between Rs.25,000 and Rs.2 lacs, and the third one for those beyond Rs.2 lacs.

The following table exhibits, in brief outline, the Sources of Finance for Small Units and the Types of Assistance rendered by each:

No.	Source: Institution	Type of Assistance
1.	State Financial Corporations	Long term credit for purchase of fixed assets.
2.	State Directors of Industries	Loans under State Aid to Industries Act/Rules for block capital.
3.	Commercial banks	Medium term credit for purchase of machinery and construction of factory. Provide working Capital

Although 45% of the total industrial production in the country is from the SSI sector, only 10% of scarce raw materials is allotted to this sector. Due to severe resource constraints, the overall capacity utilisation in the SSI sector hovers around 50%. It is interesting and instructive that my clinical interviews with (i) Mr. C.V. Kuppuswamy, Director of the Small Industries Service Institute, Madras; and (ii) Mr. K. Gopala Rao, Director-Im, Small Industry Extension Training Institute, Hyderabad, confirmed this finding.

Commercial banks are able to obtain refinance under the "Automatic Refinance Scheme" from the Industrial

Development Bank of India up to 75% of the amounts advanced by them to Small Scale units. They can also obtain guarantees covers under "Small Loans (Small Scale Industries) Guarantee Scheme 1981", from the Deposit Insurance and Credit Guarantee Corporation (DICGC), in respect of credit facilities to small scale units.

EXTENT OF THE GUARANTEE

- (a) 90% of the amount in default in regard to credit facilities granted to such categories of borrowers as may be notified by the Corporation up to the limit and other conditions as may be prescribed by the Corporation.
- (b) 90% of the amount in default for borrowers to whom credit facilities were granted, not exceeding Rs.25,000 in aggregate.
- (c) 50% of the amount in default for borrowers to whom credit facilities were granted, exceeding Rs.2.00 lacs in aggregate.
- (d) 75% of the amount in default in other cases with maximum liabilities of Corporation or Rs.10 lakhs, ie., 75% or, Rs.10 lacs whichever is less.

N.B. It may be worthwhile to note that in the U.K. there is 80% guarantee on loans to small firms.

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CHAPTER 3

MISE EN SCENE

Inventory management is perhaps the most important aspect of Working Capital Management. Inventories account for 90% of the working capital and work out to 32% of sales in many industries, as also form the single largest asset in the balance sheets of most Indian Companies. Unlike in U.S.A., Germany or Japan, where factory managers talk in terms of few hours of inventory, in India even the strictest norms prescribed by Tandon Committee talk of inventories in months. Inventories constitute more than 60% of current assets in industries like tea plantation, oils, sugar, jute and cotton textiles, iron and steel, and cement, and about 30% in electricity generation and others. The cost of inventories varies from 40% to 80% of cost of production. The amount of money blocked in inventories in the country is about Rs.30,000 crores of which Rs.5,000 crores is estimated to be in obsolete, surplus and non-moving items. The sales-inventory ratio is around 4:1 in the private and 2.7:1 in the public sectors as against 6:1 in the developed countries.* Avoidance of over-investment (or industrial obesity)[©]

* Journal of National Productivity Council, Vol.4, No.4.

© Albert Battersby, A Guide to Stock Control, BIM Publication 1970.

or under-investment has been mentioned as the desired management goal.* Three kinds of inventories have relevance to manufacturing[©] companies - raw materials, work-in-process, and finished goods.

The size of work-in-process inventory depends largely on the production cycle. The cost of holding inventories in today's conditions in India works out to 30%, ie., Rs.30 for every Rs.100 locked up in the inventories. Inventory management is, therefore, of considerable significance. The importance of inventory management has also been stressed recently by the 14th Report of Committee on Public Undertakings which mentions that "for proper inventory control, it is essential to adopt scientific practices and techniques that have been developed in this regard".

A scientific inventory control system can result in a saving of 5% to 15% on inventory cost.

Inventory management has assumed considerable importance in the last few years, thanks to the financial discipline on working capital introduced by the R.B.I.

* John P.D'Anna, Inventory and Profit, American Management Association, New York, 1966, P.23

© In Black's Law Dictionary the word "manufacture" is defined as "the production of articles for use from raw or prepared materials by giving such materials new forms, qualities, properties or combinations, whether by hand labour or machinery".

through the Tandon and Chore Committees. The inventory paradox is, not too much, not too little; and, at lower cost for higher profit..

INVENTORY DEFINED

The American Institute of Accountants designates "inventory" as "the aggregate of those items of tangible personal property which (1) are held for sale in the ordinary course of business, (2) are in the process of production for sale, or (3) are to be currently consumed in the production of goods or services to be available for sale".* The Chambers dictionary defines the term "inventory" as a list of articles or stock of goods.

In management parlance, inventory is conventionally defined as an idle resource of any kind, having an economic value (Fred Hannsman). The resource used is in the form of raw material, which is capable of being transformed into work-in-progress, and then being converted into finished product which, when marketed to the consumer, gets cash into the organisation. This cycle, known as the operations cycle, begins with cash outflow and through

* Committee on Accounting Procedure, Research Bulletin 43, American Institute of Accountants, New York, June 1953, P.27

the stages of purchase, storage, processing/manufacturing, sales and collection of receipts, ends in cash inflow to the organisation. The periodicity of the cycle depends upon the purchase and inventory policies, conversion process and sales policies. To the finance manager, the term inventory implies the monetary value of raw materials, consumables, spares, work-in-process, finished goods and scrap in which organisation funds have been locked up. Inventory is usually segregated according to the usage and point of entry in the operations.

The classification of a particular item depends on the kind of business being discussed. For a coal mining firm, coal is finished goods. For a steel mill, coal is raw material, as it will be used in the production of steel. Similarly, steel is finished goods for a steel mill, but raw material for an automobile manufacturer.

$$\text{Cost of Funds} = \text{Cost of Capital} \times \frac{\text{Average Inventory}}{\text{Investment}}$$

In its preamble, the International Accounting Standards Committee has provided a definition for inventories as "Inventories are tangible property (a) held for sale in the ordinary course of business, (b) in the process of production for such sale, or (c) to be consumed in the production of goods or service for sale". The Director of Commercial Audit*

* Audit Report-Commercial, 1967, New Delhi, P.10

classifies the total inventory of the public enterprises into two classes, viz., (a) Raw Materials, Stores and Spares (including, in-transit), loose tools, jigs and fixtures, and (b) Stock (finished and semi-finished goods).

WHY INVENTORY?

Having defined inventory as an idle resource, a natural question arises: Why then hold such idle resources in an organisation? Arrow* has applied to inventory itself, the three motives for holding cash that are referred to in the Keynesian analysis of the demand for money. Primarily, inventory is held for transaction purposes. Inventory is also held (i) as a precaution against in-lead time or consumption-rate increases, (ii) for speculative reasons, and (iii) for decoupling the stores from the user departments or the individual consumer.

WHERE SHOULD INVENTORIES BE HELD?

Inventories, in any industry, can be held in any of the three stages of the manufacturing process - as Raw Materials (RM), Work-in-progress (WIP) or Finished

* K. Arrow, S. Karlin and H. Scarf, Studies in the Mathematical Theory of Inventory and Production, Stanford University, 1959, Chap.2,3.

Goods (FG). A precise idea of where exactly inventory should be held is of paramount importance to the unit, given a set of operating conditions. To help make this decision, three parameters need to be examined. These parameters include relationship of market constraints vis-a-vis internal technological constraints, location of the bottleneck machine/section, and the commonality of raw materials/components to the finished products. Let us take these one by one:

(a) Market constraints and internal technological constraints

Four different situations are possible under this head depending on variations in any one or more of the 3 factors defined below:

(i) Lead time for procurement of Raw Materials (LT_p)

This is the time lapse between the moment a need for a particular item is identified and the moment it is available in the stores in an useable form.*

(ii) Lead time for Manufacture (LT_M)

This is the time lapse between the moment the need for manufacturing of a particular item is felt and the moment it is ready for despatch.

* See: J. Buchan & E. Koenisberg, Scientific Inventory Management, Prentice Hall, New Delhi 1966, P.335

(iii) Lead time for Delivery (LT_D)

This is the time lapse between the moment an order is placed and the moment the finished acceptable product is available to the buyer.

The inter-relationship of the above 3 factors determines theoretically the location of inventories as illustrated in the following 4 categories:

CATEGORY (i)

If $LT_P + LT_M < LT_D$, no inventory need be held.

For example, if $LT_P = 1$ week, $LT_M = 1$ week and $LT_D = 1$ month. It is apparent that there is ample time for procurement of materials, manufacture and delivery, within the stipulated period of 1 month, obviating the need for inventories. Made-to-order goods, manufacture of a majority of capital equipments, etc., fall under this category.

CATEGORY (ii)

IF $LT_D \gg LT_M$ but $< LT_P + LT_M$, inventories have to be held, at least at the RM stage. For example if $LT_P = 1$ month, $LT_M = 1$ week, and $LT_D = 2$ weeks. (as in the case of a foundry in which procurement of pig iron may take a longer time as compared to the processing time).

CATEGORY (iii)

If $LT_D \gg LT_{M2}$ but $< LT_{M1} + LT_{M2}$, as in the case of a multistage manufacturing unit (e.g., foundries and machine shop, components manufacture and assembly), inventories have to be held between stages 1 and 2 of the manufacturing process, i.e., as WIP.

Illustratively, if

$LT_P = 1$ month, $LT_{M1} = 1$ week, $LT_{M2} = 1$ week, and $LT_D = 1$ week, inventory is required as WIP soon after stage 1 of manufacturing.

CATEGORY (iv)

If $LT_D < LT_M$ for the last stage of processing, there is no alternative other than holding inventories as FG; e.g., soap, toothpaste, cigarettes, etc., in which delivery times are too short and the sale has necessarily to be from FG stocks.

As is evident from the above examples, to a large extent, it is the market that determines the stage at which inventories have to be held. The nearer the product is to the consuming market, the higher is the value added to it in the form of RM, expenses, overheads, etc. Therefore, the first cardinal rule in determining the positioning of inventories is "Materials should be held only as far away from the buyer as the buyer would permit".

(b) Location of bottleneck machine/section

The second rule is: "Inventories should be held immediately next to the bottleneck machine/section" as this facilitates the use of economic batch quantities for production and improves the aggregate machine utilisation.

(c) Commonality of raw materials/sub-assemblies

The rule is: "Common items should be kept as far towards the finalising stage as necessary to facilitate faster processing, so long as the approach does not come in conflict with the economics of the earlier two rules". This is true for industries like foundries, engineering shops and manufacturers of radios, TVs and automobiles, where certain common items go into all or many of the types of finished products.

COMPONENTS OF THE COST OF INVENTORY

Inventory costs money. The 3 major costs, generally, are:

- (a) Inventory carrying cost,
- (b) Ordering cost, and
- (c) Stock-out cost.

(a) COST OF CARRYING INVENTORY:

Generally the cost of carrying inventory can be classified under 5 heads.

The following table gives the probable range of cost under the five heads:

No.	Factors contributing	Cost/annum as %age of total value of inventory
1	Interest on capital locked up	12-15
2	Obsolescence and deterioration	2.5-10
3	Handling expenses	2-4
4	Storage space	1-3
5	Insurance	0.5-3
	Total	18-35

It will be seen from the table that the average cost of carrying inventory is about 25%.* The above percentages should be estimated for different categories of items as per the experience/type of the industrial unit.

Yet another important cost that is incurred in holding inventory is the 'opportunity cost' of the money

* Experts on inventory management write that the annual cost of carrying inventory averages approximately 25% of the value of inventory, See L.Alford and J.Bangs, production Handbook, The Ronald Press, New York, P.267. See also D.Somerly, You cannot afford Dead Money Inventories, Purchasing, Sept.15, 1971, P.73-74.

tied up. This is the return that could have been realised had the same amount of money been invested in some other profitable venture.

(b) COST OF ORDERING:

This can be generally classified under the heads:

- (i) Purchasing;
- (ii) Inspection and Storage; and
- (iii) Accounting-Checking supplies.

In general, the cost of ordering is the marginal or additional cost incurred in placing an order for an item and usually ranges between Re.1 and Rs.5 in the case of a small scale unit.

(c) COST OF STOCK-OUTS:

Two situations are possible here: (i) In the case of finished goods, it may lead to a cancellation of the order and the loss of customer goodwill; (ii) In the case of raw materials it could be the cost of disruption in machine schedules. Quantification is seldom attempted; for, a part of the stock-out costs is intangible in nature and the probability of occurrence is low at about 5%.

(d) OTHER COSTS:

There are overstock costs and systemic costs. Overstock costs can best be explained by an example. Demand for X'mas trees is obviously seasonal, and whatever

is left behind after X'mas can only be sold as firewood. The seller stocks more than can be sold, and the loss on trees left unsold is the "overstock cost". Other examples are fashionable clothing, newspapers, kites and perishable stuffs. Systemic costs cover the cost of inspection of various inventory systems and find very little application in SSI.

OBJECTIVES OF INVENTORY CONTROL

- 1) To minimise the cost of holding inventory.
- 2) To minimise the cost of ordering.
- 3) To minimise stockouts.

There are some amounts of conflicts among these objectives.

TYPES OF INVENTORY CONTROL SYSTEMS

There are basically 3 different types of inventory control systems depending on the basis for releasing orders. These are:

- 1) Stock controlled systems - where release of orders is based on stock level falling to a predetermined re_order level.
- 2) Programme controlled systems - where release of orders is based on advance sales programme converted to a production programme.
- 3) Made to order systems - where release of orders is based on receipt of customers' order.

Stock controlled systems operate under the most uncertain conditions of demand and supply necessitating in-depth analysis of inventory movement and stocking, whereas the latter two - programme controlled systems and made to order systems - operate under relatively deterministic conditions. Inventory control in the latter cases becomes rather simple and is tied up with the production planning and control function which assumes greater significance. As such the emphasis (as far as inventory control is concerned) here is on stock controlled systems.

STRUCTURE OF THE INVENTORY PROBLEM:

In inventory control it becomes necessary to determine two factors that will define the system completely:

1. How much to order at one time.
2. How often to order - or, when to order.

In short, the inventory problem is like Janus, the two-faced Roman God and often presents a Hobson's choice.

1. HOW MUCH TO ORDER?

This optimum size is known as the Economic Order Quantity (EOQ).

THE ECONOMIC ORDER QUANTITY (EOQ)

The question of how much to order directly is concerned with the problem of minimising inventory holding costs and ordering costs. The most common and perhaps widely quoted solution to the problem is given by the Wilson model* which aims at minimising the total annual variable cost associated with any order quantity. This total annual variable cost is the sum of the annual carrying cost and annual ordering cost. Stock out costs do not figure in the formula as they depend more on the timing of an order than on the quantity ordered. In other words, EOQ is that size order which minimizes the total cost of ordering plus inventory carrying.

The EOQ approach has particular relevance and usefulness in instances of high usage, low value items.

The EOQ equation can also be derived on the basis of the principle that, at the economic order level, the ordering cost will equal inventory carrying costs.

* R.H. Wilson, Harvard Business Review, 13, 1929, 116-28. See also F. Clark, Harvard Business Review, 6, 394-400; H.McGill, Industrial Management, 73, 6, 344-47; R. Davis, Manufacturing Industries, 9, 353-56; G.Mellen, Management and Administration, 10, 155; H. Owen, Industrial Management, 70, 71; G. Pennington, Manufacturing Industries-13, 199-203; R. Wilcox and W. Mueller, Harvard Business Review, 5, 197-205 (1926-7).

How rigid is this dictum of economic ordering quantity? It provides considerable flexibility to adjust the order size to the changing needs of the situation. THE ASSUMPTIONS FOR THE EOQ FORMULA OR WILSON'S OR HARRIS SQUARE ROOT FORMULA are:

- a) Usage rate of items is linear and is known with certainty.
- b) Order placed is received instantaneously, i.e., lead time is nil.
- c) No stock-out can occur as is implied by the first two assumptions.

The EOQ formula in units is:

$$\text{EOQ} = Q = \sqrt{\frac{2AD}{ac}}$$

where

Q	=	Ordering quantity in units
A	=	Cost per single order
D	=	Average annual demand in units
a	=	Cost of holding in stock one unit per year
c	=	Unit price of the item.

Let us take a numerical example:

Annual demand	=	10,000 units
Unit cost	=	Rs.0.50/unit
Inventory holding cost	=	20%
Ordering cost	=	Rs.5 per order.

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2 \times 10,000 \times 5}{0.2 \times 0.5}} \\ &= 1000 \text{ units.} \end{aligned}$$

Transport costs and quantity discounts affect the EOQ in much the same manner.* Total costs change due to a change in holding costs because of the reduction in unit price and hence the value of average inventory. In practice, 25% above or below EOQ will not make much of a difference to the total cost.

The technique for handling EOQ in aggregate is known as Aggregate Inventory Control Technique (AICT)[Ⓢ] or the Lot-Size Inventory Management Interpolation Technique (LIMIT)[Ⓔ].

LIMITATIONS IN THE APPLICATION OF EOQ:

The EOQ formula cannot be used in the case of

- 1) Allotment (Quota) items.
- 2) Imported items where lead times are high.
- 3) Scarce and Seasonal items.

* Arthur Snyder, Principles of Inventory Management, Financial Executive, April 1964.

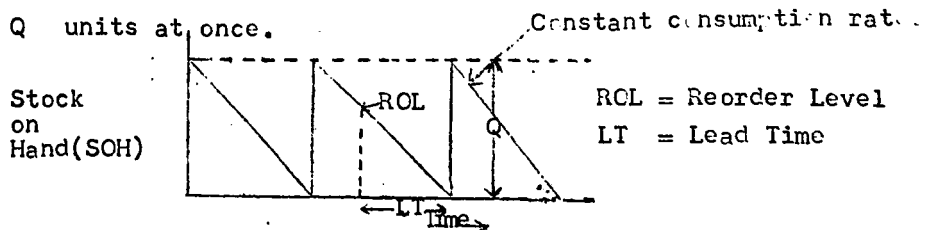
Ⓢ See: R. Brown, Aggregate Inventory Management, APICS annual conference proceedings, 1962, P.111-119.

Ⓔ See: J. Harty and O. Wight, Management of Lot-Size Inventories, American Production & Inventory Control Society, Chicago, 1963.

2. HOW OFTEN TO ORDER, OR WHEN TO ORDER?

It is to be cautioned here that there can be no straight answer to this question and the evolution of a system of when to order depends purely on the conditions under which the system is required. Various factors such as product demand, material consumption rate, production planning and lead time for procurement, play an important part in deciding the final configuration of the ordering system. However, there are some guidelines and models that can be tailored to meet any requirement. We shall discuss a few relevant models that form the base for more sophisticated models.

The ideal model that is often used as an aid to understanding the concept of when to order is, the saw tooth graph shown below. The Y axis refers to the stock on hand and the X axis to time. Let us assume that at the beginning of the period we have Q units on hand. Suppose we were to get material as soon as we placed an order. The problem becomes very simple. We would then have to order Q units (determined by EOQ) every time the SOH falls to zero and we would get Q units at once.



However, it is seldom in practice that we encounter such a situation. Usually the supplier with whom we place the order may not supply the goods instantaneously. There is always a time lag. Therefore, it becomes necessary to anticipate this delay in supply and order sufficiently in advance so that we do not run out of stock. If the lead time is known with certainty, (say, X days), we would order X days in advance so that the arrival of Q units coincides with stock falling to zero. In the figure, ROL is the point at which we place the order. When SOH reaches ROL, we place an order for Q units.

Thus, $ROL = L \text{ (lead time)} \times D \text{ (demand)}$.

Both the parameters of consumption rate during lead time and lead time itself vary with the result that there may be a stock out before the arrival of Q units. One method of controlling such stock out is providing a "buffer" or "safety" * stock to meet such a contingency. The exact quantity of safety stock of an item depends upon its lead time and usage variations. One practical guide for fixation of safety stock can be had by

* Safety stock is that which minimizes the expected cost, while variation is within prescribed limits.

See N.T. Khoury, The Optimal Level of Safety Stocks in Management of Working Capital, West Publishing Co., 1974.

working out a reasonable maximum of the fluctuation in consumption over normal lead time consumption and allowing the safety margin equal to the extra consumption. For instance, if the normal lead time consumption is 100 Kg., and if the maximum lead time consumption is 150 Kg., the safety stock should be 50 Kg. The second method of provision of safety stock is based on the following formula:

$$\text{Safety Stock} = K \sigma$$

Where K = A constant (depending on the service level we desire), and
 σ = Standard deviation of the demand during lead time periods.

IMPACT OF VARIATION IN CONSUMPTION RATES AND LEAD TIMES AND CALCULATION OF SAFETY STOCKS:

There are 3 possible situations in which a stock-out can occur:

- a) When lead time is fairly constant but consumption rate varies.
- b) When consumption rate is fairly constant but lead time varies.
- c) When both lead time and consumption rate vary.

It is possible to estimate the amount of safety stock (SS) required in each of these conditions, but as a majority of industries face the situation (c), ie., where both lead time and consumption rate vary, we shall consider the formula prescribed for such situations only:

$$\text{Safety Stock} = \text{Maximum Consumption Rate} \times \text{Reasonable Maximum Lead Time} - \text{Average Consumption Rate} \times \text{Normal Lead time.}$$

It has to be admitted that the formula is crude as it results in abnormally high (100%) protection against a stock-out. It cannot, therefore, have much practical use.

The formula which is an empirical one used in the absence of meaningful data and which has proved useful and successful in a host of SSI units (which form the enquiry of this Thesis) is

$$\text{Safety Stock} = \text{Maximum consumption Rate} \times \text{Crash Lead Time.}$$

where, Crash Lead Time is the bare minimum time necessary for procurement of the material.

The safety stock, order quantity, re-order level, maximum and minimum stock levels, constitute the inventory parameters.

$$\begin{aligned} \text{Minimum Stock} &= \text{Safety Stock} \\ \text{Maximum Stock} &= \text{Safety Stock} + \text{Order Quantity} \\ \text{Order Quantity(OQ)} &= \text{EOQ or Minimum Orderable Quantity} \\ \text{Re-order Level(ROL)} &= \text{Safety Stock} + \text{Lead Time Consumption Quantity} \\ \text{Average Stock} &= \frac{\text{Min} + \text{Max}}{2} \\ &= \text{SS} + \frac{\text{OQ}}{2} \end{aligned}$$

The other formulae are:

- i) Minimum Stock = Reordering Level - (Normal Rate of Consumption X Normal Delivery Period)
- ii) Maximum Stock = Reordering level - (Minimum Rate of Consumption X Minimum Delivery Period) + SOQ (Standard Ordering Quantity.
- iii) Reordering Level = Maximum Rate of Consumption X Maximum Delivery Period.

Operations Research Techniques can be applied for determination of EOQ of purchases of raw materials, components and spare parts by balancing the inventory carrying charges with the cost of acquisition and stock-out costs with the help of inventory control models. Examples of users being Indian Railways, ORG group.

WHERE EOQ MODEL FAILS

Under the EOQ model, the lead time consumption is much less than order quantity. If the lead time consumption equals or exceeds OQ, the stock will not reach ROL at all. Consequently, there will not be an opportunity to place any order, and this can result in a stock-out. The ordering rule therefore is "place order whenever the stock level cuts either ROL_1 or ROL_2 and the order quantity would be equal to lead time consumption".

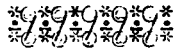
Here,

$RCL_1 = SS + \text{lead time consumption.}$

$RCL_2 = SS$

$OQ = \text{lead time consumption.}$

And, in conclusion, as Lord Keynes is supposed to have said, "it is better to be vaguely right than precisely wrong".



C H A P T E R 4

FRAGMENTS FROM THE INVENTORY MANAGEMENT KALEIDOSCOPE

-- CONCEPTS, PERCEPTS & PRECEPTS. --

FOUR CONVENIENT STATISTICAL DISTRIBUTIONS

1. A Frequency Distribution is an ordered arrangement of data from lowest to highest value, showing the relative occurrence of the various values. A single measure of the variation of individual values about the average value of a distribution is provided by the statistic known as the Standard Deviation.
2. In the Risson Distribution the frequency or probability of successively larger values increases rapidly up to some most frequent value and then decreases at a slower rate.
3. The Exponential Distribution is another distribution that gives a good approximation of some retail and wholesale level of sales.
4. The Normal Distribution is a distribution in which the values of the variables are distributed evenly about the average and our interest lies only on the right hand side of the distribution where we can anticipate the probability of the random variable exceeding a given value rather easily.

These distributions have use in arriving at Safety Stock (SS). The accuracy and validity of the SS calculated depends to a large measure on the correct identification of the distribution of consumption.

The exponential distribution, in my experience, appears to approximate closely a majority of consumption patterns in the industries of the Small Scale Sector (SSS) in India today.

SELECTIVE CONTROL OF INVENTORY - THE ABC ANALYSIS

The tremendous strain on time is evident if systems have to be developed in units using 300 to 400 raw materials. A typical example is the Pharmaceutical Industry in which even an average small scale unit uses at least 400 chemicals and packing materials. The best alternative is to make a distinction between those materials that require to be controlled and those that do not by means of some criteria. Such a segregation is usually done by what is called ABC Analysis.

The ABC Analysis is a refinement of Pareto's law.* It recognises that, in 80% of less significant items, some will be more important than others because of either increased

* M.A. Pitcher, Management Accounting for the Lending Banker, Institute of Bankers, London, P.80.
See also G. Zimmerman, The ABC of Pareto, Production and Inventory Management, September 1975, 1.

usage or higher cost and should probably be controlled more stringently. In a typical business the system might operate as shown in the following table.

Class	No. of Parts (%)	Usage/Value(%)	Type of control
A	15 ie, a little less than Pareto's 20%	60	Control closely, maintain good records Maintain Safety Stock Review frequently
B	25	25	Good control but not as close as in A. Review less frequently
C	60	15	Little control Few Reviews

This system needs to be used with discretion, giving more weight to high cost items than to those with a high usage. Control on A class items lead to a control over 60% value of material consumption. Richmond* designates this plan of concentration on important items as Control by Importance and Exception (CIE) and refers to the process of classifying and ranking of the stock

* H. Richmond, Effective Inventory Management, The Financial Executive, March 1969, P.74-78

items on the basis of their descending importance as Proportional Value Analysis (PVA). Chadda* provides some useful guidelines for selective control on the lines of my Table given.

Chadda found in his study that there was a tendency to overstock in most cases and the investment in stock could be reduced by 20 to 30% if inventory decisions were based on reason rather than intuition. In India many industrial units including public sector enterprises face this problem.®

The other criteria that can be used in ABC analysis, apart from the common criterion of rupee value of consumption, is segregation on the basis of

- * VED analysis (Vital, Essential, Desirable)
- * HML analysis (High, Medium or Low Storage or Security)
- * SDE analysis (Scarce, Difficult, Easily)
- * S-OS analysis (Seasonal, Off-seasonal)
- * FSN analysis (Fast moving, Slow moving, Non-moving)

* R.S. Chadda, Inventory Management in India, Allied Publications, Bombay, P.38

® P.S. Rao, Inventory Control in an inflationary economy, Lok Udhog, July 1974.

Whatever the method of segregation, it is essential to realise the usefulness of selectivity in the control of inventory.

VALUATION OF INVENTORIES

Valuation of stock provide the most common form of deception.* FIFO is the most popular method in the U.K., while in the U.S.A., it is LIFO.©

Three basic methods as follows, are adopted for the purpose of ascertaining the value of material in stock as at the end of accounting period. These are:

- a. At market price or realisable value. (As laid down in International/National Standards Exposure Draft 2)
- b. At market price or at cost, whichever is lower.
- c. At cost. (Most of the concerns follow this in actual practice irrespective of the remarks they put in the published accounts.)

Some of the important methods used for valuation of material stocks under "at cost" methods are:

- a. "First in, first out" method. (FIFO): The closing stock valuation here will be near the market price.

* L.S. Dyer, A Practical Approach to Bank Lending, Institute of Bankers, London. P.57

© J. Clemens & L. Dyer, Balance Sheets and the Lending Banker, Europa, London, P.73

But under inflationary conditions, profits, taxes and dividends will be higher; for, production cost will be understated while closing stock will be overstated.

- b. "Last in, first out" method (LIFO): Under inflationary conditions, this method is prudent and more conservative.
- c. "Average Price" method: Average price neutralises the fluctuations in market prices. A number of variations like Simple Average, Weighted Average, Periodic Simple Average, Periodic Weighted Average, Moving Simple Average and Moving Weighted Average, are used.
- d. "Standard Price" method: Simple, but no auditor can accept inventories at standard prices.

Valuation of Work-in-Progress is always based on actual cost. The actual cost is found by adding cost of direct material, direct labour and proportionate factory overheads.

Finished goods should be valued "at cost or selling price, whichever is lower". "At cost" would include direct material and labour, proportionate factory overheads, but would exclude administrative and selling and distribution overheads.

The Sachar Committee on Company and MRTP Acts has suggested that the cost auditor must certify in the Balance Sheet, the figures relating to inventories.

Inventories may be valued at output values or at input values. (the latter is generally the case). Input value may be defined as measurement of resources used to bring the inventory to its present condition and location.

The following table presents a Summary of different Valuation Bases

Base (For semifinished and finished stages valuations)	When applicable
OUTPUT VALUE	
1. Discounted Money Receipts	When Sale Price is known and timings of cash receipts are known
2. Current Selling Prices	When Sale Price is known and collection period is short
3. Net Realisable value	Same as in 2, when Costs of disposal are known
INPUT VALUES (For Raw Materials Valuations)	
1. Historical Cost	When selling prices are highly uncertain

- | | |
|------------------------------|------------------------------------------------------------------------------------------|
| 2. Current Replacement Costs | When current costs can be measured objectively. |
| 3. Standard Cost | When current production costs under efficient and normal conditions are to be reflected. |
| 4. Normal Stock Valuation | When an improvement over LIFO is aimed at. |
-

THE GHEERBRANT STOCK CONTROL CHECK LIST.

Philip Gheerbrant and Anthony Jolliffe* suggest the following stock control and work-in-progress Check Lists vis-a-vis canons of lending:

STOCK CONTROL:

1. Are careful records maintained showing age, number of lines and divisions into current, obsolescent and unsaleable stocks?
2. How often is the running balance per stock records checked with the physical stock?
3. Is there "independence" of maintenance of book records & physical stocks or does the storeman keep the stock ledgers?

* P. Gheerbrant and A. Jolliffe, Integrated Lending Techniques, Bankers Magazine, June 1978, London, P.27

4. Are Stock values properly reduced when shortages are found?
5. Is the basis of valuation constant and are actual cost figures being applied, or are the latest prices being applied to all stocks, whatever the date of purchase thus anticipating profits as yet unrealised?
6. Is dead, damaged and defective stock written down in value?
7. Are there appropriate stock control safeguards?

WORK-IN-PROGRESS:

1. How valued, and what controls are there?
2. Who prepares the figures? Is there any check?
3. What control is there over materials, wages and other appropriate expenses charged to work-in-progress?
4. Have all costings been verified to ensure that the contracts are profitable?
5. What is the position regarding retentions, penalties for late completion, etc?
6. Are Quality Controls effective?

INVENTORY MODELS:

Inventory Models are hybrids between Deterministic (assume certainty) and Probabilistic (assume uncertainty). These models are used as aids in controlling inventory costs. By tackling the issues of "how much and when to order or purchase", the Models can help reduce the cost of purchasing, inventory carrying and being out of stock.

The models are different conditions:-

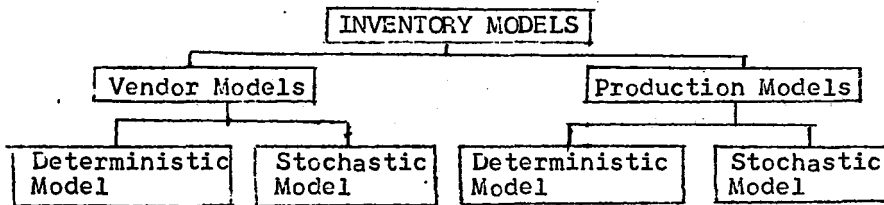
- a. Certain demand with re-ordering.
- b. Uncertain demand and no re-ordering, and
- c. Uncertain demand with ordering.

In practice, all prediction is simply extrapolation, modified by known plans.

A mathematical description of the inventory system to be studied is referred to as an Inventory Model. Few accounting systems, in practice are capable of yielding the type of cost data required for inventory models. It is because accounting systems are, in practice, geared towards the determination of periodic profits and do not employ concepts of costs such as variable costs and opportunity costs required for determining costs relevant for inventory decisions. This implies that supplementary analysis is required

to develop an estimate of these costs outside of the regular accounting system.

The various inventory models may be broadly classified into the following categories:



Vendor Models are those in which the inventorised items are purchased from suppliers outside the company, eg., the EOQ Model.

Production Models, on the other hand, deal with situations in which the user of the item produces the replenishment supply.

In cases where the demand is contractual or otherwise stable, the deterministic demand may be reasonable. In other cases, however, demand must be treated as a random variable.

Let us take a simple model by way of illustration for clarity. Consider the small grocer who replenishes his stocks from a local organisation. The object of the model is to minimize the total cost of acquiring and holding stock and to decide the most Economic Quantity that

should be ordered and the optimum number of orders placed.

Let D = Annual demand for the item;

Q = Size of the batch Quantity,

P = Cost Price per item,

H = Holding Cost which may be expressed as a fraction of the average stock value, and

C = Ordering Cost.

From the quantities, we can easily derive the following important relationships:

$$\text{Number of orders per annum} = \frac{\text{Annual Demand}}{\text{Batch Quantity}} = \frac{D}{Q}$$

$$\begin{aligned} \text{Ordering costs per annum} &= \text{Cost of One Order} \\ &\quad \times \text{Number of orders} \\ &\quad \text{per annum.} \\ &= \frac{C \times D}{Q} \end{aligned}$$

$$\text{Average stock on hand* at any one time} = \text{Half the batch quantity} = \frac{Q}{2}$$

$$\text{Average stock value at any time} = P \times \frac{Q}{2}$$

* If batch quantity Q is equal to 10 and one unit per day is consumed until Q falls to zero, then the average stock on hand must be = $(10+9+8+7+6+5+4+3+2+1+0)/11$ which equals 5, which in turn is equal to $Q/2$

Holding costs = Some percentage of average stock value.

$$= iP \times \frac{Q}{2}$$

Total cost = Ordering costs + Holding Costs

$$= \frac{CD}{Q} + \frac{iPQ}{2}$$

The problem now reduces itself to one of minimizing this total cost with respect to Q, which is achieved by taking the first derivative of TC with respect to Q and setting this equal to zero.

Therefore,

$$Q = \sqrt{\frac{2CD}{iP}} \quad \text{and}$$

$$\frac{D}{Q} = \sqrt{\frac{iPD}{2C}}$$

EXAMPLE:

A grocer has a monthly demand for a certain food of 4,000 packages. The cost of placing an order is Rs.5 while the monthly cost of maintaining a package in store is 25 paise. What should be his optimum order quantity and how often should an order be placed?

$$Q = \sqrt{\frac{2CD}{iP}} = \sqrt{\frac{2 \times 5 \times 4000}{0.25}} = 400$$

$$\frac{D}{Q} = \sqrt{\frac{iPD}{2C}} = \sqrt{\frac{0.25 \times 4000}{2 \times 5}} = 10$$

Therefore, there should be 10 orders per month for 400 packages each. It should be mentioned here that for many inventory environments, there are far too many items for individual attention. In such cases, computerised packages such as IMPACT of .. IBM/IDM can be used to monitor individual demand forecasts and stock status and thereby issue replenishment orders at the "right" times for the "right" quantities.

INVENTORY TRENDS IN INDIA - Some Findings and Observations:

1. The ratio of inventories to total assets has been steady around 32%.*
2. 12 out of 19 industries have raw materials as the major component of total inventories, 4 have finished goods and only 3 industries have "others" (spares and stores) as major items of inventory.@
3. The smallest companies (having each a paid up capital of Rs.5 to 10 lacs) have a lesser percentage of their total and current assets in inventory than larger companies.£

* RBI Financial Statistics of Joint Stock Companies in India, 1977.

@ RBI, Ibid.

£ RBI, Ibid

4. To the extent inventory management is mirrored in the ratio of inventories to sales, it will be seen that the performance of the very small companies is better than that of the bigger ones. Companies with a paid-up capital of less than Rs.10 lacs carry nearly one month sales less in inventories as compared with companies in the range of Rs.50 lacs to Rs.100 lacs.*
5. Inventories occupy nearly 1/3rd of total assets of private limited companies.£
6. Many organisations carry 3 years' requirements as stocks and are defensive about their conservative stocking policies.©
7. Less than 10% of organisations have developed their own systems of codification or catalogues of spares based on groupings such as engine spares, chassis spares, and transmission spares. 90% of organisations reported their finding it difficult to standardise spare parts since the original items of equipment were not standardised. Only about 10% of organisations had successfully brought the area of maintenance spare parts under budgetary control systems.

* RBI, Ibid.

£ RBI, Ibid.

© P. Gopalakrishnan and M. Sundareshan, Spare Parts Management, Jaico, Bombay

8. Only 10% of the organisations have written policy manuals for inventories of various categories.*
9. Tender Committee System, for purchases, operates largely only in public sector organisations.®
10. Only 9% of Public Sector and 27% of Private Sector organisations use the EOQ for purchases.£
11. In the engineering industry, the administrative lead time is 16 days for direct purchases and 62 days for purchases through canalising agencies.
12. Purchase order costs per order vary from Rs.10 per order to Rs.683 per order.
13. ABC Analysis is the most widely used technique being adopted by almost 80% of organisations.
14. The incidence of obsolete stocks is a nominal 2.5% of total inventories, by value.
15. 25% of organisations have confirmed that they have no difficulty in implementing the Tandon norms.
16. About 40% of the companies compute inventory carrying costs.

* Administrative Staff College of India Study, 1978.

© Prof. A. Iyengar of IFMR, Madras, in a clinical interview.

£ Prof. V. Ramamurthy of IFMR, Madras, in a clinical interview.

17. About 50% of organisations employ the manual system of information processing for inventory control. About 40% use computers and the rest have recourse to the United Reccord System.
18. Underutilisation of capacity is often responsible for additional raw materials inventory.
19. In heavy engineering units, work-in-progress constitutes the largest component of the inventory.*

THE FIVE ESSENTIAL STEPS FOR INVENTORY MANAGEMENT

"Inventory Management is" in the words of James Pichard, "the sum total of those activities necessary for the acquisition, storage, sale, disposal or use of materials".[©]

Effective Inventory Management calls for the following five essential steps.

1. A COMPREHENSIVE AND WELL CLASSIFIED LIST OF ITEMS IN INVENTORIES

A full list of items in stock, duly coded, classified and with indications of location, prices, etc., will save

* P. Gopalakrishnan, Inventory Problems in Public Sector Units, The Economic Times, September 24, 1975.

© J. Pichard and R. Eigel, Modern Inventory Management, John Wiley, New York, 1965, P.2

duplication of purchases and confusion. Materials codification can be said to be the foundation on which the whole edifice of inventory control is built up, particularly in large organisations.*

2. ABC ANALYSIS OF INVENTORY ITEMS

This analysis is a selective approach aimed at keeping the investments low and at the same time avoiding stock-outs of critical items. The lesser the number of items and their varieties, the greater is the effectiveness of planning and control. Among the variety reduction techniques employed, are:

- * Ordering and classification.
- * ABC Analysis.
- * Design unification.
- * Preferred numbers

3. SETTING STOCK LEVELS FOR THE DIFFERENT ITEMS:

While uncertainties of supply, government policies and procedures, transport delays, etc., render forecasting exercises difficult, they cannot be dubbed wholly responsible for the inept forecasting of materials requirements in

* A. Thomas, Stock Control in Manufacturing Industries, Gover Press, London, 1970. See also P. Gokarn and M. Pylee, Essentials of Materials Management, Somaiya Publications, Bombay, P.45-46.

many organisations. With better internal organisation, with the introduction of the concept of integration of materials management and with the provision of adequate base by way of codification and standardisation, forecasting abilities can be considerably improved, and the implications of external interferences on lead time, prices, etc., can be assessed through appropriate sensitivity analysis. In quite a few instances, there will be scope for application of sophisticated techniques such as Exponential Smoothing and Regression Analysis.*

Some organisations employ the Materials Requirement Planning System (MRP). MRP is a total system to project the requirements for various components and parts, from the master schedule, by a level by level explosion of the bill of materials. Gross requirements thus arrived at are netted against available inventory and orders on hand, for each component, at that level.

The Minimum-Maximum System is also widely used in high usage and major value categories.

* These techniques have been lucidly explained in:
Robert G. Brown, Statistical Forecasting for Inventory Control, McGraw Hill.

4. SYSTEM OF "CONTINUOUS STOCK TAKING" OR PERPETUAL INVENTORY:

This system can cover almost all items. The stock verification is undertaken throughout the year, taking care to see that each item gets checked at least once a year. This system provides a cross check for the information furnished by bin cards and enables correction of recording errors, rendering them reliable as a basis for inventory decisions. It also compels prompt updating of stock records.

5. EVALUATION THROUGH SELECTED INVENTORY RATIOS:

There are two basic methods of using financial ratios: (a) Cross Sectional Approach. (b) Time Series Approach. The Cross Sectional Approach involves the comparison of the firm's financial ratios with those of other firms at the same point of time or that of the firm's ratio to the industry average. The Time Series Approach involves the measurement of the firm's performance over a period of time. The conventional tool of ratio analysis through Value Management is widely used and well known. It is also used to predict any approaching sickness. A measure of how good a ratio is, can be derived by computing its Percentage Classification Error.

I wish to draw attention here to a new technique of application of accounting ratios, developed through

statistical exercise, for predicting sickness. Taffler and Tisshaw* in the U.K. have developed a Z-model incorporating a number of financial ratios taken together in a multi-variate approach using a statistical technique known as "Linear Discriminant Analysis". In the U.S.A., a variation of the formula has been evolved by Prof. E. Altman[©] and the tool is known as "Multiple Discriminant Analysis". MDA is a statistical tool by means of which the criterion for acceptance or rejection of prospective units can be developed.

The Altman criterion or Z-model runs as follows:

$$Z = 0.012 X_1 + 0.014 X_2 + 0.033 X_3 + 0.06 X_4 + 0.010 X_5$$

Where

$$X_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$$

$$X_2 = \frac{\text{Retained earnings as per balance sheet}}{\text{Total Assets}}$$

$$X_3 = \frac{\text{Earnings before interest and taxes}}{\text{Total Assets}}$$

* John Argenti, Corporate Collapse, McGraw Hill, P.55

© E. Altman, Corporate Bankruptcy in America, Heath Lexington Books, 1971. Other empirical works in financial ratio analysis for predictive and fore-warning purposes include Miller's cause-and-effect analysis, Beaver's approach and Wilcox's Gambler's Ruin approach.

$$X_4 = \frac{\text{Total Market value of equity}}{\text{Book value of total debt}}$$

$$X_5 = \frac{\text{Sales}}{\text{Total Assets.}}$$

Units with a Z value in the region between 1.8 and 3 are classified as sick and can be revived if a suitable nursing programme is drawn up and implemented. Units with a Z score of less than 1.8 are chronically sick and beyond redemption as revealed by experience.*

The British model of Taffler and Tisshaw, also called the Z model, is as follows:-

$$Z = Co + 0.53R_1 + 0.13R_2 + 0.18R_3 + 0.16R_4$$

Where

$$R_1 = \frac{\text{Profit before tax}}{\text{Current liabilities}}$$

$$R_2 = \frac{\text{Current assets}}{\text{Total liabilities}}$$

$$R_3 = \frac{\text{Current liabilities}}{\text{Total assets}}$$

$$R_4 = \frac{\text{Immediate assets - current liabilities}}{\text{Operating costs excluding depreciation}}$$

In this model, Co is a constant factor which is determined for a particular country based on the general economic climate and business environment, the rate of industrial growth, government policy and statutory provisions relating to industrial sector.

* Altman, however, failed to recognise that shifts occur in business conditions and fortunes of industries, which push up or down the absolute levels of financial ratios.

In India, the Industrial Credit and Investment Corporation of India (ICICI) had conducted sometime back, a study on the usefulness of financial ratios in predicting sickness of industrial units. The study revealed that the following ratios are most useful in predicting sickness:

1. Ratio of OCF to (Total assets + accumulated depreciation)
2. Ratio of EBDIT to (Interest + 0.25 debt, being a measure of debt servicing capacity).

where

OCF = Profit after interest and taxation with depreciation added back;

EBDIT = Earnings before depreciation, interest and taxation.

A unit is classified as potentially sick if any one of the ratios is adverse. The study also revealed that balance sheet ratios are less reliable for measuring an enterprise's survival strength. Earnings ratios are best suited for the purpose. According to the study, a healthy unit must have satisfactory:-

3. Gross Profit (profit before depreciation, interest and taxation) on sales and total assets.
4. Cash profit (profit after interest and taxation with depreciation added back) on sales and total assets.

The following ratios are regarded as indices of inventory efficiency:

$$\Delta. \text{ Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average Total Inventories at Cost}}$$

$$\text{Inventory turnover} = \frac{\text{Net Sales}}{\text{Average Total Inventories at Cost}}$$

All categories of inventories are aggregated. The higher this ratio, the more efficiently the inventory is said to be managed. As it is to be accepted that a prudent business is one where maximum sales are obtained with minimum of inventory.*

The rates can also be computed individually for the major inventory categories: eg.,

$$\begin{aligned} \text{Raw Material : Inventory Turnover} \\ = \frac{\text{Cost of Raw Materials Consumed}}{\text{Average raw materials inventory at cost}} \end{aligned}$$

The ITR acts as an indicator of the liquidity of the inventory.®

(The ICICI study revealed, inter-alia, that sickness is more strongly associated with excessive short-term borrowing than with long-term borrowing.

* N. Yasaswy, Working Capital Management and Efficiency criteria, Economic Times, February 3, 1978, P.5.

® J. Van Horne, Fundamentals of Financial Management, Prentice Hall, P.37, See also M.C. Bhandari, Budgeting and Materials Management, Commerce, Bombay, Vol.116, 2981, June 1968.

According to Professors B. Graham and E. McGolcrick, the chief criterion of inventory soundness is the turnover defined as the annual sales divided by the year end inventory.*

B. INVENTORY TO VALUE OF PRODUCTION RATIO

This shows the relationship between production levels and inventory requirements. A lower ratio will imply more efficient production.

C. INVENTORY TO NET WORKING CAPITAL RATIO:

This relationship will show the long term sources of inventory and should be 1:1 ideally.

SIMULATION OF INVENTORY BEHAVIOUR

Simulation is a very useful tool in recreating inventory behaviour in situations of uncertainty in demand and in lead times. Whenever inventory behaviour does not fall into any identifiable pattern, the best alternative available to us is a simulation of future behaviour on the basis of past performance. The most commonly used technique of simulation is the Monte Carlo simulation.

* C. McGolcrick and B. Graham, Interpretation of Financial Statements, Harper and Row, London, 1964.

The Monte Carlo* technique is essentially one that generates projections on the basis of historical data with the use of random numbers.

SPARES STOCKING CONTROL

At the individual unit level, expenses on spare parts constitute 50 to 80% of the total maintenance cost and organisations invest up to 10% of the capital cost in spare parts at the time of procuring the plant and machinery. Spares constitute 10 to 15% of the total inventory and 2 to 5% of the total cost of production and as much as 40% of the working capital.

The Import Trade Control defines spares as "a part for substitution, ie., ready to replace an identical or similar part, if it becomes faulty or worn out and includes an accessory or attachment in the same regard". For practical working, we can categorise those items as spares which because of wear and tear, usage or breakage, need replacement. In other words, they are identical to the parts of machine but the life of the part is less than the operating life of the equipment.

The ABC-VED approach or cost criticality analysis is usually the first step before introducing inventory control on spares.

* J. Jackson, Naval Research Logistics Quarterly, 7 (1960), P.235

The computer is used to keep an up-to-date record of the spare parts carried in inventory. Advance warning is available well before the supply of any part is exhausted thereby allowing the purchaser to obtain replenishments at optimum prices.

The Committee on Inventory Control of the Bureau of Public Enterprises had suggested that the holding of the stores and spares should not exceed 12 months' consumption in any public enterprise*

According to the Nakra Committee[©], if the spares inventory is to be reduced, the spares will have to be classified according to the nature of consumption, for example, fast moving; slow moving; risk insurance spares.

VALUE ANALYSIS AND SOME OTHER CONTEMPORARY TECHNIQUES TO CUT COSTS

It would be appropriate to round up the theoretical viewpoint of this Thesis by mentioning Value Analysis, started by Lawrence Miles in the General Electric Company, U.S.A., in 1947, which attacks directly the prime cost, which is at the core of the cost build-up. Value Analysis is the study of the cost of an item based

* Compendium of BPE circulars, Bureau of Public Enterprises, New Delhi, 1969, P.108.

© Nakra Committee Report (Report of the Spare Parts Committee) H.S.L. Ranchi, June 1968, P.6-19.

on quality, design and method of manufacture with a view to reducing its ultimate cost. The three basic principles through which Value Analysis is applied are:

- (1) MISS (modify, improve, subdivide and substitute);
- (2) EKCHANGE (exchanging, keeping or changing the item); and
- (3) DARSIRI (data analysis, recording ideas, speculating, improving, refining and implementing).

Cost reduction has become imperative for industry in the wake of monetary conditions. Value Analysis therefore, is being increasingly recognised today in Indian industry and helps them in replacing the costlier items of inventory by the less costly ones.

A CAUTION

All said and done, the statement of A.N. Whitehead, Mathematician and Philosopher, must still be borne in mind:

"There is no more common error than to assume that, because prolonged and accurate mathematical calculations have been made, the application of the result to some fact of nature is absolutely certain".

The purpose of the application of Value Analysis by the Matrix System is to determine the effectiveness by means of numerical rating. The basic principle is

instead of making one decision over a large number of possible choices, we make a number of decisions each over any two choices and evaluate by conventional methods of grouping and combining. The two basic distinct steps for applying this technique of "forced decisions" are:-

- a. Determining "weightage" which indicate the relative importance of all the factors identified as essential for a material or service and this is effected by comparing these factors in pairs;
- b. Applying "weightage" to indicate the acceptability of all the materials being compared in respect of any one of the factors. This is also completed by comparison in pairs.

The Queing Theory reduces the waiting time to a minimum after considering the service cost and waiting cost. In India, application of the Queing Theory to "rotable spares or floats" is being practised in Indian Railways, airlines, shipping, road transport, etc. The Queing System can be studied using the theory of Markov Chains (a sequence of events form a Markov Chain if the probability of each event can be expressed in terms of the previous event irrespective of any information about earlier events).

Reliability Engineering (a concept concerned with prediction, control, measurement and continuous reduction of equipment failure rates) is widely used in electronic equipment & aeronautical component manufacture to reduce costs.

Linear Programming (a mathematical technique for finding the best use of a firm's limited resources) is widely used for allocating products of factories to warehouses, transportation logistics problems, etc., for profit maximisation.

Statistical Quality Control (by reducing the incidence of scrap, rework and rejection and better buyer—seller relationship) and Obsolescence Control and Scientific Materials Handling (moving the right quantity of materials at the right time in a given space) go to reduce costs.

Group Technology (GT) concept can help bring down the quantum of bank credit by reducing inventories of both work-in-progress and finished goods and delivery time in engineering industries, manufacturing pumps, valves, machine tools, motors, gauges, copying equipments for offices, brake linings, compressors, etc. While assessing the working capital needs in an engineering industry, the provision for finished goods and stock-in-progress is generally around three months production value. This can be halved by adopting GT, thereby reducing

working capital needs and improving profitability.

For introduction of GT, the sequence of steps are:-

- a. Determination of family of components from the engineering design and drawing office angles based on say, Universal component classification, eg., OPIPZ system, VUOSO system.
- b. Production analysis.
- c. Final synthesis.
- d. Design and installation/rearrangement of production system on the basis of GT cells.
- e. Management control system - production planning, machine loading, production control.

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CHAPTER 5

THE DAHEJIA, TANDON & CHORE COMMITTEES AND WORKING CAPITAL FINANCE

The fundamental principle of working capital finance is to seek avenues whereby funds can be sought for the lead-time involved in the production. All the Committees from Dahcjia (1968) to Chore (1979) have indicated drawbacks in the cash credit system (CCS) of lending to finance working capital requirements of business units. However, CCS continues to be the most popular and convenient method of such financing (over one half of the total credit extended by banks are by way of cash credit and overdrafts). The main objection against CCS is the gap between credit limits sanctioned and the extent of their utilisation. This makes it difficult for banks to manage their funds rationally and impose credit discipline on borrowers.

Prior authorisation of Reserve Bank is required for grant of fresh working capital limits of Rs.3 crores or more to any single borrower in the public or private sector or enhancement of limits that would take the total working capital limits enjoyed by such a borrower from the entire banking system to the above level; the cut-off point is Rs.5 crores in the case of a major export oriented manufacturing unit whose annual average export turnover during the preceding three

calendar years is more than 25% of its total turnover. The working capital limits include secured or unsecured advances, as well as bills purchased and discounted. In December 1982, the Reserve Bank appointed a committee under S.S. Marathe, former Secretary to the Government of India, to review the operational aspects of this scheme.

THE DAHEJIA COMMITTEE

The problem of financing working capital needs by commercial banks was first looked into by the Dahejia Committee in 1968.* The Committee which examined "the extent to which credit needs of industry and trade are likely to be inflated and how such trends could be checked" attempted a refined exposition of the true nature of short term/working capital finance granted by the commercial banks in the form of cash credits. After analysing balance sheets of 250 firms over a period from 1961 to 1967, the Committee had come to an important conclusion that there was a deterioration in their current ratio and the increase in short term liabilities was utilised for financing the gap between long term assets and long term liabilities. The Committee had also

* Dahejia Committee Report, the National Credit Council Study Group No.2, set up in 1968.

found that one-fifth of the gross fixed assets formation of these companies was financed by expansion in short term liabilities including the bank loans.

In order to check the diversion of short term sources for long term uses, the Committee recommended the segregation of the total cash credit agreement with banks into (i) a "Hard Core" component which would represent the minimum level of raw materials, finished goods and stores, which the industry was required to hold for maintaining a given level of production, and (ii) the strictly short term component which would be a fluctuating part of the account. The Committee also desired that this "Hard Core" portion of the working capital needs might be financed through long term sources like equity, preference capital and debentures. Unfortunately, the recommendations were not implemented effectively and the firms continued to depend heavily on bank borrowings.

THE TANDON COMMITTEE *

It was in this setting that the Reserve Bank of India constituted, in July 1974, a study group under the

* "Report of the Study Group to Frame Guidelines for Follow-up of Bank Credit", Reserve Bank of India, Bombay, 1975.

Chairmanship of Shri Prakash Tandon, the then Chairman of the Punjab National Bank, to frame guidelines for the follow-up of bank credit (it is now widely known as the Tandon Committee). The report of the Committee has remained a landmark in the history of financing of working capital by commercial banks in India. Accepting the recommendations, the Reserve Bank of India instructed the commercial banks, in 1976, to put all the borrowers having aggregate credit limits from the banking system in excess of Rs.10 lacs under the first method of lending, which requires the borrowers to contribute 25% of the working capital gap - i.e., the difference between the reasonable level of current assets and non-bank current liabilities - resulting in a current ratio of 1.17:1.

Three alternatives, which can also be considered as three sequential stages, have been proposed to ensure the largest multiplier effect of bank finance for deciding on the maximum permissible level of bank credit for any borrower.

METHOD 1

Determine the working capital gap, i.e., reasonable level of total current assets minus non-bank current liabilities and reckon 75% of the working capital gap as the permissible level of bank finance.

The balance to be found by the borrower from his own funds and/or from long term borrowings.

METHOD 2

The borrower to get his own resources and/or long term funds to finance 25% of total current assets. Whatever is then required to meet the working capital gap, to be provided by the banker.

METHOD 3

Determine the core current assets*. These to be financed out of own funds and/or long term borrowings. The reasonable level of total current assets less core current assets will represent "real current assets". 25% of "real current assets" will also have to be supported by borrower's own funds and/or long term borrowings. If the non-bank current liabilities are inadequate to cover the balance of 75% of real current assets, the required amount will be obtained by way of bank borrowings.

* Core assets are those assets which remain in the pipeline all the time. For example, if an iron rod is dipped in the zinc solution, a certain portion of the zinc solution should always be there inside the machinery and this can be classified as a core asset. Why then, did the Committee want this item to be financed by the borrower himself is not clear.

The final recommendations of the Tandon Committee converged on the following five main aspects of working capital financing.

1. NORMS FOR INVENTORY AND RECEIVABLES:

The Committee fixed a maximum level for inventories and receivables. These norms would apply to all industrial borrowers whose aggregate limits for credit from the banking system were in excess of Rs.10 lacs. The Committee did not fix norms for spares inventory, but only addressed a note of caution that banks should "Keep a watchful eye if spares exceed 5% of total inventories".

In a study made by P. Gopalakrishnan of the Administrative Staff College of India, it was found that this norm of 5% of total inventories for spare parts was woefully inadequate. Industries carried spare parts at 10 to 60% of inventory levels. The survey confirmed that industries carry an inventory of 2 years' consumption on an average for spare parts. The Committee made it clear that the norms could not be regarded as entitlements. The prescribed norms for inventories were expressed as: so many months' consumption of raw materials and stores; for stocks in process, so many months' cost of production; and, for finished goods and receivables,

so many months' cost of sales. These norms are mandatory in character.

2. APPROACH TO LENDING

The maximum permissible level of bank borrowings were worked out by the Committee in terms of three stages which have been dealt with.

3. THE STYLE OF CREDIT

Banks have been advised to bifurcate the entire necessary accommodation into two components: (a) Loan (hard core working capital needs) which the borrower expects to use throughout the year, and (b) a demand cash credit to meet the fluctuating requirements. Both these limits are to be reviewed annually.

4. INFORMATION SYSTEM

All borrowers whose total credit facilities from the banking system exceed Rs.10 lacs should submit (a) an Operating Statement, (b) a Funds Flow Statement, (c) a Peak Level Balance Sheet, and (d) a proforma Balance Sheet for the next year at the time of submitting the loan application - whether for renewal, enhancement or fresh limits.

The borrowers whose aggregate credit facilities from the banking system exceed Rs.1 crore, should submit

(a) a Quarterly Operating Statement, (b) a Quarterly Funds Flow Statement, and (c) Quarterly statements of current assets and current liabilities for the purpose of follow-up. The information required will be of two types - data on past performance and plan for future estimates along with peak level requirement of bank finance.

5. BILL FINANCE

Apart from loan and cash credit limit, a part of the total credit requirement within the overall eligibility could also be provided by way of bills limits to finance seller's receivables. It is desirable that, as far as possible, receivables should be financed by way of bills rather than cash credit against book debts. These bills could be demand based or usance based, depending on the marketing practice prevalent in the industry.

THE CHORE COMMITTEE *

The Reserve Bank of India appointed a Committee under the Chairmanship of Shri K.B. Chore, in March 1979,

* "Report of the Working Group to Review the system of Cash Credit," Reserve Bank of India, Bombay 1979

to review the working of cash credit system in recent years with particular reference to the gap between the sanctioned limits and the extent of their utilisation. The Chore Committee was an extension of the Tandon Committee.

The important recommendations of the Committee include:

- a. In assessing the maximum permissible bank finance, banks should hereafter adopt the second method of lending recommended by the Tandon Committee, according to which the borrower's contribution from owned funds and term finance to meet the working capital requirements should be equal to at least 25% of the total current assets. In cases where the borrower is not in a position to comply with this requirement immediately, the excess borrowings should be segregated and treated as a working capital term loan (WCTL) which could be made repayable in half-yearly instalments within a definite period which should not exceed five years in any case.
- b. The existing system of three types of lending, viz., cash credits, loans and bills should continue. But, wherever possible, the use of cash credit should be supplemented by the use of loans and bills.

- c. The resources of the banks should be more widely spread than at present. In other words, the bulk of the credit being made available now to large houses should be spread among others.
- d. Surplus funds generated during a firm's working should not be available for expansion but should be applied towards bringing down the existing borrowing requirements of working capital.
- e. In order to achieve better inventory control, financial discipline and planning, borrowers should submit quarterly projections of credit limits and depend more on bill finance so as to curb the use of credit. All borrowers with working capital limits of Rs.50 lacs and over have to submit quarterly statements. Failure to submit quarterly information in time will attract 10% per annum penal interest on total outstanding balance during the default period.

The acceptance by the Reserve Bank of India of the recommendations has made them a fait accompli. However, the report has come in for some valid criticism.*

* Reference: My clinical interview with S. Murali Prasad, Managing Director of Sam Consultancy Services Ltd, Madras

Thus, the shift recommended to the second method of lending, without assessing the impact of the operation of the first method fully is of far reaching consequence on industry which may not be capable of obtaining more funds. (For, it is not known as to how many borrowers are complying with the first method). Another consequence would be to shift the burden, partially, from banking channels to long term sources at a time when the term lending institutions are experiencing shortage of resources. Hence, the implementation of the recommendation of second method does not appear to be pragmatic.

DETERMINATION OF "NORMS" FOR THE "SIZE" OF INVENTORIES AND "ADEQUACY" OF BANK CREDIT - A GILBERTIAN SITUATION

In an assessment of the trend and magnitude of inventories in relation to sales or output, and of bank credit in relation to the requirement for financing working capital or inventories, the important question that arises is whether or not it is possible to determine (i) the size of inventories, and (ii) the volume of bank credit needed by the industry. In other words, how does one find out, in particular situations, (a) that the size of inventories is excessive in relation to sales and output, and (b) that the volume of bank credit is adequate for financing the working capital (mainly, the inventory) requirement. It could be said

that in the determination of the adequacy of bank credit for financing the working capital requirement - particularly, of inventories - it is imperative to know if the size of inventories is excessive, relative to needs. Both the exercises are, however, fraught with several difficulties which are explained below:

(1) SIZE OF INVENTORY HOLDING: DIFFICULTIES IN ASSESSING A "NORM".

Attempts have been made by some researchers* to work out - on a macro basis - an "optimal" or a "normal" size of inventories by determining the rise in inventory value in relation to the rise in value of sales, taking into account the impact of (i) the inventory-carrying cost,[⊙] and (ii) the order, procurement or buying cost.[£] These two costs operate inversely to

* T.M. Whitin, "Theory of Inventory Management" (Princeton); W.J. Baumol, "Economic Theory and Operations Analysis" (Prentice-Hall), J.F. Magee, "Production, Planning and Inventory Control" (N.Y. 1958)

⊙ This includes interest charges on capital, storage and insurance charges and depreciation on physical account and obsolescence.

£ This includes cost of processing a purchase order, cost of transportation and inspection and other administrative and overhead costs.

each other* and have to be balanced to bring about a saving in total inventory charges. Ultimately, the size of the inventory holding would vary with the changes (a) in the volume and value of sales, and (b) in the order cost and carrying cost. On this basis, it is indicated by some^② that the optimum level of inventories should be such that "inventory should increase only in proportion to the square root of sales". In other words, "if sales of some item double, inventory should not be doubled - it should be increased to much less than 200% of its original amount".

However, the question of determining the "normal" or "optimal" size of inventories is more important for an

* The annual order cost is equal to the number of deliveries multiplied by the cost per delivery, ie., the larger the quantity ordered at a time, the fewer the number of deliveries and, therefore, the lower the order cost. Total carrying cost is equal to annual cost per unit multiplied by the number of units in an average inventory. The smaller the quantity ordered at a time, smaller the average inventory and smaller the carrying cost (these two costs, therefore, operate inversely to each other).

* W.J. Baumol, Ibid

individual firm than for an industry as a whole, and much more than for a group of industries. There are practical difficulties, too, in attempting to fix an "optimal" size of inventories for a group of industries because of the heterogeneity of the constituents different in regard to seasonality, patterns of demand and changes in the latter. The analysis here is, therefore, confined to a study of the relationship between 'inventory-sales' and 'inventory-output' ratios.*

(2) ADEQUACY OF BANK CREDIT - DIFFICULTIES OF FIXING
A "NORM"

It is equally difficult to determine a "norm" for, what should be considered as, an adequate quantum of bank credit required for working capital purposes. Firstly, bank credit is not the only source of funds available to industry for financing working capital requirements. Secondly, bank credit could be used to meet the requirements of finance emanating from acquisition of other assets, or for meeting business losses. Thus, interest and dividends, if they are paid

* M.Abramovitz, "Inventories & Business Cycles with special reference to manufacturers' inventories", Studies in Business Cycles, National Bureau of Economic Research, U.S.A., 1950.

out of the unrealised profits, would drain the working capital resources, by taking out that much cash. A drain on working capital may also occur in consequence of operating losses.

Among the main sources* of working capital, one source is the funds provided through profits on current operations. For example, receipts from sales are used not only to replenish the working capital invested in inventories and to pay operating costs but also to generate new working capital. Other sources are bank credit and other short-term loans, trade credit, sale of marketable securities and shares, etc. There is, however, no fixed principle governing the use of short-term sources of funds to finance a part or whole of working capital. Sometimes, a distinction is made between what is called "quick assets"^② comprising such of the current assets as are "one step nearer to cash" (viz., cash and receivables), and the other current assets (viz., inventories), which are subject to changes in market value and which have to be sold before they become

* Ralph D. Kennedy, *Financial Statements*, Richard Irwin, Illinois, 1968, P.184-185
② Harry G. Guthmann, "Analysis of Financial Statements" (Prentice Hall) P.81

available for paying off debts. Actually, some persons believe that the bankers, while giving credit against inventories, usually prefer those of the borrowing concerns whose total amount of current debt (liabilities) excluding such credit will not exceed the quick assets. This precaution is induced by the risk of price fluctuations in respect of inventories. However, this is not a general rule; and, actually, in the case of some of the highly speculative commodities (such as oilseeds and cotton in a rising market), their inventories are more readily convertible into cash than are receivables.

Again, there are some experts on financial management, who believe that the minimum current assets requirements of firms should be financed through long-term rather than short-term sources of funds.*

Any asset requirement, which is needed over and above the minimum, for meeting temporary seasonal change in sales, output and requirements of stocks for manufacturing purposes - which could be called temporary current assets - could appropriately be financed through short-term sources of funds - chiefly, bank credit and

* Robert H. Wessel, "Principles of Financial Analysis - a study of Financial Management" (Macmillan Co) P:93-96

trade credit. On the basis of the illustration given by Prof. Wessel* in regard to the financing requirements of a firm during the year (which depicts the monthly outstanding levels of current assets), approximately 37% of the total current assets of a firm could be said to constitute the minimum current assets. This, along with some provision for a safety margin for emergencies and the like (together up to 44% of total current assets) should, according to him, be financed from out of the long term sources of funds. The financing of the temporary current assets may be done through the use of short term funds (current liabilities) will come, on this basis, to not more than 56% of total current assets. This would be the maximum or the peak level of current assets, for which the maximum amount of short-term funds might be required. It would be difficult, however, to say how much of these short term funds should be in the form of bank credit. The temporary current assets, by their seasonal nature, would also reach a trough in the lean period of the year and the use of short term funds (especially the bank credit) has to be reduced at that time.

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* Robert H. Wessel, Ibid, P.95

JEYA MURUGAN INDUSTRIES

BRIEF HISTORY OF THE UNIT

M/s Jeya Murugan Industries was started in the year 1965 as a partnership firm of near relatives to manufacture polyethylene tubes, sheets and bags as well as PVC products. The unit has been banking since 1968 and from small beginnings in bank facility as well as sales, have come a long way. The projected sales of the unit for the year 1982-83 is expected to be about Rs.36.4 lacs.

MANAGEMENT

The affairs of the unit, managerial and technical, are looked after by a Manager, Sri Vijayanathan, who was actually the promoter of the unit but is yet to become a partner. The partnership consists of

Mr T Padmanaban (Managing Partner)
Mr A Thirumurugan
Mr T Vivekanandam
Mr T Ramaswamy
Mr Thirumalai
Mr R T R Kumar
Mr R Udaya Kumar
Smt T Athma Bai
Smt Vijaya Sundareswaran
Smt T Saroja
Smt V Radha Bai .

Smt V Radha Bai is the wife of Sri Vijayanathan (Manager) and Smt Saroja is the wife of Sri Thimmichetty, Auditor to the firm, who is also the Manager's brother. Smt Vijaya Sundareswaran is the only partner outside the family circle.

SISTER CONCERNS

The unit's sister concerns banking are:

1. M/s Polyvine products, engaged in the manufacture of PVC films, pipes, conduits as well as polyethylene tubes on sub-contract from Jeya Murugan Industries occasionally.
2. M/s Visupax Industries which manufactures accrylic sheets. Both of

these units were started after the formation of M/s Jeya Murugan Industries and the partners of these firms are again, different configurations of the partners of M/s Jeya Murugan Industries. The only exceptions are, that the Manager of M/s Jeya Murugan Industries is the Managing Partner of one unit and one Sri Subramaniam, another relative, is the Managing Partner of the other. Besides these two units, there are some trading concerns also details of which are not available.

PRESENT LIMITS

The unit presently enjoys the following credit facilities:

<u>Facility</u>	<u>Limit</u> Rs.
C/c Lock & Key	2,00,000.00
C/c Mundy Type	4,00,000.00
C/c Bills	3,00,000.00
C/c Inward Bills	40,000.00

The present limits were sanctioned in 1980.

PRODUCTS

The unit, as stated in the beginning, is engaged in the manufacture of polyethylene tubes and sheets as well as polyethylene bags of various sizes. They also manufacture utility articles like folders, files, diary covers, wallets, bags, etc., from PVC sheets. The major products are, however, tubes, sheets and bags based on low density polyethylene granules. The unit enjoys a fairly good reputation in and around Madurai and has a steady clientele.

PROCESS

L D P TUBES/SHEETS AND BAGS

L D P granules are first fed into an extruder from which it comes out in the shape of tubes. These are folded or rolled as the case may be, if they are to be

sold as sheets. When bags are to be made, the sheets are cut into the required sizes and sealed by the cut sealing machine for large sized bags. For smaller sized bags, the tubes are fed into the automatic bag making machines which are pre-set to get bags of required size.

L D P COLOUR TUBES/SHEETS

Master batches in which coloured granules are mixed with L D polyethylene granules in the proportion 1:24, then fed into the extruder to get coloured tubes. Tubes, when cut, yield sheets.

P V C PRODUCTS

These are made by manually cutting the PVC sheets to the required sizes and then welding them on or moulding them on the vacuum forming machine.

REMARKS

Normally, the extruders, once started, work continuously from Monday to Sunday. As the unit possesses a generator also, power failures, if any, do not affect it adversely. There is virtually no wastage in production as the wastage occurring during the start up of the extruders and the rejects during the process as well as defective goods returned can be reprocessed. (Please see Appendix XII for flow process charts).

GENERAL COMMENTS

The unit is one of those which are referred to as "good" in the bank. They have been promptly repaying the term loan dues and the unit has been generating surplus consistently. Even though the profitability has been as low as 2 to 3% the unit has been able to find avenues for development. It has established a good reputation in and around Madurai and as the bank has been extending more than adequate credit facilities, the unit in turn, has been able to extend sufficient credit to its major customers.

Even though there are 11 partners in the unit, only 2 are even marginally associated with the affairs of the unit. As stated elsewhere, the affairs of the unit are almost entirely managed by the Manager who is virtually a sole proprietor. The reasons for his not entering the firm as partner are not clear. However, he has given his personal guarantee to secure the advances

the bank has extended to the unit. As the unit has been able to ensure the quality of its products and has not changed its product prices despite the price fluctuations in raw materials, its major customers continue being its customers. However, the group has observed that a stricter quality control is necessary on the workers.

The marketing area of the unit has been mostly in and around Madurai. But of late, the unit has started selling its products in Kerala also. It has opened 2 new outlets at Tiruchirapalli and Coimbatore for its products which will help the unit to increase its sales apart from improving the return due to the anticipated cash sales. The unit already has a full-fledged sales office at Madurai where from the cash sales alone is of the order of Rs.3,000 per day. This office also looks after a certain portion of the credit sales of the unit. The office is headed by Sri Thirumalai Subbu, one of the partners of the firm.

INVENTORY CONTROL

The methodology adopted as also the significant findings and recommendations at each stage of the design of a suitable inventory control system for the unit's raw materials and consumables have been set out below.

ABC ANALYSIS

An ABC analysis of the projected consumption of raw materials and consumables for 1982-83 is presented in Appendix II. It can be seen that LDP granules, by themselves are anticipated to account for over 95% of the total value of consumption of raw materials and consumables. As such, only LDP granules have been treated as 'A' class items while the rest, accounting for less than 5% by value in aggregate of the total value of consumption, have been treated as 'B' class items. A fairly strict inventory control system (applying statistical methods) has been suggested, therefore, for LDP granules while a liberal adhoc system has been recommended for the others.

Incidentally an ABC analysis of past consumption, i.e., 1981-82 could not be done as the unit was unable to provide the necessary consumption figures. Nor, moreover, could these consumption be arrived at from the actual production during the year as the product-mix details were not ascertainable. In the event, it was decided to do an ABC analysis of the projected

consumption for 1982-83 based on the production and sales programme envisaged for 1982-83, presented in Appendix IV. Other assumptions made in the projection of consumption of raw materials and consumables have been explained adequately in Appendix II itself.

INVENTORY CONTROL SYSTEM FOR 'A' CLASS ITEMS

The steps involved in the design of a suitable inventory control system for LDP granules have been described below. The working details have been presented in Appendix III.

DETERMINATION OF STANDARD DEVIATION

First data relating to fortnightly consumption of LDP granules during 1981-82 were collated. Based on these, the fortnightly standard deviation in consumption during 1981-82, was computed by applying the normal statistical formula. As shown in Appendix III, the fortnightly standard deviation during 1981-82 was found to be roughly 1,513 Kgs.

DETERMINATION OF SAFETY STOCK

First, the fortnightly standard deviation was converted to the standard deviation in a lead time for 1981-82. For this purpose, the lead time for procurement of LDP granules was taken as 10 days or 0.67 fortnights after discussions with the unit. Considering that the unit buys the bulk of its requirements of LDP granules from the open market (over 60%) whose average lead time is around a week, the assumption is felt to be reasonable. The standard deviation in a lead time for 1981-82 has been computed to be roughly 1,238 Kgs (Appendix III).

Next, the standard deviation in a lead time for 1982-83 was computed by adjusting for the projected consumption during 1982-83. This was found to be approximately 1,376 Kgs, as shown in Appendix III.

Finally, the safety stock for 1982-83 was arrived at by multiplying the lead time standard deviation for 1982-83 by a factor 'K'. The value of 'K' was assumed to be 2.5 in the present case so as to limit the possibilities of a stock out to 1% only since LDP granules are the critical raw material for the unit. The safety stock for 1982-83 works out to 3,440 Kgs which has been rounded off to 3,450 Kgs or 138 bags of 25 Kgs each, as revealed by Appendix III.

COMPUTATION OF ORDER QUANTITIES

(a) ECONOMIC ORDER QUANTITY (EOQ)

The EOQ for LDP granules has been computed in Appendix III and found to be roughly 1.5 tonnes. It will be noticed that while the inventory carrying cost has been assumed at the normal level of 16% p.a., the order cost has been taken at Rs.12 per order. This is because the order follow-up necessarily involves a few trunk calls to suppliers which aspect, after discussions with the unit, has been taken into account in the computation of order cost.

(b) MINIMUM ORDER QUANTITY (MOQ)

Strictly speaking, there is no minimum order quantity for LDP granules as they are available in bags of 25 Kgs. However, the unit is of the opinion that an order quantity of less than 1 tonne, would not be a worthwhile proposition.

(c) LEAD TIME CONSUMPTION (LTC)

The lead time consumption for LDP granules has been computed to be roughly 5.9 tonnes, as shown in Appendix III. It will be noticed that the lead time has been taken at 10 days (or 1/3 month) since the weighted average lead time for procurement approximates to 10 days.

INVENTORY CONTROL SYSTEM RECOMMENDED

A multiple order level system has been recommended for LDP granules with the EOQ being the order quantity at each level. From Appendix III it will be seen that there are 7 order levels envisaged which have been spelt out, both in terms of Kgs of stock as well as in terms of bags. This has been done to facilitate the implementation of the system even in the absence of accurate stock records. The godown-keeper or stores clerk has merely to count the number of bags in the stores from time to time to make the system work. The average inventory of LDP granules, after implementing the system, is likely to be about 4.2 tonnes,

as shown in Appendix III. The anticipated order frequency, once in 2 or 3 days, is acceptable to the unit.

INVENTORY CONTROL SYSTEM FOR OTHER ITEMS

For all other items among the unit's raw materials and consumables, ie., other than LDP granules, an adhoc system of inventory control has been recommended. It is proposed that a provision of 1 month's consumption be made as safety stock while the order quantity be 2 month's requirements (ie., the order frequency being 6 times a year). The average inventory for these items, consequently, is envisaged to be 2 months' consumption ($1 \text{ month} + \frac{2 \text{ months}}{2}$).

OVERALL STOCKING OF RAW MATERIALS AND CONSUMABLES

The overall average inventory of raw materials and consumables for the unit, after the implementation of the recommended systems, is anticipated to be of the value of roughly Rs.84,150 (as shown in Appendix XI) which works out to about 0.3228 month's, say 1/3rd month's consumption, which is a very substantial improvement on the position obtaining presently..

COSTING

A detailed costing exercise was undertaken at the unit, based on which product costing of the unit's major product categories was done. Certain recommendations have also been made in regard to product mix, and pricing based on a profit/contribution analysis. The methodology adopted as well as the significant findings of the costing exercise have been enumerated below, in the order in which the exercise was carried out.

(a) IDENTIFICATION OF COST CENTRES

As shown in Appendix I, the machinery of the unit (inclusive of machines proposed to be acquired) were segregated into production, service and unbooked cost centres on the basis of utility and utilisation. It will be noticed that out of the 18 cost centres identified (encompassing 27 machines), only 50%, ie., 9, were production cost centres while as many as 7 were unbooked, the remaining 2 being service cost centres. To say the

least, the unit's choice of machinery leaves much to be desired. For the purposes of the costing exercise, the unbooked cost centres and the service cost centres were consolidated into one unbooked cost centre and one service cost centre respectively.

