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# REPORT

OF THE

**STANDING COMMITTEE FOR MACHINERY  
MANUFACTURE FOR TEXTILES  
(INCLUDING COTTON, WOOL,  
SILK & JUTE) AND  
SYNTHETIC FIBRE  
INDUSTRIES**

**VOLUME I**

**GOVERNMENT OF INDIA  
MINISTRY OF COMMERCE AND INDUSTRY**

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FOR MACHINERY MANUFACTURE FOR  
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FIBRE INDUSTRIES**

**VOLUME I**

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## INTRODUCTORY

1. *Appointment of the Committee*—With a view to develop the manufacture of industrial machinery in the country, the Ministry of Commerce & Industry, Government of India, constituted six Standing Committees on 28th February 1959 and assigned specific industries to each of them. This Committee is No. 5 on the list and is concerned with the machinery manufacture for textiles (including cotton, wool, silk and jute) and synthetic fibre industries.

2. *Terms of Reference*—We reproduce below the terms of reference which are common to all the six Standing Committees—

- (1) The likely requirements and production by the end of the Second Five Year Plan of industrial machinery in the country required for all the industries in the country.
- (2) The requirements of machinery for different industries by the end of the Third and the Fourth Five Year Plans.
- (3) To work out a list of machinery and equipment and the quantity that can be taken up for manufacture immediately by various units now manufacturing industrial machinery and machine tools. Also to recommend as to how many new units should be established in order to cover the requirements as in (2) above.

3. The personnel of this Standing Committee, as announced by the Government of India, were :—

1. Shri K. K. Birla—Calcutta, *Chairman*.
2. Shri J. C. Agarwal—National Machinery Manufacturers, Bombay.
3. Shri J. C. Morton—National Machinery Manufacturers, Bombay.
4. Shri C. B. G. Rao—Machinery Manufacturers Corporation, Calcutta.
5. Shri J. K. Srivastava—Kailash, Kanpur.
6. Shri Sitaram Jaipuria—Kanpur.
7. Shri A. N. Ghose—Bombay.
8. Shri Kantilal Shah—M/s. Vasant Industrial & Engineering Works Bombay.
9. Shri N. Majumdar—Industrial Adviser (T.P.), Office of the Textile Commissioner, Bombay.
10. Shri P. R. Ramakrishnan—Peelamedu P.O., Coimbatore.
11. Shri S. Paul—Jute Commissioner's Office, Calcutta.
12. Shri S. C. Nundy—Development Officer, Development Wing, Ministry of Commerce & Industry.
13. Shri A. N. Kapoor—Development Officer (Timber), Development Wing, Ministry of Commerce & Industry.
14. Shri A. Venkatesiah—Development Officer, Development Wing, Ministry of Commerce & Industry—*Secretary*.

The Committee was empowered to co-opt and invite more members as the Committee or its Chairman desired. In pursuance of this authority, the following additional members were co-opted :—

1. Shri R. G. Chandorkar—Director (Engineering), Office of the Textile Commissioner, Bombay.
2. Shri D. P. Goenka—Calcutta. To represent the Indian Jute Mills' Association.
3. Shri Bryan D. Hall—Lagan Jute Machinery Co. (Private) Ltd., Calcutta.
4. Shri A. Sambamoorthy—Jt. Director, Small Scale Industries, Bangalore. To represent the Silk Industry.
5. Shri A. Mozoomdar, I.A.S.—Jute Commissioner, Calcutta. Shri Mozoomdar was co-opted after his predecessor-in-office, Shri S. Paul, who was in the Committee resigned from Government service.

4. *Method of Enquiry*—The first meeting of the Standing Committee was held at New Delhi on the 16th March 1959. At this meeting, it was decided to constitute three working Groups to work out the details and submit reports as per the terms of reference to the main Committee. Before, however, the Working Groups could start work on an agreed pattern, it was decided that the relevant information already available should be collected from the Development Wing, the Textile Commissioner's Office and the Jute Commissioner's Office. It was also decided to elicit the views of the representative associations in the cotton textile, jute, woollen and silk and art silk industries.

5. The second meeting of the Standing Committee was held at Bombay on the 14th April 1959. The meeting discussed the information which was collected from the various sources and fixed the basic data regarding population and per capita consumption to be assumed for working out the requirements of machinery. The Committee then constituted three Working Groups. The convenors of the three Groups were empowered to co-opt such other members as they felt necessary in each case. The personnel of the different Working Groups including the members co-opted are as shown below :—

1. Working Group for Textile (Cotton, Woollen and Silk)—

1. Shri R. G. Chandorkar—Director (Engineering), Office of the Textile Commissioner, Bombay—*Convenor*.
2. Shri N. Majumdar—Industrial Adviser (T.P.), Office of the Textile Commissioner, Bombay.
3. Shri Kantilal Shah—M/s. Vasant Industrial & Engineering Works, Bombay.
4. Shri J. C. Agarwal—M/s. National Machinery Manufacturers, Bombay.
5. Shri J. C. Morton—M/s. National Machinery Manufacturers, Bombay.
6. Shri Kakatkar—Bombay.
7. Shri S. C. Nundy—Development Officer, Development Wing, Ministry of Commerce & Industry.

## Co-opted members—

1. Shri Jagdish Behal—M/s. Peari Mechanical Engineering & Foundry Works Ltd., Ludhiana.
  2. Shri L. N. Bhagwati—M/s. Central India Machinery Manufacturing Co., Gwalior.
  3. Shri A. Sambamoorthy—Jt. Director, Small Scale Industries, Bangalore.
  4. Shri G. R. Joshi—Dy. Director (Textiles), Office of the Textile Commissioner, Bombay.
2. Working Group for Jute Industry—
1. Shri S. Paul—Jute Commissioner's Office, Calcutta—*Convenor*.
  2. Shri D. P. Goenka—Calcutta.
  3. Shri S. C. Nundy—Development Officer, Development Wing, Ministry of Commerce & Industry.

## Co-opted Members—

1. Shri N. K. Jalan—Representing the Indian Jute Mills' Association, Calcutta.
  2. Shri B. P. Bajoria—Representing the Britania Engineering Co. Ltd., Calcutta.
  3. Shri R. L. Rajgarhia—Representing the Textile Machinery Corporation Ltd., Calcutta.
  4. Mr. J. L. Pattie—Representing the Angus Engineering Works, Angus.
  5. Mr. B. D. Hall—Representing the Lagan Jute Machinery Co. Private Ltd., Calcutta.
  6. Shri S. K. Bhattacharya—Executive Officer, Jute Commissioner's Office.
3. Working Group for Synthetic Fibre Industry—
1. Dr. A. N. Kapoor—Development Officer (Timber), Development Wing, Ministry of Commerce & Industry—*Convenor*.
  2. Shri M. D. Parikh—Bombay.
  3. Shri C. J. Lalkaka—Bombay.
  4. Shri D. H. Vora—Assistant Director, Office of the Textile Commissioner, Bombay.

## Co-opted Member—

1. Shri D. N. Shroff

The convenors were requested to prepare their reports on the agreed pattern.

6. The third meeting of the Committee was held at Calcutta on the 5th August 1959. At this meeting the reports submitted by the individual Working Groups were discussed and suggestions were given to the Cotton Textiles Working Group to revise the target figures in the light of the discussions. The final reports of the three Working Groups are given as Appendices 1, 2 and 3.



7. The fourth meeting of the Standing Committee was held at Bombay on the 8th April 1960. The members considered the draft report of the Standing Committee which was compiled and drawn up by the Chairman on the basis of the reports of the different Working Groups and that of the Secretary. While considering the chapter on the Jute Industry, it was felt that conditions in that industry had improved appreciably since the Working Group gave their report in June 1959 and, therefore, the requirements as assessed in the report needed revision. Shri D. P. Goenka was requested to review the position and send the amended figures to the Secretary. Accordingly, a short supplementary note was prepared jointly by Shri Goenka and Shri A. Mozoomdar, the Jute Commissioner. This supplementary note forms Appendix 3A of the Standing Committee's report. The views expressed in the note are given separately in this report just after Part V dealing with the Jute Industry.

8. The minutes of the four meetings of the Standing Committee are given in Appendices 4, 5, 6 and 7.

## PART I

## THE COTTON TEXTILE INDUSTRY

9. At the outset, the Standing Committee are pleased to take note of the setting up of an Ad Hoc Committee by the Government of India to advise the Government on various aspects of the textile machinery manufacturing industry. One of the functions of this Ad Hoc Committee is to assess the requirement of machinery and create adequate capacities for the same. The Ad Hoc Committee consists of officials of the Government of India, the representatives of Millowners' Associations (Consumers) and Textile Machinery Manufacturers and independent technicians.

10. *Present position of the Industry*—The Cotton Textile Industry with 13.41 million spindles and 2.01 lakh power looms is one of the largest organised industries in the country and is capable of producing about 5,100 million yards of cloth annually. In addition to the organised sector, cotton textiles are manufactured in the de-centralised sectors also, viz:—(1) Power Loom (2) Handloom and (3) Khadi and Amber Cloth. While the powerloom and handloom sectors get their yarn requirements from the organised sector, the Khadi and Amber Cloth sector is self-sufficient in respect of yarn. The existing productive capacities of all these sectors may be summarised as under—

1. Organised Sector	..	5,100	million yards
2. Powerlooms Sector	..	300	” ”
3. Handlooms	..	1,650	” ”
4. Khadi (Amber Cloth)		75	” ”
		<hr/>	
Total	..	7,125	” ”
		<hr/>	

11. The machinery of a textile mill falls into three broad sections. The first is the spinning section which comprises the following machines:—

- (a) Blow Room Lines
- (b) Carding Engines
- (c) Comber Sets
- (d) Drawing Frames
- (e) Speed Frames
- (f) Spinning Ring Frames

The second Section is the Weaving Section. Weaving machinery includes—

- (a) Winding Machines
- (b) Warping Machines
- (c) Sizing Machines
- (d) Looms

Finally there is the Processing Section with a long range of machines for bleaching, dyeing, printing, mercerising, sanforizing, etc.

12. The future requirements of textile machinery in India will be for a two-fold purpose. In the first place machinery may be required for the expansion of the existing spinning or weaving capacity and secondly, it will be required for the replacement of old worn-out machinery. Sometimes, replacement may become necessary even when the existing machinery has not been worn-out. This

will happen when some new high speed machine is evolved and has to be installed in place of the existing machinery in order to keep pace with the modern developments. The exact requirements of textile machinery for both these purposes will be governed by several factors, viz, the quantity of cloth needed by the country for internal consumption, the quantity which it will be possible to export and the policy which the Government adopt for the future pattern of the textile industry. The requirements especially for replacement will also be governed by the economic prosperity of the textile industry and the taxation policy of the Government.

13. *Population and per capita consumption of cloth at the end of the Second Plan*—The Government of India had anticipated a per capita annual consumption of 18·5 yards by the end of the Second Plan period when the total population was anticipated to be 400 million with a provision of 1,000 million yards per year for export. In fact, with the conditions prevailing at the end of 1956, it was felt that it might be necessary to make a provision for an increase in the domestic demand which might rise to 20 yards per capita. However, the recent recession in the Textile Industry which was marked by the closure of a number of mills, increased stocks and reduction of exports necessitated a fresh enquiry. Accordingly an Enquiry Committee was appointed by the Government of India to suggest remedial measures for overcoming the difficulties of the Textile Industry. In its report which was submitted in 1958 the Enquiry Committee examined among other problems the question of per capita consumption of cloth and expressed its view that since economic development is not taking place in the country at the rate envisaged in the Second Plan, the per capita consumption is not likely to exceed 17·5 yards at the end of the Plan period. This view of the Enquiry Committee has been accepted by the Government and it is on this basis that the requirements of machinery for renovation as well as for expansion during the remaining period of the Second Plan have been worked out by the Ad Hoc Committee to which reference has been made earlier.

We have also given careful thought to the question of per capita consumption and have studied the trend during the past two decades or so. The figures of consumption have been as under—

Year		Per capita availability of cloth in yards
1939-40	} Undivided India	15·8
1940-41		15·8
1945-46		12·2
1948	.. ..	15·1
1952	.. ..	14·4
1953	.. ..	15·1
1954	.. ..	15·0
1955	.. ..	16·0
1956	.. ..	16·4
1957	.. ..	16·2
1958	.. ..	16·2
1959	.. ..	16·2

These figures do not show an upward trend in the per capita consumption during the past four years. We, therefore, agree with the view of the Enquiry Committee that the per capita consumption would not exceed 17·5 yards at the end of the Second Plan period and take this figure as the target for the purpose of our report. Our assessment regarding the requirement of the different items of textile machinery has been dealt with later in the report in paragraphs 23 and 25.

14. *Existing capacity for manufacture of textile machinery*—The textile machinery industry in India is of very recent origin. Although the textile industry to which it caters is over a century old, the manufacture of textile machinery in India on any appreciable scale commenced only during the Second World War. A beginning was made with spinning ring frames and looms while carding engines and some other items were added later on. The existing capacities can meet the requirement of a number of items of spinning, weaving and processing machinery such as Carding Engines, Ring Frames, looms and conventional types of processing machinery, etc. Appendix 8 indicates the existing manufacturing capacity in respect of the spinning and weaving machinery being manufactured in the country while Appendix 9 indicates the production of the various items of textile machinery during the years 1957, 1958 and 1959 (upto September 1959). As would appear from these appendices, the capacity and production of some of the important items are as under—

Item of machinery	Annual licensed capacity including expansion	Production	
		1958	1959 (Jany. to September)
1. Blowroom lines ..	72	<i>Nil</i>	<i>Nil</i>
2. Carding Engines ..	2,640	1,148	561
3. Draw Frames ..	288	9	29
4. Speed Frames ..	400	28	9
5. Ring Frames ..	2,610	877	797
6. Looms (Plain) ..	5,040	3,151	2,540
7. Looms (Automatic) ..	2,400	36	356

In terms of value, the indigenous industry can cater to the extent of about 60 per cent of the requirement of the industry. It may be added that fresh schemes for the manufacture of new items of machinery are under implementation such as schemes for the manufacture of (1) Blowroom machinery (2) Draw Frames (3) Speed Frames (4) Open Width Bleaching Plant (5) Pneumatic Mangles (6) Hot Air Stenters (7) Mercerisers (8) Polymerisers (9) Singeing machines, etc. With the implementation of these schemes, it is expected that the indigenous textile machinery manufacturing industry would be in a position to meet about 75/80 per cent of the requirements of the industry within the next few years excepting items such as Combers, Fully Automatic Winding and Warping Machines (Barber Colman type), High Speed Sizing Machines, Shrink-

age Control Equipment, etc. In respect of automatic looms, it may be stated that at present only one type of automatic loom is available in the country from indigenous sources.

15. *Government policy regarding expansion of the mill sector*—The Government of India has recently announced a policy regarding the installation of 2,500 automatic looms per year for replacement and 3,000 for expansion purposes (for export promotion), totalling 5,500 looms per year. A meeting was convened in the office of the Textile Commissioner on the 22nd February, 1959 to discuss the question of the installation of automatic looms annually under these schemes, when it was felt that not more than 1,000 looms per year would be installed for export purposes and therefore the manufacture of automatic looms should be planned on the basis of an annual requirement of 3,000 to 3,500 per year. It was also agreed that the consumers should have some choice in the selection of machinery. It was, therefore, felt that three or four varieties of automatic looms should be available to the consumers against the present availability of only one variety manufactured by M/s Central India Machinery Mfg. Co. Ltd., Gwalior. Proposals from the existing machinery manufacturers for the production of automatic looms in collaboration with foreign reputed firms have been under consideration by the Government of India and two licenses have already been issued by them. It is felt that within the next 3 to 4 years, the requirement of automatic looms could be fully met from indigenous sources.

16. *Textile stores and accessories*—As regards items of textile stores and accessories, it may be stated that this industry has developed to a great extent especially during the Second World War. The manufacturing units in a number of cases employ less than 50 workers and, therefore, though this industry falls within the purview of the Industries (Development and Regulation) Act, it has been very difficult to maintain authentic records of production of all the items. It may, however, be stated that the country is self-sufficient in most of the items and in terms of value, self-sufficiency may be placed as high as 85 per cent to 90 per cent. Items which have no indigenous angle so far are very few and steps have been taken to manufacture the same. Some of the important items, the manufacture of which has been started very recently, are lickerin wire, ring travellers, card clothing, lappets, etc. New schemes for the manufacture of further items such as flat steel healds, B.B. jockey pulleys and metal reeds, etc., are under implementation.

17. *Ginning Industry*—With regard to the ginning industry, the Committee is of the view that the ginning machinery installed in the country is completely obsolete and needs thorough overhauling and modernisation. As India is attaching great importance to the growth of long staple cotton, it would be necessary to have the modern type of ginning machines in the country. Since the necessary statistical data regarding ginning machines which are installed in the country could not be made available to the Committee by the Indian Central Cotton Committee (which is looking after the ginning industry in the country), it is not possible for this Committee to estimate the requirement of the machinery for this industry. However, it is felt that the industrial development which is expected to take place in the country for the manufacture of textile machinery in the various sectors of the industry would cover the needs of the ginning industry also, since the requirements of the latter are not expected to be very large.

18. *Cotton Waste Yarn Industry*—With regard to cotton waste yarn, it may be stated that the cotton waste of long staple cotton is being progressively used in the mills for the manufacture of coarse counts and, therefore, the quantity left out with the mills as waste is not large. There has not been any shortage of cotton waste yarn and no expansion in the industry has been observed during recent years. The number of cotton waste spindles installed in the country is also not large, one of the contributory reasons for this being the high price secured by the mills by export of cotton waste. This is also evident from the fact that the number of waste spindles in the country is only 66,700 as against the total installed capacity of 13.41 millions. In terms of percentage, it works out at about  $\frac{1}{2}$  per cent only. It is anticipated that the industry is not likely to expand in the near future. It would therefore require machines for replacement purposes only. Since there are not many units having cotton waste plants in the country, the requirement on replacement account would not be much and since cotton waste yarn is more akin to the woollen yarn (being coarse), the woollen machinery manufacturers would be in a position to satisfy this requirement of cotton waste machinery.

19. *Estimate of population and per capita consumption during the different Plan periods*—While formulating the Second Five Year Plan, the Planning Commission had assumed a 12.5 per cent growth of population during the decade 1951-60 and a 13.3 per cent growth during the decade 1961-70. On this assumption, they estimated the population to reach 408, 434 and 465 millions respectively in 1960-61, 1965-66 and 1970-71. They had, however, observed that these estimates may well prove to be on the low side. We entirely agree with this view and feel that for the purpose of this report, it would be safe to take the population figures at 440 and 480 millions at the end of the third and fourth plans respectively. For the Second Plan, however, we take the figure of 400 million which, although on the lower side, is the one which was estimated by the Government of India as pointed out above in paragraph 13.

20. As regards the per capita consumption of cloth, so far as the Second Five Year Plan is concerned, the views of this Committee have already been expressed earlier in paragraph 13 namely that the target may be taken at 17.5 yards per capita as suggested by the Enquiry Committee. For the future plan periods there are several factors to be taken into account. The first important factor is the likely increase in the per capita income and the resulting improvement in the standard of living. The estimates of per capita income made in the Second, Plan are as under—

Period	Per capita income in Rs.	Percentage increase
At the end of the Second Plan	331	} 19.6 per cent
At the end of the Third Plan	396	
At the end of the Fourth Plan	466	17.7 per cent

If the per capita consumption of cloth were to increase in direct proportion with the increase in per capita income, the figure would be 21 yards and 25 yards respectively at the end of the 3rd and the 4th Plans. We, however, think that this assumption would not be correct. In the first place, India is a warm country and clothing is only a secondary item in the list of necessities. The general habits of the people are such that if there is an increase in income, the major part of the population would tend to spend it first on fooding, then on housing and only thereafter on clothing. Secondly, as the standard of living improves, the trend will be towards the use of finer fabrics and, therefore, though extra money would be spent on clothing, it will not be fully reflected in the increase of per capita consumption. Thirdly, certain changes in the clothing habits of the people have been taking place which will be further responsible for preventing a rise in the per capita consumption. For instance, a large number of people used to wear turbans or Puggrees. Now, however, these head-dresses are falling into disuse and are being replaced by caps. The turbans and puggrees used to require a good deal of cloth and their disuse would certainly lower the over-all per capita consumption. Likewise, a large section of the population who used to wear "dhoties" are now taking to the western style of dressing, namely suits. The consumption of cloth for suiting will be much less than for dhoties. Dhoties, apart from requiring bigger yardage, also wear out much more quickly than suits. After taking all these factors into consideration, the Committee are of the opinion that the per capita consumption at the end of the Third and the Fourth Plans may be assumed as 19 and 21 yards respectively. Taken by themselves, these targets might appear to be a bit low. But the Committee feel that in future, the popularity of art silk fabrics will increase and their consumption will rise. Whereas the present per capita consumption of art silk fabrics is 1.37 yards, we have assumed that it will rise to 1.5, 2 and 3 yards respectively at the end of the Second, Third and Fourth Plans. In view of this expected development, we feel that our estimates of 19 and 21 yards for the per capita consumption of cotton textiles in the Third and Fourth Plans should not go far wide of the mark.