(b) PROJECTION OF EXPENSES

The expenses of the unit for the next year, i.e., July 1982 to June 1983, have been projected in Appendix VIII, based on the unit's anticipated production and sales programme (presented in Appendix IV) and the past levels of expenses (presented in Appendix X), modified by discussions with the unit. It will be seen that out of the total expenses projected of Rs.34,96,430, raw materials alone account for as much as Rs.31,11,630. Since only raw material costs have been treated as prime costs (i.e., directly traceable to products), the total overheads work out to Rs.3,84,800. Further, it can be seen that production overheads are envisaged to be Rs.1,54,100 (with Rs. 71,660 being deemed variable and Rs.82,440 fixed) while selling and administrative overheads (deemed to be entirely fixed) account for the balance of Rs.2,30,700.

(c) COMPONENT MACHINE LOADING MATRIX

Based on the projected production programme for the next year (shown in Appendix IV) and on considerations of batch sizes, set-up times and operating times, as arrived at after discussions with the unit, a component machine loading matrix was developed. It will be noticed, of course, that operating and total times at each of the production cost centres have been computed for product categories than for individual products. This was because the unit expressed its inability to furnish a detailed break-up of the product categories nor was the product-wise break-up of past sales available for purposes of projection of a detailed product-mix, as mentioned in the Appendix itself. It will also be seen from the Appendix that the matrix has been arrived at after making liberal provisions for rejects and rework. Further, it is clear that the cut-sealing machine is a labour determinant cost centre for which labour hour rates are more meaningful than machine hour rates.

Based on the available hours and booked hours at each cost centre, the utilisation indices have been computed in Appendix V. It is seen that only 2 cost centres are anticipated to be fully utilised, viz., the 2 1/2" extruders and the bag making machines. However the capacity of the unit is really determined, for the assumed production programme, by the 2 1/2" extruders since they have been assumed to be working 3 shifts/day while the bag making machines have been assumed to be working on a single shift basis. However, it must be mentioned that in projecting the workload on the 2 1/2" extruders, it has been assumed that all large LDP bags and sheets, ie., over 4" and 8" width respectively, will be exclusively handled by them, though the 1" extruders are capable of handling bags of upto 8" width. In other words, if the whole or a part of the work load on account of bags and sheets (made from cutting tubes of half the required width of the sheets) of width between 4" and 8", and 8" and 16" respectively were to be off-loaded to the 1" extruders, the capacity of the unit would increase further. As can be seen from the Appendix, the utilisation of the other cost centres is projected to be low.

The low utilisation of the 1" extruders (under the assumptions made), about 25%, is particularly disturbing since they are high cost machines. The low utilisation of the cut sealing machine can be improved by reducing the number of persons allocated to that centre. For example, if the number of persons allocated is reduced from the normal level of 6 to, say, 2 persons, the utilisation of the cost centre will improve to 50%, at the same time releasing 4 persons for other work.

Keeping the foregoing in mind, it is patently clear that the unit's decision to go in for two additional 1" extruders and a winding machine (which is not anticipated to be utilised at all) is not justified. The unit would have been better placed had it gone in for an additional 2 1/2" extruder instead. The capacity of the unit as a whole as well as the utilisation of existing machines would have improved substantially resulting in an over-all reduction in production costs.

(d) ALLOCATION OF OVERHEAD EXPENSES

The allocation of overhead expenses has been done in great detail in Appendix VI. As may be seen from the Appendix itself, the factory overheads were first allocated to production, unbooked and service cost centres. Next, the overheads allocated to the service and unbooked cost centres were reallocated to production cost centres.

Finally, selling and administrative overheads (treated as entirely fixed expenses for the purpose of the study) were allocated to production cost centres. It will be noticed that where the allocated expenses were negligibly low no allocation has been made to the relative cost centre. (Eg., depreciation, repairs and maintenance, insurance, etc.) The basis of allocation/re-allocation for each of the overhead expenses has been clearly indicated in the Appendix itself.

It can be seen from Appendix VI that the highest variable and fixed expenses have been allocated to the 1" extruders followed by the allocations to the 2½" extruders, as is only to be expected keeping the relatively high cost of these machines in mind.

(e) DETERMINATION OF MACHINE-HOUR RATES

The variable and fixed machine hour rates for the cost centres have been computed in Appendix VI. While the variable machine hour rates have been computed by dividing the total variable overheads allocated to a cost centre by the relative running hours, the fixed machine-hour rates were determined by dividing the total fixed overheads allocated to a cost centre by the relative booked hours. As has been mentioned previously in the case of the cut sealing machine, the rates computed are really variable and fixed labour-hour rates since the output is labour determined.

It can be seen from the Appendix that the 3 cost centres with the highest fixed machine-hour rates (FMHR) are the vacuum forming machine, the 1" extruders and the welding machines, primarily on account of low utilisation in that order. Similarly, the 3 cost centres with the highest variable machine-hour rates (VMHR) are also the same as above and in the same order.

(f) PRODUCT COSTING

There are a few clarifications which may be made at the outset itself. First, for reasons explained earlier, the product costing exercise could be attempted only for product categories and not for individual products. Second, since the PVC-based products, whether welded or vacuum formed, comprise so many different categories of products that a meaningful product costing exercise could be carried out in the absence of a much more detailed product-mix break-up than was available. As

such, product costing has been attempted for only those product categories (which in any case, account for the bulk of the unit's projected sales as revealed by Appendix IV) which are based on LDP granules. Finally the unit for product costing has been taken as 1 Kg instead of in terms of numbers because sales are effected in Kgs., the prices also being expressed in terms of rupees/Kg. The computation of product costs have been presented in Appendix VII.

The cost/kg of a product category was arrived at by adding together the raw material cost/kg., i.e., the prime cost, and the overhead cost/kg (both variable and fixed). The computation of prime cost/kg of product was fairly simple and was determined to be Rs.14 and Rs.14.44 for plain and coloured categories of products respectively, as is evident from the Appendix itself. The variable overhead cost/kg for any product category at any cost centre was computed by multiplying the operating time/kg (derived from Appendix V) with the VMHR derived for that cost centre (arrived at in Appendix VI). Similarly, the fixed overhead cost/kg for any product at any cost centre was computed by multiplying the total time/kg (derived from Appendix V) with the FMHR for that cost centre (arrived at in Appendix VI).

Of the six product categories considered, the two highest cost categories appear to be tubes/sheets (small) and coloured bags, with unit costs of Rs.19.54 and Rs.19.20 per kg respectively. The high cost of tubes/sheets (small) is mainly due to the substantial processing time at the 1" extruders while the high cost of coloured bags is primarily on account of hot foil embassing. The two lowest cost categories are, apparently, tubes/sheets (large) and coloured tubes, with unit costs of Rs.14.57 and Rs.15.01 per kg respectively. The unit costs of bags (large) and bags (small) have been computed to be Rs.15.26 and Rs.16.83 per kg respectively. There appears to be no correlation between the unit costs of product categories and their selling prices. Apparently, the unit has not been aware of the unit costs while pricing its product categories.

(g) PROFIT AND CONTRIBUTION ANALYSIS

A profit and contribution analysis for the six major product categories costed has been made in Appendix IX.

It is seen that only tubes/sheets (small) are expected to make a loss (about Rs.2.54 per kg) while all the rest of the product categories are anticipated to make profits with coloured tubes being the most profitable (about Rs.2.99 per kg). The profitability (as a percentage of sale value) of the product categories ranges from 14.94% (loss), in the case of tubes/sheets (small) to 16.61% (profit), in the case of coloured tubes. Bags (small) are expected to just about break-even, with profits of Rs.0.17 per kg., and a profitability of 1%.

It is evident that all the product categories considered make substantial contributions towards fixed overheads with the highest contribution being made by coloured bags (about Rs.4.87 per kg). The percentage contribution ranges from 10.65% in the case of tubes/sheets (small) to 24.35% in the case of coloured bags.

Now that the unit is aware of the profit and contribution (in absolute and percentage terms) of each of the major product categories, it is in a position to make the necessary changes in its selling prices and/or product mix to improve over-all profitability, subject to the operating and marketing constraints. It would be impossible to set out all the possibilities. However, a couple of fairly obvious changes can be cited as illustrations.

First, the proportion of coloured products in the unit's product-mix, particularly that of coloured tubes, should be increased to the extent possible. Second, unless the unit is hopeful of bagging much higher volume of orders for tubes/sheets (small) than has been projected, thereby substantially improving the utilisation of the 1" extruders and lowering their FMER and therefore, the total product cost (in which case the present sale price of Rs.17/kg may be retained), the unit should explore the possibility of raising the sale price of tubes/sheets (small) by around 15% so as to enable the product to break-even. However, if the increase in price results in the loss of orders, the unit must first explore the possibility of increasing the production and sales of bags (small) so as to retain the utilisation of 1" extruders atleast at the presently envisaged level. If even this is not feasible, it would be better for the unit to retain the present selling price as some contribution is better than no contribution.

OPERATING ECONOMICS

(a) PAST PERFORMANCE

The immediate past performance of the unit has been summarised in the form of profitability statements for 3 years in Appendix X. Based on these figures, a trend analysis, in a tabular form, has been carried out in Appendix XIII. The data in Appendices X and XIII speak for themselves and detailed explanatory remarks are not deemed necessary. It has already been mentioned that financial analysis could not be completed due to non-availability of financial statements, particularly balance sheets. Consequently, trend analysis of balance sheet items and ratio analysis could not be carried out.

A careful perusal of Appendices X and XIII reveal so many discrepancies and anomalies that the veracity of the data provided by the unit itself appears to be in doubt. While some sets of figures suggest that the product-mix and the proportion of product sales to trading sales have been fairly stable, other sets of figures indicate just the opposite, for example, it appears that the audited statements of the unit have been "doctored" with the data for 1981-82 being provisional, seeming to be the most reliable. It is almost certain that the expenses for the year 1980-81 particularly have been inflated. This is borne out by, apart from the trend analysis which is also revealing, the fact that as against the normal break-even level of around Rs.23 to Rs.24 lacs sales/annum (computed in Appendix X), the break-even level for 1980-81 is in excess of Rs.30 lacs/annum. Clearly the fixed expenses for the year appear to be inflated.

Under the circumstances, the only conclusion that can be drawn about the unit's past performance is that it has consistently generated profits, probably substantially more than what has been declared.

(b) PROFITABILITY AND BREAK-EVEN LEVEL

The projected profitability statement and the anticipated break-even level of sales for 1982-83 have been worked out and presented in Appendix VIII. The

profitability statement has been based on the projected production and sales programme of the unit, presented in Appendix IV. The expenses have been based on past trends, in general, modified by discussions. The Appendix is comprehensive enough to make further elaborations unnecessary.

It is seen that the anticipated profit before tax for 1982-83 despite very liberal provisions for expenses (particularly selling and administrative), works out to roughly Rs.1.46 lacs. The break-even level of sales has been computed to be around Rs.24.86 lacs/annum which works out to about 68.3% of the projected turnover for the year.

(c) WORKING CAPITAL ASSESSMENT

The projected working capital requirements of the unit for 1982-83 have been assessed in Appendix XI. Most of the assumptions have been made explicit in the Appendix itself. It will be noticed that the existing margins have been retained.

The raw materials (and consumables) stocking level has been arrived at on the basis of the inventory control system recommended for the unit. As explained in the Appendix, an over-all stocking of roughly 10 days' consumption of raw materials and consumables, valued at Rs.84,150 is deemed to be adequate. However, for the purposes of sanctioning limits, an additional provision for Rs.10,500, in the requirements and Rs.7,875 in the permissible limits representing provision for stocking of 750 kgs of LDP granules more, may be provided for the peak level stocking of LDP granules.

Considering that the maximum batch cycle time for production is about a week, one week's stocking of semi-finished goods may be permitted. It is felt that 3 weeks' stocking of finished goods would suffice keeping in mind the fact that most of the production is against orders. Both semi-finished and finished goods have been valued at cost of production, derived from Appendix VIII. In general, both the stocking level and the valuation of semi-finished and finished goods have been liberally assumed.

The recommended bill limit of 1.4 months' sales has been arrived at, as explained in the Appendix, after taking into account the fact that atleast 30% of the sales

of the unit are on cash terms. The weighted average bill payment period for credit bills approximates to 2 months. However, the cover period for the unit's bills may be retained at 3 months since a few major customers of the unit take between 2 and 3 months to effect payment.

It can be clearly seen that the recommended limits for working capital purposes aggregate to roughly Rs.6.44 lacs, even after making a provision for peak level stocking of raw materials, for 1982-83 as against the existing limits of Rs.9 lacs. It is obvious therefore, that the unit has been overfinanced in the past. That the real working capital requirements of the unit were well below the level assessed by the bank is borne out by the relatively poor utilisation of limits in the past by the unit, as roughly gauged from the interest payments made to the bank by the unit. For example, the interest payment of Rs.65,980 during 1981-82 even if assumed to be entirely on account of working capital bank borrowings, tends to suggest that the average working capital outstandings during the year were about Rs.5.08 lacs only as against the sanctioned limits of Rs.9 lacs. There was no necessity for the bulk purchase of raw materials either.

It is recommended, therefore, that fresh limits be sanctioned to the unit as indicated below.

C/c Mundy type limit against stocks (R.M., SFG, FG.)	..	Rs.2,61,500(app)
C/c limit against outward bills	..	Rs.3,82,400(app)
		<hr/>
Total	..	Rs.6,43,900
		<hr/>
		(say Rs.6,44,000)

A separate lock and key limit is not felt to be strictly necessary though a sub-limit of Rs.71,000 for raw materials and consumables may be specified. If felt necessary, the C/c inward bill limit may be retained.

Ofcourse, these limits relate to 1982-83 and will have to be reviewed for subsequent years to adjust for changes in operating levels and product-mix. The bank must insist on regular and prompt submission of detailed stock statements and it would be advisable for the bank to check the veracity of stock statements submitted by the

unit, atleast once in 2/3 months, by physical stock verification. It would also be advisable for the bank to obtain, on a monthly basis, statements from the unit covering production, sales, expenses and the order position. This would help the bank to monitor the advance better while the unit itself would benefit from this regular exercise.

CONCLUSION

It is imperative that the unit makes every effort for a programmed reduction in the level of stagnant stocks. Even among the moving stocks, the level of stocking needs to be brought in conformity with the recommendations made earlier. The unit's contention, for instance, that 20 tons of finished goods need to be stocked does not seem reasonable. Raw material stocking above the level recommended would not be justified. In this connection, it may be mentioned that with the commissioning of the new IPCL plant, the availability of LDP granules, the major raw material for the unit, is likely to case further. As such, stocking levels could conceivably be lower, rather than higher, than envisaged.

The unit cannot afford the luxury of so many idle machines as are presently existing. The unit needs to immediately bestow attention to this aspect. It is strongly recommended that the idle machines, unless the unit makes arrangements for their utilisation at a reasonable level, be disposed off at the earliest. The utilisation of the useful machines also leaves much to be desired. The unit's decision to go in for 2 1" extruders and a winding machine, as mentioned earlier, has merely compounded the problem.

Though the unit has several obvious weaknesses, over-dependence upon the Manager and the interlocking between firms being two ready examples, it also has its inherent strengths, the most notable being its steady clientele, which suggest that the future prospects of the unit are fairly good.

MAJOR FINDINGS AND RECOMMENDATIONS

INVENTORY CONTROL

The single most important raw material for the unit is low density polyethylene granules, which accounts for over 95% by value of the unit's projected consumption in 1982-83 of raw materials and consumables. Hence, LDP granules is the only 'A' class raw material for the unit, all the rest being treated as 'B' class items. (Appendix II)

The recommended inventory control system for LDP granules, based on detailed analysis of consumption and application of statistical methods, is a multiple order level system (7 order levels) with the Economic Order Quantity as the base. The average inventory of LDP granules is computed to be 4,200 Kgs, which would represent roughly 7 days' consumption projected for 1982-83 (Appendix III).

The average inventory recommended for other raw materials and consumables, based on an adhoc system, is 2 months' consumption.

The overall weighted average inventory, after implementation of the recommendations, would work out to roughly 10 days' consumption. The value of the overall weighted average inventory is computed to be Rs.84,150, approximately for 1982-83 (Appendix XI).

The unit does not need any stocking for high density polyethylene granules since no consumption is projected for 1982-83.

COSTING

Of the 9 production cost centres identified (Appendix I), only 2 are anticipated to be fully utilised during 1982-83 (Appendix V). As such the proposed purchase of two 1" extruders and a winding machine are deemed to be totally unnecessary, the utilisation of 1" extruders being 25% for 1982-83 while the winding machine is unlikely to be used at all (treated as an unbooked cost centre). The unit may have been better advised to go in for an additional 2.5" extruder instead (anticipated utilisation - 99.75% in 1982-83).

Due primarily to their low anticipated utilisation, the 3 production cost centres with the highest variable

and fixed machine hour rates are the vacuum forming machine (utilisation 9.17%), the 1" extruders (utilisation 25%) and the welding machines (utilisation 45.83%), in that order. The relative variable/fixed machine hour rates have been computed to be Rs.16.42/79.12, Rs.5.93/20.72 and Rs.3.46/17.54 respectively. (Appendix VI)

A product costing exercise for the unit's LDP product categories reveals that all of them make a contribution to overheads. However, it is found that LDP tubes/sheets (small size) make a substantial loss while the most profitable category appears to be coloured tubes. (Appendix VII & IX).

It is recommended that the prices of LDP tubes/sheets (small size) be revised upwards by atleast 15% or, alternatively, the production of this product category in the unit's product mix be reduced. It is also recommended that the proportion of coloured products, particularly coloured tubes be increased in the unit's overall product mix. (Appendix IX).

OPERATING ECONOMICS

The projected sales of the unit for 1982-83 is Rs.36.42 lacs of which Rs.32,000 is contributed by trading sales, i.e., sales of PVC sheets (Appendix IV).

The anticipated profit before tax for 1982-83 is Rs.1,45,600 (app.) and the break-even level of sales works out to roughly Rs.24,86,200 which is about 68.3% of the projected sales for the year (Appendix VIII).

The average working capital bank borrowings for 1982-83 have been assessed to be roughly Rs.6.36 lacs with sanctioned limits of Rs.6.44 lacs being deemed adequate (Appendix XI). There is a good case for a reduction in the working capital limits granted to the unit, particularly against stocks.

The past performance of the unit reveals consistent profitable operations even though the profitability has been very low. (Appendix X).

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APPENDIX I

LIST OF MACHINERY
AND IDENTIFICATION OF COST CENTRES

Sl. No.	Machinery (with proposed additions)	No. of machines	Type of cost centre
1.	1" Extruders	3	Production cost centre
2.	2.5" Extruders	2	-do-
3.	Bag making machines	3	-do-
4.	Welding machines	2	-do-
5.	Impulse sealing machine	1	Unbooked cost centre
6.	Portable impulse sealing M/L	3	Production cost centre
7.	Hot foil embossing M/L	1	-do-
8.	Cut sealing M/L	1	-do-
9.	Winding machine	2	Unbooked cost centre
10.	Vacuum forming machine	1	Production cost centre
11.	Welding machine	1	-do-
12.	Extruder attachment	1	Unbooked cost centre
13.	Extruder reprocess attachment	1	-do-
14.	Injection Moulding machine	1	-do-
15.	Granulator	1	-do-
16.	Grinding machine	1	-do-
17.	Air compressor	1	Service cost centre
18.	Generator	1	-do-
SUMMARY: Production cost centres : 9			
Unbooked cost centres : 7			
Service cost centres : 2			

APPENDIX I
... contd.

Note:

- 1) Two 1" extruders and one winding machine are proposed to be acquired before September 1982. These are expected to be commissioned by the first week of October 1982, at the latest. However, the utilisation of the winding machines are anticipated to be practically negligible and hence, they have been treated as unbooked centres.
- 2) For the purpose of costing, the 7 unbooked centres have been treated as a single unbooked cost centre and the 2 service centres as a single service cost centre.

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APPENDIX - IIPROJECTED CONSUMPTION OF RAW MATERIALSAND CONSUMABLES DURING 1982-83

S.No.	Material Category	Class	Rate (Rs.)	Quantity (Tons)	Value of consumption (Rs.)
1.	L.D.P.Granules	A	14/Kg.	212552 Kg	29,75,730
2.	P.V.C. Sheets (Several sizes/ thicknesses)	B	7/mtre (Average)	17100 metres	1,19,700
3.	Master Batches (4 or 5 colours)	B	25/Kg.	648 Kgs.	16,200
4.	Diesel Oil	B	1.21/ Litre	8,400 Litres	10,160
5.	Other consumables	B	-	-	6,000
Total					31,27,790

NOTE:-

- (1) For coloured LDP Bags, Sheets and Tubes, Master Batches and LDP granules are required to be mixed in the proportion of 1:24. Consequently, the consumption of Master Batches for 1982-83 has been estimated to be 4% (i.e., 1/25) of the projected production of coloured LDP products of 16,200 Kgs. (See Appendix IV). Similarly, the consumption of LDP granules has been arrived at by adding together the consumption for plain products (1,97,000 Kgs.) and for coloured products (at 96% of the projected production of 16,200 Kgs., i.e., 15,552 Kgs.) It has already been mentioned that there is practically no wastage.

...

- (2) The consumption of PVC sheets includes the projected trading sales of 4,000 metres. (See Appendix IV).
- (3) L.D.P. granules, by themselves, account for over 95% of the total value of consumption of raw materials and consumables projected for 1982-83 and as such a strict inventory control system for LDP granules is called for.
- (4) The unit was not in a position to give a detailed consumption break-up in respect of PVC sheets and Master Batches in terms of individual sizes/thickness and colours respectively. Since past consumption data was also not available along the required lines, no suitable assumptions could be made for 1982-83 regarding consumption of individual items among PVC sheets and Master Batches.

APPENDIX III

INVENTORY CONTROL SYSTEM FOR LDP GRANULES

DETERMINATION OF STANDARD DEVIATION OF FORTNIGHTLY CONSUMPTIONS
DURING 1981-82

Fort-night	Consumption (X) Kgs.	(X- \bar{X}) Kgs	(X- \bar{X}) ²	Standard deviation (F) Kgs.
1.	5,891	- 1,279	16,35,841	
2.	5,146	- 2,024	40,96,576	F = $\frac{(X-\bar{X})^2}{n-1}$
3.	7,604	434	1,88,356	= $\frac{526,30,978}{(24-1)}$
4.	6,913	- 257	66,049	= $\frac{526,30,978}{23}$
5.	7,882	712	5,06,944	= 22,88,303.3
6.	7,916	746	5,56,516	= 1,512.71
7.	5,825	- 1,345	18,09,025	= say 1,513
8.	6,431	- 739	5,46,121	
9.	8,684	1,514	22,92,196	Note:
10.	5,627	- 1,543	23,80,849	All figures have been rounded off to the nearest whole number
11.	5,781	- 1,389	19,29,321	The consumption figures relate to the 12 months covered between July 1981 and June 1982
12.	6,698	- 472	2,22,784	
13.	7,780	610	3,72,100	
14.	4,465	- 2,705	73,17,025	
15.	7,893	723	5,22,729	
16.	6,034	- 1,136	12,90,496	
17.	7,874	704	4,95,616	
18.	5,599	- 1,571	24,68,041	

... contd

Appendix III
... contd.

19.	7,874	462	2,13,444
20.	8,012	842	7,08,964
21.	7,240	70	4,900
22.	9,240	2,070	42,84,900
23.	8,677	1,507	22,71,049
24.	11,226	4,056	164,51,136
Total	<u>1,72,070</u>		<u>526,30,978</u>

Average

(\bar{X}) 7,170

@@@@*@@*@@*@@*

(B) Determination of safety stock for 1982-83

Lead time (L) = 10 days or 0.67 fortnights.

Projected consumption in 1982-83 (A2) = 212,552 Kgs

Consumption during 1981-82 (A1) = 172,070 Kgs

Standard deviation in a lead time during
1981-82 (L)

$$= F \times \sqrt{L} = 1513 \times \sqrt{0.67} = 1238.44 \text{ Kgs}$$

$$= \text{say } \underline{\underline{1,238 \text{ Kgs}}}$$

Standard deviation in a lead time for 1982-83 (1982-83)

$$= L \times \sqrt{\frac{A2}{A1}} = 1,238 \times \sqrt{\frac{212,552}{172,070}}$$

$$= 1238 \times 1.23526$$

$$= 1238 \times 1.11142 = 1375.94 = \underline{\underline{\text{say } 1376 \text{ Kgs}}}$$

APPENDIX III

... contd.

$$\begin{aligned} \text{Safety stock (SS) for 1982-83} &= 3,440 \text{ Kgs.} \\ = K \times 1982-83 &= 2.5 \times 1376 = \text{say } 3,450 \text{ Kgs} \\ & \underline{\underline{\underline{\underline{\underline{\underline{\quad}}}}}} \\ & \text{(138 bags)} \end{aligned}$$

NOTE: The value of 'K' has been taken as 2.5 so as to limit stock-out risk to 1%, LDP granules being the critical raw material for the unit.

(C) Computation of order quantities for 1982-83

(1) Economic order quantity

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2X_2 X_a}{i_c}} \\ &= \sqrt{\frac{2 \times 212,552 \times 12}{0.16 \times 14}} \\ &= 1509.09 \text{ Kgs} = \underline{\underline{\underline{\underline{\underline{\underline{\quad}}}}}} \\ & \text{say } \underline{\underline{\underline{\underline{\underline{\underline{\quad}}}}}} \end{aligned}$$

NOTE: Order cost has been taken at Rs.12 after discussions with the unit, since order follow-up involves trunk calls to suppliers.

(2) Minimum order quantity (MOQ)

There is no specific minimum order quantity since the raw materials are available in bags of 25 kgs each. However, the unit feels that it would not be worthwhile to place orders for less than 1 tonne at a time.

(3) Lead time consumption

$$\begin{aligned} \text{LTC} &= \text{Average consumption in a lead time} \\ & \text{(ie., in 10 days or 1/3rd month)} \\ &= \frac{212,552}{12} \times \frac{1}{3} = 5904.22 \text{ Kgs} \\ &= \underline{\underline{\underline{\underline{\underline{\underline{\quad}}}}}} \\ & \text{say } \underline{\underline{\underline{\underline{\underline{\underline{\quad}}}}}} \end{aligned}$$

APPENDIX III

... contd.

(D) The recommended inventory control system.

A multiple order level system is recommended with the EOQ computed being the order quantity, so as to minimise the average stocking level for LDP granules. The reorder levels would work out as follows.

Re-order level 1 (ROL)

$$\begin{aligned}
 &= \text{safety stock} + \text{lead time consumption} \\
 &= 3,450 \text{ Kgs (138 bags)} + 5,900 \text{ kgs} \\
 &= 9,350 \text{ Kgs or 374 bags}
 \end{aligned}$$

$$\begin{aligned}
 \text{ROL}_2 &= \text{ROL}_1 - \text{EOQ} = (9,350 - 1,500)\text{Kgs} = 7,850 \text{ Kgs or } 314 \text{ bags} \\
 \text{ROL}_3 &= \text{ROL}_2 - \text{EOQ} = (7,850 - 1,500)\text{Kgs} = 6,350 \text{ Kgs or } 254 \text{ bags} \\
 \text{ROL}_4 &= \text{ROL}_3 - \text{EOQ} = (6,350 - 1,500)\text{Kgs} = 4,850 \text{ Kgs or } 194 \text{ bags} \\
 \text{ROL}_5 &= \text{ROL}_4 - \text{EOQ} = (4,850 - 1,500)\text{Kgs} = 3,350 \text{ Kgs or } 134 \text{ bags} \\
 \text{ROL}_6 &= \text{ROL}_5 - \text{EOQ} = (3,350 - 1,500)\text{Kgs} = 1,850 \text{ Kgs or } 74 \text{ bags} \\
 \text{ROL}_7 &= \text{ROL}_6 - \text{EOQ} = (1,850 - 1,500)\text{Kgs} = 350 \text{ Kgs or } 14 \text{ bags}
 \end{aligned}$$

$$\begin{aligned}
 \text{Average inventory} &= \text{Safety stock} + \frac{\text{Order qty.}}{2} \\
 &= (3,450 + \frac{1500}{2}) \text{ Kgs} = \underline{\underline{4,200 \text{ Kgs or 168 bags}}}
 \end{aligned}$$

APPENDIX - IVABC ANALYSIS OF PROJECTED SALES FOR 1982-83

S1. No.	Product Categories	Rate	Quantity to be sold	Sales Value(Rs.)	
1.	LDP Bags (Large size)	Rs.16/- per Kg.	1,00,000 Kgs.	1600000	'A' Class items.
2.	LDP Tubes(Large size)	Rs.16/- per Kg.	50,000 Kgs	800000	
3.	LDP Bags (Small size)	Rs.17/- per Kg.	45,000 Kgs.	765000	
4.	LDP Coloured Tubes/sheets	Rs.18/- per Kg.	12,000 Kgs.	216000	'B' Class items.
5.	PVC Welded Products	Rs.8.33/met.app.	12,000 Mts.	100000	
6.	LDP Coloured Bags	Rs.20/- Per Kg.	4,200 Kgs.	84000	
7.	LLP Sheets/Tubes (Small size)	Rs.17/- per Kg.	2,000 Kgs.	34000	
8.	PVC Vacuum formed products	Rs.10/met app.	1,100 Mts.	11,000	
TOTAL PRODUCTION SALES				3610000	
9.	PVC Sheets for sale (as sheets)	Rs.7.50/- met app.	4,000 Mts.	32000	
TOTAL SALES				= 3642000	

Remarks:- The projected production and sales programme for 1982-83 was arrived at after discussion with the unit.

- NOTE (1) The rates assumed for PVC products are extremely approximate since the rates vary considerably from product to product and from customer to customer.
- (2) The 'A' Class items identified above, ie, the first three items, constitute roughly 87.7% of the projected production sales of the unit.

COMPONENT MACHINE LOADING MATRIX

Sl. No.	Product category	Annual Quantity	Extruders (3 Nos.) 1" screw		Extruders (2 1/2") - 2 Nos.		Bag making machine 3 Nos.		Portable sealing machine 3 Nos.		Cut seal- ing machine 1 No. (persons 6)	
			OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
1.	Poly Bags (Large)(LDP)	100000 Kg	-	-	8333	3813	3750	4100	664	814	2400	2400
2.	Poly Sheets (Large) (LDP)	50000 Kg	-	-	4000	4200	-	-	-	-	-	-
3.	Poly Bags(Small)LDP	45000 Kg	4000	4080	-	-	3000	3150	-	-	-	-
4.	Poly Colour Tubings (LDP)	12000 Kg	-	-	960	1000	-	-	-	-	-	-
5.	Poly Colour Bags(LDP)	4200 Kg	-	-	336	351	300	310	-	-	-	-
6.	PVC Welded Products	12000 Mts	-	-	-	-	-	-	-	-	-	-
7.	Poly Sheets/Tubes (Small) (LDP)	2000 Kg	400	420	-	-	-	-	-	-	-	-
8.	PVC Vacuum formed products	1100 Mts	-	-	-	-	-	-	-	-	-	-
Running/Booked Hours			4400	4500	13629	14364	7050	7560	664	814	2400	2400
Available Hours			18000		14000		7200		7200		14000	
(Booked Hours ÷ Available Hours x 100)											(Labour Hours)	
Utilisation Index			25%		99.75%		105%		11.31%		16.67%	

TT = Total Time
OT = Operating Time

APPENDIX V (Contd.)

Sl. No.	Product category	Hot foil Embossing		Welding M/c (2 Nos.)		Vacuum forming Machine (1 No.)		Remarks.
		O.T	T.T	O.T.	T.T	O.T.	T.T.	
1.	Poly Bags (Large)(LDP)	-	-	-	-	-	-	1) The matrix had necessarily to be derived from operating and total times for product categories rather than for individual products as the unit expressed its inability to furnish a more detailed break-up. The production/sales records of the unit were also not such as to facilitate the projection of a detailed product mix. 2) The operating and total times projected at each production cost centre are liberal and include provisions for rejects and re-work. 3) The cut sealing machine and the hot foil embossing machines have no set up times, for all practical purposes. 4) The capacity of the cut-sealing machine is really determined by the number of persons allocated to that centre.
2.	Poly Sheets(Large) (LDP)	-	-	-	-	-	-	
3.	Poly Bags(Small)(LDP)	-	-	-	-	-	-	
4.	Poly Colour Tubings(LDP)	-	-	-	-	-	-	
5.	Poly Colour Bags (LDP)	1200	1200	-	-	-	-	
6.	PVC Welded Products	-	-	2000	2200	-	-	
7.	Poly Sheets/Tubes (Small) (LDP)	-	-	-	-	-	-	
8.	PVC Vacuum formed products	-	-	-	-	200	220	
	Running/Booked Hours	1200	1200	2000	2200	200	220	
	Available hours		2400		4800		2400	
	Utilisation Index (Booked hours ÷ Available x 100)		50%		45.83%		9.17%	

Note: 1. For the extruders (1" & 2.5"), the available hours have been computed on a 3 shift-basis for 300 working days. For all other machines, single-shift working has been assumed.

2. For 1" Extruders, the available hours have been computed as follows:

(a) Available hours of existing m/c (24 hrs x 300 days) =	7,200
(b) Available hours of proposed m/cs (24 hrs x 225 days) =	10,800 (since m/cs are available for only 9 months)
Total	18,000 hrs.

ALLOCATION OF OVERHEADS TO COST CENTRES AND CONSUMPTION OF VARIABLE & FIXED MACHINE HOUR RATES

Expense Head/ Item of Expense/	Budget for 1982-83(Rs.) (Appendix VIII)	Basis of All- cation to co centres.	Production cost centres (Allocation in Rs.) (8 centres)			
			1" Extruders (3 Nos)	2.5" Extruders (2 Nos)	Bag making M/cs (2 Nos.)	Welding Mcs. (2Nos).
(A) FACTORY OVERHEADS						
(A) Variable Expenses						
1. Power	32,400	Approximate HP rs	12,000	9,000	4,500	4,300
2. Repairs & Maintenance	23,100	Discussions	4,620	6,930	2,310	2,310
3. Fuel (Diesel Oil)	10,160	Only to generators	-	-	-	-
4. Other Consumables	6,000	Discussions	1,200	1,800	600	600
Sub-total 1.	71,660		17,820	17,730	7,410	6,910
Reallocation of expenses of service cost (included in sub-centre to production cost centres.	16,580	50% to 1" Extruders, 45% to 2.5" Extruders and 5% to vacuum forming M/c.	88,290	7,461	-	-
Sub-total 2.	71,660		26,110	25,191	7,410	6,910
(b) Fixed Expenses						
1. Rent	9,780	Area occupied by M/cs	2,178	1,695	1,502	1,743
2. Wages(29 workers)	49,820	Labour allocation	10,307	6,872	5,154	6,872
3. Supervision	5,000	Estimate of time spent	1,250	1,250	750	500
4. Depreciation	14,440	Actuals (on W.O.V.)	3,300	-	2,133	1,066
5. Insurance	3,400	Value of m/cs(original)	480	690	509	230
Sub-total 3.	82,440		17,515	10,507	10,048	10,411
Reallocation of expenses of service cost (included in centre to production cost centres.	4,890	50% to 1" Extruders, 45% to 2.5" Extruders and 5% to Vacuum Forming M/c.	2,445	2,200	-	-
Sub-total 4.	22,440		19,960	12,707	10,048	10,411

APPENDIX VI (CONTD)

1.	2	3	4	5	6	7
Sub-total 4.	82,440		19,960	12,707	10,048	10,411
Reallocation of expenses of unbooked cost centre to production cost centres	6,548	In proportion to allocated fixed expenses in sub-totals 3&4) (ie. Sub-total 4).	11,722	1,096	867	868
Sub-total 5.	82,440	(Total allocated cost at each cost centre (ie. sub-totals 2+5)	21,682	13,803	10,915	11,309
(B) <u>SELLING AND ADMINISTRATIVE OVERHEADS</u>						
Sub-total 6.	2,30,700		71,549	58,377	27,433	27,275
Total Fixed Expenses Booked Hours	3,13,140	Sub-totals 5 + 6 See Appendix V	93,231 4,500	72,180 14,364	38,348 7,560	38,584 2,200
Fixed Machine Hour Rate		Total Fixed Expenses/Booked hours	20.72	5.03	5.07	17.54
Total Variable Expenses Running Hours	71,660	Sub-total 2 See Appendix V	26,110 4,400	25,191 13,629	7,410 7,050	6,910 2,000
Variable Machine Hour Rate		Total Variable expenses/Running Hrs.	5.93	1.85	1.05	3.46

APPENDIX VI (CONTD.)

Expense Head / Item of Expense/	Production Cost Centres (Allocation in Rs.) - (8 centres)				Unbooked cost cen- tre (Rs.)	Service cost cen- tre (Rs.)
	Portable sealing M/c(3 Nos.)	Cut sealing M/c.	Hot Foil Embossing M/c.	Vacuum Forming M/c.		
(A) FACTORY OVERHEADS						
(a) Variable Expenses						
1. Power	300	500	500	1,000	-	600
2. Repairs & Maintenance	-	-	1,155	1,155	-	4,620
3. Fuel (Diesel Oil)	-	-	-	-	-	10,160
4. Other (Consumables)	-	-	300	300	-	1,200
Sub-total 1	300	500	1,955	2,455	-	16,580
Reallocation of expenses of service cost centre to production cost centres.	-	-	-	82g	-	-
Sub-total 2	300	500	1,955	3,284	-	-
(b) Fixed Expenses						
1. Rent	-	485	290	290	1,307	290
2. Wages (29 workers)	3,436	10,307	3,436	3,436	-	-
3. Supervision	250	250	250	-	-	500
4. Depreciation	-	-	-	-	4,481	3,460
5. Insurance	28	-	13	50	760	640
Sub-total 3	3,714	11,042	3,989	3,776	6,548	4,890
Reallocation of expenses of service cost centre to production cost centres	-	-	-	245	-	-
Sub-total 4	3,714	11,042	3,989	4,021	6,548	-
Reallocation of expenses of unbooked cost centre to production cost centres	321	953	344	347	-	-
Sub-total 5	4,035	11,995	4,333	4,368	-	-

APPENDIX VI (Contd.)

	1.	8	9	10	11	12	13
(B) SELLING AND ADMINISTRATIVE OVERHEAD							
Sub Total 6 (Sub-totals 2+5)	6,490	18,706	9,414	11,456			
Total Fixed Expenses	10,525	30,701	13,747	15,824			
Booked Hours	814	2,400	1,200	200			
Fixed Machine Hour Rate	12.93	12.79	11.46	79.12			
Total Variable Expenses	300	500	1,955	3,284			
Running Hours	664	2,400	1,200	200			
Variable Machine Hour Rate	0.45	0.21	1.63	16.42			

PRODUCT COSTING EXERCISE FOR MAJOR PRODUCT CATEGORIES

Sl. No.	Product category	R.M. Cost	1" Extruder		2.5" Extruders		Bag Making Machines		Welding machines		Portable impulse	
			VC	FC	VC	FC	VC	FC	VC	FC	VC	FC
1.	Bags (Large) (LDP)	14.00	-	-	0.154	0.443	0.039	0.208	-	-	0.003	0.105
2.	Tubes/Sheets (Large) (LDP)	14.00	-	-	0.148	0.423						
3.	Bags (Small) (LDP)	14.00	0.527	1.879	-	-	0.070	0.355				
4.	Tubes/Sheets (Small) (LDP)	14.00	1.186	4.351								
5.	Coloured Tubes(LDP)	14.44	-	-	0.148	0.419						
6.	Coloured Bags (LDP)	14.44	-	-	0.148	0.420						

REMARKS (1) Product costing for PVC items have not been done as the unit prices and number of units proposed to be manufactured for individual items were not ascertainable.

(2) Raw material cost per Kg. for coloured L.D.P. products have been arrived at as follows:

(a)	Cost of LDP granules	960 gms	-	Rs.13.44	(@ Rs.14/Kg)
(b)	Cost of Master Batch	40 gms	-	Rs. 1.00	(@ Rs.25/Kg)

	Total	1000 gms		Rs.14.44	
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APPENDIX VII (CONTD.)

Sl. No.	Product category	Cut sealing machines		Hot Foil Embossing		Total product cost Kg.
		VC	FC	VC	FC	
1.	Bags (Large) (LDP)	0.005		0.307		VC 14.20 FC <u>1.06</u> <u>15.26</u>
2.	Tubes/Sheets (Large) (LDP)					VC 14.15 FC <u>0.42</u> <u>14.57</u>
3.	Bags (Small) (LDP)					VC 14.60 FC <u>2.23</u> <u>16.83</u>
4.	Tubes/Sheets (Small) (LDP)					VC 15.19 FC <u>4.35</u> <u>19.54</u>
5.	Coloured Tubes (LDP)					VC 14.59 FC <u>0.42</u> <u>15.01</u>
6.	Coloured Bags (LDP)			0.466	3.274	VC 15.13 FC <u>4.07</u> <u>19.20</u>

PROJECTED PROFITABILITY STATEMENT FOR 1982-83
AND BREAK-EVEN LEVEL COMPUTATION

Income/Expense	Amount Rs.	Amount Rs.	Remarks
INCOME			
a) Production sales	36,10,000		
b) Trading sales	32,000		
	-----	36,42,000	Please see Appendix IV
EXPENSES			
a) Variable Factory Expenses			
1. Raw materials*	31,11,630		
2. Power	32,400		
3. Repairs and maintenance	23,100		
4. Fuel (Diesel oil)*	10,160		
5. Other consumables *	6,000		
	-----	31,83,290	
b) Fixed factory expenses			
1. Wages	49,820		
2. Supervision	5,000		
3. Rent	9,780		
4. Depreciation	14,440		
5. Insurance	3,400		
	-----	82,440	
COST OF PRODUCTION		32,65,730	
c) Selling & Administrative Expenses			
1. Interest (Bank & others)	84,000		Selling and administrative expenses have been treated to be entirely fixed.
2. Bank charges	4,000		
3. Printing & stationery	2,400		
4. Manager's salary & bonus	60,000		
5. Postage & telegrams	17,500		
6. Advertising	3,500		

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Appendix VIII
... contd.

1	2	3	4
7. Subscriptions	2,800		For break-even level computations variable expenses = Rs.31,83,290 and fixed expenses = Rs. 3,13,140
8. Travelling & conveyance	7,500		
9. Motor car maintenance	7,000		
10. Packing & forwarding	12,000		
11. Others (miscellaneous)	30,000		
	-----	2,30,700	
COST OF SALES		34,96,430	
Profit before tax		1,45,570	

BREAK-EVEN LEVEL

$$\begin{aligned}
 \text{B.E.L. of net sales} &= \frac{\text{Rs. } 3,13,140 \times \text{Rs. } 36,42,000}{(\text{Rs. } 36,42,000 - \text{Rs. } 31,83,290)} \\
 &= \text{Rs. } 24,86,224 \\
 &= \text{Say Rs. } 24,86,200 \\
 &=====
 & \quad (68.3\% \text{ of projected sales})
 \end{aligned}$$

* Please see Appendix II. For the purposes of costing variable overheads have been taken to be Rs.71,660 treating raw materials alone to be the prime cost of products. The total fixed overheads assumed for costing purposes is Rs.3,13,140, ie., Rs.82,440 + Rs.230,700.

APPENDIX IX

PROFIT AND CONTRIBUTION ANALYSIS FOR MAJOR PRODUCT CATEGORIES

Sl. No.	Products	Variable overhead cost per unit.	R.M.cost per unit	Total Variable Cost/ unit	Fixed overhead cost per unit	Total cost per unit	Unit Sale price (Rs.)	profit/ Loss per unit.	Unit contri- bution	Percent- age pro- fit/loss	percent- age con- tribution
1.	Tubes/Sheets (Large size) LDP.	0.15	14.00	14.15	0.42	14.57	16.00	+ 1.43	1.85	+ 8.94%	11.56%
2.	Bags (Large size) (LDP)	0.20	14.00	14.20	1.06	15.26	16.00	+ 0.74	1.80	+ 4.63%	11.25%
3.	Bags (Small size) (LDP)	0.60	14.00	14.60	2.23	16.83	17.00	+ 0.17	2.40	+ 1.00%	14.12%
4.	Tubes/Sheets (Small size) LDP (LDP)	1.19	14.00	15.19	4.35	19.54	17.00	- 2.54	1.81	- 14.94%	10.65%
5.	Coloured Bags (LDP)	0.69	14.44	15.13	4.07	19.20	20.00	+ 0.80	4.87	+ 4.00%	24.35%
6.	Coloured Tubes (LDP)	0.15	14.44	14.59	0.42	15.01	18.00	+ 2.99	3.41	+ 16.61%	18.94%

REMARKS;

1. The amounts are in rupees.
2. For all products, the unit has been taken to be one Kg.
3. PVC products do not find a place above since they could not be meaningfully costed.
4. Percentage profit/loss & percentage contribution are in relation to unit sales prices.
5. Total Variable Cost = Variable Overhead cost + Raw Material Cost.
6. Total Cost = Total Variable Cost + Fixed Cost.
7. Profit/Loss = Sale Price - Total Cost.
8. Contribution = Sale Price - Total Variable Cost
9. The unit needs to raise its prices for LDP Tubes/Sheets (small size) by atleast 15%
10. The proportion of coloured products, particularly coloured tubes, should be increased in the unit's product mix.

PAST PERFORMANCE OF THE UNIT (Last 3 years)
WITH COMPUTATION OF BREAK-EVEN LEVELS

(Amounts in rupees)			
Income/Expenses	1979-80	1980-81	1981-82
INCOME			
Sales	25,77,630	38,99,020	28,46,540
EXPENSES			
A) Factory expenses			
a) Variable			
1. Raw materials	21,97,340	33,29,280	24,48,030
2. Power	25,230	29,910	27,000
3. Repairs & Maintenance	7,570	25,980	19,250
4. Fuel	4,540	12,870	8,480
Sub-total (a)	22,34,680	33,98,040	25,02,760
b) Fixed			
1. Wages & salaries	54,000	54,000	48,620
2. Rent	16,450	22,920	9,780
3. Insurance & licence fees	8,960	8,220	8,000
4. Depreciation	24,120	18,590	12,800
Sub-total (b)	1,03,530	1,03,730	79,200
Total (A) (sub-totals a+b)	23,38,210	35,01,770	25,81,960
(B) Selling & Administrative Expenses			
1. Salary and Bonus (Manager)	47,140	57,310	58,400
2. Postage & telegram	10,620	15,860	16,450
3. Printing and stationery	8,710	5,670	1,860
4. Interest (Bank & others)	78,960	86,290	65,980
5. Bank charges	1,960	5,090	3,450
6. Commission	740	3,820	--
7. Advertising	3,760	2,910	3,020
8. Subscriptions	1,930	4,920	2,720
9. Travelling expenses	10,600	17,790	6,500

	1	2	3	4
10. Motor car maintenance	--	--		6,160
11. Packing & forwarding	7,160	8,650		9,000
12. Others (miscellaneous)	27,450	78,020		36,490
Total (B)	1,99,030	2,86,330		2,10,030
Total expenses (A + B)	25,37,240	37,83,100		27,91,990
Profit before tax	40,390	1,10,920		54,550
Break-even level of sales	22,74,056.530	35,753.1		23,94,859.2
Say	<u>22,74,100</u>	<u>30,35,800</u>		<u>23,94,900</u>

REMARKS

1. Sales include both production and trading sales.
2. All amounts have been rounded off to the nearest rupees ten.
3. The item 'interest' includes, apart from interest on bank borrowings, interest payment to some chit funds also.
4. The item 'others' under selling and administrative expenses, is made up of several miscellaneous expenses (including substantial amounts by way of auditors fees/drawings) whose break up could not be provided by the unit.
5. The figures pertaining to 1981-82 are only provisional based on the records available and discussions with the unit, since the financial statements for the year were not available at the time of the study.
6. For 1979-80 and 1980-81 wages have been computed roughly on the basis of Rs.4,500 p.m. since the unit does not maintain, nor furnish a manufacturing account.
7. For the purposes of computing the break-even levels, the entire selling and administrative expenses have been treated as fixed.

APPENDIX XI

WORKING CAPITAL ASSESSMENT FOR 1982-83

Sl. No.	Item	Requirement Rs. (nearest Rs. Ten)	Margin (%age)	Permissible borrowings (Rs.) Nearest Rs. Ten
1.	Raw materials and consumables (Please see remarks below)	84,150	25%	63,110
2.	Semi-finished and finished goods (1 month at cost of production)	272,140	30%	190,500
3.	Bills (1.4 months) (Requirement at cost of sales - Please see remarks below)	407,910	10% on sale value	382,410
4.	Expenses (1 month)	30,720	-	-
		<u>794,920</u>		<u>636,020</u>
	Less Estimated credit for purchases (1 week)	65,160		
	Less Bank borrowings (Avg.) Net deficit to be met	<u>636,020</u>		
		93,740		

NOTE: In the absence of current financial statements, liquid surplus could not be ascertained. The net deficit will be met from cash accruals and liquid surplus, if any.

REMARKS:

- The raw material stocking level has been arrived at as follows:-
 - LDP granules - average stock 4,200 Kgs (Appendix III) - Rs.58,800
 - Other raw materials and consumables - Average stock from Appendix II. 2 months' consumption (Annual consumption - Rs.152,100) - Rs.25,350

Total (representing a stocking of roughly 10 days' consumption of all items together) Rs.84,150

APPENDIX XI
... contd.

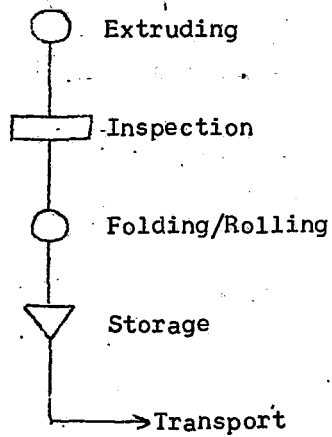
2. Cost of production and cost of sales are derived from Appendix VIII.
3. It is estimated that atleast 30% of the unit's sales will be on cash basis.(for 1981-82, cash sales were approx. Rs.3,000/day or about Rs.9 lacs for the year which is roughly 31.6% of the total sales). The weighted average bill payment period for credit sales approximates to 2 months: The overall weighted average bill payment period works out, therefore, to 1.4 months, ie., 0.7×2 months. However, the cover period for bills may be retained at 3 months since some of the customers take between 2 and 3 months to effect payment.
4. The interest on average bank borrowings at 13% p.a. works out to Rs.82,683 (say Rs.82,700) while Rs.84,000 has been provided for in Appendix VIII. In other words a provision has been made for roughly Rs.1,300 towards interest on other borrowings.
5. The limit for raw materials should take into account peak level stockings of, particularly, LDP granules. An additional provision of Rs.10,500 (750 kgs of LDP granules) in the requirements and Rs.7,275 in the permissible limits should suffice.

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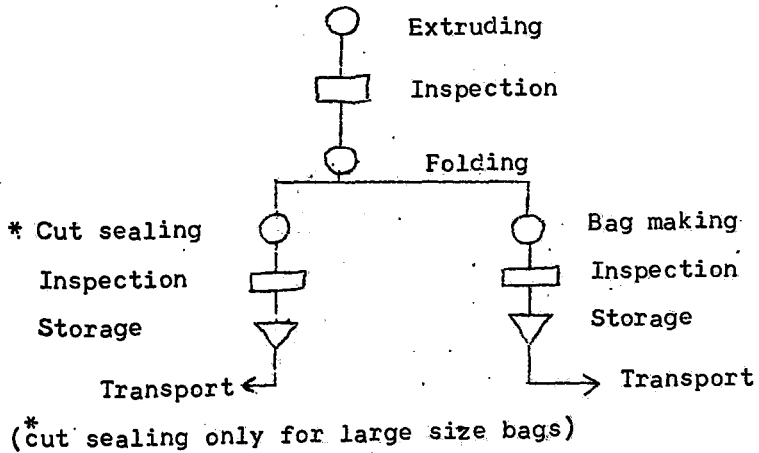
APPENDIX XII

FLOW PROCESS CHARTS FOR MAJOR PRODUCT CATEGORIES.

L D POLYETHYLENE TUBES / SHEETS - LARGE SIZE / SMALL SIZE

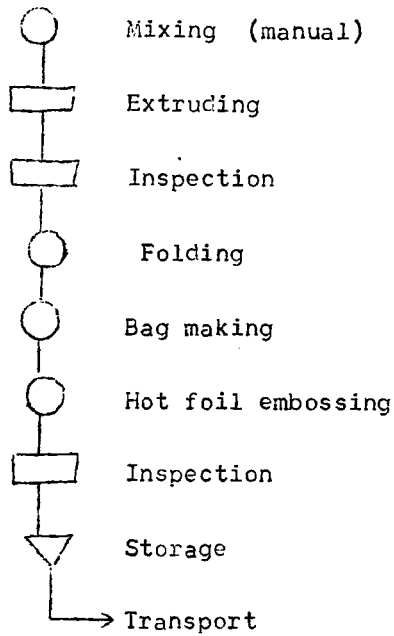


L D P BAGS - LARGE SIZE / SMALL SIZE

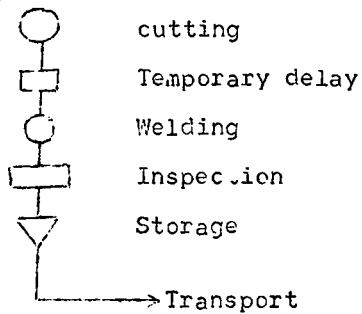


APPENDIX XII
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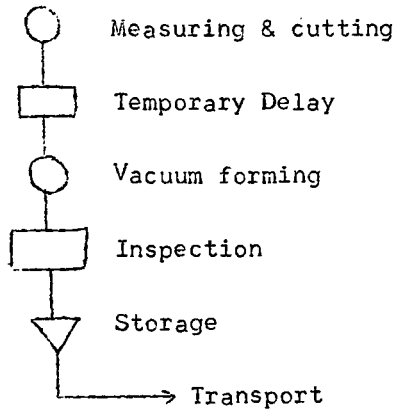
L D P COLOURED BAGS



P V C WELDED PRODUCTS



P V C VACUUM FORMED PRODUCTS



@@*@*@*

APPENDIX XIII

TREND ANALYSIS

Sl. No.	Item(s) of Expense/ Income	Base year 1979-80	1980-81	1981-82 Provl.
I	SALES (including trading sales)	100	151.3	110.4
II	VARIABLE FACTORY EXPENSES			
1	Raw materials and consumables	100	151.5	111.4
2	Power and fuel	100	143.7	119.2
3	Repairs and maintenance	100	343.2	254.3
4	Total	100	152.1	112.0
III	FIXED FACTORY EXPENSES			
1	Wages and salaries	100	100.0	90.0
2	Rent	100	139.3	59.5
3	Insurance and Depreciation	100	81.0	62.9
4	Total	100	100.2	76.5
IV	SELLING & ADMINISTRATIVE EXPENSES			
1	Manager's salary and bonus	100	121.6	123.9
2	Interest (Bank and others)	100	109.3	83.6
3	Travelling expenses and motor car maintenance	100	167.8	119.4
4	Postage, telegram, printing & sta- tionery	100	111.4	94.7
5	Bank charges, commission, adver- tising and subscriptions	100	199.5	109.5
6	Packing and forwarding	100	120.8	125.7
7	Others (miscellaneous)	100	284.2	132.9
8	Total	100	143.9	105.5
V	TOTAL EXPENSES	100	149.3	110.0
VI	PROFIT BEFORE TAX	100	274.6	135.1

- REMARKS: 1. The trend analysis has been made on the figures provided in Appendix X.
2. Trend analysis of balance sheet items could not be undertaken as the balance sheets were not made available by the unit.
3. It appears fairly certain that the figures given in Appendix X particularly those relating 1980-81 have been "doctored".

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SMALL TOOLS SERVICES

BRIEF HISTORY OF THE UNIT

The unit is a sole proprietary concern, Sri K Bhaskaran being the sole proprietor and enjoys the following credit facilities:

Cash credit (bills)	..	Rs.3.5 lacs
Cash credit (L & K)	..	Rs.3.5 lacs
Cash credit (mundy type)	..	Rs.1.5 lacs
Term Loan I	..	Rs.0.94 lacs
Term Loan II	..	Rs.0.35 lacs

Limit for establishment of letters of credit Rs.5 lacs. The unit commenced production in the year 1971 and is engaged in the manufacturing of engineering/special cutting tools. The unit is regular supplier of special cutting tools to automobiles and auto-ancillary manufacturing units of repute.

As per the recommendations, the limits were revised recently. The recommended limits are:

Cash credit (L & K)	...	Rs.2.5 lacs (reduced from Rs.3.5 lacs)
Cash credit (mundy type)	..	Rs.1.5 lacs
Cash credit (bills)	..	Rs.7.0 lacs (enhanced from Rs.3.5 lacs)

The study was undertaken to examine the adequacy of the cash credit (L & K) limit.

RAW MATERIAL

The raw materials required are mainly high speed steel (HSS) 6:5:2 and HSS 5% cobalt, along with EN series steel. The unit gets HSS material from M/s Firth India Limited, Bombay for its indigenous requirements. However its major supply of raw materials is through imports under licence, mostly from Japan and Austria.

The main classification of raw materials required

is as follows:

<u>R.M.</u>	<u>Size range</u>	<u>No. of items</u>
a) HSS 6:5:2 rounds	8mm - 135 mm	30
b) HSS 6:5:2 Flats	28X8 to 50X16	10
c) HSS 6:5:2 Squares	30mm to 55 mm	5
d) 5% Cobalt Rounds	15mm - 135 mm	} 15
Squares	25mm	
Flats	40X28 & 45X28	
e) EN-19 Rounds, Flats & Squares	-	25

Items a, b, c, d are partly imported and item e is easily available indigenously. The last item is required for butt welded tools.

Government has imposed some restrictions regarding the imports of HSS 6:5:2 rounds upto the size of 95 mm dia. As per the directive, atleast 1/3 of total purchase must be indigenously, then only rest 2/3 may be allowed to be imported. Earlier the restriction was only upto 40mm dia size.

Proper and optional stocking of raw material is the strong point of small units in this field. Sometimes higher size material is used by reducing the size but this will affect the unit adversely, so materials of all required sizes should be stocked in order to maximise profit.

PRODUCTS

The tools manufactured by the unit are to specific designs and drawings supplied by the consumer. This can be broadly classified as follows:

a) SHANK TYPE

Reamers, endmills, slot drills, form drills, subland drills, various form cutters, core drills, counter bores, counter sinks, dove tail milling cutters, hole mills, twist drills, etc.

b) BORE TYPE

Cylindrical milling cutters, double angle milling cutters, equal angle milling cutters, shell core drills, shell and mills, shell reamers, etc.

c) FORMED RELIEVED ITEMS

Concave milling cutter, convex milling cutter, keyway milling cutter, single counter rounding cutters, etc.

d) 5% COBALT ITEMS

Subland drills, wick tools, form milling cutters, stepped core drills, spot facing cutters, shell reamers, twist drills, etc.

The unit is manufacturing only to orders and are booked for next 3 months. The major consumers are TELCO, Ashok Leyland, TVS Group of industries, Enfield, TI cycles, Widia India, HAL, HMT, BEML, BHEL, Bajaj Tempo, Kirloskar, etc.

The reputation of the unit is good in the market regarding quality and supply according to schedule.

PROCESS

The process of manufacturing cutting tools is a sum total of a number of machine operations:

- | | |
|----------------------------------------|-------------------------|
| a. cutting | |
| b. Facing | |
| c. Step turning | |
| d. Shot blasting | } Subcontracted outside |
| e. Butt welding | |
| f. Annealing | |
| g. Buff reaming | |
| h. Taper turning, shank turning, etc., | |
| i. Grinding, debutting, etc. | |

CAPACITY

The major facilities available are lathes, milling machine grinder, testing machine, etc. The capacity utilisation is around 75%. The unit's sales

have increased from Rs.19,47,132 in 1980 to Rs.23,89,613 in 1982. Even allowing for the rise in the cost of raw materials, the increase is considerable. The net profit earned by the unit has also increased from Rs.40,776 to Rs.73,725 for the corresponding period.

POSITION OF ACCOUNTS

The present position of account as on 22nd April 1982 is given below:

Item	Limits sanctioned	Value of stocks/ machinery bills (Rs)	Advance value (Rs)	Drawing power (Rs)
Lock & Key	3,50,000	3,47,253	2,77,802	2,77,800
Mundy	1,50,000	2,23,144	1,52,523	1,50,000
Bills	3,50,000	5,97,034	4,47,776	3,50,000
Total	8,50,000	11,67,431	8,78,101	7,77,800

There is a clean drawing of Rs.2.08 lacs.

PERSONNEL

The unit's chief executive and the proprietor Sri K Bhaskaran is the man behind the venture. He has completed 5 years' course of 'Machine Shop Engineering' in Indian Ordnance Factories under Ministry of Defence, Government of India. He joined M/s Addison and Company Limited (Tools division) and worked in various capacities before he became production engineer, responsible for the production of the factory. He was with them till 1966. Then he joined M/s SKP Tools Ltd., in the capacity of Works Manager and worked there till 1971. In 1971 he started his own venture, M/s Small Tool Services and has been running it till now as a proprietary concern.

He is ably assisted by technically qualified people in the factory and for marketing of the production the responsibility has been assigned to a separate organisation.

PROJECTED PRODUCTION AND PROFITABILITY

The net sales are expected to increase from Rs.23.89 lacs in 1982 to Rs.40.00 lacs in 1985. The net profit will also improve over the years. The projected sales are high as the unit expects an increased demand for its tools (as the automobile and auto-ancillary industry is increasing its production every year), and also higher selling price for its products in view of increase in cost of inputs, particularly raw materials. The profit production is considered feasible.

MARKETING

GENERAL

The unit is selling its products to automobile and auto-ancillary industries. The proprietor had a good idea about the market and its demand when the unit was started in 1971 as he was in the field before starting his own venture.

The unit has handed over the sales responsibility to a separate organisation, M/s S/LPRC, which has resulted in increased sales. In the expansion programme at TELCO & Ashok Leyland in the past, the unit has found large potential in these big organisations, besides like TVS group of companies. The unit is always on the look out for new items from its customers to increase production.

PRODUCTS

The unit's products are consumable in nature and are made for automobiles and ancillary to automobiles. The cutting tools manufactured by the unit are made to specific drawings and designs.

TESTING

The unit has good facility for testing its products, so as to match consumers' requirements and this also reduces late rejections.

CREDITS OFFERED

Even though the offered credit is one month, but being a small scale unit catering to large organisations it is not in a position to force them to pay before 3 months.

Sales have steadily increased in the past. The major buyers are automobile industries, who in serving the transport need of the country, are always in the look out for increasing their capacity. Some of the big houses are opening their units abroad in collaboration with foreign government. With this trend and units tools being consumable in nature, they will always have a higher demand from these industries. The unit's sales organisation is fully equipped and experienced in this line and could be in a position to tap new sources, as they have done in the past.

The strategies that have helped the unit in selling are:

- a) Healthy contacts with private and public sector undertakings;
- b) Prompt delivery;
- c) Manufacturing tools to specific drawings and designs;
- d) Taking up the problem of consuming industry and designing tools to serve their purpose;
- e) Manufacturing bull-welded tools, thereby reducing the unit cost of tools.

UNIT'S POSITION

The unit's products have been well received by its customers and the capability of the unit to manufacture and supply precision tools is well acknowledged.

INVENTORY CONTROL

THE PRESENT SYSTEM

At present the unit is following a system, in which ordering is done on the basis of total orders in hand to be delivered within two or three months and present stock position of various raw materials.

The lead time for procuring imported raw materials is around six months and for indigenous material around four months. If there is any sudden rise in demand for a particular raw material, the present system cannot cope with.

Moreover, the safety stock limit is also arrived at randomly, not taking into consideration the consumption pattern for the last year.

This has led the unit to purchase material from local market at a high premium, eating up the profit.

THE PROPOSED SYSTEM

In order to design a selective stock control system for all raw materials an ABC analysis of the raw materials based on the value of annual consumption was made. The consumption of raw material was taken from stock issue register. For collection of data the period January 1982 to June 1982 was not considered, as the unit had some labour problem and the consumption during the period will not be representative. Instead, April 1981 to December 1981, i.e., nine months plus July and August 1982, i.e., total eleven months have been taken and proportionately increased to arrive at the annual figure. (Appendix I).

Out of the 98 items, 37 of them (38%) are classified as A class items (value of annual consumption per year above Rs.10,000) and the value of these 37 items constitute 80.59% of the total value of raw material consumed.

For the B class items (22 in numbers) which forms 23% of the total number of raw materials, the value is 14.4% and for C class items which comes to 39% (39) of the items, the value is 5.01%. The details are given in Appendix II & III.

FREQUENCY DISTRIBUTION

Frequency distribution of the consumption of some of the A class raw materials were plotted on a graph paper to find out whether it will fit into any of the three different types, normal, poisson and exponential. But, none of them fit into any of the three different types, most of them have a slight similarity to exponential distribution.

LEAD TIME FOR PROCUREMENT

Most of the raw materials required are imported from Japan and Austria. The unit will prefer to import as much as possible due to quality reason. Government of India has imposed some restriction regarding the imports of rounds. As per the directive for sizes 8 mm dia to 95 mm dia, atleast 1/3rd of total requirement must be procured indigenously, only after that the unit can proceed to import the rest 2/3rd amount.

Lead time for procuring imported items is 25 weeks.

and for HSS indigenous items 15 weeks. Considering the above-mentioned lead time for procurement, the supply may be stated to be prompt.

For items which are procured indigenously as well as imported a weighted average of lead time, i.e., 21 weeks has been taken for arriving at safety stock value.

SAFETY STOCK

The safety stock provides a cushion against variations in lead time and consumption. For A class items, safety stock has been found out for selected items:

$$\text{Safety stock} = k \cdot w \cdot \sqrt{\text{LTW}}$$

k = constant factor
 w = standard deviation
 LTW = lead time in weeks.

Factor k has been taken as 1.0 considering the frequency pattern. The safety stocks for the A class raw materials are given in Appendix V.

M O Q

The minimum order quantity for popular items is 200 kg., and for the rest HSS items 100 kg., for imported as well as indigenous items. The MOQs are given in Appendix IV.

E O Q

The economic order quantity is one which balances the cost of ordering the raw materials and the cost of holding inventory and is given by the formula:

$$\text{E O Q} = \sqrt{2Aa/ic}$$

where

- A = Annual demand and consumption in units
- a = Incremental ordering cost
- i = Incremental inventory carrying cost per year as a fraction of the cost of materials stocks
- c = Price of raw materials per unit.

Almost all the HSS items are imported either fully or atleast 2/3rd quantity. The lead time is also very high, ie., 25 weeks. Considering these two factors, ordering E O Q quantity which is always less than M O Q in this particular study has been ruled out.

MONTE-CARLO SIMULATION OF CONSUMPTION PATTERN

With the data of safety stock and reorder levels, for the system chosen, the consumption pattern of five A class itcms were simulated for 48 weeks using random numbers.

The weekly consumption data were classified into class intervals. Against each class interval, the number of occurrence (frequency) is marked. The cumulative frequency were again converted into percentage cumulative frequency and numbers were allotted to each class intervals, based on the percentage cumulative frequency.

After plotting for all the 48 weeks, in cases the Safety Stock has been shifted, keeping in view the fact that the stock out occurring for a period should not affect the business. (Appendix V).

'A' CLASS ITEMS

Details regarding 'A' class items; viz., maximum consumption, order quantity, reorder level, average stock are given in Appendix VI. This is the suggested system for all 'A' class items.

INVENTORY SYSTEM FOR 'B' CLASS ITEMS

For 'B' class itcms a two-bin system of stock control has been recommended. The details regarding reorder level and ordering quantity have been given in Appendix VII.

From Appendix it may be seen that even for the popular sizes of rounds for which the MOQ is 200 kgs, the ordering quantity has been taken as 100 kg.

The reason for taking 100 kgs, instead of 200 kgs, is that annual consumption for all the popular size B class items is such that it has only to be ordered once in 2 or 3 years and not every year. So, two items will cancel each other even if the ordering quantity is 200 kgs, so far average stock calculation 100 kgs, has been taken.

INVENTORY SYSTEM FOR 'C' CLASS ITEMS

'C' class items can be bought twice in a year as the value involved is very little. Total requirement may be calculated from past performance in the beginning of the year. Half the amount may be bought at the time and rest, after about six months.

PRODUCTION PLANNING AND CONTROL

The unit has a good system for planning its production. Since the number of products and the number of raw materials are more, it is difficult for such units to survive without a good production planning programme.

The unit is supplying through its marketing agency only against specific orders. The production schedule has to be maintained strictly to supply in time, the goodwill created thereby is the main publicity for this kind of industry.

FINANCIAL ANALYSIS AND WORKING CAPITAL REQUIREMENTS

RATIO ANALYSIS

GENERAL

The sales (value) of the unit has increased from 17.43 lacs to Rs.23.89 lacs in a span of 5 years. This is an indication of the unit's progress in the last few years. About 40% of the increased sales is due to increase in cost of raw material, but on an average, the sales volume has increased about 5% every year.

The profits for the last four years are more or less steady, varying from Rs.42,000 to Rs.72,000. Even though sales have gone up considerably, profits remained almost constant showing the declining profit margin on sales. This is basically due to very tough competition in the line. Another major reason that has contributed to the decreasing profit margin is the increase in raw material prices.

ACTIVITY RATIOS

The average stocking of raw materials is found not to be optimum. The inventory turnover ratio 6.32 in 1978 came down to 3.45 in 1980, but has again picked up and is 4.17 in 1982. This is an indication of unit's effort towards effective inventory control.

The assets turnover ratio (sales turnover by total assets) has remained more or less the same.

LIQUIDITY RATIOS

The current ratio (current assets by current liabilities) has remained steady with minor change in last five years. The range of ratio is between 0.98 to 1.1.

The acid test ratio also has remained more or less the same and is around 0.50.

PROFITABILITY RATIOS

Return on total capital employed was steady upto 1981 maintaining the level at around 27%. There is a slump in 1982, the figure has come down to 20%. This is mainly due to rise in raw material price without the corresponding rise in products and also purchasing of raw materials from local market at a premium. (Appendix X).

WORKING CAPITAL REQUIREMENTS

The working capital requirements has been calculated. The gross requirement is found to be Rs.17.95 lacs.

Working capital requirements have been worked out on Tandon Committee norms for the type of industry, viz., Engineering Ancillaries to which category the unit belongs.

The following deviation from prescribed norms are also found to be necessary and reasons therefore are

also furnished:

	Prescribed Norms	Recommended
	-----	-----
a. Work-in-progress	3/4 month	1 3/4 months
b. Finished goods and receivables	2 1/2 months	3 months

WORK-IN-PROGRESS:

The unit manufactures more than 200 different items of tools per month to customers' specific requirements. It has to do the necessary tooling, etc., before the jobs are completed. It is found that the unit has to keep some jobs at different stages of manufacture so that the necessary try-out at various stages can be carried out. Services like the heat treatment, machining, bulk welding for which the unit has to rely on sub-contracting, involve a time delay of around 20 days. It has been estimated after detailed discussion that the unit would require a minimum unavoidable stocking of work-in-progress equivalent to 1 3/4 months' cost of production and the same is recommended.

The average invoice value now comes to Rs.2.8 lacs. Looking at the trend of pick-up in sales, value has been taken as Rs.3.0 lacs for future and calculations done accordingly. The raw material content (at present price) works out to be 40%.

FINISHED GOODS AND RECEIVABLES

The unit does not require stocking of finished goods. However, it requires receivables to the extent of 3 months for the following reasons.

- a) The unit caters to public sector undertakings like BHEL, HMT, HAL, Railways, defence installations, etc., apart from leading automobile industries and auto-ancillaries. These units accept goods after try-out, as

almost all the items are made to customers' specifications. After acceptance, it takes another 1/2 months to pay, thus making the total delay around 3 months.

- b) The unit being a small scale unit and catering to large undertakings, is not in a position to force them to pay before 3 months.

RAW MATERIALS:

The unit is importing raw materials under actual users licence, for the past 8 years. Since certain raw materials like HSS-cobalt are not available indigenously. Further, in the absence of any metallurgical laboratory in its premises, it considers it safe to depend on test certificates from reputed expertise of HSS materials.

There are very few indigenous suppliers and few of them are in fact new to the field. The minimum order quantity for popular range is 200 kgs, and the price ranges from Rs.90 to Rs.175. As on date, the credit available is also negligible.

The unit manufactures as many as 200 tools per month to varied reputed industries against their requirements. These industries insist on quality as well as prompt delivery.

Keeping the above mentioned factors in mind the system has been suggested and calculations made basing on the system.

Appendix IX gives details of calculations for working capital requirements.

CONCLUSION

The unit is a competently managed unit. With proper stocking of raw material, it will rise faster in future.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

- a) Based on the suggested system of inventory control the raw material inventory requirement for a level of production 10% more than present level (10% rise is envisaged) is found to be Rs.4.5 lacs in value.
- b) It was seen that the unit was stocking at a low level, though Rs.5 lacs limit was given in Mundy and L & K. This resulted in purchasing of raw material from local market at about 40% premium. This, if continued, will definitely affect the health of the unit.
- c) Even though the suggested system will increase the inventory holding and subsequently the interest, cost will be higher, but considering the present number of stockouts and delaying of orders, the system has been suggested. The unit is manufacturing cutting tools to specific designs and drawings, this is a highly competitive field. It requires alloy steel in different shapes and sizes. The strength of a small scale unit in this field completely depends on quality and time bound supply. Steel requirements are mostly imported, though a fraction is procured indigenously. The time required for procuring indigenous as well as imported raw material is very high.
- d) Automobile and ancillary industry is expanding with Central Government backing. TELCO and some others are opening their units in Africa and other countries. The tools are consumables, so, a rise in demand is envisaged.
- e) The unit has a good, production planning system and the unit's marketing, handled by a separate concern, is also on a sound line. The unit has a good system for recording the movement of raw material, but ordering is done randomly. In the past, stock-out has occurred a number of times forcing the unit to go for crash purchase at 40% premium.

- f. The financial position of the unit is not strong. The working capital requirement is found to be Rs.16.79 lacs.
- g. In short, with the professional approach of the management and proper stocking of raw material, the unit is expected to grow at faster rate than in the past even though it is in a very competitive line.

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LIST OF APPENDICES

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APPENDIX - I.RAW MATERIAL CONSUMPTION AND COST

S.No.	Raw material	Consumption for year in Kgs.	Replacement cost per Kg. in Rs.
<u>5% Cobalt Items</u>			
1.	15 MMR	22.9	150 for all 5% cobalt items
2.	19 MMR	2.9	
3.	21 MMR	2.4	
4.	24 MMR	54.5	
5.	28 MMR	48.9	
6.	32 MMR	121.8	
7.	35/36 MMR	20.3	
8.	42 MMR	137.1	
9.	48 MMR	115.1	
10.	55 MMR	126.3	
11.	80 MMR	20.9	
12.	120 MMR	166.4	
13.	110 MMR	45.6	
14.	135 MMR	14.8	
15.	40 x 28 MMF	124.7	
16.	25 x 25 MMF	50.9	
17.	25 MMS.	86.9	
18.	90 MMR	19.1	

S.No.	Raw Material	Consumption for year in Kgs.	Replacement cost per Kg. in Rs.
6:5:2 Flats			
19.	28 x 8 mm	11.9	
20.	24 x 10 mm	5.7	
21.	25 x 10 mm	23.7	
22.	35 x 16 mm	90.4	
23.	28 x 10 mm	14.0	
24.	35 x 25 mm	77.9	
25.	40 x 16 mm	77.8	
26.	245 x 16 mm	77.1	
27.	50 x 16 mm	51.1	
28.	3/4 x 5/8 inch	45.5	
29.	1 x 1 7/8 inch	50.3	
30.	52 mm	99.2	100 for all 6:5:2 square items
31.	40 mm	40.4	
32.	44 mm	206.6	
33.	45 mm	114.8	
34.	30 mm	24.9	
35.	1 1/4 inch	24.9	
3 6: 5 : 2 Rounds			
36.	8 mm	15.8	
37.	10 mm	31.9	
38.	13 mm	168.4	
39.	15 mm	440.5	
40.	16 mm	348.3	

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S.No.	Raw Materials	Consumption per Year in Kgs.	Replacement cost per Kg. in Rs.
41.	19 mm	185.3	
42.	20 mm	262.8	
43.	21 mm	77.1	
44.	22 mm	86.8	
45.	24 mm	712.1	
46.	28 mm	345.6	
47.	30 mm	642.1	
48.	32 mm	471.2	
49.	35 mm	325.7	
50.	38 mm	162.3	
51.	40 mm	322.4	
52.	42 mm	134.2	
53.	45 mm	378.2	
54.	50 mm	307.2	
55.	55 mm	128.3	
56.	60 mm	54.3	
57.	65 mm	173.1	
58.	68 mm	121.9	
59.	70 mm	32.0	
60.	80 mm	202.5	
61.	90 mm	94.1	
62.	95 mm	115.6	
63.	106/107 mm	159.2	
64.	117 mm	206.4	
65.	127 mm	41.2	
66.	133-135 mm	535.6	

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S.No.	Raw Materials	Consumption per year in Kgs.	Replacement cost per Kg. in Rs.
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67.	110 mm	218.0	
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68.	155 mm	7.8	
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M.42 (5% Cobalt)

69.	12 MMR	2.5	175
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70.	15 MMR	45.7	175
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71.	19 MMR	118.5	175
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72.	24 MMR	51.7	175
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K-9M (10% Cobalt)

73.	MMR	76.5	175
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R Round

S-Square

F-Flats.

APPENDIX - II.

A.B.C. ANALYSIS OF RAW MATERIALS

S.No.	Raw Materials	Value in Rs.	Cumulative value in Rs.
1.	24 mm Round	67644	67649
2.	30 mm Round	60999	128648
3.	133/135 mm Round	48204	176852
4.	32 mm Round	44764	221616
5.	15 mm Round	41847	263463
6.	45 mm Round	35929	299392
7.	16 mm Round	33079	332471
8.	28 mm Round	32832	365303
9.	35 mm Round	30941	296244
10.	40 mm Round	30628	426872
11.	50 mm Round	29184	456056
12.	20 mm Round	24966	481022
13.	120 mm (5% cobalt)	24960	505982
14.	19 mm Round (M-42)	20737	526719
15.	45 mm Round	20660	547379
16.	42 mm (5%-C) Round	20565	567944
17.	110 mm Round	19620	587564
18.	80 mm Round	19238	606802
19.	55 mm (5% C) round	18945	625747
20.	40 x 28 mm flat (5% cobalt)	18705	644452
21.	117 mm Round	18576	663028
22.	32 mm Round (5% C)	18270	681298
23.	19 mm Round	17603	698901
24.	48 mm Round	17355	716256
25.	1 x 1 7/8 inch flat	16675	732931
26.	65 mm Round	16445	749376
27.	13 mm Round	15998	765374
28.	38 mm Round	15418	780792
29.	107/107 mm Round	14328	791520
30.	107 mm Round	13388	808508

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31. 25 mm Round (K-9 m)	13035	821548
32. 42 mm Round	12749	834292
33. 55 mm Round	12189	846181
34. 68 mm Round	11581	858062
35. 30 mm Round	11480	869542
36. 95 mm Round	10982	869542
37. 35 x 16 mm Flat	10396	880524
38. 40 mm Square	9920	890920
39. 32 mm Round (En-19)	9086	900840
40. 24 mm Round (M42)	9048	909926
41. 35 x 25 mm Flat	8959	918974
42. 30 16 Round	8947	927933
43. 90 mm Round	8940	936880
44. 45 x 16 Flat	8867	946880
45. 22 Round	8246	945820
46. 24 mm Round (5% C).	8130	954687
47. 15 mm Round (M42)	7998	962933
48. 24 x 25 Round (5%c)	7635	971063
49. 28 mm Round (5% c)	7335	979061
50. 21 mm Round	7324	986696
51. 22 mm Round (EN-19)	6859	994031
52. 110 mm Round (5% C)	6840	1015044
53. 50 x 16 mm Flat.	5946	1020990
54. 28 mm Round (EN-14)	5700	1026690
55. 3/4 x 5/8 inch flat	5232	1031922
56. 60 mm Round	5159	1037081
57. 52 mm Square	5030	1042111
58. 44 mm Square	4040	1046151
59. 40 mm Round (EN-19)	3119	1050070
60. 127 mm Round	3708	1053778
61. 35 x 26 mm flat	3443	1057221
62. 15 mm Round (5% C)	3435	1060656
63. 80 mm Round (5% C)	3135	1060791
64. 50 mm Round (EN-19)	3065	106856

65. 35/36 mm Round (5% c)	3045	1069901
66. 70 mm Round	3040	1072941
67. 10 mm Round	3030	1072941
68. 90 mm Round (5% c)	2865	1078844
69. 35 x 10 mm flat	2726	1081562
70. 2 x 1 1/2 inch Flat	2582	1089023
71. 1 1/4 inch square	2490	1086634
72. 35-36 mm Round (EN-19)	2389	1089023
73. 135 mm Round (5% c)	2220	1091243
74. 2 1/2 inch Square	2114	1093357
75. 28x10 mm flat	1610	1094967
76. 8 mm Round	1510	1096477
77. 24 mm Round (EN-14)	1457	1097934
78. 28x8 mm Flat	1369	1099303
79. 80 mm Round flat	1048	110351
80. 155 mm Round	684	1101035
81. 24 x 10 mm Flat	565	1101691
82. 40 mm Square (En-14)	510	1102201
83. 12 mm Round (m-42)	438	1102639
84. 14 mm Round (5% c)	435	1103074
85. 21 mm Round (5% c)	360	1103434
86. 27 mm Round (em-49)	288	1103722
87. 32 mm Square (En-14)	276	1103997
88. 13 mm Round EM14	265	1104262
89. 20 mm Round (EM-14)	200	1104462
90. 125 mm Round (EN-14)	179	1104691
91. 16 mm Round (EN-14)	169	1104810
92. 90 mm Round (EM-14)	137	1104947
93. 180 mm Round (EN-14)	130	1105077
94. 10 mm Round (EN-14)	99	1105176
95. 38 mm Round (EN-14)	76	1105252
96. 85 mm Round (EN-14)	72	1105434
97. 43 mm Round (EN-14)	71	1105395
98. 55 mm Round (EN-14)	48	1105443

APPENDIX - III

BREAK UP OF RAW MATERIALS

Sl. No.	Class	Number	Percentage	Value	Percentage
1.	A. Class	37	38	890920	80.59
2.	B. Class	22	22	159150	14.40
3.	C. Class	39	40	55373	5.01

APPENDIX IV

LEAD TIME & MINIMUM ORDER QUANTITY

Sl. No.	Raw Materials	Lead time, for imported quantity	Lead time for indigenous quantity.	Minimum order quantity.
1.	5% Cobalt items	25 weeks	-	100 Kgs.
2.	455 Flats	25 weeks	-	100 Kgs.
3.	HSS Square	25 weeks	-	100 Kgs.
4.	HSS Round 8 mm to 95 mm	25 weeks	15 weeks	200 Kgs. (for 16 mm 25 mm 100 Kgs. for red.
5.	HSS round above 95 mm	25 weeks	-	200 Kgs.
6.	M.42 & K9M	25 weeks	-	100 Kgs.
7.	EN-19	--	4 weeks	-

APPENDIX V

STANDARD DEVIATION&SAFETY STOCK FOR 'A'CLASS
ITEMS FOR WHICH GRAPH HAS BEEN PLOTTED.

Sl. No.	Raw Materials	Standard Deviation	Safety stock
1.	24 mm Round	17.93	90.1
2.	30 mm Round	22.15	115.0
3.	32 mm Round	16.2	80.0
4.	15 mm Round	12.09	65.0
5.	16 mm Round	0.79	50.0

APPENDIX VI

INVENTORY SYSTEM FOR 'A' CLASS ITEMS

Sl. No.	Raw Material	Total consumption in 12 months in Kgs.	Max. consumption in one week in Kgs.	Proportionate consumption for lead time in Kgs.
1.	24 mmd	712.1	68.9	370
2.	30 mmd	642.1	85.9	335
3.	133/135 mmd	491.0	156.6	236
4.	32 mmd	471.2	61.1	230
5.	15 mmd	440.5	46.3	153
6.	45 mmd	378.2	71.8	181
7.	16 mmd	348.2	35.4	180
8.	28 mmd	345.6	36.5	131
9.	35 mmd.	325.7	84.4	130
10.	40 mmd	322.3	37.0	124
11.	50 mmd	307.2	198.2	106
12.	20 mmd.	262.8	90.3	80
13.	120 mmd	166.4	149.1	57
14.	19 mmd. (M42)	118.5	30.1	92
15.	54 Sq.	189.4	46.2	66
16.	42 mmd (5% c)	137.1	38.7	105
17.	110 mmd.	218.0	131.1	82
18.	80 mmd.	202.5	33.5	61
19.	55 mmd. (5% c)	126.3	33.7	60
20.	40 x 28 F (5% C)	124.7	34.2	100
21.	117 mmd.	206.4	69.1	59
22.	32 mmd. (5% c)	121 .8	78.2	75
23.	19 mmd.	185.2	37.6	56
24.	48 mmd. (5% c)	115.7	77.9	56
25.	1" x 7/8" F.	145.0	48.8	70
26.	65 mmd.	173.1	66.3	70
27.	13 mmd.	168.4	24.7	68
28.	38 mmd.	162.3	35.5	66

APPENDIX VI .. contd.

Sl. No.	Raw material	Total consumption in 12 months in Kgs.	Max. consumption in one week in Kgs.	Proportionate consumption for lead time in Kgs.
29.	106/107 mmd.	159.2	89.6	70.0
30.	107 mmd. K-9M	76.5	24.2	37.0
31.	25 Sq. (5% C.)	86.9	29.2	42.0
32.	42 mmd.	134.2	37.0	55.0
33.	55 mmd.	128.3	73.7	52.0
34.	68 mmd.	121.9	52.8	50.0
35.	30 Sq.	114.8	42.5	56.0
36.	95 mmd.	115.6	43.5	47.0
37.	35 x 16 F	90.4	30.2	44.0

APPENDIX VI CONTD.

Initial stock pattern/order quantity	Re order level	A.O. Stock SS+OQ/2.	Value
1. Graph/200	Graph	195.25	17549
2. Graph	Graph	177.75	16386
3. 300/250	250	139.0	12510
4. Graph/200	Graph	172.5	16388
5. Graph/200	Graph	169.2	16074
6. 200/200	170	117.0	11115
7. Graph/200	Graph	119.82	11383
8. 240/200	200	120.0	11400
9. 200/200	150	119.0	11305
10. 200/200	145	115.0	10925
11. 150/140	140	86.0	8270
12. 130/200	125	119.0	11305
13. 120/100	90	60.0	9000
14. 80/100	65	58.0	10150
15. 155/200	100	59.0	5900
16. 85/100	75	59.0	8850
17. 125/200	120	70.0	6750
18. 85/100	95	63.0	5985
19. 80/100	70	59.0	8850
20. 80/100	70	60.0	9000
21. 125/100	110	65.0	5850
22. 75/100	70	61.0	9000
23. 100/200	85	110.0	5850
24. 80/100	65	59.0	9150
25. 90/100	80	60.0	6900
26. 80/100	80	60.0	5700
27. 80/100	80	62.0	5890
28. 80/200	80	114.0	10830
29. 100/100	80	58.0	5220
30. 60/100	45	57.0	9975
31. 60/100	50	58.0	8700

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APPENDIX VII

Initial stock pattern/order quantity	Reorder level	CLASS OF STOCK SS + 00/2	Consumption in one year	Proportionate consumption in one year	Value Initial
				L.F.	L.C.
32. 70/200	65		110.0		10450
33. 470/100	60	50.3	58.0	25	55100/50
34. 370/100 (3-10)	60	25.0	60.0	120	57000/140
35. 280/100 (3-12)	65	51.7	59.0	25	59000/50
36. 360/100 F.	60	77.9	63.0	33	298500/50
37. 460/100 F	50	77.8	56.0	33	644000/50
38. 500/100	50	1	62		50/50

APPENDIX VII

INVENTORY SYSTEM FOR 'B' CLASS ITEMS

Sl. No.	Raw material	Consumption in one year	Proportionate consumption in L.T.	Initial stock O.Q.
38.	40 Sq.	50.3	25	50/50
39.	32 mm (En-19)	826.0	128	160/140
40.	24 mmd (M-42)	51.7	25	50/50
41.	34 x 24 F.	77.9	38	50/50
42.	40 x 16 F	77.8	38	50/50
43.	90 mmd	94.1	28	50/50
44.	45 x 16 F	77.1	38.0	50/50
45.	22 mmd.	86.8	24.0	40/200
46.	24 mmd (5% c)	54.5	27.0	40/40
47.	15 mmd M.42	45.8	22.0	40/50
48.	45 x 26 F(5%c)	50.0	25.0	40/50
49.	28 mmd (5% c)	48.0	24.0	40/40
50.	21 mmd.	77.1	23.0	40/50
51.	110 mmd. En.19	623.6	96.0	150/200
52.	110 mmd	45.6	22.0	40/50
53.	50 x 16 F	51.7	25.0	40/50
54.	28 mmd En.19	518.3	80.0	120/100
55.	3/4" x 5/8"	45.3	22.0	40/50
56.	60 mmd.	54.3	16.0	40/50
57.	52 Sq.	50.3	20.0	40/50
58.	44 Sq.	40.4	20.0	40/50
59.	40 mmd En-19	356.3	55.0	100/70

APPENDIX VII CONTD.

	Reorder Level	A.V.Stock	Value
38.	30.0	30.0	3000
39.	15.0	97.0	1067
40.	3.0	30.0	4500
41.	45.0	33.0	3795
42.	45.0	33.0	3795
43.	35.0	32.0	3040
44.	35.0	32.0	3040
45.	35.0	109.0	10355
46.	35.0	33.0	4950
47.	30.0	33.0	5775
48.	30.0	30.0	4500
49.	30.0	31.0	4500
50.	30.0	107.0	10155
51.	120.0	74.0	814
52.	30.0	33.0	4950
53.	30.0	30.0	3450
54.	100.0	70.0	770
55.	20.0	29.0	3795
56.	20.0	29.0	2755
57.	30.0	30.0	3000
58.	25.0	30.0	3000
59.	70.0	55.0	605
	TOTAL	862.0	61

APPENDIX VIII

DETAILED CALCULATIONS FOR WORKING CAPITAL REQUIREMENT'A' CLASS ITEMS

37 Items constitute A Class.

Total Average stock value of A Class items Rs. 3 47 955

(Margin 10% for imported
20% for indigenous)

Less 10% margin on all Rs. 34,795

Rs. 3,13,160

Now some of the items 1/3 must be procured
indigenously, only 2/3 may be imported

$$\text{i.e. } 1/3 \times 20\% + 2/3 \times 10\% = 6.66 + 6.66$$

$$= 13.32 \text{ Say } 13.5\%$$

For the items which have to be imported as well as
procured indigenously 13.5% may be taken as the margin.
Now 10% has been taken for all, so taking 3.5% more for
the above mentioned items

Rs. 3 13 160

Less. Rs. 13 178

Advance value of A Class
items. Rs. 3 00 982

'B' CLASS ITEMS

22 Items constitute 'B' Class

Total Average value of 'B' Class items Rs. 86 261

Less 10% margin on all 8 626

Rs. 77 635

Less 10% on indigenous items 2 880

Rs. 74 755

'C' CLASS ITEMS

39 Items constitute 'C' Class

'C' Class items total value	Rs. 55 272
C Class items can be bought twice a year value of each buy	Rs. 27 636
Average stock value	Rs. 13 818
Less 20% margin	Rs. 2 762

Advance value of 'C' class items	Rs. 11 056
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Work in Process

The average invoice value per month	Rs. 3 00 000
Reccmended minimum period of stocking	1.75 months.

1.75 months value of WIP	Rs.5 25 000
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Less margin 33 1/3%	Rs.3 49 965
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Raw Materials content 40%

Raw Material held in WIP	Rs.1 39 375
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50% of 1.75 months expenses	Rs.1 09 375
-----------------------------	-------------

TOTAL	Rs.2 49 361
-------	-------------

Advance value - A Class	Rs.3 00 982
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B Class	Rs. 74 755
---------	------------

C Class	Rs. 11 056
---------	------------

TOTAL	Rs.3 86 793
-------	-------------

The calculations are based on last years consumption. Expected rise in sales is 10%. This will increase raw material consumption by 4% and this in turn will increase average stock value by 2%

i.e.	Rs. 3 86 793
------	--------------

Plus R.S.	Rs. 7 735
-----------	-----------

TOTAL	Rs. 3 94 528
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APPENDIX IX

WORKING CAPITAL REQUIREMENTS

Items	W.C.R. Rs. in lacs	Margin	Permissible limit Rs. in lacs
Raw materials	4.50	10% for imported 20% for indige- nous	3.90
Work in process	3.80	33 1/3 %	2.50
Bills	9.00	20%	7.20
Total	17.30		13.60
Expenses for 30 days	1.25		
	18.55		
Less creditors Purchase	1.05		
	17.50		
Less liquid surplus	.75		
	16.75		

75% of Rs. 16.75 lacs = Rs. 12.56 lacs

Recommended limit:

Cash credit (Lock & key)	Rs. 3.75 lacs
Cash credit (Mundy)	Rs. 1.75 "
Cash credit (Bills)	Rs. 7.00 "
Total	Rs. 12.50 "

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RATIO ANALYSIS

		77-78	78-79	79-80	80-81	81-82
ACTIVITY RATIO	ANNUAL SALES					
1. Inventory turn-over ratio	A.V. Stock	6.32	4.84	3.45	3.79	4.17
2. Assets turn-over ratio	$\frac{\text{Sales turnover}}{\text{Total assets}}$	1.11	0.97	0.91	1.16	1.04
LIQUIDITY RATIO	CURRENT ASSETS					
1. Current ratio	Current liability	0.98	1.07	1.01	1.002	1.10
2. Acid test ratio	<u>QUICK ASSETS</u> Current liability	0.58	0.60	0.54	0.44	0.61
PROFITABILITY RATIO						
1. Return on total capital employed	$\frac{\text{Net profit before tax + long term liab.}}{\text{Prop. Fund + term liab.}}$	27.53%	27.37%	24.45%	28.81%	20.75%
2. Return on tangible net worth	$\frac{\text{Net profit after the Prop. fund - intangible assets}}{\text{assets}}$	.285	.196	.094	.14	.12

COIMBATORE MACHINE TOOLS (P) LTD

BRIEF HISTORY OF THE UNIT

The unit is being ably managed by Shri N Chinnaswamy, Managing Director, who has got sufficient experience in this line of manufacture by virtue of his association with Madras Machine Tool Manufacturers Ltd., as its Manager for the last 12 years. Shri C P Govindaraj is a qualified engineer having 3 years experience in Madras Machine Tool Manufacturers Ltd., as its Works Manager and 2 years experience in DP Foundry Works. He is the technical director of the company. Shri R Narayanaswamy, a B.Sc. graduate in chemistry is looking after the sales of the Unit as its commercial director. The areas of management, production and sales, the three vital areas for the successful and efficient running of the unit have been adequately served by a judicious combination of experience and education found in the directors.

PRODUCTION FACILITIES AND PRODUCTS

The unit is now functioning in - rented premises in Coimbatore. The unit has purchased land valued at Rs.72,000/- at Tiruchi Road, Coimbatore. The Tamilnadu Industrial Investment Corporation Ltd., has sanctioned to the unit a term loan of Rs.7 lakhs in September 1981 for the purpose of construction of modernised foundry, and for the acquisition of additional machinery. This loan could not be availed of due to delay in obtaining of clearance certificate from the urban land tax authorities.

The production facilities available in the unit consist of

	<u>Nos.</u>
Lathes	6
Milling machine	1
Shaping machine	2
Planning machine	1
Radial drilling machine	1
Gear Hobbing machine	1
Cutting machine	1
Bench drilling machine	1
Tool grinder	1
Diescl generating set	1

A complete list of machinery and equipment available with the unit is shown in Appendix I.

Skilled, qualified and experienced labourers numbering 100 are being employed. Besides, inplant training in the form of apprenticeship training is being imparted to an AMIE student.

PRODUCTS MANUFACTURED AND PROCESS OF MANUFACTURE

The unit is manufacturing six different varieties of lathes, viz., CMT-1, CMT-2, CMT-3, CBE-1, CBE-2 and Vijai lathes. CMT and CBE varieties are belt driven types while Vijai is an all geared lathe. Norton gear box is attached as an optional attachment to some lathes to convert them from belt drive to gear drive.

Graded castings (grade B-25) are received by the unit from PSG foundry, Coimbatore for lathe, lathebed, gap piece and saddle. Upgraded grey iron castings for head stock body, tail stock body, change wheel blanks, etc., are received from other small foundries. These rough castings which are procured from the foundries are rough machined by the unit to check whether the castings are of the desired quality. Defective ones are immediately returned to the suppliers for replacements. The lathe beds, other important sliding parts after preliminary machining are subject to a process carried 'annealing' to relieve machine stress. This is done in 24 hours. If gap bed is to be provided into the lathe the annealing or heat treatment process will be taken up after fixing the gap bed and after machining. This depends upon the order requirements. The lathe beds undergo natural seasoning for a month in the open yard at the factory. Then they are taken to the machine shop for bed grinding on planning machine. After grinding, the legs will be fitted with the bed after drilling and tapping operations are completed. The other components like headstock, tailstock machined at the unit are received at the assembling section and assembled there.

OTHER OPERATIONS

- (a) Saddle seating with the bed.
- (b) Cross slide seating and assembling.
- (c) Compound slide seating and assembling,
- (d) Tail stock assembling.
- (e) Headstock bearing, seating and assembling.

- (f) Lead screw bracket fixing, back and head screw assembling and fixing.
- (g) Individual drive assembling (optional)

- {h} Norton gearbox assembling.
- {i} Final alignment and inspection.
- {j} Load test and trial run.
- {k} Painting.
- {l} Packing and despatch.

Flow process chart indicating the sequence of operations is furnished separately in Appendix II.

MARKETING

The unit has a network of established dealerships in six States - Kerala, Karnataka, Maharashtra, West Bengal, Andhra, Tamilnadu and Pondicherry. The main incentive for the dealers is the 15% discount allowed on the list price. Moreover the unit shares 50% of the advertisement charges incurred by these dealers. Competition is severe and it is only through lower over-head expenses that the unit is able to score over its bigger competitors. It however suffers from the handicap of not being able to support an R & D Wing for effecting sophisticated product changes. Nevertheless based on feedback received from dealers the unit has, from time to time incorporated innovations and improvements on its products to suit the needs and requirements of its customers.

The unit faces competition from reputed lathe manufacturers like Mysore Kirloskar, PSG Industries, Madras Machine Tool Manufacturers Ltd., New Bharat Engineering Works and from other manufacturers of low cost Batala lathes from Punjab.

Considering the competition prevailing in the machine tool industry the unit has fared quite well not only in increasing turnover substantially in three years but also by exporting 42 lathes to Sri Lanka during 1981-82. In 1983 six lathes have been exported upto February 1983, whereas the L.C. has been opened for 16 lathes. The remaining lathes will be exported in three months time. The unit is confident of securing on an average, orders for 8/10 lathes per month in the near future.

One notable feature about the unit is that it is the only unit of its kind in the small scale sector trying to compete with the giants in the large scale sector.

The unit is also constantly on the look out for introducing new products by improving existing designs. It has kept itself abreast of latest developments in the machine tool industry and changes in technology are being assimilated to introduce new products. Eventhough the unit has got export orders, it is trying to locate alternate sources of buyers from abroad as exclusive reliance on one importer will not be advantageous in the long run.

INVENTORY CONTROL

ABC ANALYSIS

Based on the pattern of consumption of raw materials valuewise during the last year (Appendix III) 26 commodities of the 'A' category have been taken for detailed analysis. Based on a production programme of 100 lathes in 1983-84 estimated annual consumption of raw materials have been arrived at. Product mix proposed during the year 1983-84 is as follows:

Details	Lathes	Pieces
CMT - 1	Lathe	30
CMT - 2	"	15
CMT - 3	"	5
CBE - 1	"	15
CBE - 2	"	15
Vijai 1000	"	20
	Total	100

ECONOMIC ORDER QUANTITY

Economic Order Quantity (EOQ) has been derived with the help of the Wilson formula

$$EOQ = \sqrt{\frac{2ia}{c_i}}$$

- A = Annual consumption in units in the coming year (estimated)
- a = Ordering cost at Rs.5/- per order
- c = Unit cost of the material
- i = Cost of carrying the inventory assumed at 0.20

MOQ = Minimum order quantity is that batch or groups or units which the supplier will supply in one minimum lot.

In the case of lathe beds it has been taken in multiples of per bed casting weight.

Lead^{Time} represents the time lag between the time when the need for stock is felt and its actual arrival at the unit.

Actual quantity consumed at monthly intervals for each item of A class material is represented by x. This is then compared with the monthly average consumption during such intervals \bar{x} .

The standard deviation of monthly consumption is computed as follows:

$$\sigma_1 = \sqrt{\frac{(x-\bar{x})^2}{n-1}}$$

X = Monthly consumption in units in the previous year.
 \bar{x} = Average monthly consumption
 n = Number of readings taken.

$$\sigma_2 = \sigma_1 \sqrt{\frac{A_2}{A_1}}$$

Where

A₂ = Anticipated annual consumption
 A₁ = Anticipated annual consumption in previous year

$$\text{Safety stock} = K \times \sigma_2 \times \sqrt{L}$$

Where

L = lead time.

Order quantity = EOQ or MOQ or lead time consumption whichever is highest.

Average Stock = Safety Stock + $\frac{\text{Order quantity}}{2}$

EOQ, \bar{C}_1 and \bar{C}_2 have been calculated for all 'A' class items and safety stocks and average stocks determined on the basis of the above formula. Details are presented in Appendix IV.

In the case of some 'A' class items, lead time consumption has been found to be much greater than EOQ or MOQ. Multiple order level systems of inventory control are suggested for these items. Details of order quantities and order levels for all 'A' class items are obtained in Appendix V.

It is suggested that indents be placed by the unit for all 'A' class items under the system suggested whenever stock levels fall below the order levels calculated.

For B class items, it is suggested that orders be placed at two month intervals, order quantities being two months requirements. As far as 'C' class items are concerned, orders can be placed at four month intervals, for four months requirements. A safety stock of one month is suggested for 'B' and 'C' class raw materials.

Under such an inventory control system, the average stock holding is likely to be as follows:

'A' Items	--	Rs.81,000
'B' Items	--	Rs.35,000
'C' Items	--	Rs.10,940

Total		Rs.1,26,940

MACHINE HOUR COSTING

IDENTIFICATION OF COST CENTRES

The production facilities available at the unit have been divided into the following cost centres:

- (a) Lathe 6 Nos. identical in nature/same horse power 3 H.P. jobs can be interchanged amongst lathes, hence adopted as one Cost Centre.
- (b) Milling machine 1
- (c) Shaping machine 2 identical in nature performing similar jobs.

- (d) Planning machine 1
- (e) Radial drilling machine 1
- (f) Cutting machine 1
- (g) Gear hobbing machine 1
- (h) Generator set - Service Centre
- (i) Assembling and painting - Cost Centre
- (j) Welding set and maintenance sector - Service Centre.

SERVICE COST CENTRES

Two service cost centres have been identified, the same being (a) the generator and (b) the welding and maintenance section.

COMPONENT MACHINE LOADING MATRIX

There are approximately 150-200 components that undergo machining before being assembled into a lathe. Though a number of components are common to lathes within a particular type, each model of lathe has a number of components that are unique for that particular model. Very little commonality exists between lathes of different types. For example, there are common components for CMT-1, CMT-2, and CMT-3 machines but all other components are unique to each of these machines. Very little commonality exists between the CMT variety and the CBE variety of lathes.

As such, all components being machined at the unit were identified. Operating time and total time for machining each of these components on different machines were ascertained on the basis of discussions with the management of the unit and validated by observations on the shop floor. The component machine loading matrix was then drawn up with reference to the product mix envisaged for 1983-84. A summary of the matrix is presented in Appendix VI and shows the extent of loading on each of the machine centres.

ALLOCATION OF EXPENSES

Expenses for 1983-84 have been projected based on discussions with the unit and have been divided into:

- i) Prime costs which can be directly allocable to product.
- ii) Expenses non-allocable to product. Non-allocable costs have again been divided into:
 - a) Production expenses and
 - b) Administrative and general overheads.

Production expenses have been divided into fixed costs and variable costs and they have been allocated to cost centres on appropriate basis. Service Cost Centres costs, both fixed and variable, have been reallocated to cost centres on the basis of sub-totals.

Wages, supervision salaries, rent, insurance, depreciation and interest have been treated as fixed expenses directly allocable to cost centres. Expenses like powercharges, consumable tools and stores, repairs and maintenance charges have been taken as variable expenses directly allocable to cost centres. All administrative overheads have been treated as fixed.

BASIS OF ALLOCATION

The basis of allocation of some heads of expenditure to cost centres is discussed below:

- a) Rent : According to the area occupied by each cost centre. Rent of the office area has been taken into administrative overheads.
- b) Electricity : On the basis of operating hours of each cost centre x horse power of the machine at that cost centre. Power consumed at the office is negligible.
- c) Depreciation : On the basis of written down value of each machine at each cost centre.

- d) Insurance : On the basis of original installed value of each machine.
- e) MTL interest : Of a total MTL interest of Rs.15,000 interest of Rs.12775 has been allocated on the machine bought with this loan. The balance of Rs.2225 was not directly allocated to production cost centres as this balance was used to purchase office furniture and equipment for Rs.14,000/- and an annealing furnace for Rs.21,000/-. These have been taken as administrative overheads and redistributed again to cost centres on the basis of sub-totals.
- f) Wages : This has been divided into
- i. Direct wages to factory workers,
 - ii. Supervisors salaries, and
 - iii. Office salary.
- Direct wages have been treated as directly allocable to cost centres and have been apportioned on the basis of deployment of labour to each machine centre. Supervisor's salary has been apportioned on the basis of extent of attention to each machine. Office staff salary has been taken to administrative and general overheads.
- g) Service cost : Diesel generator. The cost of this centre has been distributed to all the production cost centres as all the machines are connected to it. The generator works approximately three hours on the average per day. As such this centre's variable costs have been allocated on the basis of H.P. x running hours. Fixed costs have been allocated on the basis of sub-totals.
- h) Administrative and General overheads : This consists of expenses like taxes, postages, telegrams, stationery, managing director's remuneration, audit fees, general expenses and such of those other expenses which cannot be directly allocated on the basis of

any fixed norms. The administrative overheads have been apportioned to production cost centres on the basis of percentage of sub-totals of allocated costs, preceding this allocation.

Appendix VII gives the complete table of cost centres and the expenses allocated to each.

DETERMINATION OF MACHINE HOUR RATE

Component machine loading matrix has been prepared with the help of product mix, operating time, and total time for all the components. After allocating and apportioning all the expenses to different cost centres, machine hour rates have been determined for each cost centre as follows.

$$\text{Variable machine hour rate} = \frac{\text{Total variable expenses}}{\text{Total operation hours}}$$

$$\text{Fixed machine hour rate} = \frac{\text{Total fixed expenses}}{\text{Total booked hours}}$$

The fixed machine hour rate would decrease with increase in turnover levels, while variable machine hour rate would remain the same.

PRODUCT COSTING

Prime costs like cost of raw material, boughtout components, subcontracting charges, and painting charges are added to machining and assembling charges to arrive at the cost of the product. Details of findings are presented in Appendix VIII.

As is evident, the unit makes substantial profits on Vijai 1000 and CMT-3 types of lathes. Though profits on other types are low and even negative with respect to CBE-2 - contributions on all are positive.

On the strength of the above, it is suggested that, since there is no scope for increasing the prices and discounts cannot be reduced any further from 15% already being given, costs have to be reduced on overheads. Product mix can also be changed in favour of Vijai and CMT-3 lathes in future.

Contribution towards fixed cost being positive on all models, it is not considered necessary to delete any of these models from the product mix. Concentration on selling effort can however be directed more towards pushing the more profitable models like Vijai and CMT-3.

FINANCIAL ANALYSIS

Funds flow statement reveals that long term resources have been used to acquire long term assets and short term funds used to acquire more liquid assets. There was no diversion of funds. The effective equity is being strengthened. A detailed funds flow statement is presented in Appendix IX. Various financial ratios indicating the operating efficiency of the unit are also presented in Appendix XA and XB.

WORKING CAPITAL ASSESSMENT

RAW MATERIALS

Based on the inventory control systems suggested for the unit, the working capital requirements on raw materials has been assessed at Rs.1.27 lakhs or 1.8 months consumption.

W.I.P.

The cycle time required for producing one lathe is approximately 2 months - one month for curing castings and one month for machining and assembling. As such one month requirement of castings (for curing) are required to be financed. The rest of the work-in-process consisting of lathes in the process of being machined and assembled, finance required for working capital has been assessed at one months cost of production, i.e., total raw material plus value added for one month.

Total finance required for work in process therefore is one month's requirement of castings plus one month's cost of production. Details are given in Appendix XI.

FINISHED GOODS

As the unit is catering to the export market, a provision of two weeks requirement of finished goods has been provided for. In respect of local sales, the unit

manufactures to order and as such no provision for stocking of finished goods for this purpose is contemplated.

BILLS

As export sales are through bills, a provision of 2 months' requirements has been made. The total working capital requirements of the unit are summarised in Appendix XII.

PROJECTED PROFITABILITY

Appendix XIII gives the projected profitability of the unit for 1983-84 and has been drawn up on the basis of discussions held with the unit. It is to be noted that a substantial portion of the projected profit of Rs.1,04,400 is due mainly to the addition of the Vijai 1000 model of lathe. There is however, adequate scope to improve profitability if overhead expenses are turned down.

CONCLUSION

The Unit maintains all relevant records necessary to obtain an overall picture of its operations. However, for purposes of strict controls, it is suggested that the stock register be posted with actual consumption of materials as and when materials are issued, to obtain better correlation with production.

As the consumption of consumable stores and sundry bought-out components form a major portion of costs, detailed stock register may be introduced, for identifying and pegging down unnecessary expenditure.

Log books can also be introduced to keep track of the extent of utilization of each machine and ascertain causes for poor utilization, if any.

SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS

ABC ANALYSIS AND INVENTORY CONTROL.

An analysis of raw materials consumed during the period January 1982 to December 1982 revealed the

following pattern:

Category	No. of Commodities	Annual consumption for 1982	% of consumption
A	26	349699.16	72
B	62	111667.00	23
C	83	24064.00	5
		485430.16	

Multiple order level systems have been suggested for nine of the 26 'A' items. Details are presented in Appendix V.

A safety stock of 1 month's consumption has been suggested for B and C items. Ordering quantity for these items have been fixed at 2 and 4 months consumption respectively. 'B' items being ordered 6 months a year, and 'C' items 3 times.

Based on the above systems, average stock of inventory required to be held by the unit for an anticipated level of turnover of Rs.19.42 lakhs in 1983-84 is Rs.362600.

COSTING

M/c hour costing of the various products made by the unit reveals the following:-

Details	CMT-1	CMT-2	CMT-3	CBE-1	CBE-2	Vijai 1000
List price	19250	20900	28490	11780	12870	21000
Discount	2887	3135	4273	1767	1930	3150
Net sales	16363	17765	24217	10013	10940	17850
<u>Cost</u>						
Fixed	6097	6445	7415	4276	5231	5050
Variable	10266	11250	12950	5644	5852	8031
Total	16363	17695	20365	9920	11083	13082
Contribution	6097	6515	11267	4369	5088	9819
Profit/Loss(-)	-	70	3852	93	-143	4769

As is evident, profit potential on CMT-3 and Vijai-1000 lathes are high compared to the rest. Contribution is however positive for all products.

It is suggested that product mix ^{be} suitably changed to accommodate more Vijai-1000 and CMT-3 lathes in future.

Attempt is also to be made by the unit to cut down on its overhead expenses to the extent possible.

When capacities at the unit are booked fully, the unit can gradually drop low margin lathes from its product mix, and concentrate effort in pushing up sales of the more profitable models.

WORKING CAPITAL ASSESSMENT

Working capital requirements of the unit have been assessed at Rs.3,28,000 based on 1.8 months requirement of raw material, 2 months requirement of work in progress, 2 weeks requirement of finished goods and 2 months requirement of bills.

FINANCIAL ANALYSIS

Effective equity has increased from Rs.2.79 lakhs in 1979-80 to Rs.3.49 lakhs in 1981-82 and liquid surplus available at the end of 1980-81 was Rs.1.02 lakhs.

Cash flow statement indicates the utilisation of long term funds for acquiring block assets and short term funds for acquiring liquid assets indicating appropriate utilisation of funds. It is suggested that the preliminary and pre-operative expenses of Rs.6,000/- shown in the balance sheet as an intangible asset be written off by the unit over a period of 2 to 3 years.

Though the unit incurred losses in the initial stages, it appears to have turned the corner and it is envisaged that the unit will reach a turnover of Rs.19 lakhs in 1983-84. Net profit anticipated for this level of turnover is about Rs.1.8 lakhs.

GENERAL

The bottleneck machine has been identified as the planning machine which has an utilisation index of 93% on a two shift basis.

The break even level of sales for the unit given the product mix for the ensuing year has been estimated at Rs.14.16 lakhs (Appendix-XIV)

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LIST OF APPENDICES

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APPENDIX I

DETAILS OF MACHINERY PLEDGED TO BANK

Details of machinery	Maker's name	Date of purchase	W.D.V. as on 30.6.1981
One number M.K. make Bhadravathy No.2 belt drive standard accessories & true chucks lathe 3 HP	M/s Mysore Kirloskar & Co. Ltd	6.5.79	16,914
One number M.K. make Shimoga No.2 electric drive lathe machine with all standard spares and independent chuck 3 HP	-do-	6.5.79	15,195
One number Maclean 'V' bed electric drive lathe machine with electric motor & chucks lathe 3 HP	-do-	6.5.79	5,686
One number 3/4" geared head bench drilling machine with complete fittings & motor 1 HP	JGH	26.3.79	1,260
One number 1HP 400 volts 50 cycles 3 phase 2880 RPM motorised grinder 1HP	ICE	5.6.79	803
One number wolf drilling machine with necessary accessories 0.5 HP	WOLF	27.7.79	897
One number hydraulic hacksaw machine complete with all fittings 1HP	JASWANT	23.7.79	1,633
One number tool post grinder with 0.8 HP motor and necessary accessories	EIFCO	17.1.80	1,503

APPENDIX I
... contd.

1	2	3	4	5
9.	One number rocket arc TPA 300 3 phase, aircool Advani Oerlikon welding transformer with standard accessories 300 Amps.	Advani Oerlikon	19.5.80	5,115
10.	One number CMT-1 brand lathe with necessary accessories and special attachments with chuck 300 amps.	"Our own fabrication"	30.6.80	16,249
11.	One number 3/4" geared head bench type drilling machine with fittings & motor 1 HP	-do-	30.6.80	1,033
12.	One number press for sheet metal work	-do-	30.6.80	1,156
13.	One number electric make 31-25 KVA 400/440 volts 3 phase diesel generating set 32.5 KVI	Ruston	17.4.80	52,188
14	One number Avery platform scale - 300 Kg capacity	Avery	14.8.79	1,296
15.	One number KAC model SGC 6 air compressor 1 HP	KAC	4.10.79	1,211
16.	One number Malva No.3 Indian make milling machine universal tup with all standard accessories & dividing head 3 HP	Malva No.3	6.5.79	12,421
17.	One number oil & second hand Malva 24 machine 3 HP	Malva	11.5.79	3,005

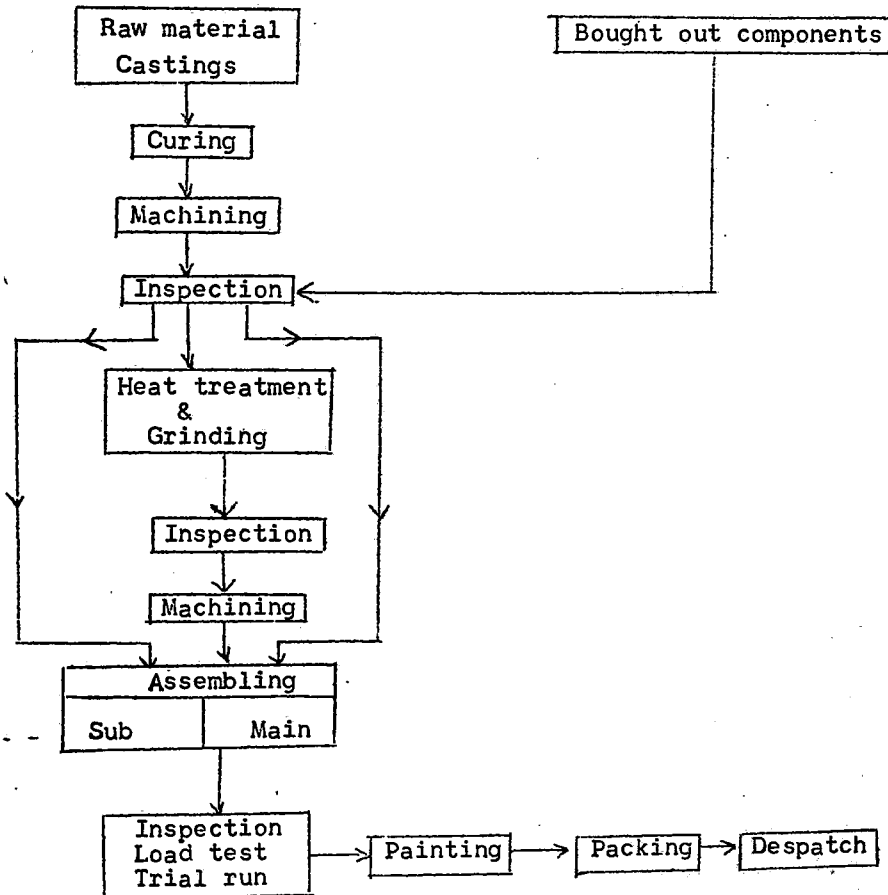
18
CO
B/S/HA

APPENDIX I
.. contd..

1	2	3	4	5
18.	One number Sharada planning machine 12.5 HP	Sharada	15.9.79	33,712
19.	One number annealing furnace	"Our own fabrication"	30.6.80	12,550
20.	One number Wolf portable grinder	Wolf	16.7.80	1,040
21.	One number HMT radial drilling machine with necessary accessories 5 HP	HMT	27.8.80	33,737
22.	Two numbers brand-new CMT-1 brand lathe with chucks 6 HP	"Our own fabrication"	30.7.80	24,650
23.	One number 24% stroke Cooper shaping machine	Cooper	27.8.80	9,562
24.	One number 'Indef' brand triple spur gear chain pulley block	Indef	27.8.80	1,678
	Total			2,54,494

APPENDIX II

FLOW PROCESS CHART



APPENDIX III

ABC ANALYSIS OF RAW MATERIALS

Sl. No.	Raw materials	Quantity Kg.	Unit Price	Annual consumption	Cumulative consumption	%
1	2	3	4	5	6	7
1.	Lathe bed CMT - 1 - 7'	11321.00	4.66	52755.86	52755.86	
2.	Motor H P 3.00 HP	41.00	910.00	90065.86	90065.86	
3.	Lathe bed CMT - 2 - 9'	7820.00	4.62	36144.00	126209.86	
4.	Chucks	34.00	700.00	23800.00	150009.86	
5.	Gun metal	833.50	25.51	22538.08	172547.94	
6.	Motor HP 1.5 HP	30.00	680.00	20400.00	192947.94	
7.	Lathe bed CBE - 2 - 6'	3237.00	491.00	15893.67	208841.61	
8.	Saddle	3091.00	4.37	13507.67	222349.28	
9.	100 MM MS round			13459.00	235808.28	
10.	Paints - speed coat surface Groyand dry			12112.00	247920.28	
11.	Big lathe leg CMT-type	5003.00	2.30	11656.99	259577.27	
12.	Small head stock leg	4952.00	2.14	10597.28	270174.55	
13.	Phosphor Bronze	234.10	45.05	10546.20	280720.75	
14.	Lathe bed CBE-1	1917.00	4.19	9412.47	290133.22	
15.	Head stock body	5219.30	1.51	7881.14	298014.36	
16.	D.A. grey	56.00		6358.00	304372.36	
17.	M.S. sheet 16 G.G.	1308.00		5616.00	309988.36	
18.	56 MM M.S. round			5575.00	315563.36	
19.	Gap piece	1392.00		4764.00	320327.36	
20.	Big lathe leg CBE	2026.00	2.30	4659.80	324897.16	
21.	Steady rest	1904.00		4570.00	329557.16	
22.	M.S. sheet 14 G.cr	1230.00		4469.00	334026.16	
23.	Follow rest	1452.00		4404.00	338430.16	
24.	Paints or thinner			4071.00	342501.16	

APPENDIX III
 ... contd..

1	2	3	4	5	6	7
25. Cone pulleg		140.00		3684.00	346185.16	
26. Paints oil primary Redoxide				3514.00	349699.16	
						-----72%
27. H.S. Small leg		2232.00		4944.00		
28. Reversible switch		68.00		340.00		
29. Thrust bearing 32211						
30. 3210		130.00		3510.00		
31. M.S. material 63 mm		1166.00		2923.00		
32. M.S. rounds 80 mm		2400.00		2870.00		
33. Dead centre MT 4		82.00		2870.00		
34. Ball bearing 6306		82.00		2747.00		
M.S. MATERIAL						
35. M.S. Rounds 45 mm		1090.00		2752.00		
36. Wiring leise 15 anys/3 core 10'		680.00		2720.00		
37. Bearing block		1200.00		2640.00		
38. Compound slide		1152.00		2544.00		
39. Drawing plate		312.00		2520.00		
40. Face plate		1200.00		2520.00		
41. Back gear shaft		1080.00		2364.00		
42. 170 type all gears lathe leg		452.00		2345.00		
M.S. MATERIAL						
43. M.S. round 70 mm		682.00		2222.00		
44. M.M. Rounds		888.00		2076.00		
45. Norton gear box		924.00		2040.00		
46. Aprin box		912.00		2004.00		
47. Compount rest		900.00		1980.00		
48. Coolant motors		6 pieces		1930.00		

APPENDIX III
... contd..

1	2	3	4	5	6	7
49.	Mono pully	864.00		1896.00		
50.	Bull gear	792.00		1848.00		
51.	Rockes bracket	828.00		1800.00		
52.	Back gear	792.00		1800.00		
53.	H.S. Lockny Rc.	804.00		1740.00		
54.	Dog plate	780.00		1728.00		
55.	Head stock screw bracket	700.00		1704.00		
56.	Thrust bearing 51114 ABC.SKF	41 pieces		1735.00		
57.	N.Rope B.80 Fenner	41 "		1763.00		
58.	M.S.Round 32 mm	357.00		1759.00		
59.	M.S.Sheet 18G CR sheet	571.00		1711.00		
60.	Door head stock & gear	744.00		1680.00		
61.	CMT follow-rest pattern	720.00		1680.00		
62.	M.S.Round 36 mm	2107.00		1699.00		
63.	M.S.Round 40 mm	739.00		1605.00		
64.	Gear wheel	708.00		1560.00		
65.	Allen key spanners	68 pieces		1584.00		
66.	Feed gear (CMT use)	696 "		1548.00		
67.	M.S.Square 40 mm Sq.	585.00		1579.00		
68.	Ball bearing 6305	54 pieces		1404.00		
69.	Handle wheel & screw rod	588.00		1296.00		
70.	Handle wheel carriage	576.00		1296.00		
71.	Head stock cover	588.00		1296.00		
72.	Dead centre MT 3	54 pieces		1296.00		
73.	Change wheel cover bracket	600.00		1248.00		
74.	M.S. Bright base	444.00		1200.00		
75.	M.S.Rounds 25 mm	511.00		1145.00		
76.	Follow rest base	504.00		1080.00		
77.	Flate belt 2" width	82 met.		1066.00		
78.	Head stock base	552.00		1044.00		
79.	Name plate	68 pieces		1020.00		
80.	Motor pully	468 "		1008.00		
81.	M.S.Rounds 22 mm	444.00		1032.00		

APPENDIX III
 ... contd.

1	2	3	4	5	6	7
82.	Feed gear (CBE use)	696.00		996.00		
83.	M.S. square 125 mm	513.00		996.00		
84.	Chuck flange	384.00		828.00		
85.	M.S. Rounds 50 mm	432.00		919.00		
86.	M.S. Rounds 190 mm	2136.00		890.00		
87.	Thrush bearing 0.9 ABC SKF 41 pieces			853.00		
88.	M.S. Round 28 mm	350.00		773.00		
89.	M.S. Sheets	211.00		619.00	<u>461366.16</u>	95%
90.	Rack pinion wheel	357.00		797.00		
91.	V Rope A.37 Fenner	27 pieces		756.00		
92.	Gear box collar	396.00		948.00		
93.	L. plate	324.00		708.00		
94.	Balls (balee leler)	68 pieces		765.00		
95.	Cross slide	300.00		660.00		
96.	S wire product	262.00		588.00		
97.	Chuck plate	264.00		588.00		
		36.00		576.00		
98.	Worm dusk	252.00		552.00		
99.	Collar wheel	228.00		516.00		
100.	Grinder piece	247.00		543.00		
101.	Tail stock end	173.00		429.00		
102.	Worm wheel	208.00		461.00		
103.	Base metal	228.00		516.00		
104.	Cross slide (small size)	216.00		468.00		
105.	Clan pevision press	304.00		444.00		
106.	Lathe wheel	240.00		444.00		
107.	Bearing straw	192.00		444.00		
108.	Dry belt	192.00		432.00		
109.	Gear wheel slide plate	192.00		432.00		
110.	Cross wheel	192.00		408.00		
111.	M.S. Rounds 90 mm	201.00		444.00		
112.	Spanners	68 pieces		680.00		
113.	Drilling machine body	192.00		408.00		

APPENDIX III
... contd.

1	2	3	4	5	6	7
114.	Turn slip gear	180.00		396.00		
115.	Height press	120.00		312.00		
116.	Brass stand	132.00		288.00		
117.	M.S. Square 80 mm Sq.	105.00		396.00		
118.	M.S. Square 22 mm Sq.	139.00		314.00		
119.	Tapper press	163.00		305.00		
120.	Star handle	8 pieces		319.00		
121.	M.S. Rounds 110 mm	173.00		403.00		
122.	E.N. - 8 Rounds	233.00		624.00		
123.	E.N. - 8 Rounds 54 mm	86.00		370.00		
124.	Press shaw	132.00		288.00		
125.	Handle for TG Gradet	120.00		276.00		
126.	Wheel Pinion	120.00		276.00		
127.	T.S. Head screw braker	120.00		252.00		
128.	Gerar (H.S.)	108.00		240.00		
129.	Handle wheel Pinion bracker	108.00		240.00		
130.	End bracket	108.00		240.00		
131.	1/2" Desc Round	72.00		240.00		
132.	Flate belt 1 1/2" width	54.00		297.00		
133.	M.S. Material	122.00		269.00		
134.	Inter locking bracket	108.00		228.00		
135.	Back gear	84.00		180.00		
136.	Cross feed driving wheel	84.00		180.00		
137.	Surface plate	60.00		168.00		
138.	Inter locking wheel	72.00		168.00		
139.	5/8" Dia Rod	60.00		168.00		
140.	Norton gear box	60.00		144.00		
141.	Bush for worm	60.00		132.00		
142.	Eccentric bracket	48.00		96.00		

APPENDIX III
... contd.

1	2	3	4	5	6	7
143.	Locking piece	48.00		96.00		
144.	Star wheel	36.00		84.00		
145.	Spindle fly	36.00		84.00		
146.	Fixed bracket	36.00		84.00		
147.	Thread dial indicator	48.00		60.00		
148.	Swinging form bracket	24.00		60.00		
149.	Splint nut disc	12.00		36.00		
150.	Swiling bracket	12.00		36.00		
151.	Handle base	5.00		24.00		
152.	Bull cover gear plate	12.00		24.00		
153.	M.S. Square Swaure piece	33.00		86.00		
154.	M.S. Square 16 mm	36.00		192.00		
155.	" 50 mm	48.00		120.00		
156.	M.S. Plates					
157.	12 x 3 mm plates	72.00		180.00		
158.	18 x 3 mm plates	17.00		41.00		
159.	20 x 5 mm plates	28.00		67.00		
160.	20 x 6 mm plates	6.00		18.00		
161.	25 x 6 mm plates	71.00		77.00		
162.	20 x 10 mm plate	17.00		37.00		
163.	40 x 6 mm plate	14.00		31.00		
164.	Drawing plate	65.00		144.00		
165.	Bush 170 big shaft	93.00		151.00		
166.	Shifting handle holder	26.00		86.00		
167.	T D I Bolly	22.00		53.00		
168.	C I Rod	24.00		53.00		
169.	M S material 20 mm	58.00		151.00		
170.	ENS rounds 23 mm	4.00		22.00		
171.	Thread bearing 0.8 ABC SKE	2.00		42.00		
172.	Mac sheet $\frac{1}{2}$ $\frac{1}{4}$ " thickness	136.00		136.00		
				-----485430.16	100%	

CALCULATION OF AVERAGE STOCKS OF "A" CLASS ITEMS.

Sl. No.	Raw Materials	Qty. Kg.	Unit Price Rs.	Annual consumption-Rs.	Monthly Average.	Lead Time	Safety Stock
1	2	3	4	5	6	7	8
1.	Graded castings Lathe Beds CMT1 425 Kgs. each.	15480	485	75078	625650	1 M	1275 (3 castings)
2.	CMT 2 500 Kgs. each.	7500	485	36375	303125	1 M	1000 (2 castings)
3.	CBE2 205 Kgs. each.	3075	485	14913.75	124285	1 M	410 (2 Beds)
4.	CMT 3 675 Kgs. each	3375	485	16368.75	136456	1 M	675
5.	CBE 1 175 Kgs.	2625	485	12731.25	106014	1 M	525 (3 castings)
6.	Vijai 205 KG.	4100	225	19885	165708	1 M	410 (2 castings)
7.	Vijai HS	4000	225	9000	750	1 M	400
8.	Vijai TS	2800	225	6300	525	1 M	280

APPENDIX IV .. contd.

1.	2.	3	4	5	6	7	8
9.	CMT HS	14929	225	33587 50	279895	1 M	1356
10.	CBE HS	7765	225	17471 .25	145593	1 M	588
11.	CBE TS	2310	2 25	5197 .50	43312	1 M	338
12.	CMT TS	7765	2 25	17471 .25	145591	1 M	1538
13.	Gun Metal	1735	26	45110	3759	1 M	184
14.	Phosphor Bronze	916	43 68	40010 .88	333424	1 M	44
15.	Saddle	5130	4 85	24880 .50	207337	1 M	358
16.	H.S.Bronze	6585	2 25	14816 .25	123468	1 M	742
17.	Motor 1.5 H.P.	30	680	20400	1700	1 M	4.76
18.	Motor 3 H.P.	50	910	45500	379166	1 M	4
19.	Motor 2 H.P.	20	750	15000	1250	1 M	1
20.	Chuck	50 Nos.	700	35000	291666	1 M	3.96
21.	M.S.Rounds 100 mm	2590	2 50	6475	53958	1 M	432

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APPENDIX IV .. contd.

1.	2.	3	4	5	6	7	8
22.	PAINTS N.C.Thinner	725	8	5800	48800	1M	44
23.	Oil Primary	325	15 65	5037	41900	1M	24
24.	Speed coat surface grey	1295	28	36260	302100	1M	58
25.	D.A. Grey	200	26	5200	43300	1M	13
26.	Gap piece 27 Kg.unit	1660	4 85	8051	67060	1M	166
27.	M.S.Rounds 56 MM	2952	2 25	6642	55400	1M	206
28.	16 G. CR	2304	3	6912	57600	1M	122
29.	14 G. CR	1808	3 20	5785	48200	1M	322
591258 88					70%		

NOTE: There are 29 items under 'A' class here because of the inclusion of a new model of Lathe : the Vizai 1000 and the deduction of a few other previously 'A' Class items which have ceased to be 'A' class according to projections.

Sl. No.	Raw Materials	EOQ	MOQ	Lead Time	Order quantity	Average stock	Value
1	2	3	4	5	6	7	8
1.	Graded Castings Lathe Beds CMT1 425 Kg. each.	379	425	1290	425	1489*	*One Lathe 425 Kg.x3 1275 - 3 castings or 1,275 Kgs. Order quantity
2.	CMT2 500 Kg. each	278	500	625	500	1250*	
3.	CBE2 205 Kg. each	178	205	256	205	615	
4.	CMT3 675 Kg.	186	675	337	675	1012	
5.	CBE1 175 Kg.	164	175	218	175	612	
6.	Vijai 205 Kg.	206	205	350	205	512	
						5490	26626 50
7.	Vijai HS	298	-	333	400	600	
8.	Vijai TS	249	-	233	280	420*	
9.	CMT HS	230	-	1120	1070	1461*	
10.	CBE HS	415	-	647	630	903*	
11.	CBE TS	227	-	192	227	451	
12.	CMT TS	415	-	647	650	1863*	
						5968	12820 50

APPENDIX IV .. contd.

1.	2.	3	4	45	6	7	8	
13.	Gun Metal	58		144	144	256	6656	
14.	Phosphor Brooze	32		76	76	82	3581 76	
15.	Saddle	230		427	427	572	2774 20	
16.	H.S. Brooze	383		549	383	933	2099 25	
17.	Motor 1.5 H.P.	1.48		3	2	6	4080	
18.	Motor 3 H.P.	1.65		4.16	4	6	5460	
19.	Motor 2 H.P.	1.62		1.66	2	2	1500	*Multiple order system used.
20.	Chuck	1.88		4.16	4	6	4200	
21.	M.S. Rounds 100 mm	228		215	228	546	1365	
22.	Paints N.C., Thinner	67	200	60	200	144	1152	
23.	Oil Primary	32		27	40	44	662 20	
24.	Speedcourt Surface grey	48		108	120	118	3304	
25.	D.A. Grey	20		17	20	23	598	
26.	Cap Piece 27 Kg. per unit.	130		138	135	235	1139 75*	

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APPENDIX IV .. contd.

1.	2	3	4	5	6	7	8
27. M.S. Rounds 56 mm		256		246	256	334	751
28. 16G CR		196		192	196	220	660
29. 14G CR		169		151	169	406	1299 20
							80729 36

APPENDIX V

INVENTORY SYSTEM FOR 'A' CLASS ITEMS

Sl. No.	Item	Order Level/Levels	Order quantity	Safety stock	Remarks
1	2	3	4	5	6
1.	CMT 1 Lathe Bed	1. 6 castings 2. 5 castings 3. 4 castings 4. 3 castings.	1 casting	3 castings	Order 1 costing at each of the order levels given. If two level system is preferred order 4 castings at order level 1 and order level 4.
2.	CMT 2 Lathe Bed	1. 4 castings 2. 3 castings	1 casting	2 castings	
3.	CBE 2 Lathe Bed	1. 3 castings 2. 2 castings	1 casting	2 castings	
4.	CMT 3 Lathe Bed	2 castings	1 casting	3 castings	
5.	CBE 1 Lathe Bed	1. 4 castings 2. 3 castings	1 casting	3 castings	
6.	Vijai	1. 4 castings 2. 3 castings 3. 2 castings	1 casting	2 castings	
7.	Vijai HS	1. 44 castings 2. 3 castings 3. 2 castings	1 casting	400 Kgs.or 2 castings	
8.	Vijai TS	"	"	"	
9.	CMT HS	7,6,5,4	1	4	

1.	2.	3.	4.	5.	6.
10. CBE HS		4, 3, 2,	2	2	
11. CBE TS		4, 3, 2	2	2	
12. CMT TS		7, 6, 5, 4	1	4	
13. Phosphor Brooze	1. 120 Kgs. 2. 44 Kgs.		76 Kgs.	44 Kgs.	
14. Saddle	1. 785 Kgs. 2. 358 Kgs.		427	358 Kgs.	
15. H.S. Body	1. 1125 Kgs. 2. 742 Kgs.		383	742 Kgs.	
16. Motor 1.5 H.P.	8, 6, 5		2	5	
17. Motor 3 H.P.	8, 6, 4		2	4	
18. Motor 2 H.P.	3		2	1	
19. Chucks					Optional. No system suggested as variety
20. Gun Metal					is high and consumption could not be identi- fied immediately
21. 100 mm round	647 Kgs.		228	432 Kgs.	
22. N.C. Thinner	104 Lit.		200 Lit	44 Lit.	

1.	2	3	4	5	6
23.	Oil Primary	51 Lit.	40 Lit.	24 Lit.	
24.	Speed coat surface grey	166 Lit.	120 Lit.	58 Lit.	
25.	D.A. Grey	30 Lit.	20 Lit.	13 Lit.	
26.	Gap piece	1.11 2.6	5	6	
27.	56 mm Rounds	552 Kgs.	256 Kgs.	206 Kgs.	
28.	16 Gauge short	314 Kgs.	196 Kgs.	122 Kgs.	
29.	14 Gauge short	473 Kgs.	169 Kgs.	322 Kgs.	

NOTE: The multiple order level system requires a fair amount of work in maintaining a close watch on inventory levels. As such, depending on the manpower available, a two-level order system can also be used as an alternative. Order quantity in such cases will be lead time consumption and orders will be placed at two levels (a) the order level and (b) the safety stock level.

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APPENDIX VI

SUMMARY OF COMPONENT MACHINE LOADING MATRIX

Sl. No.	Item	Lathes		Milling		Shaping		Planning		Radial drilling		Gear Hobbing		Cutting	
		OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
1.	CMT 1,2,3 Common parts	11791	12461	1553	1620	4692	5230	83	128	1777	1986	1077	1276	2500	2500
	Bed Machining														
2.	CMT 1							900	1029	33	59				
3.	CMT 2	133	163					621	709	83	92				
4.	CMT 3	33	41					181	205	13	15				
5.	CBE 1	2228	2498	414	449	774	870	700	750	391	464	220	268	2300	2300
6.	CBE 2	2304	2559	414	449	774	870	736	780	391	464	220	268		
7.	Vijai 1000	3033	3397	810	869	1125	1310	805	900	421	475	225	287		
	Total hours	OT 19522		3191		7365		4026		3109		1742		4800	
		IT	21119		3387		8280		4501		3555		2099		4800

ALLOCATION OF EXPENSES AMONG COST CENTRES

Sl. No.	Item of Expenditure	Basis for allocation	Budget for the year 1983-84	Lathe	Milling	Shapping	Plaining
				1	2	3	4
<u>Fixed Expenses</u>							
1.	Direct Wages	No. of men	196600	38300	6384	6384	12740
2.	Supervision	"	28000	5509	918	1836	918
3.	Rent	Area	9400	2300	470	710	940
4.	Depreciation	Value of Mech.	39900	11700	2000	2000	5100
5.	Medium Term Loan	"	12775	2200	-	1200	-
6.	Insurance	"	2000	586	98	256	256
7.	Labour Welfare Expenses	No. of men	3000	600	100	200	100
	Sub-Total (A)		291675	61195	9970	12428	20054
<u>Variable</u>							
8.	Electricity	HP x running Hrs.	14000	4800	765	1800	4700
9.	Repairs & Maintenance	Discussion	2000	500	100	100	500

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APPENDIX VII .. contd.

		1	2	3	4	
10. Consumable Tools	Discussion	10000	2300	2000	1000	1000
11. Consumable stores	"	3000				
Sub-Total (B)		29000	7300	2865	2900	6200
Sub-Total (C)		320675	68495	12835	15328	26254
12. Service cost centre						
Generator Fixed	Sub-Total	17390	5912	971	2238	5701
-do- Variable	"	3200	1088	179	412	1049
13. Service cost centre	Sub-Total (A)	24382	5972	973	1212	1957
Fixed						
14. Service cost centre	Sub-Total (B)	250	71	28	61	34
Variable						
Sub Total (D)		320675	81538	19218	35022	19870
Administrative Over-		261175	66400	12200	15700	28500
heads		581850	147938	27186	34918	63522
Total Fixed cost		552850	139479	24114	31578	56212
Variable expenses		29000	8459	3072	3340	7310
Total expenses		581850				

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APPENDIX VII...contd.

	1	2	3	4
Total operating hours	19522	3191	7365	4026
Total Booked hours	21119	3387	8280	4501
Variable Mec.Hr.				
Rate $\frac{TVC}{TOT}$	0.42	0.96	0.45	1.82
Fixed Mec. Hr.				
Rate $\frac{TFC}{TTC}$	6.6	7.12	3.81	12.49

Sl. No.	Item of Expenditure	Radial drilling.	Cutting	Gear Hobbing	Generator	Assembly & Painting	Welding Trans-former	Maintenance Section.
		5	6	7	8	9	10	11
<u>Fixed Expenses</u>								
1.	Direct Wages	6400	3192	6400	-	97300	2800	16700
2.	Supervision	918	918	918	-	13311	459	2295
3.	Rent	470	470	940	700	2350	50	
4.	Depreciation	5100	100	5200	7800	-	900	
5.	Medium Term Loan				8500		875	
6.	Insurance	256		263	390		53	
7.	Labour Welfare Expenses	100	100	100	-	1450	100	150
	Sub Total (A)	13244	4780	13821	17390	114411	5237	19145
<u>Variable</u>								
8.	Electricity	1200	135	400			200	
9.	Repairs & Maintenance	250	50	250	200		50	
10.	Consumable Tools	2000	500	1500				
11.	Consumable Stores				3000			
	Sub Total (B)	3450	685	2150	3200	-	250	-

APPENDIX VII .. contd.

	5	6	7	8	9	10	11
Sub Total - (C)	16694	5465	15971	20590	114411	5487	19145
12. Service Cost Centre Sub Generator Fixed Total	1562	456	550				
-do- Variable "	288	84	100				
13. Service Cost Centre " (A) Fixed	1292	466	1348		11162		
14. Service cost centre " (B) Variable	34	7	21				
Sub Total (D)	19870	6478	17990		125573		
Administrative Overheads	16200	5275	14700		102200		
	36070	11753	32690		227773		
Total Fixed Costs	33298	10977	30419		227773		
Variable Expenses	3772	776	2271				
Total Expenses							
Total operating Hrs.	3109	4800	1742				
Total Booked Hrs.	3555	4800	2099				
Variable Mec. Hr. Rate $\frac{TVC}{TOT}$	1.21	0.16	1.30				
Fixed Mec. Hr. Rate $\frac{TFC}{TTC}$	9.09	2.3	14.5				

APPENDIX VIII

PRODUCT COSTING

	CMT I			CMT II			CMT III		
	Total weight	Unit	Value	Total weight	Unit	Value	Total weight	Unit	Value
	1	2	3	4	5	6	7	8	9
1. Graded Castings	462	4.85	2241	591	4.85	2866	766	4.85	3715
2. Ungraded Castings	844	2.25	1975	844	2.25	1975	844	2.25	1975
3. Gun Metal	21.55	26.00	560	21.55	26.00	560	21.55	26.00	560
4. Phosphor Brooze	10.80	43.68	472	14.10	43.68	616	14.10	43.68	616
5. M.S. Rounds & Squares	197.50	3.00	600	212.20	3.00	650	240	3.00	740
6. M.S. Sheets	35.75	3.25	130	44.75	3.25	150	50.25	3.25	200
7. Purchase Parts (Direct)			1500			1500			1500
8. -do- (Indirect)			156			156			156
9. Painting Materials			625			625			825
10. Consumer Stores			1298			1430			1939
11. Sub-Contract			400			400			400
12. Machining & Assembling Cost			6406			6767			7739
13. E.N.S. Rounds									
Total A			16363			17695			20365

APPENDIX VIII .. contd. 206

	1	2	3	4	5	6	7	8	9
Selling Price			19250			20900			28490
Less Discount 15%			2887			3135			4273
Net Sales			16363			17765			24217
Net Profit (B-A)			Nil			70			3852
Total Profit						11050			19260
Total Variable Cost			10266			11250			12950
Total Fixed Cost			6097			6445			7415
Contribution towards towards Fixed Costs.			6097			6515			11267

Sl. No.	CBE I			CBE II			VIJAY 1000		
	Total Weight	Unit Price	Value	Total weight	Unit Price	Value	Total weight	Unit Price	Value
1. Graded Castings	185	4.85	897	205	4.85	995	234	4.85	1135
2. Ungraded Castings	400	2.25	900	400	2.25	900	543	2.25	1222
3. Gun Metal	13.15	21.55	342	13.15	26.00	350	15	26.00	390
4. Phosphor Brooze	-	-	-	-	-	-	-	-	-
5. MS Rounds & Squares	120.50	3.00	370	128.50	3.00	390	105	3.00	315
6. M.S Sheets	2180	3.25	75	2780	3.25	75	12	20.65	250
7. Purchase Parts (Direct)			1100			1100			1658
8. -do- (Indirect)			100			100			100
9. Painting Materials			400			400			350
10. Consumer Stores			811			887			1431
11. Machining & Assembling Cost			4525			5486			5565
12. Sub Contract			400			400			400
13. E.N.S. Rounds									265
Total A			9920			11083			13081

	1	2	3	4	5	6	7	8	9
Selling Price			11780			12870			21000
Less Discount 15%			1767			1930			3150
Net Sales B			10013			10940			17850
Net Profit (B-A)			93			- 143			4769
Total Profit			1395			-2145			95380
Total Variable Cost			5644			5852			8031
Total Fixed Cost			4276			5231			5050
Contribution towards fixed costs			4369			5088			9879

APPENDIX IXFUNDS FLOW STATEMENT

Sales	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>	1980-81	1981-82
	71	512	1203		
<u>Sources:</u>					
Increase in Equity				60	-
Increase in Term Loans				28	58
Increase in short term Bank borrowings				151	11
Increase in Sundry Creditors				38	
Increase in Unsecured borrowings				32	
Increase in Deposits				33	
Increase in Other Liabilities				24	10
Decrease in Loss				1	9
Decrease in Fixed Assets					10
Decrease in Loans & Advances					8
				<u>367</u>	<u>106</u>
<u>Application</u>					
Increase in Sundry Debtors				25	15
Increase in Investments				-	3
Increase in Stocks				237	4
Increase in Fixed Assets				64	
Decrease in S. Creditors					41
Decrease in other liability				33	39
Increase in Loans & Advances				10	
				<u>369</u>	<u>102</u>

APPENDIX IX ... contd.

	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>	1980-81	1981=82
Sales	71	512	1203		
Net Cash Actuals/Deficit				-2	+ 4
	+	-			
Opening Cash Balance				3	1
Closing Cash Balance				+ 1	5

APPENDIX - X-AFINANCIAL RATIOS

	1979-80	1980-81	1981-82
1. Debt	422	695	694
2. Equity + Reserves Less all Losses	279	340	349
3. Current Assets	333	603	621
4. Current Liabilities	358	588	519
5. Net Profit (Before tax)	-15	2	5
6. Net Sales	Loss	Profit	Profit
7. Raw Materials consumed	71	512	1203
8. Average Inventory	35	226	650
9. Sundry Debtors	138	300	471
10. Total Assets	17	42	57
11. Fixed Assets	701	1035	1043
12. Total capital employed	368	432	422
13. Value added	701	1035	1043
14. Total Investments (Capital + Reserves + Deferred Liabilities)	364	467	535
<u>Financial Ratios</u>			
Debt/Equity	0.213	0.3	0.49
Current Ratio	.93	1.03	1.2
Net Profit/Sales	Loss	0.3	0.4
Inventory turnover Average material consumed			
Average inventory	3.9	0.75	1.4

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APPENDIX XA .. contd.

	1979-80	1980-81	1981-82
<u>Average collection period</u> <u>Sundry Debtors x 365 days</u> Gross Sales P.A.			Negligible as goods are sold on cash or carry basis.
Fixed Assets/Total liability + capital employed	.51	.41	.4
Value added/Total Investment			
Net profit Equity			
Sales/Total Assets	.1	.49	1.14
Earning power N.P/Total Assets	Loss	.003	.005
Equity Fixed Assets	.82	.83	.83
Equity + Debt/Fixed + noncurrent asset			

ANALYSIS OF BALANCE SHEET

Current Liabilities	1979-80	1980-81	1981-82	Current Assets	1979-80	1980-81	1981-82
State Bank	-	-	358	Cash	3	1	5
Other Banks	196	347	-	Stocks	303	540	544
Sundry Creditors	33	71	30	S. Drs.	17	42	57
Unsecured loans	38	70	56	Loans & Advances	10	19	11
Creditors for Expenditure	14	23	15	Investments		1	4
Others	67	34	30				
Security deposit from selling agents	10	43	30				
	358	588	519		333	603	621
<u>Deferred</u>							
SBIMTL	-	-	150	Land & Building	96	123	105
Other Banks	64	92	-	Plant and Machinery	272	309	317
Dues to Debtors	-	15	25				
	64	107	175		368	432	422
<u>Equity</u>				<u>Intangible</u>			
Capital	300	360	360	Accumulated Losses	15	14	5
Reserves				Preliminary Expenses	6	6	6
	300	360	360		21	20	11
	722	1055	1054		722	1055	1054

APPENDIX - XIVALUATION OF STOCKS IN PROGRESS.

Cycle time for manufacture of
a Lathe = 2 Months

This comprises of

Curing time for castings = 1 Month

Machining, enameling, painting & testing = 1 Month

Working capital required for
2 months

= 1 Month finance for curing

costings

+ 1 Month cost of production

= 22026 + 67130 + 75270

RM + Value added in 1 Month

= 1,64,426.

APPENDIX - XIIASSESSMENT OF WORKING CAPITAL REQUIREMENTS

<u>Sales</u>	<u>Yearly</u>	<u>Monthly</u>	
Cost of production	18,23,000	1,51,933	
Raw Materials	17,08,800	1,42,400	
	8,05,550	67,130	
	<u>Permissible Limit</u>	<u>Total Working</u>	<u>Capital require-</u>
		<u>ment.</u>	
Raw Materials			
1.8 Months	1,27,000		
Less Margin 25%	* <u>31,750</u>	95,250	1,27,000
Stock in Process	1,64,400		
Less Margin 33 $\frac{1}{3}$ %	<u>54,800</u>	1,09,600	1,64,400
Finished goods			
2 weeks	71,200		
Less Margin 33 $\frac{1}{3}$ %	<u>23,700</u>	47,500	71,200
Sundry Debtors			
for export			
sales 2 Months	75,400	75,400	75,400
40% of Total Sales			
viz: 1823800x40			
	100		
= 729300			
Less 38%			
discovery 277100			
= <u>452200</u>			
6			
= 75400			
Expenses for			
1 Month	75,300		75,300
		<u>3,27,750</u>	<u>5,13,300</u>

APPENDIX - XIIIPROFITABILITY ESTIMATES FOR 1983-84Expenses

To Raw Materials	8,05,550
To Sub contracting	40,000
	<u>8,45,000</u>
Wages including ESI Bonus	1,96,600
Supervisory charges	28,000
Labcur Welfare	3,000
Rent	9,400
Interest on MTL (12775 + 2225)	15,000
Depreciation (39900 + 5100)	45,000
Insurance	2,000
Repairs & Maintenance	2,000
Power Charges	14,000
Consumable Tools	10,000
Diesel	3,000
<u>ADMINISTRATIVE OVERHEADS</u>	
Administrative Staff Salary	45,400
Printing & Stationery	8,000
Postage & Telegrams	13,000
Travelling Expenses	16,000
Licenses & Taxes	1,000
Filing Fees	550
Subscription	1,500

... contd.

<u>APPENDIX XIII .. contd.</u>	
Advertisement	3,000
Miscellaneous	10,000
Interest on Bank borrowings, Cash credit a/c	80,000
Bank charges	3,000
Brokerage/commission @ 15% on Rs.18.76 lakhs	2,81,400
Audit Fees	2,500
Donations	500
Selling Expenses	7,000
Remuneration to Directors	62,400
	<u>17,08,800</u>

PROFITABILITY ESTIMATES FOR 1983-84

By Sales	<u>TYPE</u>	<u>UNIT PRICE</u>	<u>PIECES</u>	<u>VALUE</u>
	CMT 1	19250	x 30	5,77,500
	CMT 2	20900	x 15	3,13,500
	CMT 3	28490	x 5	1,42,450
	CBE 1	11780	x 15	1,76,700
	CBE 2	12870	x 15	1,93,050
	Vijai 1000	21000	x 20	4,20,000
				<u>18,23,200</u>

Cash Incentive 20%
Duty Drawback 3%
on exports 23%

Export Sales from 40% of total
sales 1875600 x $\frac{40}{100}$ = 7,50,640

On this 23% 750640 x $\frac{23}{100}$ = 1,72,647

APPENDIX XIII .. contd. 219

By recovery of Packing Charges	5,000	
By Labour charges Receipts	40,000	
By Value of cur fabrication	20,000	
	65,000	
Total Income 18,23,200+65,000	18,88,200	
Total Expenses	17,08,800	
	1,79,400	
Profit	1,79,400	
By Other Sources	65,000	
By Sales of Lathes	1,14,400	

APPENDIX - XIVBREAKEVEN ANALYSIS

By Sales		18.88
Variable Expenses		16.59
Contribution		<u>7.29</u>
Fixed Expenses		5.49
Breakeven Price	=	$\frac{\text{Fixed Expenses}}{\text{Contribution}}$
		$\frac{5.49}{7.29} = 75\%$
Breakeven point of sales		18.88 x .75
	=	14.16 lakhs per year
	=	1.18 lakhs per month

LANWARD INDUSTRIES

BRIEF HISTORY OF THE UNIT

M/s Lanward Industries was established in 1969 as a sole proprietary concern of Sri S. Srinivasa Varadan, who is a mechanical engineer. The unit manufactures reversible jumps which are industrial products. About 90% of the unit's sales during 1981-82 were reversible switches. The monthly average sales of switches during 1981-82 amounted to about Rs.10,000, and the present average production per month is 200 switches. The switches are manufactured against firm orders placed by the 8 offices of the I/AEC and M/s Mysore Kirloskar. The switches are manufactured under the patent rights of M/s Mysore Electrical Industries, and 4% royalty is being paid to them on the sale of switches.

The unit enjoys cash credit, mundy type limit of Rs.1 lakh and a bill limit of Rs.40,000. A term loan of Rs.7,500 has also been granted to the unit towards reimbursing part cost of the machinery purchased by it.

The unit is housed in one of the plots allotted by the State Industries Development Corporation Limited. The factory premises have been made available to the unit on hire purchase basis and the present outstandings are Rs.7,000/-.

INVENTORY CONTROL

The machined components of the reversible switches constitute only 27% and the rest 73% are either bought out or sub-contracted. In the case of circuit breakers, the process involves only cutting to sizes of the glass tubes and fitting the brass caps and tin ware, which are all bought out components. Copper jumps are manufactured by cutting the copper wire to the required length and bending the ends.

All the raw materials and components required by the unit are available locally. There is no minimum quantity stipulation in the procurement of any raw material required by the unit.

As the Unit's books were not up-dated, the details of purchases and consumption of raw materials by the unit vis-a-vis its sales during April 1981 to October 1981 were studied in detail.

An analysis of the sales revealed that reversible switches manufactured by the unit constitute 90% of the sales and the circuit breakers and copper jumps account for the

remainder. The analysis of raw material consumption indicates that 88% of the total value of total consumption relates to reversible switches and 12% to circuit breakers and jumps.

ABC ANALYSIS OF RAW MATERIALS

An analysis of raw materials that would be consumed in the next year reveals the following categorisation. (Appendix IA).

Class of materials	% of items	% value consumed
A (8 items)	21	70
B (12 ")	31	23
C (19 ")	48	7

The inventory parameters for the unit's envisaged scale of operation, viz., 500 switches a month, have been worked out in the Appendix II.

STANDARD DEVIATION AND SAFETY STOCK

The safety stock of each raw material/component for A and B class items has been arrived at, taking into account the standard deviation observed in the consumption pattern of the relative materials during the period April 1981 to October 1981. 15 fortnightly readings of consumption of raw materials were noted for arriving at the standard deviation. The annual consumption for the projected period has, however, been based on the quantum of materials/components required for manufacturing a single switch and the proposed production plan. This procedure had to be adopted as the consumption pattern during April 1981 to October 1981 was found to be not representative.

ECONOMIC ORDER QUANTITY (EOQ)

The Economic Order Quantity of A & B items was found out using the formula

$$EOQ = \sqrt{\frac{2Aa}{IP}}$$

in quantity, where

A = Annual demand (Qty)
a = cost of per class per order (Rs.5)
I = Inventory carrying cost (20% per annum)
P = Price of the item per unit in Rs.

and the unit needs to take positive steps to counter this problem.