21. *Exports*—In the Second Five Year Plan, the annual export of cloth by 1960-61 was expected to increase to 1,000 million yards. But the actual exports during the last few years have been as under:

Year						Export of cloth in million yards
1952	..	..	..	..	..	602
1953	..	..	..	..	..	657
1954	..	..	..	..	..	867
1955	..	..	..	..	..	753
1956	..	..	..	..	..	744
1957	..	..	..	..	..	877
1958	..	..	..	..	..	617
1959	..	..	..	..	..	797 (Estimate)

The reason why exports have not developed according to expectations lies in the fact that in addition to the constantly stiff competition from Japan and Hong Kong and a sporadic one from China, some of the other countries in Asia and Africa which have been the traditional markets for India have started developing their own textile industry. Special mention may be made of Pakistan where not only is a textile industry springing up fast but where there is also the potentiality of establishing exports. On account of all such circumstances, competition in our export markets is naturally on the increase. Although we are confident that every effort would be made to maintain these markets and to keep up exports, we feel that in view of this new development the original target of 1,000 million yards is not likely to be achieved. We are inclined to think that it would be safer to fix a lower target of 800 million yards annually for export and this we are doing not only for the remaining portion of the Second Plan but also for the Third and Fourth Plans.

22. *Requirement of cloth during the Plan periods and its allocation to the different sectors of production*—On the basis of the above targets for per capita consumption and for exports, the total annual requirements of cloth by the end of the Second, Third and Fourth Five Year Plans would work out as follows—

	Second Plan	Third Plan	Fourth Plan
1. Anticipated population in millions ..	400	440	480
2. Per capita consumption in yards ..	17.5	19.0	21.0
3. Requirements of cloth for internal consumption in million yards ..	7,000	8,360	10,080
4. Annual export target in million yards .. .. .	800	800	800
5. Total annual requirements of cloth in million yards .. .. .	7,800	9,160	10,880

Since the production at the beginning of 1959-60 may be placed at 7,125 million yards as pointed out in paragraph 10, the additional requirement of cloth which has to be planned would be as follows:—

Period	Additional annual requirement of cloth in million yards
Last two years of the Second Five Year Plan .. .. .	7,800 minus 7,125=675
Third Five Year Plan .. .. .	9,160 minus 7,800=1,360
Fourth Five Year Plan .. .. .	10,880 minus 9,160=1,720

This additional requirement is now to be allocated to the different sectors according to the pattern of development desired.

We shall consider the question of allocation in the different plan periods separately.



*Second Plan—*

(a) *Mill Sector*—The present policy of the Government of India is to encourage the handloom industry in the country. Accordingly, the Government are not allowing further increase in the weaving capacity of the mill sector for the time being. The only exception is that mills may instal additional automatic looms under the Export Promotion Scheme according to which the entire production of such additional looms will have to be exported out of the country. Although the Government of India have authorised the installation of 3,000 additional automatic looms per annum under this Scheme, the number which may be actually installed, as pointed out in paragraph 15, is not likely to be large. It is not expected to exceed 1,000 during the last two years of the Second Five Year Plan and 1,000 per annum during the Third Plan. On the basis of 100 yards per day per loom in 2½ shifts, the production of these additional 1,000 automatic looms would be 30 million yards by the end of the Second Plan.

(b) *Powerloom Sector*—In this sector, the Government of India have permitted the installation of 10,000 additional power looms. Half of these are expected to be installed during the last two years of the Second Five Year Plan and the remaining half during the Third Plan period. On the basis of 44 yards per loom per day in 1½ shifts, the 5,000 looms to be installed during the Second Plan should give an additional production of 66 million yards or say, a minimum of 60 million yards roughly. It is also expected that an extra production of 60 million yards could be achieved on the existing powerlooms during the Second Plan period by improving the efficiency. Thus the total extra production from the powerloom sector at the end of the Second Plan would be 120 million yards.

(c) *Amber Cloth*—In the amber cloth sector, the target for the Second Plan is 300 million yards as against the present production of 75 million yards. Assuming that the target will be achieved, we shall have an extra production of 225 million yards from this sector.

(d) *Handloom*—The balance additional requirement of cloth during the Second Plan period namely 675—(30+120+225) or 300 million yards has to come from the handloom sector.

*Third Plan—*

(a) *Mill Sector*—We think that under the present policy of the Government, the mill sector would not be able to produce more than 370 million yards of extra cloth annually by the end of the Third Plan. This extra production could be achieved as follows—

- (i) 150 million yards by the installation of 5,000 additional automatic looms for the production of cloth for export.
- (ii) 60 million yards by allowing installation of 2,000 additional looms balancing purposes where the ratio of spindles and looms is unbalanced.
- (iii) 120 million yards by the installation of 4,000 automatic looms and necessary spindles in cloth mills.
- (iv) 40 million yards by modernisation and partly by working additional shifts.

(b) *Powerloom Sector*—As already pointed out, 5,000 additional looms are to be installed during the Third Plan. These would give an extra production of 60 million yards.

(c) *Amber Cloth*—No further expansion is envisaged in this Sector.

(d) *Handloom*—The balance additional requirement of 1,360—(370+60) or 930 million yards is being allocated to the Handloom Sector. But whether this Sector would be able to produce the entire quantity of additional cloth allocated to it is a different matter.

#### *Fourth Plan—*

As no further expansion in the powerloom or Amber Sector is anticipated and as the development of the Handloom Sector also has its limits, we are allocating the additional requirement of 1720 million yards equally between the mill sector and the handloom sector.

The extra production of 860 million yards in the mill sector could be achieved by the installation of 28,750 additional automatic looms.

The allocation to the different sectors may, therefore, be shown as under:—

Sector	Allocation of cloth in million yards			
	Second Plan	Third Plan	Fourth Plan	Total
Mill Sector .. ..	30	370	860	1,260
Powerloom Sector .. ..	120	60	..	180
Handloom Sector .. ..	300	930	860	2,090
Amber Cloth .. ..	225	..	..	225
<b>Total .. ..</b>	<b>675</b>	<b>1,360</b>	<b>1,720</b>	<b>3,755</b>

The Committee would like to observe that the allocation of additional production of cloth to the different sectors given above, except in the case of the Fourth Plan, is based on the policy adopted at present by the Government on the pattern of development in the textile industry. We have not considered the merits or the demerits of the policy but have only assessed what the allocation could be on the basis of that policy. The only deviation we have made from that policy is in respect of the Fourth Plan period. We think that the Handloom Sector alone would not be able to meet the entire additional requirement of 1,720 million yards of cloth in the Fourth Plan. At the same time we do not have before us any specific data to indicate what the capacity of the Handloom Sector would be in the Fourth Plan. In the absence of such data, we are provisionally allocating the additional requirement of 1,720 million yards equally between the Handloom and the Mill Sectors.

23. *Requirement of textile machinery*—On the basis of the requirement of cloth and its allocation to the different sectors as assumed above, the Committee have considered and ascertained the requirements of machinery both for replacement as well as for the additional cloth which has to be produced by each sector of the Cotton Textile Industry. The details of calculation for spinning and

weaving machinery are given in Appendix 10 and the results have been summarised in Statements A and B attached to the appendix. As these statements show, the annual requirements of the different items of spinning and weaving machinery would be as under :—

Serial No.	Item of machinery	Annual requirement both for expansion as well as for replacement		
		Last two years of the Second Plan	Third Plan	Fourth Plan
1	Blowroom Lines .. ..	45	42	58
2	Carding Engines .. ..	1,400	1,230	2,040
3	Comber Sets .. ..	25	21	41
4	Draw Frames .. ..	118	108	158
5	Speed Frames .. ..	330	304	431
6	Ring Frames .. ..	1,440	1,325	1,840
7	Winding Machines—			
	(a) High Speed .. ..	35	33	34
	(b) Fully automatic .. ..	15	16	23
8	Warping Machines—			
	(a) High Speed .. ..	24	22	23
	(b) Fully automatic .. ..	15	16	23
9	Sizing Machines.. ..	32	38	49
10	Plain Looms .. ..	2,475	1,650	1,225
11	Automatic Looms .. ..	3,000	4,700	8,250
Total value of the above items in Rs. lacs. .. ..		1,464.225	1,449.450	2,130.125

considering only the expansion of the mill-sector, it would appear from Appendix 1<sup>a</sup> and the Statement "A" attached to it that the number of additional spindles and automatic looms which will be installed by the end of the Fourth Plan comes to 3.3 millions and 36,750 respectively. Thus within a period of 12 years, the total number of spindles in the mill-sector would increase from 13.41 millions to 16.71 millions while the number of looms would increase from 2.01 lacs to about 2.38 lacs.

24. Although the details, as worked out in Appendix 10, are based on the conventional types of machinery being used in the industry at present, the actual installation can be expected by the latest and up-to-date machines. Because of their higher efficiency, the number of such machines required

would be less during the Third and Fourth plan periods but the total value is not expected to alter appreciably, since the latest machines would be relatively costly.

25. While ascertaining the requirement of processing machinery, the present trend namely an increasing preference for finished goods has been taken note of and provision has accordingly been made for additional machinery for processing a higher percentage of cloth. The method of working out the requirements of processing machinery is indicated in Appendix 11 and the results are tabulated in the Statement C attached to the appendix. It would be seen from the statement that the average annual requirement of processing machinery during the last two years of the Second Plan and during the Third and the Fourth Plans works out as indicated below—

Period	Average annual requirement of Processing Machinery in Rs. lacs
1. Last two years of the Second Plan .. .. .	598·37
2. Third Plan .. .. .	439·10
3. Fourth Plan .. .. .	539·93

26. It may be noted that, though as a general rule, the requirement on account of replacement has been worked out on the expected life of the different machines, care has been taken to see that adequate provision is made for an earlier replacement of machinery in cases where obsolescence due to recent technological advances has been a more weighing factor. Instances of such items are winding and warping machines, stenters, washing machinery, etc. The basis of replacement is explained in Appendices 10 and 11.

27. *Stores items*—The requirement of the various items of stores has been worked out on the basis of a survey of the consumption of mill stores carried out by the office of the Textile Commissioner. Two appendices 12 and 13 indicating only important items of textile machinery spares have been prepared. Appendix 12 shows the items having partial or no indigenous angle while Appendix 13 indicates the items where self-sufficiency has already been achieved. The value of items in Appendix 12 adds up to Rs. 328·72 lacs. This includes stores items required for the art silk industry also. The latter have been included here because, their requirements being small, the same can be met by manufacturers producing stores items for the Cotton Textile Industry. While assessing the requirement, necessary allowance has been made for the likely increase in the number of spindles which would be installed during the Third and Fourth Plan periods and also the trend which was observed from the import applications received in the office of the Textile Commissioner in respect of such items. Taking all relevant circumstances into consideration, we are placing the consumption of stores items during the remaining part of the Second Plan and during the Third and Fourth Plans at an average figure of Rs. 32·72 lacs annually.

28. *Summary of total requirement of machinery*—The total average annual requirement by value of spinning, weaving and processing machinery including stores items during the Second, Third and Fourth Plan periods is summarised as under—

Machinery	Average annual requirements in value in lacs of rupees		
	Last two years of the Second Plan	Third Plan	Fourth Plan
Spinning & Weaving ..	1,464·225	1,449·450	2,130·125
Processing .. ..	598·370	439·100	539·930
Items of Stores ..	328·720	328·720	328·720
Total ..	2,391·315	2,217·270	2,998·775

29. *Requirement of additional capital equipment*—With the object of ascertaining the different view points regarding the additional requirements of capital equipment, a circular was issued to important textile machinery manufacturers requesting them to submit the relevant information according to proformas I and II. These proformas are given in Appendix 14. It would be observed from the proformas that the information called for pertains to all possible type of capital equipment which is normally required for the manufacture of machinery.

30. The indigenous textile machinery manufacturing capacity as in existence at present has been kept in view while working out the requirement of additional capital equipment for textile machinery manufacturers. This requirement has been based on the assumption that the additional manufacturing capacity would be limited to the machinery manufacturers already established in the country. While assessing the requirement of capital equipment, care has also been taken of the modern trends in the Textile Machinery Industry.

31. The requirement of capital equipment for the manufacture of the conventional type of spinning and weaving machinery has been calculated on the basis of the requirement of capital machinery for each individual item. It may, however, be stated that the industry may install modern machines as indicated in paragraph 24 and accordingly the capital equipment for the manufacture of such modern machines would also change, but the total value of such equipment will not appreciably differ from what has been assessed on the basis of the manufacture of the conventional type of machinery.

32. With regard to the requirement of capital equipment for the manufacture of processing machinery, the same has been assessed on the basis of the total value and tonnage of the processing machinery required. After taking into account the capital equipment already existing with the machinery manufacturers, the requirement of additional capital equipment has been arrived at.

33. Our assessment of capital equipment does not cover the requirement of machines which are specially built for the manufacture of items like paper cones, paper tubes, cotton healds, wire healds card clothing, etc. Based on the import applications received in the past in the office of the Textile Commissioner for the import of the above equipment, it is felt that the requirement of such capital machinery could be safely assessed at the rate of Rs. 20 lakhs annually. This, however, does not include the cost of plant and equipment required for the manufacture of machinery for producing the stores and accessories.

34. The requirements of capital equipment to manufacture textile machinery as assessed above are given in Appendices 15, 16 and 17 and the statements attached thereto. Appendix 15 shows the capital equipment required for the manufacture of spinning machinery and automatic looms. Appendix 16 shows the equipment required for the manufacture of preparatory machinery and plain looms while Appendix 17 gives the requirements of capital equipment for the manufacture of processing machinery. The requirement of capital equipment given in these three appendices includes those for the manufacture of art silk machinery also. The Cotton Textile and the Art silk Industries are allied industries. Moreover, the machinery requirement of the Art Silk Industry is not high enough to make it worthwhile for any manufacturer to undertake its production independently. The Committee feel that the existing cotton textile machinery manufacturers would easily be in a position to take up the manufacture of art silk machinery also in addition to that of cotton textile machinery. In the circumstances, the requirements of capital equipment given by us are the combined requirements for cotton textile machinery as well as art silk machinery. These requirements as given in Appendices 15, 16 and 17 have been summarised in Appendix 18 which shows that the total value of capital equipment required by the end of the Fourth Plan would be Rs. 9.01 crores made up as follows—

	Value in Rs. lacs
Capital equipment required by the end of the Fourth Plan for the manufacture of—	
1. Cotton & Staple Fibre Spinning Machinery and Automatic Looms for Cotton and Art Silk Industry .. .. .	383.978
2. Weaving preparatory machinery and plain looms for cotton and art silk .. .. .	50.890
3. Processing machinery for cotton and art silk .. .. .	225.900
4. Stores and accessories at Rs. 20 lacs per year for 12 years	240.000
	900.768
	or say, Rs. 9.01 Crores.

## PART II

## THE SILK INDUSTRY

35. The silk industry in India dates back to the dawn of Indian history. The industry is mainly centered in four States, namely, Mysore, West Bengal, Assam and Jammu and Kashmir. Mysore State alone produces about 60 per cent of the total output of raw silk in the country. The production of raw silk during the past few years has been steadily increasing. From 19.68 lac lbs. in 1953, it increased to 25.34 lac lbs. in 1958. This production, however, falls short of our demand which stands at about 30 lac lbs.

36. *Production of raw silk*—The estimated production of raw silk during the Second Five Year Plan is expected to reach 28 lac pounds. There may be a variation of 10 per cent. either way owing to vagaries of weather which plays a predominant part in the production of raw silk.

37. *The two sectors producing silk*—The consumption of raw silk in India is by two sectors, namely, the power-operated sector and the handloom sector. The handloom sector depends to some extent on the silk preparatory sector of the power-driven part of the Silk Industry and obtains thrown silk from that sector. The rest of the operations are undertaken entirely by the handloom weavers on cottage industry basis.

38. *Present equipment*—The machinery utilised by the two sectors is rather old and needs renovation and replacement. The industry has to modernise its equipment so as to produce the latest and modern designs. The demand for silk fabrics is on the increase and therefore the Industry has to expand to cater to the growing needs of the country. There is no concern solely engaged in the manufacture of machinery required by the Silk Industry, but the demand in respect of reeling machines, winding and warping machines, looms and the conventional type of processing machines could easily be met by the existing machinery manufacturers for the Cotton Textile Industry.

39. *Targets*—The Committee are of the opinion that the targets of production for the Silk Industry during the plan periods may be taken as under:—

	Plan Periods		
	Second	Third	Fourth
(a) Production of raw silk estimated in lac lbs. .. .. .	28	35	38 to 41
(b) Silk Cloth Production in million square yards .. .. .	25 to 28	27 to 31	30 to 34

It will be seen from the above targets that the average production of silk cloth per pound of raw silk is anticipated to decrease in future. The reason is that as the standard of living improves, people will start using a larger quantity of silk cloth for suitings and door curtains also. This cloth will be comparatively heavier and therefore, the average production per lb. of raw silk will diminish.

40. The targets for the production of raw silk are expected to be achieved subject to climatic conditions. The latter may cause a variation of 10 per cent on either side. Due to the increasing level of income, the consumption of silk cloth will also rise and as such, the prospects for the production of silk fabrics during the third and the fourth plan periods are expected to be good. Export promotion and a demand for faultless fabrics would induce the producers and the marketing organisations to grade and classify silk before marketing it. Testing equipment would, therefore, be needed for grading raw silk during the third and the fourth plan periods.

41. *Requirement of machinery*—With regard to the requirement of machinery for the silk industry, it may be stated that this industry is not organised on the pattern of a large scale industry. As such no rapid replacement of the plant and machinery can be expected. During the Second Plan period, the replacement in machinery would be of a very nominal nature which for all practical purposes may be considered as nil. Replacement is expected to take place to some extent only during the third and fourth plans.

42. It is expected that additional power looms would be needed to produce improved varieties of silk fabrics which will be in demand as the standard of living rises. Although no such expansion is envisaged during the second plan period, it is anticipated that 1,000 additional looms would be installed in the industry at the rate of 500 looms in each of the third and fourth plans.

43 Testing equipment for grading raw silk will be required to grade and classify the silk before it is marketed. It is anticipated that at least six new sets will have to be installed to meet the existing and additional demand. It may however, be stated that silk machinery such as silk throwing and twisting machinery has undergone a vast change during recent years and in comparison the existing conventional type of machinery in the Industry is obsolete. Replacement and expansion in the industry would therefore be by the latest machines. The requirements of machinery for expansion and for replacement are shown in appendix 19 and the statement I attached to it. Statement I gives 20 items of machinery and shows that the total value of their requirements during the third and fourth plan periods works out to Rs. 88.728 lacs and Rs. 87.6845 lacs so that the annual requirement during the two Plan periods would be Rs. 17.7 lacs and Rs. 17.5 lacs respectively.

44. *Capacity for the manufacture of silk machinery*—As for the manufacture of machinery for the Silk Industry in terms of the estimate indicated in the Statement I, the Government of Mysore would be in a position to meet the requirement of the new machines as well as of the replacement machinery in regard to silk reeling, re-reeling and cooking machines which are items Nos. 1, 2 and 3 in the statement. As regards testing machines (item 4 in the Statement), since they are of specific design and of extreme accuracy, it would not be possible to undertake their manufacture in India without foreign collaboration. In the absence of such collaboration, these machines will have to be imported either from the U.S.A. or from Switzerland. The value of these machines required during the Third and Fourth Plans is only Rs. 1.65 lacs and Rs. 2.20 lacs respectively. The other machinery is similar to that used in the Cotton Textile Industry and the capacity that is proposed to be built up for the manufacture of the latter would be sufficient to cover the demand for the silk preparatory and weaving



machinery also, provided a sustained demand is assured and specific designs are chosen by those using silk preparatory and finishing machines. It is apprehended that no programme of purchase of capital goods for setting up an industry to manufacture silk preparatory machinery would be successful for the reason that the annual demand is too small and manufacturers would not venture to invest in this line of manufacture unless a firm demand is assured on the basis of new designs. Item 15 in the Statement I, namely, Screen Printing Machinery, would have to be imported if indigenous manufacture is not proposed to be set up in the Cotton Textile or Art Silk machinery manufacturing groups. The total value of Screen printing machinery required during the two plans is very small, viz :—only Rs. 0·24 lacs. Items 17, 18 and 19 of the Statement, viz: Cottage Steamers and Boilers, are already in production in the country.

*PART III*  
**THE WOOLLEN INDUSTRY**

45. *Present position of the Industry*—The installed and productive capacity of the Woollen Industry on double shift working at present is as under—

	Capacity installed	Capacity productive
1. Woollen spindles .. .. .	59,904	24 million lbs. of yarn
2. Shoddy .. .. .	4,280	2·2 million lbs. of yarn
3. Worsted spindles .. .. .	1,30,980	26·2 million lbs. of yarn
4. Wool top spindles .. .. .	Nil	Nil
5. Power Looms .. .. .	3,095	37·2 million yards of woollen/worsted cloth

46. The actual production against the above installed capacities during the past few years has been as under—

	1955-56	1956-57	1957-58	1958-59
(a) Woollen Yarn (Million Lbs.)	10·7	11·86	14·16	13·33
(b) Worsted Yarn (Million Lbs.)	10·97	14·01	14·97	13·55
(c) Shoddy Yarn (Million Lbs.)	..	..	..	..
(d) Woollen/Worsted Cloth (In million yards) .. .. .	15·04	15·87	16·79	17·53

47. From the above, it would appear that the existing capacity is not being fully utilised. The idle capacity can, therefore, be utilised for the production of the additional requirement of woollen cloth during the remaining period of the Second Plan and during the Third Plan period to achieve the targets.

48. *Present equipment*—Most of the machinery in the woollen industry has been installed prior to 1946 and as the same has been used during the Second World War as well as after that, its condition cannot be considered as satisfactory. There has been no renovation and replacement of an appreciable nature so far. The machinery is not giving satisfactory performance and efficiency and this is resulting in a higher cost of production. The existing concerns must therefore carry out replacement and modernisation if they have to survive.