MACHINERY INSTALLED

The unit has the following machinery:

a)	6' PSG lathe	-	1 No.
b)	Drilling machines	-	2 Nos.
c)	Bench Grinder	-	1 No.
d)	Spray painter	-	1 No.

A spot welding set acquired in January 1981 is yet to be commissioned. The utilisation factor of all the above machinery is estimated at about 50% only at present.

COSTING AND PRICING PATTERN

No proper costing method has been adopted by the unit in pricing its products. The discussions reveal that the unit has followed differential pricing in marketing the switches, depending upon the selling price of its competitors.

The unit at present has to sub-contract the materials for bending, punching, spot welding, plating and painting. Further, the entire fixed and variable costs have to be borne by the switches only as the other components, viz., circuit breakers and copper jumps, manufactured by the unit forms only a negligible portion of sales (about 10%). In view of the marketing problems faced by the unit and its declining profitability, the unit may follow marginal costing in determining the price of reversible switches. The details of the fixed and variable costs in this regard are worked out in the Annexure III.

MACHINE HOUR RATE

The spot welding set will have low utilisation. To enable the unit to know the rate at which it can take up jobs for these machines, the machine-hour rates for the same have been worked out in the Annexure V and the unit will do well to undertake job works to utilise the idle capacity of these cost centres. The other items of machinery will be fully utilised at the production levels anticipated by the unit during 1982-83.

BREAK EVEN POINT

The break even level of sales has been assessed at an annual turnover of Rs.2.61 lacs or 5,455 switches, representing 94% of the projected sales.

FINANCIAL ANALYSIS

The balance sheets for the years 1980 and 1981 were made available. Basing on that and the details available for the period 1.4.1981 to 31.12.1981, the projected balance sheets for 1982 and 1983 were drawn and analysed in the annexure.

PAST PERFORMANCE

a) A sudden slump in sales during 1981 was due to the general recession as well as the failure in initiating steps to maintain and boost the sales of the product by the main dealers, the Industrial and Agricultural Engineering Company, Bombay.

b) Scarcity and abnormal increase in the price of essential raw materials during 1980-81 have hampered production.

c) Power-cut was also partially responsible for the downward trend in production.

d) The unit level of production was not sufficient to meet the fixed expenses which has resulted in loss and erosion in equity.

e) Decrease in sales has resulted in decrease in profit and the unit is expected to suffer a loss of about Rs.8,000 during the current year.

f) Inordinate delay in realisation of receivables has affected the profit of the unit.

g) Increase in bank borrowing disproportionate to the level of operation was due to repayment of and application of interest.

FUTURE PROGRAMME

The unit envisages an increase in production from 200 to 500 reversing switches per month in view of the

repeat orders on hand as well as the favourable trend in market for raw materials and finished goods.

A spot welding set acquired in 1981 is expected to commence work in April/May 1982 which will increase the unit's earnings substantially in view of the availability of adequate job orders.

Thus, the unit's working capital requirements has been assessed on the basis of a monthly production of 500 reversing switches. There is a net deficit of Rs.55,400 which can be made good as follows:

Proceeds from chit	Rs.10,000
Fresh capital	Rs.10,000
Term loan	Rs.20,000
Profit accruals	Rs.15,400

At the envisaged level of production, the unit will be in a position to earn a profit of Rs.1,750 per month which will enable it to repay the term loan at the rate of Rs.500 per month even after making adequate provision for the working capital deficit. Thus, the term loan will be repaid in 40 monthly instalments.

The proprietor is stated to have substantial income from agricultural land and buildings which will enable him to stabilise the financial position of the unit.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

- a. The unit at present carries an inventory worth Rs.64,693/- against an average inventory level of Rs.23,855 required for its scale of operation.
- b. The reversible switch, the main product of the unit, is manufactured by assembling 60% bought out components and incurring sub-contracting charges of 12½%. The machine-hour costing of the product will not, therefore, be representative of the pricing pattern to be adopted by the unit. The unit has to follow marginal costing in determining the sale price of switches, especially due to the marketing problems faced by the unit, which are detailed elsewhere in this report.
- c. A spot welding set acquired in January 1981, remains uncommissioned. The unit can undertake job works

for spot welding to increase its profitability by commissioning the welding set forthwith. The unit can also save sub-contracting charges of 40 paise per switch, now being paid by it for spot welding.

The PSG lathe in the unit has been found to have idle capacity, the present utilisation being 50%.

The machine-hour rates in respect of the lathe and the spot welding set, have been worked out in the Annexure to enable the unit to undertake job works on these machines, to increase the utilisation of the machines and to increase the unit's profitability.

- d. The unit will break even at Rs.2.61 lacs, which is very much on the high side. The unit should take up sales promotion measures to achieve its capacity turnover of 150 switches a month, on single shift basis.
- e. The analysis of the working results of the unit during the past three years reveals a downward trend in sales accompanied by decreasing profitability. There has been a gradual erosion in equity. This needs to be remedied forthwith.
- f. The working capital requirements of the unit at the peak level of production are furnished in the Appendix VII. The overall position reveals a net deficit of Rs.55,400 which should be met by the unit bringing in additional equity by the proprietor and by ploughing back profit accruals.
- g. The unit maintains the basic records and books of accounts such as stock registers, cash book, ledger, sales and purchase registers. The entries in the stock register need to be up-dated.

LIST OF APPENDICES

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ABC analysis of raw materials consumed for past 7 months	I
ABC analysis of raw materials based on projected consumption	I-A
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Machine hour rate for lathe and spot welding set	V
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Working capital requirement at the peak level of production anticipated	VII
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APPENDIX I
A B C ANALYSIS OF RAW MATERIALS CONSUMED FOR PAST 7 MONTHS

Item Description	Consumption value Rs.	Cumulative Consumption value Rs.	Cumulative % %
A			
1. M.S.Strips (16G & 14G)	9,180		
2. Red Oxide Primer	5,830		
3. Fixed Contacts	4,960		
4. Main Housing	3,792		
5. Brass Caps	3,700		
6. Moving Contact	3,528		
7. Moving Contact	3,277	34,267	65.2
B			
8. M.S.Strips 12G	2,400		
9. Copper Wire	2,400		
10. Lever Arms			
11. Copper Caps	2,000		
12. Switch Covers	1,482		
13. Paint	1,240		
14. M.S.Rounds	1,068	47,157	89.7
C			
15. Compressor Spring	685		
16. Sleeveings	640		
17. Glass Tubes	630		
18. Leatheroid Sheet	438		
19. M.S.Nuts	429		
20. Corrugated Box	427		
21. Handle Knob	368		
22. Carrier Spacer	330		
23. Tension Spring	315		
24. Name Plates	315		
25. Soldering Lead	200		
26. M.S. Screws (M4)	200		
27. M.S. Screws 3/8	146		
28. M.S. Nuts	80		
29. M.S. Washers 3/4	47		
30. M.S. Screws 3/4	44		
31. Spring Washers 3/16	28		
32. Collar Pin	23		
33. M.S. Washers 5/8	18		
34. Spring Washers 3/8	12		
35. M.S. Washers 3/8	9	52,541	

Categori- sation	No. of items.	%	Value	%
A Item	7	20	34,267	65.2
B Item	7	20	12,690	24.5
C Item	21	60	5,704	10.3
Total	35	100	52,511	100.0

Note:- As the Consumption Pattern during the past 7 months is not a representative one, an AEC of anticipated consumption was taken and made use of in the Inventory control exercise.

APPENDIX I-A

A B C ANALYSIS OF RAW MATERIALS BASED ON PROJECTED CONSUMPTION

Sl. No.	Item Particulars	Annual Consumption Rs.	Cumulative Consumption Value Rs.	Cumulative %
A				
1.	Copper Wire	22,800		
2.	Red Oxide Primer	22,790		
3.	Fixed Contacts	21,600		
4.	Moving Contact Carrier	18,000		
5.	Switch Cover	15,000		
6.	Moving Contacts	14,400		
7.	Main Housing	14,400		
8.	M.S.Strips (16G & 14G)	13,320	1,42,310	70
B				
9.	Sleevings	6,400		
10.	Brass Caps	6,000		
11.	Lever Arms	6,000		
12.	Glass Tubes	5,400		
13.	Leatheroid Sheet	4,200		
14.	Corrugated Boxes	3,900		
15.	Compressor Spring	3,600		
16.	M.S. Rounds	3,304		
17.	Handle Knobs	3,000		
18.	Name Plates	3,000		
19.	M.S.Strips 12G	2,664		
20.	Paint	2,400	1,92,178	93
C				
21.	Carrier Spacers	1,800		
22.	M.S.Screws M4	1,782		
23.	M.S.Nuts 3/8	1,500		
24.	Tension Spring	1,500		
25.	M.S. Screws 3/8 M	1,200		
26.	Soldering Lead	750		
27.	Tin Wire	700		
28.	M.S. Screws	600		
29.	Grammelled Copper Wire	600		
30.	M.S. Washers 3/4	480		
31.	M.S. Washers 3/8	360		
32.	M.S. Nuts 3/16	300		
33.	M.S. Washers 3/8	180		

	1	2	3	4
34. Spring Washers		120		
35. Collar Pin		120		
36. Spring Washers 3/8		120		
37. Kaffuring Powder		120		
38. Patti		48		
39. Aluminium Rivets		45	2,04,503	100
<hr/>				
Categorisation	No.of items	%	Value	%
A Item	8	21	1,42,310	70
B Item	12	31	49,868	23
C Item	19	48	12,325	7
Total	39	100	2,04,503	100

The Projected consumption has been deduced from the projected sales and the bills of materials.

APPENDIX II.

INVENTORY CONTROL SYSTEM

Present Production 200 Switches per annum
 Anticipated production 500 Switches per annum.

Copper Jumps 1500 sets
 Time limit basis 6000

Sl. No.	Items Particulars	Annual consumption quantity (A)	Annual Consumption value Rs. (B)	Unit price	EOQ	Order quantity O.Q.	For Projected
					$\sqrt{\frac{2Aa}{P}}$ 7.07A/P		$20 \times \sqrt{L}$ 6 X 1.414
1	2	3	4	5	6	7	8
1.	Copper Wire	570 Kg.	22,800	40/kg	26.8	27 Kg.	13
2.	Redoxide Primer	86 Litres	22,790	265	3.9	4 Ltrs.	2.31
3.	Fixed Contact	54,000 Pieces	21,600	0/40	2595	2600	1148
4.	Moving Contact Carrier	18,000 Sets	18,000	1 Set	947	950	292
5.	Switch Covers	6,000 Pieces	15,000	2/50	346	350	99
6.	Moving Contacts	36,000 Pieces	14,400	0/40	2121	2200	1094
7.	Main Housing	6,000 Pieces	14,400	2/40	353	400	226
8.	M.S. Strips	2,200 Kg.	13,320	6/Kg	136	150	210
			142,310				

Sl. No.	Items Particulars	Safety stock 26 L -S.S.	NLT Normal Lead Time	Average consumption Rate per week.	LTC Lead Time consum-ption.	Max stock SS + 00	R.OL S.S. + LTC	Aver- age stock Max+ SS/2	Value of ave- rage stock Rs.	Stock held
1		9	10	11	12	13	14	15	16	17
1.	Copper wire	26 Lt.	1 week	11 Kg.	11 Kg.	53 Kg	37 Kg	40 Kg	1,600	
2.	Redoxide Primer	5 "	1 week	1.7	1.7	9 Lt	7	7	1,855	
3.	Fixed Contact	2300	1 week	1038	1038	4900	3350	3600	1,440	
4.	Moving Contact Carrier	800	1 week	345	345	1750	1150	1275	1,275	
5.	Switch covers	198	1 week	115	115	548	320	373	933	
6.	Moving contacts	2200	1 week	690	690	4400	2900	3300	1,320	
7.	Main Housing	500	1 week	115	115	900	625	700	1,680	
8.	M.S. Strips (16 & 14 G)	420	1 week	43	43	570	463	495	2,970	
									13,073	41,009 about four months

1	2	3	4	5	6	7	8	
9. Sleeveings	Mts.	2,000	6,400	Mts.	3/20	176.75	200	30.8
10. Brass caps	pieces	12,000	6,000	Piece	0/50	544	600	1503
11. Lever arms	"	6,000	6,000	"	1/-	548	550	433
12. Glass Tubes	Kg.	300	5,400	Kg.	18/-	28.2	30	5.9
13. Leatheroid Sheet	Kg	120	4,200	Kg.	35/-	12.7	15	1.7
14. Corrugated Boxes	Pcs.	6,000	3,900	Piece	0/65	676	700	83
15. Compressor Spring	Pcs.	36,000	3,600	Piece	0/10	4242	4250	714
16. M.S. Rounds	Kg.	944	3,304	Kg.	3/10	115.9	120	28.09
17. Handle knobs	pieces	6,000	3,000	Piece	0/50	387	400	98
18. Name plates	"	6,000	3,000	Piece	0/50	387	400	91
19. M.S. Strips 12 G	Kg.	444	2,664	Kg.	6/-	60.8	65	64
20. Paint	Litres	60	2,400	Lts.	40/-	8.5	9	9.94
			49,868					

1.	2.	9.	10.	11.	12.	13.	14.	15.	16.	17.
9. Sleevings	62	1 week	38	38	262	100	162		518	
10. Brass caps	3000	1 week	230	230	3600	3250	3300		1,650	
11. Lever arms	866	1 week	115	115	1416	990	1141		1,141	
12. Glass Tubes	12	1 week	6	6	42	18	27		486	
13. Leatheroid sheets	4	1 week	3	3	19	7	12		420	
14. Corrugated Boxes	176	1 week	115	115	876	291	526		342	
15. Compressor Spring	1428	1 week	692	692	5678	2120	3553		355	
16. M.S.Rounds	56.18	1 week	18.1	18.1	177	75	117		410	
17. Handle Knob	196	1 week	115	115	596	311	396		198	
18. Name Plates	182	1 week	115	115	582	297	382		191	
19. M.S.Strips (12 G)	128	1 week	8.5	8.5	193	137	166		996	
20. Paint	19.98	1 week	1.1	1.1	29	21	25		1,000	
									7,707	13603 Three Months

1.	2.	3.	4.	5.	6.	7.	8.
21.	Carrier Spacers						
22.	M.S. Screws (M4)						
23.	M.S. Nuts 3/8						
24.	Tension springs						
25.	M.S. Screws 3/8 M						
26.	Soldering lead						
27.	Tin wire						4 Month's require- ment ie.,
28.	M.S.Screws 3/4 "						Thrice a year
29.	Grammelled Copper wire		12,325				Rs.4,100.
30.	M.S. Washers 3/4						
31.	M.S. Washers 3/8						
32.	M.S. Nuts 3/16						
33.	M.S. Washers 5/8						
34.	Spring Washers 3/86						
35.	Cottar pin						
36.	Spring Washers 3/86						
37.	Kaffuring powder						
38.	Patti						
39.	Aluminium Revets						
	For C Item						4 Months' consump- tion

1.	2.	9.	10.	11.	12.	13.	14.	15.	16.	17.
21. Carrier spacers										
22. M.S. Screws										
23. M.S. Nuts 3/8										
24. Tension springs										
25. M.S. Screws 3/8 M										
26. Soldering lead										
27. Tin wires										
28. M.S. Screws 3/4"		1 Month's				5Month's		3Months		
29. Gramelled copper wire		require-				require-		require-		
30. M.S. Washers 3/4		ment ie.,				ment		ment		
31. M.S. Washers 3/8		Rs.1,025								
32. M.S. Nuts 3/16						Rs.5,125		Rs.3,075	3075	10001
33. M.S. Washers										10
34. Spring Washers 3/16										Months
35. Cottar pin										
36. Spring washers 3/3										
37. Kaffuring powder										
38. Patti										
39. Aluminium Revets										
For C Item		1Month's				5 Months		3 Months		23855
		consump-				consump-		consump-		
		tion				tion		tion		

APPENDIX III

FIXED AND VARIABLE COST OF REVERSIBLE SWITCHES AND BREAK-
EVEN LEVEL

	1981-82	1982-83. (Projected)
	Rs.	
Sales - Quantity	2200 Nos.	6000 Nos.
Sales - Value	Rs.1,05,000	Rs.2,88,000
Fixed and Semi Variable Expenses per annum	Rs.	Rs.
1. Wages	15,287	17,500
2. Rent	4,620	4,620
3. Depreciation	2,800	2,400
4. Bank Interest (MTL & WC)	17,520	17,400
5. Insurance	1,600	1,600
6. Cottages and Telephone	2,220	2,500
7. Printing & Stationery	420	600
8. Rates and Taxes	3,015	5,800
9. Audit fees	350	350
10. Proprietor's Remuneration	7,200	7,200
Total Fixed and Semi-Variable expenses per annum	51,032	59,970
Variable Expenses per annum		
1. Electricity (12 HP)	1,200	1,200
2. Repairs & Maintenance	1,030	1,200
3. Consumable Tools	990	1,200
4. Freight & Octroi	850	1,700
5. Royalty (4%)	4,000	11,500
6. Sub Contracting Charges (@ Rs.6/- per switch)	14,952	36,000
7. Sub Total	23,022	52,800
8. Raw Materials	59,000	1,69,200
9. Total variable costs	82,022	2,22,000
Variable cost/Reversible Switch	37.3	37.00
Contribution towards Fixed Expenses =	2,88,000 -	2,22,000
	= Rs.66,000	
Break Even Point = $\frac{59,970}{66,000} \times 2,88,000$		
	= Rs.2,61,840	ie., 5455 switches per annum
		i.e. 94% of projected Sales.

APPENDIX IV

GROSS REVENUE FROM CIRCUIT BREAKERS AND COPPER JUMPS.

	1981-82 Rs.	1982-83 Rs.
CIRCUIT BREAKERS		
Sales Value (6000 pieces P.A. @ Rs.3.90 per piece)	9,870	19,120
COST		
a. Glass Tubes - 300 Kgs.	5,400	
b. Brass Caps 12000 Nos.	6,000	
c. Kaffuring Power 1 Kg.	120	
d. Tin Wire 1 Kg.	700	
		12,220
Gross Revenue from circuit breakers		6,900
	1981-82 Rs.	1982-83 Rs.
COPPER JUMPS		
Sale Value (1500 Sets P.A.)	15,000	26,250
750 @ Rs.23/-	17,250	
750 @ Rs.12/-	9,000	
COST		
Copper wire - 570 Kgs. @ Rs.40/- per Kg.		22,800
Gross Revenue		3,450

The fixed and semi Variable expenses applicable to the manufacture of the above items forms a negligible portion of about 2% and hence have not been segregated from the estimates for manufacturing switches.

APPENDIX V
MACHINE HOUR RATE FOR LATHE AND SPOT WELDING SET

Particulars	COST CENTRES				
	Lathe	Spot welding			
Fixed and Semi Variable Expenses per Month (150 Hours)	Rs.	Rs.			
a. Wages	200	350			
b. Rent	155	40			
c. Depreciation	60	120			
d. Administrative Overheads	740	740			
Total Fixed Cost per month	1,155	1,250			
Variable Expenses at Maximum Utilisation					
a. Electricity	80	750			
b. Repairs and Maintenance	25	15			
c. Consumable Tools	50	35			
d. Freight	120	250			
Total Variable Cost per month	275	1,050			
Variable Machine-hour Rate	1.84	7			
Fixed Machine-Hour Rate					
	UTILISATION FACTOR				
	20%	40	60	80	100
1. Lathe	38.50	19.25	12.83	9.62	7.70
2. Spot Welding	41.65	20.82	13.88	10.41	8.33
Total Machine-Hour Rate					
1. Lathe	40.34	21.09	14.67	11.46	9.54
2. Spot Welding	48.65	27.82	20.88	77.41	15.73

SUMMARY OF BALANCE SHEET AS ON 31ST MARCH

Liabilities	1980	1981	1982 Expec- ted	1983 Pro- jected	Assets	1980	1981	1982 Expec- ted	1983 Pro- jected
Current Liabilities					Current Assets				
Bank	144	129	135	151	Cash	5	1	-	13
Sundry creditors	44	27	16	12	Stock	102	91	65	34
Other Liabilities	5	9	-	-	Sundry Debtors	75	49	25	75
	193	165	151	163	Investment	4	3	12	2
						186	144	102	124
Deferred K S I C	14	10	7	3	Block Land & Building	44	47	44	41
Bank Term Loan			4	-	Plant & Machinery				
	14	10	11	3	Sundries	4	4	3	2
Capital and Surplus	27	20	-	1		48	51	47	43
	27	20	-	1	Intangibles	-	-	13	-
						-	-	13	-
Total	234	195	162	167	Total	234	195	162	167
Less Raw materials	237	129	130	333					
Expenses	133	52	59	204					
Depreciation	93	70	76	111					
Net Profit	4	4	3	2					
	11	3	8	16					

APPENDIX VII

WORKING CAPITAL REQUIREMENT AT THE PEAK LEVEL
OF PRODUCTION ANTICIPATED

Monthly Sales			Rs.27,750
Cost of Production			Rs.26,000
Raw materials			Rs.17,000
		Permissible	W R C
Raw Materials Average 1½ Month as per system proposed	Rs.25,500		
LESS 25% Margin	6,375		
	-----	19,125	25,500
Goods in Process 1 Week	Rs. 6,500		
LESS Margin 33-1/3%	2,100		
	-----	4,400	6,500
Finished Goods 1 Month	Rs.26,000		
LESS Margin 33-1/3%	8,600		
	-----	17,400	26,000
Bills 3 Months	Rs.83,250		
LESS Margin 10%	8,325		
	-----	74,925	78,000
Expenses 1 Month			9,000
		-----	-----
		1,15,850	1,45,000
Sundry Creditors 3 week		12,750	
Permissible Limit		1,15,850	1,28,600
<u>Deficit</u>			
Deficit in working capital	=	Rs.16,400	
Current Deficit		Rs.39,000	
Net Deficit		Rs.55,400	

Sources to meet the deficit			
Proceeds from chit		Rs.10,000	
Fresh Capital		Rs.10,000	
Term Loan		Rs.20,000	
Profit Accretion		Rs.15,400	

		Rs.55,400	

APPENDIX VIII

TREND ANALYSIS

Particulars	Actual Figures (Figures are in Rupees thousands)			Pro- jec- ted	As % with 79-80 as Base Year (100%)		
	79-80	80-81	81-82		82-83	81	82	83
Sales	237	129	130	333	54	55	140
Raw Materials Com- pound	133	52	59	204	39	44	153
Expenses	93	70	76	111	75	82	119
Net Profit	11	3	8	16	27	73	146
Equity	27	20	-	1	74		
Current Assets	186	144	102	124	77	55	67
Deferred Liability	14	10	11	3	71	78	21
For Bank Working Capital Borrowing	144	129	135	151	60	94	105
Total Assets	234	195	149	167	83	64	71
Block	44	47	44	41	107	100	93
Sundry Debtors	75	49	25	75	65	33	100
Sundry Creditors	44	27	16	12	61	36	27
Interest Paid	15	12	17	17	80	113	113
Total Cost of Production	226	126	138	317	56	58	140

FUNDS FLOW STATEMENT

APPENDIX IX

(Figures in Rs.'000)

Sources	1981	1982	1983
Increase in other liability	4	-	-
Increase in bank borrowings	-	6	16
Increase in term loan	-	4	-
Increase in equity	-	-	1
Decrease in stock	11	26	31
Decrease in sundry debtors	26	24	-
Decrease in investment	1	-	10
Decrease in fixed assets	-	3	3
Decrease in sundries	-	1	1
Decrease in intangibles (Loss)	-	-	13
	42	64	75
Application			
Decrease in bank borrowings	15	-	-
Decrease in sundry creditors	17	11	4
Decrease in other liability	-	9	-
Decrease in K S I C	4	3	4
Decrease in term loan	-	-	4
Decrease in equity	7	20	-
Increase in sundry debtors	-	-	50
Increase in investment	-	9	-
Increase in fixed assets	3	-	-
Increase in intangibles (Loss)	-	13	-
	46	65	62
Opening cash balance	5	1	-
ADD Sources	42	64	75
LESS Application	46	65	62
Closing balance	1	Nil	13

APPENDIX X

RATIO ANALYSIS

	1980	1981	1982	1983
Debt:Equity	207:277.7	185:209.2	162	166:1
Current Asset:Current Liability	186:193	144:165	102:151	124:163
Net profit:Sales	11:237	3:129		16:333
Annual consumption: Average inventory				
Average collection (No. in days)	109	138	71	83
Earning power	4.9%	1.5%		9.5%
Fixed assets: Equity	44:27	47:20		41:1
Value added to total investment				

TOOLS ENGINEERING

BRIEF HISTORY OF THE UNIT

The unit was established as a partnership concern in the year 1975 and has been banking since its inception. The unit has now converted itself into a proprietorship firm. Smt R Dinubhen Shah is the proprietrix of the firm. The unit is presently enjoying extensive credit facilities with the bank. The unit has recorded a satisfactory level of growth and by dint of a well-run managerial system, good quality of its products and good public contacts has established itself as a strong force in the market and has among its regular customers - M/s Jindal Aluminium, M/s Bharat Electronics Ltd, M/s NGEF, M/s Mysore Electrical Engineering Industries Ltd.

The position of the unit's accounts as on 18.2.1983 is given below:

Facility -----	Limit Rs. -----	Outstanding Rs. -----
C/c mundy / bills	45,000 1,10,000	3,01,694.53*
Medium Term Loan		
I	80,000	11,250.00
II	67,000	6,080.00
III	94,000	54,500.00

* includes excess drawings allowed for purchase of machinery.

The various data collected and classified under various appendices have been culled from the available records provided by the unit and detailed discussions

with Sri R L Shah*(husband of the proprietrix), the full time accountant and the foreman-cum-floor supervisor. For the guidance of the unit, a proforma cost sheet is enclosed. (Appendix No.XIX)

COSTING (Refer Appendix Nos. VIII & XI)

The production programme for the budget year, viz., 1983-84 was fixed in consultation with the unit and its past performances.

* Manager of the unit.

The budgeted figures given in the Appendix are within the normal capacity and reach of the unit and should be comfortably attained.

The projected production programme has been subdivided into three categories on the basis of the unit's operating performance in the past.

The unit expects to sell 7,000 sprinklers of various sizes valued at Rs.5,60,000 between July 1983 and January 1984 since the demand for sprinklers is of a seasonal nature. The unit expects to reach its peak performance, between August and October.

The unit expects to do jobbing with raw materials valued at Rs.5,00,000 over the entire 12 months of the year. A major part of this work is expected to be accomplished between March and June 1983 and in February 1984.

The unit expects to do jobbing without raw material valued at Rs.4,00,000. These are in the nature of fabrication jobs undertaken in a sporadic manner.

Thus the total projected sales comes to Rs.14,60,000.

DIRECT COSTS

The raw material cost in the case of sprinklers is expected to be 71.57% of the sale value. However, if we take into account the value of scrap generated during the production of sprinklers, the value of raw materials will come down to 64.07%. The conversion cost for sprinklers is expected to be 12.7% of the sale value.

The raw material content in jobbing with raw material is expected to be about 75%. However, an analysis of the actual consumption based on the balance sheet figures reveals a very high raw material consumption rate of 85%. There has been a marginal under-valuation of closing stocks which coupled with rejections has resulted in an apparently low margin of profits on jobbing with raw materials. The conversion cost is expected to be 17.7% of sale value.

In the case of jobbing without raw materials, the unit expects to generate a net profit of 29% on sale value.

The unit expects to generate a profit of 16.44% on the the sale value at the projected production and sales level.

BUDGETED EXPENSES AND ALLOCATION

The various expenses to be incurred to achieve this target have also been projected after detailed discussions with the unit and have been allocated suitably to the different cost centres, after segregating them into fixed allocable costs, variable allocable costs and fixed non-allocable costs.

The various production facilities in the factory were categorised into various cost centres, production centres and service centres, (no unbooked cost centre came to light) depending upon the purpose to which they were put. Machines performing similar functions have been allocated/identified under one common cost centre. The machines used for the various operations like turning, drilling, milling, grinding, etc., have been accordingly identified as different cost centres. The bench-grinders two in number, which are used for sharpening, levelling, etc., of the various items of consumable tools for feeding into the machines have been classified necessarily as a service centre.

The expenses under the following heads have been allocated as described below:

(a) Electricity to be consumed has been allocated on the basis of H.P. rating of each machine X the operating hours.

(b) Wages - paid to each category of workmen have been obtained from the books of the unit and apportioned to each cost centre based on the labour force in each unit. The wages (salary) paid to the fore-man-cum-floor supervisor has been apportioned on the basis of time spent at the respective cost centres.

(c) Rent - paid by the unit has been calculated and apportioned on the basis of carpet/floor area occupied by each cost-centre after making suitable provisions for the area occupied by the office, store-room, open space and a shed.

(d) Depreciation on machinery - has been allocated according to the written down value of each cost centre.

e) Consumable tools and stores - have been allocated to each cost centre on the basis of discussions with the unit.

FIXED AND VARIABLE MACHINE HOUR RATES

The facilities available with the unit have been loaded with the projected production sales programme based on the projected operating and booked hours on each cost centre and the expenses allocated/apportioned to them. The variable and fixed machine hour rates have been completed and presented in Appendix VII.

PRODUCT COSTING AND PROFORMA COST SHEET

Using the machine hour rates sprinklers and some of jobbing products have been costed (Appendix X) and a contribution analysis has been done (Appendix IX). It is observed that all the items yield positive contribution as well as profits. The components of water sprinklers have been costed and it is hoped that this will serve a useful purpose in spare part pricing.

INVENTORY & RECEIVABLES NORMS AND WORKING CAPITAL REQUIREMENTS

The inventory norms have been evolved on the basis of a detailed estimate of the requirements of RM, WIP, FG & BR of sprinklers, job-work with and without RM. The basic assumptions are given below.

RAW MATERIALS (RM)

The RM requirements for sprinklers have been estimated on the basis of order quantity and lead time for individual components of the sprinkler (Appendix). The crash lead time has been assumed to be one day since all the components are either easily available in the market or are processed at the factory itself.

The raw material requirements for jobbing with raw materials has been estimated at seventy five per cent of sale value. The stocking level has been assumed at 1/2 month consumption.

WORK IN PROCESS

The process time for sprinkler, jobbing with raw materials and jobbing without raw materials, has been assumed to be 10 days, 7 days and 7 days respectively.

FINISHED GOODS STOCK

The finished goods stock for sprinklers has been assumed as 10 days. The finished goods stock of jobbing with raw materials has been assumed at 7 days.

BILLS RECEIVABLES

The outstanding bills against sprinklers has been assumed to be seven days, since the realisation has been almost immediate in the past.

In the case of jobbing with and without RM, the unit expects to have 60 days' bills outstanding since the payment from its major customers are very much delayed due to procedural problems and normal credit available in the market.

On the basis of the above assumptions, the unit's requirement of working capital is expected to peak in July 1983 (Rs.2,83,992). The inventory norms consequently evolved are as under:-

Raw materials	30 days
Work-in-process	10 days
Finished goods	7 days
Bills receivable	60 days

The aggregate working capital requirements based on above work out to be Rs.3,65,500 against which is a bank finance of Rs.1,70,000 for bills and Rs.25,000 for stocks is considered adequate.

OPERATING ECONOMICS

The unit has registered a sales turnover of Rs.13 - 10 lacs during the year 1982. For the year 1983, it anticipates a turnover of approximately Rs.15 lacs. Taking the figure for the year 1980, as the basis, the unit has registered a growth of 195% in 1981 and 303% in 1982. The present budgeted sales of Rs.14,60,000 works out to be about 303% which appears to be realistic.

The unit being one among the very few irrigation sprinkler manufacturers in the country, has got a competitive advantage in sales and its relationship with its sole buyer - M/s Jindal Aluminium appears to be most satisfactory. The unit however encounters stiff

competition from the very many tool components units in the area as far as its jobbing activities go but, has managed to do well for itself, judging by the many noteworthy customers on its books, viz., M/s NGEF, MEEI, BEL, etc.

PROFITABILITY

The unit has earned profits amounting to Rs.49,000, Rs.81,000 and Rs.35,000 during the years 1980, 1981 and 1982 respectively. The profit earned during 1982 has however come down as a result of the unit's expansion programmes/endeavours but taking into account the provision made for the investment allowance reserve for which it is eligible, the decline in profits need not be taken too seriously.

BREAK-EVEN ANALYSIS

Since the unit is involved in both the production of sprinklers and job works with and without raw materials, an attempt has been made to evaluate the break-even level on the basis of ALLOCATED FIXED COST on account of sprinklers. The basic assumption here is that "product mix" will continue to remain unchanged.

Sale price	Rs.80.00	per piece
Cost of production	Rs.61.91	per piece
Contribution	Rs.24.29	per piece
Fixed Cost(Allocated)	Rs.43,400	
Break-even level of production of sprinklers	1,787 pieces	
Break-even value of sales	Rs.1,42,960.	
%age production at break-even (as compared to projected sales level)	25.52%	

The break-even value of total sales on the basic assumption that the "product mix" remains unchanged is given now:

Total projected sales	Rs.14,60,000
Total projected variable cost	Rs. 8,75,818
Total contribution	Rs. 5,84,182
Total fixed cost	Rs. 3,01,687
Break-even sales =	$\frac{301687}{584182} \times 1460000 = \text{Rs.}7,53,982$
Break-even sales of job work without and with RM	= Rs.6,11,022.

FINANCIAL ANALYSIS

Funds flow statement (Appendix No.XVI)

An analysis of the funds flow statement for the last three years reveals that in the years 1980 and 1982, there has been a diversion of short term sources of funds for long term uses. In 1982 this situation has arisen on account of drawings permitted in the cash credit account in anticipation of sanction of a term loan of Rs.1,63,000 for purchase of machinery. However, if we assume that the purchase of machinery has been financed by a long term source then the surplus of long term sources of funds over long term uses will be Rs.1,01,000. In 1981 the unit has been able to generate a long term source of funds amounting to Rs.75,000 to meet the short term uses.

The unit has increased its outlay against stocks considerably in 1982, to the tune of Rs.2,64,000. This has mainly arisen on account of stocking of brass extruder rods and imported steel rods in anticipation of orders for sprinklers. The stocking goes much beyond the inventory norms evolved for the unit.

There has been a steady increase in sundry creditors over the years. The increase in 1982 has been to the tune of Rs.1,90,000 which is an indication of the unit's ability to generate short term funds to finance its operations.

The increase in capital in 1980 and 1981 has been steady but with the retirement of two partners and the reconstitution of the firm as a sole proprietorship, the increase in capital has been only Rs.2,000 in 1982.

FINANCIAL RATIOS (Appendix XVII, XVIII)

The debt equity ratios have shown a substantial increase from 1.7 in 1981 to 2.98 in 1982. This has mainly been due to (a) reconstitution of the firm as a proprietorship and (b) an increase in the net block consequent on the acquisition of fixed assets in 1982.

The current ratio has shown a satisfactory increase from 0.73 in 1980 to 1.23 in 1982. The unit is therefore in a position to effectively meet its maturing current obligations.

The sales equity ratio has shown a steady increase from 1:5 in 1980 to 1:9 in 1982.

The ratio of equity to total liabilities came down to 1:3.8 in 1981 from 1:5.82 in 1980. However, in 1982 the ratio has increased to 1:6.8.

The major bills raised by the unit were analysed for a weighted average collection period, which comes to 67 days.

TREND ANALYSIS

The sales of the unit have shown a substantial increase over the years. Sales increased by 90% in 1981 as compared to the level obtained in 1980. There has been a further encouraging increase of 60% in sales in 1982.

The gross profit has shown a steady rise from Rs.2,28,000 in 1980 to Rs.3,79,000 in 1982.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

The unit is among one of the five manufacturers of irrigation 'sprinklers' in the country and enjoys the enviable position of being the sole supplier of the above named product to M/s Jindal Aluminium, from this part of the country. The unit's sales have registered an appreciable upward trend over the past so many years and is expected to record even better performances in the years to come. The turnover for the last three years is given below:

<u>Years</u>	<u>Sales</u> (in Rs.-ooo's)
1980	432
1981	821
1982	1310

The unit is managed by the husband of the proprietrix, Sri R L Shah who has business interest in a foundry unit, which is supplying castings for sprinklers.

PRODUCT CLASSIFICATION

For the purpose of analysis the unit's products have been grouped into three categories:

- (a) Sprinklers accounting for a sale of Rs.5,60,000.
- (b) Jobbing with raw material accounting for a sale of Rs.5,00,000.
- (c) Jobbing without raw materials accounting for a sale of Rs.4,00,000.

These three categories, the projected sales figure for which are given above were used for arriving at machine loads and utilisation and subsequent costing exercise.

COSTING, PRICING AND PRODUCT MIX

From the machine hour rates estimated during the study, some of the major products have been costed and the results show that all the products yield positive contribution and profit. A proforma cost sheet has been prepared and given in Appendix XIX. It will help the unit to quote for enquiries it receives in future.

INVENTORY NORMS

The findings of the costing exercise have been used to arrive at average stocking periods for various categories of inventory items at the peak level of requirement which work out to be:

- | | | |
|----|-----------------|---------|
| a) | Raw materials | 30 days |
| b) | Work-in-process | 10 days |
| c) | Finished goods | 7 days |

RECEIVABLE NORMS

By taking major bills and their collection period during 1982, the weighted average collection period for unit's jobbing bills comes out to be 67 days. The sprinklers bills are realised in 7 days and the weighted average receivables period has been estimated at 60 days for assessing working capital.

On the basis of estimated inventory and receivables norms the unit's requirements for working capital at the projected annual sales turnover of Rs.14,60,000 works out to be Rs.3,66,000 against which following bank finance may be considered to meet the requirement adequately:

C/c bills	Rs.1,50,000
C/c mundy type	Rs. 75,000

BREAK-EVEN ANALYSIS

Since the very nature of the unit's operation is heterogenous, the break-even value of the total sales has been estimated at Rs.7,53,982. On the basis of allocated fixed cost the break-even value of sale of sprinklers is Rs.1,42,960. Thus, the break-even value of sales of job work including both with and without raw materials is Rs.6,11,022.

ANALYSIS OF FINANCIAL STATEMENTS (APPENDIX XV, XVI)

The unit's limits were reviewed recently and a term loan of Rs.1,63,000 and enhanced working capital facilities of Rs.2.5 lacs have been recommended by the bank. In anticipation of sanction, excess drawings have been permitted in the unit's cash credit account which is expected to be regularised once the formal sanction is received.

The unit's stocking has shown a dramatic rise in 1982 from Rs.65,000 to Rs.3,29,000. This has been mainly due to stocking of brass extruder rods and imported steel rods in anticipation of orders for sprinklers. The stocking level is unusually high and considering that the lead time for procuring brass extruder rods is very low the stocking level is considered excessive.

There has been a steady rise in sundry debtors and sundry creditors commensurate with the increased level of operations of the unit over the past three years. There has been a substantial increase in sundry creditors in 1982 to the tune of 175% of the level obtaining in 1981.

The unit has acquired substantial fixed assets in 1982. Consequently, the net block has increased by nearly 48% in 1982 over the level obtaining in 1981.

The unit was reconstituted as a proprietorship firm. There has therefore been a marginal increase in capital and surplus.

Loans from friends and relatives have shown wide fluctuations and stands at Rs.2,63,000 in 1982.

There has been a very encouraging rise in sales which stood at Rs.13,10,000/- in 1982.

CAPACITY UTILISATION (Please refer to Appendix II, III and IV)

On a scrutiny of the machine loading matrix, it will be observed that all the machines have been fairly well utilised. The bottle-neck machines in the unit are the milling machines which are utilised to the extent of 121%. It is suggested that the unit goes in for a second shift also, but from discussions with the unit, it appeared that it had no immediate plans to go in for a second shift due to major operational and managerial problems--such as supervision, labour and power and the implications of the Factory Act, ESI, etc.

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LIST OF APPENDICES

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PARTICULARS OF MACHINERY - COST CENTRE WISE

S.No.	Description of Machine	H.P.	Value of Machinery	Depreciated Value on 31-12-1982	Depreciation for 1983	Cost Centre
1.	Kirloskar Shimaga Lathe	4.15	38320.00	27935.00	2800.00	X
2.	Kirloskar Hi-Cut Lathe	2.15	26692.00	16786.00	1678.00	X COST
3.	Oetoo HMT Centre Lathe	3.15	41059.20	29932.00	2993.00	X CENTRE
4.	Geedee Weiler Lathe	1.65	33102.11	21718.00	2172.00	X No.1
5.	Geedee Weiler Lathe	1.65	22606.10	16479.00	1648.00	X
6.	Copying Lathe	6.50	13150.00	11835.00	1184.00	COST CENTRE No.2
7.	Verticle Milling Machine	4.15	39529.00	16782.00	1678.00	X
8.	Horizontal Milling Machine	10.15	113988.60	87309.00	8730.00	X COST CENTRE No.3
9.	Drilling Machine	1.5	3108.87	1338.00	134.00	X
10.	Universal Drilling Machine	1.0	10054.00	5936.00	593.00	X COST CENTRE
11.	Bench Drilling Machine Cincinnati	3.0	11509.00	9322.00	932.00	X No.4
12.	Bench Type Drilling Machine	0.9	2652.00	2386.00	238.00	X
13.	HMT Drilling Machine	9.15	146912.94	137221.65	13722.00	X
14.	Battliboi Shaping Machine	3.0	20800.00	15163.00	1516.00	COST CENTRE No.5
15.	Essics Stalling Machine	1.0	13300.00	8726.00	873.00	COST CENTRE No.6
16.	PSG Surface Grinder	1.5	5301.75	3478.00	348.00	X COST CENTRE
17.	Praga Surface Grinder	1.65	73958.04	66562.00	6656.00	X No.7
18.	Fly Press No.5	-	940.00	450.00	45.00	X COST CENTRE
19.	Double sided Fly Press No.10	1.0	4256.00	2792.00	279.00	X No.8
20.	Hackshaw Machine	1.0	2392.00	1412.00	141.00	X COST CENTRE No.9

Appendix I Contd...

: 2 :

(1)	(2)	(3)	(4)	(5)	(6)	(7)
21. Compressor (Air)		1.0	1000.00	900.00	90.00	COST CENTRE No.10
22. Rockwell Disc & Belt Sander		0.5	3266.25	2142.00	214.00	X SERVICE
23. Bench Grinder Power Master		0.5	850.00	365.00	36.00	X COST CENTRE No.1
				486969.00	48696.00	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(5) MAIN JET & SOIDER JET	do	do								
a. Turning	X		16100	16520						
b. Drilling & Threading	X			19501						
				7800						
(6) STEEL PINS	do	do								
a. Turning			10500	10920						
b. Cutting										
(7) ASSEMBLY	do	do								
TOTAL (MINUTES)			89775	93665			78225		80535	
TOTAL (HOURS)			1496	1561			1304		1342	

APPENDIX II Contd..

S.No.	Shaping		Slotting		Grinders (2 Nos.)		Fly Press		Hacksaw OT	Com- pressor		Hand- filing		Assem- bly		
	OT	TT	OT	TT	OT	TT	OT	TT		OT	TT	OT	TT	OT	TT	
1d.												21000	21000			
3d.									10500	10710						
4a.									7000	7210						
4e.			10500	10640												
6b.									5250	5620						
7 .														21000	21000	
TOTAL (MINUTES)			10500	10640					22750	23590			21000	21000	21000	21000
TOTAL (HOURS)			175	177					379	393			350	350	350	350

MACHINE LOADING MATRIX - JOB WORK WITH R. M.

S.No.	Products Description	Qty. Bud- geted	Batch No.	Lathes (5)		Copying Lathe		Vertical/ Hori. Milling		Drilling (5 Nos.)	
				O.T	TT	O.T	TT	O.T.	TT	O.T.	TT
1.	C.I. Match Plates	50	10					1000	1150	2250	2430
2.	Brush Holder	580	100	5000	5090			17400	17490	17490	17490
3.	Allum Alloy Sindle	2170	500	21700	21790			10850	10895	6510	6540
4.	Parelllel Key	26000	1000					208000	208135	78000	78090
5.	Bearings	280	280	2800	2815						
6.	M.S. Shafts	50	5	9000	9420			3000	3210		
7.	Boat Pressure Lever	2000	500	20000	20120			30000	30120		
8.	Terminal Jug	50	50	750	780			750	780	250	260
9.	Plunger Bush	120	120	1800	1830						
10.	Retainer	370	200	9250	9310						
11.	Contract Block	320	200	9600	9660			3200	3260	3200	3260
12.	Aruing Contact	540	500					8100	8160	2700	2720
13.	Inserts	2040	1000	20400	20490						
14.	O.D. 150	140	140	16800	16860						
15.	Outer Contact	100	100	3000	3015			4000	4035		
16.	T.L. Steeve	450	450	6750	6750			4500	4505	4500	4510
17.	S.S. Mercury Dosing Rod	50	50	2700	2730						
18.	Fan Hubs/Inserts	10250	2000	102500	102830						
19.	Grease Nipple	5000	2000	50000	50060						
20.	Brass Wedge	90	90					2700	2710	900	905
21.	Hinges	20	20	1200	1220						
22.	Sparkler Spares	400	400	1400	1460					1000	1030
23.	Terminals (BEL)	3400	1000					10200	10230		
24.	Star Strio	4900	1000	49700	49760						
25.	Misc. Gen. Items			5000	5440			3000	3030	2900	2930
26.	Terminal Link	26000	5000								
TOTAL (MINUTES)				339350	341430			306700	307710	117360	120165
TOTAL (HOURS)				5656	5691			5111	5128	1956	2002

APPENDIX III Contd..

S.No.	Shaping		Slotting		Grinders		Fly Press		Hacksaw		Com-Hand pres-filing sor		Assembly	
	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
1.							500	590					8700	8700
2.														
3.														
4.														
5.														
6.														
7.														
8.														
9.														
10.														
11.														
12.														
13.			10200	10230										
14.														
15.														
16.														
17.									120	120				
18.														
19.							15000	15000						
20.									450	450				
21.									200	200				
22.			600	610										
23.														
24.														
25.	54000	54090				1000	1020							
26.	54000	54090						53000	53180					
	54000	54090	10000	10890	1000	1020	68500	68920	770	770			8700	8700
	900	902	180	181	17	17	1141	1148	13	13			145	145

JOB WORKS - WITHOUT RAW MATERIALS - COMPONENTS MACHINE LOADING MATRIX

S.No.	Description	Qty. Produced	Batch No.	Lathe Nos. (5)		Copying Lathe		Verticle Milling & Horizontal Milling (2)		Drilling 5 Nos.	
				OT	TT	OT	TT	OT	TT	OT	TT
(1) JINDAL MAIN											
LINE COUPLER:											
	a. Turning I O.P	30000 Pcs	1000 Pcs			22500	23400				
	b. -do- II OP					72000	73800				
(2) FITTER HEAD CASTINGS:											
		12000 Pcs	500 Pcs								
	a. Turning			27000	27360						
	b. Drilling - (30P)									54000	55440
	c. Milling					18000	18000				
	d. Tapping									54000	54720
	e. Cleaning										
(3) DISTANT PIECES: (Part of Higher Capacity Ele. Motors)											
	Surface Grinding	50000 Pcs	1000 Pcs								
TOTAL (MINUTES)				27000	27360	94500	97200	18000	18720	108000	110160
TOTAL (HOURS)				450	456	1575	1620	300	312	1800	1836

APPENDIX IV Contd..

S.No.	Shaping		Slotting		Grinders		Fly Press		Hacksaw		Com- pres- sor		Hand- filing		Assem- bly	
	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
1.											10800	10800				
2.					75000	76500										
TOTAL (MINUTES)					75000	76500					10800	10800				
TOTAL (HOURS)					1250	1275					180	180				

APPENDIX V

PRODUCT MACHINE LOADING MATRIX

S. No.	Product Description	Lathe No.5	Copy- ing Lathe	Verti- cal & Hori. Milling 2 Nos.	Drill- ing 5 Nos.	Sha- ping	Slot ting	Grin- der (2 Nos.)	Fly Press Nos.2	Hack-pres- sor	Hand filing	Ass- embly
1.	Water Sprinklers											
	O.T.	1496	-	-	1304	-	175	-	-	379	-	350 1750
	T.T.	1561	-	-	1342	-	177	-	-	393	-	350 1750
2.	Job Works without Raw Materials											
	O.T.	450	1575	300	1800	-	-	1250	-	-	180	- -
	T.T.	456	1620	312	1836	-	-	1275	-	-	180	- -
3.	Job Works with Raw Materials:											
	O.T.	5656	-	5111	1956	900	180	17	1141 13	-	-	145
	T.T.	5691	-	5128	2002	902	181	17	1148 13	-	-	145
TOTAL												
	O.T.	7602	1575	5411	5060	900	355	1267	1141 392	180	350	1895
	T.T.	7708	1620	5440	5180	902	358	1292	1148 406	180	350	1895
Available Machine Hrs.		11250	2250	4500	11250	2250	2250	4500	4500 2250	2250	2250	-
Capacity Utilisation		68.5%	72%	120.88%	46.04%	40.08%	15.91%	28.71%	25.51% 18. 04%	8%		

NOTE: THE O.T. (OPERATING TIME) AND T.T. (TOTAL TIME) HAVE BEEN TAKEN FROM
APPENDICES II, III, IV.

APPENDIX VI

COMPUTATION OF FACILITY HOUR RATES

	Budgets	Lathe (5)	Copy- ing Lathe	Mill- ing (2)Nos.	Drill- ing	Shap- ing	Slot- ting	Grin- ders (2)	Fly Press (2)	Hack- saw	Com- pres- sor	Hand filing	Assem- bly
Total Variable Cost	142000	46900	10328	39583	12777	6874	1148	11430	-	9990	450	1680	840
Total Operating Hours		7602	1575	5411	5060	900	355	1267	1141	392	180	350	1895
Variable Machine Hour Rate		6.7	6.55	7.31	2.52	7.63	3.23	9.02		25.48	2.5	4.8	.44
Total Fixed Cost	103827		16912	67544	56507	10718	5374	25360	3633	4824	2993	1380	2615
Total Booked Hours		7708	1620	5440	5180	902	358	1292	1148	406	180	350	1895
Machine Hour Rate		13.47	10.44	12.41	10.90	11.88	5.95	19.62	3.16	11.88	16.62	3.94	1.38

NOTE: The Variable and Fixed Expenses have been taken from Appendix VII

ALLOCATION OF EXPENSES FOR THE BUDGETED LEVEL OF PRODUCTION

S. No.	Fixed Expenses	Budgeted	Lathe (5)	Copy- ing Lathe	Verti- cled Hori- Mill- ing	Drill- ing (5)	Shap- ing	Slott- ing	Grinder (2)	Fly Press (2)	Hack- saw	Com- pres- sor	Hand- fil- ing	As- sem bly	Grin- ders SCC (2)
1.	Wages	64000	30000	4500	12000	6000	2000	1000	3000	1500	500	1100	400	1500	500
2.	Rent	13000	4300	800	2700	2400	580	400	800	280	60	400	170	-	110
3.	Sal. of Supervisor	18000	4500	900	5400	4500	540	540	720	-	-	-	-	200	700
4.	Bonus	15000	7050	1400	2800	1400	460	250	700	350	120	350	-	-	120
5.	Bldg. Maintenance	3250	1075	200	675	600	185	100	200	70	15	100	-	-	30
6.	Depre- ciation	48700	11291	1184	10408	15619	1516	873	7004	324	141	90	-	-	250
7.	Interest on Term Loan	22200	5164	540	4750	7200	691	397	3190	147	64	41	-	-	16
	SCC Allocated		63380	9524	38733	37719	5972	3560	12614	2671	900	2081	570	1700	1726
(A)		184150	63898	9696	39165	38151	6058	3646	12614	2671	900	2081	570	1700	1726

VARIABLE EXPENSES:

1.	Tools Written Off & Store Consumed	70000	17500	3500	19600	3500	3500	-	7000	-	7000	-	1400	-	7000
2.	Tools Main- tenance	9000	2250	450	2700	450	450	-	900	-	900	-	-	-	900

: 2 :

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
3. Machinery															
Main.	15000	3750	750	4200	750	750	-	1500	-	1500	300	-	-	1500	
4. O.T.															
Wages	36000	16870	2530	8180	3375	1125	560	1680	-	280	-	280	840	280	
5. Power	12000	3600	2120	2460	2260	560	100	350	-	310	150	-	-	90	
		43970	9350	37140	10335	6385	660	11430	-	9990	450	1680	840	9770	
SCC															
Allocated		2930	978	2443	2442	489	488								
(B)	142000	46900	10328	39583	12777	6874	1148	11430	-	9990	450	1680	840	9770	
TOTAL															
ALLOCABLE															
COSTS (A+B)	326150	110798	20024	78748	50928	12932	4794	27044*	10890	2531	2250	2540			
TOTAL															
FIXED										*2671					
NON-															
ALLOCABLE	117537	39929	7216	28379	18356	4660	1728	9746*	3924	912	810	915			

*962

APPENDIX VII - B

FIXED COSTS (NON-ALLOCABLE)

1. Baner Charges	...	400
2. General & Fire Insurance	...	3000
3. Printing & Stationery	...	1000
4. Postages & Telegrams	...	800
5. Auditors' Fee	...	400
6. Water Charges	...	300
7. Telephone Charges	...	4000
8. Profession Tax	...	1200
9. Frdight Inward	...	5000
10. Freight outward	...	2000
11. Conveyance Charges	...	2000
12. Scooter Maintenance	...	3000
13. Advertisement	...	6000
14. Licences & Renewels	...	600
15. Medical Aid to Workers	...	600
16. Sundry Expenses	...	12000
17. Commission on Sales	...	15000
18. Rent (Office)	...	3850
19. Salaries	...	27000
20. Building Maintenance	...	1250
21. Interest on Working Capital	...	27000
22. Depreciation	...	1137

TOTAL	...	117,537

CONTRIBUTION ANALYSIS

	R.M.		SCRAP VALUE			Net RM Cost	Com. @1% on Sale	Total Price Cost	Variable Mac-hine Cost	Fixed Mac-hine Cost	Total Variable Cost	Total Cost	Selling Price	Contri-bution	Pro-fit
	Wt. Kg.	Rate Rs.	Cost Rs.	Wt. gms.	Rate Kg. Rs.										
I. WATER SPRINKLERS															
1. Body	.300	12.00				12.00		12.00	0.70	1.52	12.70	14.22	-	-	-
2. Arm		12.00				12.00		12.00	0.33	0.90	12.33	13.23	-	-	-
3. Bottom Nut	.300	12.00	120	20.00	2.40	9.60		9.60	0.84	1.01	10.44	11.45	-	-	-
4. Bottom Tube	.230	40	9.20	160	-	3.20	6.00	6.00	1.16	1.39	7.16	8.55	-	-	-
5. Main Jet	.30		1.20	10	-	0.20	1.00	1.00	0.25	0.58	1.25	1.78	-	-	-
6. Soilder Jet	.30		1.20	10	-	0.20	1.00	1.00	0.25	0.53	1.25	1.78	-	-	-
7. Pin	.100	45	4.50	-	-	-	4.50	4.50	0.47	0.51	4.97	5.48	-	-	-
8. Sorings	2	4	4.00	-	-	-	4.00	4.00				4.00	-	-	-
9. Washers	6	1	1.00	-	-	-	1.00	1.00				1.00	-	-	-
	Nos. set	X													
	Nos. set	X													
TOTAL FOR SPRINGLER INCLUDING ASSEMBLY COST						51.00	.75	51.85	3.86	6.20	10.06	61.91	80.00	24.29	18.09
II Jindal Mainline Coupler									0.34	0.72	1.06	1.06	2.00	1.66	0.94
III Filter Head Castings									1.14	2.74	3.88	3.88	6.00	4.86	2.12
IV Distant Pieces									0.11	0.25	0.36	0.36	0.40	0.29	0.04

	Raw Material		Prime Cost Rs.	Variable		Total Vari- able Rs.	Total Cost Rs.	Sell- ing price Rs.	con- tri- bution Rs.	Pro- fit Rs.	
	Wt. gms	Rate Kg. Rs.		Cost Rs.	Mac- hine Cost Rs.						Mac- hine Cost Rs.
V. Boat & Pressure Lever Gun Metal Casting	300	40/-	12.00	12.00	2.93	5.42	8.35	20.35	22.00	7.07	1.65
VI. Allum. Alloy Spindle Allum Casting	100	30/-	3.00	3.00	0.72	1.74	2.46	5.46	9.00	5.28	3.54
VII M.S. Shafts Steels Rods	30 Kgs.	10/-	300.00	300.00	13.40	33.67	47.07	347.07	370.00	56.60	22.93
VIII Parellel Keys - M.S. Flats Keybars	50	10/-	0.50	0.50	0.36	0.88	1.24	1.74	2.39	1.53	0.65
IX Terminal - BEL - Brass Strips	40	50/-	2.00	2.00	0.15	0.29	0.44	2.44	3.40	1.25	0.96

PRODUCT - COSTING

		O.T. Mts.	VMR	VC	T.T. Mts.	FMR	FC
<u>I. WATER SPRINKLERS</u>							
1. Body	Lathe	3.00	6.7	0.33	3.2	13.47	0.72
	Drilling	2.25	2.52	0.09	2.35	10.90	0.43
	"	1.00	2.52	0.04	1.02	10.90	0.18
	Handfiling	3.00	4.8	0.24	3.00	3.94	0.19
				-----			-----
				.70			1.52
				-----			-----
2. Arm	Lathe	2.25	6.7	0.25	2.35	13.47	0.53
	Drilling	2.00	2.52	0.08	2.02	10.90	0.37
				-----			-----
				.33			.90
				-----			-----
3. Bottom Nut	Hacksaw	1.5	25.48	0.63	1.53	11.88	0.30
	Lathe	1.0	6.7	0.11	1.06	13.47	0.24
	Drilling	1.0	2.52	0.04	1.06	10.90	0.19
	Drilling	1.5	2.52	0.06	1.53	10.90	0.28
				-----			-----
				.84			1.01
				-----			-----
4. Bottom Tube	Hacksaw	1.00	25.48	0.42	1.03	11.88	0.20
	Lathe	2.25	6.7	0.25	2.28	13.47	0.51
	Drilling	1.8	2.52	0.07	1.83	10.90	0.33
	"	1.1	2.52	0.04	1.13	10.90	0.20
	Slotting	1.5	3.22	0.38	1.52	5.95	0.15
				-----			-----
				1.16			1.39
				-----			-----

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5. Main Solder Jet	Lathe X Drilling X Threading X	2.3	6.7	0.25	2.36	13.47	0.53
6. Pin	Hacksaw Lathe	0.75 1.5	25.48 6.7	0.31 0.16	0.81 1.56	11.88 13.47	0.16 0.35
				0.47			0.51
7. Assembly	Manual	0.15	0.44	0.11	0.15	1.38	0.34
	TOTAL			3.86			6.20
<u>II JINDAL MAIN LINE COUPLER</u>							
	I op Lathe	0.75	6.7	0.08	0.78	13.47	0.17
	II op Lathe	2.4	6.7	0.26	2.46	13.47	0.55
				0.34			0.72
<u>III FITTER HEAD CASTINGS</u>							
	Lathe	2.25	6.7	0.25	2.28	13.47	0.51
	Drilling	4.5	2.52	0.18	4.62	10.90	0.84
	Milling	1.5	7.31	0.18	1.56	12.41	0.32
	Drilling	4.5	6.7	0.50	4.56	10.90	0.82
	Copressor	0.9	2.5	0.03	0.09	16.62	0.25
				1.14			2.74
<u>IV DISTANT PIECES:</u>							
	Grinding	0.75	9.02	0.11	0.76	19.62	0.25
				0.11			0.25

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
V. ALUMINIUM ALLOY								
SPINDLE	Lathe	1.00	6.7	0.67	6.2	13.47	1.39	
	Drilling	1.2	2.52	0.05	1.4	10.90	0.35	
				0.72			1.74	
VI. M.S. SHAFTS								
	Lathe	1.20	6.7	13.40	1.50	13.47	33.67	
				13.40			33.67	
VII. PARALLEL LEYS								
	Milling	1.2	7.31	0.15	1.3	12.41	0.27	
	Drilling	0.6	2.52	0.03	0.8	10.90	0.15	
	Grinding	1.2	9.02	0.18	1.4	19.62	0.46	
				0.36			0.88	
VIII TERMINATES BEL								
	Milling	1.2	7.31	0.15	1.4	12.41	0.29	
				0.15			0.29	

PROJECTED PRODUCTION AND SALES PROGRAMME

TOTAL	March Rs.	April Rs	May Rs.	June Rs.	July Rs.	August Rs.	Sept. Rs.	Oct. Rs.	Nov. Rs.	Dec. Rs.	Jan. Rs.	Feb. Rs.
1. SPRINKLER QTY. 7000 Nos. Value @ Rs.80Rs- Rs.560000					625 50000	1500 120000	1500 120000	1500 120000	625 50000	625 50000	625 50000	
2. Jobbing with Raw Materials Rs.500000	60000	60000	60000	60000	38750	15000	15000	15000	38750	38750	38750	60000
3. Jobbing without Raw Materials Rs.400000	50000	48000	48000	48000	30000	12000	12000	12000	30000	30000	30000	50000
TOTAL Rs.1460000	110000	108000	108000	108000	118750	147000	147000	147000	118750	118750	118750	110000
RAW MATERIAL CONSUMPTION												
1. Sprinkler Rs.400818					35787	85890	85890	85890	35787	35787	35787	-
2. Jobbing with Raw Materials Rs.375000	45000	45000	45000	45000	29060	11250	11250	11250	29060	29060	29070	45000
TOTAL RS.775818	45000	45000	45000	45000	64847	97140	97140	97140	64847	64847	64857	45000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>CONVERSION COST</u>													
1. Sprinkler (Rs.71146)						6352	15246	15246	15246	6352	6352	6352	
2. Jobbing with RM (Rs.88840)	10661	10661	10661	10661	10661	6885	2665	2665	2665	6885	6885	6885	10661
3. Jobbing without RM (Rs.284285)	35536	34115	34115	34115	34115	21321	8528	8528	8528	21321	21321	21321	35536
TOTAL (Rs.444271)	46197	44776	44776	44776	44776	34558	26439	26439	26439	34558	34558	34558	46197
<u>COST OF PRODUCTION</u>													
1. Sprinkler (Rs.471964)						42139	101136	101136	101136	42139	42139	42139	
2. Jobbing with RM (Rs.463840)	55661	55661	55661	55661	55661	35945	13915	13915	13915	35945	35945	35955	55661
3. Jobbing without RM (Rs.284285)	35536	34115	34115	34115	34115	21321	8528	8528	8528	21321	21321	21321	35536
TOTAL COST OF PRODUCTION (Rs.1220089)	91197	89776	89776	89776	89776	99408	123579	123579	123579	99405	99405	99415	91197

APPENDIX XI

WORKING CAPITAL REQUIREMENTS

Average Month Sales	...		Rs.1,22,000/-		
Average monthly cost of Production			Rs.1,02,000/-		
Average Raw Materials Consumption			Rs.64,700/-		

S. No.	Particulars	Re-quire-ment (days)	Working Capital Required	Margin	Permissible Limit
1.	Raw Materials	30	Rs.64,700/-	Rs.16,175/-	Rs.48,525/-
2.	Work in Process	10	Rs.34,000/-	Rs.11,400/-	Rs.22,600/-
3.	Finished goods	7	Rs.25,500/-	Rs.8,500/-	Rs.17,000/-
4.	Bills Receivable	60	Rs.2,04,000/-	Rs.73,200/-	Rs.1,70,800/-
5.	Expenses	30	Rs.37,300/-	Rs.37,300/-	
TOTAL			Rs.3,65,500		Rs.2,58,925/-

Liquid Surplus as per balance Sheet as on Dec. 1983					Rs.1,08,000/-
Limits Recommended					Rs.2,25,000/-
Deficit				...	Rs. 32,500/-

The current assets as on 31-12-1982 are Rs.5,81,000/- and the current liabilities are Rs.6,36,000/-. However Rs.1,63,000/- Represents a Term Loan to be sanctioned where drawals have been permitted in the c.c. account. Hence the real current liabilities are Rs.6,36,000 - Rs.1,63,000 = Rs.4,73,000. The liquid surplus is therefore Rs.5,81,000/- - Rs.4,73,000/- = Rs.1,08,000/-

A limit of Rs.2,25,000/- has been Recommended. The deficit of Rs.32,500/- is expected to be met out of future profit accruals which are projected to be Rs.23,000/- per month. The limits recommended are as under:

Limit Against Bills	...	Rs. 1,50,000/-
Stocks	...	75,000/-
TOTAL		2,25,000/-

APPENDIX XII

INVENTORY NORMS - WORKING CAPITAL REQUIREMENTS

Particulars	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Inventory Norms at Peak Level of requirements in July 1983
<u>RAW MATERIALS</u>													
1. Sprinkler (As per Stocking norms)					40430	40430	40430	40430	40430	40430	40430	40430	
2. Jobbing with RM(15 days RM Consumption)	22500	22500	22500	22500	14530	5625	5625	5625	14530	14530	14530	22500	
TOTAL	22500	22500	22500	22500	54960	46055	46055	46055	54960	54960	54960	22500	30 Days
<u>WORK IN PROCESS</u>													
1. Sprinkler (10days)					12990	31170	31170	31170	12990	12990	12990		
2. Jobbing with Raw Materials(7Days)	12580	12580	12580	12580	8125	3145	3145	3145	8125	8125	8125	12580	
3. Jobbing without RM (7 Days)	8885	8530	8530	8530	5330	2130	2130	2130	5330	5330	5330	8885	
TOTAL	21465	21110	21110	21110	26445	36445	36445	36445	26445	26445	26445	21465	10 Days

APPENDIX XII Contd....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	*(14)
FINISHED GOODS STOCKS:													
1. Sprinkler (10 Days)					14045	33710	33710	33710	14045	14045	14045		
2. Jobbing with Raw Materials (7 Days)	13915	13915	13915	13915	8990	3480	3480	3480	8990	8990	8990	13915	
TOTAL	13915	13915	13915	13915	23035	37190	37190	37190	23035	23035	23035	13915	7 Days
<u>BILLS RECEIVABLE:</u>													
1. Sprinkler (7 Days)						12500	30000	30000	30000	12500	12500	12500	
2. Jobbing with Raw Materials (60 Days)			111322	111322	111322	91605	49860	27830	27830	49860	71890	71890	
3. Jobbing without Raw Materials (60 Days)			69650	68230	68230	55435	29850	17055	17055	29850	42640	42640	
TOTAL			180972	179552	179552	159540	109710	74885	74885	92210	127030	127030	60 Days
TOTAL WORKING CAPITAL REQUIRED													
	57880	45525	238497	237077	283992	279230	229400	194575	179325	196650	231470	184910	

STOCKING NORMS FOR SPRINKLER RAW MATERIALS

Particulars	Rate Rs.	Order Qty.	Lead Time	Crash Lead Time	Average Stock Quantity	Value Rs.
	Rs.	Pieces	Days	Day	Pieces	Rs.
1. Body Casting	12/-	500	15	1	250	3,000
2. Arm	12/-	500	15	1	250	3,000
3. Bottom Nut	12/-	1000	7	1	500	6,000
4. Tubes	9.36	1000	7	1	500	4,680
5. Main Jet	1.20	5000	7	1	2500	3,000
6. Solder Jet	1.20	5000	7	1	2500	3,000
7. Pin	4.50	5000	7	1	2500	11,250
8. Spring Set	4.00	2000	7	1	1000	4,000
9. Washer Set	1.00	5000	28	1	2500	2,500
TOTAL						40,430

APPENDIX XIV

STATEMENT OF PROFITABILITY FOR PROJECTED SALES

	Rs.	Rs.
A. 1. Sales		14,60,000
2. Scraps Sales		42,000
		15.02,000
<u>B. VARIABLE COST OF PRODUCTION:</u>		
Raw Materials Consumed		7,75,818
1. Tools Written Off & Stores Consumed	70,000	
2. Tools Maintenance	9,000	
3. Machinery Maintenance	15,000	
4. Overtime Wages	36,000	
5. Power	12,000	
	-----	1,42,000
<u>C. FIXED & SEMI VARIABLE COST:</u>		
1. Wages	64,000	
2. Rent	13,000	
3. Supervisors Salary	18,000	
4. Bonus	15,000	
5. Building Maintenance	3,250	
6. Depreciation	48,700	
7. Interest of Term Loan	22,200	
8. Bank Charges	400	
9. Gen. & Fire Insurance	3,000	
10. Printing & Stationery	1,000	
11. Postage & Telegram	800	
12. Auditor's Fees	400	
13. Water Charges	300	
14. Telephone	4,000	
15. Profession Tax	1,200	
16. Freight Inward	5,000	
17. Freight Outward	2,000	
	-----	2,02,250

APPENDIX XIV Contd....

	Rs.	Rs.
	2,02,250	
18. Conveyance Charges	2,000	
19. Scooter Maintenance	2,000	
20. Advertisement	6,000	
21. Licences & Renewals	600	
22. Medical Aid to Workers	600	
23. Sundry Expenses	12,000	
24. Commission on Sales	15,000	
25. Rent	3,820	
26. Salaries	27,000	
27. Building Maintenance	1,250	
28. Interest on Working Capital	27,000	
29. Depreciation	1,137	
	-----	3,00,657/-
Total Cost of Production		12,18,475/-
Profit Before Tax		2,83,525/-

APPENDIX. XV

BALANCE SHEETS

Balance Sheet as at (Rs. in thousands)

Liabilities	1980	1981	1982	Assets	1980	1981	1982
S.B.I	215	183	338	Cash	1	5	1
Other Banks	-	-	-	Investment	5	-	10
Sundry Creditors	38	107	297	Stocks	61	65	229
Expenses				Sundry Drs.	101	205	218
Loans				Stores	17	17	17
Others	4	7	1	Others	5	12	6
	<u>257</u>	<u>297</u>	<u>636</u>	TOTAL	<u>190</u>	<u>304</u>	<u>581</u>
DEFERRED							
State Aid				Block	347	344	509
Bank	95	142	78	Sundries	14	30	30
Other Loans	126	98	263				
	<u>221</u>	<u>240</u>	<u>341</u>		<u>361</u>	<u>374</u>	<u>539</u>
Capital & Surplus	82	141	143	Misce- laneous	9		
	<u>82</u>	<u>141</u>	<u>143</u>		<u>9</u>		
				Intan- gibles			
TOTAL	<u>560</u>	<u>678</u>	<u>1120</u>	TOTAL	<u>560</u>	<u>678</u>	<u>1120</u>

Liquid Surplus: Rs.

(Current Assets - Current Liabilities)

APPENDIX XVI

FUNDS FLOW STATEMENT

<u>SOURCES</u>			<u>USES</u>				
	1980	1981	1982		1980	1981	1982
<u>SHORT TERM</u>				<u>SHORT-TERM</u>			
1. Increase in Bank Borrowings	100	-	155	1. Increase in Stocks	10	4	264
2. Increase in Sundry Creditors	36	69	190	2. Increase in Sundry Debtors	-	104	13
3. Increase in other current Liabilities	4	3	-	3. Increase in other Current Assets	21	7	-
4. Decrease in other Current Assets	37	-	-	4. Decrease in other current Liabilities	-	32	6
Sub-Total	177	72	345	Sub-Total	31	147	283
<u>LONG-TERM</u>				<u>LONG-TERM</u>			
1. Increase in Bank Borrowings	-	47	-	1. Increase in Fixed Assets	48	-	165
2. Increase in term Liabilities	-	1	165	2. Increase in other term assets	13	16	-
3. Increase in Capital	14	59	2	3. Decrease in other term liabilities	107	28	64
4. Decrease in net block	-	3	-				
5. Decrease in other Term Assets	8	9	-				
Sub-Total	22	119	167	Sub-Total	168	44	229
TOTAL	199	191	512	TOTAL	199	191	512

	SUMMARY		
	1980	1981	1982
Long-Term Sources	22	119	167
Long-Term Uses	168	44	229
Surplus/Shortfall	(- 146)	(+ 75)	(-62)
Short-Term Sources	177	72	345
Short-Term Uses	31	147	283
	(+146)	(-75)	(+62)

APPENDIX XVII

RATIOS AND TREND ANALYSIS

S. No.	Particulars	1980	1981	1982
1.	Total Debt/Equity + Reserves	1.53	1.70	2.38 (2.98)
2.	Current Assets/Current Liabilities	0.73	1.02	0.91 (1.23)
3.	Net Profit/Net Sales	11.34%	9.75	2.67%
4.	Earning Power	59.75%	57.44%	24.47%
5.	Fixed Assets to Capital Employed	4.23	2.43	3.56
6.	Sales/Equity	1:5.27	1:6	1:9
7.	Equity/Total Liabilities	1:5.82	1:3.80	1:6.80
8.	Average Collection period	52	70	60

--:oOo:-- --:oOo:--

1.	Sales	432	821	1310
2.	Gross Profit	228	308	379
3.	Net Profit	49	81	35
4.	Current Assets	190	304	581
5.	Current Liabilities	257	297	636
6.	Equity + Reserves	82	141	143
7.	Bank Borrowings	215	183	338
8.	Sundry Debtors	101	205	218

APPENDIX . XVIII

WEIGHTED AVERAGE COLLECTION PERIOD OF MAJOR BILLS RAISED BY
THE UNIT (A SAMPLE ANALYSIS)

S. No.	Date of Bill	Name of Customer	Amount (in Rs.)	Realised on	Number of days	Product
1.	16-1-82	N.G.E.F. Limited	6450.56	27/2/82	42	270900
1a.		-do-	2127.98	27/2/82	42	88200
2.	25-1-82	-do-	2078.39	21/3/82	56	117600
3.		-do-	6915.39	-do-	56	386400
4.		-do-	1255.09	-do-	56	70000
5.		-do-	2828.55	-do-	56	156800
6.		-do-	27343.70	-do-	56	1531600
7.	9-2-82	BEL	2550.60	24/3/82	44	112200
8.	13-2-82	NGEF	2103.18	28/3/82	44	92400
9.		BEL	11944.48	28/3/82	44	525800
10.	16-1-82	Techno Lab Instruments	4500.00	12/6/82	148	666000
11.		BEL	2200.00	23/6/82	159	349800
12.		NGEF	1820.00	19/4/82	94	169200
13.		NGEF	8237.00	19/4/82	94	770800
14.		Dust Control Pvt. Ltd.	2970.07	10/5/82	115	339250
15.	10-4-82	MEI Ltd.	11853.67	24/4/82	14	165900
16.	14-4-82	Integrated Processes	5150.00	24/4/82	10	51500
17.	18.4.82	NGEF	2892.40	16/6/82	59	171100
18.	25-4-82	Intercon Engineers	3470.88	28/8/82	115	376750
19.	10-4-82	MEI Ltd.	3437.56	15/7/82	96	331200
20.	12-5-82	D.C. & V Pvt. Ltd.	3243.42	14/8/82	94	305500
21.	21-5-82	NGEF	33268.79	5/7/82	45	1496250
22.	23-5-82	Technolab Instruments	2220.00	16/7/82	53	116600
23.	5-6-82	D.C. & V Pvt. Ltd.	3016.36	25/9/82	112	336000
24.		BEL	4687.50	4/8/82	60	282000
25.		BEL	12120.00	1/10/82	118	1427800
26.	14-6-82	BEL	8875.00	8/8/82	55	489500
27.	23-6-82	-do-	5294.12	8/8/82	46	243800
28.	2-7-82	MEI Ltd	2417.22	16/9/82	76	182400
29.	5-7-82	BEL	2980.80	22/9/82	79	181700
30.	12-7-82	MEI Ltd.	5669.10	21/8/82	40	226000

: 2 : APPENDIX . XVIII Contd..

(1)	(2)	(3)	(4)	(5)	(6)	(7)
31.	28-7-82	Jindal	8658.00	30/9/82	74	640100
32.	30-7-82	BEL	2933.00	6/10/82	68	197200
33.	25-7-82	MET	13015.80	22/9/82	59	769000
34.	1-8-82	JINDAL	8325.00	30/9/82	61	506300
35.	11-8-82	NGEL	8408.62	27/10/82	77	646800
36.		-do-	9297.00	28/10/82	78	725400
37.		-do-	4590.65	27/10/82	77	354200
38.		-do-	2603.16	27/10/82	77	200200
39.	16-8-82	D.C. & V	3357.25	17/10/82	62	207700
40.	26-8-82	N.G.E.F	2570.10	27/10/82	62	158100
41.	28-8-82	JINDAL	23552.40	30/9/82	33	777150
42.		-do-	7498.34	30/9/82	33	247500
43.	1-9-82	MET	3532.86	18/11/82	79	276500
44.		-do-	15056.48	-do-	79	1188950
45.		-do-	2993.63	-do-	79	237000
46.	1-8-82	H.H.V.P.				
		Ltd.	12055.11	20/12/82	142	1831600
47.	1-9-82	MET	13432.29	16/1/83	138	1849200
48.	20-10-82	-do-	3765.28	22/1/83	93	348750
49.	28-10-82	NGEF	2900.00	10/2/83	105	304500
50.		-do-	2856.10	5/2/83	100	285000
51.	24-9-82	MET	2833.00	10/12/82	77	210000
52.		-do-	22705.34	10/12/82	77	1747900
53.	3-11-82	MET	3137.73	7/2/83	96	297600
54.		-do-	5447.92	7/2/83	96	523200
55.	22-11-82	-do-	16491.85	15/12/82	25	412500
56.	28-11-82	NGEF	3236.00	2/1/83	35	113750
57.	9-12-82	NGEF	6846.72	15/2/83	68	465800

Rounded off to
the nearest 50 406900

27552,500

(round off to the
nearest hundred)

WEIGHTED AVERAGE COLLECTION PERIOD

$$= \frac{\text{TOTAL PRODUCTS}}{\text{TOTAL AMOUNT}} = \frac{27552500}{406900} = 67$$

AVERAGE VALUE OF A BILL

$$= \frac{\text{TOTAL AMOUNT}}{\text{NO. OF BILLS}} = \frac{406900}{58} = \text{Rs.7015}$$

APPENDIX . XIX

PROFORMA COST SHEET

Product Name	Quantity	(Nos.)
Raw Material consumption	Kg. X	Rate =
Less Scrap	Kg. X	Rate =
Total Raw Material Cost		=
Sub-contracting Cost		=
Total Prime Cost (A)		=

Machining Cost

	Variable Cost		Fixed Cost	
	O.T.	V.M.H.R TOTAL	T.T.	F.M.H.R. TOTAL
1. Drilling		2.5		10.90
2. Lathe		6.7		13.47
3. Copying Lathe		6.5		10.44
4. Milling		7.3		12.41
5. Shaping		7.6		11.88
6. Slotting		3.2		5.95
7. Grinders		9.0		19.62
8. Fly-press		-		3.16
9. Hack-saw Machine		25.4		11.88
10. Air-compressor		2.5		16.62
11. Hand-fling		4.8		3.94
12. Assembly		0.4		1.38

TOTAL MACHINE COST = (B) (C)

TOTAL VARIABLE COST = (A + B) =

TOTAL COST = (A + B + C) =

SREE SAILA ENGINEERING ENTERPRISE

BRIEF HISTORY OF THE UNIT

The unit, originally started in 1968 as M/s Linas Engineering Enterprise Private Limited, was engaged in the manufacture of clamping elements. In 1978, the above named company decided to close the unit and Shri Sreesaila, their production engineer purchased the unit and renamed it as M/s Sree Saila Engineering Enterprise. The unit continued to manufacture the products manufactured by the erstwhile firm. Besides, the unit is executing orders from M/s Lakshmi Automatic Looms Company, Hosur, covering supply of various products.