49. *Capacity for wool tops*—For the manufacture of worsted yarn, wool tops are necessary. But no capacity existed for wool tops at the commencement of the second plan period. The import of wool tops during the past years has been as under—

Year	Quantity of wool tops imported in million lbs.
1955-56 .. .. .	12·53
1956-57 .. .. .	15·11
1957-58 .. .. .	16·79
1958-59 .. .. .	16·36

50. Several schemes for the manufacture of wool tops in collaboration with foreign firms were received and so far, a capacity for the production of 10 million lbs. has been licensed. In view of the quantity of wool tops imported, as shown above, it would be necessary to create additional capacity during the second and third plan periods to meet the increasing demand.

51. *Shoddy Wool*—Shoddy wool is used for the manufacture of shoddy yarn. The development of the shoddy spinning industry in India began about 3 or 4 years back when some concerns mostly in Amritsar started utilising the same. Shoddy wool is produced from wastes, such as rags, mungo, old worn out clothing, hosiery cutting and wastes, noils and other woollen waste accumulated in the mills. It is the cheapest raw material available in the world for the manufacture of woollen shoddy and as such, it has achieved great popularity in this country too.

52. Unfortunately, there is no sufficient data available about the indigenous capacity for the production of shoddy wool. However, it is estimated that the industry is utilising about 1 million lbs. of waste annually accumulated from the woollen mills, hosiery mills, tailors cutting, etc. The bulk requirement of shoddy wool is being met by imports. Since shoddy wool is the main raw material for the manufacture of shoddy yarn, it is necessary to create sufficient capacity for the same during the remaining years of the second Five Year Plan and during the third Five Year Plan. Imports during 1956-57, 1957-58 and 1958-59 were as under—

Raw Material	Year	Quantity in million lbs.	Value in lacs of Rs.
Shoddy Wool and Wool Waste ..	1956-57	0.73	12.3
	1957-58	2.54	32.9
	1958-59	3.38	38.7

53. After the capacity required for shoddy wool has been created, it would be necessary to allow the import of only wool rags, cuttings and wastes instead of the import of shoddy wool which is being allowed at present.

54. *Shoddy yarn*—There were 4,280 shoddy spindles at the commencement of the Second Plan. Since then, 8 more concerns have taken effective steps to install 10,000 additional spindles capable of producing about 5.0 million lbs. of shoddy yarn. About 2,000 existing woollen spindles have also been converted for the production of shoddy yarn. The production capacity of these spindles is estimated at about one million lbs. of shoddy yarn. Besides these, 3,000 more of shoddy spindles have been licensed and they are expected to go into production shortly. Thus there would be about 20,000 spindles capable of producing 10 million lbs. of shoddy yarn annually at the end of the Second Plan period.

55. *Existing capacity for the manufacture of woollen machinery*—Against the existing capacities, there is one indigenous machinery manufacturer who has been licensed to manufacture worsted machinery. However, this firm has not registered any progress worth the name in the manufacture of machinery. The indigenous capacity to manufacture woollen machinery for the

present may therefore be ignored. Some of the machinery required for finishing processes could perhaps be manufactured by the existing processing machinery manufacturers for cotton textiles.

56. *Targets*—The targets for the woollen industry which the Committee have assumed for the Second and Third Plan periods are as under—

	Plan Periods	
	Second	Third
1. Woollen Yarn (million lbs.) .. ..	12	13
2. Worsted Yarn (million lbs.) .. ..	16	22
3. Wool Tops (million lbs.) .. ..	10	26
4. Shoddy Wool (million lbs.) .. ..	2.5	11.5
5. Shoddy Yarn (million lbs.) .. ..	10	10
6. Woollen/Worsted cloth (million yards) ..	20	30

The above targets have been based on the rate of increase reflected in the production of woollen yarn including shoddy and worsted yarn, increase in population and the improvement in the standard of living during the past four years.

57. The Committee have not fixed any targets for the Fourth Plan. They could not do so with any reasonable degree of accuracy, with the material so far available to them. In the circumstances, the requirements of machinery also for expansion during the Fourth Plan could not be worked out.

58. *Requirement of additional machinery for the woollen industry*—Additional machinery is required for the production of wool tops only for which the capacity is being developed. Although some machines would be required for shoddy wool also, the requirement of the same can be met partly by the installation of new machines and partly by the replacement of existing machines. Most of the machinery in the industry is old and needs modernisation and removal. The details of requirement are given in Appendix 20 and Statements J and K attached to the appendix. Statement J gives the additional machinery required for the manufacture of wool tops during the Second and Third Plan periods. The annual value of such machinery during the two Plan periods comes to Rs. 202.958 lacs and Rs. 83.020 lacs respectively. Statement K gives the requirements of machinery for replacement during the Second, Third and Fourth Plan periods. The annual value of these requirements as Statement K shows is Rs. 232.3 lacs and this is the same for each of the three plan periods because the rate of requirement for replacement during the plan periods has been assumed to be of the same order. The requirements of additional machinery for shoddy wool and of additional machinery for processing during the Second and Third Plans which are not very large have been included in Statement K.

59. *Requirement of capital equipment for the manufacture of woollen machinery*—As regards the capital equipment required for manufacturing the additional woollen machinery, we have accepted the details given by Shri

Jagdish Behal who has had first hand experience with the Japanese manufacturers in the allied line. The details given by him are on the pattern adopted in Japan. These details are shown in Appendix 21 and the statements L, M and N attached to the Appendix. The requirements of capital equipment assessed therein can be summarised and given under broad categories as under—

*Requirement of capital equipment for the manufacture of woollen/worsted machinery*

Category	Value of capital equipment in Rs. lacs.
1. Foundry .. .. .	5.25
2. Wood Working .. .. .	1.20
3. Machine Shop .. .. .	28.11
4. Special Purpose .. .. .	2.60
5. Heat Treatment and Laboratory Equipment .. .. .	0.54
6. Welding .. .. .	0.06
7. Forging .. .. .	0.15
8. Painting and Electro-plating .. .. .	0.12
9. Miscellaneous .. .. .	0.75
Total .. .. .	38.78

60. Woollen machinery being somewhat akin to cotton textile machinery, it would be more economic if the cotton textile machinery making industry were to take up the manufacture of woollen machinery. We would, therefore, recommend that the cotton textile machinery manufacturers be invited to diversify their production pattern to include woollen machinery also.

## PART IV

## THE SYNTHETIC FIBRE INDUSTRY

61. *Requirements of art silk fabrics*—The synthetic fibre or art silk industry has a bright future in India. The price of art silk fabrics compares favourably with that of fine cotton fabrics and is lower than that of superfine cotton fabrics. Besides, art silk fabrics satisfy the aesthetic taste of the poor man and are likely to appeal to him more and more as he becomes familiar with them. Thus as the economic development of the country progresses and the standard of living improves, the consumption of art silk fabrics is bound to rise appreciably. At present, the per capita consumption of art silk fabrics is 1·37 yards but taking all the circumstances into consideration, the per capita consumption is expected to reach 1·5 yards by the end of the Second Plan and 2 yards and 3 yards respectively by the end of the Third and the Fourth Five Year Plans. This is a very conservative estimate because in other countries the ratio of consumption of art silk fabrics to cotton fabrics is 1 : 4 and on that basis, the per capita consumption in India should be approximately 5 yards. Even on the conservative basis adopted above, the requirement of art silk fabrics at the end of the different plan periods would be as follows :—

Period	Estimated population in millions.	Per capita consumption of art silk fabrics in yards.	Annual requirements of art silk fabrics in million yds.
Second Plan .. ..	400	1·5	600
Third Plan .. ..	440	2·0	880
Fourth Plan .. ..	480	3·0	1440

62. *Present equipment and production*—The art silk industry at present has about 45,000 registered power looms and about 10,000 unauthorised power looms. Most of these looms are on an average working only  $1\frac{1}{2}$  shifts but as the consumption of art silk fabrics rises, they could easily work  $2\frac{1}{2}$  shifts. On the basis of 20 yards per loom per shift, the production from these power looms could be  $55,000 \times 2\frac{1}{2} \times 20 \times 300$  yards (taking the number of working days in a year at 300) or 825 million yards per annum. In addition to these power looms, there are about a lakh of handlooms also. These are equivalent to 20,000 power looms working on one shift basis. The production capacity of these handlooms is thus  $20,000 \times 20 \times 300$  yards or 120 million yards per annum. The total production capacity on the present equipment is, therefore,  $825 + 120 = 945$  million yards.

63. *Requirement of power looms for expansion*—The above estimates show that there would be no requirement of additional weaving capacity in the Second or the Third Five Year Plan. Expansion would be required only in the fourth plan period to the extent of a weaving capacity of  $1440 - 945 =$

495 million yards. On the basis of 20 yards per shift and 2½ shift working as before, this would require 33,000 looms during the Fourth Five Year Plan; that is to say 6,600 looms per year from 1966 onwards. Some of the new looms would have to be automatic and some more of special types. The requirements of the different types of looms are estimated as under :—

Type of loom	Annual requirement of looms for expansion during the Fourth Plan period
Plain .. .. .	5,650
Automatic .. .. .	800
Special looms, mocket looms, velvet looms, warp knitting looms, etc. .. .. .	150
Total ..	6,600

64. *Requirement of power looms for replacement*—Out of the 55,000 power looms existing at present in the country a majority have served their useful life and it is anticipated that at least 30,000 will have to be replaced during the Third and the Fourth Plan periods. The looms required for replacement would, therefore, be 3,000 per year from 1961 onwards. It is also anticipated that while making replacements the factories would like to instal automatic looms and special looms in some cases. The requirements of automatic and special looms may be placed at 500 and 100 respectively per annum.

65. *Requirements of preparatory machinery*—(i) *Automatic pirn winding machines*—(a) *For replacement purposes*—It has already been stated above that 30,000 looms will be required to be replaced in 10 years ending 1971 and on the basis that one spindle of an automatic pirn winding machine would feed two power looms, the requirement of automatic pirn winding machines for replacement purposes would be 15,000 spindles in 10 years, i.e. 1500 spindles per annum. The requirement of ordinary pirn winding machines, if any, could also be met by the unit manufacturing automatic machines.

(b) *For expansion purposes*—During the course of the fourth plan period, the expansion in loomage, as worked out above, is 33,000 power looms. This would need 16,500 spindles of automatic pirn winding machines, i.e. 3,300 spindles per annum.

The total requirements of automatic pirn winding spindles for expansion and replacement during the third and the fourth five year plan periods would, therefore, be 31,500 or a round figure of 32,000.

(ii) *Sectional Warping Machines*—It is expected that the future trend would be towards the high speed warping machines and therefore the manufacture of that type of machine only should be established. If there is a particular requirement for ordinary warping machines, the same manufacturing unit should be able to meet that also. The requirement is, therefore, worked out in terms of high speed sectional warping machines. On the basis

that one high speed sectional warping machine is enough for 200 power looms, the requirements for replacement would be 15 machines annually from 1961 onwards and the requirements for expansion would be 33 machines per year from 1966 onwards.

(iii) *Sizing machines*—On the basis that one sizing machine can feed 300 looms, the requirement for replacement would be 10 machines annually from 1961 onwards and the requirement for expansion would be 22 machines annually from 1966 onwards.

(iv) *Twisting machines*—

(a) *Ordinary*—(1) *For replacement*—50 machines of 200 spindles each per year from 1961 onwards.

(2) *For Expansion*—50 machines annually from 1966 onwards.

(b) *Special*—(1) *For replacement*—25 machines annually from 1961 onwards.

(2) *For expansion*—50 machines annually from 1966 onwards.

During the third plan period, therefore, the annual requirements of twisting machines would be ordinary 50 and special 25 and during the fourth plan period, ordinary 100 and special 75.

The requirements of preparatory machinery and power looms during the Third and the Fourth Plan periods would thus be as shown below. An estimate of the C.I.F. prices of these machines is also given so as to indicate the total value of the machinery to be manufactured.

*Requirements of Preparatory and Weaving Machinery*

Sl. No.	Name of machines	No. of units required during the Third Plan	No. of units required during the Fourth Plan	Estimated value per unit in Rs.
1	Automatic pirn winders ..	7500 spindles	24000 spindles.	1250
2	High speed sectional warping machines .. ..	75	240	50000
3	High speed Hot Air Multi-Cylinder Sizing Machines .. ..	50	160	75000
4	Twisting Machines			
	(a) Ordinary Type .. ..	250	500	4000
	(b) Special Type .. ..	125	375	40000
5	Power Looms—			
	(a) Ordinary .. ..	12000	40250	3000
	(b) Automatic .. ..	2500	6500	5000
	(c) Special Type .. ..	500	1250	10000

Rs.

Total Value of machinery required during the Third Plan .. 7,63,75,000  
Total Value of machinery required during the Fourth Plan 23,67,50,000



The value of annual requirements during the Third and the Fourth Plan periods works out to Rs. 152·75 lacs and Rs. 473·50 lacs respectively.

66. *Requirements of processing machinery*—The requirements of processing machinery during the Third and the Fourth Plan periods are given in Appendix 22 which shows that the total value of the requirements during the two plan periods is estimated at Rs. 66,70,000 and Rs. 1,63,83,000 respectively. The value of annual requirements, therefore, works out to Rs. 13·340 lacs and Rs. 32·766 lacs in the two plan periods respectively.

67. *Requirements of maintenance parts and stores*—The following three principal items which are required in substantial quantities have been included under these headings:—

Item	Annual Requirements
Flat Steel Healds ..	C.I.F. value of Rs. 20 lacs per year.
All Metal Reeds ..	3 pieces per loom per year approximate value being Rs. 20 per piece. On this basis, the value would be Rs. 33 lacs per year during the third plan period and Rs. 52·8 lacs during the fourth plan period.
Metallic Bobbins ..	Rs. 10 lakhs per year.

68. The estimates of requirements of preparatory, weaving and processing machinery and maintenance parts and stores as assessed above may be summarised as follows :

Machinery.	Annual requirements in lacs of rupees.	
	Third Plan	Fourth Plan
Preparatory & Weaving .. ..	152·750	473·500
Processing Machinery .. ..	13·340	32·766
Maintenance Parts & Stores .. ..	63·000	82·800
Total .. ..	229·090	589·066

69. *Existing capacity for manufacture of art silk machinery*—Some capacity for the manufacture of ordinary looms, ordinary twisting and sectional warping machines already exists in the country. Capacity for the balance requirements has to be created. The requirements of capital equipment have for reasons already mentioned in paragraph 34 above, been included along with those for the Cotton Textile Industry in Appendices 15, 16, 17 and 18.

70. *Requirements of yarn/fibre*—It has been seen above that the annual requirement of art silk fabrics by 1971 would be 1440 million yards of cloth. On the basis of 5 yards to a pound, this would require 288 million pounds of yarn. At present, the consumption of filament and staple fibre is in the ratio of 8 : 5. From the past trends, it appears that staple fibre will be consumed in

increasing quantities due to its being comparatively cheaper and it is expected that by 1971 the consumption would be in the ratio of 50 : 50. The requirement of filament and staple fibre yarns by 1971 would, therefore, be 144 million pounds of each. To this must be added the requirements of ancillary industries such as hosiery, gas mantle, etc., which are estimated at 30 million pounds of filament yarn. The requirements of filament yarn and staple fibre can be further sub-divided as shown below:—

					Requirements of filament Yarn in million pounds	Requirements of staple Fibre in million pounds
Viscose	..	..	..	..	132 (including 30 millions for an- cillary indus- tries)	108
Acetate	..	..	..	..	29	29
Synthetic	..	..	..	..	8	7
Cuprammonium	..	..	..	..	5	..
				Total	174	144

This does not account for the requirements of rayon tyre yarn industry which have been dealt with separately.

71. *Capacity to manufacture yarn/fibre*—The existing capacity to manufacture different varieties of yarn/fibre as well as the additional capacities required are as under :—

(a) *Viscose filament*—The capacity for the manufacture of viscose filament which is existent and is expected to materialise by 1961 is 75 million lbs. Since the requirement by the end of 1971 is estimated at 132 million lbs., the additional capacity required would, therefore, be  $132 - 75 = 57$  million pounds. The economical size for a viscose yarn plant is one with a capacity of 8 million pounds per annum. We, therefore, should set up approximately 8 such units for the manufacture of viscose filament yarn. The requirement of machinery for one such unit has been worked out on the assumption that batch process would be adopted. Batch process is well established in the country and the manufacture of machinery required for it would be easier. Taking a batch of 300 kg., the requirements of machinery would be as given in appendix 23. The C.I.F. value of the major items of equipment has also been shown in the appendix. The total C.I.F. cost of the machinery required for the unit would be approximately Rs. 3 crores out of which approximately Rs. 1 crore would be for electrical items. The annual requirement of spare parts is estimated at approximately Rs. 6 lacs. These spare parts, however, are so numerous in nature and varieties that it may not be economical to create capacity for their manufacture at present. Besides, the problem is further complicated by the fact that most of the existing units have machineries of different makes. Sometimes, the same unit will have

two different types of machinery. In the circumstances, the spare parts required cannot be standardised. However, the existing machinery manufacturers would be able to manufacture some of them.

(b) *Viscose Staple Fibre*—The capacity for the manufacture of viscose staple fibre which is existent and is expected to materialise by 1961 is 55 million pounds. Since the requirement at the end of 1971 is estimated at 108 million lbs., the additional capacity required would, therefore, be  $108-55=53$  million pounds. The minimum size of a plant for the manufacture of viscose staple fibre is 20 tons per day or about 16 million pounds per year. Three such units would, therefore, be required by 1971. The major equipment required for one such unit is given in Appendix 24. The investment for a plant of this type would be approximately Rs. 4 crores, out of which the electrical equipment would cost approximately Rs. 1 crore to Rs. 1.5 crores. Annual requirements of spare parts would be approximately Rs. 6 lacs. These are, however, so numerous in varieties that it may not be economical to create capacity for their manufacture at present.

(c) *Acetate*—At present, there is only one unit with a capacity for 4 million lbs. of acetate filament. As the requirements of acetate filament and acetate staple fibre by 1971 are estimated at 29 million lbs. each, we shall require an additional capacity for 25 million lbs. of acetate filament and 29 million lbs. of acetate staple fibre. Since the minimum sizes of plants for filament and staple fibre are those with a capacity of 8 million and 16 million lbs. respectively, the additional requirements will be met by the installation of 3 units for acetate filament and 1 unit for acetate staple fibre. We recommend only 1 acetate staple fibre plant because it would be easier to expand its capacity beyond 16 million lbs. than to set up 2 units. One unit of acetate filament with a capacity of 8 million lbs. is expected to cost nearly Rs. 5 crores. The material required for the construction of a large portion of the plant consists of copper and stainless steel, both of which at present are not produced indigenously. Except for the actual spinning plant, it should be quite possible to fabricate the rest of the plant indigenously from imported copper and stainless steel materials. The existing Acetate Rayon plant was designed by a rather unprogressive British firm whose technical know how was not up-to-date. It may, therefore, be necessary to import one modern plant in collaboration with some well-known manufacturers and then take up the manufacture of complete plants indigenously.

(d) *Synthetic*—The present capacity for synthetic yarn (nylon/perlon) is nil. But schemes for 2 million lbs. capacity are under implementation. Since the requirements of synthetic filament and staple fibre by 1971 are estimated at 8 and 7 million lbs. respectively, the additional capacity required would be  $8+7-2=13$  million lbs. The economical size of a plant for the manufacture of nylon/perlon fibre is 2 tons per day or 1.6 million lbs. per annum. We shall require 9 such units by the end of the Fourth Five Year Plan. A list of machinery required for one such plant is given in appendix 25.

(e) *Cuprammonium*—At present, we have no capacity for cuprammonium rayon. As only one plant of about 5 million lbs. capacity is needed, it will necessarily have to be imported because technical know-how in India is lacking.

72. *Requirements of cellophane machinery*—The present licensed capacity for manufacture of cellophane is 5400 tons or 12 million lbs. per year. It is anticipated that the requirement of cellophane would rise to 10,000 tons or 24 million

lbs. per year at the end of the Third Plan and 15,000 tons or 36 million lbs. per year at the end of the Fourth Plan. The minimum size of a plant for the manufacture of cellophane is 5 tons per day. We shall, therefore, require the installation of 6 or 7 such plants by the end of 1971. The major equipment required upto but excluding the stage of film casting is common to both filament and staple fibre manufacture. A staple fibre equipment (using the slurry method) is preferable and the major items required for such equipment are given in appendix 26.

73. *Requirement of tyre yarn machinery*—The requirements of viscose tyre yarn in 1961, 1966 and 1971 are estimated at 10 million lbs., 20 million lbs. and 30 million lbs. respectively. The machinery for meeting the requirements upto 1961, i.e. for 10 million lbs. production, will have to be imported. The machinery required for subsequent expansion can be manufactured indigenously. The machinery required for a tyre yarn unit of 10 million lbs. capacity is given in Appendix 27.

74. *Requirements of additional capital equipment for manufacturing yarn/fibre*—The requirements of plans for manufacture of yarn/fibre by the end of the Fourth Plan may, therefore, be summed up as indicated in the following statement—

*Additional Plants required for the production of Filament Yarn/Staple Fibre during the Third and Fourth Plan periods*

Sl. No.	Plant	Number of additional plants required during Third and Fourth Plans	Minimum annual capacity of each Plant in million lbs.	Estimated price of each plant in Rs. crores	Total price in Rs. crores	Remarks
1.	Viscose Filament	8	8	3	24	
2.	Viscose Staple Fibre.	3	16	4	12	
3.	Acetate—					
	Filament ..	3	8	5	20	One plant may be imported. The rest could be made in India.
	Staple Fibre	1	16			

Sl. No.	Plant	Number of additional plants required during Third and Fourth Plans	Minimum annual capacity of each Plant in million lbs.	Estimated price of each plant in Rs. crores	Total price in Rs. crores	Remark
4.	Nylon/Perlon	9	1.6	2	18	
5.	Cuprammonium	1	5	4	4	It will be imported.
6.	Cellophane	6	4	1	6	Substantial portion of the plant is the same as Viscose Staple Fibre plant.
7.	Tyre Yarn ..	6	5	2	12	Two of these plants are required for the Second Plan. These would be imported. The remaining plants could be made in India.

It would thus appear that plants costing roughly Rs. 83 crores will have to be manufactured in the country during the Third and Fourth Plan periods. The capital equipment required for manufacturing these plants may be estimated at about 6 or 7 crores of rupees.

## PART V

## THE JUTE INDUSTRY

75. *Present position of the industry*—The Jute Industry in India occupies a very important place in the economy of the country. Its importance lies in the fact that jute goods are the largest, or the second largest earner of foreign exchange. There are in all 112 mills in India of which 101 are in West Bengal, 4 in Andhra, 3 in Bihar, 3 in U.P. and 1 in M.P. These mills are managed by 82 companies.

76. The Indian Jute Industry has 72,783 looms which represent about 53 per cent of the total loomage in the world. The break-up of this figure is as follows—

Hessian	..	..	..	..	..	44,078
Sacking	..	..	..	..	..	24,875
Others	..	..	..	..	..	3,830
Total						72,783

Outside India, there are mills in Pakistan, U.K., France, Germany, Belgium Italy and to a smaller extent in a number of other countries. Many of these countries having jute mills produce jute bags for their own consumption. Some of them, like Pakistan, U.K. and Germany, export to other countries also. The most serious competition which has of late been developing is from Pakistan. The other difficulty which jute goods have to face is competition from substitutes like paper bags, cotton bags and bags made of other fibres as well as from bulk handling. However, jute goods are in general accepted as the most satisfactory packing material and the reason lies in their cheapness and durability.

77. *Modernisation and its progress*—After the second World War when almost all the jute mills in the Continent and U.K. were equipped with modern high speed machinery, mills in India with their old machinery found it difficult to compete with mills in those countries. The use of substitutes and bulk handling of goods presented another difficulty. At that stage, the mills in India embarked upon schemes of modernisation with a view to attaining competitive efficiency so as to retain the foreign markets on which the industry is primarily dependent.

78. So far modernisation of mills in India has been confined primarily to the preparatory and spinning stages. It consists in the installation of high speed machinery in replacement of the old one and thus eliminates one of the intermediary processes known as "roving". It enables mills to run more economically by producing improved quality of yarn at a much higher speed and with a smaller labour force.

79. The process of modernisation started some time back but gained momentum only in recent years. On 31st March 1959, the position was that a total number of 2,24,606 spinning spindles—1,90,206 on the fine side and 34,400 on the coarse side—had been modernised. These modern silver spinning spindles were installed in mills belonging to 51 out of 82 companies. Since the total

number of modern sliver spinning spindles required to modernise the entire industry works out at 4,03,208, it means that about 55 per cent of the installed looms are already being fed by sliver spun yarn.

80. *Production and consumption of jute goods*—The following table shows at a glance the production of jute goods and their disposal through exports and internal consumption since the year 1956-57, i.e. the commencement of the Second Five Year Plan—

(Figures are in thousand tons)

Year	Production	Consumption		
		Exports	Internal consumption	Total
1956-57	1,115.5	893.8	181.0	1,074.8
1957-58	1,095.1	849.7	193.7	1,043.4
1958-59	1,101.9	791.8	214.2	1,006.0

(NOTE—The figures of internal consumption given here relate to 99 mills which are members of the Indian Jute Mills' Association and 4 other mills which are not members of that Association. Figures from the remaining 9 mills which are outside the Association were not available and are not included here. But it is estimated that the aggregate figure of internal consumption through these 9 mills would be round about 25,000 tons.)

81. It will be seen from the figures given above that although production has been maintained more or less at the same level, there has been a marked rise in internal consumption. Exports have, however, shown a downward trend. It is worthwhile mentioning here that the industry is working with 12½ per cent of its looms sealed since the latter part of 1956. This has been done under the Working Time Agreement of the Indian Jute Mills' Association, the main object of which is to ensure that production is maintained in line with the world demand.

82. *Requirement and production during the remaining period of the Second Five Year Plan*—The jute industry is primarily an export industry and its level of production is more or less inter-related with the demand in export markets. Although India's share in the export of jute goods is still the largest among all the jute manufacturing countries in the world, she is no longer in a monopolistic position. One of the major developments is the emergence of Pakistan as a serious competitor in the world markets. Pakistan which is now in a position to export between 10,000 and 12,000 tons of jute goods a month is making serious inroads into the traditional markets of India. Besides Pakistan, countries like Burma, Thailand, Philippines, Vietnam and Egypt have established their own jute mills and have cut down their imports to a considerable extent. On the other hand, quite a number of countries are enjoying an expanding economy which is bound to result in a greater use of jute goods. Then again, with the increase in agricultural production in the world, the demand for packaging material will also increase. There is, therefore, every likelihood that our level of exports by the end of the Second Five Year Plan will be more than what it is

now. An improvement is already noticeable in the figures of export during the current year. The quantity of jute goods exported from April 1959 to August 1959 was 3,86,174 tons as against the figure of 3,24,733 tons during the corresponding part of the previous year. This increase works out to roughly 19 per cent.

83. The internal consumption of jute goods has been increasing at a fairly rapid rate. The increased production of foodgrains and other agricultural commodities is also likely to result in a bigger internal demand for jute goods. The targets of production and development to be achieved over the Second Plan period in respect of foodgrains and some other important commodities which are usually packed in gunny bags are given below—

(Figures are in thousand tons)

Item	Production in 1955-56	Target for 1960-61	Percent- age increase in 1960-61 over 1955-56
1. Foodgrains .. .. .	65,794.0	75,000	13.99
2. Oil Seeds .. .. .	5,643.0	7,000	24.04
3. Soda Ash .. .. .	80.5	230	185.71
4. Nitrogenous Fertilisers (In terms of Ammonium Sulphate) .. .. .	394.0	1,450	268.02
5. Phosphate Fertilisers (In terms of Super Phosphate) .. .. .	71.0	720	914.08
6. Cement .. .. .	4,506.2	13,000	188.49
7. Salt .. .. .	3,056.7	3,676	20.26
8. Sugar .. .. .	1,700.5	2,250	32.31
Total .. .. .	81,245.9	1,03,320	27.17

84. That internal consumption of jute goods is steadily rising is also evident from the figures available so far for the current year. From April 1959 to November 1959, internal consumption was 1,37,500 tons as against 1,24,400 tons during the corresponding part of the previous year. This shows roughly a 10 per cent rate of improvement.

85. Taking all the above factors into account, we have assumed that the requirement and production of jute goods by the end of the Second Five Year Plan would be of the order of 11.5 lakh tons. Considering the speed with which modernisation is progressing at present, we expect that the industry will install more of sliver spinning spindles so that by the end of the Second Five Year Plan it will feed almost all its working looms with sliver spun yarn. As there will be an increase in production on account of the increased efficiency of modern machinery, it is estimated that the industry will be in a position to meet the extra demand even though 12½ per cent of the looms will continue to remain sealed.



86. *Requirement and production during the Third Five Year Plan*—Although it is difficult to say anything definitely as to what the trend of production will be during the Third Five Year Plan period, there is no doubt that with the increase in agricultural production and progress of industrialisation in India, the requirement of jute goods will go up still further. Taking the relevant facts into consideration, we are inclined to place the increase in demand over the plan period at about 8 percent. On this basis, the demand may be expected to increase from 11.5 lac tons annually at the end of the Second Plan to 12.4 lac tons annually at the end of the Third Plan. The increase in annual demand would thus be roughly 90,000 tons. In order to meet the extra demand, it will be necessary to unseal 5 percent of the looms. On the basis that the unsealed looms will be used for sacking, the extra production obtained from them will be of the order of 90,000 tons a year which will cover the estimated increase in annual demand. We expect that the industry will also install the requisite number of sliver spinning spindles to feed these unsealed looms and will also take up the modernisation of its weaving section.

87. *Requirement and production during the Fourth Five Year Plan*—It is still more difficult to make any estimate about the requirement and production during the Fourth Five Year Plan period which will commence seven years hence. There is, however, every possibility that during this period the industrial uses of jute goods and their internal consumption will increase to an extent which may necessitate the unsealing of the balance 7½ per cent of the looms. We expect that the increase in annual production from these unsealed looms will be of the order of 1,40,000 tons. Thus, by the end of the Fourth Five Year Plan, we think the industry will then be working with all its installed looms and all the looms will be almost fully modernised and will be fed with sliver spun yarn.

88. *Requirements of preparatory and spinning machinery*—Assuming that the increase in the requirement and production of jute goods during the period under review will be as indicated above, we have worked out the requirements of modern preparatory and spinning machinery for each plan period. Appendices 28, 29 and 30 show the basis of our calculation and appendix 31 gives the estimated requirements of modern preparatory and spinning machinery for the last two years of the Second Five Year Plan and for the Third and Fourth Five Year Plans. The requirements as given in Appendix 31 may be summarised as under—

Serial No.	Name of machines	Total requirements during the last two years of the Second Plan or during the third and fourth plans		No. of machines already on order from abroad		Balance requirement	
		Fine	Coarse	Fine	Coarse	Fine	Coarse
1	Finisher Card ..	130	45	48	12	82	33
2	First Drawing Frame	23	26	5	7	18	19
3	Second Drawing Frame	196	..	81	..	115	..
4	Finisher Drawing Frame	304	228	97	59	207	169
5	Sliver Spinning Frame	1,417	463	564	128	853	335

89. We consider that with the commencement of the Third Five Year Plan, the industry will take up the modernisation of its weaving section as by the end of the Second Plan period the modernisation of the preparatory and spinning machinery will almost be completed. In this context, we discussed the possibility of the installation of circular looms 12 of which have been working in three mills in Calcutta for some time. We understand that the result of working of these looms is not at all encouraging and the general feeling in the industry is that these looms are not suitable for work in Indian conditions. We however, learn that a shuttle-less weaving machine, the manufacture of which has been developed in the U.K., is reported to be working satisfactorily in Europe. This machine has not yet been tried out in India but the manufacturers of this machine are confident that it will run successfully here too. Although it is premature to make any comments about its suitability, we consider that there is every possibility of the shuttleless weaving machine being gradually introduced in our industry. The process of modernisation of the weaving section is, however, likely to be spread over the Third and Fourth Five Year Plan periods.

90. We are told that the production from a shuttleless weaving machine is more than that from a standard loom and that the increase in production is in the region of 33 per cent. Moreover, it is expected that these machines will be worked in three shifts. On this basis, we have worked out the number of shuttleless weaving machines required to modernise all the looms. The number of winding and beaming machines will depend on the number of weaving machines and has been calculated accordingly. The requirements of weaving, winding and beaming machines thus calculated are as under—

	Hessian	Sacking
1. Shuttleless Weaving Machines .. .. .	9,176	8,428
2. Winding Machines .. .. .	350	464
3. Beaming Machines .. .. .	130	140

The position will, however, be different if some other type of weaving machine is introduced.

91. Although it is difficult to say as to which type of looms will be taken up for modernisation first, indications are that in view of the early increase expected in the production of agricultural commodities mills will concentrate more on the modernisation of sacking looms during the Third Five Year Plan. If that be the case, the modernisation of hessian looms will be taken up during the Fourth Plan period.

92. The requirements of modern preparatory and spinning machinery mentioned in paragraph 88 above and the requirements of weaving, winding and beaming machines mentioned in paragraph 90 above have been combined

and given in appendix 32 along with their weight and value. These are the total requirements of jute mill machinery and may be summarised as under—

Serial No.	Name of machinery	Total requirements during the last two years of the Second Plan and during the third and fourth plans			
		Total Nos.		Value in lacs Rs.	
		Fine	Coarse	Fine	Coarse
1	Finisher Card .. ..	82	33	32.80	13.20
2	First Drawing Frame .. ..	18	19	6.48	6.84
3	Second Drawing Frame .. ..	115	..	41.40	..
4	Finisher Drawing Frame .. ..	207	169	74.52	60.84
5	Sliver Spinning Frame .. ..	853	335	426.50	167.50
6	Weaving Machine (Looms) .. ..	9,176	8,428	1376.40	1264.20
7	Winding Machines .. ..	350	464	79.80	105.79
8	Beaming Machines .. ..	130	140	63.70	68.60
				2101.60	1686.97
	Grand Total			3788.57	

93. *Requirements of looms for speciality products*—There are at present 3,830 looms installed in the industry which are engaged in the production of speciality products like carpets, webbing, cotton bagging and carpet backing cloth. We understand that, barring wide looms which are required for the manufacture of carpet backing cloth, the requirements for the other types of looms are small. There is already one unit in Calcutta which is engaged in the production of wide looms. Its present production capacity is 6 looms per month on single shift basis but this capacity could be increased according to the demand of the industry. The manufacturing programme of this unit is now being examined by the Government.

94. *Requirements of spare parts and stores*—We have found it difficult to make a realistic assessment about the requirements of spare parts of jute mill machinery which are now allowed to be imported. However, taking into consideration the number of moving parts in respect of each item of jute mill machinery and the number of shifts this machinery normally works, we are of the opinion that the requirements of spare parts will be of the order of 10 per cent in terms of value of the total requirement of machinery. Since the total requirement of machinery is in the region of Rs. 3 crores a year on an average, the annual requirements of spare parts will be about Rs. 30 lacs. This is our estimate of requirements during the remaining part of the Second Plan. In the Third and Fourth Plan periods, however, the requirement will be still higher. We think that in the Third Plan period, the requirements of spare parts will be 15 per cent and in the Fourth Plan period, they will be 20 per cent of the value of the total requirements of machinery. A list showing the more important items of spare parts of modern drawing and spinning machinery which are now being allowed to be imported is given in Appendix 33.

95. Another list showing the major items of stores including items like motors and starters is given at Appendix 34. The value of the annual requirements of these items is estimated at Rs. 627·15 lacs. We understand that all these items are available in India.

96. *Capacity of the existing units for manufacturing jute mill machinery*—There are at present three units—The Britannia Engineering Co. Ltd., The Lagan Jute Machinery Co. Private Ltd. and the Textile Machinery Corporation Ltd.—which are engaged in the production of light yarn sliver spinning frame which is the only item of modern machinery now produced in India. These units are all working in collaboration with one or the other of the three principal jute mill machinery manufacturers in the U.K. As a result of this development, it has been possible to stop the import of spinning frames except those which are required to produce heavy yarn. A statement showing the licensed capacity of these three units and their actual production is given at Appendix 35. The appendix would show that the present licensed capacity is for the production of 660 spinning frames per year. Against this licensed capacity, the actual production in the past has been as follows—

Year	No. of spinning frames manufactured
1954	6
1955	11
1956	56
1957	138
1958	170
1959 (upto May)	117

97. The present position is that none of the three units manufactures all the components it requires and has to import quite a number of them from abroad. Two of the units—Britannia and Texmaco—however, claimed that they were in a position to manufacture spinning frames with 15-per cent imported components, while the third Lagan—Stated that it could reduce the percentage of imported components to 20 after installation of the necessary capital equipment. We examined the extent to which the manufacture of the components now imported could be developed in India. A list showing the items of components which are now imported and also those the manufacture of which can be progressively developed in India is given in Appendix 36.

98. It seems that except in the case of one—The Lagan Jute Machinery Co. Private Ltd.—there exists a large idle capacity in the other two units. There is ample scope to utilise this idle capacity in developing the manufacture of the other items of modern machinery required by the industry.

99. Our enquiry reveals that the capacity available with the various engineering works round about Calcutta is sufficient to meet the future demand of the jute mill machinery manufacturing units for castings and forgings.

100. There are also a number of small units which are engaged in the production of different items of spare parts and accessories for the old type of jute mill machinery. One of the more important of these units also manufactures some items of components which are required for the assembly of spinning frames by the bigger units. It seems that when the manufacture of modern jute mill machinery is fully developed in India, these small units will be in a position to undertake the manufacture of a good number of components which will be required to assemble those machines on the basis of sub-contracting.

101. *Additional capacity required to meet the increased machinery requirements*—As we have stated earlier, a large part of the manufacturing capacity is lying idle and this can be usefully utilised in developing the manufacture of other items of modern machinery which will be required during the remaining period of the Second Plan and also during the Third and Fourth Plans. The details of the machinery required in terms of quantity and value have already been given in Appendix 32 as mentioned in paragraph 92 above. It is worthwhile mentioning here that the units which are presently engaged in the manufacture of light yarn sliver spinning frames will be running short of work by the end of the Second Plan and it will then be possible for them to utilise most of the machine tools already installed in their works for the manufacture of new items of modern machinery. The extra items of capital equipment which these units will need are those detailed in Appendix 37. The value of this additional capital equipment, as shown in the Appendix, is Rs. 57 lacs.

102. Although we have not attempted to make an assessment of the estimated requirement of roll forming and roll feeding equipments which are almost universally used with modern carding machinery and to some extent with drawing machinery, there is no doubt that there will be a large requirement of these equipments during the period under review. One unit in Calcutta is already engaged in the production of roll forming equipment of simpler types. Our enquiry reveals that the manufacture of these equipments can be easily developed in India and that it will not require the installation of any major item of capital equipment.

103. *Recommendations*—(1) We are of the opinion that there is no need to establish any new manufacturing unit to meet the additional requirements of modern machinery and spare parts and recommend that, in the first place, attempts should be made to utilise the capacity which is still lying idle and secondly that the existing units should be allowed to expand further to the extent necessary. At the same time, care should be taken to see that there is no duplication in capacity. This will ensure the maximum utilisation of the capacity which already exists.

(2) We recommend that the additional capital equipment required to augment the existing manufacturing capacity should be allowed to be installed before the end of the Second Five Year Plan so that the manufacture of the entire range of modern machinery is developed with the commencement of the Third Five Year Plan. This will enable the industry to go ahead with its scheme of modernisation without any difficulty.

(3) We think that the increased capacity which will be available by the end of the Second Plan will be sufficient to meet the additional requirements of

modern machinery during the Third and Fourth Five Year Plans. In other words the need for the installation of any more capital equipment during the Third and Fourth Five Year Plan periods should not arise.

(4) We are of the view that it will be possible for the units engaged in the manufacture of modern machinery to develop the manufacture of spare parts also which the industry will need by way of replacement. Accordingly, we recommend that whenever a unit takes up the manufacture of a new item of machinery, it should be persuaded to take up simultaneously the manufacture of some items of replacement spares also.

(5) High priority should be given by the Government to the jute mill machinery industry in respect of allotment of raw materials like steel, pig iron etc., so as to enable the machinery manufacturers to keep pace with the progress of modernisation.

(6) The manufacturing programme of the units should be so phased that the manufacturing units are in a position to reduce the percentage of imported components to the barest minimum within the shortest possible period. This period should not normally exceed three years. We think that this time limit will be sufficient.

(7) The import of modern machinery as well as spare parts should be so regulated that the indigenous manufacturers do not feel any difficulty in selling their items of manufacture. So long as the existing manufacturing capacity is not fully developed to meet the requirements of all types of modern machinery and spare parts, their import should continue to be allowed to the extent of which the demand is not met by indigenous sources.

(8) Finally, we suggest that the Government may ask the existing units to come up with manufacturing schemes immediately so that the same may be put through by the end of the Second Plan period.

## SUPPLEMENTARY NOTE ON THE JUTE INDUSTRY

104. *Improvement in the outlook for the Jute Industry*—Part V of this report dealing with the Jute Industry was drafted on the basis of the report of the Working Group on Jute Industry which was submitted in June 1959. Since then, the outlook for the Jute Industry has considerably improved. The Industry which was working with 12½ per cent of its looms sealed at that time, has found it possible to unseal 3½ per cent of its looms since then. Production, exports and internal consumption of jute goods were all considerably higher in 1959-60 than in the previous year. The statistics of production and consumption since the beginning of the Second Five Year Plan are reproduced below:—

(Figures are in thousand tons)

Year	Production	Consumption		
		Exports	Internal consumption	Total
1956-57	1,115.5	893.8	181.0	1,074.8
1957-58	1,095.1	849.7	193.7	1,043.4
1958-59	1,101.9	791.8	214.2	1,006.0
1959-60	1,119.6	849.3	242.7	1,092.0

105. *Revised estimate of production of jute goods in the Third Plan*—As both exports and internal consumption are improving, it may be reasonably expected that if world economic conditions continue to be favourable the level of exports by the end of the Second Plan will be about 9,00,000 tons and internal consumption at least 2,50,000 tons. With increases in both agricultural and industrial production in India and the world, it may be predicted that the rising trend in the requirement of jute goods will be maintained during the Third Plan period. It seems that exports and internal consumption of jute goods during the Third Plan period will be of the following order—

(Figures are in thousand tons)

Year	Exports	Internal Consumption	Total Production
1961-62	920	280	1,200
1962-63	940	310	1,250
1963-64	960	340	1,300
1964-65	980	370	1,350
1965-66	1,000	400	1,400

If this estimate proves to be correct, all the looms in the industry would have to be unsealed within the Third Plan period. It goes without saying that this increase in production can be achieved only if supply of adequate raw material is ensured. In this connection, we understand that the Third Plan target for jute production suggested by the Ministry of Agriculture is 65 lakh bales. This along with the expected output of about 20 lakh bales of mesta should be sufficient to meet the requirement of increased jute goods production.