The position of the unit's accounts as on 26.2.1983 is as under:

(Amount in Rupees)					
Facility	Limit	Market Value	Advance Value	Drawing Power	Outstanding
-----	-----	-----	-----	-----	-----
C.C. Bills	90000	115,598	92,478	90,000	195,522/92
C.C.M.T.	<u>80000</u>	<u>138,367</u>	<u>97,988</u>	<u>80,000</u>	
	170000	253,965	190,466	170,000	
		B.R.C. Rs.52,000			
M.T.L.	-	-	-	33,000	33,000/00

PRODUCTS MANUFACTURED

The unit is engaged in the manufacture of clamping elements made from alloy steel (EN-8 mostly) and mild steel. The regular product range covered by the unit consists of the following:

1. T. Bolts
2. T. Nuts
3. Studs
4. U Clamps
5. Flat Strap Clamp
6. Goose Neck Clamps
7. Table Clamps
8. Double ended Clamps
9. Stepped Packing Blocks
10. Slotted Clamps
11. Clamping Kits, etc.

The unit is also manufacturing the following products based on the orders and specification received from M/s Laxmi Automatic Looms Works, Hosur

1. Flanges A (Small)
2. Flanges B (Big)
3. Clamps
4. Clamping Plate
5. Hexspacing Nut
6. Eye Bolt
7. Latch
8. Guide Plate

All the products from 1 to 6 are manufactured in various sizes and for simplicity grouped into 3 categories, viz., low, medium and high ranges of dimension. For study, the product M12 group which are fast moving are taken into account for the purpose of costing.

MARKET

The unit's customers are machine tools manufacturers and machine tools users. The first category customers buy the clamping elements and sell them along with the machines as standard accessories. While the machine tool users are the end-users of the products, hence the products are sold directly to the customers. Among the major customers are M/s Hindustan Machine Tools and M/s Kirloskar Ltd. The other products are manufactured by the unit on orders placed by M/s Laxmi Automatic Loom Works according to the specifications. This segment constitutes about 50% of the unit's total sales turnover.

PROCESS OF MANUFACTURE AND FACILITIES

The details of machinery are given in Appendix IV, and the flow process chart for the selected products are given in Appendices I, II & III. The process of manufacture involves simple machining and milling operation on standard machine tools. All the operations are done within the unit except for head forging, which is done in sister concern M/s Sree Saila Forge, Peenya Industrial Estate and gas cutting of M.S. Sheets which is done by a neighbouring unit.

As the unit manufactures against firm orders there is no economic batch quantity. Only the exact quantity ordered is manufactured.

CCSTING

The unit has projected for 1983, a total sales of Rs.5,80,900/-, 50% of this constitutes an order received from M/s Laxmi Automatic Loom Works worth Rs.2,90,000/- balance constituting sale of regular products. A separate productwise costing has been done for all the products to be made and supplied to M/s Laxmi Automatic Looms Ltd., and few representative regular products, viz., T Belt, M12 stud, M12 T Nut, M14 flat strap clamps, M14 U clamp and Goose neck clamp M14.

The unit has furnished its budget of overhead expenses for 1983-84. The budget includes selling commission, packing and forwarding charges and CIW aggregating Rs.25,500/-. The first 2 items of expenditure are recoverable and the other is directly traceable to the product. Thus, they have been eliminated from the overhead expenses.

To arrive at the utilisation of the capacity, machine loading matrix have been prepared based on the information obtained from the proprietor of the unit with regard to products, quantity, batch quantity, operation time and set-up time, etc.

The capacity utilisation works out as under for each of the identified production facility:

1. Hacksaw cutting machine	67 %
2. Vertical milling machine	97 %
3. Horizontal milling machine	47 %
4. Centre lathe	89 %
5. Drilling machine	5 %
6. Bench grinder	4 %

Based on the capacity utilisation, vertical milling machine has been identified as the bottleneck facility.

Overheads have been allocated, apportioned to production cost centres on suitable logical basis. Refer column No.3 for basis of allocation chart. Allocation of direct costs have been ascertained from the proprietor for each of the products and variable and fixed overhead costs have been arrived at based on time utilised in each production cost centre by the product multiplied by the variable and fixed hour rates worked out earlier.

All the products manufactured by the unit cover fully their variable costs and are contributing towards the fixed overheads.

The total contribution for the year 1983-84 comes to Rs.2,50,656 (Rs.1,02,977 from Laxmi Automatic Loom Works, the rest from the regular products).

It is observed from the contribution analysis that the unit is not able to cover the fixed overheads fully in case of 6 items manufactured and supplied to M/s Laxmi Automatic Loom Works. Therefore, there is a need for the unit to seek of higher price for those items in production of which it is incurring losses. It is advised that the unit concentrates more on sale of the regular products, which have higher margins.

WORKING CAPITAL

Assessment of working capital requirements have been worked out on an anticipated monthly sales of Rs.47,200/-. The requirement of raw materials to achieve the anticipated monthly sales has been worked out at Rs.20,000. The total expenses of the unit per month comes to Rs.24,000.

RAW MATERIALS

Major raw materials required by the unit are bright bars, black rods, M.S. sheets, M.S. Flats, etc. The unit has an annual quota of 20 tonnes of M.S. flats and sheets from KSSIDC. Rest of the raw materials are obtained from open market. Ratio of quota to open market procurement of raw material works out to 60:40 (1:66). Based on the ABC analysis and the need to lift quota allotments, an inventory of 7 weeks' requirements of raw materials has been provided for.

STOCK-IN-PROCESS

The process involves cutting, milling, drilling, machining and other operations which normally takes 15 days to convert the raw material into finished products. Therefore, a provision for holding of 15 days' stocks has been made.

FINISHED GOODS

A provision for holding 1 week's finished goods has been made while arriving at the working capital requirements to enable the unit to arrange for transportation/despatch.

SUNDRY DEBTORS

Average collection period for the unit's receivables comes to 68 days. Therefore, a provision for financing the unit's requirements for 68 days less 10% margin has been made.

EXPENSES

The total expenses of the unit per month works out to Rs.24,000. The total working capital requirements of the unit works out to Rs.1,93,500. The unit gets one month's credit on purchases made from the local suppliers which works out to Rs.10,000 and from other creditors on account of expenses another Rs.10,000. Thus the total credit availability for the unit has been assumed as Rs.20,000.

The permissible limits for the unit against stocks comes to Rs.52,350 and against bills Rs.96,300. Therefore, the following limits are recommended for sanction:

Cash credit (M.T.)	Rs.52,000
Cash credit (Bills)	Rs.96,000

	Rs.1,48,000

There is a deficit of Rs.30,500 including Rs.5,000 liquid deficit in the Balance Sheet as on 28.2.1982 amounting tax. The deficit in the working capital requirement has to be met by the unit either by infusion of fresh capital or by ploughing back the profit accruals or by both.

In the event of the proprietor expressing his inability to bring in fresh funds, a clean cash credit limit of Rs.25,000 repayable over a period of 12 months may be considered for sanction keeping in view the conduct of the unit's accounts in the past.

INVENTORY CONTROL

An ABC analysis of the stocks of raw materials has been worked out and is given in Appendix XV. The unit is mainly using EN8 rods, EN8 bright, M.S. flats, plates, etc., for the manufacture of its products. These items except M.S. plates are available locally and the lead time for the materials varies from 2 days to one week. However,

M.S. plates are allotted by the KSIDC at irregular intervals. As the quota material is insufficient, the unit buys M.S. plates in the open market also. About 9 items of raw materials account for 73.8% of the total value of materials consumed during 1982. These items have been classified as 'A'. The balance 10 items are classified as B & C items.

SAFETY STOCK

A chart detailing the quantity of raw materials of 'A' items consumed during 1982 has been drawn. The safety stock of these items has been worked out by applying the following formula:

$$\text{Safety stock} = (\text{Maximum consumption rate} - \text{Average consumption rate}) \times \text{Lead time}$$

ECONOMIC ORDER QUANTITY

The economic order quantity has been arrived at on the basis of the following formula:

$$\text{EOQ} = \sqrt{\frac{2Aa}{I \times C}}$$

The order cost, transport cost, inventory carrying cost, etc., have been worked out on the information supplied by the proprietor and the EOQ was calculated taking into consideration the transport cost.

MINIMUM ORDER QUANTITY

As all the raw materials are freely available in the local market, no minimum order quantity is stipulated by any of the suppliers. The order quantity is taken as maximum of minimum order quantity / economic order quantity / lead time consumption.

AVERAGE STOCK

Average stock has been arrived at employing the following formula:

$$\text{Average stock} = \text{Safety stock} + \frac{\text{Order quantity}}{2}$$

A detailed study on the above pattern was considered not necessary for B and C items as they comprised of materials of smaller value. However, a safety stock of one month and an order quantity of two months have been arrived at on ad-hoc basis based on past experience. The last category of items, viz., Quota materials, no formula could be applied by us since these are allotted by the KSIDC at irregular intervals and the unit has no option but to lift the same immediately.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

It is recommended that 2 or 3 pieces be clamped at a time when doing the milling operations as against the present practice of milling one piece at a time, thus bringing down the total time per piece. This would also result in better utilisation of the machine and increase in the capacity. This is specially recommended for milling long and medium size clamps.

While making slots in the clamps the drilling and milling operations are done on the milling machine. It is suggested that drilling machine which is used sparingly (992 minutes per month) is made use for drilling operations for making shots in the clamp instead of the milling machine which is the practice at present.

Raw materials, viz., bright rods and bars are kept on the floor of the shop haphazardly hampering free movement of workers in the shop area. It is suggested that raw materials are properly stored in a corner of the workshop using a suitable stand.

The unit has on hand an order worth Rs.2,90,600 from M/s Laxmi Automatic Loom Works, Hosur, for execution during 1983-84.

It is observed from the cost contribution analysis that the unit is making a net profit of Rs.4,770 on execution of this order. The total contribution made by this order towards the unit's fixed overheads comes to Rs.1,02,977. Balance contribution out of total Rs.2,50,656 and total net profit of Rs.38,773 is from the unit's regular products.

Though the unit makes a net profit of Rs.4,770 only on the order received from M/s Laxmi Automatic Loom Works, it gives stability to the unit's operations and

results in covering fixed overheads to the tune of Rs.1,02,997. It is however recommended that the unit should try and obtain a higher price in respect of those products where price obtained at present is insufficient to cover the fixed overheads, especially, clamps, hex spacing nut, clamping plate and eye-bolt. It is also suggested that the unit concentrates more in future, on sale of its regular products where the margin of profit is very high.

Capacity utilisation chart reveals that the bottleneck machine is vertical milling machine, which is utilised to the extent of 19,364 minutes out of the available 20000 minutes, which expressed in percentage works out to 97% of the available capacity. The next bottleneck machine being centre lathes which are utilised to the extent of 35508 minutes out of the available time of 40,000 minutes which works out to 89% of the capacity. It is therefore suggested that greater attention and more care be exercised in handling the critical facilities.

FINANCIAL ASSESSMENT

The unit's financial position has been analysed and the following observations have been made.

Sales have steadily increased from Rs.1,88,000 in 1979 to Rs.4,86,000 in 1982 (11 months period) with the year 1979 as the base, the increase works out to 201%.

The % of raw materials, the total sales and % of expenses in the sales are as under:

	1979	to	1982
Raw materials	42%		46%
Expenses	50.53%		45%

There has been a steady increase in profit during the period under review. Net profit has increased from Rs.3,000 in 1979 (the 1 year of the unit) to Rs.16,000 in 1982 (for 11 months period).

The trend analysis indicates, (with 1979 as base year), that sales have increased by 201%, consumption of raw materials by 151%, expenses by 230% (1981) and profit by 633%. The net profit per centage on sales which was 1.59% in 1979 has gone upto 5.02% in 1981. Further, it is expected to go upto 6.67% in 1983.

The current position during the period under review has not been very comfortable except for 1980. There has been a liquid deficit of Rs.9,000 in 1979, Rs.11,000 in 1981 and Rs.5,000 in 1982. The position has resulted mainly due to withdrawal of Rs.16,000 from the partner's current account during 1981 and due to non-plough back of a portion of the profits to strengthen the equity base. The position calls for strengthening of equity base by curtailing drawings by the proprietor to the minimum extent and, if possible, by infusion of fresh capital.

The unit has been able to bring down the average collection period of receivables which was 93 days in 1981 to 68 days in 1982. It is suggested that the unit start to follow-up the receivables promptly.

INVENTORY CONTROL

Raw materials consumed by the unit for its products are classified as 'A' class; 'B' class and 'C' class items. Apart from this, M.S. plates which fall under quota allotment by the KSIDC are treated separately. About 9 items which constitute 73.8% of value of raw materials consumed during 1982 are classified as 'A' class items. The remaining items are taken altogether and treated as 'B' and 'C' class items. The order quantity has been arrived at after taking into consideration the economic order quantity as well as minimum order quantity. In this type of industry, the suppliers do not prescribe any minimum quantity for purchase. As such only the economic order quantity alone remains to be adopted. However, the abnormal cost of transport would render it impossible for the unit to place repeat orders based on economic order quantity. Therefore the unit's order quantity has been arrived at 200 kgs.(EOQ considering the transport cost also) for all the 'A' class items. The order quantity for 'B' and 'C' class items has been worked out on ad-hoc basis with due consideration for past consumption pattern. As regards the quota allotment items, viz., M.S. plates, the unit cannot follow any procuring pattern as the allotments are made at irregular intervals and the quantities are also subject to change.

BREAK-EVEN LEVEL

Break-even level for the unit has been worked out applying the formula

$$\frac{\text{Total overhead expenses} \times \text{Total sales}}{\text{Total contribution}}$$

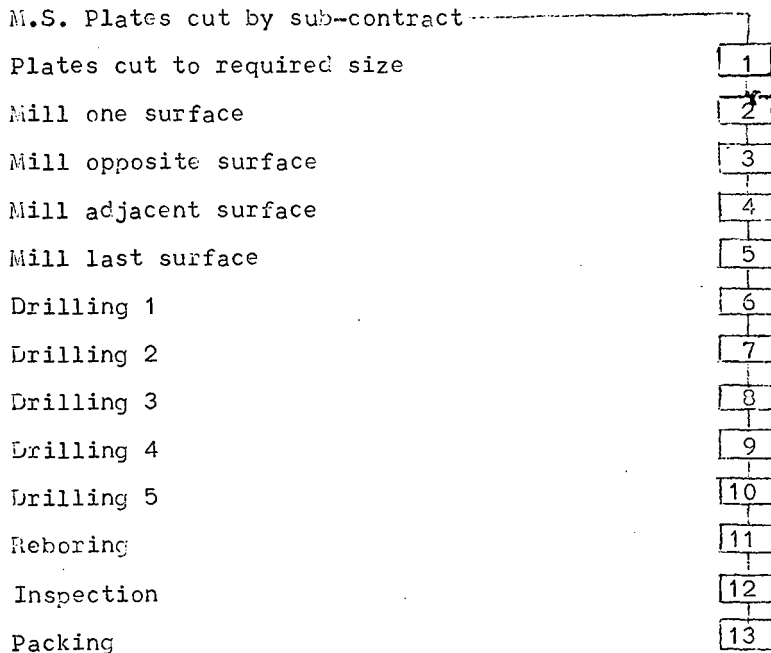
which works out to Rs.4,08,393/- expressed in percentage as 68.07% of the projected level of sales.

C,*C*©*

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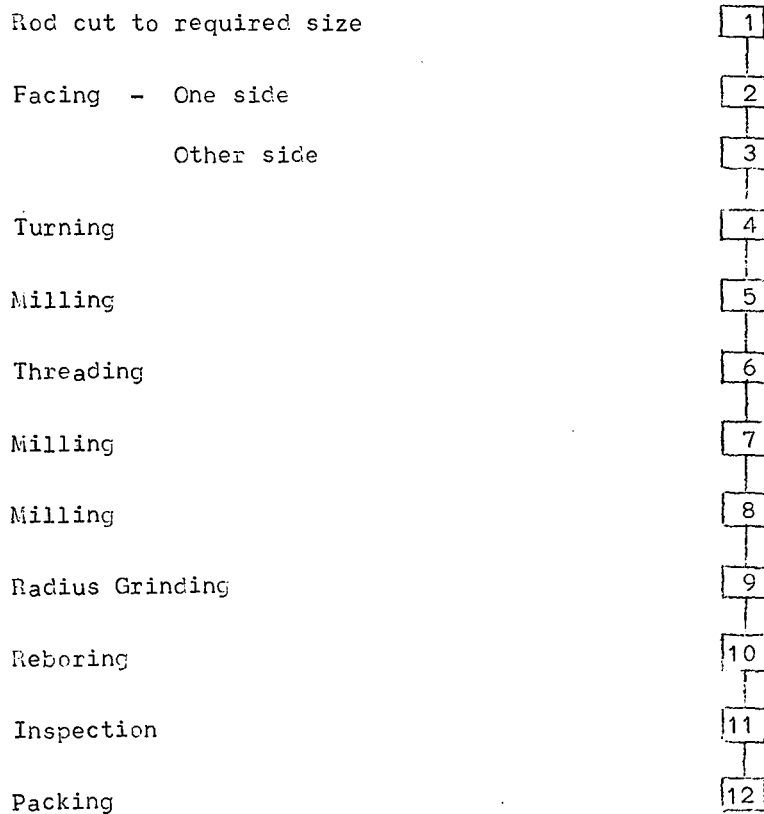
APPENDIX I

FLOW PROCESS CHART - FLANGES B

Despatch

APPENDIX II

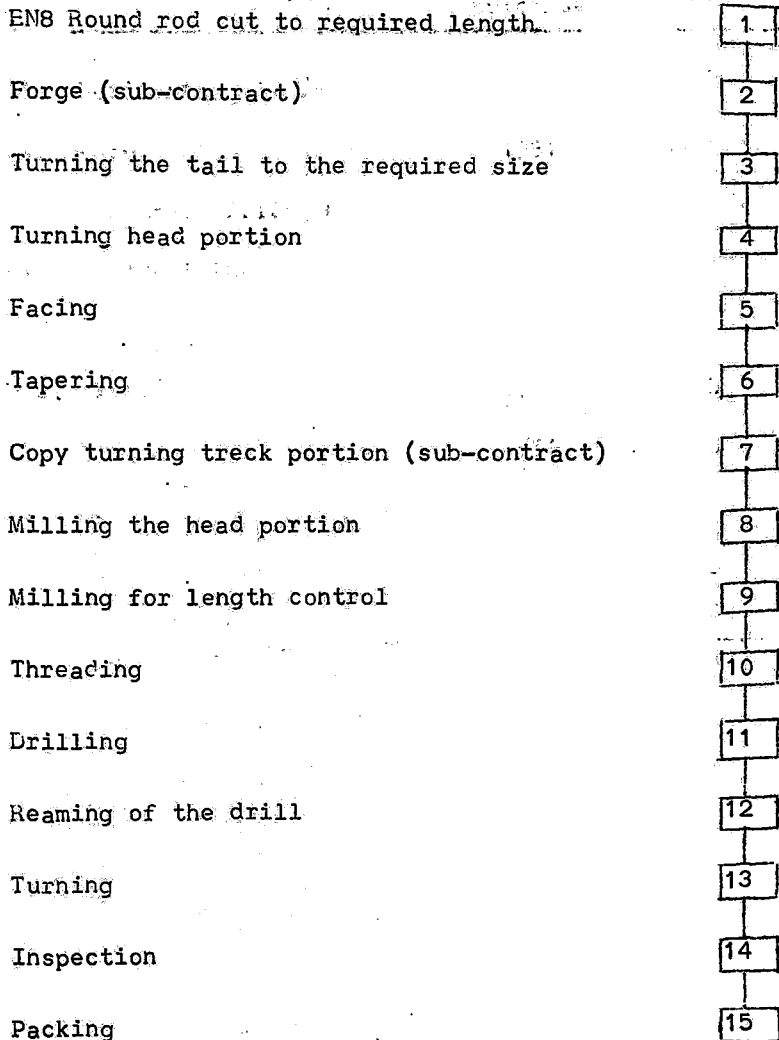
FLOW PROCESS CHART - CLAMPS



Despatch

APPENDIX III

FLOW PROCESS CHART - EYE BOLT



Despatch

APPENDIX IV

LIST OF MACHINERY

Machinery	Year of purchase	H.P.	Book value 31.3.'83 Rs.
1. Horizontal milling machine	1967	3	19,500
2. -do-	1981	4	53,500
3. Vertical Milling Machine	1977	4	17,900
4. Centre lathe	1966	1.5	7,000
5. -do-	1980	1.5	9,900
6. Radial drilling machine	1966	0.75	1,600
7. Band saw	1956	0.75	1,300
8. -do-	1982	1.5	8,000
9. Bench Grinder	1966	0.75	400

APPENDIX V

PROJECTED SALES FOR 1983-84

Product	No. of pieces	Rate/Piece	Sale value
1. Flanges A	7000	13.40	93,800
2. Flanges B	3500	20.00	70,000
3. Clamps	9000	3.50	31,500
4. Clamp plate	3000	7.80	23,400
5. Eye bolt	3000	12.00	36,000
6. H Enp. spacing nut	3000	4.00	12,000
7. Guide plate	3000	6.50	19,500
8. Latch	1500	7.00	10,000
9. T Bolts			
Low	14300		
Medium	5000		
High	5700		125,000
10. Studs			
Low	2200		
Medium	1200		20,000
High	1600		
11. T Nuts			
Low	2050		
Medium	1200		
High	2750		42,000
12. Clamps Flat Strap			
Low	560		
Medium	420	30.00	43,200
High	360		
13. U Clamp			
Low	354		
Medium	216	45.00	37,800
High	240		
14. Goose neck			
Low	216		
Medium	108	45.00	16,200
High	36		
			<u>580,900</u>

APPENDIX VI

BUDGET OF OVERHEAD EXPENSES FOR 1983-84

			Rs.
Wages, incentives bonus, etc.,	..	..	55,000
Tools & accessories	..	..	40,000
Consumable stores	..	..	18,000
Power	..	..	4,320
Water	..	..	480
Repairs & maintenance	..	..	3,000
Depreciation	..	..	17,868
Rent	..	..	5,748
Interest on T.M.	..	..	3,000
" " W.C.	..	..	22,800
Bank charges	..	..	500
Salaries to proprietor	..	..	18,000
Salary - skilled staff	..	..	18,000
T.A. & Conveyance	..	..	6,500
Printing & stationery	..	..	2,000
Postages, telephone & telegram	..	..	5,500
Professional charges	..	..	6,000
Professional tax	..	..	2,507
Advertisement	..	..	1,000
Sales promotion	..	..	3,000
Carriage outwards	..	..	2,500
Insurance	..	..	700
Vehicle maintenance	..	..	1,500
Labour welfare	..	..	5,000
Subscription	..	..	500
Miscellaneous	..	..	3,747
Selling commission	..	..	15,000
Freight inward	..	..	1,500
Packing & forwarding	..	..	9,000

Total			2,67,040
			=====

APPENDIX VII

COMPONENT MACHINE LOADING MATRIX

Sl. No.	Component	Quantity per month	Batch Size Nos.	Hacksaw Cutting machine		Vertical Milling machine	
				OT	TT	OT	TT
1.	Flanges A	583	400	5830	5830	1166	1189
2.	" B	292	200	2920	2920	876	888
3.	Clamp	750	1200	3750	3750	4500	4510
4.	Clamping plate	250	400	1250	1250	1750	1762
5.	Exspacing nut	250	400	1250	1250	5000	5010
6.	Eyebolt	250	400	1250	1250	1000	1010
7.	Latch	125	200	625	625	500	506
8.	Guide Plate	250	650	1250	1250	1000	1004
9.	T Bolt						
	Low	1192		918	918		
	Medium	417		575	575		
	High	475		812	812		
10.	T Nut						
	Low	171		258	258	234	234
	Medium	100		181	181	137	137
	High	229		488	488	382	382
11.	Stud						
	Low	183		141	141		
	Medium	100		138	138		
	High	133		227	227		
12.	Flat Straps clamp						
	Low	55		1188	1188	486	486
	Medium	35		352	352	351	351
	High	30		1020	1020	357	357
13.	U Clamp						
	Low	32		691	691	351	351
	Medium	18		490	490	222	222
	High	20		680	680	278	278
14.	Grosencap Clamp						
	Low	18		248	248	388	388
	Medium	9		156	156	218	218
	High	3		66	66	81	81
TOTAL OPERATING TIME							
CR TOTAL TIME				26754	26754	19277	19364

APPENDIX VII contd..

Sl. No.	Horizontal Milling Machine		Central Lathe		Bench Grinder		Drilling Machine		Manual	
	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
1.	1749	1815							9095	9095
2.	2920	3051							4730	4730
3.			6750	6766	750	750			7575	7575
4.	1000	1012							3825	3825
5.			500	521					3825	3825
6.	750	766	5000	5027					5075	5075
7.	500	509							1325	1325
8.	750	760	1250	1254					4296	4296
9.	1383	2575	4553	9095			572	572	1788	1788
	563	980	1943	3532			200	200	1376	1376
	717	1192	2651	4460			220	220	1539	1539
10.	547	788	400	742					684	684
	381	522	257	457					400	400
	1014	1337	641	1099					916	916
11.			644	780					183	183
			838	974					130	130
			702	801					249	249
12.	512	680							204	204
	385	492							146	146
	410	501							162	162
13.	379	468							118	118
	261	311							75	75
	352	407							108	108
14.	216	293							91	91
	139	177							45	45
	58	70							20	20
TOTAL OPERATING TIME (OR) TOTAL TIME	14986	18706	26129	35508	750	750	992	992	47980	47980

APPENDIX VIII

CAPACITY UTILISATION OF FACILITIES

	T.T.	A.T.	Percentage utilisation
1. Hack saw	26754	40000	67%
2. Vertical milling machine	19364	20000	97%
3. Horizontal milling machine	18700	40000	47%
4. Bench grinder	750	20000	4%
5. Drilling machine	992	20000	5%
6. Centre lathe	35508	40000	89%

NOTES

T.T. = Total time (Book time)

A.T. = Available time

= No. of shifts X No. of machines X 400 minutes/day
X 25 days.

ALLOCATION OF OVERHEADS

APPENDIX - IX 313

EXPENSES	BUDGETED EXPENSES MONTHLY Rs.	BASIS OF ALLOCA- TION	HACKSAW	HORIZONTAL MILLING MACHINE	VERTICAL MILLING MACHINE	CENTRE LATHE	BENCH PCC	GRINDER SCC	DRILLING MACHINE	MANUAL	SCC
<u>VARIABLE OVERHEADS</u>											
Tools	3333	Discu- sion	333	1000	500	833	10	156	250	-	-
Consumable Stores	1500		166	333	166	333	-	-	-	500	-
Power	360	HPxDT	64	113	83	98	-	1	1	-	-
Repairs & Maintenance	250	Discussion	16	100	50	83	-	-	-	-	-
SUB-TOTAL	5443	Extent of service	579	1546	799	1347	10	157	251	500	-
B.G. SCC App rtioned			23	56	29	50					
Total Variable Overheads			602	1602	828	1397	10	-	251	500	-
<u>FIXED OVERHEADS:</u>											
Wages, Bonus etc.	4583	No. of workers engaged	400	1200	600	1200		100	100	983	
Water	40		2	5	3	5		1	1	23	
Rent	360	Area Occupied	40	28	14	30		5	10		233
Term Loan - IWT	250	Term loan held		250							
Depreciation	1489	Book Value	116	913	244	211		5	20		
Total of other Fixed Exp. to be apportioned	7963	Proportionate to expand	661	2838	996	1713	15	117	155	1192	276
Sub-Total	14685		1219	5234	1837	3159	15	228	286	2198	509
SCC Costs		Extent of Service	79	337	118	203	-	-	-	-	-
Total Fixed Overhead			1298	5571	1955	3362	15	-	286	2198	
Variable Hour Rate			1.35	6.42	2.58	3.21	0.80	-	15.21	0.63	
<u>= Total Variable Overheads</u>											
Total Operating Time											
Fixed Hour Rate			2.91	17.86	6.06	10.76	1.20	-	17.33	2.75	
Total Fixed Overhead											
<u>Total Booked Time</u>											

VARIABLE AND FIXED OVERHEADS

APPENDIX - X 314

Sl. No.	Cost Centre	Flange A		Flanges B		Clamp		Clamping plate		Hexspacing Nut		Eye Bolt	
		V	F	V	F	V	F	V	F	V	F	V	F
1.	Hacksaw C.M.	0.22	0.49	0.22	0.48	0.11	0.24	0.11	0.24	0.13	0.24	0.11	0.24
2.	Vertical Mill M	0.09	0.21	0.13	0.31	0.26	0.61	0.30	0.71	0.86	2.02	0.17	0.41
3.	Horizontal MM	0.32	0.93	1.07	3.11	-	-	0.43	0.20	-	-	0.32	0.91
4.	Central Lathe					0.48	1.62			0.10	0.37	1.07	3.60
5.	Bench Grinder					0.01	0.02						
6.	Drilling Machine												
7.	Manual	0.16	0.72	0.17	0.74	0.07	0.46	0.16	0.70	0.16	0.70	0.16	0.70
	Total	0.79	2.35	1.59	4.64	0.96	2.95	1.00	2.85	1.25	3.33	1.83	5.86

VARIABLE OVERHEAD/PIECE
AND
FIXED OVERHEAD/PIECE

NOTES: V = Variable Overheads/Piece
= Variable Hour Rate X Operating Time/Piece
F = Fixed Overheads/Piece = Fixed Hour Rate x Total Time/Piece

A P P E N D I X

X - Contd...

Sl. No.	LASCH		GUIDE PLATE		T BELT		T NUT M 12		Stud M 12	Flat Strap Clamp		U Clamp		Coose Neck		
	V	F	V	F	V	F	V	F	V	F	V	F	V	F		
1.	0.11	0.24	0.11	0.24	0.02	0.04	0.03	0.07	0.02	0.04	0.48	1.05	0.48	1.05	0.31	0.67
2.	0.17	0.40	0.17	0.41	-	-	0.06	0.14	-	-	0.38	0.89	0.47	1.10	0.92	2.17
3.	0.43	1.21	0.32	0.91	0.12	0.64	0.34	1.37	-	-	0.99	3.68	0.26	4.35	1.28	4.84
4.	-	-	0.27	0.90	0.20	1.37	0.13	0.17	0.19	0.76						
5.																
6.					0.12	0.14										
7.	0.11	0.49	0.18	0.79	0.02	0.07	0.04	0.18	0.01	0.05	0.04	0.17	0.04	0.17	0.05	0.23
Total	0.82	2.34	1.05	3.25	0.48	2.26	0.60	1.93	0.22	0.85	1.89	5.79	2.25	6.67	2.59	8.01

(Variable O.H/Piece
and Fixed O.H/Piece

DIRECT COSTAPPENDIX XI

S1. No.	Products	Raw Materials Used	Raw Materials per piece	Scrap in %	Rate of landed cost per Kg Rs.	Scrap Selling Rate per Kg.	Income from sale of scrap per piece	Raw Materials Cost	Net R.M. Cost per piece	Sub- cont- ract cost per piece	Packing materi- al cost per piece	Total Direct Cost per piece
1.	Flanges A (Small)	MS Plates	2 Kg	25%	4.00	1	0.50	8.00	7.50	0.50		8.00
2.	-do- B (Big)		3 Kg	42%	4.00	1	1.25	12.00	10.75	0.75		11.50
3.	Clamps	EN8 (25mm Rod)	200 gms.	62%	9.00	11	0.12	1.80	1.68	-		1.68
4.	Hexspacing Nut	MS Round 28mm.	625 "	40%	6.50	1	0.06	0.75	0.69	-		0.69
5.	Clamping Plate	MS Flat	675 "	25%	7.50	1	0.16	5.06	4.90			4.90
6.	Eye Belt	EN8 20x40x104 mm. Round 20 mm.	450 "	55%	7.00	1	0.25	3.15	2.90	2.25		5.15
7.	Latch	MS Flat 8x60x195	640 "	22%	7.00	1	0.15	4.48	4.33	-		4.33
8.	Guide Plate	MS Plate 8x40x122 mm.	350 "	50%	7.00	1	0.16	2.45	2.29	-		2.29
9.	T. Belt	16mm. Black Rod	240 "	37.5%	7.00	1	0.09	1.68	1.59	1.20	0.11	2.90
10.	T. Nut	25 mm. Br	80 "	37.5%	7.00	1	0.03	0.56	0.53		0.06	0.59
11.	Stud	12 mm. Br	80 "	25 %	9.50	1	0.02	0.76	0.74		0.06	0.80
12.	Flat Strap Clamps 14x125	MS Flat	1.17 Kg	57.26%	5.00	1	0.67	5.85	5.18		0.44	5.62
13.	U Clamp 14x125		1.35 Kg	57.46%	5.00	1	0.77	6.70	5.93		0.44	6.37
14.	Goose Neck Clamp 14x25		1.53 Kg	55.55%	5.00	1	0.85	7.65	6.80		0.44	7.24

COST AND CONTRIBUTION ANALYSIS

APPENDIX XII

Sl. No.	Product	Direct cost per Piece Rs.	Variable O.H. Cost per piece Rs.	Total variable cost Rs.	Fixed O.H. Cost per piece Rs.	Total cost per piece Rs.	Selling price per piece Rs.	Contribution per piece Rs.	Profit Rs.
1.	Flanges A	8.00	0.79	8.79	2.35	11.14	13.40	4.51	2.26
2.	Flanges B	11.50	1.59	13.09	4.64	17.73	20.00	6.91	2.27
3.	Clamp	1.68	0.96	2.64	2.95	5.59	3.50	0.86	-2.09
4.	Clamping Plate	4.90	1.00	5.90	2.85	8.75	7.80	1.90	-0.95
5.	Hexspacing Nut	0.69	1.25	1.94	3.33	5.27	4.00	2.60	-1.27
6.	Eye Bolt	5.15	1.83	6.98	5.86	12.84	12.00	5.02	-0.89
7.	Latch	4.33	0.82	5.15	2.34	7.49	7.00	1.85	-0.49
8.	Guide Plate	2.29	1.05	3.34	3.25	6.59	6.50	3.16	-0.09
9.	T. Nuts M 12 Low Medium High	0.59	0.60	1.19	1.93	3.12	4.50	3.31	1.38
10.	T Bolts M 12 Low M H	2.90	0.48	3.38	2.26	5.64	6.00	2.62	0.36
11.	Stud M 12 L M H	0.80	0.22	1.02	0.85	1.87	2.50	1.48	0.63
12.	Flat Strap Clamp 14x25 L M H	5.62	1.89	7.51	5.79	13.30	25.00	17.49	11.70
13.	U Clamps 14x25 L M H	6.37	2.25	8.62	6.67	15.29	34.00	25.38	18.71
14.	Geose Neck Clamps 14x25 L M H	7.24	2.59	9.83	8.01	17.84	34.00	24.17	16.16

APPENDIX XIII

BREAK-EVEN POINT

	<u>Contribution</u>	<u>Profit</u>	<u>Loss</u>
	Rs.	Rs.	Rs.
Flanges A	31,570	15,820	
" B	24,185	7,945	
Clamps	7,740		-18,810
Clamping plate	5,700		2,850
Hex Spacing Nut	6,180		3,810
Eye bolt	15,060		2,520
Latch	2,775		735
Guide plate - 102,690	9,180		2,270
T Nut	6,786	2,829	
T Bolt	37,466	5,148	
Stud	3,256	1,386	
Flat strap clamp	11,543	7,722	
U Clamp	9,746	7,185	
Gooseneck clamp 74018	5,221	3,491	
TOTAL CONTRIBUTION FROM LAKSHMI ORDER	1,76,708	51,526	28,995
		28,995	
		- 22,531	
T Bolts H + M	28,034	3,852	
Studs H + M	4,144	1,764	
T Nuts H + M	13,075	5,451	
Flat strap clamp H + M	13,642	9,126	
U Clamp H + M	11,573	8,532	
Goose neck clamp H + M	3,480	2,327	
TOTAL CONTRIBUTION	2,50,656		
TOTAL PROFIT		53,583	

$$\begin{aligned}
 \text{BREAK-EVEN LEVEL: B.E.P.} &= \frac{\text{Total fixed O.H.} \times \text{Total sales}}{\text{Total contribution}} \\
 &= \frac{14685 \times 12 \times 500,900}{250,656} \\
 &= 408,393 \text{ Rs.} \\
 &= 68.07\% \text{ of projected sales}
 \end{aligned}$$

APPENDIX XIV

ESTIMATED FIGURES OF PROFITABILITY FOR 83-84.

ENCLOSURE 'A'

Sales		Rs.580,900 (A)
Raw materials consumed	252,844	
Less: Scrap	15,967	
	<u> </u>	
Net	236,877	
Sub-contract charges	48,900	
	<u> </u>	Rs.285,777
Consumable stores		Rs. 18,000
Power & fuel		Rs. 4,320
Repairs and maintenance		Rs. 3,000
Wages		Rs. 55,000
Factory supervision and overheads		Rs. 42,500
Administrative overheads (office salaries, insurance, rent, travelling and other expenses, etc.)		Rs. 43,928
Selling and advertising expenses		Rs. 4,000
Interest on borrowings:		
a) On maximum permissible (working capital limits) as per enclosure 'B'	Rs.22,800	
b) On term loans sanctioned (and/ or) to be sanctioned	Rs. 3,000	
c) On other borrowings	<u>Rs. 500</u>	Rs. 26,300
Depreciation		Rs. 17,868
Salaries of partners		Rs. 18,000
Other expenses		Rs. 8,624
		<u> </u>
Total expenses		Rs.527,317 (B)
		<u> </u>
Profit (A - B)		Rs. 53,583
Less: Commission on sale of regular products		Rs. 14,810
		<u> </u>
Net profit		Rs. 38,773
		<u> </u>

APPENDIX XV

A B C ANALYSIS OF RAW MATERIALS

	Qty. Kgs.	Rate	Value	Cumulative Total	
1. 16mm Bright	1351	9.50	12,834.50	12,834.50	
2. EN8 22mm Rod	1634	7.00	11,438.00	24,272.50	
3. 25mm Bright	854	9.00	8,113.00	32,385.50	
4. 20 x 40 Flats	766	7.50	5,745.00	38,130.50	
5. 20mm Bright	567	9.50	5,386.50	43,517.00	
6. EN8 32mm Rod	716	7.00	5,012.00	48,529.00	
7. EN8 25mm Bright	520	9.00	4,680.00	53,209.00	'A' Class
8. EN8 20mm Rod	612	7.00	4,284.00	57,493.00	
9. 28 mm Bright	445	9.50	4,227.50	<u>61,720.50</u>	<u>73.81%</u>
10. EN8 45mm Rod	571	7.00	3,997.00	65,717.50	
11. EN8 36mm Rod	492	7.00	3,444.00	69,161.50	'B' Class
12. EN8 50mm Rod	441	7.00	3,087.00	72,248.50	
13. EN8 40mm Rod	393	7.00	2,751.00	<u>74,999.50</u>	<u>15.80%</u>
14. EN8 MM Rod	375	7.00	2,625.00	77,624.50	
15. 24mm Bright	276	9.50	2,622.00	80,246.50	
16. M.S.28 Bright	241	7.50	1,807.50	82,054.00	'C' Class
17. EN8 10mm Bright	100	9.50	950.00	83,004.00	
18. EN8 55mm Rod	100	7.00	700.00	<u>83,704.00</u>	<u>10.40%</u>

MONTHLY CONSUMPTION OF 'A' CLASS (MATERIALS) ITEMS

Raw Materials	January	February	March	April	May	June	July	August	September	October	November	December	Average Consumption
1. 16 MM. Bright	300	347	237	-	-	-	-	-	265	-	-	202	113
2. EN 8 22 MM	520	300	200	-	-	-	210	100	200	104	-	-	136
3. 25 mm. Bright	-	-	600	-	-	-	-	-	-	-	254	-	71
4. 20x40 Flats	245	-	521	-	-	-	-	-	-	-	-	-	64
5. 20 mm. Bright	-	-	100	-	-	-	-	-	-	-	-	467	47
6. EN832mm.	-	363	7	-	-	-	-	-	-	346	-	-	60
7. EN 8 25 mm.	-	-	-	-	-	100	-	91	-	137	-	192	44
8. EN 8 20 mm.	325	148	-	-	-	-	-	-	-	169	-	-	51
9. 20 mm. Bright	245	-	-	-	-	-	-	-	-	-	200	-	37

INVENTORY SYSTEM FOR 'A' CLASS RAW MATERIALS

APPENDIX - XVII

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'A' CLASS RAW MATERIALS	Safety Stock	Lead Time	MOQ	LTC	EOQ (Considering Transport Cost	OQ	RDL SS-LTC	Average Stock	Rate Rs./Kg.	Value
	Kg.	Days	Kg.	Kg.	Kg.	Kg.	SS+OQ 2			
1. 16 mm. Bright	37	4	1	18	200	200	55	137	9.50	1,301.00
2. EN8 22 mm.	60	4	1	22	200	200	82	160	7.00	1,120.00
3. 25 mm. Bright	84	4	1	12	200	200	96	184	9.00	1,656.00
4. 20x40 Flats	36	2	1	5	200	200	41	1136	7.50	1,020.00
5. 20 mm. Bright	68	4	1	9	200	200	76	168	9.50	1,596.00
6. EN 8 32mm.	48	4	1	10	200	200	58	148	7.00	1,036.00
7. EN 8 25 mm.	24	4	1	7	200	200	31	124	9.00	1,116.00
8. EN 8 20mm.	19	4	1	8	200	200	27	119	7.00	833.00
9. 28 mm. Bright	22	4	1	6	200	200	28	112	9.50	1,159.00
										<u>10,837.00</u>

NOTES: Safety Stock: = (Maximum Consumption Rate - Average consumption Rate) Normal Lead time
M.O.Q. = Minimum orderable Quantity
L.T.C. = Consumption during Lead time
E.O.Q. = Economic Order Quantity
R.O.L. = Reorder Level
O.Q. = Order Quantity
(Max. of MOQ/LTC/EOQ)

$$= \sqrt{\frac{2 \cdot A_q \cdot a}{i \cdot x \cdot c}}$$

A_q = Annual consumption in Kg.
a = Ordering cost Rs./order
i = Inventory carrying cost expressed as a fraction
c = Landed cost/Kg.

ECONOMIC ORDER QUANTITY FOR 'A' CLASS ITEMS

APPENDIX - XVIII

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Raw Materials	Annual Consumption	O. Q.	No. of order per annum	Rs./Annum Order cost (35 paise per order)	Transport cost Rs./Annum	Value of Av. Stock	Inventory carrying cost Rs./Annum	Total cost Rs./Annum
16 mm Bright	1351	30	45	15.75	675	52x9.5	51.87	742.62
		200	7	2.45	105	137x9.5	144.00	251.45
		1000	2	0.70	1000	537x9.5	535.00	635.70
EN 8 22 mm	1634	34	48	16.80	720	77x7	56.60	793.40
		200	8	2.80	120	160x7	117.60	240.40
		1000	2	0.70	100	560x7	411.60	512.30

NOTES: Cost/Order is 8.35 Rs.

Inventory carrying Cost = 0.11 Rs./Rs. Inventory.

Transport cost upto 200 Kgs. is Rs.15/- (Cart load)-

" for 1000 Kgs. is Rs.50/- (Tempo load)

It is seen that the total cost (Ordering cost + Inventory carrying Cost + Transport Cost) is Minimum for order quantity of 200 Kgs. and hence it is taken as Economic Order Quantity.

Average stock in each case was found out by $SS + \frac{00}{2}$

APPENDIX XIX

INVENTORY NORMS FOR 'B' AND 'C' CLASS ITEMS & QUOTA ITEMS

B & C ITEMSConsumption

Rs.22,000/- per annum

S.S. = 1 month

O.Q. = 2 months

S.S. = $\frac{22000}{12}$ = Rs.1,800/-

O.Q. = Rs.3,600 (2 months)

Average stock for B & C.items = 1800 + $\frac{3600}{2}$ = Rs.3,600/-QUOTA ALLOTMENT

Maximum allotment during 1982

6.39 tonnes value Rs.22,365/-

TOTAL RAW MATERIALS INVENTORY

Value of average stock of 'A' Class items Rs.10,837/-

-do- B & C Class items Rs. 3,600/-

Maximum quota allotment Rs.22,365/-

Rs.36,802/-

APPENDIX XX

Balance sheet as at 31-3-79, 31-3-80, and 31-3-81.

(Rs. in thousands)

LIABILITIES	1979	1980	1981
Bank	81	90	96
Sundry creditors	14	27	9
Expenses	14	20	59
Loans	19	-	-
	128	139	166
DEFERRED			
Bank			14
Other loans	20	16	10
	20	16	24
Capital & surplus	50	50	50
Current account	16	16	-
	66	66	50
TOTAL	214	221	240

APPENDIX XX...contd..

ASSETS	1979	1980	1981
Cash	1	-	-
Investments	100	-	-
Stocks	58	85	47
(Sundry Drs.)	46	44	97
Stores	14	4	4
Others	-	12	7
	270		
	119	145	155
Block sundries	94	74	74
	10		
	94	74	74
Miscellaneous	-	1	3
Capital	-	1	3
	-	1	3
Intangibles	-	1	1
Current account	-	-	4
Difference in books	-	-	3
	-	1	8
TOTAL	214	221	240

APPENDIX XXI

BALANCE SHEET AS AT 29th FEBRUARY 1982

(For 11 months) (Rs. in thousands)

LIABILITIES		ASSETS	
CURRENT			
Bank	149	Cash	5
Sundry creditors	52	Investment	-
Expenses	67	Stocks	78
Others(Taxes)	2	Sundry Drs	152
		Tools & accessories	4
		Others	26
	<u>270</u>		<u>265</u>
DEFERRED			
Bank	52	Block	113
Other loans	10		
	<u>62</u>		<u>113</u>
Capital & surplus	50	Miscellaneous	1
	<u>50</u>		<u>1</u>
		Intangibles	3
	<u>382</u>		<u>382</u>
TOTAL	382	TOTAL	382

APPENDIX XXII

PAST PERFORMANCE .

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Sales	188	293	378	486
Raw materials	79	85	120	225
Expenses	95	174	219	218
Depreciation	11	20	20	27
Profit/Loss	3	14	19	16

APPENDIX XXIII

FINANCIAL ANALYSIS

	1979	1980	1981
Profitability	1.59%	4.78%	5.02%
Liquidity ratio	0.92	1.04	0.93
CA/CL			
Acid test ratio			
CA - Stocks/CL	0.47	0.43	0.65
Equity:Debt	2.24	2.34	3.60
Equity/Sales	2.84	4.50	9.00
Long Term Debt Equity	0.30	0.25	0.57
Stock turnover		4.13	5.73
Average collection period		42 days	93 days
Payment period for creditors		88 days	40 days
Asset turnover ratio			
Sales T.op.assets	0.88	1.33	1.62
Liquidity ratio			

APPENDIX XXIV

TREND ANALYSIS

	1979	1980	1981
Sales	188	293	378
	100	155	201
Raw materials	79	85	120
	100	107	151
Expenses	95	174	219
	100	183	230
Profit	3	14	19
	100	466	633
Liquidity ratio	0.92	1.04	0.93
	100	113	101

APPENDIX XXV

ASSESSMENT OF WORKING CAPITAL REQUIREMENTS

A) Monthly sales		Rs.47,200	
B) Cost of production		Rs.44,000	
C) Raw materials consumed		Rs.20,000	
		Permissible limit	Working capital required
		-----	-----
	Rs.	Rs.	Rs.
i) Raw materials 7 weeks	36,800		
Less: Margin 25%	<u>9,200</u>	27,600	36,800
ii) Stock-in-process 15 days	22,000		
Less: Margin 25%	<u>5,500</u>	16,500	22,000
ii) Finished goods 1 week	11,000		
Less: Margin 25%	<u>2,750</u>	8,250	11,000
iv) Sundry Drs.(at sale value) 68 days	107,000		
Less: 10% Margin	<u>10,700</u>	96,300	
Sundry Drs. at cost			99,700
v) Expenses 1 month(s)			24,000
		-----	-----
		148,650	193,500
		-----	-----
TOTAL WORKING CAPITAL REQUIRED:			
LESS: a) Sundry creditors (1 month purchases)		20,000	
b) Limits recommended		<u>148,000</u>	

c) Liquid deficit in balance sheet as on 28.2.1982		168,000	5,000

			198,500
			<u>168,000</u>

			30,500
			=====
			=====

DEFICIT

SOUTHERN ANCILLARIES (PRIVATE) LIMITED

BRIEF HISTORY OF THE UNIT

The unit was established as a private limited company in 1968. It was started as an associate concern of M/s Southern Alloy Foundries (P) Ltd., one of the leading SG.Iron manufacturers in India. The present Board of Directors are:-

1. Sri S Thiagha Rajan, B.E., M.A., M.A.F.S.
2. Sri S Sadasivam
3. Sri M Subramaniam
4. Sri S Ratnavel
5. Sri S Karunanandham

Sri S Sadasivam, who is also one of the directors and a diploma engineer in Mechanical Engineering looks after the day to day affairs of the company.

The unit came to Bank in December 1970, when an instalment credit loan of Rs.27,400 was sanctioned. Again the unit was sanctioned a term loan of Rs.85,000 for purchase of machinery in October 1975 for its unit No.II at Kodavasal, Tanjore District. The above two loans have been repaid promptly. A term loan of Rs.82,500 was sanctioned on 19.6.1980 to meet cost of machinery partially. Another term loan of Rs.1,99,400 was sanctioned on 3.11.1981 for the purpose of purchase of machinery.

P&S PERFORMANCE

The unit's performance over the years has been satisfactory. The sales/service turnover and profit figures are given below:-

('000s)

	1976-77	1977-78	1978-79	1979-80	1980-81
Sales/Service *	313	415	267	378	403
Profit *	132	156	35	89	32

* This includes for both this unit as well as the unit No.II at Kodavasal.

COSTING

IMPORTANCE OF COSTING

A good system for costing and pricing will be of assistance in making sound financial and marketing decisions in a small scale industry. The scientific costing enables, to vary the prices without affecting its economic viability keeping an edge over the competitors. The unit being basically a machine shop, the value added can be identified with a machine centre.

COST CENTRE

In developing the costing system the entire machinery in the factory as given in Appendix I, has been subdivided into production cost centres, service cost centres and unbooked cost centres, while doing this two leased planing machines which have been leased to unit's sister's concerns are not considered.

The service cost centres are:-

1. Generator
2. Tool cutter grinder
3. Hacksaw machine
4. Bench grinder
5. Welding set

Because of their non-utilisation the following machinery are classified as unbooked cost centres.

1. MM centre lathe - 4
2. 12' Punjab lathe
3. Radial drilling machine
4. HMT LB 20 lathe

During the discussion with the Director it was told that the negotiations are underway for few new orders from Ashok Leyland & if it comes through both Radial drilling machine and HMT LB 20 will be utilised.

MACHINE LOADING MATRIX

Detailed time study was conducted on the items. Operation times and total times for various operations were computed after applying rating and giving allowances. Appendix II, gives the operation time and total time for each operation. For the budgeted programme, a

component-Machine Loading Matrix was built as shown in Appendix III. The percentage utilisation of the machines and the performance index of the unit is also shown in this Appendix.

PROJECTION OF PROFITABILITY AND EXPENSES FOR THE BUDGETED PROGRAMME

The projected profitability and expenses are shown in Appendix V. These projections have been made on the basis of past data and on discussion with the unit. The expenses on power, fuel, consumable stores and tools and repairs and maintenance of machinery are considered as variable expenses.

As the unit is presently engaged in jobbing hence there is no raw material utilisation. While computing the variable expenses, an allowance for price rise upto 10% has been taken into account.

Wages, salaries, bonus, insurance, depreciation on machinery, MTL Interest, repair of building and administrative and other expenses have been considered as fixed expenses. Wages have been arrived at after summing up of the individual wages of all the 17 operators. Expenses on insurance, depreciation, MTL interest, etc., are the actual expenses the unit would incur. The interest on the W.C. limit recommended is considered as administrative and other expenses.

ALLOCATION OF EXPENSES

All the expenses have been broken into variable and fixed expenses and allocated to different cost centres. The fixed expenses are further sub-classified as production fixed expenses and administrative and other fixed expenses. Salaries of office staff, remuneration to Director, Director's sitting charges, etc., are taken as administrative expenses.

While allocating both fixed and variable production expenses to different cost centres, the responsibility of each cost centre in incurring it are taken into consideration.

FIXED EXPENSES

- (a) WAGES: This comprises of wages for operators. This has been apportioned on the basis of actual number of operators allotted to each cost centre. ESI, EPE and LWF have been apportioned on the same lines.
- (b) SUPERVISORS' AND INSPECTORS' SALARIES: This has been apportioned on the basis of extent of supervision and inspection demanded at each cost centre.
- (c) REPAIR AND INTEREST ON LEASEHOLD OF BUILDING: This has been apportioned on the basis of the area occupied by each cost centre, including the service and unbooked cost centres. The area occupied by each machine is given in Appendix I.
- (d) INSURANCE: This has been apportioned on the basis of the value of each machine.
- (e) M.T.L. INTEREST: This has been apportioned on the basis of actuals and allocated to respective cost centres.
- (f) DEPRECIATION: Depreciation of the machinery is apportioned on the basis of value of each machinery.
- (g) GENERATOR: Fixed expenses on the Generator are reallocated to other booked cost centres on the basis of the product of H.P. of each machine and total number of operating hours on each machine.
- (h) SERVICE COST CENTRES: The machines which are utilised for servicing and which are not directly involved in the jobbing are considered in this head, expenses on these machines are re-allocated to the booked cost centres on the basis of sub-totals.
- (i) UNBOOKED COST CENTRES: The machines which are unbooked are considered under this head. Allocation is made on the basis of sub-totals.

VARIABLE EXPENSES:

- (a) POWER AND FUEL: The expenses on the power and fuel are apportioned on the basis of product of H.P. and the hours booked on each cost centre. The fuel is also considered in this head as the fuel is used by the generator.

- (b) **REPAIR AND MACHINERY:** The apportionment is made on the basis of the extent of use (age) and the replacement cost of the machine.
- (c) **CONSUMABLE STORES AND TOOLS:** These include coolant oil, lubricants, kerosene, cotton waste, etc., and tools like drills, reamers, and other cutting tools. Allocation has been made on the basis of past data and in consultation with the unit.

ADMINISTRATIVE AND GENERAL EXPENSES

All the costs other than production overheads are considered in this category. The expenses are shown in Appendix IV. The expenses are considered as fixed and distributed on the basis of the production fixed costs.

MACHINE HOUR RATES

From the total, variable and fixed costs, variable hour rate and fixed hour rates are computed. The fixed hour rate will be valid for a particular time-bound production and decreases with increased production, whereas the variable hour rate remains a constant.

$$\text{Variable machine hour rate} = \frac{\text{Total variable cost at the centre}}{\text{Total operating hours}}$$

$$\text{Fixed machine hour rate} = \frac{\text{Total fixed cost at the centre}}{\text{Total booked hours}}$$

Appendix VI gives both the fixed and variable machine hour rates. It is observed from the Appendix VI that the fixed machine hour rates are very high in case of centre lathes MM2 and MM3. This is because of the fact that these two machines are very much under-utilised. The unit should take steps to step up the utilisation of these two machines. Fixed hour rate is slightly higher in CAPSTAN lathe because of interest burden.

PRODUCT COSTING

After deriving fixed and variable hour rates at each cost centre, costing can be done for each job. The fixed and variable costs at each cost centre could be computed

as follows:

Fixed cost = fixed hour rate X booked hours at the centre

Variable cost = variable hour rate X operating hours at the centre

This is shown in Appendices VII and IX.

The total cost of each product is derived by adding total variable cost and total fixed cost and this is shown in Appendix VIII.

CONTRIBUTION ANALYSIS

Appendices VIII & VIII-A show the sale value/piece. Appendix VII shows the contribution analysis without taking into consideration the scrap. Whereas Appendix VIII-A, shows the contribution analysis after taking into consideration the income from scrap sales.

The total revenue - total variable cost gives the contribution for each product. It is seen from Appendices VIII and VIII-A that all the items contribute positively. It is also seen that the maximum contribution is from Elbow and the minimum contribution is from F.T.C. collar. Though the unit is making loss from F.T.C. collar because of very high fixed hour rates of MM centre lathes 2 and 3, as this item is giving positive contribution, the unit should continue to job this product. However, the unit should raise the utilisation of the above two machines in order to reduce the high fixed hour rates. The value added as shown in Appendix X, in case of Nozzle clamp is 70%, Drain plug 84%, Elbows 76%, Tee pieces 83% and in case of FIC collar it is 188%. The unit should try to get a higher price in the case of drain plug. Tee pieces and F.T.C. collars, contribution/critical facility hour is better in CAP Elbows compared to Tee piece as shown in Appendix X-A.

ADDITIONAL JOB ORDERS

The unit should try to get additional job works in order to utilise under-utilised and unbooked machines. The charges can be fixed at least to cover the variable expenses, excess going to meet the fixed expenses. The pricing of each item could be done as per the format given in Appendix IX by computing, operating time and total time.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

(a) MACHINE LOADING MATRIX

The utilisation of each machine for the projected level of operation is given in the component Machine Loading Matrix shown in Appendix III.

(b) PROFITABILITY

The profitability at the projected level of operation is shown in Appendix V.

(c) MACHINE HOUR COSTING

Apportionment of projected expenses to production cost centres and derivation of machine hour rates is shown in Appendix VI. In the case of MMM2, and MMM3 the fixed hour rates are very high as both these machines are very much under-utilised.

(d) PRODUCT COST

Cost for each product has been derived by summing up the products of process times at each machine centre and variable hourly rates and the product of Total time for each product and fixed hourly rates. Derivation of labour cost, variable and fixed costs are shown in Appendix VII. The total cost/piece, contribution and profit/loss per piece are shown in Appendix VIII and VIII-A. Out of 5 items, the unit is incurring loss in one item, i.e., F.T.C. collar. The loss here is due to the reason that the item is being processed on the centre lathes MMM2 and MMM3, which are very much under-utilised, hence resulting in very high fixed hour rates. However, the item is giving positive contribution. The unit should take steps to utilise these under-utilised lathes to capacity. Also, the unit should try to increase its labour charge on the drain plug, tee pieces and F.T.C. collars.

(e) MARGINAL COSTING

The unit can make use of the hourly rates for decisions on taking job orders on under-booked machines, like centre lathes MM2 and MM3, HMT milling, radial drilling machine, HMT LB 20 lathe, etc. The variable cost of any job should be covered by the service charge and excess will go towards meeting the fixed overheads. The variable machine hour rates can be made use of for this purpose. A model computation is shown in Appendix IX.

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LIST OF APPENDICES

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LIST OF MACHINERY

No.	Name of the machine	Date of purchase	H.P.	Area occupied in sq.ft.	Remarks
1.	HMT Lathe 16.20	Sep.70	10.00	49.36	
2.	Lmt Milling	Feb.72	9.63	39.80	
3.	Effco Drilling M/c	Sep.78	2.00	10.89	
4.	Pmt Milling	May.73	4.60	16.00	
5.	12' Punjab Lathe	Apr.70	3.00	37.50	
6.	Tool and cutter grinder	Mar.70	0.75	3.61	
7.	Capston 3 Ds W&A D	Aug.80	5.50	26.92	
8.	Hacksaw M/c	Apr.70	0.50	6.00	
9.	Bench grinder M/c	Apr.70	0.80	5.00	
10.	Welding set	Apr.70	12.00*	6.00	
11.	Model Lathe 4	1977	3.00	33.25	
12.	" 3	Jan.78	3.00	35.00	
13.	" 2	Sep.81	3.00	35.00	
14.	" 1	Feb.82	3.00	35.00	
15.	Radial Drilling M/c	Mar.82	9.00	48.86	
16.	MEI Drilling M/c	Apr.70	0.50	3.00	
17.	4' Beco Planing M/c	1977	3.00	15.75	
18.	6' " "	1970	3.00	18.00	
19.	Generator	Dec.75	35.00*	66.00	

* KVA

APPENDIX I-A

BUDGETED PRODUCTION PROGRAMME

No.	Products	No. of pieces	Rate	Value	Cumulative value
1.	Nozzle clamp	51,600	2.70	139,320	139,320
a.	Insuling				
2.	Elbows	14,400	6.00	86,400	225,720
c.	It also spot face				
3.	Drain plug	18,000	3.00	54,000	279,720
e.	It also				
4.	PTC collar	9,600	2.25	21,600	301,320
d.	It also				
5.	Ice pieces	3,500	6.00	21,000	322,320
f.	It also				
6.	Other works	-	-	46,000	368,320
g.	It also				

APPENDIX II

OPERATING AND TOTAL TIME

No.	Operating	Machine	Batch Qty.	O.T. per piece
NOZZLE CLAMP				
a.	Drilling	M.E.I. Drilling	500	2.775
b.	Spot facing	EIFCO drilling	500	1.221
c.	II side spot facing	-do-	500	1.4985
d.	Radial Milling	Front drilling	500	3,12,18
e.	II Milling	Hmt "	500	1,3875
f.	Rough spherical	EIFCO "	500	0,3741
g.	Fine spherical	-do-	500	0,4840
2. ELBOWS				
a.	Side threading drilling	Capston	500	4,6731
b.	Side II	"	500	6,9379
3. DRAIN PLUG				
a.	Machining	MM Contri Lathe	500	8,6606
b.	Drilling	EIFCO	500	1,0764
4. PTC COLLAR				
a.	Bore machining	MMT Lathe	200	55
b.	Second side facing	"	200	60
c.	Milling	HMT Milling	200	120
d.	Drilling	MEI drilling	200	30
e.	Drilling	"	200	30
5. TEE PIECES				
a.	I side drilling threading condensor	Capston	500	4,3656
b.	II side	"	500	4,3656
c.	III side	"	500	4,3646

APPENLIX II contd.

No.	Set up time per batch	Total time per piece
	(mts)	(mts)
a	15	2,805
b	15	1,251
c	15	1,5285
d	150	3,4218
e	90	1,5675
f	30	0,4341
g	30	0,544
2.a.	240	5,1531
b.	240	7,4179
3.a.	240	9,1406
b.	240	1,1364
4.a.	55	3,305
b.	60	1,7985
c.	120	1,9043
d.	30	1,5625
e.	30	0,6924
5.a.	240	4,8456
b.	240	4,8456
c.	240	4,8456

APPENDIX III

COMPONENT MACHINE LOADING MATRIX & PERFORMANCE INDEX

No.	Component	Budgeted Qty.	HMT Lathe LB20	HMT Milling	Effico Drilling
1.	Nozzle clamp	51,600		80,883	193,892
2.	Elbow	14,400			
3.	Drainplug	18,000			20,476
4.	F.T.C. Collar	9,600		18,282	
5.	Tee pieces	3,500			
6.	Other works			10,193	22,116
7.	Total			109,358	236,484
8.	Available time on 2 shifts		225,600	256,500	256,500
9.	% utilisation			42.64	92.19

No.	12' lathe	CAPSTON	MMM1	MMM2	MMM3	MMM4
1.						
2.		181,023				
3.			164,533			
4.				31,728	17,266	
5.		50,879				
6.		23,959	16,985	3,755	1,781	
7.		255,861	181,518	35,483	19,047	
8.	256,500	256,500	256,500	256,500	256,500	
9.	-	99.75	70.77	13.82	7.42	

APPENDIX III .. contd.

No.	Radial drilling machine	MEI Drilling machine
1.		144,738
2.		
3.		
4.		21,648
5.		
6.		17,167
7.		183,553
8.		256,500
9.		71.56

Standard man minutes for production: 12,16,088

Available attendance man minutes = 450 x 300 x 17 x .85

Performance index = $\frac{1,21,6088}{450 \times 300 \times 17 \times 8.5} \times 100$

88 % 62.33 %

APPENDIX IV

Administrative & General Expenses

	Rs.
1. Director's remuneration	12,600
2. Transportation, petrol & car maintenance	13,000
3. Postage, telephone & stationery	5,400
4. Licence & tax	2,500
5. Advertisement	400
6. Travelling expenses	2,000
7. W.C. Interest & bank charges	12,350
8. Directors' sitting charges	4,000
9. Rent	3,750
10. Sundry expenses	8,000

Total (D)	64,000
	=====

APPENDIX V

PROFITABILITY AT PROJECTED LEVEL

1.	Service charges recovery		368,000
2.	Scrap sales		12,000
	TOTAL (A)		<u>380,000</u>
3.	Electricity and fuel	16,000	
4.	Consumables and tools	60,000	
5.	Repairs and maintenance	13,000	
	TOTAL VARIABLE EXPENSES(B)	<u>94,000</u>	
6.	Salaries and wages	88,300	
7.	ESI, PF and LWF	8,600	
8.	Directors' remuneration	12,600	
9.	Petrol and car maintenance	8,000	
10.	Postage, telephone & stationery	5,400	
11.	Travelling expenses	2,000	
12.	Transportation charges	5,000	
13.	Licence and tax	2,500	
14.	Insurance	500	
15.	Advertisement	400	
16.	Bank interest & charges	30,000	
17.	Directors' sitting charges	4,000	
18.	Rent	3,750	
19.	Sundry expenses	8,000	
20.	Building repairs	8,000	
21.	Depreciation	40,000	
	TOTAL FIXED EXPENSES(C)	<u>221,090</u>	
	Say		222,000
Total expenses	= B + C	= 3,16,000	
Gross profit	= Net sales - Total expenses		64,000
Provision for taxation	= 380,000 - 316,000	=	<u>40,000</u>
Profit after tax		=	<u>24,000</u>
Add Back depreciation			<u>40,000</u>
Net cash accruals		=	<u><u>64,000</u></u>

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APPENDIX VA

PROJECTED EXPENSES

I. VARIABLE EXPENSES

	Rs.
1. Electricity and fuel	16,000
2. Consumables and tools	60,000
3. Repairs and maintenance	<u>18,000</u>
TOTAL VARIABLE EXPENSES (A)	<u>94,000</u>

II. FIXED EXPENSES

1. Salaries and wages	88,300
2. ESI, PF and LWF	8,600
3. Directors' remuneration	13,600
4. Postage & car maintenance	8,000
5. Postage, telephone and stationery	5,400
6. Travelling expenses	2,000
7. Transportation charges	5,000
8. Licence and tax	2,500
9. Insurance	500
10. Advertisement	400
11. Bank interest and charges	30,000
12. Directors' sitting charges	4,000
13. Rent	3,750
14. Sundry expenses	8,000
15. Building repairs	2,000
16. Depreciation	40,000
TOTAL FIXED EXPENSES(B)	<u>221,090</u> 222,000

TOTAL EXPENSES = A + B = 316,000

APPORTIONMENT OF EXPENSES TO COST-CENTRES AND DERIVATION
OF MACHINE HOUR RATE

No.	Items of expenditure	Basis of Allocation.	Budget 1982-83
I FIXED PRODUCTION			
1.	Wages	Labour	55,080
2.	ESI, PF, LWF	Wages	8,600
3.	Supervisors' salary	Extent of Supvn.	12,000
4.	Inspector's salary	Extent of Inspn.	5,300
5.	Repairs & rent of building	Area occupied	3,240
6.	Insurance	Value of machine	500
7.	MIL Interest	Actuals	17,000
8.	Depreciation	Value of machine	40,000
9.	Generator FE re-allocated	HP X Hrs	-
10.	Sub-total (A)		
11.	Service & unbooked cost centres, FE re-allocated	Sub-total (A)	
12.	Sub-total (B)		
II VARIABLE PRODUCTION			
13.	Power & fuel	HP X Hrs	16,000
14.	Repairs & machinery	present value X age	18,000
15.	Consumables	Estimated	60,000
16.	Sub-total (C)		
17.	Service unbooked c.c. V.E. re-allocated	Sub-total (C)	
18.	Total V.E.		
19.	Administrative general expenses allocated	Sub-total B	64,000
20.	Total fixed expenses	(12 + 19)	
21.	Booked Hours		
22.	Fixed cost/Hr	20/21	
23.	Operating Hrs		
24.	Variable cost/Hr	18/23	

APPENDIX VI contd.

No.	BOOKED COST CENTRES					
	Hmt milling	Hmt milling	Capston	MMM 1	MMM 2	MMMM 3
1.	3636	5616	7956	7776	3816	3096
2.	567	877	1242	1214	596	483
3.	1000	1800	3000	2800	600	600
4.	481	857	1125	798	156	84
5.	280	112	190	245	245	245
6.	7	9	137	55	46	23
7.	-	-	5382	3303	-	-
8.	468	2228	9685	3515	3275	2095
9.	1225	1042	1636	634	119	64
10.	7384	12141	30163	20095	8607	6445
11.	2528	4500	10327	6881	2948	2207
12.	9912	17641	40491	26976	11656	8652
13.	3484	2965	4557	1802	339	183
14.	1165	1265	4340	14460	735	875
15.	8000	12000	20000	4000	3000	2000
16.	12649	16230	28997	7262	4074	3058
17.	2528	3243	5995	1451	814	611
18.	15177	19473	34792	8713	4888	3669
19.	4493	8000	18357	12230	5284	3922
20.	14405	25641	58848	39206	16940	125574
21.	1827	3246	4264	3025	591	317
22.	7.88	7.89	13.80	12.96	28.66	39.66
23.	1546	2962	3918	2866	542	26.5
24.	9.82	6.57	8.88	3.04	9.0	13.85

APPENDIX VI contd.

No.	Effico Drilling	M.E.I. Drilling	Generator	Total cutter grinder	Hacksaw machine
1.	6138	6138	-	4176	-
2.	958	958	-	652	-
3.	800	800	-	600	-
4.	992	807	-	-	-
5.	76	21	462	60	-
6.	11	-	33	17	-
7.	-	-	-	-	-
8.	1015	-	-	-	-
9.	535	107	-	66	-
10.	10439	8810	-	108	-
11.	3375	3016	-	-	-
12.	14014	11826	-	-	-
13.	1492	302	-	284	189
14.	705	675	3000	525	-
15.	1500	1500	2000	5000	500
16.	3697	2377	5000	5809	689
17.	739	475	-	-	-
18.	4436	2852	-	-	-
19.	6353	5361	-	-	-
20.	20367	17187	-	-	-
21.	3941	3059	-	-	-
22.	5.17	5.62	-	-	-
23.	3750	2978	-	-	-
24.	1.18	0.96	-	-	-

APPENDIX VI contd.

UNBOOKED & SERVICE COST CENTRES

No.	Bench grinder	Welding set	MMM	12' Lathe	Radial drilling	Hmt LH 20
1.					2376	4356
2.					372	681
3.						
4.						
5.	35	42	233	263	343	346
6.			13		149	
7.					8965	
8.			1330		9485	
9.	66					
10.	142	42	1576	263	21690	5383
11.	303					
12.						
13.	303					
14.			995		2360	
15.	500					
16.	803		995		2360	
17.						
18.						
19.						
20.						
21.						
22.						
23.						
24.						

APPENDIX VII

FIXED/VARIABLE MACHINE COSTS AND PRODUCT COSTS.

No.	Product	Cost centre	Booked time in minutes	Operation time in minutes
		Print milling	3,4218	3,1218
		EIFFCO	3,7576	3,556
1.	Nozzle clamp	Hmt milling	1,5657	1,3875
		MEI drilling	2,8050	2,7750
		Total cost/piece		
2.	Elbow	CAPSTAN	12,5710	11,6110
		Total cost/piece		
		MMi	9,1406	8,6606
3.	Drain plug	EIFFCO	1,1364	1,0764
		Total cost/piece		
		Hmt milling	1,9043	1,3043
4.	FTC collar	MMM2	3,3050	3,0305
		MMM3	1,7985	1,4985
		MEI	2,2549	1,9565
		Total cost/piece		
5.	TEE piece	CAPSTAN	13,5368	13,0968
		Total cost/piece		

APPENDIX VII ... contd.

Variable hour rate	Fixed hour rate	Variable cost per piece	Fixed cost per piece	Total cost
6.57	7.89	0.34	0.45	0.79
1.18	5.17	0.07	0.32	0.39
9.82	7.88	0.23	0.20	0.43
0.96	5.62	0.04	0.26	0.30
		0.68	1.23	1.91
0.88	13.80	1.72	2.89	4.61
		1.72	2.89	4.61
3.04	12.96	0.43	1.97	2.40
1.18	5.17	0.02	0.03	0.11
		0.45	2.06	2.51
9.82	7.88	0.21	0.25	0.46
9.00	28.66	0.45	1.57	2.02
13.85	39.66	0.34	1.18	1.52
0.96	5.62	1.03	0.21	0.24
		1.94	3.21	4.24
8.88	13.80	1.94	3.11	5.05
		1.94	3.11	5.05

APPENDIX VIII

CONTRIBUTION ANALYSIS PER PIECE

No.	Product	Sale value price	Variable cost	Fixed cost	Total cost
1.	No.22/e clamp	2.70	0.68	1.23	1.91
2.	Elbow	6.00	1.72	2.89	4.61
3.	Drainplug	3.00	0.45	2.06	2.51
4.	F.T.C.Collar	2.25	1.03	3.21	4.24
5.	Tee piece	6.00	1.94	3.11	5.05

No.	Contribution	Profit/Loss	Remarks
1.	+2.02	+0.79	
2.	+4.28	+1.72	
3.	+2.55	+0.45	
4.	+1.22	-1.99	Loss is because of this product being made on
5.	+4.06	+0.95	MMM2 and MMM3 lathes, which are under very high fixed hour rate

APPENDIX VIII A

CONTRIBUTION ANALYSIS PER PIECE CONSIDERING SCRAP SALES

No.	Product	Sale value price	Income from scrap sale	Total revenue per piece
1.	Nozzle clamp	2.70	0.08	2.78
2.	Elbow	6.00	0.19	6.19
3.	Drain plug	3.00	0.09	3.09
4.	F.T.C. Collar	2.25	0.07	2.32
5.	Tee piece	6.00	0.19	6.19

No.	Variable cost	Fixed cost	Total cost	Contribution	Profit/Loss
1.	0.68	1.23	1.91	+2.10	+0.87
2.	1.72	2.89	4.61	+4.47	+1.91
3.	0.45	2.06	2.51	+2.64	+0.54
4.	1.03	3.21	4.24	+1.29	-1.92
5.	1.94	3.11	5.05	+4.25	-1.14

APPENDIX IX 353

PROFORMA FOR COMPUTATION OF PRODUCT COST FOR ANY PRODUCT

No.	Cost Centre	Variable hour rate	Fixed rate	Hour	T.O.T. in Hrs	Total time in Hrs
1.	2.	3.	4.	Value	5. Total in	6.
1.	Nozzle clean				70	
2.						
3.	Blows				76	
4.						
5.	Wash pipe				64	
6.	A.T.C. collect				168 *	
7.						
8.	Tray plate				84	
TOTAL COST						

No.	Variable cost (3) x (5)	Fixed cost (4) x (6)	Total cost
7	8	9	
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

TOTAL COST = Total variable cost + Total fixed cost.

APPENDIX X

VALUE ADDED FOR EACH ITEM

No.	Items	Value added in %
1.	Nozzle clamp	70
2.	Elbows	76
3.	Drain plug	84
4.	F.T.C. collar	188 *
5.	Tee piece	83

* This is due to very high fixed hour rate of the two MM centre lathes MM2 and MM3.

*C*C*O*C*

APPENDIX XA

ANALYSIS OF CONTRIBUTION/CRITICAL FACILITY HOUR.

CRITICAL FACILITY

CAPSTON LATHE

Taking into consideration scrap sales				
No. Product	No. of pieces	Total time as critical facility	Contribution per piece	Total contribution
1. Elbow	14,400	181,023 Min	4.47	64,368
2. Tee piece	3,500	50,879 Min	4.25	14,875

Without considering scrap sale revenue					
No.	Contribution per critical facility hour	Total time on critical facility	Contribution per piece.	Total contribution	contribution per critical facility Hr.
1.	21.33	181,023 Min	4.28	61,632	20.42
2.	17.54	50,879 Min	4.06	14,210	16.75

SABARI INDUSTRIES

BRIEF HISTORY OF THE UNIT

The unit was established in 1968 as a partnership concern. The present partners are: (1) Smt R Rajamani, (2) Sri N Sukumaran, (3) Sri N Mohan and (4) Sri N Duraiswamy. Sri N Mohan is the Managing Partner in active charge of the unit's working. The unit is a machine shop engaged in the manufacture and supply of electric motors in the H.P. range of 2,3,5,7.5,10,12.5 and 20. The unit's motors are marketed under the trade name of 'Suguna' motors with ISI markings. The unit markets its products in Tamil Nadu, Andhra Pradesh, Karnataka and Rajasthan through its own branch offices.

The position of the unit's operative account with the bank as on 6.3.1983 is as follows:

Facility	Limit sanctioned	Market value	(Amount in Rupees)		
			Advance value	Drawing power	Out-standing
C/c (L & K)	250,000	232,019	174,014	174,000	
C/c (Mundy type)	200,000	535,391	392,561	200,000	
Bills	150,000	129,932	110,443	110,400	
	<u>600,000</u>	<u>897,342</u>	<u>677,018</u>	<u>484,400</u>	<u>361,123</u>

PAST PERFORMANCE

The unit's sales have fluctuated over the years with no definite upward trend. The net profit has also dwindled, touching a low point of Rs.17,000 during 1982.