106. *Revised estimate of requirements of jute machinery*—Assuming that the increase in production will be as indicated above, the revised estimate of the requirement of modern preparatory and spinning machinery would be as given in the following statement—

*Estimated Requirement of Modern Preparatory and Spinning Machinery during the remaining period of the Second Plan and also during the Third Plan*

Serial No.	Machinery	Total requirement during the remaining period of the Second Plan and also during the Third Plan		Already licensed		Balance				Remarks	
						Total Nos.		Value in Rs. lacs			
						Fine	Coarse	Fine	Coarse		Fine
1	Breaker Card	..	..	..	..	..	..	..	..	1. Old machinery renovated and used.	
2	Finisher Card	..	85	65	33	3	52	62	20.80	24.80	2. Old machinery renovated and used in most cases. It has been assumed that the number of new machinery required will be about 35 per cent of the total requirement.
3	First Drawing Frame	..	..	..	4	3	..	..	..	..	3. As in 1 above.
4	Second Drawing Frame	..	160	..	40	..	120	..	43.20	..	4. As in 2 above.
5	Finisher Drawing Frame	..	240	180	68	31	172	149	61.92	53.64	
6	Sliver Spinning Frame	..	1,100	350	..	69	1,100	281	550.00	140.50	5. Sliver spinning frames other than those required to produce sacking weft yarn are produced in India.
								675.92		218.94	
						Total		894.86			



From the above statement, it would appear that the value of the preparatory and spinning machinery required by the end of the Third Plan would be Rs. 894·86 lacs. According to the previous estimates given in paragraph 92, the total requirements of jute machinery were worked out at Rs. 3,788·57 lacs of which the preparatory and spinning machinery items total up to Rs. 830·08 lacs and the weaving machinery to Rs. 2,958·49 lacs. The revised estimates for preparatory and spinning machinery are thus not far different from the previous estimates in value. But the important point to note is that whereas the previous estimate of Rs. 830·08 lacs was for the requirements of preparatory and spinning machinery by the end of the Fourth Plan, the revised estimate of Rs. 894·86 lacs is for requirements by the end of the Third Plan. As regards machinery required for the modernisation of the weaving section, the position is not altered. The Committee do not visualize that the process of modernisation could be completed earlier than envisaged before and therefore, the previous estimate of Rs. 2,958·49 lacs by the end of the Fourth Plan stands.

107. At present, the preparatory and spinning machinery installed in the industry supplies all the yarn required for the sacking and hessian looms and also feeds the wide looms, 620 of which have already been installed and are working. But when all the looms which are sealed at present have been unsealed, there will not be sufficient yarn left for the wide looms. In that case, additional preparatory and spinning machinery would have to be installed to feed them. There are plans to instal some more wide looms in the industry in the immediate future. The number of preparatory and spinning machines required to feed all the installed wide looms may be estimated as indicated below—

Serial No.	Machinery	Nos. (Fine)
1.	Finisher Card .. .. .	10
2.	Second Drawing Frame .. .. .	20
3.	Finisher Drawing Frame .. .. .	30
4.	Sliver Spinning Frame .. .. .	160

Wide looms are assumed to be working in three shifts and others in a single shift.

108. The progress of modernisation upto the spinning stage has also been reviewed in this context. On 31st March 1960, the position was that a total number of 2,64,928 modern sliver spinning spindles—2,21,056 on the fine side and 43,872 on the coarse side—were installed and working in mills belonging to 58 out of 82 mill companies. It means that about 66 per cent of the installed looms are now being fed by sliver spun yarn.

109. *Summary of Conclusions and recommendations*—Our conclusions and recommendations are summarised as under—

#### A. *The Cotton Textile Industry*—

(I) The population of country is estimated at 400, 440 and 480 millions and the per capita consumption of cotton cloth at 17·5, 19 and 21 yards at the end of the Second, Third and Fourth Plan periods respectively. The export target is taken at the constant figure of 800 million yards annually. (*Paragraph 22*).

(II) On the basis of these estimates of population, per capital consumption and exports, the total annual requirements of cotton cloth at the end of the Second, Third and Fourth Plan periods would be 7,800, 9,160 and 10,880 million yards respectively. Since the present production is about 7,125 million yards, the additional requirements would be 675, 1,360 and 1,720 million yards respectively. These additional requirements are allocated to the different sectors producing cloth, namely, mill sector, powerloom sector, handloom sector and amber cloth sector according to the policy adopted by the Government of India. The allocation is as indicated below—

(Allocation of cloth in million)

Sector	yards		
	Second Plan	Third Plan	Fourth Plan
Mill Sector .. .. .	30	370	860
Powerloom Sector .. .. .	120	60	..
Handloom Sector .. .. .	300	930	860
Amber Cloth .. .. .	225	..	..
Total .. .. .	675	1,360	1,720

(Paragraph 22).

(III) On the basis of the additional production of cloth to be obtained from the different sectors, the annual requirements of textile machinery have been calculated. The requirements in respect of some important items will be as shown below—

Serial No.	Item of machinery	Annual requirements both for expansion as well as for replacement		
		Last two years of the Second Plan	Third Plan	Fourth Plan
1.	Carding Engines .. .. .	1,400	1,230	2,040
2.	Ring Frames .. .. .	1,440	1,325	1,840
3.	Plain Looms .. .. .	2,475	1,650	1,225
4.	Automatic Looms .. .. .	3,000	4,700	8,250

The value of the entire requirements of spinning, weaving and processing machinery including stores items is estimated at Rs. 2,291·315 lacs, Rs. 2,217·270 lacs and Rs. 2,998·735 lacs annually during the Second, Third and Fourth Plan periods respectively. (Paragraphs 23 and 28).

(IV) The textile machinery industry in India is self-sufficient so far as certain items of textile machinery are concerned. Taking an overall picture, however, it may be stated that the industry can at present cater to the extent of 60 per cent of the requirements of machinery required for the cotton textile industry. After the fresh schemes for the manufacture of new items of machinery which are under implementation have been completed, 75 to 80 per cent of the requirements excepting certain items would be met indigenously. (*Paragraph 14*).

(V) The Committee are of the view that installation of additional capacity for the manufacture of cotton textile machinery should be limited to the units which are already engaged in that line. It is on this assumption that the requirement of additional capital equipment has been worked out. (*Paragraph 30*).

(VI) The total additional capital equipment which would be required by textile machinery manufacturers by the end of the Fourth Plan is estimated at Rs. 9.01 crores. (*Paragraph 34*).

### B. The Silk Industry—

(I) The annual production of raw silk in India is estimated at 28 lac pounds by the end of the Second Plan, 35 lac pounds by the end of the Third Plan and 38 to 41 lac pounds by the end of the Fourth Plan. The production of silk cloth would accordingly range from 25 million yards to 34 million yards during the plan periods. (*Paragraph 39*).

(II) 1,000 additional looms will have to be installed in the country during the Third and Fourth Plans along with the necessary preparatory and finishing machinery. Besides, a good deal of modernisation will also be necessary during those plan periods. The value of silk machinery required annually for expansion and replacement during the Third and Fourth Plans is estimated at Rs. 17.7 lacs and Rs. 17.5 lacs respectively. (*Paragraphs 42 and 43*).

(III) There is no concern solely engaged in the manufacture of silk machinery. A large number of machines are similar to those required for the cotton textile industry. The capacity proposed to be built up for the latter would, therefore, meet the requirements of the silk industry also. Some machinery like the testing equipment, etc., would have to be imported. (*Paragraphs 38 and 44*).

### C. Woollen Industry—

(I) The capacity installed at present for the manufacture of woollen/worsted cloth is 37.2 million yards. The present production is, however, only about 18 million yards and it is expected to rise to 20 million yards by the end of the Second Plan and to 30 million yards by the end of the Third Plan. No additional capacity is, therefore, required for woollen and worsted cloth during the Second and Third Plans. A similar remark applies to woollen/worsted and shoddy yarn also. (*Paragraphs 45, 54 and 56*).

(II) Additional capacity is required for the production of wool tops and shoddy wool. Wool tops are necessary for the manufacture of worsted cloth while shoddy wool is a raw material for shoddy yarn. (*Paragraphs 49, 51 and 58*).

(III) Machinery required for wool tops is new to this country and will have to be manufactured in collaboration with foreign manufacturers. The annual requirements of this machinery during the Second and Third Plan

periods are estimated at Rs. 202·953 lacs and Rs. 83·02 lacs respectively. Machinery for shoddy wool already exists in this country and can be utilised with certain additions. (*Paragraphs 50 and 58*).

(IV) The machinery installed in the woollen industry is old and needs renovation on an appreciable scale. The annual requirements of machinery for replacement during each of the Second, Third and Fourth Plans are estimated at Rs. 232·3 lacs. This includes the requirements during the Second and Third Plans of additional machinery for shoddy wool and for processing which, however, are not large. The Committee have not fixed targets for the Fourth Plan. The requirements of machinery for expansion during the Fourth Plan are, therefore, not calculated. (*Paragraphs 48, 57 and 58*).

(V) The existing capacity for manufacturing woollen machinery in this country is negligible. The total capital equipment required for the manufacture of woollen machinery is estimated at Rs. 38·78 lacs. (*Paragraphs 55 and 59*).

(VI) Woollen machinery being somewhat akin to cotton textile machinery, it is recommended that the cotton textile machinery manufacturers be invited to include woollen machinery also in their manufacturing programme. (*Paragraph 60*).

#### *D. Synthetic Fibre or Art Silk Industry—*

(I) The present per capita consumption of art silk fabrics in India is 1·37 yards. The per capita consumption is expected to rise to 1·5, 2 and 3 yards respectively by the end of the Second, Third and Fourth Five Year Plans. The annual requirement of art silk fabrics at the end of the three plan periods would accordingly be 600, 880 and 1440 million yards respectively. (*Paragraph 61*).

(II) The present weaving capacity installed in the country would be sufficient to meet the increasing requirements of art silk fabrics during the Second and Third Five Year Plans. Additional weaving capacity would be required only during the Fourth Plan period. For replacement, however, machinery would be required during the Third Plan also. (*Paragraph 66*).

(III) The requirements of preparatory, weaving and processing machinery and maintenance parts and stores during the Third and Fourth Plans are estimated at Rs. 229·090 lacs and Rs. 589·066 lacs annually respectively. (*Paragraph 68*).

(IV) The present capacity for manufacturing art silk machinery is not sufficient. The additional capacity required has been included while working out the requirements of capital equipment for the Cotton Textile Machinery Industry. (*Paragraphs 34 and 69*).

(V) The increased production of art silk fabrics will necessitate the supply of a larger quantity of filament yarn and staple fibre also. The quantity of 1440 million yards of art silk fabrics which is expected to be consumed annually at the end of the Fourth Plan will require 288 million pounds of yarn. Keeping 30 million pounds for ancillary industries, the total requirement of yarn will be 318 million pounds. (*Paragraph 70*).

(VI) The present capacity for the production of yarn and fibre is insufficient to meet the requirement of 318 million pounds. Additional capacity will, therefore, be required during the Third and the Fourth Plan periods. It is estimated that additional plants worth about Rs. 96 crores will be required by the end of the Fourth Plan for the manufacture of the necessary quantities of filament yarn, staple fibre, rayon tyre yarn and cellophane. Out of these, plants worth about Rs. 83 crores could be manufactured in India. The capital equipment required for the manufacture of these plants is estimated at Rs. 6 crores to Rs. 7 crores. (*Paragraphs 71 to 74*).

#### *E. Jute Industry—*

(I) The present production of jute goods in India is round about 11 lac tons with 12½% of the looms sealed. (*Paragraphs 80 and 81*).

(II) The annual requirement and production of jute goods by the end of the Second Plan is estimated at 11.5 lac tons. (*Paragraph 85*).

(III) Demand for jute goods will increase further during the Third and Fourth Plan periods. The annual demand is expected to increase from 11.5 lac tons at the end of the Second Plan to 12.4 lac tons at the end of the Third Plan and to 13.8 lac tons at the end of the Fourth Plan.

The additional demand will be met by unsealing 5% of the looms during the Third Plan and the balance 7½% during the Fourth Plan. Installation of additional weaving capacity would not be necessary. (*Paragraphs 86 and 87*).

(IV) The Industry, however, requires large scale modernisation. This modernisation must be completed by the end of the Fourth Plan. (*Paragraph 87*).

(V) The total requirements of machinery required for modernisation by the end of the Fourth Plan are estimated at Rs. 3788.57 lacs. (*Paragraph 92*).

(VI) Three units are at present engaged in the manufacture of jute mill machinery but none of them is self-sufficient. All of them have to import a large number of components. (*Paragraphs 96 and 97*).

(VII) The Committee are of the opinion that the three units which are engaged in the manufacture of jute mill machinery can be developed to manufacture the entire range of machinery required for the modernisation of the industry. No new unit need be established for this purpose. (*Paragraphs 101 and 103*).

(VIII) The additional capital equipment which would be required by the three units to manufacture the requirements of jute mill machinery is estimated at Rs. 57 lacs. (*Paragraph 101*).

(IX) The Committee are of the view that the entire additional capital equipment should be installed by the end of the Second Plan so that the manufacture of the entire range of machinery is developed with the commencement of the Third Plan. (*Paragraph 103*).

#### *F. Supplementary Note on Jute Industry—*

(I) The outlook for the Jute Industry has considerably improved during recent months. The industry which was working with 12½ per cent of its looms sealed in June 1959 has found it possible to unseal 3½ per cent of its

looms since then. Internal consumption and exports of jute goods are both rising and, it is expected, will continue to rise during the Third Plan period in view of the increasing agricultural and industrial production in India and the World. Whereas previously the Committee had estimated the annual requirement and production of jute goods in India at 12·4 lac tons and 13·8 lac tons at the end of the Third and Fourth Five Year Plans respectively, they now feel that the annual requirement of jute goods at the end of the Third Plan itself may be about 14 lac tons. In that case, all the looms which are sealed at present will have to be unsealed within the Third Plan period. (*Paragraphs 104 and 105*).

(II) In view of this improvement in the outlook for the industry, the estimate of requirements of jute machinery will be altered. According to previous estimates, the requirements of preparatory and spinning machinery were Rs. 830·08 lacs by the end of the Fourth Plan. Now, according to revised estimates, the requirements of preparatory and spinning machinery will be Rs. 894·86 lacs by the end of the Third Plan. No estimate of preparatory and spinning machinery has been made for the Fourth Plan. As for weaving machinery, the previous estimate was Rs. 2958·49 lacs by the end of the Fourth Plan. This estimate stands as it is. (*Paragraph 106*).

(III) After the industry has unsealed all the looms which are sealed at present, there will be shortage of yarn for the wide looms which are already working and which are likely to be installed in future. In that case, some additional preparatory and spinning machinery would be required to feed the wide looms. (*Paragraph 107*).

110. *General Remarks of the Committee*—In their letter appointing the Standing Committee, the Government of India had desired that the final report should be submitted within a period of four months after the constitution of the Committee. The report, however, has taken a longer time. It is obvious that a report of this nature entails the collection of detailed information and data from a number of sources. Moreover, there was the difficulty of getting together several technical experts from different places for discussing the salient points connected with the preparation of this report. In the circumstances, some delay was inevitable. All the same, it is regretted.

111. *Acknowledgments*—We wish to place on record the full co-operation and the valuable assistance received from the Textile Commissioner, the Officers of the Development Wing and the various Federations and Associations in Bombay and Calcutta. We are indebted to all of them.

We also wish to place on record our appreciation of the excellent work done by the Secretary of the Committee and by the Convenors and the members of the various working groups who spared their valuable time for collecting the necessary information and preparing the reports.

K.K. BIRLA, *Chairman*

J.C. AGARWAL

R.G. CHANDORKAR

A.N. GHOSE

D.P. GOENKA

B.D. HALL  
S.R. JAIPURIA  
A.N. KAPOOR  
N. MAJUMDAR  
J.C. MORTON  
A. MOZOOMDAR  
S.C. NUNDY  
P.R. RAMKRISHNAN  
C.B.G. RAO  
A. SAMBAMOORTY  
K.L. SHAH  
J.K. SRIVASTAVA  
A. VENKATESIAH, *Secretary.*

**APPENDICES 1, 2, 3 & 3A**

Appendices 1, 2 and 3 are the reports of the three Working Groups and Appendix 3A is the Supplementary Note on the Jute Industry. These appendices are given in Volume II of the Standing Committee's report.



## APPENDIX 4

*Minutes of the First Meeting of the Standing Committee on Machinery Manufacture for Textiles and Synthetic Fibre Industries held on the 16th March 1959 in Room No. 135, Udyog Bhavan, New Delhi*

## PRESENT

Shri K.K. BIRLA, *Chairman*

## MEMBERS

1. Shri N. MAJUMDAR
2. Shri S.C. NUNDY
3. Dr. A.N. KAPOOR
4. Shri S. PAUL
5. Shri J.C. MORTON
6. Shri J.C. AGARWAL
7. Sri C. B. GUNDU RAO
8. Shri KANTILAL SHAH
9. Shri P.R. RAMKRISHNA
10. Shri A. VENKATESIAH, *Development Officer (Industrial Machinery Dte.) (Secretary).*

*By Special Invitation—*

1. Dr. B.D. Kalelkar, Senior Industrial Adviser.
2. Shri Chandorkar.

1. The Chairman welcomed the members to the first meeting of the Standing Committee and before proceeding with the regular work of the Committee he requested Dr. Kalelkar, Senior Industrial Adviser (Engg.) to address the Members.

2. Dr. Kalelkar opened his remarks by stating that when the Development Wing, after the end of the First Five Year Plan period, prepared the estimates of the requirements of industrial machinery for the Second Five Year Plan period, he had realised how difficult it was to make a correct assessment of the same. Considering the developments that were envisaged for the Third and Fourth Plans, he was fully aware of the considerable magnitude of the work that was involved. He further felt that it was only in the fitness of things that the specialists in the various fields should be associated with this heavy task of preparing the report as per the terms of reference entrusted to them. In pursuance of this idea the Government had constituted six committees for different Engineering Industries and they were all required to submit reports within a period of four months. He briefly outlined the way in which the Committee could start on the work and stated that in the case of Textile Machinery Industry the tasks would be of a two fold nature. Firstly the machinery requirements of the Third and Fourth Plan periods will have to be determined having in view the targets that were to be fixed for these periods and in this connection he drew the attention of the Members to the note sent to all the members by Shri L. K. Jha (Additional Secretary, Ministry of Commerce and Industry).

After having visualised the targets to be reached during the Third and Fourth Plan periods, it would then be necessary to determine the requirements of the various items of machinery to achieve those targets. While doing so a due provision should be made for the modern trends and development of new techniques in this industry. The second task for this Committee would then be to make an assessment of the requirements by way of machinery and equipment to manufacture such of those specialised items of machinery in the Textile Industry and for this he was confident that the vast experience and expert knowledge that was available in this Committee would stand them in good stead. He also emphasised that due prominence should be given to spare parts requirements of this industry.

Answering a point raised by Mr. Majumdar that particularly in the case of Textile Industry it would be extremely difficult to forecast the demands in the Fourth Plan period, Dr. Kalelkar mentioned that while he no doubt realised the difficulties and the risk involved in making such assessments, he felt, however that it would be necessary for this Committee also to fall in line with what was being done by the other Committees. Since they are also making in a very broad way the assessment of the demands for the Fourth Plan, this Committee also may indicate the same on the basis of the trends of increase assessed for the Third Plan.

3. The Chairman then addressed the Members and stated at the outset that the time limit of four months prescribed by the Government for the final submission of the report was indeed very tight. He, therefore, requested the members to express their views as to the best course to be adopted so that they may present as comprehensive a report as possible covering all the points mentioned in terms of reference. He further stated that for assessing the requirements of the Textile Industry, consideration should primarily be given for

- (a) increase in population;
- (b) the expected progress in the living standards and the consequent assessment of per capita consumption;
- (c) export programme envisaged for the textile industry.

There was then a general discussion on the various issues arising out of the terms of reference.

4. Shri S. C. Nundy suggested that taking into consideration the several complicated issues involved in fixing the targets for the Third and Fourth Plan periods, it would perhaps be more advisable to first fix an economic unit for each section of the industry and then work out the quantitative requirement of machinery required for that standard economic unit. By way of illustration he suggested that for the Cotton Textile Industry say, 20,000 spindles could be considered as an economic unit and similarly for the jute industry a capacity of 500 looms. After some discussion on the subject the Chairman suggested that this was quite a good idea and may be taken up again at a later stage.

5. The Chairman then suggested that in view of the very little time at the disposal of the Committee, it would be desirable to constitute study groups for each branch in the industry. Shri Nundy favoured the formation of three or four working groups and suggested that they could very advantageously

be set up in three centres such as Bombay, Bangalore and Calcutta so that all the issues may be exhaustively studied. Several members expressed their views on this and the Chairman finally decided that three working groups may be constituted but, before they can start their work on an agreed pattern, useful information already available with the Development Wing, the Textile Commissioner's Office and the Jute Commissioner's Office may be made available to the Members.

6. Shri Majumdar then circulated to all the Members a note he had prepared on the Cotton Textile Industry and briefly explained the main contents. In the light of the day's discussions he also agreed to supplement this note with additional information on Silk and Woollen Industry. It was then decided that the following notes should be sent to the Secretary before 4th April 1959—

- (i) Note on Cotton Textiles and Silk and Woollen Industry by Shri Majumdar.
- (ii) Note on Jute Textiles by Shri Paul.
- (iii) Note on Rayon Industry by Dr. Kapoor.

7. The Chairman also suggested that in order to elicit the views of the representative Associations in the Textile Industry letters may be addressed by the Secretary to the following federations—

- 1. Federation of Millowners' Association, Sir Vithaldas Chambers, 16, Apollo Street, Fort, Bombay.
- 2. Indian Jute Mills' Association, Royal Exchange, Calcutta.
- 3. The Federation of Woollen Manufacturers, J. K. Building, Dougall Road, Ballard Estate, Bombay.
- 4. Silk and Art Silk Mills Association, 78, Vir Nariman Road, Bombay 1.

The Chairman further desired that it must be clearly indicated in the letters that replies were to be sent before 4-4-1959.

8. The Chairman accepted the suggestion of Shri N. Majumdar that Shri Chandorkar be co-opted as a Member of this Committee. Shri Paul then suggested the inclusion of one representative from the Jute Mills and one from the Jute Machinery Manufacturers. The Chairman agreed to this and stated that he would personally consult the President of the respective Associations for the names of the individuals and then they would be co-opted for the Committee.

9. It was decided that the next meeting be held in Bombay on the 14th April 1959 at 11 a.m. in the office of the Textile Commissioner.

## APPENDIX 5

*Minutes of the Second Meeting of the Standing Committee of Machinery Manufacture (Textiles) and Synthetic Fibre Industries Held in the Committee Room of the Textile Commissioner's Office, Bombay, on 14-4-1959*

## PRESENT

1. Shri K.K. Birla (*Chairman*).
2. Shri N. Majumdar.
3. Shri S. Paul.
4. Shri S. C. Nundy.
5. Shri A. N. Kapoor.
6. Shri R. G. Chandorkar.
7. Shri A. Venkatesiah (*Secretary*).
8. Shri C. B. G. Rao.
9. Shri J. C. Morton.
10. Shri J. C. Aggarwal.
11. Shri D. P. Goenka.
12. Shri Kantilal Shah.
13. Shri S. Jaipuria.
14. Shri G. R. Joshi.

Before commencing the day's deliberations Shri K. K. Birla introduced Shri Goenka as a new Member of the Committee and in welcoming him stated that his wide knowledge and experience in the Jute Industry would be of very great service to this Committee.

In view of the fact that the final report of this Standing Committee has to be submitted to the Government by the first week of July 1959, the Chairman stated that the draft report in its final form, should be ready at least a month earlier. Having this in view he desired that the Working Groups, which are to be constituted during the course of the day, would have to finalise their report much earlier so that the consolidated report from all the three Working Groups may be placed before the Committee well in time.

To facilitate the Working Groups in the preparation of their reports, it was necessary that the main Committee should give them certain general guidance regarding the pattern in which the report has to be presented and the main data on which the calculations of the requirements would have to be based.

The Chairman desired that the report from each Working Group should essentially consist of three parts. The first part would deal with factual statements relating to the present position of the particular industry. The second part should explain clearly the basis of approach for the targets that would be fixed for each plan period and the third part should contain detailed statements regarding the requirements of machinery that would be necessary to manufacture the items of equipment envisaged in part II above.

The Chairman next proceeded to the consideration of the notes prepared by Shri Majumdar, Dr. Kapoor and Shri Paul. Before requesting Shri Majumdar to address the Members on the salient points of his note, the Chairman desired

to pay a handsome compliment for the very valuable information given by him and he very much appreciated the thorough manner in which the data has been presented. He also desired that the notes on the Rayon and the Jute Industry should generally fall in line with the pattern followed in this note.

Shri Majumdar then explained the contents of his note and all the members participated in the discussions that followed.

The Chairman then suggested that the Committee should now take up for consideration the following three important points—

- (a) The population at the end of each plan period.
- (b) The per capita consumption of cloth during the above three plan periods.
- (c) The export quota to be taken into consideration while fixing the target for each plan.

During the discussions on the above points, the Chairman enlightened the Members with information and the statistical data extracted from several authoritative publications like the monthly statistical bulletins published by the Government of India. Since the per capita consumption of cloth depended not only on the availability of the cloth but also on the purchasing power, the Chairman gave the following figures for the information of the members—

The actual production in the 3 sectors during the past few years has been as under—

*Cloth Production in Million Yards*

Year	Millmade	Handloom	Powerloom	Total
1955 ..	5094	1480	272	6847
1956 ..	5306	1509	278	7093
1957 ..	5317	1643	303	7263
1958 ..	4488	1624	296	6408
(Jan—Nov.)				

The per capita availability of cloth during the same period.

Year	Popu- lation in mil- lions	Total produc- tion in million yards.	Im- ports in mil- lion yds.	Ex- ports in mil- lion yds.	Deli- veries for other pur- poses in mil- lion yds.	Avail- ability of cloth for civil require- ments in million yds.	Per capita avail- ability in million yards
1955	377	6847	6	873	29	5951	15.8
1956	381	7093	13	804	27	6275	16.5
1957	385	7263	12	795	27	6453	16.8
1958	387	6408	11	490	20	5909	..
(Jan—Nov.)							

The expected increase in National and per capita income during the First and Second Plans is indicated below—

	Percentage increase				
	1950-51	1955-56	1960-61	1951—56	1956—61
1. National income (in Rs. crores at 1952-53 prices) ..	9110	10800	13480	18 per cent	25 per cent
2. Per capita income (Rs.) ..	253	281	331	11 per cent	per cent

#### Working Groups—

	Population	Per capita consumption	Export targets
	million	yards	million yds
For 2nd Plan Period ..	400	17·5	800
For 3rd Plan Period ..	430	18·5	800
For 4th Plan Period ..	460	21·0	800

The consideration of the Rayon Industry was taken up next and Dr. Kapoor explained briefly the contents of his note. He further desired to have from Shri Majumdar the data regarding the Rayon/Staple fibre processing industry.

Mr. Majumdar stated that the Art Silk Industry is generally considered as a luxury industry and this industry depends very greatly on imported raw materials. Therefore, the targets for this industry would have to be worked out having these in the background. He stated that there are 45,000 Powerlooms in this industry that have been authorised and there are quite a number of unauthorised looms also. These 45,000 looms are today running a little less than 1½ shifts per day. Mr. Majumdar stated that he has given the data required by Dr. Kapoor in his second note circulated to the members and explained the same in details. He felt that so far as the 3rd Plan is concerned an increase of 20 per cent may be taken for fixing up the targets. So far as weaving section is concerned the productive capacity is considered sufficient and no additional capacity need be visualised for the Second or Third Five Year Plan. The requirements of machinery would, therefore, be only for replacement purposes. The Chairman then requested Dr. Kapoor to take a note of the above data given by Shri Majumdar and desired that the Working Group should prepare the report on the same lines as in the case of the cotton textile industry.

Shri Majumdar next dealt with the requirements of woollen industry and stated that the necessary details were given in his note. It was generally agreed that the target of the requirements would be fixed on the same basis as was arrived at for the cotton textile industry.

The discussion on Shri Paul's note was taken up next. It was observed that the targets for the different plan periods for the jute industry cannot be determined in the same way as in the case of the cotton textiles as the trend of consumption was not directly related to the population but to other factors.

Shri Paul explained the salient points about his note and after some discussion it was decided that the Working Group should prepare their note taking into consideration the modernisation programme in the jute industry and the trends of export market.

The Chairman next announced the formation of the following Working Groups—

**I. Working Group for Textiles (Cotton, Woollen and Silk)—**

Shri R. G. Chandorkar (Convenor).

Shri N. Majumdar.

Shri Kantilal Shah—M/s. Vasant Industrial Engg. Works, Bombay.

Shri J. C. Aggarwal } N. M. M.  
Shri J. C. Morton. }

Shri Kakatkar.

Shri S. C. Nundy.

**II. Working Group for Jute Industry—**

Shri S. Paul (Convenor).

Shri D. P. Goenka.

Shri S. C. Nundy.

**III. Working Group for Synthetic Fibre—**

Dr. A. N. Kapoor (Convenor).

Shri Parikh.

Shri Lalkaka.

Shri D. D. Vora, Asstt. Director (Textiles).

The convenors were, however, empowered to co-opt such other members as they felt necessary in each case.

Shri K. K. Birla requested the Convenors of the Working Groups to briskly go ahead with the preparation of the reports and suggested that tentatively this Committee will next meet at Calcutta on the 23rd June at the meeting hall of I.J.M.A. at 11 a.m.

## APPENDIX 6

*Minutes of the Third Meeting of the Standing Committee for Machinery Manufacture (Textiles) held on 5-8-1959 at 10-30 A. M. at No. 8, India Exchange Place, Calcutta*

## PRESENT

1. Shri K. K. Birla—(Chairman)

## MEMBERS

2. Shri N. Majumdar.
3. Shri S. Paul.
4. Shri A. N. Kapoor.
5. Shri S. C. Nundy.
6. Shri R. G. Chandorkar.
7. Shri A. Sambamoorthy.
8. Shri S. R. Joshi.
9. Shri D. H. Vora.
10. Shri Bryan D. Hall.
11. Shri C. J. Lalkaka.
12. Shri D. P. Goenka.
13. Shri A. N. Ghose.
14. Shri J. L. Behal.
15. Shri C. B. G. Rao.
16. Shri J. C. Aggarwal.
17. Shri A. Venkatesiah (Secretary).

*By Special Invitation—*

Shri D. S. Joshi—Textile Commissioner, Bombay.

*Absent—*

1. Shri J. C. Morton.
2. Shri J. K. Srivastava.
3. Shri Sitaram Jaipuria.
4. Shri Kantilal Shah.
5. Shri P. R. Ramkrishnan.

The Chairman at the outset welcomed Shri D.S. Joshi, the Textile Commissioner, Bombay, and thanked him for having accepted the invitation to attend the meeting. He hoped that Shri Joshi's presence would be very helpful in the deliberations of the Committee.

The Chairman then reviewed the work done by the Committee in its previous two meetings. As the reports of the Working Groups could not be circulated in time to all the members he desired the conveners to briefly explain the salient points of their reports.

Shri Chandorkar explained to the members the main features of the report of the Cotton Textiles Working Group including the silk and the woollen industry. He stated that the report prepared by Shri Sambamoorthy on Silk Industry was also included in their report but as the report was received a little late it could not be studied in detail and considered by the working group.



Shri Sambamoorthy then explained the basis on which he had worked out the figures contained in his report. The Chairman then suggested that the working group may go through the report in detail.

Shri Majumdar suggested that the particular portion relating to the Rayon Industry, covered in the report of Cotton Textiles Working Group, may for the present be deleted and the targets for the art silk fabrics as well as the machinery requirements for the same should be re-examined, after knowing the decisions on these by the Development Council for Art Silk Industry which was scheduled to meet on the 8th August 1959 at Bombay.

The Chairman also observed that there were some differences in the population figures, taken by the Art Silk working group and the Cotton Textiles working group. A discussion then followed as to the correct figures that had to be taken for the final report. During the course of the discussions, Shri Joshi, the Textile Commissioner, expressed his opinion that it would be desirable to approach the target figures for the Textile Industry on a more liberal basis. Considering the very many variable factors that influence the fixation of targets for the Third and Fourth Plan periods, his personal view was that it would be better to indicate the range of requirements of spindles, looms in the different plan periods corresponding to certain specific basic assumptions regarding the per capita consumption of cloth.

In the end the Chairman after taking note of the various points expressed by the members regarding the trends in the rise of the population, the per capita income, suggested that the Committee may adopt the following figures—

Population to be assumed to be 400 million by the end of the 2nd Plan.

Population to be assumed to be 440 million by the end of the 3rd Plan.

Population to be assumed to be 480 million by the end of the 4th Plan.

The Chairman suggested that in view of the Committee having agreed to base their reports on the above figures, it would be necessary to rework the figures in the different annexures enclosed in the working groups' report. Shri Chandorkar agreed to this and stated that he would call a meeting of his working group shortly.

Shri Paul next briefly explained the note prepared by his working group and there was a general discussion. It was suggested that the production figures given in the note would have to be checked up and revised. The Chairman also suggested that Mr. Paul may prepare a brief synopsis of the conclusions of his working group in a comprehensive form so that the same could be incorporated into the body of the main report to be sent by the Standing Committee to the Government.

Dr. Kapoor then explained the salient features of the report of his working group. Mr. Majumdar suggested that in view of his remarks made earlier Dr. Kapoor may convene a meeting of his working group immediately after the meeting of the Development Council at Bombay so that all the important points on the Rayon side would be considered and whatever overlapping that crept into the present reports could be avoided. The Chairman then suggested that as in the case of the Cotton Textiles working group, a brief summary of the final conclusions arrived at by the group may be given at the end of the report so that this could be incorporated in the final report of the Standing Committee.

The Chairman then stated that after the receipt of the final reports from the individual working groups, he would suitably prepare the final report in the proper manner for submission to the Government in consultation with the various conveners and the Secretary. He requested the conveners to expedite their final report and desired that they may be submitted by the end of the month. He indicated that the Standing Committee's report should be submitted to the Government before the end of September 1959 and for this purpose he would be calling a meeting of the Committee as soon as the final report is ready and the date and place of the meeting would be duly intimated.

## APPENDIX 7

*Minutes of the fourth (Final) Meeting of the Standing Committee for Machinery Manufacture (Textiles) held on 8th April 1960 at 11-30 A.M. at Bombay in the Committee Room of the Office of the Textile Commissioner*

## PRESENT

1. Shri K. K. Birla, *Chairman*

## MEMBERS

2. Shri N. Majumdar.
3. Shri R. G. Chandorkar.
4. Shri Sitaram Jaipuria.
5. Shri Kantilal Shah.
6. Shri D. P. Goenka.
7. Shri J. C. Morton.
8. Shri C. B. G. Rao.
9. Dr. A. N. Kapoor.
10. Shri P. R. Ramkrishnan.
11. Shri A. N. Ghose.
12. Shri A. Venkatesiah, *Secretary*.

*By Special Invitation—*

Shri D. S. Joshi, Textile Commissioner, Bombay.

At the outset, the Chairman thanked Shri Joshi, the Textile Commissioner, for having kindly accepted his invitation to be present at the meeting.

The Chairman then stated that the draft report, copies of which were circulated to all the Members, contained a few additional paragraphs written by him purely with a view to clarify certain points which were necessary. He requested the members to express their opinion on the draft report and desired that if they were in agreement with the report as drafted, it could be duly signed. There was next a discussion on this matter and it was suggested that the draft report should be gone into and if the members desired any amendments, they could be considered by the Committee.

Accordingly the draft report was seen through. While considering the portion on Cotton Textiles, Shri N. Majumdar suggested that the following should be added at the end of paragraph 33—

“However this does not include the cost of plant and equipment required for the manufacture of machinery for producing the stores and accessories”.

This was agreed to. The Committee also agreed that after paragraph 59, the following should be added—

“The woollen machinery being somewhat akin to cotton textile machinery it would be more economic if the cotton textile machinery making industry were to take up the manufacture of woollen machinery. We would therefore recommend that the cotton textile machinery manufacturers be invited to diversify their production pattern to include woollen machinery also.”

As regards the portion on Art Silk, Dr. Kapoor stated that he wished to amend a few figures in the light of the decisions arrived at by the Development Council for Art Silk Industry. It was agreed that Dr. Kapoor would send the revised figures to the Secretary. The Chairman pointed out that he had included, in the draft report, an assessment of the value of capital equipment required to manufacture the additional plants that would be necessary to produce the requisite quantity of art silk yarn. The Committee accepted the Chairman's assessment in this behalf.

Lastly, the portion on the Jute Industry was considered. Shri Goenka stated that since the submission of the report by the Working Group on Jute Industry, there had been a substantial change in the outlook of the Jute Industry and that he would very much like to review the position again in the light of the recent discussions held under the Chairmanship of the Minister for Industry. After some discussions, the Chairman requested Shri Goenka to revise the figures and send the amended ones to the Secretary as early as possible.

In the end, the Chairman thanked all the Members for their co-operation and help. He particularly thanked the Conveners for the very efficient way in which they had so successfully discharged the heavy task entrusted to them.

## APPENDIX 8

*Existing capacity for the manufacture of Cotton Textile Machinery*

Item of Machinery	Name of the Manufacturer	Annual licensed capacity including expansion	Remarks
1. Blowroom	1. Ramakrishna	.. 12 lines	} Not yet gone into production.
	2. Textools	.. 24 "	
	3. Texmaco	.. 24 "	
	4. A.T.E.	.. 12 "	
	Total	.. 72 "	
2. Carding Engines.	1. M.M.C.	.. 1200 Nos.	
	2. Textools	.. 900 "	
	3. N. M. M.	.. 240 "	
	4. Texmaco	.. 300 "	
	Total	.. 2640 "	
3. Draw Frames.	1. Textools	.. 96 frames	} Only Textools have so far gone into production.
	2. Texmaco	.. 83 "	
	3. Ramakrishna	.. 25 "	
	4. Lakshmiratan	.. 36 "	
	5. Ramkrishna	.. 48 "	
Total	.. 288 "		
4. Speed Frames.	1. Textools	.. 96 Nos.	} Do.
	2. Lakshmiratan	.. 72 "	
	3. Texmaco	.. 160 "	
	4. Ramakrishna	.. 72 "	
	Total	.. 400 "	
5. Ring Frames	1. Textools	.. 900 "	} Not yet gone into production.
	2. N. M. M.	.. 600 "	
	3. Texmaco	.. 450 "	
	4. Ramakrishna	.. 360 "	
	5. Lakshmiratan	.. 300 "	
Total	.. 2610 "		

APPENDIX 8—*contd.*

Item of Machinery	Name of the Manufacturer	Annual licensed capacity including expansion	Remarks
6. Winding	1. Cimmco (H.S.)	.. 60 Nos.	} Production yet to commence.
	2. Textools	..	
	(a) Single end	.. 60	
	(b) Multiple end	.. 60	
	Total	.. 180	
7. High Speed Warping.	1. Cimmco	.. 60	..
8. Looms (Plain).	1. Cimmco	.. 2400	..
	2. Mysore Machinery	720	..
	3. Copper	.. 1200	..
	4. India Machinery	720	..
	Total	.. 5040	..
9. Looms (Auto)	1. Cimmco	.. 2400	..

*Processing Machinery*—It may be stated that it has not been possible to indicate the licensed capacities in terms of units in respect of textile processing machinery since the number of items of processing machinery manufactured by each firm is very large. Moreover, any increase in the productive capacity of one item will result in the decrease in the productive capacity of other items and vice versa.

## APPENDIX 9

*Production of cotton textile machinery during 1957, 1958 and 1959  
(Jan.—Sept. 59)*

Items of machinery	Production		
	1957	1958	1959 (Jan.—Sept. 59)
<i>Spinning &amp; Weaving—</i>			
1. Carding Engines .. .. .	1,023	1,148	561
2. Draw Frames .. .. .	34	9	29
3. Speed Frames .. .. .	33	28	9
4. Ring Frames .. .. .	1,364	877	797
5. H. S. Winding Machinery .. .. .	2	..	..
6. H. S. Warping Machinery .. .. .	1	..	..
7. Looms (Plan) .. .. .	2,552	3,151	2,540
8. Looms (Auto) .. .. .	316	36	356
9. Reeling Machinery .. .. .	1,965	804	339
10. Bundling Press .. .. .	112	53	26
11. Baling Press .. .. .	26	5	5
<i>Processing Machinery—</i>			
12. Jiggers .. .. .	90	174	105
13. Chemiking Machinery .. .. .	5	5	11
14. Padding Mangle .. .. .	22	22	26
15. Scutcher .. .. .	15	9	9
16. Water Maugle .. .. .	33	27	15
17. Washing Machinery .. .. .	20	26	18
18. Squeezing Machine .. .. .	5	4	6
19. Damping Machine .. .. .	5	2	..
20. Back Filling .. .. .	11	5	2
21. Kiers & Heaters .. .. .	16	23	17
22. Plaiting, Doubling & Folding Machines	29	50	36
23. Soapers .. .. .	4	11	1
24. Agers .. .. .	11	23	27
25. Winches .. .. .	9	14	3
26. Expanders .. .. .	40	31	20
27. Drying Cylinders .. .. .	73	59	36
28. Sizing Cylinders .. .. .	45	48	24
29. Cloth Printing Machine .. .. .	2	11	12
30. Forcing Machine .. .. .	4	3	2

APPENDIX 9—*contd.*

Items of machinery	Production		
	1957	1958	1959
		(Jan.-Sept.)	
31. Filter Press .. .. .	14	2	..
32. Colour Mixer .. .. .	10	5	6
33. Starch Mangle .. .. .	8	..	2
34. Preheater .. .. .	5	1	1
35. Stenters .. .. .	5	3	3
36. Cotton Driers .. .. .	1	..	3
37. Laboratory Padding .. .. .	..	..	2
38. Dummy Ageis .. .. .	2	4	3
39. Auto Piler .. .. .	..	1	2
40. Mercerising Machine .. .. .	..	..	1
41. Batching machine .. .. .	1	..	4
42. Hydro-Extractor .. .. .	..	..	8
43. Hank Yarn Printing Machine .. .. .	..	..	2
44. Sheering Machine .. .. .	..	..	1
45. Stamping Machine .. .. .	..	..	3



## APPENDIX 10

*Assessment of Requirement of Cotton Cloth, Yarn and Textile Machinery (Spinning & Weaving) required during the remaining period of Second Plan and during Third and Fourth Plan Periods*

	II	III	IV
1. Population anticipated (Million) ..	400	440	480
2. Per capita consumption (annual) in yards	17.5	19	21
3. Requirement of cloth at per capita rate at (2) above (million yards) .. ..	7,000	8,360	10,080
4. Export target (annual) million yards ..	800	800	800
5. Total requirement (million yards) ..	7,800	9,160	10,880

6. Current annual production and the production at the end of the second and third plan in each of the sectors in million yards.