EQUITY

The unit's equity which was strengthened gradually upto 1981 has dipped during 1982 and continues at the level of Rs.614,000 ever since.

The unit's performance from 1979 to 1983 is summarised in the following table:

Years	(in 000's)			
	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Sales	55.44	66.74	45.48	42.33
Profit	3.36	3.32	0.70	0.17
Equity & Reserves	6.04	6.94	7.88	6.14

INFRASTRUCTURE, PROCESS AND MARKETING

The unit is functioning on its own premises and factory off Avanashi Road within the municipal area. The space is adequate for the present and may also meet the needs of any marginal expansion. The unit has a sanctioned power load of 65 H.P. of which only 45 H.P. are now being drawn.

The total compliment of staff of 44 is made up as follows:

Accountant	1
Clerks	3
Storekeeper	1
Supervisor	1
Asst. Supervisor	1
Foreman	1
Turners	11
Driller	1
Chippers	7
Shaper	1
Winders	6
Painters	5
Fitter	1
Watchmen	3
Office boy	1

	44

The major items of machinery are as follows:

NAME	NO. OF MACHINES
----	-----
Lathes	13
Grinders	2
Drilling machine	3
Radial drilling	1
Keyway milling	2
Shaft grinder	1
Shaping machine	2
Compressor	1
Cutting machine	1

The machinery is more than adequate for the present needs of the unit; as a matter of fact, the machinery is utilised only to 2/3rd of its capacity.

PROCESS

Among the various components that go into the manufacture of the unit's motors, only 6 items are machined. These are (1) motor body which is seated, drilled, tapped and shaped; (2) motor cover; (3) motor cover caps both of which undergo machining operations similar to item (1); (4) shaftings which are cut, centred, drilled and ground filed; (5) rotors which are machined; and (6) stator stampings which are pressed under hydraulic press. The machined parts are assembled after passing through the winding section. The assembled motor is painted, cleared for defects, tested for horse power and finally despatched.

MARKETING

Marketing has not posed much of a problem to the unit in view of the quality (ISI) of the product and the ready demand for 3 HP and 5 HP motors especially in Andhra Pradesh, where the unit has one of its branches. As a matter of fact, the unit could well market a considerably more number of motors, judging by the heavy order book position.

The only constraint is self-imposed as the unit has taken a deliberate decision not to work more than one shift.

SALES PATTERN

The pattern of the unit's sales is shown in Appendix III. It would be observed that the first three items, namely, 3, 5 and 7.5 HP motors alone account for 80% of the sales. The unit anticipates and the pending orders confirm that the same sales pattern will continue during the coming years.

PROJECTED PERFORMANCE

On the basis of the pending orders, presently with the unit - most of them being of a repetitive nature - and the fairly stable sales pattern mentioned earlier, a sales of Rs.70.07 lacs has been projected for the period April 1983 to March 1984. The projected production programme together with the product mix is given in Appendix IV.

INVENTORY CONTROL

An ABC analysis of the unit's raw material consumption for the 12 months ending March 1983 reveals that the unit consumed a total of 153 items valued at Rs.47,29,243. Of these, 11 items accounting for 77.5% have been classified as 'A' class items. These comprise of super enamelled wire of different gauges, stator stampings and motor stampings of different diameters and thickness and rough castings. A detailed study with monthly readings of the consumption pattern of the eleven items revealed that the pattern conforms, by and large, to a normal frequency distribution; standard deviation was therefore computed to arrive at safety stock level.

18 items accounting for 12.9% of annual consumption and 124 items accounting for 9.6% of annual consumption have been classified as 'B' and 'C' class items respectively. Details of the ABC analysis are given in Appendix I.

For the projected sales of Rs.70.07 lacs, the itemwise requirements of 'A' class items have been calculated; the total works out to Rs.433,900. Adding 2 months' holdings of 'B' class items and 4 months' holdings for 'C' class items, it is estimated that the total requirement of inventory would be about

Rs.688,754 based on average stock level. Average stock calculations are presented in Appendix II.

LEAD TIME

The unit procures its major raw materials from the following sources:

1. Bharat Insulation Company,
Bombay .. Copper enamelled
wire
2. Indo-American Electricals,
Calcutta .. "
3. Metal Syndicate, Coimbatore.. "
4. Geskin Williams, Bangalore .. Stampings
5. -do- Coimbatore .. "
6. Suguna Foundry, Coimbatore .. Rough castings
7. Bharat Bright Bar -
Peelamedu .. Shaftings
8. Orgay's National Engineering
Foundry Co., Madras .. "
9. Associated Boaring Company,
Bombay .. Ball bearings
10. J.B. Bearings, Madras .. "

Since the unit is a regular customer with these suppliers, its requirements are regularly met. The unit generally finds no difficulty in obtaining the materials on regular basis. There has, seldom, been stoppage of production on account of a stock-out of these items since, at a pinch, the unit is able to resort to local purchases in small quantities. Considering all these factors and the unit's past experience, the average lead time for all the 'A' class items except rough castings has been taken as one month and the crash lead time as nearly zero. The lead time for rough castings has been taken as 15 days.

PROJECTED INVENTORY LEVEL

As stated earlier, the unit requires an average raw material inventory of Rs.688,754 for its working for the next 12 months. The 'A' class items have been treated with special care in devising a system of inventory control.

SAFETY STOCK $(K\sqrt{L})$

In calculating the safety stock the rate of consumption in the average lead time for all the items has been taken into account. The constant factor K has been reckoned at 2.5 for maximum safety. This factor gives a protection of nearly 99% against stockouts.

ECONOMIC ORDER QUANTITY

The EOQ has been calculated for each of the 11 items using the formula

$$EOQ = \sqrt{\frac{2\Lambda a}{ic}}$$

where

- Λ = annual projected consumption in quantity
- a = cost of ordering (in rupees)
- i = inventory carrying cost expressed as a fraction, ie., 0.2
- c = cost per unit quantity

In case of all the items the EOQ as worked out above is in very small quantities in view of the minimum cost of ordering, namely Rs.2 per order. In most cases, the EOQ represents only a day's consumption. For practical reasons it is not possible to order in such tiny quantities. Hence in calculating the average inventory of raw materials the figure has been arrived at by adding the safety stock and half the minimum order quantity.(MOQ) The detailed calculations have been shown in Appendix II.

In the case of 9 out of 11 'A' class items, the lead time consumption (LTC) is more than the order quantity. Multiple order systems have therefore been suggested with a view to pegging down inventory holdings. For example, with respect to stator stampings 142M (5HP),

the LTC is 3107 kg. Safety stock is 2362 kg. The order rule is: an order for 2000 kgs is to be placed when the stock level touches 5400 or 3400 or 1400. There are thus 3 order levels. Average stocks in such cases will be safety stock + order quantity. Items for which the

2

multiple order system has to be used are indicated in Appendix II with the notation (M).

SEMI FINISHED GOODS

Taking the unit's production pattern, delivery schedules and machine and labour constraints into consideration, the processing time has been taken to be one week on the basis of the discussions with the unit's engineer. The working capital required for semi-finished goods has therefore been taken as one week's requirement.

FINISHED GOODS

The unit produces only against a definite production programme and the motors are promptly despatched. However, in case of same items of more frequent demand, a small buffer stock is kept to meet urgent demands. Taking this into consideration the average stocking period has been taken as one week.

To summarise, the unit's raw material inventory holding for the future is expected to be significantly lower than the past, even after allowing for the requirements of increased production.

COSTING

NEED FOR COSTING

The unit manufactures a number of motors of different HPs in different RPMs. In the past even when there was an increase in sales, profitability remained uneven. The unit has a general idea that some of the items are not remunerative. A proper costing system will give the unit a correct picture of the relative profitability of the different products. The following paragraphs explain the approach adopted during the course of the study in arriving at the actual cost incurred by the unit in manufacture of the products along with an outline of the steps the unit will have to take to enhance profitability.

MACHINE UTILISATION AND DETERMINATION OF BOOKED HOURS

The production programme furnished by the unit provides the basis for finding the machinery utilisation ratios and total number of hours for which the machines will be actually engaged (Booked hours) during the year.

The unit's engineer furnished the operation times and the set up times for a batch of 30 motors. The unit has only 3 different batch timings. For this reason, 2, 3, 5 HP motors are grouped together as one batch, 7.5 and 10 HP as another and 12.5, 15 and 20 as the third. As the factory did not function, it was not possible to validate the timings given by the engineer. These have therefore been taken as the basis for computing the following particulars:

- a) The operation time in hours that will be spent in each work centre in manufacture of different products;
- b) The set up time in hours that will be spent in setting up the machines for different operations;
- c) The booked hours being the sum of a & b;
- d) The utilisation factors for the different work centres given by

Total booked hours on a centre

No. of hours available during the year

ASSEMBLY SECTION

The method given above has been applied for the production centres. However, in the assembly section consisting of winding, finishing and assembly, various types of miscellaneous works are done. The value of the individual machines is negligible here.

Accordingly, since the work done is of manual nature, the labour hours required for assembling various products have been taken on the basis of information given by the unit's engineer.

There would be no set-up time in this section and hence the booked hours will be the same as the operation time. The available hours for this section is given entirely by the man-hours of the workers employed in

various jobs. The operation times, booked hours for different work centres with corresponding utilisation factor are given in Appendix V.

MACHINE HOUR/MAN HOUR COSTING

Since the unit under study is a machine shop, with widely different material contents, operation time and set up time for different jobs, a system of machine hour costing has been attempted. All the expenses, variable as well as fixed, are allocated to specified cost centres and the cost per hour at each cost centre is worked out on the basis of total load on the particular cost centre. This load is expressed as machine hours. However, as explained in para above an element of man hour costing is inevitable in the assembly cost centres. The total load in these centres is expressed as man hours.

COST CENTRES

For the purpose of costing, the factory has been divided into 12 cost centres as shown in Appendix V. It can be seen that the 12 lathes have been grouped together to form one cost centre as it is learnt that the work performed on these lathes is freely interchangeable. Similarly, drilling and tapping machines as also the shaping machines have been grouped together.

PROJECTION OF EXPENSES

The total expenses for the factory have been classified into variable and fixed expenses. Variable expenses are those that vary directly with the level of production, eg., electricity, repairs and maintenance, consumable stores, etc. Fixed expenses are items such as wages, depreciation and interest which remain constant at all levels of production. The expenses for the 12 months from April 1983 to March 1984 have been projected on the basis of previous year's financial statements and discussions with the managing partner of the unit. The details of projected expenses are given in Appendix VIII.

ALLOCATION OF EXPENSES

The allocation of variable and fixed expenses to different cost centres is shown in Appendix VI. The basis of allocation is explained below:

(a) ELECTRICITY CHARGES

This is a variable expense and depends on the horse power rating of each machine and the extent of utilisation of the machine. It has been apportioned on the basis of per-centage, weighted product of HP rating and the actual working hours.

(b) MACHINERY MAINTENANCE AND REPAIRS

This depends on the number of years a machine has worked, the number of hours it is used and its cost. It is a variable expense and has been apportioned to the cost centres on the basis of discussion with the engineer.

(c) CONSUMABLE STORES

These variable expenses have been apportioned to different cost centres on the basis of discussion with the store keeper in charge of these items.

(d) WAGES

This has been classified as

- (i) Direct wages of factory workers including Supervisor's salaries;
- (ii) Indirect wages, ie., of office staff.

Direct wages have been treated as fixed expenses and have been apportioned on the basis of the deployment of labour on each machine which has been determined in consultation with the unit. The indirect wages of office staff, have been treated as part of the administrative and general overheads.

(e) RENT

No rent is paid for the factory which is on the unit's own premises. Rent for the residence of the managing partner has been included in the administrative overheads.

(f) DEPRECIATION

This varies with the cost of machines and the number of years they have been used. The basis of allocation has been written down value of each machine; after discussions with the unit, the depreciation has been budgeted individually for each item.

(g) BONUS, PF, ESI, ETC

These costs incurred on behalf of factory workers are fixed costs and have been apportioned to each cost centre on the same basis as the wages.

(h) INSURANCE

This has been budgeted for on the basis of the past years' expenses and allocated amongst cost centres on the basis of the value of machinery.

(i) SERVICE COST CENTRE

There is one service cost centre, viz; the generator which is not being used at all after the casing of the power situation. For a single shift, the unit does not anticipate any need to resort to captive power generation in the year to come. As such only fixed costs such as depreciation and insurance are incurred on this service cost centre. These costs have been re-apportioned on the basis of the electricity consumption amongst the power consuming cost centres only.

(j) ADMINISTRATIVE, FINANCIAL & GENERAL OVERHEADS

This category comprises such expenses as office salaries, bonus, residential rent, P & T, stationery, conveyance, maintenance, interest on borrowings, carriage inward and miscellaneous expenses. These overheads have been apportioned to the production cost centres on the basis of the relative percentages and sub-totals of allocated cost preceding this allocation (ie., sub-total C in Appendix VI).

VARIABLE AND FIXED MACHINE HOUR RATES

The variable machine hour rate for each cost centre has been found by dividing the total variable expenses for each cost centre, by the total operating hours. The fixed machine hour rate for each cost centre has been found by dividing the total fixed expenses allocated to each cost centre by the number

of booked hours. These rates are given in Appendix VI. As the fixed machine hour rates are applicable only to the production programme on hand, these rates will vary as and when the machine loading pattern changes with a revision in the production programme. The variable machine hour rate would remain constant and the fixed machine hour rates would decrease with an increase in turnover levels.

PRODUCT COSTING

The variable machining cost for each component of the motor has been calculated by multiplying the actual operating time at each production cost centre for each component with the variable machine hour rate for that centre and totalling these products for all the centres at which work is done on the component. Similarly the fixed machining cost has been obtained for all the components by multiplying the fixed machine hour rates with the total times (ie., O.T.+set-up time). The machining cost for 2, 3 and 5 HP motor component is presented in Appendix VII. The total cost of each motor has been calculated by adding the raw material cost to the total of the variable and fixed machining costs for the component undergoing process.

Appendix V gives the machine loading for all the proposed components, detailing the O.T. and I.T. for manufacturing.

Appendix VII gives the component wise details of costing. VII-A gives the machining cost involved in making 2, 3.5", 7.5, 10 and 12.5, 15, 20 HP motors. VII-B gives the total product cost for all the different HP motors, the selling prices, contributions and profit/loss on each motor. An addendum to VII B gives the break-even list prices together with suggested list prices for the unit to make profits of 3%, 4% and 5%.

FINANCIAL ANALYSIS AND OPERATING ECONOMICS

FINANCIAL RATIOS AND TREND ANALYSIS

Appendix XI, and Appendix XII give the financial data and the financial ratios respectively of the unit for the past 4 years. Appendix XIV gives the funds flow statement for these four years.

As was mentioned earlier and as is evidenced by the trend analysis in Appendix XIII, there appears to be

no discernible upward or downward in the overall financial and operating picture of the unit. All indicators have registered erratic movements.

Equity has decreased from Rs.7.88 lacs in 1981 to Rs. 6.14 lacs in 1982. It is considered essential to step up the equity base of the unit by ploughing back at least Rs.1.3 lacs of profit likely to materialise by the end of the current financial year. Debt has increased from Rs.11.17 lacs in 1979 to Rs.15.41 lacs in 1982.

Profitability shows a downward trend, perhaps because of the substantial increase in raw material prices without corresponding increase in selling prices.

OPERATING ECONOMICS

PROFITABILITY

The projected profitability statement is presented in Appendix VIII. Against anticipated profits of Rs.2.09 lacs in 1982-83, the projections for 1983-84 anticipate a relatively low profit of Rs.20,800. This is mainly due to increased prices of raw materials. It is however learnt that the unit is contemplating an upward revision of prices by April 1983 which, if instituted, will improve the profit picture substantially.

WORKING CAPITAL REQUIREMENTS

The working capital requirements for the unit for the projected level turnover of Rs.70 lacs in 1983-84 is presented in Appendix X.

Based on inventory control norms suggested in this report, 1.5 months' requirements of raw materials need be financed.

Other requirements have been calculated on the basis of 1 week's work-in-progress, 1 week's finished goods, 1 month's bills and 1/2 month's expenses.

The total working capital requirement is anticipated to be about Rs.12.07 lacs and a limit of Rs.8.00 lacs is suggested. The deficit of Rs.1.31 lacs after providing for sundry creditors and liquid surplus has to be met by profit anticipated in 1982-83.

BREAK-EVEN POINT

A break-even analysis for 1983-84 (Appendix IX) reveals that the unit will break-even at the inordinately high level of 97% of turnover, i.e., at Rs.67.98 lacs of sales. This is again mainly because of the substantial increase in cost of raw materials over the last couple of years without corresponding increase in prices of the finished motors. The contemplated upward revision of selling prices of motors in April 1983 should, however, help improve this situation.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

(a) SALES

The sales turnover for the 12 months from April 1983 to March 1984 is projected at Rs.70,07,000. The break-up of sales of the different types of motors is given in Appendix IV.

(b) INVENTORY CONTROL

- (i) Raw materials: To achieve the projected sales, the unit will require 153 items of raw materials. The total consumption of raw materials at current rate is estimated at Rs.54.70 lacs for the next 12 months out of this an ABC analysis reveals that 11 'A' class items account for 77.5% of the consumption, 18 'B' class items account for 12.9% and the remaining 124 items account for 9.6% classified under 'C'.
- (ii) A suitable inventory control system has been recommended for the 'A' class items and reasonable level of inventory based on observations and discussions has been recommended for 'B' and 'C' class of raw material items.
- (iii) For the 'A' class items, an EOQ system of inventory control has been recommended. The average carry over of raw material

inventory is estimated to be around Rs.688,000 for all items put together.

- (iv) The unit has been advised to discontinue the present practice of clubbing together the various sizes/qualities of the four major 'A' class items (wires, stampings, castings, shaftings) in their stores register and instead maintain separate record of individual items of distinctive size/quality, etc.

(c) SEMI FINISHED AND FINISHED GOODS INVENTORY

Considering the machining/processing times for the different components and the batch quantities, one week's inventory of semi-finished goods is recommended. As for finished goods, a similar period of 1 week will suffice in view of the fact that the unit produces motors only against pending orders.

(d) COSTING

- (i) The unit's operations have been studied on the basis of machine hour costing. Twelve production cost centres and one service cost centre have been identified and the unit's estimated expenses for the next 12 months have been allocated amongst these centres. The cost incurred at the service centre has been further apportioned amongst the production cost centres. The variable and fixed machine hour rates at each of the production centres have been worked out on the basis of timings given by the unit's engineer. These timings could not be validated by actual observations in view of the continuing and total strike in the unit referred to elsewhere. At the assembly section, cost centre alone the basis of costing has been 'man hour' instead of machine hour considering the miscellaneous nature of machinery and minor nature of work done at the centre.

(ii) The following table summarises the major findings in the area of costing:

Product - 1440 RPM	2 HP	3HP	5HP	7.5HP	10HP	12.5HP	15 HP	20HP
List price	865.00	1040.00	1320.00	1720.00	2000.00	2320.00	2800.00	3700
Price less discount	692.00	832.00	1056.00	1376.00	1880.00	1856.00	2240.00	2900
Total cost	728.73	859.19	1004.83	1418.52	1623.69	2073.42	2348.33	2679
Variable cost	631.75	762.21	967.85	1311.49	1516.66	1883.61	2158.52	2480
Contribution	60.00	70.00	148.00	65.00	163.00	- 28.00	81.00	480
Profit/Loss	- 36.73	-27.19	51.17	-42.52	56.31	-214.42	-108.33	289

(e) RELATIVE PROFITABILITY OF PRODUCTS

- (i) As is apparent from table above the unit will be incurring a loss on 5 of the 8 different HP motors manufactured by it, these 5 accounting for nearly 85% of the total sales. It is recommended that the unit revise upwards the prices of the loss making items. For this purpose, a three tier system of prices at 3%, 4% and 5% profitability has been suggested for all the 8 items (Appendix VII B).
- (ii) The utilisation of the machines-at present approximately 60% - if improved, can bring down costs. Contribution on 7 products being positive, it is not necessary to delete any of them from the product mix. However, the unit has to take a second look at its pricing policies and contemplate upward revisions if possible. The 12.5% HP motors providing negative contribution can be deleted from the product mix. If, however, for various reasons it is considered necessary to continue producing it, the management can take a deeper look into the product to identify areas of potential cost reduction.

- (iii) It is also considered essential that the unit review its product mix on a continuing basis.

(f) CAPACITY UTILISATION

It would appear that the unit is working at around 2/3rd of its capacity on the existing machinery. The unit works only one shift a day. It will be advisable for the unit to attempt to work to full capacity with a view to improving its working results. In particular, the unit would be well advised to discontinue the existing system of combined batch timings for machining "2-3-5-", "7.5-10" and "12.5-15-20" HP motor parts. This might involve the installation of a few more items of machinery and possibly the working of a double shift.

(g) FINANCIAL ANALYSIS

A study of the unit's financial data for the past 4 years indicates that there has been no discernible upward trend in its sales. Even the rather erratic sales have not been accompanied by corresponding levels of profitability. The equity base of the unit also calls for urgent strengthening; the unit has been advised to plough back not less than Rs.1.30 lacs from the current year's profits into the business. The unit has also been advised to regulate the workings in the partners drawing account on some basis.

(h) ESTIMATED PROFITS AND WORKING CAPITAL REQUIREMENTS

The profit before tax for the projected sales of Rs.70.07 lacs for the period April 1983 to March 1984 at the existing sales prices, product mix and capacity utilisation is estimated at Rs.21,000. The working capital limits for this level of operations have been assessed at Rs.8 lacs.

(i) LABOUR SITUATION

Throughout the period of the study, the factory remained closed due to a strike by all the workers. The background to the strike is that the factory employs 10 apprentices as against 35 regular workers. When the apprentices enrolled themselves in the workers' union,

the management decided to remove them from service. In protest, the factory workers resorted to a wild cat sit-in-strike from 6.3.1983. The factory has since remained idle and at the moment of writing, both sides seem to be treating the strike as a test of endurance. There does not seem to be any definite prospect of early resumption of activity in the unit. It may be added in this connection that there was also protracted strike in the unit from 9.9.1981 to 6.12.1981, halting production for 3 months. It would therefore appear that the labour situation in the unit requires a close watch, and sensitive handling, so that irritants could be identified and avoided.

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ABC ANALYSIS - CONSUMPTION OF RAW MATERIALSAPPENDIX-I

RAW MATERIALS	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
1	2	3	4	5	6	7	8	9	10	11
1. Super Enamel Wire 18.5 SWG	1178	1364	1600	1779	1203	1258	1364	812	1581	1680
2. 20 SWG	1214	1071	1459	1290	826	857	800	1433	1622	1234
3. Rough Castings	16605	20244	21440	22455	20054	17995	15534	16371	24218	19445
4. Stator Stampings 142 M (5 HP)	2565	2970	3483	3875	2619	2741	2970	1769	3443	3659
5. Stator Stamping 142M (3HP)	2451	2163	2946	2606	1669	1730	1617	2894	3275	2534
6. Super Enamel Wire (17 SWG)	350	640	413	521	534	810	481	631	618	499
7. 142M. Rotor Stamping 5 HP	1539	1782	2090	2325	1571	1644	1782	1061	2066	2195
8. 142 M Rotor Stamping 3 HP	1618	1428	1945	1720	1102	1142	1068	1911	2162	1673
9. Motor Stamping 142 M 7.5 HP	698	1242	737	931	989	1533	815	1222	1164	1009
10. Super Enamel Wire 16 SWG	171	144	324	234	587	209	188	187	163	167
11. Rotor Stamping P.D.C.	468	832	494	624	663	1027	546	819	780	676

RAW MATERIALS	FEBRUARY 12	MARCH 13	TOTAL 14	RATE 15	VALUE 16	S.D.O. 17
				Rs.	Rs.	
1. Super Enamel Wire 18.5 SWG	1469	279	15567	43/-	669381	414
2. 20 SWG	1616	316	13738	43/-	590734	388
3. Rough Castings	21691	10845	226897	2/-	453794	3659
4. Stator Stampings 142M (5 HP)	3199	608	33899	13/-	440687	901
5. Stator Stamping 142 M (3 Hp)	3265	639	27789	13/-	361257	785
6. Super Enamel Wire 17 SWG	667	186	6350	43/-	273050	164
7. 142 M. Rotor Stamping 5 HP	1920	365	20339	13/-	264408	540
8. 142 M Rotor Stamping 3 HP	2156	422	18346	13/-	238503	652
9. Motor Stamping 142 M 7.5 HP	1203	388	11931	13/-	155103	306
10. Super Enamel Wire 16 SWG	153	22	2549	43/-	109607	142
11. Rotor Stamping P.D.C.	806	260	7995	13/-	103935	205
					<u>3660459</u>	<u>77.5%</u>

B.

A B C . ANALYSIS-CONSUMPTION OF RAW MATERIALS

382

RAW MATERIALS	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL	RATE	VALUE	17
													14	15	16	
														Rs.	Rs.	
1. Shefting 13/4"													27181	2.5	67955	
2. Stator Stamping 143 M (10)													4471	13/-	63935	
3. Ball Bearing SKF 6306													2480	22/-	54560	
4. Leather aid Paper													1448	35/-	50680	
5. Ball Bearing 6305													2690	18/-	48420	
6. Ball Bearing MBC 330													2113	22/-	46486	
7. Ball Bearing 6307													1652	26/75	44191	
8. Rotor Stamping 143 M (10)													2944	13/-	42099	
9. Ball Bearing MBC 325													1722	18/-	30996	
10. Super Enamel Wire 21 SWG													618	43/-	26574	
															475896	

 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

B. Contd.

																	475896
11. Ball Bearing																	
SKF 6308																	760 33.50 25460
12. Ball Bearing																	
BI BC 335																	812 25/- 20300
13. Starter Stamping																	
102 M (15)																	1163 16/- 18614
14. Starter Stamping																	
102 M (12.5)																	914 16/- 14624
15. Starter Stamping																	
102M (2)																	1052 13/- 13676
16. Shaftings 17/8"																	5470 2.5 13674
17. Ball Bearing MBC 340																	398 33.50 13333
18. Ball Bearing 6309																	322 40/- 12880

																	608457 12.9%

C. Class Items (124)																	460327 9.6%

SUMMARY	NO. OF ITEMS	VALUE RS.	PERCENTAGE
A	11	36,60,459	77.5%
B	18	6,08,459	12.9%
C	124	4,60,327	9.6%
		47,29,243	100.0%

APPENDIX II

AVERAGE STOCKS CALCULATIONS

No.	Raw materials	Quantity consumed 1982- 83 (3)	Unit Price (4)	Annual Consump- tion 1983- 84 (5)	Average Procurement months consump- tion (6)	Procurement period (7)	Safety stock (8)
1.	Super Enamel wire 18.5 SWG	15567	43	17124	1427	1 month	1086
2.	Super Enamel wire 20 SWG	13738	43	15112	1259	-do-	1017
3.	Stator Stampings 142 M (5)	33899	13	37289	3107	-do-	2362
4.	Stator Stampings 142 M (3)	27789	13	30568	2547	-do-	2058
5.	Super Enamel wire 17 SWG	6350	43	6985	582	-do-	430
6.	Rotor Stampings 142 M (5)	20339	13	22373	1864	-do-	1416
7.	Rotor Stampings 142 M (3)	18346	13	20181	1682	-do-	1710
8.	Stator Stampings 143 M (7.5)	11931	13	13124	1094	-do-	802
9.	Super Enamel Wire 16 SWG	2549	43	2804	234	-do-	372
10.	Rotor Stampings Pt. Diecast	7995	13	8795	733	-do-	537
11.	Ranger castings	226297	2	249586	20799	1/2 month	16789

AVERAGE STOCKS CALCULATIONS-CONTD.

S. NO.	Raw Materials	EOQ	MOQ	LEAD TIME CONSUMPTION	AVERAGE STOCK	ORDER RATES		
						VALUE	ORDER LEVEL	OQ
1	2	9	10	11	12	13	14	15
1.	Super Enamel Wire 18.5 SWG	89	1000	1427	1586	68198	2513	1000
2.	Super Enamel Wire 20 SWG	84	1000	1259	1517	65231	2276	1000
3.	Stator Stampings 142 M (5)	239	2000	3107	3362	43706	5469	2000 (M)
4.	Stator Stempings 142 M (3)	217	2000	2547	3547	46111	5605	2000 (M)
5.	Super Enamel Wire 17 SWG	57	500	582	680	29240	1110	500 (M)
6.	Rotor Stamping 142 M (5)	186	2000	1864	2416	31408	3832	2000 (M)
7.	Rotor Stamping 142 M (3)	176	2000	1682	3710	48230	3392	2000 (M)
8.	Stator Stampings 143 M (7.5)	142	2000	1094	1802	23426	2604	2000 (M)
9.	Super Enamel Wire 16 SWG	36	500	234	622	26746	999	500 (M)
10.	Rotor Stampings Pt. Diecast	116	1000	733	1233	16029	1770	1000 (M)
11.	Ranger Castings	1580	2000	20799	17789	35576	34578	2000 (M)
				"A"		433903		
				"B"	18 Items	101409		2 Months
				"C"	124 Items	153442		4 Months
						688754		

APPENDIX III

ABC ANALYSIS OF SALES

No.	Product	Sales during 1982-83 in Qty.	Rate per unit	Sales in Value	% of total sales
1	2	3	4	5	6
1	3 HP Motor OT 1440 RPM	2160	1040	2246400	27.15
2	5 HP Motor OT 1440 RPM	2068	1320	2729760	33.00
3	7.5HP Motor OT 1440 RPM	422	1720	725840	8.78
4	3 HP TEFC 1440 RPM	362	1050	380100	4.60
					<u>77.93 (A)</u>
5	5 HP TEFC 1440 RPM	265	1335	364805	4.40
6	Non-STD 3HP 2880 RPM	132	1300	172600	2.08
7	5 HP OT 960 RPM	101	1760	177760	2.15
8	7.5 HP OT 960 RPM	88	2100	184800	2.23
9	10 HP 1440 RPM CT	83	2100	174300	2.10
10	2 HP TEFC 1440 RPM	69	1120	77280	0.93
11	7.5 HP TEFC 1440 RPM	68	1735	117980	1.42
12	5 HP 9 TEFC 960 RPM	62	1775	110050	1.33
13	10 HP OT 960 RPM	56	2820	157960	1.91
14	NON STD 2 HP 2880 RPM	45	1100	49500	
15	7.5 HP TEFC 960 RPM	35	2120	74200	
16	10 HP TEFC 1440 RPM	26	2120	76320	
17	2 HP TEFC 960 RPM	18	1120	20160	
18	3 HP TEFC 960 RPM	18	1340	24120	
19	3 HP OT 960 RPM	17	1325	22525	

... contd.

APPENDIX III contd.

1	2	3	4	5	6
20	10 HP TEFC 960 RPM	17	2840	43280	
21	15 HP TEFC 1440 RPM	14	2840	39960	
22	15 HP OT 1440 RPM	12	2800	33600	
23	12.5 HP 1440 RPM	11	2320	25520	
24	12.5 960 RPM OT	11	3200	<u>35200</u>	7.92%
25	15 HP OT 960 RPM	11	3920	43120	
26	12.5 HP TEFC 1440 RPM	11	2335	25685	
27	20 HP TEFC RPM	11	3750	41250	
28	5 HP 2880 RPM	11	1650	18150	
29	2 HP CT 960 RPM	10	1100	11000	
30	2 HP 2880 RPM TEFC	5	920	4600	
31	3 HP TEFC 2880 RPM	5	1060	5300	
32	15 HP TEFC 960 RPM	5	3960	19800	
33	5 HP 2880 RPM TEFC	4	1475	5900	
34	3 HP 960 RPM	4	1500	6000	
35	20 HP OT 1440 RPM	3	3700	11100	
36	20 HP TEFC 1440 RPM	2	3750	7500	
37	12.5 HP TEFC 960 RPM	2	3250	6500	
38	10 HP 2880 N.STD.	2	2250	4500	
39	7.5 HP 2880 RPM	2	1735	3470	
	Total sales as per list price			<u>8272695</u>	
	Less 22 1/2 % discount			<u>2001871</u>	
	Net sales			<u>6270824</u>	

APPENDIX IV

PRODUCT MIX AT PROPOSED LEVEL OF OPERATIONS
1983-84

Name			Quantity
3 HP	1440	RPM	2376
5 HP	"	"	2275
7.5 HP	"	"	464
10 HP	"	"	92
12.5 HP	"	"	12
15 HP	"	"	14
20 HP	"	"	4
2 HP OT	960	"	11
3 HP	"	"	19
5 HP	"	"	110
7.5 HP	"	"	97
10 HP	"	"	62
12.5 HP	"	"	12
15 HP	"	"	12
2 HP TEFC	1440	"	76
2 HP	2830	"	6
3 HP TEFC	1440	"	398
3 HP	2880	"	6
5 HP TEFC	1440	"	291
5 HP	2880	"	5
7.5 HP TEFC	1440	"	75

APPENDIX IV contd.

Name			Quantity
7.5 HP	2880	RPM	2
10 HP TEFC	1440	"	29
12.5 HP	"	"	12
15 HP	"	"	16
20 HP	"	"	3
3 HP	960	"	5
2 HP TEFC	"	"	20
3 HP	"	"	20
5 HP	"	"	68
7.5 HP	"	"	38
10 HP	"	"	19
12.5 HP	"	"	2
15 HP	"	"	6
20 HP	"	"	12
2 HP NON.STD	2880	"	50
3 HP	"	"	145
5 HP	"	"	12
10 HP	"	"	3
			6879

MACHINE LOADING MATRIX - BATCH QUANTITY 30

APPENDIX V 391

		1		2		3		4		5	
		Lathes		Drilling & Tapping		Shaping		Cutting		Keyway Milling	
		M1		M2		M3		M4		M5	
		OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
Motor Body	2,3,5 HP	29	32	12	13 1/2	13 1/2	15				
	7.5, 10 HP	29	32	9 1/4	10 1/2	13 1/2	15				
	12.5, 15, 20 HP	46 3/4	52	24 1/2	27	21 1/2	24				
Motor Cover	2,3,5 HP	21	24	5 1/2	6						
	7.5, 10 HP	22 1/4	25	5 1/2	6						
	12.5, 15, 20 HP	48 1/2	54	8	9						
Motor Cover Caps	2,3,5 HP	13 1/2	15	4	4 1/2						
	7.5, 10 HP	18	20	5 1/2	6						
	12.5, 15, 20 HP	24 1/2	27	5 1/2	6						
Starter Stampings	2,3,5 HP										
	7.5, 10 HP										
	12.5, 15, 20 HP										
Rotor Stampings	2,3,5 HP										
	7.5, 10 HP										
	12.5, 15, 20 HP										
Total	304 3/4	339	79 3/4	88 1/2	48 1/2	54					

TT = Total Time
 OT = Operating Time

ALLOCATION OF EXPENSES AMONG COST CENTRES - CONTO.

392

1	2	3	M6 RMT GRINDER	M7 HYDRAULIC	M8 ASSEMBLY	M9 WINDING	M 10 COMPRESSOR	M 11 CLEARANCE	M 12 TESTING	GENERATOR
			10	11	12	13	14	15	16	17
<u>1. Fixed Expenses</u>										
	Direct Wages	No. of Men	7882	8089	5867	37680	34687	2579	3228	
2.	Depreciation	Value of Machine	5550	580	-	-	249	498	333	3396
3.	Insurance	-do-	779	81	-	-	35	70	46	476
4.	Bonus	No. of Men	904	928	673	4321	3978	296	370	-
5.	Provident & Other Funds	-do-	786	807	585	3757	3459	257	322	-
	Sub Total A		15901	10485	7125	45758	42408	3700	4299	3872
<u>Variable Expn.</u>										
6.	Electricity	HP Hours	1470	-	-	-	2627	-	240	-
7.	Repairs	& Value	341	155	-	-	197	29	18	-
8.	Consumable Stores	Total Time (OT)	790	3476	1563	11237	10343	770	770	-
9.	Sub Total B		2601	3631	1563	11237	13167	799	1028	-

ALLOCATION OF EXPENSES AMONG COST CENTRES

APPENDIX VI

393

Sl. No.	Items of Expenditure	Basis for an allocation	Budget for 1984	M1 Lathes 12	M2 Drilling & Tapping	M3 & Shaping Machine	M4 Cutting Machine	M5 Keyway Machine
1	2	3	4	5	6	7	8	9
<u>Fixed Expenses</u>								
1.	Direct Wages	No. of Men	180500	60042	10453	8059	729	1205
2.	Depreciation	Value of Machine	28500	11680	2900	994	249	2071
3.	Insurance	-do-	4000	1640	407	140	35	291
4.	Bonus	No. of Men	20700	6885	1199	924	84	138
5.	Provident & Other Funds	-do-	18000	5988	1042	804	73	120
	Sub-Total A		2517000	86235	16001	10921	1170	3825
<u>Variable Expenses</u>								
6.	Electricity	HP Hours	13200	5198	2189	1184	49	243
7.	Repairs	& Value	12000	10347	694	151	7	61
8.	Consumable Stores	Total Time (OT)	46100	11404	3090	1942	322	393
	Sub Total B		71300	26949	5973	3277	378	697

ALLOCATION OF EXPENSES AMONG COST CENTRES - CONTD.

394

1	2	3	RMT M6 GRINDER	HYDRAULIC M7 PRESS	ASSEMBLY M8	WINDING M9	COMPRESSOR M10	CLEARANCE M11	TESTING M12	GENERATOR
			10	11	12	13	14	15	16	17
	A + B		18502	14116	8688	56995	55575	4499	5398	3872
9.	Service Cost Centres	Electricity consumed	431	-	-	-	771	-	71	-
	Sub Total C		18933	14116	8688	56995	56346	4499	5398	-
10.	Financial Administrative & General Overheads	Sub Total	C 25433	18963	11671	76564	75692	6044	7252	-
	Total Expenses		44366	33079	20359	133559	132036	10543	12650	
12.	Total Variable Expenses	B	2601	3631	1563	11237	13167	799	1028	
13.	Total Fixed Expenses	A+9+10	41765	29448	16796	122322	118871	9744	11622	
14.	Total operation hours	Total Hours	1293	5580	2501	20078	18483	1376	1376	
15.	Variable Machine hour rate	O.T.	2.01	.65	.63	.56	.71	.58	.75	

ALLOCATION OF EXPENSES AMONG COST CENTRES - CONTD.

395

1	2	3	M6 RMT GRINDER	M7 HYDRAULIC PRESS	M8 ASSEMBLY	M9 WINDING	M 10 COMPRESSOR	M 11 CLEARENCE	M 12 TESTING	GENERATOR
			10	11	12	13	14	15	16	17
16.	Total Booked Hours	TT	1411	6210	2793	20078	18483	1376	1376	-
17.	Fixed Machine hour rate		29.60	4.74	6.73	6.09	6.43	7.08	8.45	-
18.	Utilisation Factor		58.79	129.37	-	139.43	-	57.33	57.33	-

ADMINISTRATIVE OVERHEADS

Bonus	9000
Rent	8000
Office Salaries	51400
Printing & Stationery	55400
Conveyance	15000
Interest	111800
Carriage Inward	15000
Misc. Expenses	168300
	<u>433900</u>

MACHINE COST COMPONENTS - 2,3,5 HP MOTORS

APPENDIX VII

		M1	M2	M3	M4	M5	M6	M7	M8	M9	M 10	M11	M12	Total
Motor Body	Fixed Costs	12.66	3.83	4.44										20.93
	Variable Costs	1.42	.50	.47										2.39
	Total	14.08	4.33	4.91										22.32
Motor Cover	Fixed Costs	9.50	1.70											11.20
	Variable Costs	1.03	.23											1.26
	Total	10.53	1.93											12.46
Stator Stampings	Fixed Costs							3.79						3.79
	Variable costs							.47						.47
	Total							4.26						4.26
Rotor Stampings	Fixed Costs	1.98						.47						2.45
	Variable costs	.22						.06						.28
	Total	2.20						.53						2.73
Shaftings	Fixed Costs	4.35			.48	1.43	5.92							12.18
	Variable costs	.49			.05	.10	.37							1.01
	Total				.53	1.53	6.29							13.19
Assembly	Fixed Costs								2.69	16.24	17.15	1.42	1.70	39.20
	Variable Costs								.23	1.34	1.70	.11	.14	3.52
	Total								2.92	17.58	18.85	1.53	1.84	42.72
		38.24	7.71	4.91	.53	1.53	6.29	4.79	2.92	17.58	18.85	1.53	1.84	106.72

PRODUCT COSTING -- MACHINE COST FOR EACH MOTOR

APPENDIX VII A

	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8	M 9	M 10	M 11	M 12	Total
2, 3, 5 HP Fixed Costs	34.42	6.82	4.44	.48	1.43	5.92	4.27	2.67	16.24	17.15	1.42	1.70	96.98
Variable cost	3.82	.87	.47	.05	.10	.37	.52	.25	1.42	1.89	.12	.15	10.11
Total	38.24	7.69	4.91	.53	1.53	6.29	4.80	2.94	17.73	19.04	1.54	1.85	107.09
7,5,10 HP Fixed Costs	36.79	6.44	4.43	.47	1.43	5.91	4.26	2.69	24.36	17.14	1.42	1.69	107.03
Variable cost	4.10	.86	.47	.05	.10	.37	.53	.25	2.24	1.89	.12	.14	11.12
Total	40.89	7.30	4.90	.52	1.53	6.28	4.79	2.94	26.60	19.03	1.54	1.83	118.15
12,5,15,20 HP Fixed Costs	62.85	11.93	7.10	.60	3.41	15.79	5.19	5.38	48.72	25.72	1.42	1.70	189.81
Variable cost	7.00	1.61	.75	.07	.23	.98	.64	.45	4.48	2.84	.12	.14	19.31
Total	69.85	13.54	7.85	.67	3.64	16.77	5.83	5.83	53.20	28.56	1.54	1.84	209.12

PRODUCT COSTING FOR DIFFERENT 1440 RPM MOTORSAPPENDIX VII B

	2 HP	3 HP	5 HP	7.5HP	10 HP	12.5 HP	15 HP	20 HP
1. Raw Materials	532.93	655.14	786.38	1167.01	1356.78	1694.90	1948.41	2230.11
2. Packing Materials	14.49	14.49	14.49	14.49	14.49	14.49	14.49	14.49
3. Diecasting Charges - Rotors	23	26	32	42	46	60	67	80
4. Carriage outwards	25.27	25.27	25.27	25.27	25.27	25.27	25.27	25.27
5. Commission on Sales	25.95	31.20	39.60	51.60	63	69.60	84	111
6. Machining cost variable	10.11	10.11	10.11	11.12	11.12	19.35	19.35	19.35
A. Tool Variable Cost	631.75	762.21	907.85	1311.49	1516.66	1883.61	2158.52	2480.22
7. Machining Cost Fixed	96.98	96.98	96.98	107.03	107.03	189.81	189.81	189.81
B. Total Cost	728.73	859.19	1004.83	1418.52	1623.69	2073.42	2348.33	2670.03
8. Selling Price : List Price	865	1040	1320	1720	2100	2320	2800	3700
9. price Less Discount Net Selling Price	692	832	1056	1376	1680	1856	2240	2960
10. Contribution (9-A)	60	70	148	65	163	28	81	480

PRODUCT COSTING FOR DIFFERENT 1440 RPM MOTORS -- CONTD.

	2 HP	3 HP	5 HP	7.5 HP	10 HP	12.5 HP	15 HP	20 HP
11. Profit/Loss (9-8)	36.73	27.19	51.17	42.54	56.31	217.42	108.33	289.97
12. Break even List Price (assuming 20% Disc.)	910.91	1073.99	1256.04	1773.15	2029.61	2591.78	2935.41	3337.54
13. Suggested price for a profit of 3%	* 939.08	1107.20	1294.88	1827.99	2092.38	2671.93	3026.20	3440.76
14. " 4%	948.86	1118.74	1308.37	1847.03	2114.18	2699.77	3057.72	3476.60
15. " 5%	958.85	1130.51	1322.14	1866.47	2136.43	2728.18	3089.91	3513.20

*The underlying assumption is that the product mix remains the same.

APPENDIX VIII

STATEMENT OF PROFITABILITY FOR THE YEAR 1983-84

	Rs.	Rs.
1. Sales		70,07,500
2. Raw materials	54,70,500	
3. Direct wages & supervision	1,80,500	
4. Bonus	20,700	
5. Consumable stores	46,100	
6. Electricity	13,200	
7. Repairs & Maintenance	12,000	
8. Rent - residential	8,000	
9. Office staff salary & bonus	60,400	
10. Postage, telephone & stationery	55,400	
11. Conveyance & vehicle maintenance	15,000	
12. Miscellaneous expenses:		
a) Insurance	4000	
b) PF, ESI, etc	18000	
c) Carriage inward	15000	
d) Carriage outward	173800	
e) Packing	99700	
f) Commission on sales	346300	
g) Lie casting charges	139500	
h) Others	168300	
	-----	9,64,600
13. Depreciation	28,500	
14. Interest on cash credit	1,11,800	

15. Total cost of production (2 to 14)	69,86,700	
		69,86,700

16. Net profit before tax		20,800

MACHINE LOADING MATRIX - FUTURE PRODUCTION

APPENDIX VIII A

	1		2		3		4		5		6		7		8		9		10		11		12	
	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT
2,3,5 HP 5893	15322	17090	4223	4714	2652	2946	422	491	540	589	1080	1179	4764	5303	-	2357	-	15714	-	16714	-	1179	1080	1179
7.5, 10 HP 881	2460	2731	595	660	396	440	66	73	80	88	162	176	712	792	-	352	-	3524	-	2349	-	176	162	176
12.5,15,20HP 105	550	556	133	147	75	84	10	11	22	25	51	56	104	115	75	84	-	840	-	420	-	21	19	21
6879	18282	20397	4951	5521	3723	3470	518	575	642	702	1293	1411	5580	6210	75	2793	-	20078	-	18483	-	1376	1261	1376
Total Hours	28800		7200		4800		2400		2400		2400		4800		14400		2400		2400		2400		2400	
Utilization Factor	71%		77%		72%		24%		29%		59%		129%		139%		57%		57%		57%		57%	
Fixed Machine Hourrate	11.87		8.52		8.88		5.71		14.34		29.6		4.74		6.73		6.09		6.43		7.08		8.48	
Variable Machine Hour Rate	1.47		1.27		1.05		.73		1.09		2.01		.65		.63		.66		.71		.58		.75	

MACHINE LOADING MATRIX - BATCH QUANTITY 30

	Grinding M6		Hydraulic Press M7		Assembly M8		Winding M9		Compressor M10		Clearance M11		Testing M12							
	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT	OT	TT						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14						
Stator																				
Stamping 2,3,5 HP						21/2	24													
7.5,10 HP						21/2	24													
12.5, 15, 20HP						27	30													
Rotor																				
Stampings 2,3,5 HP						2	3/4	3												
7.5, 10 HP						2	3/4	3												
12.5,15,20 HP						2	3/4	3												
Shaftings																				
2,3,5 HP			2 1/4	2 1/2	2 3/4	3	5/2	6												
7.5, 10 HP			2 1/4	2 1/2	2 3/4	3	5/2	6												
12.5,15,20 HP			2 3/4	3	6/4	7	14/2	16												
Assembly																				
2,3,5 HP							10 3/4	12	72	80	72	80	5/2	6	5/2	6				
7.5,5,10							10 3/4	12	108	120	72	80	5/2	6	5/2	6				
12.5,15,20 HP							21/2	24	216	240	108	120	5/2	6	5/2	6				
Total ...			7 1/4	8	11	3/4	13 2 1/2	28	78 1/4	87	43	48	396	440	252	280	16 1/2	18	16 1/2	18

APPENDIX IX

BREAK-EVEN LEVEL OF OPERATION

No.	Description	Value in rupees
	Annual sales for 1984	70,07,000
1.	Raw materials	54,70,000
2.	Other variable expenses	8,31,700
	Total variable expenses	<u>63,01,000</u>
3.	Margin of contribution	7,06,000
4.	Total fixed expenses	6,85,000
5.	Break even point $\left| \frac{4}{3} \right|$	97 %
	ie., $\frac{\text{Fixed expenses}}{\text{Margin of contribution}}$	
6.	Break even sales	67,98,000
7.	Monthly sales for B.E.P.	5,66,000

ASSESSMENT OF WORKING CAPITAL REQUIREMENTS

Average monthly sales - anticipated	Rs. 584,000
Cost of production	Rs. 582,000
Raw materials	Rs. 456,000

	Rs.	Permissible limit Rs.	Working Capital required Rs.
Raw materials (as per inventory control	688,000		
LESS margin 25%	172,000		
	-----	516,000	688,000
Work in process - 1 week	145,500		
LESS margin 33 1/3%	48,500		
	-----	97,000	145,500
Finished goods 1 week	145,500		
LESS margin 33 1/3%	48,500		
	-----	97,000	145,500
Bills - 1 month	584,000		
LESS margin 15%	87,600		
	-----	497,400	582,000
Expenses 1/2 month		-	63,000
		-----	-----
		1207,400	1624,000
Sundry creditors for purchase	456,000		
Liquid surplus	237,000		
Limits recommended:			
Lock & key	250,000		
Mundy type	200,000		
Bills	350,000		
	800,000		
	-----		1493,000

DEFICIT			131,000

Deficit is to be met by capitalising a portion of the projected profits of about Rs. 209,000 for the year ending 31.3.1983. This would ensure that the equity base of the unit is strengthened adequately so that the ratio of equity to the projected sales of Rs. 70,07,000 will fall within the Bank's norms.

FINANCIAL DATA

	1979	1980	1981	1982	1983
1. Total debt	1117	1443	1360	1541	
2. Equity + Reserves	604	694	788	614	
3. Current Assets	1313	1713	1777	1778	
4. Current liabilities	1117	1443	1360	1541	
5. Net profit	336	332	70	17	209
6. Net sales	5544	6674	4548	4233	6271
7. Annual consumption of raw materials	4055	5287	3345	2740	4805
8. Sundry debtors	342	567	701	705	
9. Sundry creditors	335	534	526	637	
10. Total assets	1721	2137	2148	2155	
11. Fixed assets	380	345	320	304	
12. Total capital employed	419	309	366	121	
13. Value added	1153	1055	1133	1476	1257
14. Total investment	1070	1223	1257	1138	

APPENDIX XII
APPENDIX XII

1979 FINANCIAL RATIO BASE YEAR 1979

	1979	1980	1981	1982	1983
1. Total debt/equity	185%	208%	173%	251%	-
2. Current assets/current liabilities	117.5%	118.5%	130.6%	116.9%	-
3. Net profit/sales	6.06%	4.98%	1.54%	0.40%	3.3%
4. Fixed assets to total capital employed	90.69%	111.67%	87.4%	251%	-
5. Value added/total investment	107.7%	86.26%	90.13%	129.7%	-

APPENDIX XIII

TREND ANALYSIS - BASE YEAR 1979

		1979	1980	1981	1982	1983
1. Sales	5544	100	120	82	76	113
2. Current assets	1313	100	130	135	135	-
3. Current liabilities	1117	100	129	122	138	-
4. Equity + Reserves	604	100	115	130	102	-
5. Gross profit	1256	100	115	86	71	88
6. Bank borrowings	466	100	114	101	112	-
7. Overhead expenses	971	100	90	100	130	96
8. Sundry debtors	265	100	195	254	212	-
9. Sundry creditors	--	100	159	158	190	-

ANNEXURE XIV

FUNDS FLOW STATEMENT

	1979-80	1980-81	1981-82
	(Rupees in thousands)		
Increase in bank borrowings	63	-	55
Increase in sundry creditors	199	-	111
Increase in expenses	-	-	23
Increase in loans	94	-7	-
Increase in capital	90	94	-
Decrease in inventory	-	-	134
Decrease in sundry debtors	-	-	-
Decrease in fixed assets	35	25	16
Decrease in other miscellaneous assets	160	82	-
Decrease in cash & bank balances	-	34	-
	641	242	339
Decrease in bank borrowings	-	60	-
Decrease in sundry creditors	-	8	-
Decrease in expenses	30	22	-
Decrease in loans	-	-	28
Decrease in capital	-	-	144
Increase in inventory	364	18	-
Increase in sundry debtors	225	134	4
Increase in other miscellaneous assets	-	-	40
Increase in cash & bank balances	22	-	123
	641	242	339

BHARAT TYRE AND RUBBER PRODUCTS

BRIEF HISTORY OF THE UNIT

The unit is engaged in the manufacture of various types of rubber products and has the essential know how for running an industry of this nature. The proprietor after having undergone training at the Imperial Chemical Industries Laboratories, has furthered his knowledge by studying the rubber industry in Japan and Malaysia. As such, the unit is now in a position to cater to the needs of various customers including Government and public sector undertakings. Besides undertaking job works like retreading of truck, car, jeep and scooter tyres, the unit also undertakes the manufacture of various rubber products as per design and specifications of customers, a fair percentage of such products being import substitution items which call for high degree of sophistication in technique and workmanship. Given below is a list of a few major items made by the unit and the customers for whom they are made:

- | | | | |
|--------|--------------------------------------------------|---|--------------------------------------------------------|
| (i) | Dredger suction hose | - | Port Trusts |
| (ii) | Fenders | - | Hindustan Shipyard |
| (iii) | Conveyor Diocs | - | Vizag Port Trust, NMDC |
| (iv) | Rubber lining for
metallic pipes
and tanks | - | Coromandel Fertilizers
Limited |
| (v) | Neoprene Rubber Gaskets- | - | Hindustan Shipyard |
| (vi) | Non-skid lined matting | - | -do- |
| (vii) | Expansion Joints | - | Coromandel Fertilizers
Limited, Vizag
Port Trust |
| (viii) | Cable connectors | - | M/s Allied Industries |
| (ix) | Vulcan coupling | - | Tuticorin Port Trust |

PREMISES

The unit is situated in the plots of the Industrial Estate, which area has been acquired from the State Industrial Infrastructure Corporation at a cost of Rs.1,50,000/-.

MACHINERY

The total cost of the machinery installed in the unit is Rs.219,000 all of which are wholly owned by the company.

PERSONNEL

The break-up of the personnel employed in the unit is as follows:

Production Manager	-	1
Office Manager	-	1
Foreman	-	1
Office clerk	-	1
Skilled, semi-skilled and unskilled workers	-	18

Total		22

POWER AND FUEL

The unit has six machines which run on electricity as per the break-up given below:-

Mixing mill	-	40 HP
Air compressor	-	3 HP
Solution mixture	-	1.5 HP
Water feeding pump	-	1.5 HP
Tyre buffing machine	-	3 HP
Flexible shaft grinder	-	1 HP

In addition to the above power, an average of 400 litres of oil are required per day to run the two vertical cross tube boilers for production of steam.

FINANCE

The unit has, at present, been afforded two facilities, the hypothecation and the outward bill facilities, the limits for which as on date are Rs.50,000 and Rs.100,000 respectively. The position of the accounts as on 13.3.1983 were as under:

	<u>Limit</u>	<u>D.P.</u>	<u>Outstandings</u>
Hypothecation	Rs.50,000	Rs. 50,000	Rs.174,033.58
Outward bill	Rs.100,000	Rs. 17,820	Rs. 9,279.91

The primary security for the hypothecation facility are stocks of raw material, stocks in process and finished goods, and for the bill facility, the receivables. The collateral security is in the form of pledge of the

unit's machinery valued at Rs.219,000. The unit has also promised to mortgage the land and building once the purchase of the same from the State Industrial Infrastructure Corporation is registered.

RAW MATERIALS

With the exception of natural rubber which has to be procured from Kerala, the rest of the raw materials are available locally and within the State. The purchase of the same does not pose any problem.

PAST PERFORMANCE

The sales of the unit have been showing steady increase over the years. However, there was a dip in the year 1982-83 when the unit failed to receive some of the bulk orders it normally did every year. The big orders have been resumed this year thus leaving no cause for concern.

INVENTORY CONTROL

The raw material requirement of the unit has been studied in detail and it is apparent that the unit has to stock 62 varieties of raw materials required for production, not taking into account the various raw materials purchased as and when required. On flipping through the stock register which the unit maintains, it was evident that the consumption of certain items was much higher than most others. The annual consumption of all raw materials was worked out and an AB analysis of the same revealed that 10 items out of 62 (refer Appendix I) accounted for 85% of the annual consumption, these items were labelled as 'A' class items.

On the basis of the annual consumption of 1982-83, the annual consumption for 1983-84 was worked out keeping in view a 7% and 20% increase in the price of carbon black and corde repairs fabric respectively and a general 10% increase in consumption of raw materials following a 10% increase in sales. On the basis of the projected annual consumption, the following were then ascertained for 'A' class items of raw materials (Appendix II).

(i) Lead time consumption

(ii) Monthly standard deviation σ_1

$$\sigma_1 = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}}$$

where \bar{X} = average monthly consumption
 X = monthly consumption
 n = number of months for which data was collected and used, ie. 12

(iii) Monthly standard deviation for projected annual consumption (for 1983-84)

$$\text{ie., } \sigma_2 = \sigma_1 \sqrt{\frac{A_2}{A_1}}$$

where A_2 = annual consumption for 1983-84
 A_1 = annual consumption for 1982-83

(iv) Safety stock for each item of 'A' class raw materials

$$\text{Safety stock} = K \times \sigma_2 \times \sqrt{L}$$

where K = 2.5
 σ_2 = as mentioned above.
 L = lead time expressed in months.

(v) Economic order quantity (EOQ) for the ten raw materials.

$$\text{EOQ} = \sqrt{\frac{2Aa}{ic}}$$

where A = Annual consumption in rupees (1983-84)
 a = cost of ordering = Rs. 2
 i = inventory holding cost = Rs. 0.20
 c = cost of raw material/unit.

(vi) The minimum order quantity by discussions with the unit. This would be minimum amount of any raw material that could be ordered at a particular time. Column 11 of Appendix III indicates the MOQs in the major items of R.M. It may be noticed that only one item namely vulcanising solution can be ordered as per EOQ while for the rest, the order quantity will be MOQ.

(vii) Reorder level: This is the level of stocks at which an order has to be placed. Reorder levels have been fixed at a level equal to safety stock plus lead time consumption.

(viii) Average inventory: With implementation of the inventory systems suggested in this study the average level of inventory holding is likely to be of the order of Rs.29,400 in the ensuing year. Average inventory has been determined using the formula

$$\text{Average inventory} = \text{safety stock} + \frac{\text{O.Q.}}{2}$$

In the case of 'B' class items, safety stocks of 1 month and order quantity of four months' requirements are suggested. Average inventory holdings thus, are likely to be about 3 months' requirements in the case of 'B' class items.

COSTING

A detailed costing exercise was undertaken to determine the costs, contribution and profits of a few major items made by the unit. The method of costing adopted was machine hour costing, an overview of which, follows:

IDENTIFICATION OF COST CENTRES

For purposes of the above study, the factory was divided into 13 production centres, 3 service centres and 6 unbooked centres. Appendix VI gives the detailed break-up of the various cost centres.

COMPONENT MACHINE COSTING MATRIX

The main pre-requisite for drawing up a component machine loading matrix is the projection of product mix for the ensuing year. However, the nature of the unit is such that it survives entirely on job orders and as such no definite product-mix could be identified. Appendix IV and V provide adequate indication to the varied nature of sales effected during 1982-83. Hence, for drawing up the component machine loading matrix pending (firm) orders on hand and projections of a few repetitive kinds of job works have been used. Appendix VII gives the estimated product mix for 1983-84.

Appendix VIII gives the component machine loading matrix for the envisaged production in the ensuing year. The following is the explanation of the terminology used in the Appendix.

O.T. - Operating time is the time taken at a cost centre to process the product mix, ie., it is the time during which the machine is in operation.

T.T. - Total time is the actual time that a product books a cost centre, ie., it is the total set up time and operating time.

Utilisation factor is the anticipated utilization of a cost centre for the envisaged product mix and is given by the formula

$$\text{Utilisation factor} = \frac{\text{Total booked hours}}{\text{Total available hours}}$$

Available hours have been calculated on the basis of an 8 hours single shift operation of the factory over a period of 300 days in a year. After allowing 100 hours for breakdown, etc., the total available hours for each machine has been taken as 2300 hours.

ALLOCATION OF EXPENSES

As mentioned earlier the sales of the unit have been projected at Rs.8.51 lacs for the ensuing year and a projected profitability statement has been drawn up (Appendix XII).

Prime costs have first been segregated and all remaining expenses have been categorized as either

- a) Costs allocable to cost centres, or
- b) Costs non-allocable to cost centres.

Costs allocable to cost centres are mainly production overheads and these overheads have been separated into fixed and variable overheads and allocated amongst the various cost centres on a logical basis as possible (Appendix IX). The basis of allocation of various expenses are outlined:

WAGES

The budgeted expenditure for wages has been apportioned according to the number of men working at each cost centre.

BONUS AND PROVIDENT FUND AND E.S.I.

These are apportioned in the same manner as wages.

SUPERVISORY SALARIES

This has been allocated to various cost centres depending on the amount of supervisory attention deemed necessary at each.

INSURANCE AND DEPRECIATION

These have been apportioned according to the value of machinery installed at each cost centre.

POWER

This expense has been apportioned on the basis of the ratio of weighted product of horse power and running hours of each cost centre.

FUEL

Fuel has been apportioned among the machines which work on steam on the basis of discussions held with the unit.

CONSUMABLE STORES, REPAIRS AND MAINTENANCE

These expenses have been apportioned on the basis of discussions with the unit.

The fixed and variable expenses allocated to service centres have thus been apportioned to production centres on the basis of the sub-totals arrived at consequent to the above. Further, the entire chunk of non-allocable expenses have been termed financial, administrative and general overheads and have been apportioned to production centres on the basis of the sub-totals arrived at after apportioning service centre expenses.

CALCULATION OF FIXED AND VARIABLE MACHINE HOUR RATES

After the allocation of expenses to cost centres, the fixed and variable machine hour rates for cost centres have been worked out as follows:

$$\text{Fixed machine hour rate} = \frac{\text{Total fixed expenses}}{\text{Total booked hours}}$$

$$\text{Variable machine hour rate} = \frac{\text{Total variable expenses}}{\text{Total operating hours}}$$

PRODUCT COSTING

With the hour rates calculated as mentioned above, major items of pending and repetitive type orders were costed in order to gauge costs contribution of various items. Appendix X gives an overview of the costing exercise.

Variable cost of machining a product has been arrived at in the following manner:

The operating times taken by the product at different cost centres have been multiplied with the respective variable machine hour rates of the cost centres and the variable costs thus arrived at for machining at each centre, have been aggregated to give total variable cost of machining/processing.

A similar exercise has been carried out to determine the total fixed costs of machining/processing a product, using total booked hours and fixed machine hour rates.

The total cost of a product is then raw material (prime) cost plus the variable and fixed costs of machining. Appendix X-A summarises the findings of the costing exercise.

As is evident, four products, namely cable connectors male & female, and retreading the scooter and car/jeep tyres result in losses. It is also of interest to note that contribution on scooter tyres is negative implying that the unit not only fails to cover its fixed expenses on the retreading of these tyres but also incurs more expenditure on variable costs.

Hence, it is suggested that the unit discontinues retreading of scooter tyres. A major factor, contributing to the incidence of high variable costs, is the boiler which is oil fired. It may be worthwhile

for the unit to explore possibilities of converting this boiler into a coal fired one. Whereupon variable expenses are likely to come down drastically.

The other three loss-incurring products need not necessarily be deleted from the product mix as their contributions towards fixed expenses are positive. This is in the light of the part that the machines available with the unit are under-utilised and as such the unit can still minimise losses by taking up more products on a marginal cost basis.

OPERATING ECONOMICS

Break-even analysis (Annexure XII) based on the projected sales of Rs.8.51 lacs Appendix XII and the projected profit and loss account. The break-even point has been worked out at Rs.7.10 lacs sales or 83.5% of production.

WORKING CAPITAL ASSESSMENT

The average inventory of A and B class items in future is likely to be Rs.29,400/- as per the inventory control norms suggested in this report. The requirement against stocks in process has been estimated at 10 days' stocking of goods at cost of production, which would be raw material plus value added at peak level.

In the case of finished goods, the unit does not need to stock for long period in view of the fact that most of the works undertaken are job orders of a small nature. In the case of big orders like dredger hoses, fenders, conveyor discs, belts, etc., the finished goods have to be stocked until the entire order is executed and hence it is envisaged that 15 days' stocking against finished goods may be necessary. The requirement as per the assessment works out to Rs.83,200 and after maintaining a margin of 25%, against raw materials and 40% against stocks in process and finished goods, a permissible limit of Rs.54,330 has been arrived at.

A study of the realisation of bills has revealed that it takes about 30 days for a bill to be realised (Appendix XVI) and hence finance is to be afforded in the form of an outward bill limit on the monthly average sales after retaining a margin of 10%.

The following limits are recommended:

- | | |
|-----------------------------|-----------|
| a) Mundy type limit of | Rs.55,000 |
| b) Outward bill facility of | Rs.65,000 |
| c) Inward bill limit of | Rs. 5,000 |

as a sub-limit under the mundy type account to enable the unit to make advance payments to suppliers of certain raw materials.

FINANCIAL ANALYSIS

A study of the unit's balance sheets and profit and loss accounts for the years ended 1980, 1981, and 1982 has been made (Refer Appendix XIV) through ratio analysis, trend analysis and funds flow analysis.

SOME SALIENT RATIOS

TOTAL DEBT/EQUITY PLUS RESERVES

The capital invested in the unit has shown a declining trend with the proprietor withdrawing more funds than the profit made. The borrowings from the bank have also risen.

CURRENT ASSETS/CURRENT LIABILITIES

Though the bank borrowings have increased from Rs.91,000 in 1981 to Rs.140,000 in 1982, there has been no corresponding increase in the current assets reflecting the utilisation of these funds for purchase of fixed assets.

FIXED ASSETS TO CAPITAL EMPLOYED

This ratio also clearly reflects that the fixed assets have increased without any increase in the capital thus showing that the only other source, i.e., Bank Finance (W.C) has been used for purchase of fixed assets.

TREND ANALYSIS & FUNDS FLOW STATEMENT

A cursory glance at the financial ratios, trend analysis and the funds flow statement Appendix XIII reveals that the diversion of funds from working capital finance has been towards purchase of miscellaneous assets and not towards plant and machinery which action may not be to the health of the unit.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

INVENTORY CONTROL

According to an AB analysis of raw materials consumed by the unit, 10 out of 62 items accounted for nearly 85% of annual consumption and were labelled as 'A' class items. The remaining have been marked as 'B' class items.

Detailed inventory norms have been suggested for 'A' class items (Appendix III) and ad-hoc systems for 'B' class items.

Average inventory likely to be held by the unit on adoption of the system suggested in this report is Rs.29,400.

COSTING

An exercise on machine hour costing reveals that four of the unit's pending orders are loss incurring items. A summary of their costs is given below:

Product	Projected production (No.)	Selling Price	R.M.	V.C.	F.C.	T.C.	contribution	Profit/Loss
(Rupees)								
1. Cable connector (Male)	2600	12350	5840	3725	5075	14040	3385	-1690
2. Cable connector (Female)	2600	9750	5200	3125	5075	13400	1425	-3650
3. Retreading car/ jeep tyres	405	40500	25820	11367	26522	63807	3213	-2309
4. Retreading scooter tyres	93	3534	22230	3159	7544	2933	-1855	-9399

Though the first three items are losing, their contribution towards fixed expenses is positive and since machine utilisation at the unit is rather low, it is not considered necessary to delete these products from the product-mix. However, the retreading of scooter tyres has necessarily to be deleted as contribution from the same is negative.

It is advised that the unit explore the possibilities of converting the oil fired boiler into a coal fired one in order that variable expenses - currently at a high level are brought down.

FINANCIAL ANALYSIS

An analysis of the unit's financial position, vide balance sheets over the past three years, reveals that short term funds have been utilised in acquiring non-current assets which indication is considered unhealthy for the unit.

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APPENDIX I

ANALYSIS OF CONSUMPTION OF RAW MATERIALS
OF 'A' CLASS ITEMS

Sl. No.	Particulars of Raw Materials	Quantity in Kgs.	Unit price Rs.	Annual consumption value	Cumulative consumption value
1.	Natural Rubber Creep	2432	7.00	17,204	17,204
2.	Carbon Black	2023	7.50	15,172	32,196
3.	Natural Rubber R.M.A.	1700	8.50	14,450	46,646
4.	Corde Repair Fabric	57 Rolls	200.00	11,400	58,046
5.	Chemlock 220	13 Kgs.	750.00	9,750	67,796
6.	Reclaim Rubber	2735	2.60	7,111	74,907
7.	Vulcanising solution	750 Ltrs.	8.50	6,375	81,282
8.	Cotton Duck	1½ Rolls	3893.00	5,840	87,122
9.	Neoprene Rubber	77 Kgs.	35.00	2,695	89,817
10.	China Clay	3766	0.65 P.	2,447	92,264
	<u>'B' Class items</u>	Kgs.	Rs.		85%
11.	Zinc Oxide	278.8	7.00	1,952	94,216
12.	Nitrile Rubber	32.5	32.00	1,040	95,256
13.	Magnesium Oxide	61.4	15.00	921	96,177
14.	Process Oil	90	10.00	900	97,077
15.	Chemlock 205	1.5	500.00	750	97,827
16.	Whiting Powder	1110	0.65 P.	722	98,549
17.	Stearic Acid	100.5	6.50	653	99,202
18.	Pine Tar	97.4	6.00	584	99,786
19.	Forcal S	225.5	2.50	564	1,00,350

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APPENDIX I (Contd)

1.	2.	3.	4.	5.	6.
20.	Calcium Silicate	120	3.95	474	1,00,824
21.	Ebonite Dust	112.80	4.20	471	1,01,295
22.	Vulcstab D. Paste	50	8.80	440	1,01,735
23.	M.E.K.Solvent	22 Ltrs.	17.00	374	1,02,109
24.	Titanium Dioxide	22.5 Kgs	13.50	304	1,02,413
25.	Desmodur R.	4.2 Ltrs.	63.00	283	1,02,696
26.	Butyle Rubber	15.5	17.00	+ 264	1,02,960
27.	Aluminium silicate	80	2.75	220	1,03,180
28.	Styrene Pitele	113	1.50	169	1,03,349
29.	Cushion compound	5 Tons	45.00	225	1,03,574
30.	Petroleum Jelly	20.5	8.00	164	1,03,738
31.	Calcium Carbonate	80	2.00	160	1,03,898
32.	D.O.P	5.5	11.00	61	1,03,959
33.	Boiler Cure	11	4.50	50	1,04,009
34.	Parafin Wax	20	2.30	46	1,04,055
35.	Micropere N 80	2	22.00	44	1,04,099
36.	NA 22	.5	85.00	42	1,04,141
37.	Colours Red	200 Grs.			
88.	" Green	435 "	44.45	42	1,04,183
39.	" Blue	600 "			
40.	" Yellow	400 "			
		----- 1635 Grs. -----			

APPENDIX I (Contd)

1.					
41.	Vulcafer	MBTS	18.500		
42.	-do-	MBT	23.340		
43.	-do-	DBG	11.000		
44.	-do-	TMT	14.530	21.60	3,780 1,07,963
45.	-do-	DHE	10.000		
46.	-do-	F	2.600		
47.	-do-	H.P.S.	25.850		
48.	-do-	B.A.			
			<u>105.820</u>		
49.	Nonex	- BL	59.200		
50.	-do-	B.Rods	9.675		
51.	-do-	D	14.750	14.40	1,296 1,09,259
52.	-do-	S.P.	7.000		
			<u>90.625</u>		
53.	Vulcatal	Ch.	8.5	4.30	37 1,09,296
54.	Chalk	Powder	30	1.00	30 1,09,326
55.	Bytrytes		15	1.00	15 1,09,341
56.	Triotheonamin		1 Kg.	8.00	8 1,09,349
57.	Red Oxide		.5 Kg	15.00	8 1,09,357
58.	Polykin TR.	Resin	1 Kg.	7.00	7 1,09,364
59.	Lithophore		3 Kgs.	3.00	9 1,09,373
60.	Sulpher		1.17	2.60	3 1,09,376
61.	Sodium Bicar		N.L	-	-
62.	Rubber Latex				

APPENDIX II

DISTRIBUTION PATTERN OF RAW MATERIALS CONSUMPTION FOR THE YEAR 1982-1983

(A-Class items only)

Sl. No.	Name of the Raw material	Rate per unit	April 1982	May 1982	June 1982	July 1982	August 1982	September 1982
1.	Natural Rubber creep	7.00/kg.	134	276	317	290	-	50
2.	Carbon Black	7.50/kg.	90	191	100	77	200	55
3.	Natural Rubber RMA	8.50/kg.	50	100	148	52	150	205
4.	Corde Repair Fabric	Rs.200/Roll	3	7	-	-	-	2
5.	Chemlock	Rs.750/kg.	-	1	2	-	-	4
6.	Reclaimed Rubber	2.60/kg.	256	179	300	385	195	70
7.	Vulcanising Solution	8.50/litre	25	200	50	-	50	150
8.	Cotton Duck	Rs.3893/Roll	-	-	0.5	-	-	0.5
9.	Neoprene Rubber	Rs.35/K.G.	13	4	12	15	-	5
10.	China Clay	0.65 kg.	355	339	327	275	250	340

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APPENDIX II (Contd).

Sl. No.	Name of the Raw Material	October 1982	November 1982	December 1982	January 1983	February 1983	March 1983	Total qty.	Annual consumption in Rs.
1.	Natural Rubber Creep	240	220	515	225	-	165	2,432	17,024 -
2.	Carbon Black	140	105	315	310	175	265	2,023	15,172 -
3.	Natural Rubber RMA	200	195	50	170	140	240	1,700	14,450 -
4.	Corde Repair Fabric	5	15	25	-	-	-	57	11,400 -
5.	Chemlock	2	-	2	1	-	1	13	9,750 -
6.	Reclaimed Rubber	165	155	160	320	255	295	2,735	7,111 -
7.	Vulcanising Solution	25	75	175	-	-	-	750	6,375
8.	Cotton Duck	-	-	-	0.5	-	-	1.5	5,840 -
9.	Neoprene Rubber	-	-	16	2	-	10	77	2,695 -
10.	China Clay	340	270	300	305	365	300	3,766	2,447
Total value									92,264

VALUE OF RAW MATERIALS - PROJECTED FIGURES FOR 'A' CLASS ITEMS ONLY:-

Sl. No.	Name of the Raw material	Units	Projected annual consumption in units.	Rate per unit in Rs.	Projected value of annual consumption in Rs.	Lead time in months	Lead time consumption in units	Standard Deviation of LTC(6 σ) $\sqrt{\frac{A2}{A1}}$
1	2	3	4	5	6	7	8	9
1.	Natural Rubber Creep	KG	3040	7.00	21,280 -	0.66	168	163.
2.	Carbon Black	"	2225	8.00	17,800 -	0.33	61	94.4
3.	Natural Rubber RMA	"	2125	8.50	18,062 -	0.66	117	73
4.	Corde Repair Fabric	Roll	63	240.00	15,120 -	0.66	3.3	-
5.	Chemlock.	Litres	14	750.00	10,500 -	0.66	0.6	1.26
6.	Reclaimed Rubber	KG	3419	2.60	8,889 -	0.50	146	98.4
7.	Vulcanising Solution	Litres	825	8.50	7,013 -	0.50	35	76
8.	Cotton Duck	Roll	2	3893.00	7,786 -	0.66	-	-
9.	Neoprene Rubber	KG	96	35.00	3,360 -	0.66	5.3	6.7
10.	China Clay	"	4143	0.65	2,693 -	0.66	228	37.8

APPENDIX III (Contd.)

Sl. No.	Name of the Raw material	Safety stock Kg/T	E.O.Q. in units	R.O.Q. in units	R.O.L. (S.S.+ LTC) in units	Average inventory in units SS + OQ/2	Average inventory in rupees.	Remarks
1	2.	10	11	12	13	14	15	16
1.	Natural Rubber Creep	330	93	250	498	455	3,185 -	
2.	Carbon Black	134	75	250	195	259	2,072 -	7% increase in rate is expected.
3.	Natural Rubber RMA	148	71	250	265	273	2,320 -	
4.	Corde Repair Fabric	12	2.2	10	15.3	17	4,080 -	20% increase in rate is expected.
5.	Chemlock.	2.56	0.61	5	3.2	5	3,750 -	
6.	Reclaimed Rubber	173	162	250	335	254	660 -	
7.	Vulcanising Solution	133	44	24	168	155	1,318 -	
8.	Cotton Duck	0.5	1	1	-	1	3,893 -	
9.	Neoprene Rubber	14	7.4	50	18.9	39	1,365 -	
10.	China Clay	77	357	2060	304.5	1077	700 -	
							23,343	

Notes: (i) Increase in cost of raw materials over last year's consumption works out to 21.9%

(ii) Considering the future level of production, requirement of rubber of various varieties is stepped up by 25% of consumption during last year. In the case of other items an increase of 10% is required to be maintained.

(iii) Lead time Consumption, and E.O.Q. etc. are not calculated for 4 & 8 in view of their low consumption.

Basis : -
Discussion
with the
unit

APPENDIX IV

ANALYSIS OF SALES - PRODUCTION JOBS

(FROM 1.4.1982 TO 31.3.1983)

Sl. No.	Type of Product	Sale Value	Cumulative sale value
1	2	3	4
1.	Dredger Suction Hoses	93,418 -	93,418
2.	Rubber Discs	62,622 -	1,56,040
3.	Neoprin Rubber Gaskets	41,623 -	1,97,663 -
4.	Conveyor Belts	26,100 -	2,23,763 -
5.	Non skid rubber mattings	23,648 -	2,47,411 -
6.	Expansion Joints	22,650 -	2,70,061 -
7.	Cable Connectors	20,049 -	2,90,110
8.	Rubber 'O' Rings	18,010 -	3,08,120
9.	Rubber Packing	14,892 -	3,23,012 -
10.	Rubber Packing Strip	14,649 -	3,37,661 -
11.	Bushes	13,326 -	3,50,987
12.	Rubber Rings for Ball & Sockets	8,190	3, 59,177 -
13.	Rubber Sleeves	6, 840 -	3,66,017 -
14.	Rubber spools	4,200 -	3,70,217 -
15.	Rubber Washers	4,734 -	3,74,951 -
16.	Rubber buffer rings for import idlers	3,626 -	3,78,577 -
17.	Rubber Compound	3,123 -	3,81,700 -
18.	Rubber cell lock strip	3,038 -	3,84,738 -
19.	Vulcanising blow impire	2,828 -	3,87,566 -
20.	Rubber Cock	2,475 -	3,90,041 -
21.	Rubber below for scrubber pump	2,424 -	3, 92,465 -
22.	-do- for stand pipe jump	2,136 -	3,94,601

APPENDIX IV (Contd.)