	Current rate	At the end of II Plan	At the end of III Plan
(i) Mill Sector .. .. .	5,100	5,130	5,500
(ii) Powerloom Sector .. .. .	300	420	480
(iii) Handloom Sector .. .. .	1,650	1,950	2,880
(iv) Khadi (Amber) .. .. .	75	300	300
Total ..	7,125	7,800	9,160

7. Additional requirement of cloth in million yards during each of plan periods to be planned—

II	III	IV
7800—7125	9160—7800	10880—9160
675	1360	1720

8. Allocation of additional cloth to different sectors in million yards.

	II	III	IV
(i) Mill Sector .. .. .	30	370	860
(ii) Powerloom Sector .. .. .	120	60	..
(iii) Handloom Sector .. .. .	300	930	860
(iv) Amber Cloth .. .. .	225	..	..
Total ..	675	1,360	1,720

9. The additional capacity as shown above in the mill and power-loom sectors is expected to be achieved as under—

*Mill Sector*

*During II Plan—*

30 million yards are expected to be achieved as under —

By the installation of 1,000 automatic looms for the production of cloth for export purposes.

*Basis*—40 yards per shift per loom working 2½ shifts per day or 100 yards per day per loom.

*During III Plan—*

370 million yards are expected to be achieved as under—

(a) *150 million yards*—Installation of 5,000 additional looms for the production of export cloth. The Government has already accepted the proposal in principle for the installation of additional looms. It is expected that all the 5,000 looms would be automatic and the rate of installation would be 1,000 looms per year. *Basis of production*—40 yards per shift per loom working 2½ shifts per day or 100 yards per loom per day.

(b) *60 million yards*—Installation of 2,000 additional looms for balancing units so as to establish balanced composite units with about 25,000 spindles and 500 looms. These looms are also expected to be automatic. *Basis of production* : Same as indicated against (a) above.

(c) *120 million yards*—Installation of 4,000 looms in lieu of existing looms with permanently closed mills which are to be scrapped and replaced. These looms are also expected to be automatic. *Basis of production* : Same as indicated in (a) above.

(d) *40 million yards*—By more intensive utilisation of the installed capacity and by large scale renovation and modernisation of the existing plants and equipment.

*During IV Plan —*

860 million yards are expected to be achieved as under—

By the installation of roughly 28,750 automatic looms during the Plan Period of 5,750 automatic looms per year. *Basis of production* : Same as indicated against (a) above.

Powerloom Sector	Additional Allocation
During II Plan .. ..	120 million yards out of existing plus additional looms.
During III Plan .. ..	60 million yards out of additional looms
Total	180 million yards

There are 27,000 powerlooms (registered) in this sector producing 300 million yards at present. 10,000 additional looms have been permitted to be installed in replacement of handlooms. It is expected that 5,000 looms would be installed during the II Plan period and remaining 5,000 during the III Plan period. Basis of production : About 44 yards per loom for 1½ shifts per day.

Handloom Sector	Additional allocation
During II Plan .. ..	3,000 million yards.
During III Plan .. ..	930 ..
During IV Plan .. ..	860 ..

Handloom Industry is reported to have over 2 million active looms which are not fully utilised throughout the year. The production of handloom cloth is no doubt steadily going up but whether this sector would be able to produce the entire quantity of additional cloth allocated to it is a different matter. The allocation has been made on the basis of the Government's policy of encouraging the handloom industry.

#### *Amber Cloth*

During II Plan 225 million yards.

The target fixed under this sector has been 300 million yards during the II plan period. As against this, the sector has so far achieved a production of 75 million yards. The target of 300 million yards has been left unaltered during the next two plan periods.

#### *Yarn requirement*

	II	III	IV
(a) Cloth for which yarn is required to be produced by the mill sector (Million yards) .. .. .	7,800—300	9,160—300	10,880—300
	7,500	8,860	10,580
(b) On the basis of 4·5 yards of cloth per lb. of yarn plus 5% waste, the yarn required to produce cloth against (a) above (Million lbs.) .. .. .	1,750	2,067	2,469
(c) Requirement of yarn for purposes other than the production of cloth. Basis : 5% of requirements of yarn for cloth purposes. (Million lbs.) .. .. .	87·50	103·35	123·45
(d) Total requirement of yarn (Million lbs.)	1,837·50	2,170·35	2,592·45
(e) Production of yarn as reported by the Mill Sector during 1958-59 (actual) is 1,712 million lbs. The additional yarn therefore needed would be (million lbs.)	1,837·50 —1,712 =125·50 or 125	2,170·35 —1837·50 =322·85 or 335	2,992·45 —21·7035 =422·10 or 420

(f) The production of the additional yarn as indicated at (e) above is expected to be achieved as under—

## II Plan Period—

125 million lbs. are expected to be achieved as under—

(a) 102·0 million lbs—About one million additional spindles have already been licensed which cannot be revoked as the effective steps to a certain extent for the installation of the same have already been taken by the mills. The progress of installation is very slow and it is estimated that about  $\frac{1}{2}$  million spindles at the rate of  $\frac{1}{4}$  million spindles per year would be installed by the end of the II Plan period. As such the additional production from  $\frac{1}{2}$  Millions spindles only has been taken into account. Basis : 205 lbs. per spindle per year for  $2\frac{1}{2}$  shifts per day.

(b) 23 million lbs—Partly by the fuller utilization of idle capacity and partly by the renovation of the existing plant and equipment. There are 13·41 million spindles and the average utilization of the same shiftwise is as under—

I Shift	II Shift	III Shift
11·15	10·70	4·60

## III Plan Period—

335 million lbs. are expected to be achieved as under—

(a) 155 million lbs—Installation of 0·75 million additional spindles. Basis : 205 lbs. production per spindle per year at  $2\frac{1}{2}$  shifts working per day.

(b) 60 million lbs—Installation of 0·3 million spindles in replacement of spindles in existence at present with mills which are permanently closed. These are to be scrapped and replaced by new ones. Basis : Same as at (a) above.

(c) 120 million lbs—Partly by more intensive utilisation of installed capacity and partly by modernisation of the existing plant and equipment.

There are about 350 mills which are running on marginal profits or at no profits at all. These require large scale renovation and intensive modernisation.

## IV Plan—

(a) 420 million lbs. are expected to be achieved as under—

By the installation of an additional 2·05 million spindles during the Plan period or 0·41 million spindles per year. Basis of production : 205 lbs. of yarn per year per spindle at  $2\frac{1}{2}$  shifts per day.

### *Requirement of machinery for expansion II plan period*

The Ad Hoc Committee appointed by the Government of India to advise them on the manufacture of textile machinery worked out the details of the requirement of machinery needed during the II plan period at its meeting held

at Coimbatore on 31-3-59. The basis and the working details for the machinery with which we agree are as under—

*Spinning machinery*— $\frac{1}{2}$  million additional spindles are required to be installed to produce 102 million lbs. of yarn. The basis and the actual requirement of machinery is as under—

1. *Blow Room*—Basis—12,000 spindles per line.

$$\text{No. of blow room lines} = \frac{5,00,000}{12,000} = 42$$

2. *Carding Engines*—Basis—4 cards per 1,000 spindles.

$$\text{No. of cards} = \frac{5,00,000 \times 4}{1,000} = 2,000.$$

3. *Draw frames*—Basis—4,000 spindles per finisher frame.

$$\text{No. of draw frames} = \frac{5,00,000}{4,000} = 125$$

4. *Comber sets*—Basis—5,000 spindles per set.

It is expected that the demand for combed yarn would rise due to better standard of living and the liking of the public to go in for fine and super fine cloth. It can therefore safely be assumed that a least 50% of the spindles would be utilized for the production of combed yarn. As such the number of spindles required to be worked on combed yarn would be 2,50,000.

$$\text{No. of comber sets} = \frac{2,50,000}{5,000} = 50$$

5. *Speed Frames*—Basis—4,000 spindles per preparation.

One slubber =  $1\frac{1}{2}$  intermediate frame.

$$\text{No. of slubbing frames} = \frac{5,00,000}{4,000} = 125$$

$$\text{No. of intermediate frames} = 125 \times \frac{3}{2} = 187$$

$$\text{Total} = 312 \text{ or say } 310.$$

6. *Ring Frames*—Basis—400 spindles per frame.

$$\text{No. of frames} = \frac{5,00,000}{400} = 1,250$$

*Weaving Machinery*—Additional looms would be installed as under—

(a) <i>Powerloom Sector</i>	..	5,000 looms (Additional)
(b) <i>Mill Sector</i>	..	1,000 looms (Automatic) to produce 30 million yards.
<b>Total</b>	..	<b>6,000 looms</b>

*Powerloom sector*—The Government of India has permitted the installation of 2,500 automatic looms per year for replacement of plain looms by automatic looms in the mill sector. The plain looms so replaced are expected to go in the powerloom sector where 100,000 additional looms are to be installed. It is expected that out of 1,000 looms only 5,000 would be installed in the second plan period and the remaining would be installed in the third plan period. The replaced plain looms of the mill sector are expected to satisfy the need of the powerloom sector to the extent of 50% only and the balance 50% i.e. 2500 would have to be installed as new.

It is felt that the preparatory machinery required for the above 5,000 looms would be made available from the replacement that is likely to be effected in the mill sector under renovation and modernisation schemes.

*Mill Sector.*—1,000 additional automatic looms are expected to be installed for the production of cloth for export purposes.

*Preparatory machinery for 1,000 automatic looms*—It is expected that 50% of the automatic looms would be fed from fully automatic winding and warping machines while the remaining 50% would be fed from High Speed Winding and Warping Machines. The requirement of machinery has been calculated as under—

*High Speed Winding Machine—Basis*—10 lbs. per spindle per shift per day and 120 spindles per machine.

(a) Anticipated production out of 1,000 automatic looms	30 million yards
(b) Yarn required to produce 30 million yards (Basis: 4.5 yards per lb. plus 5 % waste)	7 million lbs. roughly.
(c) Warp yarn necessary to produce 30 million lbs. Basis: 55 % of yarn to be taken as warp yarn	3.85 million lbs.
(d) Since only 50% yarn has to be wound on the H.S. Winding machines, the number of machines required	$\frac{38,50,000}{2 \times 300 \times 2.5 \text{ shifts} \times 10 \times 120}$ $= \frac{77}{36}$

or say 2 machines.

*High Speed Warping Machines—Basis*—2 High speed warping machines.  
= 3 High Speed Winding Machines.

No. of machines required would be .. .. 1

*Fully automatic winding and warping—Basis*—14 lbs. per spindle per shift per day and 240 spindles per machine.

No. of machines =  $\frac{38,50,000}{2 \times 300 \times 2.5 \times 14 \times 240} = \frac{55}{72}$  or say 1 set.

*Sizing machines—Basis—*One high speed sizing machine for 300 looms.

$$\text{No. of machines required} = \frac{1000}{300} = 3.33 \text{ or say } 40$$

Since the above calculations were made early in 1959 when there were about two years remaining for the completion of the Second Plan, the annual requirement of machinery would be half in number as calculated above and the same has been shown as annual requirement under column 3 in the annexed statement A.

### III Plan Period—

*Spinning Machinery—*0.75 million additional spindles have to be installed for producing 155 million lbs. of yarn. The requirement of spinning machinery has been calculated on the same basis as shown earlier while calculating the requirement of machinery for the II plan period. The requirement for five years is as under—

Serial No.	Name of the machinery	No. of units	Remarks
1.	Blowroom lines	63	
2.	Carding Engines	3000	
3.	Comber sets	75	50% of additional spindles would be on combers.
4.	Drawing Frames	188	
5.	Speed Frames—		
	(a) Slubbing frames	188	} 470
	(b) Intermediate	282	
6.	Ring Frames	1875	

*Weaving Machinery—*The installation of additional looms in the industry would be as under—

(a) Powerloom Sector	..	5000
(b) Mill Sector—		
(i) Automatic looms for export of cloth	..	5000
(ii) Automatic looms for balancing so as to establish balanced composite units		2000

Total .. 12000

*Powerloom Sector—*5000 additional looms have to be installed.

The installed capacity of looms in the organised mill sector is 2.01 lakh looms. The entire capacity of the industry is not being utilised as is evident from the following figures—

Installed capacity (In lakhs)	Average utilization shiftwise in lakhs		
	I	II	III
2.01	1.76	1.67	0.37

Quite a good number of looms in the industry are idle. This is due to the fact that some 20/25 mills are more or less permanently closed and that many other mills are partially closed due to the dilapidated condition of the machinery and equipment. To put the Industry on a sound footing, stress is to be laid on the modernisation and rehabilitation of the industry rather than its expansion so that more effective use is made of the capital equipment without bringing about a possible redundancy in the capacity but at the same time ensuring a sizable increase in the productivity of the existing installation. It is estimated that about 4,000 looms at present in existence with some of the permanently or partially closed units would be scrapped and replaced by new ones.

It is anticipated that 50% of the requirement of the power loom sector would be met out of the replaced looms and only the balance 50% i.e. 2500 looms would be needed as new.

The requirement of preparatory machinery for the 5,000 looms is expected to be met out of the replacement expected to occur in the Mill Sector under the renovation and modernisation schemes.

*Mill Sector*—The following additional looms would be installed :—

(a) Automatic looms for production of export cloth ..	5000
(b) Automatic looms for balancing so as to establish balanced composite units ..	2000
Total ..	7000

*Preparatory machinery for 7000 automatic looms*—It is expected that all the automatic looms would be fed from fully automatic winding and warping machines. The requirement of machinery which has been worked out on the same basis as adopted for the II Plan is as under.—

*Fully Automatic Winding and Warping Machines*—

(a) Anticipated production of 7,000 automatic looms .. .. .	210 million yards.
(b) Yarn required to produce 210 million yards. Basis—4.5 yards to a lb. plus 5% waste	49 million lbs.
(c) Warp yarn necessary to produce 210 million yards. Basis—55 % of yarn required for the cloth to be taken as warp .. .. .	27 million lbs.
(d) No. of machines $\frac{27,000,000}{300 \times 2.5 \times 14 \times 240} = \frac{900}{84}$ or say 11.	

*Sizing Machines*—Basis—One high speed sizing machine for 300 looms.  
No. of machines=24 or say 25 machines.

Since the expansion in spinning and weaving for which the above machinery is needed has to take place in five years, the rate of annual requirement would be one fifth of the number as calculated above. This annual requirement has been shown under column No. 6 in the annexed statement 'A'.



*IV Plan period—*

*Spinning Machinery*—2·05 million additional spindles have to be installed for producing 420 million lbs. of yarn. The requirement of spinning machinery has been calculated on the same basis as shown earlier while calculating the requirement of machinery for the II Plan period. The requirement of machinery for 5 years works out as under :—

Serial No.	Name of machinery.	No. of units.	Remarks
1.	Blowroom lines	171	
2.	Carding Engines	8200	
3.	Comber Units	205	50% of the additional spindles would be on combers
4.	Drawing Frames .. ..	513	
5.	Speed Frames—		
	(a) Slubbing Frames 513 ..	} 1282	
	(b) Intermediate Frames 769 ..		
6.	Ring Frames .. ..	5125	

*Weaving Machinery*—Roughly 28,750 additional automatic looms would have to be installed to produce 860 million yards of cloth.

*Preparatory Machinery for 28,750 Automatic looms*—All the automatic looms are expected to be fed from fully Automatic Winding and Warping Machines. Taking the basis as shown for the II Plan period, the requirement of machinery would be as under :—

*Fully Automatic Sinding and Warping Machines—*

- |   |                               |
|---|-------------------------------|
| (a) Anticipated production of cloth by 28,750 automatic looms ..  | 860 million yards.            |
| (b) Yarn required to produce 860 million yds. <i>Basis</i> —4·5 yards to a lb. plus 5% waste ..                         | 201 million lbs.              |
| (c) Warp yarn necessary to produce 860 million yards of cloth- <i>Basis</i> —55% of yarn to be taken as warp yarn .. .. | 110 million lbs.              |
| (d) No. of machines required to produce 110 million lbs. of yarn  | 43 (to be rounded off as 45). |

*Sizing Machines—Basis*—One high speed sizing machine for 300 looms. No. of machines — 96 or say 95 machines.

Since the expansion in the Spinnig and Weaving Machinery for which the above machinery is needed has to take place in five years, the rate of annual requirement would be one fifth of the number as shown above. The annual requirement of machinery has accordingly been calculated and shown in annexed statement 'A' under column 9.

*Requirement of machinery for replacement purposes*

*During II Plan—period*

Although the normal life of a machine can be expected to be of the order of about 40 years yet in most cases it is usually found that on account of lack of finance, etc., the mills are slow and often take a longer time in replacing their machines. Therefore for a more realistic assessment of the rate of replacement, it would be better to take 50 years as the life of machinery in general (40 years for ring frames) except for those machines which are becoming obsolete on account of technological advancement. Based on the installed capacity of the machines, the requirement of Spinning Machinery for replacement purposes would be as under—

Serial No.	Name of machines	Installed capacity (1958)	Average life	No. re-quired annually	Remarks
1	Blowroom lines ..	1,217	50	24	
2	Carding Engines ..	40,195	50	804	
				400	As against 804 required on the basis of life of 50 years, only 400 cards are expected to be replaced since rate of replacement has been found to be slow.
3	Comber sets .. ..	2,834	50	Nil	No replacement is anticipated since the comber sets are comparatively recently installed in the industry.
4	Draw Frames	2,750	50	55	
5	Speed Frames ..	8,750	50	175	
6	Ring Frames—				
	(a) Spindles ..	1,30,54,098	..	..	
	(b) Frames (400 spindles per frame) ..	32,635	40	815	

*Weaving Machinery—*

*Preparatory*—Details about the actual installation of Weaving Preparatory Machinery in the mills are not known. As such, on the basis of life of machinery it is not possible to estimate the requirement. However, the requirement has been calculated as under—

*Basis—*

(1) Estimated annual cloth production (million yards) ..	5,100
(2) Yarn required for 5,100 million yards in million lbs.	1,190
(4.5 yards per lb. of yarn plus 5% waste) ..	654.5
(3) Warp Yarn 55% of yarn at (2) above (million lbs.) ..	654.5
(4) No. of High Speed Winding Machines required to process 654.5 million lbs. of yarn. per Basis—10 lbs. per spindle shift 120 spindles per machine 2 shifts .. ..	909
	or say
	900

- (5) No. of High Speed warping Machines required to process the above Warp Yarn *Basis*—3 High Speed Winding Machines equivalent to 2 High Speed Warping Machines 600
- (6) No. of existing looms (in lakhs) .. .. . 2.01
- (7) No. of sizing machines. *Basis*—300 looms per one Sizing Machine (High Speed) .. .. . 670

It is presumed that 50 per cent of the preparatory machinery viz. Winding and Warping machines used in the textile mills is obsolete and this could be replaced during the next 10 years. Out of this, 50 per cent of the replacement expected to be by the fully automatic type (Barber Colman). (*Basis*—Production per spindle on Fully Automatic Winding Machine such as Barber Colman is 14 lbs. per spindle— (240 spindles per unit).

Similarly provision has to be made for the replacement of existing High Speed Winding and Warping Machines on the basis of a life of 20 years. 50 per cent of such replacement would be with the Fully Automatic type. Thus, the requirement of Winding and Warping Machines on account of replacement could be assessed as under:—

*Existing capacity. (In terms of High Speed Winding and Wrapping)*

900 winding machines				600 wrapping machines			
Grey vertical 450 to be replaced in 10 years		High & fully automatic 450 to be replaced in 20 years		Ordinary 300 to be replaced in 10 years		High speed & fully automatic 300 to be replaced in 20 years	
23 High speed (per year)	9 Automatic (per year)	11 High speed (per year)	5 Fully automatic (per year)	15 High speed (per year)	9 fully Automatic (per year)	8 High speed (per year)	5 Automatic (per year)
Annual requirement of Winding Machines for replacement				Annual requirement of Wrapping Machines for replacement			
H. S. Winding Machines .. 34				H. S. Wrapping Machines .. 23			
Fully Automatic Winding Machines (Barber Column). .. 14				Fully Automatic Wrapping Machines (Barber Column) .. 14			

As regards Sizing Machines, It is presumed that 15 per cent of the capacity is of the modern type and that 40 per cent of the existing capacity is expected, to remain on the old system where only cylinders are likely to be replaced. Thus 45 per cent of the capacity viz. 300 units are expected to be replaced within the next 10 years— i.e., at the rate of 30 per year.

So far as looms are concerned, replacement is expected only in respect of plain looms. Only little replacement if any is expected to be carried out in existing automatic looms during the Second Plan period as the same have been

installed in recent years. Based on a 50 years life and considering the number looms installed in the industry, the annual rate of replacement would be  $\frac{1,86,244}{50} = 3,725$ . Since 2,500 looms are expected to be replaced annually by Automatic Looms, the requirement of ordinary looms would be 3,725—2,500—1,225.

The details indicating the annual requirement of different items of machinery during the Second Plan period are as shown in the annexed statement 'A' under column No. 4.