1.	2.	3.	4.
23.	Rubber bedding & bedding	1,976 -	3,96,577 -
24.	Rubber radiator hose	1,822 -	3,98,399 -
25.	Rubber bucket seal	1,720 -	4,00,119 -
26.	Rubber Diaphragms	1,621 -	4,01,740 -
27.	Rubber Cups	1,474 -	4,03,214 -
28.	Coupling Pads	1,309 -	4,04,523
29.	Chair boots	1,108 -	4,05,631
30.	Rubber Blocks	928 -	4,06,559 -
31.	Spacers	837 -	4,07,396 -
32.	Rubber tyres for castorwheels	700 -	4,08,096 -
33.	Rubber impellor	600 -	4,08,696 -
34.	Rubber link mat	570 -	4,09,266 -
35.	Rubber ferrules	550 -	4,09,816 -
36.	Rubber Pully	490 -	4,10,306 -
37.	Rubber x - bushes	320 -	4,10,626 -
38.	Rubber Plugs	151 -	4,10,777
39.	Rubber Oil crasher boot	41 -	4,10,819 -
		<u>4,10,819 -</u>	
	Total of job works as per Appendix V	<u>3,43,635 -</u>	
	Total Sales	<u>7,54,454 -</u>	

APPENDIX V

ANALYSIS OF SALES - JOB WORKS
 (FROM 1.4.1982 to 31.3.1983)

Sl. No.	Type of Product	Sale Value	Cumulative Sale Value
1.	Miscellaneous Job Works	1,13,581 -	1,03,581 -
	RETREADING		
2.	Truck Tyres	1,86,120 -	2,89,701 -
3.	Car/Jeep Tyres	40,400 -	3,30,101 -
4.	Scooter	3,534 -	3,33,635 -
		-----	3,43,635
		3,43,635 -	-----

APPENDIX VI

IDENTIFICATION OF COST CENTRES & AVAILABLE MACHINE HOURS

Sl. No.	Description of Machinery	Cost Centre No.	Value of Machine (Rs.)	Available machine hours	Basis
1	2	3	4	5	6
1.	Resoling machine 9.00 x 20	1	3,621.00	4,800	1. It is assumed that the unit works for 300 days in the coming year (from 1.4.83 to 31.3.84). 2. The unit works one shift per day at 8 hours per shift. 3. Available machine hours 300x8=2400 Less allowance for break-down = 100 ----- 2300 -----
2.	9.00 x 20 Retreading machine		10,208.50		
3.	7.00 x 16 machine with one matrix x 6.00 x 16(Jeep)	2	2,693.00	2,400	
4.	7.00 x 16 Lody Type Machine with 2 Matrix 5.90 x 15 & 6.40 x 15	3	6,650.00	2,400	
5.	Tyre Rolling machine	4	1,000.00	2,400	
6.	Tyre Buffing machine	5	1,000.00	2,400	
7.	12.00 x 20 machine with 2 matrices 10 x 20 & 11 00 x 20	6	6,115.00	2,400	
8.	3.50 x 10 Lody type scooter machine with two matrices	7	2,210.00	2,400	
9.	Segment machine & matrix 14.00 x 12.00	8	3,800.00	2,400	
10.	Mixing Mill with reduction gear & 40 HP Motor	9	34,000.00	2,400	
11.	Solution mixing drum with 3 HP Kirloskar Engine		1,201.00		

APPENDIX VI (Contd)

1.	2	3	4	5	6-
12.	Steam hand ply moulding press 12" x 12"		1,339.00		
13.	-do- 12" x 12"		1,545.00		
14.	A/B 4 Nos. -do-	10	6,000.00	12,000	
15.	A/B 2 Nos. -do-		3,000.00		
16.	Hand fly press for cutting with one H.P. Motor		4,046.00		
17.	24" x 24" Steam Mould Press 2 Nos.	11	6,250.00	2,400	
18.	28' Long vulcanising chamber with loose inner guides.	12	11,266.00	2,400	
			<u>1,05,944.50</u>		
19.	Fenner Vertical cross Tube Boilers 2 Nos.	1	20,255.00	2,400	
20.	Air Compressor	2	4,074.00	2,400	
21.	Welding machine 350 Amp.220/ 440	3	1,500.00	2,400	
22.	Vulcanising Chamber		10,200.00		
23.	Truck Tyre Changing machine	U n b o o k e d C e n t r e	2,214.65		
24.	Calendering machine with 3 designed rollers 2 1/2 HP Motor		4,800.00		
25.	71"x71" Steam Press		18,000.00		
26.	Vertical vulcanising chambers 2 Nos.		3,800.00		
27.	Vulcanising Machine		1,556.85		
			<u>1,72,345.00</u>		
	Value of other items of machinery not listed in detail		46,655.00		
	Total value		<u>2,19,000.00</u>		

APPENDIX VII

LIST OF PENDING ORDERS AND PROPOSED SALES
 INCLUSIVE OF RETREADING & JOB WORKS.

Sl. No.	Name of the Product	Quantity	Rate Rs. P.	Sale value Rs.	Raw mate- rial value Rs.	Gross margin of con- tribution
<u>Production Items</u>						
1.	Dredger Suction Hoses	15	7200-	1,08,000	60,000	48,000
2.	Fenders 308 x 150 x 2100 MM	25	3650 -	91,250	37,500	53,750
3.	Fenders 400 x 200 x 3000 MM	12	4800 -	57,600	21,600	36,000
4.	Rubber Discs	10850	7.50	81,375	43,400	37,975
5.	Expansion Joints 18"	5	5000 -	25,000	9,000	16,000
6.	Cable Connectors Male	2600	4.75	12,350	5,840	6,510
7.	Cable Connectors Female	2600	3.75	9,750	5,200	4,550
8.	Miscellaneous Pro- duction items			1,13,000		
				4,98,325		
<u>Job Works</u>						
1.	Retreading Tyres - Truck	871	240 -	2,09,040	1,25,400	83,640
2.	Retreading Jeep/Car	405	100 -	40,500	25,920	14,580
3.	Retreading Scooter	93	38 -	3,534	2,230	1,304
4.	Other Miscellaneous Job Works			1,00,000	-	
Total				8,51,399	3,36,090	

COMPONENT MACHINE LOADING MATRIX

Sl. No.	Product	Quantity	Batch Quantity	C1	C2	C3			
				1. Resolling machine 900x20 with 3 matrix 9.00x20; 8.25x20; and 7.50x20.	2. 9.00 x 20 Re- treading machine.	7.00 x 16 machine with one matrix 6.00 x 16.	(Jeep)	7.00 x 16. Lody Type machine with 2 matrix 5.90 x 15 and 6.40 x 15.	
				O.T.	T.T.	O.T.	T.T.	O.T.	T.T.
1.	Dredger Suction Hoses	15	1						
2.	Tenders 308x150x2100 M.M.	25	1						
3.	Tenders 400x200x3000 M.M.	12	1						
4.	Rubber Discs	10850	30						
5.	Expansion Joints 18"	5	1						
6.	Cable Connectors Male	2600	40						
7.	Cable connectors Female	2600	40						
8.	Retreading Truck Tyres	871	1	217.45	290.20				
9.	Retreading Car/Jeep Tyres	405	1	101.15	135.00	607.30	810.00	90.00	100.00
10.	Scooter Tyres	93	1	23.15	31.00				
	Total			342.15	456.20	607.30	810.30	90.00	100.00
				4600			2300		2300
				9.9%			35%		4.3%

Sl. No.	Product	C 4		C5		C6		C7		C8	
		O.T.	T.T.	O.T.	T.T.	O.T.	T.T.	O.T.	T.T.	O.T.	T.T.
	Tyre rolling machine										
	Tyre Buffing machine										
	12.00 x 20 machine with 2 matrices										
	10.00 x 20; and 11.00 x 20.										
	3.50 x 10 Lady Type scooter machine with two matrices										
	Segment machine and matrix										
	14.00 x 12.00										
1.	Dredger Suction Hoses										
2.	Tenders 308x150x2100 M.M.										
3.	Tenders 400x200x3000 M.M.										
4.	Rubber Discs										
5.	Expansion Joints 18"										
6.	Cable connectors Male										
7.	Cable connectors Female										
8.	Retreading Truck Tyres	145.00	217.45	580.00	725.00	1742.00	2177.30			50.00	70.00
9.	Retreading Car/Jeep tyres	67.30	101.15	202.30	270.00						
10.	Scooter Tyres	15.30	23.15	31.00	46.30			108.30	155.00		
	Total	228.00	342.15	813.30	1041.30	1742.00	2177.30	108.30	155.00	50.00	70.00
			2300		2300		2300		2300		2300
			14.8%		45%		94.6%		6.7%		3%

Sl. No.	Product	C9	C10	C11	C12	C13					
	1. Mixing mill with Reduction gear and 40 H.P. Motor.	O.T.	T.T.								
	2. Sglution Mixing Drum with 3 H.P. Kirloskar Engine.										
	1. Steam Hand fly Moulding press 12x12	O.T.	T.T.								
	2. -do- 12x12										
	3. A/B 4 Nos. -do-										
	4. A/B 2 Nos. -do- 12x12										
	5. Hand fly press for cutting with one HP Motor.										
	1. 24" x 24" Steam Mould press - 2 Nos.	O.T.	T.T.								
	2. 28 feet long vulcanising chamber with loose inner guides.	O.T.	T.T.								
	Assembling section.	O.T.	T.T.								
1.	Dredger Suction Hoses	60.00	67.30		45.00	60.00	2100.00	2389.30			
2.	Fenders 308x150x2100 M.M.	150.00	175.00		100.00	125.00	1250.00	1500.00			
3.	-do- 400x200x3000 M.M.	72.00	84.00		48.00	60.00	600.00	720.00			
4.	Rubber Discs	162.00	202.00	1534.00	1696.00		1172.00	1496.00			
5.	Expansion Joints 18"	2.30	5.00			7.30	10.00	200.00	225.00		
6.	Cable connectors male	40.00	48.00	320.00	420.00	600.0	676.0				
7.	Cable connectors Female	40.00	48.00	320.00	420.00						
8.	Retreading Truck Tyres										
9.	-do- Car/Jeep Tyres										
10.	Scooter Tyres										
		526.30	629.30	2174.00	2536.00	600.00	676.0	200.30	255.00	5322.00	6330.30
		370.30	720.30	2492.00	3464.00	600.00	676.0	-	-	2025.00	2625.00
		897.00	1350.00	4666.00	6000.00	600.00	676.0	200.30	255.00	7347.00	8955.30
			2300		11600		2300		2300		14400
			59%		5.2%		29%		11%		62%

Service Centre 1	Service Centre 2	Service centre 3	Unbooked centre
<p>Ferror Vertical Cross TubeBoilers 2 Nos.</p>	<p>Air compressor</p>	<p>Welding machine 350 AMP 220/440</p>	<p>1.Vulcanising Chamber 2.Truck tyre changing machine 3. Calendering machine with 3 designed roller 2 1/2 HP Motor 4. 71" x 71" Steam press. 5. Vertical vulcanis- ing chambers 6. Vulcanising machine</p>

APPENDIX IX

ALLOCATION OF EXPENSES FOR THE BUDGETTED LEVEL OF PRODUCTION

Sl. No.	Item of Expenditure	Basis	Budget- ted ex- penditure	C1	C2	C3	C4	C5	C6
<u>A. Fixed Expenditure</u>									
1.	Wages	No. of men	49,000	2,450	1,200	1,250	2,450	1,250	600
2.	Insurance	Value of machinery	1,500	100	50	50	--	--	50
3.	Salaries	No. EMP	23,200	700	700	700	500	500	500
4.	Bonus, P.F. & E.S.I.	-do-	17,300	980	540	540	980	540	270
5.	Depreciation	Value of machinery	16,000	1,000	400	400	400	400	400
Sub Total I			1,07,000	5,230	2,890	2,940	4,430	2,690	1,820
<u>B. Variable Expenditure</u>									
1.	Power	H.P. & Running hours	8,600	--	--	--	--	516	--
2.	Fuel	Discussion	81,000	--	4,000	4,000	--	--	20,000
3.	Consumable Stores	with unit	36,000	500	500	500	500	500	1,000
4.	Repairs & Maintenance		6,000	200	100	100	200	200	100
Sub Total II			1,31,600	700	4,600	4,600	700	1,216	21,100
ADD Sub Total I			1,07,000	5,230	2,890	2,940	4,430	2,690	1,820
<u>Service Cost centres</u>									
Fixed			13,990	396	494	497	358	288	1,673
" Variable			15,446	489	564	558	380	289	1,786
			2,68,036	6,815	8,548	8,595	5,868	4,483	26,379

APPENDIX IX (Contd.)

1.	2.	3.	4.	C1	C2	C3	C4	C5	C6
			2,68,036	6,815	8,548	8,595	5,868	4,483	26,379
			4,350	124	167	148	139	78	541
			2,72,386	6,939	8,715	8,743	6,007	4,561	26,920
Financial Admn. & General overheads			1,64,000	4,770	5,990	6,009	4,129	3,135	18,503
Total Expenses:- Rs.			4,36,386	11,709	14,705	14,752	10,136	7,696	45,423
Total Fixed Expenses			1,07,000	5,230	2,890	2,940	4,430	2,690	1,820
Add. overheads			1,64,000	4,770	5,990	6,009	4,129	3,135	18,503
Service Cost Centres - Fixed				396	494	497	358	288	1,673
Unbooked Centres				124	167	148	139	78	541
Total Fixed Expenses			2,71,000	10,520	9,541	9,594	9,056	6,191	22,537
Total Variable Expenses			1,31,600	1,189	5,164	5,158	1,080	1,505	22,886
Total Operation hours				342.25	607.5	90	228.00	813.5	1742.00
Total Booked Hours				456.33	810.00	100	342.25	1041.5	2177.5

1.	2.	C7	C8	C9	C10	C11	C12	C13	SC1	SC2	SC3	Unbooked Centre
A. Fixed Expenditure												
1.	Wages	600	1,300	7,350	4,900	1,200	2,450	14,700	6,000	1,000	300	-
2.	Insurance	50	50	300	50	50	50	50	200	50	50	350
3.	Salaries	500	500	4,000	4,000	500	4,000	4,000	1,000	500	500	-
4.	Bonus, PF & ESI	270	540	2,240	2,160	540	980	4,830	1,300	450	140	-
5.	Depreciation	400	400	3,000	1,100	400	800	400	1,600	400	500	4,000
	Sub Total I	1,820	2,790	16,890	12,210	2,690	8,280	23,980	10,100	2,400	1,490	4,350
B. Variable Expenditure												
1.	Power	-	-	7,138	-	-	-	-	258	516	172	-
2.	Fuel	2,000	1,000	-	25,000	5,000	20,000	-	-	-	-	-
3.	Consumable Stores	500	500	15,000	500	500	500	3,000	9,000	1,000	2,000	-
4.	Repairs & Maintenance	100	100	1,000	200	500	700	-	2,100	200	200	-
	Sub Total II	2,600	1,600	23,138	25,700	6,000	21,200	3,000	11,358	1,716	2,372	-
	Add Sub Total I	1,820	2,790	16,890	12,210	2,690	8,280	23,980	10,100	2,400	1,490	4,350
		4,420	4,390	40,028	37,910	8,690	29,480	26,980	21,458	4,116	3,862	4,350
	Service Cost Centres											
	Fixed:	592	289	2,662	2,542	573	1,946	1,880	-	-	-	-
	-do- Variable:	347	324	2,960	2,905	667	2,181	1,996	-	-	-	-
		5,159	5,003	45,650	43,357	9,930	33,607	30,856	21,458	4,116	3,862	4,350
	Unbooked Centres:-	99	91	849	794	181	577	562	-	-	-	-
		5,258	5,094	46,499	44,151	10,111	34,184	31,418	21,458	4,116	3,862	4,350
	Financial, Admn. & General overheads	3,614	3,501	31,961	30,347	6,950	23,496	21,595	-	-	-	-
	Total Expenses : Rs.	8,872	8,595	78,460	74,498	17,061	57,680	53,013	21,458	4,116	3,862	4,350

APPENDIX IX (Contd)

Sl. No.	Item of Expenditure	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
	Total Fixed Expenses							1820	2790	16890	12210	2690	8280	23980
	Add overheads							3614	3501	31961	30347	6950	23496	21595
	Service cost Centres-fixed							392	289	2662	2542	573	1946	1880
	Unbooked centres							99	91	849	794	181	577	562
	Total Fixed Expenses							5925	6671	52362	45893	10394	34299	48017
	Total variable expenses							2947	1924	26098	28605	6667	23381	4996
	Total operation hours							108.5	50	897.00	4666.0	600	200.5	7347.0
	Total booked hours							155.0	70	350.00	6000.0	676	255.0	8955.5
	Fixed Machine hour rate	23.05	11.77	95.94	26.46	5.94	10.35	38.22	95.30	38.78	7.65	15.37	134.50	5.36
	Variable Machine Hour rate	3.47	9.50	57.31	4.74	1.85	13.14	27.16	39.43	29.09	6.13	11.11	116.61	0.68
	Utilisation factor %	9.9	35	4.3	14.8	45	94.6	6.7	3	59	52	29	11	62

Notes: (1) Fixed Machine Hour Rate = $\frac{\text{Total Fixed Expenses}}{\text{Total Booked Hours}}$

(2) Variable Machine Hour Rate = $\frac{\text{Total Variable Expenses}}{\text{Total Operation Hours}}$

(3) Utilisation Factor = $\frac{\text{Total Booked Hours}}{\text{Total available hours}}$ (Expressed as a %)

PRODUCT COSTING BY MACHINE HOUR COSTING METHOD

Sl. No.	Machine Centre	Quantity	Cost centre No.	Operation time in hrs.	Set up time in hours.	Total time in hours	Variable machining cost/hour.	Fixed machining cost/hour.	Variable machining in (Rs.) 5 x 8	Fixed machining rate in Rs. 7 x 9
1	2	3	4	5	6	7	8	9	10	11
1.	<u>Dredger Suction Hoses</u>	15								
	i. Mixing Mill		9	60	7 1/2	67 1/2	89.09	38.78	1,745.40	2,617.65
	ii. Vulcanising Chamber		12	45	15	60	116.61	134.50	5,247.40	8,070.00
	iii. Assembling Section		13	2100	289 1/2	2389 1/2	-.68	5.36	1,428.00	12,807.72
									8,420.80	23,495.37
2.	<u>Fenders 308x150x2100 M.M</u>	25								
	i. Mixing Mill		9	150	25	175	29.09	38.78	4,363.50	6,786.50
	ii. Vulcanising Chamber		12	100	25	125	116.61	134.50	11,661.00	16,812.50
	iii. Assembling Section		13	1250	250	1500	-.68	5.36	850.00	8,040.00
									16,874.50	31,639.00
3.	<u>Fenders 400x200x3000 MM</u>	12								
	i. Mixing Mill		9	72	12	84	29.09	38.78	2,094.48	3,257.50
	ii. Vulcanising Chamber		12	48	12	60	116.61	134.50	5,597.28	8,070.00
	iii. Assembling Section		13	600	120	720	-.68	5.36	408.00	3,859.20
									8,099.76	15,186.70
4.	<u>Rubber Discs (361 per batch)</u>	10850								
	i. Mixing Mill		9	162	40	262	29.09	38.78	4,712.60	7,833.60
	ii. Steam hand ply moulds.		10	1534	162	1696	6.13	7.65	9,403.40	12,974.40
	iii. Assembly Section		13	1172	324	1496	0.68	5.36	797.00	8,018.60
									14,913.00	28,726.60

1.	2.	3	4	5	6	7	8	9	10	11
<u>5. Expansion Joints 18"</u>		5								
i.	Mixing Mill	9	2 1/2	2 1/2	5	29.09	38.78		72.72	193.90
ii.	Vulcanising Chamber	12	7 1/2	2 1/2	10	116.61	134.50		874.57	1,345.00
iii.	Assembling Section	13	200	25	225	0.68	5.36		136.00	1,206.00
									1,083.29	2,744.90
<u>6. Cable Connectors (Male) 2600</u> (40 per batch)										
i.	Mixing Mill	9	40	8	48	29.09	38.78		1,163.60	1,861.45
ii.	Steam Hand ply moulds	10	320	100	420	6.13	7.65		1,961.60	3,213.00
									3,125.20	5,074.45
<u>7. Cable Connectors</u> (Female) (40 per batch)		2600								
i.	Mixing Mill	9	40	8	48	29.09	38.78		1,163.60	1,861.45
ii.	Steam Hand ply moulds	10	320	100	420	6.13	7.65		1,961.60	3,213.00
									3,125.20	5,074.45
<u>8. Retreading: Truck Tyres</u>		871								
i.	Tyre buffing machine	5	580	145	725	1.85	5.94		1,073.00	4,806.50
ii.	Resoling machine	1	217.75	72.58	290.33	3.47	23.05		755.60	6,692.10
iii.	Tyre Rolling Machine	4	145	72.75	217.75	4.74	26.46		687.30	5,761.66
iv.	Machine with Matrix	6	1742	435.5	2177.5	13.14	10.35		22,889.88	22,537.12
v.	Segment Machine	8	50	20	70	28.48	95.30		1,924.00	6,671.00
									27,329.78	45,988.38

APPENDIX X (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
<u>9. Car/Jeep Tyres</u>		405								
	i. Tyre buffing machine	5	202.5	67.5	270	1.85	5.94		374.16	1,603.80
	ii. " Resoling machine	1	101.25	33.75	135	3.47	23.05		351.33	3,111.75
	iii. " Relling Machine	4	67.5	33.75	101.25	4.74	26.46		319.95	2,679.07
	iv. Machine with matrix	2	607.5	202.5	810	8.50	11.77		5,163.75	9,533.70
	v. L&dy Type Machine	3	90	10	100	57.31	98.94		5,157.90	9,594.00
									<u>11,367.09</u>	<u>26,522.32</u>
<u>10. Scooter Tyres</u>		93								
	i. Tyre buffing machine	5	31	15.5	46.5	1.85	5.94		57.35	276.20
	ii. Tyre resoling machine	1	23.25	7.75	31	3.47	23.05		81.55	728.50
	iii. Tyre relling machine	4	15.50	7.75	23.25	4.74	26.46		73.47	615.20
	iv. Lody type machine with matrix	7	108.5	46.5	155	27.16	38.22		2,946.86	5,924.10
									<u>3,159.23</u>	<u>7,544.00</u>

APPENDIX X - A

Sl. No.	Item	Quantity.	Variable Machin- ing cost in Rs.	Raw Material cost in Rs.	Total variable cost in Rs. (4+5)
1	2	3	4	5	6
1.	Dredger Suction Hoses	15	8,420.80	54,000.00	62,420.80
2.	Fenders 308x150x2100 MM	25	16,874.50	37,500.00	54,374.50
3.	-do- 400x200x3000 MM	12	8,099.76	21,600.00	29,699.76
4.	Rubber Discs	10850	14,913.00	36,400.00	51,313.00
5.	Expansion Joints 18"	5	1,083.29	9,000.00	10,083.29
6.	Cable connectors (Male)	2600	3,125.20	5,840.00	8,965.20
7.	Cable connectors (Female)	2600	3,125.20	5,200.00	8,325.20
8.	Retreading of Tyres - Truck	871	27,329.78	1,25,400.00	1,52,729.78
9.	Retreading Car/Jeep	405	11,367.09	25,920.00	37,287.09
10.	Retreading Scooter	93	3,159.23	2,230.00	5,389.23

APPENDIX X - A (Contd.)

Sl. No.	Item	Fixed cost in Rs.	Total cost in Rs. 6 + 7	Sale price in Rs.
1	2.	7	8	9
1.	Dredger Suction Hoses	23,495.37	85,916.17	1,08,000.00
2.	Fenders 308 x 150 x 2100 MM	31,639.00	86,013.50	91,250.00
3.	Fenders 400 x 200 x 3000 MM	15,186.70	44,886.46	57,600.00
4.	Rubber Discs	28,726.60	80,039.60	81,375.00
5.	Expansion Joints 18"	2,744.90	12,828.19	25,000.00
6.	Cable connectors (Male)	5,074.45	14,039.65	12,350.00
7.	Cable connectors (Female)	5,074.45	13,399.65	9,750.00
8.	Retreading of Tyres - Truck	45,968.38	1,98,698.16	2,09,040.00
9.	Retreading Car/Jeep	26,522.32	63,809.41	40,500.00
10.	Retreading Scooter Scooter	7,544.00	12,933.23	3,534.00

APPENDIX X-A (Contd)

S1. No.	Item	Profit/Loss in Rs. (9 - 8)	Contribution (9 - 6)
1	2	10	11
1.	Dredger Suction Hoses	+ 22,083.83	+ 45,579.20
2.	Fenders 308 x 150 x 2100 MM	+ 5,237.50	+ 36,875.50
3.	Fenders 400 x 200 x 3000 MM	+ 12,713.54	+ 27,900.24
4.	Rubber Discs	+ 1,335.40	+ 30,062.00
5.	Expansion Joints 18"	+ 12,171.81	+ 14,916.71
6.	Cable connectors (Male)	- 1,689.65	+ 3,384.80
7.	Cable connectors (Female)	- 3,649.65	+ 1,424.80
8.	Retreading of Tyres - Truck	+ 10,341.84	+ 56,310.22
9.	Retreading Car/Jeep	- 23,309.41	+ 3,212.91
10.	Retreading Scooter	- 9,399.23	- 1,855.23

Column 10 : - + indicates Profit
- indicates Loss

Column 11 : - + indicates Positive contribution
- indicates Negative contribution

APPENDIX XI

BREAK - EVEN ANALYSIS

(for projected level of sales)

	Amount in Rs.	Amount in Rs.
Projected annual sales		8,51,000
<u>Less:-</u> Cost of raw materials	3,95,000	
Variable Expenses	<u>1,31,600</u>	5,26,600
Margin of contribution		<u>3,24,400</u>
Total Fixed Expenses		2,71,000
Break-Even Point	$\frac{2,71,000}{3,24,400} =$	83.5%
Break Even Sales = 83.5% of annual sales		7,10,600
Monthly sales for break even point		59,200

Note:-

$$\text{Break Even Point} = \frac{\text{Total Fixed Expenses}}{\text{Margin of contribution}} \left\{ \begin{array}{l} \text{(Expressed as a} \\ \text{percentage)} \end{array} \right.$$

APPENDIX XII

STATEMENT OF PROFITABILITY FOR PROJECTED SALES

S.No.	Rs.	Rs.
1. Sales realisation		8,51,000
2. Raw Materials	3,95,000	
3. Direct Wages & Supervision Charges	49,000	
4. Bonus, P.F. & E.S.I.	17,300	
5. Consumable Stores	36,000	
6. Electricity & Fuel	89,600	
7. Repairs & Maintenance	6,000	
8. Rent	2,800	
9. Sales Tax	32,000	
10. Office Staff Salaries	23,200	
11. Postages, Telephone & Stationery	9,700	
12. Conveyance & Vehicles Upkeep	15,800	
13. Interest on Bank Borrowings (C/c)	15,000	
14. Depreciation	16,000	
15. Miscellaneous Expenses	68,300	
16. TOTALS	7,75,700	8,51,000
17. By sales realisation		8,51,000
Less Total cost of production		7,75,700
Net profit before tax:		75,300

FUNDS FLOW STATEMENT

	March '80	March '81	March '82
<u>Sources</u>			
1. Increase in Equity/Reserves Reserves	157	52	-
2. -do- Bank Loans	42	50	49
3. -do- Sundry Creditors (Misc.)	99		-
4. Decrease in Fixed Assets	-	12	-
5. -do- Current Assets	-	-	-
6. -do- Cash	-	-	90
	298	114	139
<u>Uses</u>			
1. Decrease in Equity/Reserves	-	-	4
2. -do- Sundry Creditors	-	1	4
3. Increase in Fixed Assets	197	-	53
4. -do- Current Assets	98	22	78
5. -do- Cash	3	91	-
	298	114	139

APPENDIX XIV

FINANCIAL RATIOS

	1980	1981	1982
1. Total Debt./Equity + Reserves		0.91:1	1.14:1
2. Current Assets/Current Liabilities		0.89:1	0.75:1
3. Net Profit/Net Sales		4.81%	6.78%
4. Average Collection Period		-	30
5. Earning Power		0.12%	0.15%
6. Fixed Assets to Capital Employed		1.07:1	1.24:1

TREND ANALYSIS

1. Sales	700	960	995
2. Current Assets	119	215	177
3. Current Liabilities	141	191	235
4. Equity + Reserves	158	209	206
5. Gross Profit	@	407	395
6. Bank Borrowings	77	91	140
7. Overhead Expenses	@	360	327
8. Sundry Debtors	71	3	122

Note: For Trend Analysis, base year is 1980
Amount in thousands.

@ - Not available.

APPENDIX XV

ASSESSMENT OF WORKING CAPITAL REQUIREMENTS

Anticipated average monthly sales				: Rs.70,900/-
-do- cost of production				: Rs.64,600/-
-do- monthly consumption of Raw materials				: Rs.32,900/-
	Raw Materials	W.C.R. %	Amount	Permissible limits
1 Month requirement of 'A' class items as per inventory		23,400		
+ 4 months stocking of B & C class items		6,000		
		29,400	25	7,350
				22,050
Semi-finished goods 10 days stocking		21,500	40	8,600
Finished goods 15 days stocking		32,300	40	12,920
				19,380
	Total	83,200		28,870
				54,330
Limit recommended Cash Credit Mundy Type Limit of Rs.55,000/-				
<u>Outward Bill Limit</u>				
1 month average sales		70,900		
Less 10% margin		7,090		
				<u>63,810</u>
Limit recommended Outward Bill Limit of Rs.65,000/-				

APPENDIX XVI

STATEMENT OF OUTWARD BILLS SUBMITTED FOR COLLECTION UPTO 31.3.83

S.No.	Date of Bill	Amount	Realieed on	No.of days	Product
1.	10.12.82	22,275.00	6. 3.83	86	19,15,650
2.	14.12.82	239.99	6. 1.83	23	5,520
3.	14.12.82	226.65	6. 1.83	23	5,221
4.	14.12.82	959.94	19. 1.83	36	34,560
5.	14.12.82	1,060.00	2. 1.83	19	20,140
6.	22.12.82	1,877.22	27.12.82	5	9,385
7.	29.12.82	2,303.86	9. 2.83	42	96,768
8.	29.12.82	513.30	23. 1.83	25	12,825
9.	29.12.82	11,583.20	19. 1.83	21	2,43,243
10.	6. 1.83	685.18	23. 1.83	17	11,645
11.	6. 1.83	2,730.00	15. 3.83	68	1,85,640
12.	6. 1.83	1,550.00	23. 1.83	17	19,550
13.	6. 1.83	5,173.00	25. 1.83	19	98,287
14.	20. 1.83	2,495.84	25. 1.83	5	12,480
15.	20. 1.83	4,629.04	25. 1.83	5	23,145
16.	20. 1.83	1,479.90	25. 1.83	5	7,400
17.	20. 1.83	746.62	25. 1.83	5	3,735
18.	20. 1.83	4,053.08	25. 1.83	5	20,265
19.	20. 1.83	6,300.00	25. 1.83	5	31,500
20.	20. 1.83	2,559.84	25. 1.83	5	12,800
21.	9. 3.83	33,079.25	27. 3.83	18	5,95,422
22.	10. 3.83	3,034.78	10. 3.83	-	-

- APPENDIX XVI (Contd).

S.No.	Date of Bill	Amount	Realised on	No.ofdays	Product
23.	15. 3.83	2,764.50	31. 3.83	17	47,005
24.	15. 3.83	586.63	31. 3.83	17	9,979
25.	15. 3.83	2,026.54	31. 3.83	17	34,459
26.	15. 3.83	986.61	31. 3.83	17	16,779
Total		Rs. 1,15,519.97			34,73,403

Weighted average period : $\frac{34,73,403}{1,15,519.97} = 30$ days

NURSING PROGRAMME - BOSTONS PHARMAS

INTRODUCTION

This report relates to the study made at M/s Bostons Pharmas, during April 1983. Bostons Pharmas is a sick unit and its account is irregular by about Rs.4.6 lacs. I have tried to evaluate the technical and financial status of the company and suggest a suitable course of action.

The situation with regard to nursing sick units reminds me of a story I heard long ago, long before these turbulent times. It concerns a doctor who was awakened in the middle of the night by a phone call.

"Doctor", a frantic housewife said, "my husband is very ill with pneumonia. What shall I do?"

"That depends", the doctor replied. "If your husband was basically healthy before he caught sick, the normal medications will do. But if he was not, ask him to write his will".

If the unit was managed well before, it will probably be nursed back to health. If not, it will be difficult.

BRIEF HISTORY OF THE UNIT

M/s Bostons Pharmas was started in 1975 at Pondicherry by Mr. Nagarathinam with a view to manufacture ointments, syrups and tablets. The unit has a capacity to manufacture and repack chemicals and drugs worth about Rs.1 lac per month. After the expiry of the proprietor, Mr. Nagarathinam, the unit is being managed by his son, Mr. Janakiraman, with the guidance of the Manager, Mr. Ramalingam. A brief history of the unit is given in Appendix I.

BALANCE SHEET

The balance sheet of the company as on 31st March 1983 is given in Appendix II. The balance sheet shows that the loans and advances from

bank (Rs.6.13 lacs) is balanced more than 90% by sundry debtors - Williams and Company, stock and proprietor's negative balance. The sundry debtors - Williams and Company, shown in the balance sheet is merely proprietor's drawings from the company accounted as sundry debtors. The raw material stock is high and the majority of lock and key stock items have not been consumed at all for production during the last 3 years. It is considered that the stock will fetch a higher realisation than the book value as the market value of the majority of items is higher than the book value. The unit has made a loss of about Rs.81,000 during the year 1982-83 as shown in the profit and loss account given in Appendix III.

REASONS FOR SICKNESS

The major reasons which led to the current position of the unit are:

- (i) Diversion of the funds by the proprietor for personal uses.
- (ii) Closure of the manufacture for more than 16 months within a period of 3 years and the expiry of the proprietor in 1982 has greatly upset the working of the unit,
- (iii) Lack of planning of production and purchase has resulted in non-use of stock for manufacture and the consequent build up of high raw material stock.
- (iv) Lack of proper management information to enable the proprietor to control production, wastage, quality, etc. The cancellation of the licence is partly due to the lack of information system.
- (v) The absence of a responsible person at the unit on a day-to-day basis to physically control production, quality and wastage. This provides scope for manipulation of production, wastage, etc. The cancellation of licence twice during the last three years could have been avoided by suitable action at the right time by a responsible person.

STRENGTH OF THE UNIT

In spite of the present financial position of the unit, it has the capacity to come out of this present crisis due to the following reasons:

- (a) The profitable working of the associate concern, namely, Williams and Company which has made a net profit (before tax) of Rs.48,000/- (Estimated) during 1982-83. In addition, rent is received from buildings (about Rs.12,000 p.a.) owned by M/s Williams & Co.
- (b) Higher market value for the stock held in lock and key account. It is believed that, on a modest estimate, about Rs.1.5 lacs could be realised by selling non-usable stock worth Rs.1.15 lacs as per the books.
- (c) Reasonable sales potential for the products.

NURSING SCHEME

A nursing scheme is recommended after considering pros and cons as follows:

- (i) The total outstandings of Rs.6.135 lacs is proposed to be divided as follows:

(a) covered by good stock & bills	.. Rs.1.485 lacs
(b) covered by saleable stock	.. Rs.1.000 lac
(c) clean drawings without cover	.. Rs.3.650 lacs
Total	.. Rs.6.135 lacs

The details are given in Appendix IV. Thus a clean term loan (CTL-1) of Rs.3.65 lacs and frozen lock and key account of Rs.1.0 lac is recommended.

- (ii) Based on sales projections by the unit and the past performance, a projected working of the unit quarter by quarter, corresponding working capital requirements, cash flow and repayment of CTL-1 and frozen lock and key account has been estimated as shown in Appendices V to VIII.

- (iii) The successful operation of the nursing scheme greatly depends on
- (a) payment of Rs.5000 per month from Williams and Company till the dues are cleared. It is understood that the proprietor of the unit has agreed to pay Rs.6000 per month. However, the study of the balance sheet and profit and loss account of Williams and Company indicated that the company may not be able to make a payment of Rs.6000 per month on a regular basis. Hence, a payment of Rs.5000 per month is recommended. Any default in this payment will upset the nursing scheme recommended.

In addition to Bostons Pharmas, Williams and Company has sundry creditors of Rs.1.37 lacs. However, it is understood that no payment is necessary in the immediate future (next 5 years) as agreed by Mr. Janakiraman and accordingly no repayment towards this has been provided in the cash flow.

- (b) Disposal of stock not usable by Boston Pharmas in the immediate future. It is considered that stock worth about Rs.1.15 lacs as per the books could be disposed off. It is believed that since the market value of such stock is higher than the book value, an amount of Rs.1.5 lacs could be realised from such a sale. A list of items that could be disposed off, probable selling price and the values are given in Appendix IX. A physical stock verification was also done for the majority of the items, and this revealed that the actual weight is less for some items and the total value of the loss is Rs.14,000. This value has been deducted in the closing stock shown in the balance sheet. The proprietor of Bostons Pharmas (Mr. Janakiraman) has given a period of one year within which the above stock will be sold. However, since the stock is imported, the unit should obtain the permission of Drug authorities and sell the materials only to actual users.

- (c) Maintaining the level of operation as indicated in the programme (Appendix V). It is considered that the unit should be able to maintain the level indicated without much difficulty with proper sales plan and follow-up action.
- (d) Exercising proper controls on production, wastage and quality and maintaining the expenses within the limits indicated in the proposal (Appendix V)
- (e) In general, all purchases and sales should be routed through the bank and a monthly reconciliation of production, purchases, stock and sales should be done to the satisfaction of the bank. In this context, it is recommended that the unit compile and submit the returns recommended in the Task Force report for all nursing units.

PRODUCTION PROGRAMME

The production programme was discussed with the unit and based on the programme given by the unit, itemwise raw material and packing material requirements have been worked out. The raw material cost for both manufacturing and repacking items and sales realisation have been worked out and given in Appendices X and XI. The raw materials required for the programme indicated is given in Appendix XII.

MARKETING

The unit proposes to sell the products to hospitals, medical stores and private parties in Madras city and surrounding areas. The unit has already developed contacts for the same. In addition, it is also employing salesmen on a commission basis to sell its products. It is believed that it would not be very difficult for the unit to sell the production indicated in the proposal for nursing programme. However, collection of outstandings should be more aggressive.

DISCUSSIONS WITH DRUG INSPECTOR

Discussions were held with the Drug Inspector to get his views on cancellation of licence earlier and, in general, about the unit, from the point of view of adherence to the Government Drug Regulations. It is understood that the Drug Inspector is happy about the change of chemist, and if other minor requirements listed out by the Central Drug Control authorities are also complied with, the unit should not have much problem. The Drug Inspector also expressed that a responsible person should stay at Pondicherry to look after the unit. Other points suggested by Drug Inspector are:

- (a) The unit should plan to set up an Analytical laboratory since, by the end of this year, it will be a statutory requirement to have a laboratory;
- (b) The unit should manufacture items under loan licence arrangement on behalf of big firms;
- (c) The floor area of the unit is less for the number of sections in the unit. Hence, the unit could think of shifting the repacking of chemicals to some other area (it is suggested that repacking could be shifted to Madras).

MANAGEMENT INFORMATION SYSTEM

The present information system is inadequate for proper control of the unit. It was observed that the materials are not balanced with material issues from stock and production. The production records were not being maintained properly, and the batch yield was found to vary considerably and wastage shown was high in some cases. With such records, it is not possible to balance input and output, and scope for malpractices is high. Also, it is difficult to ensure whether it is profitable at all to manufacture an item or not. Although major accounts are being maintained, it was observed that cash book and ledger are not written then and there, but only once in an year. The purchase register was not being maintained properly.

N.B. It may not be out of context to note that clearing banks in U.K. have set up "intensive care units" to nurse ailing companies (Barclays runs a special team lead by Assistant General Manager S. Carslake; Midland ... contd. p.t.o.

Hence, to provide the information required for the unit and bank, the following additional/modified records and reports are suggested:

- (a) Purchase book (Appendix XIII) to be maintained at Factory and Madras.
- (b) Stock book (Appendix XIV) to be maintained at factory and Madras.
- (c) Batch control statement (Appendix XV).
- (d) Monthly stock statement showing itemwise opening stock, receipts, issues and closing stock (Appendix XVI)

MONITORING OF NURSING SCHEME

A close monitoring is considered necessary to ensure strict adherence to the schedule. For this purpose, monthly profit and loss account and balance sheet should be prepared. All the expenses should be checked and ascertained. The control books and statements recommended to be maintained in this report will provide the information required for the above.

SENSITIVITY ANALYSIS

A sensitivity analysis was carried out to examine the sensitivity of repayment period to pessimistic and optimistic variations from those schedules in the projections as follows:

- (a) **OPTIMISTIC:** Sales reaching a level of 10 lacs per annum from the third quarter itself. The repayment under such optimistic conditions is estimated to be three years.
- (b) **PESSIMISTIC:** Sales not increasing beyond 6.0 lacs per annum and payment from M/s Williams and Company being restricted to Rs.4000 per month. The repayment under such conditions is estimated to be 7 years.

... from page 461

Bank has General Manager M. Wallis presiding over while NatWest tackles through its head office and regional structure - much like the banks in India)

An examination of the relevant data indicates that repayment programme is sensitive to the two following main parameters:

- (a) The ability of Williams and Company to maintain payment of Rs.5,000 per month till the account is regularised and atleast a minimal equity is built up.
- (b) The disposal of surplus stock being carried out as early as possible, preferably within the period mentioned, at a price higher than the book value.

GENERAL REMARKS

- (a) The unit should raise as much funds as possible by selling off properties like air-conditioner, land, car, etc., and from loans from friends and relatives to reduce the outstandings as much as possible.
- (b) The services of the manager Mr. Ramalingam, will be required by the unit to guide Mr. Janakiraman, since he is new to the business.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

- (a) A nursing scheme with a clean term loan of Rs.3.65 lacs and frozen lock and key loan of Rs.1 lac is recommended. The expected repayment period is four years.
- (b) Additional management control records and reports are recommended both from the bank's point of view and the proprietor's control point of view.

A study of sick units being nursed will show that Lenin had correctly said, that the strongest of all the forces is the force of inertia. "When one cannot wipe off one's errors", wrote Chateaubriand (in the Execution of the Duke of Enghien) "one dismisses them, one makes a dogma of one's mistakes and one believes oneself to be a renegade to give up the cult of one's iniquities."

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APPENDIX I

BRIEF HISTORY OF THE UNIT

Boston's Pharmas was established at Pondicherry by Mr K Nagarathinam, in the year 1974 with a view to manufacture tablets, ointments and syrups and repack a few items of drugs and chemicals. The unit started production in January 1975. The unit was able to increase the turnover to Rs.4.9 lakhs by 1978 from 0.39 lakh in 1975. The manufacturing licence was cancelled for eight months in 1978-79 and again for eight months in 1980-81, for manufacturing substandard drugs and drugs not included in the licence. In spite of the cancellation of manufacturing licence, the unit was able to maintain a turnover of Rs.4.7 lakhs in 1980-81 by repacking drugs and chemicals. The expiry of the proprietor Mr K Nagarathinam, in May 1982 has drastically affected the unit since the Proprietor's son who is now looking after the unit and the three medical shops in Madras (Williams & Co.), has yet to acquire the experience to run the business. The proprietor's son Mr. Janakiraman, is greatly depending on the Manager, Mr. Ramalingam, for guidance in running Williams & Co., and Boston Pharmas. M/s Janakiraman and Ramalingam visit Pondicherry only once/twice in a fortnight, and the

... contd.

APPENDIX I..contd.

day-to-day running of the unit has been entrusted to a relative of Mr. Janakiraman. The books of accounts of M/s Boston Pharmas are maintained at Madras.

The total outstandings as on 31st March 1983, is Rs.6.13 lakhs and the account is irregular by Rs.4.65 lakhs, out of which the clean drawings amount to Rs.3.65 lakhs.

@@*@*@*

BALANCE SHEET AS ON 31.3.1983

LIABILITIES		ASSETS	
1. Proprietor's		1. Machinery at cost	14,446.68
Capital Account		Depreciation upto	
Balance as on		31.3.82	<u>7,703.43</u>
31.3.1982	(-) 6,174.86		6,743.25
Profit/(Loss)	(-) <u>81,179.99</u>	Depreciation @ 10%	<u>674.33</u>
	(-) 87,354.85		6,068.92
2. Loans & Advances		2. Equipment at cost	32,265.71
Bank Bills A/c Madras	27,086.83	Add	<u>192.77</u>
Bank Pondicherry	586,307.05		33,158.48
3. T.Sadasivam	5,000.00	Depreciation upto	
		31.3.82	<u>16,833.20</u>
			16,325.28
		Depreciation at 10%	<u>1,632.53</u>
			14,692.75
		3. Building	9,556.61
		4. Tools and Equipment	591.84
		5. Furniture & Fixtures	4,467.60
		Depreciation at 10%	<u>446.76</u>
			4,020.84
		6. Cycle	218.70
		Depreciation	<u>21.87</u>
			196.83
		7. Air Conditioner	1,851.00
		8. Deposits and advances	
		as at 31.3.82	3,452.72
		Less: withdrawal	<u>825.00</u>
			2,627.72
		9. Bills Receivable	34,500.95
		10. Sundry Debtors (Williams & Co)	188,450.24
		11. Stock on hand	267,523.60
		12. Cash on hand	0.35
		Cash at Bank	<u>957.38</u>
			957.73
	<u>531,039.03</u>		<u>531,039.03</u>

PROFIT & LOSS ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1983.

EXPENDITURE		INCOME	
To opening stock	315,130.00	By Sales	313,256.61
To Purchases- Raw Material	149,335.71	By Closing Stock:	
Bottles & Caps	<u>12,248.14</u>	Lock & Key A/c.	180,607.00
To Freight, Cooly & Carriage (Purchase)	161,583.85	Mundy	41,240.40
To Wages and Salaries	10,916.68	By Finished stock	<u>45,676.20</u>
To Electric Charges	4,078.22		267,523.60
To Fuel, firewood etc.	2,073.07		
To Packing & Forwarding	241.71		
To Gross Profit	1,642.13		
	85,114.55		
	<u>580,780.21</u>		<u>580,780.21</u>
Sales Tax	25,150.61	Gross Profit	85,114.55
Commission	8,202.23	Net Loss	<u>81,179.99</u>
Printing & Stationery ..	186.80		
Rent	5,357.69		
Entertainment	45.05		
Postage, Telegram & Telephones	1,291.37		
Interest	88,510.83		
Taxes & Licences	1,297.50		
Bank Charges	480.57		
Travelling Conveyance ..	5,237.31		
Insurance	1,693.80		
Machinery Maintenance	376.33		
Repairs & Renewals	748.16		
General charges, testing, fees etc.	5,732.80		
Salaries	19,158.00		
Advertisement	50.00		
Depreciation	2,775.49		
	<u>166,294.54</u>		<u>166,294.54</u>

APPENDIX IV

BREAK-UP OF OUTSTANDINGS

	Book Value	Advance value	at
	Rs.	Rs.	
1. Raw material (usable)	110,000	99,000	90%
2. Finished goods	45,000	36,000	80%
3. Bills (less than 60 days) Realisable	15,000	13,500	90%
4. Cash balance	1,000	-	
	<u>171,000</u>	<u>148,500</u>	
5. Outstandings as on 31/3/1983		Rs. 613,500	
6. Advance value of present usable stock/bills		<u>Rs. 148,500</u>	
7. (a) Deficit		Rs. 465,000	
(b) Frozen lock & key advance value at 90%		<u>Rs. 100,000</u>	
(c) Clean term loan I		<u><u>Rs. 365,000</u></u>	

SALES AND PROFITABILITY

(Rs. Thousands)

Description	Q1	QII	QIII	QIV to V	QVI to VII	VIII to XI	Q. XII to XV
Net Sales Realisation excl. S.T. and excise.	135.0	180.0	180.0	360.0	360.0	900.0	1000.0
A. DIRECT							
Raw Materials 71% (app)	95.2	127.8	127.8	255.6	255.6	639.0	710.0
Carriage Inwards	5.8	7.7	7.7	15.4	15.4	33.4	42.6
Wages	2.0	2.7	2.7	5.4	5.4	5.4	11.8
Power	0.6	0.8	0.8	1.6	1.6	1.6	5.0
Fuel	0.2	0.3	0.3	0.6	0.6	1.6	1.6
B. OVERHEADS							
Sales commission	4.1	6.8	6.8	13.6	13.6	34.2	38.0
Rent	1.2	1.2	1.2	2.4	2.4	4.8	4.8
Postage, Telephone	0.4	0.4	0.4	2.4	0.8	1.6	1.6
Taxes & Licences	0.2	0.2	0.2	0.4	0.4	0.8	0.8
Travelling, Conveyance	1.2	1.8	1.8	3.6	3.6	7.2	7.2
Insurance	0.3	0.3	0.3	0.6	0.6	1.2	1.2
Packing & Forwarding	1.4	1.8	1.8	3.6	3.6	9.0	10.0
Maintenance	0.3	0.3	0.3	0.6	0.6	1.2	1.2
Testing charges	1.5	2.1	2.1	4.2	4.2	9.6	10.0
Salaries	0.4	0.4	0.4	0.8	0.8	1.6	1.6
Depreciation	0.6	0.6	0.6	1.2	1.2	2.4	2.4
Interest WCR	8.0	10.5	10.5	21.0	21.0	52.2	58.0
L&K - CTL.	<u>06.2</u>	<u>15.2</u>	<u>13.8</u>	<u>20.2*</u>	<u>16.5*</u>	<u>23.5*</u>	<u>9.1*</u>
Cost of Prod.	139.6	180.9	179.5	351.6	347.9	334.7	916.9
Profit/Loss	- 4.6	- 0.9	0.5	8.4	12.1	55.3	83.1
ADD Depreciation	<u>0.6</u>	<u>0.6</u>	<u>0.6</u>	<u>1.2</u>	<u>1.2</u>	<u>2.4</u>	<u>2.4</u>
Cash Accruals	- 4.0	- 0.3	1.1	9.6	13.3	57.7	85.5

* Average interest over the period is applied.

NOTE : Raw materials include bottles, stationery, caps etc.

APPENDIX VI

WORKING CAPITAL REQUIREMENT

(Rs. in thousands)

Sl. No.	Details	QI		QII-VII		Q.VIII-XI		QXII-XV	
		WCR	PL	WCR	PL	WCR	PL	WCR	PL
1.	Raw materials 3 months	95.7		127.8		159.8		177.5	
	Less Margin 10%		86.1		115.0		143.8		159.8
2.	Work in progress 1 week	9.0		11.8		14.2		15.6	
	Less Margin 20%		7.2		9.4		11.3		12.5
3.	Finished goods at 1 1/2 months	69.5		89.2		104.5		114.3	
			55.6		71.4		83.6		91.4
4.	Bills 2 months at C.Op.	92.6		119.2		139.3		152.4	
	Sales value less 10%		81.0		108.0		135.0		150.0
5.	Expenses, say 1/2 month	7.2		8.0		8.2		8.2	
		274.0		356.0		426.0		468.0	
	(Say)		229.9		303.8		373.7		413.7
			229		303		373		413
	Deficit	45		53		53		55	
	Limits recommended								
	Cc stock M.T/L & K	148		195		238		263	
	CC Bills	81		108		135		150	
		229		303		373		413	

APPENDIX VII

C A S H F L O W

(Rs. in thousands)

Sl. No.								
	I	II	III	IV to V	VI to VII	VIII to XI	XII to XV	
1	2	3	4	5	6	7	8	9
<u>I SOURCE OF FUNDS</u>								
1 Net profit before tax		-4.6	-0.9	0.5	8.4	12.1	55.3	83.1
2. Depreciation		0.6	0.6	0.6	1.2	1.2	2.4	2.4
3 Net cash accruals		-4.0	-0.3	1.1	9.6	13.3	57.7	85.5
4. Increase in S.T. borrowing		80.5	74.0	-	-	-	70.0	40.0
5 Reduction in dues from Williams		15.0	15.0	15.0	30.0	30.0	60.0	60.0
6 Reduction in old debts (60 days)		5.0	6.0	6.0	-	-	-	-
7. Reduction in frozen lock & key a/c		27.0	27.0	40.0	20.0	-	-	-
8 Surplus in sales of stock in Fz L&K A/c		10.0	10.0	12.0	5.0	-	-	-
9 Decrease in inventory & book debts		-	-	-	-	-	-	-
10 Net cash inflow (A)		133.5	131.7	74.1	64.6	43.3	187.7	185.5
<u>II APPLICATION OF FUNDS</u>								
11 Taxation		-	-	-	-	9.3	18.0	25.0
12 Increase in inventory & book debts		103.0	82.0	-	-	-	70.0	42.0
13 Decrease in Fz L & K A/c		24.0	24.0	36.0	16.0	-	-	-
14 Decrease in C.T.L. 1		6.0	18.0	36.0	48.0	36.0	96.0	125.0
15 Decrease in S.T. bank borrowings		-	-	-	-	-	-	-
Net cash outflow (B)		133.0	124.0	72.0	64.0	42.3	184.0	192.0

APPENDIX VII contd.

1	2	3	4	5	6	7	8	9
Op. surplus (A-B)		0.5	7.7	2.1	0.6	1.0	3.7	-6.5
Opening balance		-	0.5	8.2	10.3	10.9	11.9	15.6
Closing balance		0.5	8.2	10.3	10.9	11.9	15.6	8.9

- NOTE: (1) The total payment from Williams & Co., envisaged in the above projection is Rs.2.25 lakhs.
- (2) Tax liability has been estimated as a partnership firm with nine partners.

(Mr. Janakiraman informed that before end of next year, partnership will be signed)

POSITION OF ACCOUNT

(Rs. in figures)

Details	Present	Proposed	I	II	III	IV & V	VI & VII	VIII -XI	XII - XV
Stocks	613500	148500	229000	303000	303000	303000	303000	373000	413000
Bills									
Frozen Lock & Key A/c.	-	100000	76000	52000	16000	-	-	-	-
C.T.L.	--	365000	359000	341000	305000	259000	221000	125000	-
	-	613500	664000	696000	624000	560000	524000	498000	413000

Repayment schedule for C.T.L. I

I Qr.	-	Rs. 2000 / month
II Qr.	-	Rs. 6000 / month
III Qr.	-	Rs. 12000 / month
IV & V Qr.	-	Rs. 8000 / month
VI & VII Qr.	-	Rs. 5000 / month
VIII-XI Qr.	-	Rs. 8000 / month
XII - XV Qr.	-	Rs. 10000 / month

APPENDIX IX

LOCK AND KEY STOCK

Sl. No.	Item	Unit	Qty.	Rate/unit	Value	Qty. usable in mate-03-04	Value of usable mate-rials.	Sur- plus	Pro- bable sell- ing price	Reali- sable amount	Non- sal- able	Scr- ap rate	Scrap value	Re- marks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Carbolic Acid	200 Kg	4	1070	4280	All	4280	-	-	-	-	-	-	-
2.	Lactose	25 Kg	53	100	5300	36bags	3600	17	225	3825	-	-	-	-
3.	Mag. Trisilicate	50 Kg	14	107	1498	All	1498	-	-	-	-	-	-	-
4.	Borax	Kg	48	10	480	Nil	-	48	10	480	-	-	-	-
5.	Barium Sulphate	50 Kg	4	450	1800	Nil	-	4	300	1200	-	-	-	-
6.	Amm. Bicarbonate	50 Kg	8	250	2000	All	2000	-	-	-	-	-	-	-
7.	Glycerine	50 Kg	3	1050	3150	All	3150	-	-	-	-	-	-	-
8.	Lactic acid	25 Kg	1	1250	1250	Nil	-	1	500	500	-	-	-	-
9.	Ext. Gentian	Lts.	120	60	7200	Nil	-	120	60	7200	/	-	-	-
10.	Phtalyl Sulpha- thiazole	50 Kg	11	2640	29040	230 Kg	12144	6	2750	16500	-	-	-	*
11.	Caffeine	50 Kg	3	2750	8250	1	2750	2	4000	8000	/	-	-	-
12.	Caffeine citrate	25 Kg	1	1250	1250	Nil	-	1	2500	2500	/	-	-	-
13.	Phenacetin	Kg	140	28	3920	All	3920	-	-	-	/	-	-	-
14.	Phenobarbitone	50 Kg	4	7750	31000	83 Kg	12865	2	20000	40000	/	-	-	**
15.	Sulphaguardine	50 Kg	3	6300	18900	Nil	-	3	6300	18900	/	-	-	-
16.	Vitamin B2	Kg	5	1025	5125	2 Kg	2050	3	1025	3075	/	-	-	-
17.	Ephedrine Hcl	Kg	90	360	32400	16	5760	50	300	15000	-	-	-	***
18.	Vitamin B1	25 Kg	2	8525	17050	10 Kg	3410	35	450	15750	/	-	-	@
19.	Nicacinamide	Kg	10	250	2500	Nil	-	10 Kg	100	1000	/	-	-	-

NOTE:

- * : Physical stock 20 Kg less.
- ** : Physical stock 17 Kg less.
- *** : Physical stock 24 Kg less
- @ : Physical stock 5 Kg less.

PRODUCTION PROGRAMME AND RAW MATERIAL COST - MANUFACTURE

Sl. NO.	Item	Unit	Batch size	R.M. Cost/ batch Rs.	Packing material cost Rs.	Total cost Rs.	cost/ 100 bottles	Total	
								Qty.	Value Rs.
1	2.	3.	4.	5	6	7	8.	9	10
1.	Zinc cream BP	450 gm.	474	2311.20	201.60	2512.80	530.00	2550	13515.00
2.	Sulphur ointment IP	bottle	312	1407.10	134.00	1541.10	494.00	3250	16055.00
3.	Lysol IP	450 ml.	788	4310.00	336.00	4646.00	589.50	3320	19571.00
4.	Amm. Mercury Oint. IP	450 gm.	312	2003.80	134.00	2137.80	685.20	420	2077.80
5.	Benzyl Benzoate App. IP	450 ml.	210	943.00	92.00	1035.00	492.90	1250	6161.30
6.	Tobu Syrup IP	650 ml.	147	545.00	62.70	607.70	413.35	2050	8473.70
7.	Calcium Gluconate Tab.	1000	27	457.70	6.90	464.60	1718.50	540	9279.90
8.	Ichthayol Gly. BPC	450 gm.	1090	8710.00	460.50	10610.50	973.80	1080	10517.00
9.	Liquified Phenol IP	450 gm.	453	2016.00	194.90	2210.90	488.10	5000	24405.00
10.	Acetic acid IP	450 ml.	215	290.80	92.50	383.30	178.30	650	1159.00
11.	Diethyl Carbamazincitrate	1000 Nos.	190	2467.50	46.00	2513.50	1337.90	380	5065.00
12.	Ephedrine Hcl. Tab	1000 Nos.	290	5501.00	69.00	5570.00	1920.70	290	5570.00
13.	Phthalyl Sulphathiazole IP	-do-	44	11337.80	10.53	1348.40	3064.50	400	122580.00
14.	Benedicts Soln.	450 ml.	125	426.50	54.61	481.10	384.90	1500	5774.00
15.	Vasaka Syrup	650 ml.	147	1008.00	62.70	1070.70	728.36	2000	14561.20
16.	Salicylic Acid Oint. IP	450 gm.	312	1515.40	133.90	1648.30	528.20	2000	10564.00
17.	Boric Acid Oint. IP	450 gm.	312	1282.40	134.00	1416.40	454.00	1500	6810.00
18.	Lint. Turpentine IP	450 ml	655	1043.50	280.60	1324.10	202.15	10000	20215.00
19.	Cal. Lactate Tab. IP	1000 Nos.	46	195.50	20.15	215.70	468.90	800	3751.20
20.	Mandles pt. BPG	450 gm.	255	2397.90	111.20	2509.10	983.96	2000	19680.00
21.	Whitefield Oint. BPG	-do-	315	2212.50	134.40	2346.90	745.00	3000	22350.00
22.	Zinc oxide oint. IP	-do-	315	1590.90	134.40	1725.30	457.70	2000	10954.00
23.	Syrup USP	650 ml.	147	360.00	62.70	422.70	287.55	1000	2875.50
24.	Stg. Amm. Acetate Soln. IP	450 ml.	215	531.20	103.10	634.30	249.90	1000	2499.00
25.	Ext. Liquorice liq. IP	450 ml.	110	596.50	47.40	643.90	585.36	2000	11707.20

APPENDIX X (Contd). 478

1.	2.	3.	4.	5.	6.	7.	8.	9.	10
26.	Coal tar oint.	450 gm.	312	1726.90	133.90	1860.80	596.40	1000	5264.00
27.	Spt. Manthic Pip.	-do-	210	1992.00	91.90	2083.90	992.33	300	2976.70
28.	Tr. Iodine	450 ml.	200	837.00	88.20	925.20	462.60	2000	9252.00
29.	Magnesium Trisilicate	1000 Nos.	47	207.00	10.27	217.30	461.90	500	2309.50
30.	Paracetamol	-do-	28	1072.00	6.90	1078.90	385.00	500	19250.00
31.	Vitamin C 100 mg.	1000 Nos.	97	1087.00	91.60	1128.60	1163.50	500	5817.50
32.	Tr. Benzoine	450 ml.	200	1252.00	86.20	1338.20	669.10	5000	33455.00
33.	Riboflavine	1000 Nos.	190	1069.00	44.20	1113.20	585.90	150	878.90
34.	Vitamin B1 50 mg.	-do-	96	745.00	23.00	768.00	800.00	200	1600.00
35.	Piperazine citrate	450 ml.	210	623.00	88.90	711.90	339.00	200	6780.00
36.	A.P.C. Tab.	1000 Nos.	47	563.50	15.00	575.00	1223.40	620	7585.10
37.	Aspirin	-do-	96	726.00	23.00	749.00	780.20	600	4681.20
38.	Phenobarbitone 1/2 gm.	-do-	96	1639.50	23.00	1662.50	1731.80	250	4329.50
39.	-do- 1 gm.	-do-	96	3238.50	23.00	3261.50	3397.40	250	8493.50
									37 2576.90

APPENDIX X A

SALES REALISATION - MANUFACTURE

Sl. No.	Item	Rate/Unit	I Quarter Qty.	Value Rs.	Qty	Total Value Rs.
1	2	3	4	5	6	7
1	Zinc cream BP	850	250	2125	2550	21675
2	Sulphurointment 1P	600	450	2700	3250	19500
3	Lysol 1P	900	440	3960	3320	29880
4	Amm. Mercury oint.1P	1200	100	1200	420	5040
5	Benzyl Benzoate App.1P	600	200	1200	1250	7500
6	Tobu syrup 1P	540	300	1620	2050	11070
7	Calcium Gluconate Tab	1900	-	-	540	10260
8	Ichthayol Gly. BPC	1200	200	2400	1080	12960
9	Liquified phenol 1P	600	1000	6000	5000	30000
10	Acetic Acid 1P	375	100	375	650	24375
11	Diethyl carbonazine	1800	50	900	380	6840
12	Ephechine Hcl. Tab.	2800	50	1400	290	8120
13	Phthalyl sulphathiazole 1P	3300	100	3300	400	13200
14	Benedicts Coln.	400	300	1200	1500	6000
15	Vasaka Syrum	950	200	1900	2000	19000
16	Salicylic Acid Oint 1P	850	300	2550	2000	17000
17	Boric Acid oint. 1P	800	300	2400	1500	12000
18	Lint turpentine 1P	300	1500	4500	10000	30000
19	Cal. Lactate Tab 1P	550	200	1100	800	4400
20	Mandles Pt. BPC	1450	400	5800	2000	29000
21	Whitefield oint BPC	1075	600	6450	3000	32250
22	Zinc oxide oint 1P	850	300	2550	2000	17000
23	Syrup USP	500	200	1000	1000	5000
24	Stg. Amm. Acetate Sol 1P	400	200	800	1000	4000
25	Ext. Liquorice lig.1P	850	200	1700	2000	17000

APPENDIX X A contd

1	2	3	4	5	6	7
26	Coal tar oint.	850	100	850	1000	8500
27	Spt. Manthia Pip.	1500	-	-	300	4500
28	Tr. Iodine	500	250	1250	2000	10000
29	Mag. Trisilicate	750	50	375	500	3750
30	Paracetamol	4500	125	5625	500	22500
31	Vitamin C. 100 mg.	1800	125	2250	500	9000
32	Tr. Benzoin	1050	1000	10500	5000	52500
33	Riboflovine	900	30	270	150	1350
34	Vitamin B1 50 mg.	750	50	375	200	1500
35	Piperazine citrate	750	100	750	200	1500
36	A P C Tab.	3000	100	3000	620	18600
37	Asprin	1250	150	1875	600	7500
38	Phenobarbitone 1/2 gm.	2000	50	1000	250	5000
39	-do- 1 gm.	3500	50	1750	250	8750
		89000				526082

S U M M A R Y

	Manufacture (Rs.)	Repacking (Rs.)	Total/Qr.(Rs.)
Sales I Qr.	= 89,000/Qr.	53,125.5	= 142,000 (say)
II - IV Qr.	= 437,082 at 145694/ Qr.	145,259.5 at 48420/ Qr.	= 193,000 (say)
Total	= 526,082	198,385.0	335,000

PRODUCTION PROGRAMME, RAW MATERIAL COST & SALES
REALISATION - REPACKING.

APPENDIX XI

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Sl. No.	Item	Unit	R.M.	Packing	Total	No. of	Total	Sales	Sales	I Quarter	
			cost/ 100 units	cost/ 100 units	cost/ 100 units	units per annum	R.M. cost/ annum	price/ 100 units.	value/ annum Rs.	Qty.	Value
1	2	3	4	5	6	7	8	9	10	11	12
1.	Glacial Acetic Acid IP	450 ml.	360	42.42	402.42	1500	6036.3	450	6750	300	1350
2.	Boric Acid IP	450 G.	225	23.23	248.23	3000	7446.9	400	12000	600	2400
3.	Calamine IP	-do-	540	23.23	563.23	300	1689.7	750	2250	75	5625
4.	Glycerine IP	-do-	855	42.42	897.42	3200	28716.8	1025	32800	800	8200
5.	Kaoline IP	-do-	38.25	23.23	61.48	10000	6448.0	90	9000	2500	2250
6.	Liquid Paraffin IP	450 ml.	810	42.42	852.42	5800	42621.0	1025	51250	1000	10250
7.	Magnesium Sulphate IP	450 gm	54	23.23	77.23	4000	3089.2	10.0	4000	1000	10000
		100x25 gm.	3.0	1.20	4.20	300	1260.0	900	2700	75	675
8.	Zinc Oxide	450 gm.	702	23.23	725.23	300	2175.7	800	2400	75	600
9.	Aspirin Powder	-do-	1170	23.23	1193.23	300	3579.7	1750	5250	50	875
10.	Magnesium trisili- cate	-do-	337.5	23.23	360.73	500	1803.7	400	2000	125	500
11.	Plaster of Paris	-co-	54	23.23	77.23	500	386.2	100	500	125	125
12.	Sodium Bicarbonate	-co-	90	23.23	123.23	5000	6161.5	160	8000	1250	2000
13.	Sulphanilamide	-do-	2790	23.23	2813.23	100	2813.2	4000	4000	50	2000
14.	Pot. Bromide	-do-	675	23.23	698.23	100	698.2	1400	1400	50	700
15.	Chloroform	-do-	225	42.42	267.42	300	802.3	850	2550	150	1275
16.	Light Magnesium Carbonate	-do-	270	23.23	293.23	600	1759.4	400	2400	100	400
17.	Cal. Lactate IP	450 gm.	562.5	23.23	585.73	100	585.7	800	800	50	400
18.	Amn. Carbonate IP	-do-	270	23.23	293.23	200	586.5	500	1000	100	500
19.	White Petroleum Jelly IP.	-do-	360	42.42	402.42	200	804.8	550	1100	100	550
20.	Yellow Petroleum Jelly	-do-	315	42.42	357.42	200	714.8	500	1000	100	500
21.	Ichthammol IP	-do-	1440	42.42	1482.42	100	1482.4	1800	1800	50	900
22.	Salicylic Acid IP	-do-	990	23.23	1013.23	200	2026.5	1600	3200	50	800
23.	Lactose	-do-	180	23.23	203.23	1000	2032.3	750	7500	250	1875

APPENDIX XI (Contd.)

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1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
24. Purified Talk	450 gm	45	23.23	68.23	2000	1364.6	90	1800	500	450	
25. Calcium carbonate	-do-	112.5	23.23	135.73	1000	1357.3	200	2000	250	500	
26. Oil turpentine	450 ml	139	42.42	181.92	1000	1819.2	300	3000	250	750	
27. Sodium salicylate	450 gm.	900.0	23.23	923.23	500	4616.2	1250	6250	100	1250	
28. Calcium Gluconate	450 gm.	1350.0	23.23	1373.23	100	1373.2	1600	1600	-	-	
29. Arachis oil	450 ml	225.0	42.42	267.42	500	1337.1	600	3000	-	-	
30. Ammoniated mercury	450 gm.	387.5	6.0	393.50	250	983.8	1050	2625	-	-	
31. Ammonium Bicarbonate	-do-	108.0	23.23	131.23	500	656.2	250	1250	150	375	
32. Phenacetin	--do-	1260.0	23.23	1283.23	200	2566.5	5600	11200	-	-	
							141494.9	198385			

Sales - I Qr. = Rs.53,125.5
 II to IV Qr. = Rs.1,45,259.5 at Rs.48,420 per quarter.

RAW MATERIALS REQUIREMENT

APPENDIX XII

Sl. No.	Material	Unit	Item No.	Kg.	Item	Kg.	Item No.	Kg.	Item No.	Kg.	Total
1	2	3	4	5	6	7	8	9	10	11	12
1.	Zinc oxide	Kg.	1	387.30	22	142.88 (VIII)		135.00			665.20
2.	Oleic acid	Lts.	1	6.05							6.05
3.	Arachis oil	Lts.	1	387.50	XXIX	225.00					612.30
4.	Woolfat	Kg	1	96.83	2	70.30	4	10.85	16	56.44	274.98
			22	40.46							
5.	Calcium Hydroxide	Lts	1	387.30							387.30
6.	Sublimed sulphur	Kg	2	156.20							156.20
7.	Hard Paraffin	Kg	2	70.30	4	10.85	16	226.60	17	19.96	368.17
			22	40.46							
8.	Catostaryl Alcohol	Kg	2	70.30	4	10.95	17	33.29	22	40.46	154.90
9.	Yellow soft paraffin	Kg	2	1195.03	26	436.00 (XX)		90.00			1723.63
10.	Creasol	Lts.	3	042.60							842.60
11.	Soft soap	Kg	3	379.10	18	412.30					791.40
12.	Purified water	Lts.	3	421.00	5	417.00	9	442.00	10	203.00	
			14	720.00	18	1069.00	20	20.00	24	163.00	
			28	450.00	35	48.00	23	340.00	6	697.00	
			15	272.00							5262.00
13.	Ammoniated Mercury	Kg	4	5.04	26	12.01 XXXI		6.25			23.30
14.	White Soft paraffin	Kg	4	167.20	117	599.31	22	688.20 (XIX)		98.00	2760.20
		Kg	16	565.40	21	650.10					
15.	Benzyl Benzoate	Kg	5	143.90							143.90
16.	Emulsifying wax	Kg	5	11.90	21	390.60					402.50
17.	Calcium Gluconate	Kg	7	300.00 (XXVII)	45.00						345.00
18.	Starch	Kg	7	39.60	11	5.00	12	3.50	13	31.816	
			19	34.80	29	32.24	30	55.50	31	2.58	
			33	0.79	34	6.25			36	39.57	303.25
			39	12.50	38	39.10					

APPENDIX XII (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
68.	Kaoline		(V)	4500							4500.00
69.	Magnesium sulphate		(VII)	2250							2250.00
70.	Plaster of Paris		XI	225							225.00
71.	Sodium Bicarbonate		XII	2250							2250.00
72.	Sulphanilamide		XIII	45							45.00
73.	Pot. Bromide		XIV	45							45.00
74.	Magnesium Carbonate		XVI	270							270.00
75.	Amm. Carbonate		XVIII	90							90.00
76.	Calcium Carbonate		XXV	450							450.00
77.	Sodium Salicylate		XXVII	225							225.00
78.	Bottles	Nos.									6800.00
79.	Closures	..									6800.00
80.	Labels	..									14000.00
81.	Polythene bags	..									70000.00
82.	Cartons	..									70000.00

Note: Roman figures correspond to corresponding serial numbers of items in Appendix XI.

PURCHASE BOOK

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APPENDIX XIII

Sl. No.	Date	Description	Name of manu- facturer/ supplier	Date & order No.	Date & deli- very. Note No.	Qty. received Kgs. Value Rs	Invoice No. and date	Date cheque/ cash sent.	Re- marks
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To be maintained at Madras.

PURCHASE BOOK

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Sl. No.	Date	Description	Name of manu- facturer	Name of supp. lier.	Invoice No. and date.	Qty. Recd. Kgs. Value Rs.	Qty. sent for analysis	Date sample sent for analysis	Date of re- ceiving ana- lytical report.

To be maintained at Factory:

STOCK STATEMENT FOR THE MONTH OF

Sl. No.	Description of Material	Opening Stock		Receipts		Total		Issues		Closing stock	
		Kgs.	Value	Kgs.	Value	Kgs.	Value	Kgs.	Value	Kgs.	Value
1	2	3	4	5	6	7	8	9	10	11	12

Monthly Statement to Bank

MAJOR FINDINGS AND RECOMMENDATIONS

- OVERTURES TO A NEW PROSPECTIVE -

AN INTRODUCTORY RECAPITULATION

The object of this Thesis has been to study Inventory Control and Costing in Risk Assessment in Bank Lending to Small Scale Units. The Risk (which is the variability of the possible returns) of an investment proposal is measured by a relative measure of dispersion known as coefficient of variation (CV) of the cash flows from the investment over its economic life. The CV is the value obtained by dividing the standard deviation of cash flows by its expected value. The greater the value of CV, the greater is the risk of the investment. I have endeavoured to consider established management accounting principles vis-a-vis inventory control and their relevance to the lending banker in the context of basic canons of lending. I am not sure whether any one can explain fully as to why the learning process for lending is a slow one. Some would say it is an art that can be perfected only over many years of experience and not taught in the form of a Bullet Payment in euro-currency bonds. There are nearly always good reasons for "not lending". But to

use a quotation from James Gilbert, the Adam Smith of modern banking, "a bank that is so conducted as never to make a loss, will seldom make much profit." And to quote Nobel Laureate Albert Szent-Gyorgyi, the discoverer of Vitamin C, "There is but one safe way to avoid mistakes, to do nothing or, atleast, to avoid doing something new." As once aptly observed by retired Master of the Rolls Lord Denning, "Like many other things, a good banker is easier to recognise than to define." And therein lies the need for highlighting the problems of and findings on bank finance to Small Units and making recommendations for reducing the risk component by using the Occam's razor yet ever watching out for the operation of Murphy's Law.

I begin by re-emphasising a point made in the Introduction, viz., no two banking proposals are alike. This leads to Ashby's law which states "Only variety absorbs variety". As Bernard Shaw said (in a different context), the golden rule is that there is no golden rule. No universal key exists. Therefore, for the sake of clarity, the findings and recommendations pertaining to each of the units studied have been presented separately at the end of each empirical study for estimating the

effect of related financial engineering. The ten real life cases given in this dissertation highlight the instructional purposes of the Thesis and are offered as a major pedagogic device for reinforcing my thesis.

It is axiomatic that each SSI Unit will need to formulate its own positive programme of bank finance. The temptation to adopt common "solutions" has to be contained to avoid exacerbation of situations.

The study has, of course, exhibited certain similar problems in bank financing of Small Scale Industrial Units. They show that, though there is no one answer for all, there is a certain harmony, which stand out like Volkswagens in Casino parking lots. Yes, if one stands high atop the Himalayas and looks down into the valleys, many miles deep, one does sense a strange combination of limits, depths and heights relating to each other in harmony. Similarly the problems of financing SSI Units, blend into a holistic understanding.

Successful banking is concerned with the careful balancing of asset and liability. And by doing this with regard to the criteria of quality, quantity and maturity, it is able to create added value. This is the fundamental Banking Equation.

AT THE MACRO OR NATIONAL SETTING

1. Research by Dun and Bradstreet -- and, by a few others -- indicates that failure is particularly common among new firms, ie., those that have been in existence for less than five years. This has been corroborated by my study, too. The most important single cause of business failure has historically been the inability of the unit to promote effectively the product and generate sufficient sales. Difficulties in collecting receivables and in controlling operating expenses have also frequently been the causes of failure.

2. There are some units whose products are highly seasonal, ie., where there are alternative peaks in stockbuilding and billing -- eg., agro-based products like fertilisers, pesticides, fungicides, sprayers, fireworks, hosieries. It is observed that banks encounter difficulties in the assessment of ex ante working capital requirements of such units. At present the guarantee-cum-special hypothecation limit (against both stocks and bills) is applicable only to private or public limited

companies. For other units (partnership firms and sole proprietary units) separate mundy and bill limit only are made available. During the lean season the units go on building the stocks, the bill limit is sparingly used and vice-versa. Till such time, the banks modify the policy on the guarantee-cum-special hypothecation limits, so as to be applicable for all types of units engaged in the manufacture of seasonal products, the banks should work out the possible peaks in the initial stage itself for stocks and bills so that day-to-day excess drawings/BRC problems are minimised, if not entirely avoided. For working out the projections, the available data of the previous year/s should be used.

3. Often there is unintentional diversion of working capital by SSI units due to lack of managerial expertise, into fixed assets, development of new products, development of new jigs and fixtures without proper finance, overstocking. This leads to reduction in circulating working capital which, in turn, leads to low level of operations and losses. Provision of training (for entrepreneurs) on working capital management, by banks, on the lines of the Entrepreneur Development Scheme of

State Bank of India, the programmes of the Management Development Institute, New Delhi, in conjunction with Small Industries Service Institute, State Technical Consultancy Organisation, Small Industries Development Organisation, New Delhi, National Small Industries Corporation, New Delhi, and Small Industry Extension Training Institute, Hyderabad is recommended. A National Entrepreneurial Research & Development Centre like the one in Malaysia may be set up to train entrepreneurs in what Jisaku Akatsu of Komatsu Corporation and Prof. R. Hirono of Seikei University call, "Total Quality Control" and what Prof. M.K. Datta Chandhuri of the Delhi School of Economics calls more comprehensively as "software aspect of infrastructure". In short, to tutor entrepreneurs all about, to choose a phoneme between the Palaeopolis of Academia and the Charybdis of commerce, Cybernetics. The recent move by the all India financial institutions, IDBI, ICICI, IFCI and SBI to set up the Entrepreneurship Development Institute in Ahmedabad and the introduction of a M S Degree in Entrepreneurship by the Indian Institute of Technology Madras, are moves in this direction. A famous Chinese philosopher rightly said: "If you wish to plan for a year,

sow seeds. If you wish to plan for ten years, plant trees. If you wish to plan for a lifetime, develop men". So, it is the entrepreneur who must be developed. I may point out here that the present Chairman of Chase Manhattan Bank in a recent lecture at the Harvard Business School listed "quality of management" as the number-one-cause for failure of Small Business in the U.S.A.

4. SSI Units in Tamil Nadu find it difficult to meet their Sales Tax dues as banks do not finance them and because they suffer from paucity of finance. Some of the State Governments like the Government of Maharashtra do give Sales Tax Loans to SSI Units. This system needs to be adopted in other States.

5. A separate specialised Bank for Small Industry along the lines of the Small and Medium Industry Bank (SMIB) of the Republic of Korea, to cater to and appreciate the special needs and problems of the Sector may be set up. The recently-established Export Import Bank of India and the National Agriculture Bank for Rural Development are efforts in a similar direction. The proposed special Bank for the Small Industry Sector

Can, in order to augment its foreign currency resources to finance the foreign exchange requirements of SSI Units, avail of the credit-line from international institutions like the Asian Development Bank (ADB) in Manila, agree to arrange co-financing with ADB and so on. Apart from becoming the main financier of small industries and their most important source of foreign currency, the proposed Bank can also provide other forms of advisory and technical assistance. The Industrial Development Bank of India (IDBI), which is the apex industrial financial institution in the country, renders direct financial assistance to large and medium scale industries and only indirect financial assistance (mainly in the form of refinancing) to SSI. Thus there is a clear case for a separate autonomous apex financial institution for the SSI Sector.

6. Today the Public Sector Banks in India have a socio-economic responsibility also. Should a banker be governed solely by private profitability or something more like the Social Rate of Return?

Bryce* provides a solution to the riddle when he

*Bryce M., Policies and methods for Industrial Development, Kogakusha Co. Ltd, Tokyo, 1960 P.32-33.

defines the desirable rate of return "as the total net measurable rate of return to the economy on an investment". This is a macro-economic view of profit potential. Normally, no industrial project with an Internal Rate of Return of less than 15% should be approved by banks, except perhaps projects belonging to the core sector and "Priority Sector". Because of the implicit Social Rate of Return, one may also ask whether there is or not a case for separating commercial lending from social purpose lending.*

7. My study of SSI Units also revealed that the existing scheme of concession in Excise Duty hampered continuous growth and, hence, it needs to be liberalised.

8. It has been observed that the present poor equity base of SSI units is responsible to a large extent for its poor performance as it reduces the additional borrowing capacity of the units in time of dire necessity and the resultant excessive dependence on loans increases the interest burden.

It is suggested - to rejuvenate sick units and reduce industrial sickness - that an Equity Fund be created and the modalities of administering assistance out of this Fund be evolved jointly by a consortium of banks and the

* For a detailed study of social analysis of projects, see: I. Little & J. Mirrlees, *Social Cost Benefit Analysis*, LCOECD, Paris, 1968; The Charles Moskowitz lectures, New York, 1972, by Jan Tinbergen.

term-lending institutions. This arrangement can be made on these lines: (a) Assuming the debt-equity ratio 4:1 as reasonably satisfactory, any shortfall in the owned funds to this extent should be given as equity loan, and (b) in the case of non-adherence to financial discipline by entrepreneurs, the facility should be withdrawn by converting it into interest-bearing credit.

9. This study of SSI Units has revealed that the major underlying contours of industrial sickness emanate primarily from liquidity problems.

One of the main objectives of management in the control of the company's liquidity is to maintain the lowest possible ratio of working capital to turnover. It is against this macro-economic backdrop that I am making the following suggestion for implementation by banks, industry and Government. In Britain, banks have subsidiaries which engage in other activities. For instance, Griffin Factors Ltd, is a subsidiary of Midland Bank plc. In India, there is a proposal now in Parliament to amend the banking law to permit subsidiaries. Two points may be noted here in this regard:

(i) For several reasons full-fledged Factoring has yet to establish itself in India and its role in working capital management is yet to be appreciated. Factoring smoothens Cash Flow and increases it.

(ii) Leasing is another means to release funds for meeting working capital needs. It also helps capital gearing. While the lessors can provide for depreciation in their books, the lessees can treat lease-rent as an item of cost in their profit and loss account. Hopefully, it will become eventually as popular as in the U.S.A. and U.K.

10. There is a thorough confusion about what should be the role of SSI. Small Units are venturing into product areas which should logically lie in the domain of the large scale sector. For example, due to some misguided egalitarian logic, the Government is promoting small enterprises in the finished product field, like TV receivers. As a consequence, such absurdly low capacities have sprung up that there is no possibility of substantial investment in areas like design, development and product improvement.

I suggest, therefore, that as in Japan, the SSI

Sector is treated basically as a ^{hinterland} supplier to large manufacturers. While the large industries should concentrate on assembly, finishing and some major highly specific jobs (like large casting and forgings in the case of the automobile industry), the SSI Sector should play the role of sub-contractors and ancillaries to the parent large enterprise.

This symbiosis will narrow down the penumbra zone between big and small industries and should result in:

- (a) Technology transfer to the SSI Units. (My study found the sector to be technologically primitive).
- (b) Research & Development facilities being made available to the SSI Units. (My study perceived an almost total lack of this facility therein).
- (c) Benefit of managerial experience to the SSI Sector. (My study detected a massive deficiency in this direction).
- (d) Diffusion of marketing problems - a major constraint also - for the SSI Sector.

11. I also suggest a rapid diffusion of mechatronic equipment in the SSI Sector

- (a) to combat the chronic shortage of skilled workers;

- (b) for increasing demand for small lot production of a variety of commodities (flexibility) to reduce vulnerability to change in business cycles;
- (c) for a sharp rise in productivity;
- (d) for improvement of quality and precision of products;
- (e) for lowering unionisation (a major confinement in some States like West Bengal and Maharashtra); and
- (f) for lowering the Cost of Labour.

The Ministry of International Trade and Industry which played a key role in catalysing Japan's phenomenal post-war industrial progress, sponsored, inter-alia, the establishment of a robot leasing company (Japan Robot Lease). In the same way, the Ministry of Industries of the Government of India can float a leasing company for diffusion of mechatronic equipment for the SSI Sector.

12. I recommend the establishment of a Small Firms Information Centre described by the acronym SFIC, along the lines spelled out by Professor Leslie Chadwick of the University of Bradford, to act as Advisory Service between banks and entrepreneurs. This will

be a useful Clearing House for both, banks as well as entrepreneurs, for sorting out enigmas.

13. The definitional aspects to quantify a SSI Unit in terms of total investment, number of employees, volume of sales and the like are unsatisfactory as we all know. The Bolton Committee in UK defined a Small Firm in manufacturing as an enterprise with 200 employees or less and in retailing with an annual turnover of £ 50,000 ^{or less} (at 1963 prices). In continental Europe, it is usual to distinguish between small and medium enterprises (Petites et Moyennes Enterprises [PME]); in manufacturing small enterprises are those with 50 employees or less and medium with 51-300 employees. In the USA, the Small Business Act (1953) states that "a small business concern shall be deemed to be one which is independently owned and operated and which is not dominant in its field of operation." Thus, you have American Motors, a substantial enterprise with 28,000 employees, been classified as a Small Firm because it has only 2% of the US car market. With the passage of time come inexorable changes in the real value of the monetary unit (owing to inflation), and technological innovation continually changes the proportions of labour and capital inputs.

Hence, a quantitative definition becomes obsolete and irrelevant soon. It seems best to me, as Professor Ross Robertson of Indiana University and Professor Deane Carson of Columbia University say, to define a SSI Unit "in relative terms".

I would, therefore, commend a definition of SSI Unit which says that as long as its guiding venturer and chief operating officer maintains direct and firm lines of communication with his operating managers and keeps personal ties with a large proportion of his work force, it is a small unit. I admit such a distinction is unsatisfactory in some respects, but it brings into focus the ultimate distinguishing characteristic of the small unit, the crucial importance of the individual entrepreneur in its ultimate success or failure.

14. My survey divulged that banks discriminated against SSI Units in lending during tight money conditions. The discrimination issue has political overtones and only government policy through priority sector exemptions, etc., can stem this discrimination. There is a continuing debate regarding empirical validity between Professors J. Galbraith, Thomas Meltzer and D. Carson

interpreting findings as definitive evidence of discrimination of this issue on one hand, and Professors G. Bach, D. Hodgman, W. Mazek, J. Christian and the Wharton School of the University of Pennsylvania study (1967) rejecting the discrimination hypothesis, on the other.

15. There is no universally accepted definition of Working Capital (WC).^{*} Broadly speaking, it is taken either as the total current assets (which are also called circulating capital or trading assets), or the excess of current assets[⊙] over current liabilities.[£]

* See Joseph F. Bradley, Administrative Financial Management, Holt, Rinehart and Winston, New York, 1964, pp.2-3: A recent attempt at defining the term "working capital" has widened the gap still more. According to it, the meaning of the term "working capital" may be limited to capital consumed during the fiscal period creating current income. In accordance with this idea, the value of that portion of a company's land, buildings and equipment which is applicable to the production of current as distinguished from future goods falls within the scope of "working capital". See Wilford J. Eitmen and James N. Holtz, "Working Capital Management", in Karl A. Boedecker et al (ed.), Essays on Business Finance, Mastereo Press, Ann Arbor, 4th edition, pp.209-211.

⊙ Current assets are those assets that in the ordinary course of business can be or will be turned into cash within a brief period (not exceeding one year normally) without undergoing diminution of value and without disrupting the organization.

£ See next page.

"Working capital, according to the time honoured definition", says Professor Harry G. Guthmann and Herbert E. Dougall, "is the excess of current assets over current liabilities."* Accountants' Handbook[©] completely endorses this view, while to Professor C.W. Gerstenberg, "any comprehensive discussion on the working capital includes the excess of current assets over current liabilities".[§] In recent years, there has been a systematic attempt to relate the level of bank finance permissible to industry (other than term loans for financing acquisitions of capital assets) to the WC requirements based on an analysis of the projected financial position of the borrower. Successive committees on bank finance have recommended the adoption of methods which limit the permissible bank finance to 75% of the WC gap (Method 1) or of current assets further reduced by available current liabilities (Method 2).

£ Current liabilities are those liabilities intended at their inception to be paid in the ordinary course of business within a reasonably short time (normally within a year) out of the current assets or the income of the business.

* Harry G. Guthmann and Herbert E. Dougall, Corporate Financial Policy, Prentice-Hall, New York, P.387

© Rufus Wixon (ed.), Accountants' Handbook, The Ronald Press Co., New York, 4th edition, 1957, p.254.

§ C.W. Gerstenberg, Financial Organisation & Management, Prentice Hall, New York, P.282

A correct understanding of the term WC assumes importance since an incorrect definition can lead to denial of bank finance legitimately due to an industrial organisation giving an illustration of the Morton's Fork. There is reason to believe that the level of clarity in the minds of bankers or the industry in this regard needs to be improved.

Even the affected borrower, apart from expressing anguish over the inadequate bank finance sanctioned, is not able to pinpoint the conceptual error in the computation. Forms, such as those used for determining the maximum permissible bank finance under the Credit Authorisation Scheme, have a mind-boggling effect and interfere with logical reasoning. And, the banker is unable to go beyond the boundaries set by the established methods of determination of a maximum permissible bank finance. It is time the Reserve Bank undertook a more detailed study of the problem.

The fundamental principle of WC finance is to seek an avenue whereby funds can be sought for the leadtime involved in the production. Core assets are those which remain in the pipe-line all the time.

I, therefore, propose the following empirical definitions which are strictly based on the Operating Cycle concept; and, bank finance computed on the basis of the resultant classification will be determined solely by changes in business position and not by accounting practices.

Working Capital refers to the total of current assets required to support a given level of operations less the current liabilities incurred against them.

Current Assets are the cash and other assets reasonably expected to be realised in cash during the normal operating cycle of a business and will include assets realisable beyond one year if the operating cycle exceeds a year. The operating cycle refers to the process starting with the acquisition of materials and ending with the realisation of sale proceeds.

Current Liabilities are limited to obligations for items which have entered into the operating cycle , such as trade credit but will not include purely financial liabilities such as current instalments of long term debt, proposed dividend, provision for taxes, etc.

16. Should there be a different set of Normally Accepted Accounting Principles (NAAP) for SSI Units? Is the universal application of Accounting Standards (AS), national or international, as effective when applied to small units?*

I found the following criticisms of AS, by SSI Units, during my survey:

- (i) that the AS are too complicated to be easily adopted by them;
- (ii) that the costs of adopting the AS are too high, vis-a-vis, the benefits of better management; and
- (iii) that some of the NAAP are not germane to SSI financial reporting requirements.

Although I acquiesce that a dual AS can have undesirable effects, I none-the-less recommend, as a blueprint for action that:

- (a) the reporting requirement can be cleaved into
 - (i) a Core Group of Accounting information that will apply to all business irrespective of size and
 - (ii) a group of information that will apply only selectively;

* The Cohen Commission (1978) (U.S.A.) has concluded against a separate set of standards for Small business.

(b) every AS can be simplified in such a manner that both big and small units can easily apply.

THE PERSPECTIVE FROM BANKS AND INDUSTRY

17. The inflationary turbulence is not taken into account while assessing the requirements of working capital for the units. For example, two years back, a working capital limit of Rs.6 lacs was sanctioned to a new rubber unit. The gestation period took two years. The limit of Rs.6 lacs had been fixed on the basis of the rubber price of Rs.10.50 per kg. ruling at the time of project appraisal. The rubber price now being Rs.14.50 per kg, the limit is inadequate to achieve the anticipated sales. It follows, therefore, that the inflationary aspect of raw materials for one to two years hence should be taken into consideration. Since inflation seems to have become a permanent feature of modern economies, it is recommended that Inflation Accounting be made a part and parcel of working capital assessments. Adoption of Inflation Accounting is also recommended as it is perfectly possible for a company to show high profits when it is going bankrupt. The GNP deflator is, many economists like Bank Negara Malaysia Deputy Governor Dr. Lin See Yan

think, a better and more comprehensive gauge of the underlying rate of inflation. During inflationary conditions, firms have an incentive to invest more heavily in inventory than is indicated by the minimum cost calculation. "Inventory Speculation" is the term used to describe this extra investment. Bankers should insist for meaningful analysis and evaluation on the introduction of Inflation Accounting as balance-sheets and profit and loss accounts prepared on the basis of historical costs provide neither an adequate measurement of the "real" profits nor indicate the true financial position of the company. Profits reported on historical cost basis are much higher than what would have been the case if the profits are computed on the basis of replacement value of assets. Also, in a historical-cost based balance-sheet, long and medium term assets are shown at misleading values, which are much lower than their replacement costs, leading to improper valuation of the networth of such business. By paying dividends out of illusory book profits, when there are only real losses, the companies are really paying dividend out of capital. Although the various professional accounting bodies have produced an enormous amount of paper indicating how inflation-corrected accounting should be undertaken,

except in UK and the USA where inflation accounting have been introduced as a legal or quasi-legal requirement, nothing much has happened except some purple prose in the Chairman's statement. There is still no comprehensive official pronouncement available in this regard.

I suggest that inventories and depreciation should be reflected at the current replacement costs for measuring the "real" profitability for each of the company's products. For this purpose, it is quite in order to use reasonable approximations rather than getting tied up in knots trying to locate the appropriate economic indices of one kind or the other. Or, alternatively, the purchase price of "A" class items (10% items in number constituting around 70% in terms of value of annual consumption) based on ABC analysis should be forecast every quarter and used for pricing out materials. This method should be relatively easy to administer as the number of "A" items will be small. The variations in purchase price can be picked up at the time of the purchase by means of a price variance account and the net variance distributed onto the product cost as an overhead item. While reporting product-wise profitability, it is essential to include

full inflation-corrected manufacturing costs (based on replacement costs). This is based on the understanding that all manufactured products use capacity and there is an opportunity cost of this capacity. It is very important, indeed critical, to charge interest at current borrowing rates on average working capital (based on replacement values), locked up in cash production. In this sense, interest becomes a variable cost because it varies directly with the amount of Working Capital invested, which in turn is a function of the volume of operations. We can, therefore, say that if the product is not manufactured, the working capital employed in it can be liquidated to release funds for investment elsewhere.

18. The Tandon Committee norms for stocking period of raw materials, finished goods, etc., are erroneous in an uncertain economy like ours, where controlled (quota) items are decontrolled, scarce items become plentiful, OGL items in import policy are canalised, and so on. It follows, therefore, that it is not pragmatic to fix rigid norms. A lot of flexibility is called for. It is better to have a quantitative approach

in fixing the requirements rather than a period-based approach especially in the case of raw materials and finished goods. For example, a person using Soda Ash as raw material keeps a minimum stock of 10 tonnes. The Soda Ash arrives, however, in wagon loads of 30 tonnes. So, the maximum working capital requirement will have to be evaluated for stocking 40 tonnes (10+30) or Rs.1 lac (40 x Rs.2,500 per tonne).

19. Because of credit squeeze and reduction of limits, cash flow and liquidity problems, etc., large units - which generally paid for materials purchased from Small Units in 60 days before - now pay the bills only after 120 days. Hence, if the working capital is assessed on 60 days' requirement of bills, the SSI Units do not get the actual requirements. The financing bank should have a flexible approach by temporarily increasing the cover period for bills and bill limits in such periods of crisis.

20. Credit on purchase of materials and expense creditors (Sales Tax, especially) create problems for bankers. Many units get double finance for stocks - the unpaid stocks are hypothecated to banks and they

get money for unpaid stocks. Strictly speaking, in 95% of the units, the margins on working capital stipulated by the banks are met not by the entrepreneur's capital but through purchase creditors and expense creditors. This should not be allowed. The assessment of working capital requirement should be such that unpaid stocks are deducted from the working capital requirement. Similarly, expense creditors should be deducted from semi-finished goods. While computing the advance value and the drawing power of the units depending on stock statements, banks should find out the quantum of purchase creditors and expense creditors, and these should be deducted from stocks before applying margins so as to arrive at the drawing power/advance value.

21. A big flaw-area which nobody seems to have brought out earlier is the cash losses which a SSI Unit incurs during the initial production period. Most units take 6 months to 3 years to achieve cash break-even sales after starting production. This results in diversion of working capital. Bankers do not finance such cash losses as there is no security. What usually happens in such cases is that the cash loss

is ultimately met by the banks as clean drawings in the working capital. Then the bank tightens the grip on the SSI Unit in many cases by not allowing the unit to operate the account till it is made regular by putting in money. This naturally affects the units. So, it is essential that bankers finance cash losses also till the unit achieves the break-even point. I may point out that 5 years is the accepted norm by the Small Business Administration of the US Government, in this regard.

22. In many countries like Japan, Working Capital is given as a term loan which has to be repaid over a period of time. In India Working Capital cash credit increases with the level of operations of the units. I suggest the adoption of the system prevalent in Japan so that dependence on bank finance is reduced; in it, the incentive to plough back profit will be given and the staff employed in monitoring cash credits will be reduced.

23. It need hardly be emphasised that the book values of assets as shown in the balance sheet should NOT be accepted implicitly for valuation purposes - the balance sheet figures represent only the unamortized portion of

money invested in assets.

The lower of cost or market value which is the prevalent mode of valuation, too, is unsound for a variety of reasons like:

- (a) The valuation in one year may represent substantially the market price and, in another year, the cost. This oscillation between the market price and cost from year to year, would distort the analysis and interpretation of financial statements.
- (b) This method involves valuation at market price when the market price is lower than cost and thereby, it charges a loss in the Profit and Loss Account of the year in which the loss has not actually arisen, distorting the view of earnings.
- (c) Market price may connote replacement cost or realizable value. This method does not state in what specific sense the two terms are to be used.

24. Many customers like Government undertakings and large industries retain 10% of the bills for items supplied

by SSI Units for a long time (6 to 9 months) and, in many cases I have come across the retention money is not paid. Banks are hesitant to finance 10% retention bills for more than 3 months.

Most of the SSI Units have a profit margin of 2% to 10% and this blocking of 10%, which is higher than the profit margin, reduces the availability of working capital.

It is suggested that banks should provide a separate bill limit with higher cover period of 6 to 9 months for the 10% retentions so that the unit receives sufficient finance for working capital. The banks along with the units should follow up the bills to recover the retentions. This aspect is more pronounced in the cases of units engaged in pesticides, furnace manufacturers, control panels, etc.

25. A painstaking researcher will find a policy of AD HOCISM and reckless lending to be the root of the failure of cooperative banking in India. I found that they still continue to give weightage to the Balance Sheets only and give a scant regard to Cash Flows. This is not a correct approach. According to G. Williams,

Vice-Chairman of J. Henry Schroderwagg & Company, "the tendency towards exclusive concentration on balance-sheet ratios is being supplemented by increasing attention to Cash Flow projections." This is because, as Philip Gheerbrant and Anthony Jolliffe have rightly put it, balance-sheets and revenue accounts look backwards, while Cash Flow looks forward. Notwithstanding the evidence presented to the Wilson Committee, banks still appear to place much greater emphasis on historical accounting figures than on forward projections of trading and cash flow.

What does this mean to the lending banker? I think the following information on corporate customer accounts could be most useful:

- (a) Wherever profit is used in ratio analysis, potential Cash Flow from operations and/or internally generated Cash Flow might provide a revealing additional comparison.
- (b) The ratio comparing internally generated Cash Flow to additional operating investments would reveal the extent to which the firm was living within its means.

- (c) A development of the analysis will indicate what inflation does to Cash Flow.

The lending banker should try to find out the non-optimum operating procedures of the borrower to become alert to risks. Of the various Models structured by Pogue, Faucett and Bussard*, Lerner[©], Reed[£], Baumol[§] and others, I recommend the use of the Miller and Orr[§] model which has, reportedly, a 40% accuracy.

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- * G. Pogue, R. Faucett and R. Bussard: Cash Management; a system approach: Industrial Management Review: Vol.II, P.55-74.
- © E.M. Lerner, Simulating a Cash Budget, California Management Review, Vol.9, P.79-86.
- £ W. Reed, Profits from better Cash Management, Financial Executive, Vol.40, May 1972, P.40-56.
- § W.J. Baumol, The Transactions Demand for cash: an inventory theoretic approach, Quarterly Journal of Economics, November 1952.
- § M.H. Miller and D. Orr, A model of the Demand for Money by Firms, Quarterly Journal of Economics, August 1966. The mathematical proof of this model is rather complicated, the interested reader is therefore referred to the original article.

In the Miller and Orr stochastic Cash Flow Model, the cash balance is allowed to wander freely until it reaches either (i) an upper control limit 'h', whereupon it is reduced to some return point 'Z' or, (ii) a lower control limit 'r' which triggers a liquidation of investments to restore the cash balance to 'Z'. Given this policy structure, the return point 'Z' and the upper control limit 'h' are derived by minimizing the expected cost function with respect to 'h' and 'Z', setting these expressions equal to zero and solving. The lower control limit 'r' is assumed given, reflecting perhaps some intuitive assessment of the goodwill consequences of small cash balances. In their original derivation, Miller and Orr assume $r = 0$ for the sake of mathematical simplicity, but any user of the model is not constrained to make this assumption. In the special case where the probability of a decrease in the cash balance is equal to the probability of an increase, it can be shown that the optimum value of 'h' and 'Z' are

$$Z = \left(\frac{3b \sigma^2}{4i} \right)^{1/3}$$

$$h = 3Z$$

where σ^2 = the variation of daily changes in the cash balance; b = fixed minimum fees and i = cost of capital.

In the preparation of the Cash Flow projections, I suggest the useful life of the project be divided into three periods as under:

- (i) Project implementation stage,
- (ii) Initial operating years,
- (iii) Subsequent operating years till the end of the useful life.

Perhaps, with a suitable Cash Flow analysis and timely remedial action, industrial sickness could be avoided. Cash Flow analysis, done at regular intervals, offers an excellent method of control of various factors affecting profitability. Wider use of Cash Flow statements is, therefore, recommended, unlike the practice prevalent now, where Cash Flow statements are given importance only at the time of appraisal of the proposal and thereafter religiously asked for but not looked into.

26. In the interests of appraisal, control, costs, time, profitability and accuracy, it is suggested that computers begin to be used. Simple programmes have been developed to quantify judgments about the borrower's standing, and to compute the Internal Rate of Return on his project. By way of illustration, a mention may

be made here of the system devised by Citibank N.A., USA, to computerize its loaning function. It is a package of six computer programmes, viz., HISTORY, FUNFLO, MODFUN, ALTERN, SPREAD, and UPDATE, each catering to a specific area of analysis. To elaborate: HISTORY calculates some key financial ratios upto 6 years and trends; MODFUN produces a complete financial forecast for the next five time-intervals - months, quarters or years. It prints out how much, when and in what manner finance will be needed and raised. The ALTERN programme evaluates the financial alternatives. SPREAD produces a complete synopsis of the company's financial statements for the preceding six years for use in other calculations. UPDATE feeds new figures into the computer as and when received, and, thus, automatically updates the data. Top American, Japanese and European banks like American Express, Bank of Tokyo, Midland Bank plc., and Barclays International plc., - all use computers profitably. Since the entire emphasis of financial analysis is on logical conclusions, computerization of analysis will reduce the riskiness of bank lending. Using Database Management Systems and on-line processing, accurate,

analytic, relevant information becomes available in seconds. R.J. White, President of the Australian Institute of Bankers and other experts see a big role for computers in banks in the financial environment of the future. A beginning can, at least, be made by setting up regional data processing centres.

27. The use of Numerical Credit Rating System (NCRS) is strongly recommended for introduction in all banks in India, where only a few banks like Grindlays plc., use it at the moment. This technique holds great promise in the screening of loan applications and in reducing risk in bank lending to SSI sector. Statistical weights are assigned to some basic non-financial factors with reference to each particular client. Marks are awarded to each of the important variables which bear upon the liquidity and solvency of the firm/individual. The aggregate score helps the banker to categorise the client according to "riskiness". In Japan, excellent credit rating services exist.

28. The existing Standard Format used for Assessment of Working Capital Requirements by the public sector banks in India - which constitute 92% of the banking sector in the country - suffers from some severe drawbacks.

This aspect stands out in technicolour against the monochrome of assessments done by banks now. In order to make my findings and recommendations in this aspect clear, I am presenting first the Format in use, then highlighting its shortcomings as revealed in this study and thereafter suggesting a new Format for use by banks.

Format now in use

ASSESSMENT OF WORKING CAPITAL REQUIREMENTS

Name of the Unit:

* Anticipated monthly sales Rs.

§ Cost of production per month Rs.

Cost of raw materials per
month Rs.

* Sales to be computed at the maximum level of anticipated production during the next 12 months.

§ Cost of production includes cost of raw materials plus all expenses.

Item	Stocking/ payment period	Working Capital reqd.	Margin % value	Permissi- ble limit
i. Imported raw materials	months			
ii. Indigenous raw materials	months			
iii. Stock-in-process	weeks			
iv. Finished goods	weeks			
v. Sundry Debtors [§]	months			
vi. Expenses	months			
Total				
Total working capital required		Rs.		(A)
LESS				
i) Liquid surplus in balance sheet as on _____		Rs.		
ii) Credit on purchases (.... month)		Rs.		
iii) Limits recommended Deficit (A-B)		Rs.		
		-----	Rs.	(B)
			-----	Rs
				(C)

§ State, under "Working Capital Required" the value receivable at cost, and under "Permissible Limit", value thereof at sales value as margin.

For items (iii) and (iv) the basis of calculation would be the cost of production. Deficit, if any in balance-sheet to be added to working capital requirements.

The limitations of this Format

My study showed that the use of the existing Format leads to either over-financing or under-financing.

(a) Normally, the Ex-factory Sales are taken to mean Sales for assessing Working Capital. This leads to under-financing for bills. The Invoice Value of Sales (gross sales, ie., ex-factory value + Excise Duty + Sales Tax + freight outwards) should be the basis for assessment of bill finance since it is the invoice value of bills that is being financed and not the ex-factory value of Sales.

(b) At the semi-finished and finished goods stages, the valuation is based on cost of production which normally includes both direct selling expenses and non-cash expenses like depreciation. This is incorrect. For semi-finished goods and finished goods, the valuation should be based on cost of production excluding direct selling expenses (commission, freight outwards, excise duty, sales tax, etc.) and non-cash expenses like depreciation.

(c) Semi-finished goods are valued at cost of production (Raw Materials + value added), which is not correct. This assumption leads to substantial over-

financing in units where the processing time is long. The correct assessment of semi-finished goods is given in (b) above.

(d) While calculating liquid surplus, the latest available balance-sheet figures are taken, which normally will be six months old at least. The correct procedure will be to take the current figures of current assets and current liabilities, and then arrive at the liquid surplus. Also, while assessing the current assets and current liabilities, care should be taken to remove stagnant stocks and bad and doubtful bills from current assets to arrive at the genuine liquid surplus.

(e) While arriving at the working capital deficit, creditors for purchases are reduced but not creditors for expenses and outstanding expenses. In an unit, normally there will be substantial expense creditors as it enjoys credit, on an average: one month Sales Tax; one month power; one to two months telephone expenses; 15 days wages and salaries; and 45 days interest on term loans and working capital (interest is charged only once in three months). So, for assessing the actual deficit, creditors for expenses and outstanding expenses must be reduced.

(f) Normally, the deficit in working capital - however big - will have to be financed by injection of fresh capital or by profits. Usually, for running units, it is almost impossible to bring in extra finance as capital to bridge the working capital deficit. So, the only alternative is to plough back profits. It is, therefore, necessary to ensure that the cash accruals available in the first-operating cycle (after meeting the long term repayment obligations during the period of the operation cycle) is more than the working capital deficit. Otherwise, there will be a shortage of working capital which will bring down the level of operation.

Suggested Format For Working Capital Assessment
(using hypothetical figures)

For 1983

Assessment on 31.12.1982

	Figures in Rs. (Lacs) -----
(i) Anticipated Monthly Gross Sales (Including excise duty, sales tax and freight outwards)	2.20
(ii) Anticipated Monthly Net Sales (Excluding excise duty, sales tax and freight outwards)	1.70

(iii)	Raw materials consumption per month	1.00
(iv)	Cost of production (excluding direct selling expenses, excise duty, sales tax and depreciation)	1.50
(v)	Cost of production excluding depreciation	2.00

Item	Stocking/ payment period	Working capital reqd.	Margin	Permitted limit
Raw materials (Based on iii)	2 months	2.00	25%	1.50
Semifinished goods (Based on iv)	1/2 month	0.75	33.5%	0.50
Finished goods (Based on iv)	1 month	1.50		1.00
Bills	2 months at invoice value (based on i) 4.40 at cost (based on v) 4.00		10%	3.96
Expenses	1/2 month (based on 4-3)	0.25	100%	--
(A) Total working capital required				8.50 (A)
LESS (i) Liquid surplus available in Balance Sheet as on 31.12.82			0.30	
(ii) Creditors for purchases 1/2 month			0.50	
(iii) Creditors for expenses 1/2 month			0.50	
(iv) Limits recommended			<u>6.90</u>	8.20 (B)
Deficit (A-B)				0.30

LIQUIDITY POSITION AS ON 31.12.1982

(Actual circulating Current Assets & Current Liabilities)

		(Rs. in lacs)	
Current Liabilities		Current Assets	
Bank cash credit	6.0	Stocks	3.50
Creditors for purchases	0.40	Bills	3.50
Creditors for expenses & outstanding expenses	0.40	Cash	0.10
	-----		-----
	6.80		7.10

Liquid surplus $7.10 - 6.80 = 0.30$

The operating cycle is 5.5 months ($2 + \frac{1}{2} + 1 + 2$)

Number of operating cycles in a year = $\frac{12}{5.5} = 2.2$

Cash accrual per year = Rs.2.4 lacs (assuming no tax)

Cash accrual per operating cycle = $\frac{2.4}{2.2} = 1.1$ lacs

Repayment of Term Loan in the first operating cycle
= Rs.0.30 lacs

Net amount available for meeting working capital
deficit in the first operating cycle = $1.10 - 0.30$
= 0.80 lacs.
Deficit = 0.30 lacs

Hence, Working Capital deficit can be easily met.

29. A common forecasting problem faced by banks in evaluating estimates provided to it by units - and by the industry - is one of estimating total industry sales during the next year. One method - which I recommend for wide use as a pre-emptive strategy - is of the use of an exponential smoothing technique represented by the following equation:

$$F_t = (S_{t-1}) + (1 - \alpha)(F_{t-1})$$

Where

F_t = Sales forecast for the next year,

S_{t-1} = Actual sales this year,

F_{t-1} = Forecast for this year (made last year), and

α = a smoothing constant.

In simple terms, this equation states that the next year's sales will be governed by two factors: (a) The market's behaviour (sales) this year, (b) The market's behaviours in previous periods as summarized in the forecast made for this year.

30. My survey detected that Trade Credit (short-term credit extended by one non-financial business firm to another) was the cheapest source of funds to a SSI Unit. I would, therefore, agree with Professor Robert Johnson of

Purdue University that it is vital to monitor its use properly. I must, however, in all fairness, mention that Professor Thomas Mayer and Professor P. MiCszkowski of Queen's University in Canada have warned against the unqualified use of Trade Credit as it is "notoriously expensive" and adversely affects the firm's credit standing. In other words, there is a continuing debate with regard to its empirical validity. Possibly, both are valid in different socio-economic environments.

31. Research & Development (R & D) is important to the survival and growth of SSI Units, especially those engaged in electronics, drugs, etc. Since a SSI Unit cannot afford the luxury of waiting for several years, the R & D payoff must be short-term. Of course, I admit, uncertainty of success, assurance of product quality, non-availability of manpower, facilities and capital are big constraints. (For example, some work can be done on Magneto-hydrodynamics [MHD] power generation as in US, USSR and China and in Fuel Cells for isothermal electrochemical transformation of hydrogen against rapidly depleting fossil fuel).

Unfortunately, in-house R & D is there more with an

eye on the tax benefits than anything else. An information agency, along the lines of the Science and Technology Agency in Japan, can be set up to maintain a data bank for SSI Units of the latest research findings in various fields. A study of the excellent information collection systems of Japan's giant trading houses like Marubeni and Mitsui will be of great benefit.*

Even in the OECD countries, the vast majority of small firms do not carry out any significant R & D work. For the few that do, R & D fall into firms which have just begun to exploit a new invention, either their own or that of an independent inventor. Some U.K. examples are plug-board sequence control for machine tools (Nickels Automatic); printed circuit board for electronics industry (Technograph) and atmospheric press packing for raw wool fibres (Roypack).

Turning to the empirical correlation between the size of a firm and the innovative contribution, as distinct from inventions, OECD studies and those of the Science Policy Research Unit, Sussex, indicate that for Britain, France, Japan and Germany, the following

* The best hope lies in industries like electronics and biotechnology.

tendencies are broadly common:-

(a) In capital-intensive areas of chemicals, cement, pharmaceuticals, steel, nuclear power, ship-building, aerospace and the like, small firms hardly play a role. The large firms dominate invention and innovation.

(b) In textiles, paper and board, leather and footwear, machine tools, furniture, electronics and scientific instruments, small firms account for 15% of the innovations and 20% of the value of net output.

(c) Small firms make their contributions mainly in the field of machinery and instrument innovations where capital intensity and development costs are low for many products and entry costs low for new firms.

I recommend that Government assistance should cover fundamental research, applied research, development, prototype development, marketing and distribution in one integrated package. So far, the Council of Scientific and Industrial Research(CSIR),

through its laboratories and the National Research Development Corporation (NRDC), have made sporadic efforts only to disseminate information in technical areas, leaving the marketing and distribution aspects to be handled by the Central and State Small Industries Corporations. The result is the absence of an unified approach and negligible progress in innovation.

Each State Small Industries Corporation should coopt representatives of the NRDC, CSIR, and the private sector to form a separate Enterprise Development Board (EDB). Every company wanting assistance should apply to the EDB in its state with full particulars of the innovative activity involved which requires funding. The EDB should focus on overall firm performance in addition to specific innovation projects and ensure that innovation assistance is provided only if the project implies a real risk in relation to aggregate firm resources.

32. Bankers depend on the Current Ratio as a liquidity indicator. But, this suffers from a very crucial weakness as it depends on book-value of current

assets which may not be reliable and which lie generally at different stages of liquidity. What is the way out to provide a banker information on the quality of financial management with regard to working capital?

I suggest the use of Time Adjusted Current Ratio through a process of discounting and close selection. In it, different segments of current assets and liabilities are equated to cash and an Adjusted Current Ratio is calculated to indicate the short-term liquidity of the organisation. This is done through the method of discounting as in case of Discounted Cash Flow (DCF) methods. Normally in DCF calculations, the discount rate is based on the cost of capital. But here the rate should be the company's earning rate before tax. This would be much higher than the cost of capital which is used to find the net cash flow after tax in DCF computations. In a loss making concern, the discount rate should be the borrowing rate. The calculation of the discount factor is as follows:

$$\text{Discount factor} = \frac{1}{\left(1 + \frac{r}{100}\right)^n}$$

where,

Period 'n' is the total cycle time taken to convert cash into raw materials, then into finished products and ultimately back to cash. It is denoted as 'n' used in the calculation as a fraction of a year.

'r' indicates the annual earning rate and is taken as the discounting rate.

AT THE MICRO LEVEL

33. While assessing the ex-ante working capital requirements with regard to semifinished goods (SFG), finished goods and bills the following approach should be adopted:

SFG:

The Process Time (ie., the time taken for the raw materials to become finished product) is computed. The value of SFG to be financed is arrived at using the formula:

$$\text{SFG} = \frac{\text{Raw materials consumption during process time}}{\text{days} + \frac{1}{2} \text{ cash expenses other than direct selling expenses during the process time.}}$$

(The full cash expenses other than direct selling expenses can be taken for computing SFG if the process time is less than a week).

Finished goods:

Finished goods are to be valued at cost of production. While computing finished goods value non-cash expenses like depreciation, writing off of pre-operation expenses, etc., need not be taken into account. Similarly, selling expenses like freight, sales tax, and excise duty, need not be taken.

Bills:

Bills should be valued at cost of sales, ie., in the expenses, excise duty, sales tax, freight outward, are to be added to arrive at cost of sales. However, non-cash expenses like depreciation etc, need not be taken.

34. SSI Units, often engage in only one line of product or activity, - ie., with no diversification of activities - and are, as such, very vulnerable to the vagaries of large units. For instance, the recent sectoral recession in the automobile industry affected the giants like Ashok Leyland Ltd, and the TVS group, in the State of Tamil Nadu; as a direct consequence of this, the numerous SSI Units which supplied components

to them have been hit badly, mainly because there is no diversification and change of product-mix. The banks have to consider this aspect when financing the SSI Units.

35. Often, the success of a SSI Unit depends on the ability of the individual behind the show. If for some reason the individual is not able to continue therein, the unit fails. This vulnerable aspect too, must be looked into by banks when financing it.

36. Lack of advertising ability on the part of SSI Units becomes a handicap in competition for procuring/maintaining a share in the market.

37. Generally, there is an inflexibility in operations of SSI Units - ie., they suffer from an inability to increase/reduce production commensurate with the market demand - due to paucity of finance. While considering financing proposals banks tend to overlook this dimension.

38. It was observed, in the course of this study, that many SSI Units had accumulated surplus raw materials - which they were not actually using but were saying they

would use at a future date - and against which they were obtaining bank finance. This obviously, results in "double financing" by the banks. (The prominent examples are of M.S. items, alloy castings in the case of furnace manufacturers, and tools, jigs, fixtures, in the case of electronics units). This requires rectification.

39. The next step is to build an explicitly dynamic, multi-sector inter-temporally consistent empirical Model for Assessment of Working Capital. This I have ventured to do as follows:

(A) In case of semi-finished goods (SFG)

Case (a) Where all the raw materials are added initially and the value addition is more or less uniform throughout the processing period:

$$SFG = \left(\text{Raw materials consumption per day} + \frac{\text{Value added per day}}{2} \right) \times PT$$

Value added = expenses - (selling expenses and non-cash expenses like depreciation)

PT = processing time in days.

Examples of industries to which applicable: Manufacture of nails, bolts, foundry and soap.

Case (b) Where raw materials are added in stages but value addition is more or less uniform:

$$\text{SFG} = \left(\text{Weighted Average Raw Material Content} + \frac{\text{Value added}}{2} \right) \times \text{PT}$$

Examples of industries to which applicable: Assembly units like manufacture of TV, radio and control panels.

Case (c) Where raw materials are added initially but the value addition is in stages:

$$\text{SFG} = \left(\text{Raw Materials consumption per day} + \text{Weighted averages value added} \right) \times \text{PT}$$

Example of industry to which applicable: Aluminium extrusion.

Case (d) Where both raw materials and value addition are in stages:

$$\text{SFG} = \left(\text{Weighted average raw materials content} + \text{Weighted averages value added} \right) \times \text{PT}$$

Examples of industries to which applicable: Perfumery, Chemicals.

It was found, on analysis of the working capital requirements for SFG in SSI Units using the above models, that the actual stocks were 10% to 40% higher. The difference (a) was marginal in the case of units which followed a production plan and (b) was very pronounced where units were run through "Crisis Management". In such units, it was found that, when a customer pressed for supply of some component, the unit stopped production of the ones in the pipeline and took up the production of the former on a priority basis. As a result, stocks of semi-finished goods piled up and became stagnant in the long run, distorting the stocking.

(B) In the case of Bills.

The 3 variables in case of working capital requirement against Bills are:

(a) Gross Billing per month: Billing is seldom uniform throughout the year, because of seasonality and other factors. Net sales (ex-factory) differs from gross sales (gross billing includes excise duty, sales tax, freight outwards, etc). The basis for calculation should always be gross billing as it indicates the total value of the bill which is discounted/presented to the bank

and is also the amount that is collected from the customers.

(b) Weighted average collection period: The collection period of a bill is the time from the date of invoicing or despatch to the date of credit in the account of the unit. The weighted average collection period can be arrived at by analysing the past bills and will be equal to

$$\frac{\sum B_i C_i}{\sum B_i}$$

where B_i = Value of an individual bill, and

C_i = collection period for bill B_i .

Normally, 3 months are taken for arriving at the weighted average collection period.

Alternatively, the weighted average collection period can be arrived at by analysis of periods for payments of different customers and will be equal to

$$\sum S_i C_i$$

where S_i = percentage sales to customer i (out of the monthly billing),

C_i = the collection period for customer i , and

i = customer.

(c) Profit Margin: Normally, it is taken as the difference between gross sales and cost of sales excluding depreciation, both expressed as a percentage.

(C) In the case of cash:

Cash required is dependent on

- (a) the length of the operating cycle; and
- (b) the extent of uncertainties.

Generally, a cash requirement equal to upto 15 days' cash expenses is provided if the operating cycle is of 3 months or less, and equal to one month's cash expenses is provided if the operating cycle is of more than 3 months.

Mathematically,

$$\begin{aligned} \text{Working Capital} &= \left[\sum_{i=1}^n SS_i + \frac{OQ_i}{2} \right] + \left[RMC + \frac{VAD}{2} \right] PT \\ &+ \left[\sum_{o=1}^n SS_o + \frac{BQ_o}{2} \right] + \left[GSD \times \frac{\sum BiCi}{\sum Bi} \right] S \\ &+ 15 VAD. \end{aligned}$$

Where,

- SS_i = Safety stock or minimum stock for raw material i (in rupees),
- UQ_i = Order Quantity (Purchase Quantity) of raw material (in rupees),
- RMC = Raw Material consumption per day (in rupees),
- V/D = Value added per day
- $$= \frac{\text{Cost of production per month} - \text{Raw Materials consumption per month}}{25 \text{ (working days in a month)}}$$
- PT = Processing time in days (time taken from Raw Material stage to finished goods stage),
- SS₀ = Safety stock of finished goods 0 (in Rupees),
- BQ₀ = Batch Quantity produced of finished goods 0 (in rupees),
- GSD = Average gross sales per day (in rupees) (ex-factory sales + excise duty + sales tax + outward freight)
- B_i = Bill value for Bill i,
- C_i = Collection period for Bill i (the days from despatch of finished goods to the credit of sales proceeds in the account), and
- S = Cost of sales expressed as a fraction of gross selling price.

Assumptions:

- (a) A number of raw materials are used in some industries. For instance, in paints, or electronic industries.
- (b) In manufacturing, all the raw materials are added at the initial stages.

- (c) The value addition is uniform.
- (d) Products are consumer items where production is not against order but for stocking since customers are not willing to wait.
- (e) Production is in batches.
- (f) Uniform sales throughout the year.
- (g) No advance payment for supply of materials is required.

There will be some variations in the Model in some cases as follows:

(i) Where the units are having only a few (less than 4) Raw Materials and the sources of supply are the same as in the case of chemical industries making sodium silicate or potassium nitrate:

$$\begin{aligned} \text{Working capital} = & \left[\sum_{i=1}^n \text{SS}_i + \text{OQ}_i \right] + \left[\text{RMC} + \frac{\text{VAD}}{2} \right] \text{PT} \\ & + \left[\sum_{o=1}^n \text{SS}_o + \frac{\text{BQ}_o}{2} \right] + \left[\text{GSD} \times \frac{\sum \text{BiCi}}{\sum \text{Bi}} \right]^S \\ & + 15 \text{ VAD} \end{aligned}$$

(ii) Where the products are manufactured against orders as in the case of industrial products:

$$\begin{aligned} \text{Working Capital} = & \left[\sum_{i=1}^n \text{SS}_i + \frac{\text{OQ}_i}{2} \right] + \left[\text{RMC} + \frac{\text{VAD}}{2} \right] \text{PT} \\ & + \left[\sum_{o=1}^n \frac{\text{DQ}_o}{2} \right] + \left[\text{GSD} \times \frac{\sum \text{BiCi}}{\sum \text{Bi}} \right]^S + 15 \text{ VAD} \end{aligned}$$

where, DQ_o = Despatch Quantity for product O (in rupees)

(iii) Where there is only one product manufactured against orders as in the case of assembly of components:

$$\text{Working Capital} = \left[\sum_{i=1}^n \text{SSi} + \frac{\text{OOi}}{2} \right] + \left[\text{RMC} + \frac{\text{VAD}}{2} \right] \text{PT} \\ + \text{DQ} + \left[\text{GSD} \times \frac{\sum \text{BiCi}}{\text{Bi}} \right]^S + 15 \text{ VAD}$$

40. The use, as far as practicable, of the Matching Principle - which holds that the firm should finance short-term needs with short-term sources and long term needs with long-term sources - is recommended to avoid diversion of funds and its consequent effect on production levels. I would, in the same breath, however, stress that the use of long-term sources of finance for short-term uses, it will be discerned, increases liquidity and working capital and is desirable to an extent and is the rationale behind the Tandon and Chore Committees' recommendations.

41. The banks must be constantly alert to symptoms* of approaching sickness in units financed by them so that corrective measures are taken in time. My study revealed

* Much like Weber anticipated Spengler or Sydney University historian John McManners extension in the area of "liberty".

that the following danger signals are emitted from the accounts operated by the units:

- (a) Poor operations in the cash credit account.
- (b) Frequent returning of cheques unpaid.
- (c) Request for frequent overdrawals in the cash credit account.
- (d) High proportion of purchased bills being returned unpaid or dishonoured.
- (e) Heavy carry-over stocks in the monthly stock statements.
- (f) Ageing of stocks.
- (g) Inability to repay the instalments on due dates.

The ratios developed by Altman, Beavers, Deakin and Libby help to determine the health of the firm by part crystal ball gazing. In India, at the moment, only the Grindlays Bank plc., widely uses the Altman Analysis.* It is recommended that the following health ratios be used by other banks, too:

- (i) Cash Flow Ratios: Lower trend normally indicates sickness.
- (ii) Net Income Ratios: Lower trend normally indicates sickness.
- (iii) Debts/Total Assets Ratios: Higher trend normally indicates sickness.

* En passant: I am dubious as to the appropriateness to Small Units of computer models based on either "Z" score formula of Altman or City University's Taffler, or "A" score of John Argenti, mainly because of delayed information.

- (iv) Current Asset/Current Debt Ratios: Lower trend normally indicates sickness. This ratio indicates liquidity. I must emphasise here that this ratio only indicates the relationship at a point of time, ie., it is a static concept. Therefore, it becomes necessary to use a different indicator called the "Liquidity Index". It is not the quantum of assets at a point of time but how quickly the assets can be converted into cash that is relevant in assessing the liquidity position of a firm. The "Liquidity Index" reflects the duration for which the assets remain in a non-liquid state.
- (v) Turnover Ratios: Lower trend normally indicates sickness.
- (vi) Cost Ratios: Higher trend normally indicates sickness.
- (vii) Debt-Equity Ratios: Indicates solvency and is, perhaps, the most widely used ratio by bankers.

Though a 1:1 ratio is considered ideal, in India 3:1 and more is also tolerated. It will be pertinent to mention that in Korea debt-equity ratios of 5:1 to 25:1 are common.

I would add that it is advisable to use both the basic methods of using these financial ratios, viz., the Cross Sectional approach as well as the Time Series approach, so as to have a more reliable and complete panorama.

I would further recommend that, to the extent possible, the banks carry out Sensitivity Analysis to examine the impact of variation (usually 10%) in the critical inputs on the profitability of the units.

42. A banker must, as an investor, see, inter-alia, that the SSI Unit which has approached for finance is "growing". In this context, I recommend the use of Growth Ratio which sets out to explore the relationship of certain defined endogenous variables empirically. It is hypothesized that firms tend to rely on borrowing only to the extent the growth in funds from operations do not keep pace.

Mathematically,

$$GR_t = \frac{TA_{t-o} / TA_o}{FOP_{t-o} / FOP_o}$$

Where, GR = Growth Ratio (ie., a ratio of the percentage growth in TA to the percentage growth in FOP)

TA = Total Assets,

FOP = Funds from operations,

t = 1983 (say), and

o = 1980 (say)

43. Because of continued inflation, external auditors of the SSI Units as well their bankers ask the same questions each year:

- (a) Why have inventories grown so much? Is the volume up, or do you have more obsolete or slow moving items?
- (b) Why are receivables up? Are you being more credit-lenient?
- (c) Why are payables up? Aren't you paying your bills.

Three classifications of working capital changes, viz., productivity changes, sales volume changes, and

inflation impact, can be used to measure the Impact of Inflation on Working Capital. To break these components out of the balance sheet, I am advocating herein-below a series of formulae. (The formulae conform to LIFO accounting, as adopted by most units.) The use of these formulae would quantify the money (rupees) impact for operating management in the form of an events analysis report.

FORMULAE APPLIED TO WORKING CAPITAL DATA

PRODUCTIVITY

$$\text{Inventory change} = (\text{Current Inventor}) \left(\frac{\text{Prior year LIFO Indx}}{\text{Current year LIFO Indx}} \right) - \frac{(\text{CCS})(\text{PY LIFO Indx})(\text{CY LIFO Indx})}{\text{Prior year turns}}$$

Where CCS = Current cost of sales
 PY = Prior year
 CY = Current year
 Indx = Index

$$\text{Accounts receivable change} = \frac{(\text{CR})(\text{PYP/CYP}) - (\text{PYD})(\text{CYS})(\text{PYP})(\text{CYP})}{360}$$

Where CR = current receivables
 PYP = prior year prices
 CYP = current year prices
 PYD = prior year days
 CYS = current year sales

$$= (CP) \left(\frac{PY \text{ LIFO Indx.}}{CY \text{ LIFO Indx.}} \right) -$$

$$(CCS)(PY \text{ LIFO Indx.}) / (CY \text{ LIFO Indx.})$$

$$\text{Account payable change} = \frac{\text{-----}}{\text{Prior year payable turns}}$$

Where CP = Current payables
 PY = Prior Year
 CY = Current Year
 CCS = Current Cost of Sales

VOLUME CHANGE

$$\text{Inventory Change} = (\text{Prior year's inventory})(\% \text{ volume change})$$

$$\text{Accounts receivable change} = (\text{Prior year's receivables})(\% \text{ volume change})$$

$$\text{Accounts payable change} = (\text{Prior year's payables})(\% \text{ volume change})$$

INFLATION IMPACT

$$\text{Inventory change} = \text{Current year inventory} - \text{volume change} + \text{productivity} - \text{prior year inventory}$$

$$\text{Accounts receivable change} = \text{Current year receivables} - \text{volume change} + \text{productivity} - \text{prior year receivables}$$

$$\text{Accounts payable change} = \text{Current year payables} + \text{volume change} - \text{productivity} - \text{prior year payables.}$$

44. My survey exhibited that the transcriptions by the bank branches regarding Inspection and Valuation of stocks were not homologous. For the proper control over the advances against stocks, I urge that the following records be invariably maintained:

- (a) Proposal file of latest limits.
- (b) Godown stock register - godown-wise.
- (c) Stock register - total stock/party-wise.
- (d) File of stock statements and lodgement letters.
- (e) Delivery order book.
- (f) Insurance due date diary.
- (g) Market price register.
- (h) Drawing power register.
- (i) Lock and key register.
- (j) Open loan stock register for ready reference of stock value, drawing power, balance, insurance, etc.
- (k) Party's ledger account.
- (l) Godown Inspection Report file.

It is desirable that both ^{*}AS1 and AS2 should be made mandatory to ensure full, fair and effective disclosure of accounting policies in respect of Inventory Valuation.

* Accounting Standards Board, Valuation of Inventories; Institute of Chartered Accountants of India, June 1981.

In the meanwhile, it is suggested that all the statutory auditors should see that all the recommendations of the Institute of Chartered Accountants of India as provided in AS1 and AS2 are observed. A mention in the audit report on this aspect will be excellent.

45. In the course of my investigation, I came across a number of cases where classification of manufactured components into Raw Materials (RM) and Work in Progress (WIP) proved a Gordian knot to untie.

For instance, a limited company in the light engineering industry manufactures certain components and also purchases some others to be used in sub-assemblies and final assemblies. The components are normally manufactured for stock and there is no connection between the work-order for these components and the work-order for finished products.

QUESTION: Should the manufactured components be classified into RM, WIP or in some other category keeping in view the disclosure requirements of Schedule VI to the Companies Act, 1956?

OPINION: In view of the Statement on Amendments to Schedule VI to the Companies Act 1956 (1980) of

the Institute of Chartered Accountants of India (para 6.4., page 27), the manufactured components should not be classified as RM. And, the finished manufactured components requiring further production operations should be shown as WIP. In the alternative, this can be separately disclosed in the Profit & Loss Account and Balance Sheet, as Finished Components. It should be noted that the alternative chosen must be followed consistently throughout.

46. The strategy of market segmentation:

- (i) The small scale entrepreneur should select those products which ensure positive cash flows over fairly long periods of time rather than jump into products with apparent high profit, and growth potentials (but with large risks). This is because liquidity problems will normally arise as the SSI is plagued by limited cash and credit resources.
- (ii) It is desirable for a small scale entrepreneur to avoid products or product lines in which credit

terms are liberal or easy, as in the process of competing with large or established manufacturers, he is most likely to run into cash or liquidity problems.

- (iii) Large markets in which there is little scope for successful competition with the large scale sector may be avoided, eg., scooter tyre.
- (iv) Rapidly expanding small markets attract the attention of large scale units sooner or later and it is, therefore, appropriate for the small scale sector to avoid them. For example, in the USA, the small firms dominated the electronic calculator market in the developmental stages. However, as the market expanded, giants like Rockwell International and Texas Instruments dominated the market soon decimating in the process the small scale units.
- (v) Products with saturated markets in which a major portion of the total demand is accounted by replacement demand, also deserve to be ignored by prospective Small scale entrepreneurs as they involve tough competition with the units already entrenched in the industry.

It is therefore, desirable for a prospective small scale entrepreneur to concentrate his attention on relatively small markets with potential for reasonable but stable profits over long periods of time.

47. How is it that some owners of SSI Units manage without any formal systems or overall strategies while others have to devote much attention to such approaches and work 16 hours a day? During my research this was a recurrent observation like the great melody that recurs throughout the whole opera. And out of fragments, I have tried to construct a mosaic.

To recapitulate briefly, the models over the last 20 years that seek to delineate stages of corporate growth.

McGuire* building on the work of W.W. Rostow[§] in economics, formulated a model that saw companies moving through five stages of development:

1. Traditional small company,
2. Planning for growth

* Joseph McGuire, Factors Affecting the Growth of Manufacturing Firms, University of Washington, 1963.

§ W.W. Rostow, Stages of Economic Growth, Cambridge University, 1960.

3. Takeoff or departure from existing conditions;
4. Drive to professional management,
5. Mass production marked by a "diffusion of objectives and an interest in the welfare of society."

Christensen and Scott* formulated three stages that a company moves through as it grows in overall size, number of products and market coverage:

1. One-unit management with no specialised organisational parts,
2. One-unit management with functional parts such as finance and marketing,
3. Multiple operating units, such as divisions, that act in their own behalf in the market place.

Steinmetz[§] theorized four stages:

1. Direct supervision,
2. Supervised supervision - the manager devotes attention to growth and expansion,
3. Indirect control - delegate tasks to key managers
4. Divisional organization - at this stage, the company will remain viable.

* Roland Christensen & B. Scott, Review of Course Activities, IMEDE, Lausanne, 1964.

§ Lawrence Steinmetz, Critical Stages of Small Business Growth, Business Horizons, February 1969, P.29.

Finally, Greiner* proposed a model of corporate evolution in which organizations move through 5 phases of growth (in sales and employees). Each phase is distinguished by a particular management style and a crisis which precipitates a jump into the next phase.

1. Growth through creativity. Crisis of leadership.
2. Growth through direction. Crisis of autonomy.
3. Growth through delegation. Crisis of control.
4. Growth through coordination. Crisis of red-tape.
5. Growth through collaboration.

A framework relevant to small and growing businesses can now be developed, emanating from the work of Steinmetz and Greiner, using a combination of experience, a search of the literature and empirical research. (To test the model, 52 responses were obtained from owners of successful small companies/firms asking them to identify as best they could, the phases or stages their units passed through). The framework evolved from this effort delineates five stages of development through which a company must grow and pass or die. Each stage is characterized by an

* Larry Greiner, Evolution as Organizations Grow, HBR, July-August 1972, P.37

index of size, diversity and complexity and described by five management factors (Southern Methodist University distinguished professor of Accounting, N. Churchill, distinguishes between management factors relating to the enterprise and those relating to the owner): managerial style, organisational structure, extent of formal systems, major strategic goals and owner's involvement in the business.

To depict in a compact form:

En Passant: (The position of SSI sector in the ASEAN nations)

- (a) The respective shares of SSI (defined as establishments with 10-49 persons engaged) in employment and value added are far small, with the exception of Indonesia, than in Japan. This is especially pronounced in the Philippines, where the share of SSI in value added is even less than in the USA. SSI is well represented in the manufacturing sector of Malaysia. Assuming a wage-rental ratio approximately reflecting the market-price ratio in Malaysia, SSI is efficient in only industrial chemicals and in the Philippines in leather and plastic products and professional instruments.
- (b) In the highly developed Singaporean economy, SSI is efficient in traditional industries (leather, wood and cork products, etc) as well as in modern industries (professional goods, non-electrical machinery, etc).

	Stage I Existence	Stage II Survival	Stage III-D Success - Disengage- ment (eg. start a new enterprise	Stage III-G Success growth	Stage IV Take-off	Stage V Resource Maturity
Management style	Direct Supervision	Supervised supervision	Functional	Functional	Divisional	Line & staff
Major strategy	Existence	Survival	Maintaining profitable statusquo	Get resources for growth	Growth	Return on investment
Extent of formal systems	Minimal to non-existent	Minimal	Basic	Developing	Maturing	Extensive
	Newly started restaurants & retail stores to high technology manufacturers	Manufacturing business that cannot get their products or process sold as planned.				

48. The Materials Department satisfies three out of four basic criteria for a profit Centre - it employs capital; it incurs costs and it adds value by distribution. Just one basic criterion is missing - pricing. This limitation is not serious. This can be remedied as in the case of conventional Profit Centres. The solution lies in the fixation of proper transfer pricing (Once determined, this should not be changed until the company changes the price of end products). The procedure for this can be illustrated as:

Purchases during the year	Rs.500,000
Annual operating expenses of the Materials Department	Rs. 20,000
Return on Capital (20% on the average investment of Rs.150,000)	Rs. 30,000
	<u>Rs.550,000</u>

Thus, in this company, value added by distribution in the Materials management process is Rs.50,000 a year on purchases worth Rs.5 lacs. The Rs.30,000 return on capital can be earned if the Materials Department adds 10% on every item it buys. Materials costing Rs.5 lacs should be supplied to the production department for Rs.5.5 lacs.

I recommend the Profit Centre approach to Materials Management as it converts the materials manager into an entrepreneur to seek opportunities for profit, take reasonable risks and work towards corporate goal congruence.

FINALE

It will be clearly seen that historical analysis as well as regression results generally confirm the validity of this neoliberal thesis. The various paradigms make us come to the same normative conclusion.

In closing, it must be said that there is in life an element of elfin coincidence which bankers, reckoning on the prosaic, may perpetually miss. As it has been well expressed in the paradox of Poe, wisdom should reckon on the unforeseen, despite all the sophisticated modern techniques and financial statements. After all, despite all "unconscious inferences" (H. Von Helmholtz) and "inferential constructs" (F. Bartlett), as Arthur Koestler, Wittgenstein, Einstein Arnold Toynbee, Bertrand Russell, and other titans in the Valhalla of worthies would acquiesce with me, 30% of everything is placebo and 70% does you harm. We may,

however, as Monsieur Poincare once said, and Sir Winston Churchill and Sir John Colville never tired of quoting, "take refuge beneath the impenetrable arch of probability". It is important to recognise that bankers, like economists, have a propensity to react to Emmanuel Kant's "categorical imperatives" similarly or "roll-over together" (an observation expressed by the late Roy Blough of Columbia University and on which Professor Paul Samuelson of Massachusetts Institute of Technology and a Nobel Laureate has rightly laid fin-de-siecle emphasis in his Memorial Article on John Maynard Keynes). A successful development banker, however, must ab-initio follow, as New York Zoological Society Director Dr. George Schaller puts it, his own vision. Compared to the pond of knowledge, our ignorance still remains atlantic. An empirical statement, rightly concludes Oxford University philosopher F. Waismann, is never "completely verifiable", since no battery of tests can establish its truth. Waismann goes further by arguing that an empirical proposition does not even entail specific observational propositions. If it did, it could be refuted by coming into conflict with observations. All we are entitled to say, as Australian

National University don John Passmore explains, is that an experience "speaks for" or "speaks against", "strengthens" or "weakens" a proposition, never that it proves or disproves it. In fact, we come once again to the three C's, which are so important in banking. Capital, Character and Capability. The capital can be seen by examining accounts, but the character and the capability must be judged on wider observation. A banker must, therefore, in the ultimate analysis, know his man. There is, alas, no way out of it. Yet.

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SELECT BIBLIOGRAPHY

A) ARTICLES IN JOURNALS AND PERIODICALS

- Ashford, D.K., Risk Assessment in small or medium bank, Journal of Commercial Bank Lending - March 1979
- Banks, R., Managing the smaller company, American Management Association - 1969
- Bates, James, The Finance of Small Business, Bulletin of Oxford Institute of Statistics - May 1958
- Bates, James, Financing the Small Business, Chartered Secretary - March 1962
- Bollard, A., Small is Beautiful, Management Accounting, London - November 1982
- Gheerbrant, P., and Jolliffe, A., Integrated Lending Techniques, Bankers Magazine, London - June 1978
- Gopalakrishnan, P., Inventory Problems in Public Sector Units, The Economic Times - September 1975
- Horn, C., Is Small really beautiful? Management Accounting, London, - June 1982
- Piercy, Lord, Financing Small Business, The Banker, London - October 1961
- Richmond, H., Effective Inventory Management, Financial Executive - March 1969
- Snyder, Arthur, Principles of Inventory Management, Financial Executive - April 1964
- Yasaswy, N., Working Capital Management and Efficiency Criteria, The Economic Times - February 1978

B) REPORTS

- Bolton Report on Small Firms, HMSO - 1971
- Campbell Report, Melbourne, - 1981
- Dahejia Committee Report, National Credit Council
Study Group 2 - 1968
- Macmillan Report on Finance & Industry, HMSO - 1931
- Nakra Committee Report on Spare Parts, H.S.L. Ranchi
- June 1968
- Radcliffe Report on the Working of the Monetary System,
HMSO - 1959
- Report of the Study Group to frame guidelines for
follow-up of Bank Credit, Reserve Bank
of India - 1975 (Tandon Committee)
- Report of the Working Group to review the system of
Cash Credit, Reserve Bank of India - 1979
(Chore Committee)
- Wilson Report on Financing of Small Firms, HMSO - 1979

C) UNPUBLISHED REPORTS AND OTHER PAPERS

- Ballan, R., and Tomita, I., Financial Reporting in
Japan, Sophia University, Tokyo - 1976
- Banerji, R., Employment and growth potential of
Small Scale Industries, Kiel working paper 64,
Institute für Weltwirtschaft, Kiel - 1977
- De Vries, B., Industrialisation and Employment, the
role of Small Firms, International Economic
Development & Resource Transfer Workshop 1978,
Tubingen
- Okamoto, Y., Business Behaviour in Japan, Tokyo
University Economic Research Fund - 1973
- Patmasiriwat, D., Industrial Growth and Employment,
Thai University Research Association Report 7,
Bangkok, - 1980

Rea, D., A comparative Financial Analysis of 26 indigenous North Ireland Public Companies, unpublished thesis for the degree of M.Sc. (Econ), Queen's University of Belfast

Takahashi, K., The Mitsushita Electric Company Limited, Keio University, - 1971.

D) PUBLISHED STUDIES, STATEMENTS, REVIEWS, JOURNALS, ETC

Banks and Small Businesses, Cambridge Seminar 1978, Institute of Bankers, London

Business Ratios (a Dun and Bradstreet/Moodies Publication) this journal ceased publication in 1970

Chartered Accountant, Institute of Chartered Accountants of India, New Delhi

Chartered Secretary, Institute of Company Secretaries of India, New Delhi

Committee on Accounting Procedure, Research Bulletin 43, American Institute of Accountants, New York, - June 1953

Compendium of BPE circulars, Bureau of Public Enterprises, Delhi

Financing Small Business, Report to the Committee on Banking, US Congress, Federal Reserve System, US Government Office, - 1958

Journal of the Australian Institute of Bankers, Melbourne

Journal of the Indian Institute of Bankers, Bombay

Journal of the Institute of Bankers, (Banking World) London

Journal of the Institute of Bankers Malaysia, Kuala Lumpur

- Management Accountant, Institute of Cost & Works
Accountants of India, Calcutta
- Mathews, T., and Mayers, C., Developing a Small Firm
B.B.C., - 1968
- National Association of Accountants Research Report 40,
Techniques in Inventory Management, New York
- 1982
- Philip, S., TVA and the Grass Roots, University of
California, Berkeley, - 1949
- Production and Inventory Management, Journal of
Production & Inventory Control Society,
Washington
- Purchasing & Supply, Institute of Purchasing, London
- R.B.I. Financial Statistics of Companies in India
Raiborn, D., Audit Problems in Small Business, AICPA,
New York, 1982

E) PUBLISHED BOOKS

- Abramovitz, M., Inventories & Business Cycles with
special reference to Manufacturer's Inventories,
National Bureau of Economic Research, USA -
1950
- Alford, L., Production Handbook, Ronald Press,
New York
- Altman, E., Corporate Bankruptcy in America,
Heath Lexington Books, 1971
- Argenti, John, Corporate Collapse, McGraw Hill -
1976
- Arrow, K., Studies in Mathematical Theory of
Inventory and Production, Stanford University
- 1959
- Balakrishnan, G., Financing Small Scale Industries
1950-52 in India, Gokhale Institute of
Economics, Poona - 1961

- Banerji, B., Cash Management, World Press - 1982
- Bannock, G., The Economics of Small Firms, Basil Blackwell, - 1981
- Bates, James, Financing of Small Business, Sweet & Maxwell, London 1971
- Battersby, Albert, A guide to Stock Control, BIM Publication, 1970
- Baumol, W.J., Economic Theory and Operations Analysis, Prentice-Hall
- Brown, Robert, Statistical Forecasting for Inventory Control, McGraw Hill
- Chadda, R.S., Inventory Management in India, Allied Publications
- Clemens, J., and Dyer, L.S., Balance Sheets and the Lending Banker, Europa, London
- Drucker, Peter, The New Markets, Heinemann, London, - 1971
- Dyer, L.S., A Practical Approach to Bank Lending, Institute of Bankers, London, - 1979
- Egginton, D.A., Accounting for the Banker, Longman, - 1977
- Gopalakrishnan, P., Spare Parts Management, Jaico
- Graham, B., Interpretation of Financial Statements, Harper & Row, London
- Guthmann, Harry G., Analysis of Financial Statements, Prentice-Hall
- Horne, Van, J., Fundamental of Financial Management, Prentice-Hall
- Institute of Cost & Works Accountants of India, Management Accounting Problems in Small Scale Industries, ICWA, - 1975

- Institute for Financial Management & Research, Inventory
Management, IFMR, - 1980
- Lipton, M., Why poor people stay poor, Temple
Smith, London, - 1977
- Mather, L.C., Lending to limited companies,
Institute of Bankers, London, - 1975
- Mishra, R.K., Problems of Working Capital, Somaiya,
- 1975
- Morishima, M., Why has Japan succeeded - Western
Technology and Japanese ethos, Cambridge
University, Cambridge - 1982
- Pascale, R., and Athos, A., The art of Japanese
Management, Penguin, - 1982
- Pfeffer, I., The Financing of Small Business, Collier
Macmillan, - 1967
- Pitcher, M.A., Management Accounting for the Lending
Banker, Institute of Bankers, London, - 1980
- Pylee, M., Essentials of Materials Management,
Somaiya Publications
- Ramamoorthy, V.E., Working Capital Management,
IFMR, - 1976
- 807 Reserved Small Industries, Small Business Publica-
tion, Delhi, 1982.
- Robinson, R.T., Financing the Dynamic Small Firm,
Wadsworth, 1966
- Scase, R., and Goffee, R., The Real World of
Small Business, Croomhelm, London, - 1980
- Schollhammer, H., and Kuriloff, A., Entrepreneurship
and Small Business Management, John Wiley & Sons,
New York, 1979

- Schumacher, E.F., Small is Beautiful, Abacus,
London, - 1974
- Thomas, A., Stock Control in Manufacturing Industries,
Gover Press, London, - 1970
- Wessel, Robert, H., Principles of Financial Analysis,
Macmillan Company
- Whitin, T.M., Theory of Inventory Management, Princeton
University, - 1958
- World Bank, Employment & Development of Small Enterprises,
World Bank, Washington, - 1978
- Zwick, J., Handbook of Small Business Finance, U.S.
Government, SBA, Washington, - 1965

F) FURTHER READING

ARTICLES (arranged on the basis of publication year)

- Peitzke, D.L., Inventory management and the accountants.
Cost and Management, March/April 1970, p.32
- Hampton, J.D., Some implications of methods of inventory
control. The South African Chartered Accountant,
April 1970, p.131
- Crankshaw, C.D., and Corlett, R.J., Stock inventory
control with data bases and analysis, N.A.A.
Management Accounting, May 1970, p.26
- Jones, A.C., Mechanisation of stock control in small batch
or jobbing manufacture. Work Study and Management
Services, September 1970, P.733
- Hill, G., Improved inventory control methods can assist
liquidity. Accountancy Age, 13th Nov.1970, p.15
- Parry, E., Product categorisation eases inventory
decisions. Industrial Engineering, Nov.1970,
p.24

- Burton, R.O., Computerised stock control in heavy engineering, Purchasing Journal, Jan.1971 - p.34
- Woolley, T.A., Stock control by punched tape, Purchasing Journal, March 1971, p.32
- Saalmans, P., Stock control and simple packages, Computer Management, May 1971, p.20
- Brady, E., and Babbitt, J.C., Inventory control systems, Management Accounting, (NAA), December 1972
- Smith, D., Controlling the investment in inventory. Chartered Accountant in Australia, December 1972, p.42
- Goyal, S.K., and Honeyman, N., Some capital investment aspects of stock control, Cost and Management, May/June 1973, p.32
- Pattinson, W.R., Excess and obsolete inventory control, Management Accounting (NAA), June 1974, p.35
- Crowe, W.R., Effective stock management: short-term demand forecasting for inventory control. Accountants Review, September 1974, p.218
- Claycombe, W.W., and Sullivan, W.G., Steps to effective inventory, Journal of Systems Management, March 1975, p.38
- Herzberg, E., Management's growing stock problems, Business Administration, June 1975, p.14
- Karsh, R.S., Inventory management, Internal Auditor, July/Aug.1975, p.69
- Brewster, R.S., Controlling inventory: on line computer systems. The CPA, September 1975, p.35
- Shim, J.K., and Siegel, J., Automated methods in inventory planning, Management Accounting, November 1975, p.363
- Duncan, I.D., Inventories - their use and control, Cost and Management, Jan/Feb.1976, p.46
- Bowness, J., Stock control, Procurement, Sep.1976, p.18

- Jagetia, L.C., Inventory control as simple as ABC,
Management Accounting, September 1976, p.305
- Northcote, E.F., Stock control policies questioned,
Management Accounting, November 1976, p.390
- Shaw, R.J., Blueprints for production planning and
inventory control, Management Controls,
Jan/Feb.1977, P.19
- Gaskell, D.L., Merchandise and cash control in
retailing, Accountant, 3rd March 1977, p.246
- Brooks, W.J., and Alexander, W.S., Methods of
inventory control, Journal of Purchasing and
Materials Management, Summer 1977, p.3
- Allen, D., Stock control, Accountants Weekly, 15th
July 1977, p.18
- Jagetia, L.C., Effective raw materials inventory
system, Cost and Management, July/August 1977,
p.19

BOOKS

- American Institute of Certified Public Accountants -
Practical Techniques and policies for inventory
control, New York:A.I.C.P.A., c.1968
- Baily, P.(J.H.) and Tavernier, G.,
Design of stock control systems and records,
(London), Gower, P., 1970
- Baily, P.,
Successful stock control by manual systems,
London, Gower P., 1971
- Barrett, D.A.,
Automatic inventory control techniques, London,
Business Bks, 1969
- Battersby, A
A guide to stock control, 2nd ed. London: Pitman
for the British Institute of Management, 1970
- Brown, R.G.,
Statistical forecasting for inventory control,
New York:McGraw-Hill, 1959

- Clyne, H.W.,
Stock control: needs of the smaller company.
London: Industrial and Commercial Finance
Corporation Ltd, 1971
- Fowler, H.O.
The elements of financial merchandising control.
(Melbourne? The author?), 1972
- Harvard Business Review
Inventory policy - reprints of selected articles
(Cambridge, Mass.):H.B.R., (1976?)
(Harvard Business Review reprint series)
- Hobbs, J.A.,
Control over inventory production, London;
McGraw-Hill, 1973.
- Humphreys, R.G.,
How to release cash through stock
reduction, London: Chartered Accountants Trust
for Education and Research, 1974.
- Lavery, K.R.,
Selective Inventory management, Hamilton,
Ont.:S.I.A.C., c.1972
- Lewis, C.D.,
Demand analysis and inventory control, Farnborough:
Saxon House, c.1975
- Lewis, C.D.,
Scientific inventory control., London:Butterworths,
1970.
- Lincs, A.H., and Beart, J.,
Inventory control techniques, London: Industrial
and Commercial Techniques Ltd, 1972
- Reisman, A., & others
Industrial inventory control. New York: Gordon
& Breach Science Pubs., c.1972
- Sewell, R.,
Profitable stock management; a brief guide for
motor traders, Rev. ed. London: N.E.D.O., 1971

- Stohr, E.A.,
Information systems for observing inventory levels, Evanston, Ill.: Northwestern University, Centre for Mathematical Studies in Economics and Management Science, 1976 (Discussion paper, No.243)
- Thomas, A.B.,
Stock control, London: Chartered Accountants Trust for Education and Research 1973.
- Tomeski, E.A.,
Fundamentals of Computers in Business, Holden Day Inc., USA., 1979
- Trux, W.R.,
Data processing for purchasing and stock control., London: McGraw-Hill, c.1971
- U.S. Government Publication, U.S. Small Business Administration - The Vital Majority, - Small Business in the American Economy, 1974.
- Vendemark, R.L.,
Wholesaler inventory control, Rev. ed. Dallas: VanDeMark Inc. for National Association of Wholesaler-Distributors, 1972 (1975 reprint)

UNITED STATES GOVERNMENT PRINTING OFFICE

- America's Small Business Economy, Agenda for Action, Report to the President, -1980
- Best of the SBI Review, 1973-79, - 1980
- Buying and Selling a Small Business, - 1979
- Economic Research on Small Business: The environment for entrepreneurship and small business summary analysis of the regional research reports, - 1981
- Export marketing for smaller firms, - 1979

- Future of small business in America, - 1979
- Handbook for small business, - 1980
- Protecting the small business cash flow lifeline,
- 1980
- Role of small business enterprise in Economic
Development, - 1981
- Small business administration annual report, - 1980
- Small business administration business basics, -
self-instructional booklets on
Inventory and scheduling techniques,
manufacturing, - 1980
- Inventory management, Manufacturing service,
- 1980
- Purchasing management and inventory control for
small business, - 1980
- State of small business: A report of the President
transmitted to the congress, March 1982,
- 1982
- Study of small business, - 1978

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