*During III Plan period*—The present installed capacity in the mill sector is 13.41 million spindles and 2.01 lakh looms. The entire capacity is not always utilized as would be evident from the following figures—

	Installed Capacity	Average utilization shiftwise		
		I	II	III
Spindles (Millions) .. ..	13.41	11.15	10.70	4.60
Looms (Lakhs) .. ..	2.01	1.76	1.67	0.37

The large idle capacity of the Industry is accounted for by the fact that some 20/25 mills are more or less permanently closed while many other mills are totally close on account of the dilapidated condition of machinery and equipment and their uneconomic operation. On a rough estimate there will be about 150 mills which are running on marginal profits or no profits at all. Even mills which are working under comparatively good management are not always working without some defect in their maintenance of machinery. Under the circumstances, sufficient importance has to be given to the modernisation and rehabilitation of the industry. Mills with extremely old and dilapidated machinery have upto now been allowed to exist and although there was no production worth mentioning from these units, nevertheless they worked as a dead weight to the economic well being of the industry. Other economically unstable units surviving on minimum profits or low profits are also a potential danger on account of their inability to hold stocks in time of adversity. They thereby create an unstable situation in the market affecting even the comparatively better units in the Industry. Therefore, it is necessary that during the Third Plan period an all out effort should be made to scrap all units whose machinery is beyond redemption and in their place to establish new model units with the latest labour saving machinery and up-to-date finishing plant capable of producing improved varieties of cloth required for the export market. It is estimated that about 3 lakh spindles and some 4,000 looms at present existing with some of the permanently closed units can be scrapped and replaced by new ones. The remaining 150 marginal units and another about 200 mills will require large scale renovation. There will still be 100 other mills which would require normal routine maintenance of their machinery. When all this is accomplished the Industry would be put on a sound footing and would be in a position to give

the increased rate of production required to achieve the targets. The programme of replacement could thus be divided as under:—

- (1) Installation of 3 lakh new spindles and 4,000 looms with permanently closed mills.
- (2) Large scale renovation and routine maintenance in the mills.

*Requirement of machinery for 3 lakh spindles and 4,000 looms*—On the same basis as indicated earlier for the II Plan period, the requirement of machinery would be as under—

*Spindle Machinery*

Serial No.	Name of the item	No. of units required for the Plan period	Annual requirement	Remarks
1	Blowroom Lines .. ..	25	5	
2	Carding Engines .. ..	1200	240	
3	Comber Sets .. ..	30	6	only 50% spindles on
4	Draw Frames .. ..	75	15	combers.
5	Speed Frames—			
	(a) Slubbing .. ..	75	188	38
	(b) Intermediate .. ..	113		
6	Ring Frames .. ..	750	150	

*Weaving Machinery*—Cloth anticipated to be produced from 4,000 looms is of the order of 120 million yards.

- (1) Yarn required for 120 million yards *Basis*— 28 million lbs.  
4.5 yards per lb. of yarn plus 5% waste.
- (2) Warp yarn (55% of 28 million yards) .. 15.4 million lbs.
- (3) No. of Fully Automatic Winding and Warp- 6 machines in the Plan  
ing Machines *Basis*—14 lbs. per spindle period or say 1 per  
and 240 spindles per machine. .. .. year.
- (4) No. of Sizing Machines (300 looms per 13.3 or say 15 machine  
machine) .. .. .. in the Plan period or  
3 per year.
- (5) No. of looms (These looms would be all  
automatic) .. .. .. 4000 in the Plan period  
or 800 per year.

*Machinery for Large Scale Renovation and Normal Routine Maintenance—*  
The number of spindles and looms Needing replacement under this category would be as under—

	Installed capacity	Proposed to be installed in permanently closed Mills	Balance number needing replacement
Spindles (Millions) .. .. .	13.4	0.3	13.1
Looms (Lakhs) .. .. .	2.01	0.04	1.97

*Spinning Machinery—*The details of the existing spinning machinery are already shown at page 112 (x). Deducting the machinery for 3 lakh spindles as shown above and based on the average life of machinery as per details shown at page 112 (x), the requirement of spinning machinery would be as under—

Name of machinery	Installed capacity	Requirement for 3 lakh spindles	Balance requiring replacement	Average life	No. required annually
1. Blowroom Lines	1,217	23	1,192	50	24
2. Carding Engines	40,195	1,200	38,995	50	780
3. Comber Sets	No replacement is envisaged as a majority of the combers are recently installed.				53
4. Draw Frames ..	2,750	75	2,675	50	or say 55
5. Speed Frames	8,750	188	8,562	50	172
6. Ring Frame ..	32,635	750	31,885	40	797 or say 800

As regards weaving and its preparatory machinery, the position is as under—

Since the details about the actual installation of machinery in the preparatory sector are not known, it would be worth while to work out the machine details in the same manner as worked out for the second plan. Accordingly the annual requirement would be as under—

1. High Speed Winding Machines	..	..	..	33
2. High Speed Warping Machines	..	..	..	22
3. Fully Automatic Winding (Barber Colman)	..	..	..	13
4. Fully automatic warping (Barber Colman)	..	..	..	13
5. Sizing machines	..	..	..	30
6. Looms (Plain) ..	..	..	..	1,150
7. Looms (Automatic)	..	..	..	2,500

Thus the annual requirement of replacement is as under—

Name of item of machinery	Annual requirement for 3 lakh spindles and 4000 looms	Annual requirement for modernisation and renovation	Total requirements
1. Blowroom Lines .. ..	5	24	29
2. Carding Engines .. ..	240	780	1,020
3. Comber Sets .. ..	6	..	6
4. Drawing Frames .. ..	15	55	70
5. Speed Frames .. ..	38	172	210
6. Ring Frames .. ..	150	800	950
7. High Speed Winding Machine .. ..	..	33	33
8. High Speed Warping Machine .. ..	..	22	22
9. Fully Automatic Winding Machine.	1	13	14
10. Fully Automatic Warping Machine.	1	13	14
11. Pirn Winding Spindles .. ..	..	..	..
12. Sizing Machines .. ..	3	30	33
13. Looms (Plain) .. ..	..	1,150	1,150
14. Looms (Automatic) .. ..	800	2,500	3,300

In case of Carding Engines, although the requirement on account of replacement as worked out above is for 1020, in actual practice it is expected to be of the order of about 630 Carding Engines (240 for 3 lakh spindles and 390 for renovation purposes only). No replacement in case of combers is envisaged since most of them have been installed recently in the Industry. As regards looms, the number of Plain Looms left out to be replaced in the Industry after the installation of 4000 looms would be 1,82,244. Based on a 50 years life, the rate of replacement would be 182244—3644. Since 2500 Automatic Looms are allowed to be installed in the Industry by way of replacement of plain looms by Automatic Looms, the number of plain looms needed for replacement would be 1144 or say 1150 looms. The details of replacement are shown under column No. 7 of Statement 'A'.

*During IV Plan Period—*

Since the necessary large scale modernisation and renovation as explained in the preceding paragraphs has been provided for in the organised mill sector during the III Plan period, only normal and routine replacement is expected to occur in the IV Plan. As such it would be safe to assume that the pattern of replacement would be on the same lines as during the II Plan period. The details of requirement of machinery on replacement account are shown in the statement 'A' under Column No. 10.

## STATEMENT 'A' ATTACHED TO APPENDIX 10

*Annual Requirement of Machinery (Spinning & Weaving) for Cotton Textile during the Plan Periods*

S. No.	Name of item of machinery	II Plan Period			III Plan Period			IV Plan Period		
		Expansion	Replacement	Total	Expansion	Replacement	Total	Expansion	Replacement	Total
1	2	3	4	5	6	7	8	9	10	11
1	Blow Room Lines	21	24	45	13	29	42	34	24	58
2	Carding Engines ..	1,000	400	1,400	600	630	1,230	1,640	400	2,040
3	Comber Sets ..	25	..	25	15	6	21	41	..	41
4	Draw Frames	63	55	118	38	70	108	103	55	158
5	Speed Frames ..	155	175	330	94	210	304	256	175	1
6	Ring Frames ..	625	815	1,440	375	950	1,325	1,025	815	1,840
7	Winding Machines—									
	(a) High Speed ..	1	34	35	..	33	33	..	34	34
	(b) Fully Automatic	1	14	15	2	14	16	9	14	
8	Warping Machines—									
	(a) High Speed ..	1	23	24	..	22	22	..	23	23
	(b) Fully Automatic	1	14	15	2	14	16	9	14	23
9	Sizing Machines ..	2	30	32	5	33	38	19	30	49
10	Plain Looms ..	1,250	1,225	2,475	500	1,150	1,650	..	1,225	1,225
11	Auto Looms ..	500	2,500	3,000	1,400	3,300	4,700	5,750	2,500	8,25

## STATEMENT 'B' ATTACHED TO APPENDIX 10

*Annual Requirement of Machinery (Spinning and Weaving) for Cotton Textiles during the Plan Periods*

S. No.	Name of item of machinery	II Plan Period			III Plan Period			IV Plan Period		
		Require-ment	Value in Rs. Lakhs	Tonnage	Require-ment	Value in Rs. Lakhs	Tonnage	Require-ment	Value in Rs. Lakhs	Tonnage
1	Blow Room Lines	45	112.500	2,430	42	105.00	2,269	58	145.000	3,132
2	Carding Engines ..	1,400	168.000	4,900	1,230	147.60	4,305	2,040	244.800	7,140
3	Comber Sets ..	25	75.000	125	21	63.00	105	41	123.000	205
4	Draw Frames	118	59.000	707	108	54.00	689	158	78.000	1,027
5	Speed Frames ..	330	132.000	2,640	304	121.60	2,432	431	172.400	3,448
6	Ring Frames ..	1,440	576.000	14,400	1,325	530.00	18,250	1,840	736.000	18,400
7	Winding Machines—									
	(a) High Speed ..	35	14.000	245	33	13.20	231	34	13.600	238
	(b) Fully Automatic	15	75.000	105	16	80.00	112	23	92.000	161
8	Warping Machines—									
	(a) High Speed ..	24	9.600	48	22	8.80	44	23	9.200	46
	(b) Fully Automatic	15	..	30	16	..	32	23	..	46
9	Sizing Machines ..	32	56.000	224	38	66.50	266	49	85.750	393
10	Plain Looms ..	2,475	87.125	1,980	1,650	24.75	1,320	1,226	17.375	980
11	Automatic Looms	3,000	150.000	4,500	4,700	235.00	7,050	8,250	412.000	12,375
			1464.225	32,394		1449.45	32,105		2130.125	47,591



## APPENDIX 11

*Requirements of Processing Machinery*

The *ad hoc* Committee at its meeting on 6th June, 1958 held at Calcutta appointed a Sub-Committee for working out the requirement of processing machinery during the II Plan period. Accordingly the Sub-Committee at its meeting held on 15th January 1959 worked out the requirement of the processing machinery. The basis adopted by the *ad hoc* Committee is shown in the minutes of the meeting given in enclosure to this appendix while the actual requirements of machinery worked out on that basis are given in the annexure to that enclosure. The requirements for the III and IV Plan periods have also been assessed on the basis indicated in the enclosure. Provision has been made for additional processing capacity to the extent of about 10 per cent (5 per cent for each of the Plan period). The processing machinery as shown in the annexure includes a large variety of equipment for balancing the existing shortage. Requirement of such equipment in the III and IV Plan periods would not therefore be at the same rate and as such, necessary allowance has been made for the same and provision has been made for just the adequate capacity for processing additional requirement of cloth likely to be produced and for replacement. These items of machinery are (1) Shearing (2) Continuous and Semi-Continuous Bleaching units and (3) Mercerisers and (4) Batching. The details of requirement of processing machinery thus worked out including value and tonnage for the different Plan periods are given in the Statement 'C' attached to this appendix.

## ENCLOSURE TO APPENDIX 11

*Minutes of the Second Meeting of the Sub-Committee of Processing Machinery Manufacturers held on 15th January 1959 in the Conference Room of the Office of the Textile Commissioner, Ballard Estate, Bombay*

## PRESENT

- Dr. S. R. Ramachandran, *Chairman.*  
 Shri R. G. Chandorkar, *Director (Engg.)*  
 Shri Ramesh Ramanlal, *Vasant Eng. Works, Baroda.*  
 Shri B. I. Joshipura, *T. Maneklal Mfg. Co., Ltd.*  
 Shri T. Maneklal  
 Shri Prabhu Mehta, *Calico Industrial Engg.*  
 Shri K. H. Shah, *Vasant Engg. Works, Bombay.*  
 Shri G. R. Joshi, *Deputy Director (Engg.)*  
 Shri B. K. Shahani, *Assistant Director (Eng.)*  
 Shri K. S. Bhujang, *Assistant Director (CP).*

The Chairman at the outset welcomed the members present and drew their attention to the data worked out and circulated to the members about processing machinery requirements. In arriving at figures of requirements the cloth production envisaged by the Textile Enquiry Committee was taken into consideration.

A factor that had to be kept in view in dealing with processing machinery was the obsolescence of the units. In this case the life of a unit was not so important as its obsolescence. Scientific developments in the designing of machinery have been such that units of revolutionary designs with high efficiency, low consumption of power and steam have been introduced. Instances in point were of the jet types of stenters, soapers, involving high speed, low consumption of water and provision for vigorous agitation of liquor. It was possible also to incorporate in existing processing machinery some of the advanced techniques without going in for complete replacements. In this context the introduction of jet types of heating in conventional types of stenters undertaken by one of mills in up-country was a significant development. In this case it was stated that efficiency is as good as that of an entirely new unit. It was just possible that similar modifications would be effected in other types of processing machinery which would ultimately result in foreign exchange expenditure being minimised. In dealing with replacement therefore all these factors have to be kept in view.

One other aspect that was not to be lost sight of was the trend in processing. In drawing up the list of machinery requirements this factor has also been kept in view. This aspect is particularly relevant with regard to the bleaching units where provision has been made for continuous peroxide ranges. The view taken has been that 70 per cent of the production in this sphere will continue to be of the conventional Kier type and 30 per cent will be of the continuous or semi-continuous type.

Thereafter the Chairman invited the views of the members both with regard to the data furnished to them as also the general approach to be made in assessing the requirements.

There was general discussion and it was decided that (a) the grouping of units should be based on broad processing divisions and (b) the requirements should be based on the modern trends and the working efficiency of the units.

The meeting then went through each item of machinery and a final list of the requirements of processing machinery for the next two years of the Second Five Year Plan was drawn up.

**S. R. RAMACHANDRAN**

*Director, CP Section*

**ANNEXURE OF ENCLOSURE TO APPENDIX 11**  
*Details of Requirement of Processing Machinery*

Name of the machines		i ting units			Requirement based on trend and working efficiency			Addl. require-ment du-	Aver- age an-	Remarks
Process	Item of machinery	Compo- site mills	Pro- ces- sors	Total	No. of units required	Repla- cement	Total ring for Plan period	ring 2nd Plan period	quire- ment	
1	2	3	4	5	6	7	8	9	10	11
1. Preparatory ..	Sizing and all types ..	89	9	98	120	20	140	42	21	
	Shearing ..	56	6	61	300	10	310	249	125	
2. Bleaching (Scouring) ..	Pressure Kier Open ..	695	70	765	340	70	510	70	35	Only replacement is envisaged.
	Continuous and semi continuous bleaching unit rope/open. Chemicking	15	..	15	50	..	50	35	18	Do.
3. Rope Washing ..	Rope Washing ..	210	50	260	210	60	270	60	30	Trend being change over to open width.
	Open Width (All types)	541	54	595	340	25	365	25	13	Only replacement is envisaged.
4. Fabric ..	Scutcher ..	102	30	132	138	30	168	30	15	Do.
	Beaterless Scutcher ..	270	50	320	270	64	334	64	32	
5. Water Extraotion ..	Water extraction of all types ..	..	..	..	..	50	50	50	25	
6. Drying ..	All types of units ..	210	10	220	210	200	230	10	5	
7. Impregnation ..	Padding Machine ..	448	52	500	450	100	550	50	25	
	Starch & Chemical.	518	90	608	600	50	650	42	21	
8. Hydro-conditioning ..	Damping Machine ..	250	20	270	260	12	272	12	6	
9. Calendering ..	Calenders ..	502	40	542	550	30	580	38	19	
10. Folding ..	Folding Machine ..	1,110	120	1,230	950*	100	1,050	100	50	*Existing are obsolete and hence large number indicated under "Existing". Only replacement is envisaged.
11. Dyeing ..	Jiggers ..	2,100	200	2,300	2,500	460	2,960	660	330	
12. Mineral Khaki ..	Jiggers ..	14	..	14	14	4	18	4	2	
13. Batching ..	Jiggers ..	58	10	68	200	..	200	132	66	
14. Staroh Cooking Colour & Colour Mixing	Colour Staining ..	336	336	356	356	20	20	20	10	Only replacement is envisaged in consideration of modern trend.
	Printing Machine ..	37	..	37	125	..	125	88	44	
15. Garment Printing ..	Agers ..	134	80	214	144	20	164	20	10	
	Mercerising ..	107	40	147	125	16	141	16	8	
16. Mercerising ..	Mercerising ..	97	..	97	140	..	140	48	22	
17. Stentering ..	Stenters all types ..	303	20	323	380	20	400	77	39	
18. Polymorising and curing..	Polymerising/Curing ..	50	7	57	80	..	80	23	12	

## STATEMENT 'C' ATTACHED TO APPENDIX 11

*Processing Machinery for Cotton Textiles*

Item of Machinery	Average annual requirements during the period of								
	II Plan			III Plan			IV Plan		
	Unit	Value in (Rs. lacs)	Tonnage	Unit	Value in (Rs. lacs)	Tonnage	Unit	Value in (Rs. lacs)	Tonnage
	1	2	3	4	5	6	7	8	9
1. Pressure Kier ..	35	8.75	220.0	38	9.50	220.0	46	11.25	276.0
2. Bleaching Units ..	18	108.00	108.0	6	30.00	30.0	6	36.00	30.0
3. Chemical ..	30	1.88	105.0	32	3.84	112.0	39	4.68	136.5
4. Rope Washing ..	13	1.88	71.5	14	2.10	77.0	17	2.55	93.5
5. Soutcher ..	32	1.86	40.0	35	2.10	52.5	42	2.52	63.0
6. Open Width ..	15	5.25	22.5	16	5.60	24.0	20	7.00	30.0
7. Water Extraction ..	8	1.50	22.5	6	1.80	27.0	7	3.10	31.5
8. Drying all types ..	25	10.00	500.0	28	11.20	560.0	34	13.60	680.0
9. Ladding Machines ..	2	8.40	126.0	23	9.20	138.0	28	11.20	168.0
10. Damping Machines ..	6	0.60	27.0	7	0.70	31.5	9	0.90	40.5
11. Folding Machines ..	50	7.40	100.0	54	8.10	108.0	66	9.90	132.0
12. Jiggers ..	330	52.80	577.5	353	56.50	617.8	430	68.80	752.0
13. Mineral Khaki ..	2	4.00	3.5	2	5.00	3.5	2	5.00	3.5
14. Batching ..	66	6.60	132.0	10	1.00	30.0	12	1.20	24.0
15. Colour Staining ..	54	16.20	540.0	58	8.70	290.0	72	10.80	340.0
16. Agers ..	8	4.00	200.0	9	4.50	225.0	11	5.50	275.0
17. Mercerising ..	22	77.00	550.0	3	10.50	75.0	4	14.00	100.0
18. Stenters ..	39	136.50	714.0	42	147.00	798.0	51	178.50	969.0
19. Printing Machines ..	10	10.00	300.0	11	11.00	330.0	14	14.00	420.0
20. Polymerising/Curing	12	12.00	180.0	13	13.00	195.00	16	16.00	240.0
21. Shearing ..	125	87.50	250.0	22	15.40	44.0	28	19.60	56.0
22. Beaterless Soutcher ..	25	3.00	37.5	28	3.36	42.0	34	4.08	51.0
23. Calenders ..	19	33.25	380.0	20	35.00	400.0	25	43.75	500.0
24. Shrinkage Control ..				11	44.00	300.0	14	56.00	39.0
<b>Total ..</b>	<b>946</b>	<b>598.37</b>	<b>5,207.0</b>	<b>841</b>	<b>439.10</b>	<b>4,450.3</b>	<b>1,027</b>	<b>539.93</b>	<b>5,450.6</b>

## APPENDIX 12

*Annual requirements of spares, stores and accessories for the Cotton Textile and Art Silk Industries during the Second Third and Fourth Plan periods  
(Items which are partially manufactured in India)*

Items	Assessed requirement	Approximate value in (Rs. lakhs)	Remarks
<i>Spinning</i>			
1. Card Clothing ..	8,000 sets	120.00	Indigenous capacity is expected to reach 1,500 sets per year by the end of II Plan period.
2. Licker-in-Wire ..	25 Tons	2.00	Indigenous capacity is expected to meet the requirement.
3. Grinding Rollers	500 pcs.	3.00	No indigenous capacity.
4. Ball Bearing Top Rollers for Draw Frames, Speed Frames, Combers and Ring Frames.	3.31 lakh pcs.	21.72	Indigenous capacity would be available by the end of the 2nd Plan and/or beginning of 3rd Plan to meet the country's requirement entirely. Perhaps bearing units may have to be imported if indigenous manufacturers fail to supply the same.
5. Speed Frame Spindles.	1 lakh pcs.	12.00	These can be manufactured indigenously without extra machine-tools capacity.
6. Flyers ..	1.25 lakh pcs.	20.00	These can be manufactured indigenously for which additional machine tools would be necessary.

APPENDIX 12—*contd.*

Items	Assessed require- ment	Approxi- mate value in (Rs. lakhs)	Remarks
<i>Spinning—contd.</i>			
7. Hank Indicators . .	3,500 pcs.	1.75	Indigenous capacity is expected to meet 50 per cent of the requirement.
8. Jockey Pulleys . .	3 lakh pcs.	12.00	Do.
9. Rings (Doubling)	1 lakh pcs.	6.00	There are two types— (1) Spinning Rings up to 2½" dia. (2) Doubling section Rings for the car types (non-self lubricating and self-lubricating). While Rings of type (1) above do not require any additional equipment the rings of type 2 can be manufactured with some additional machinery.
<i>Weaving</i>			
10. Winding Spindles	10,000 pcs.	3.00	Indigenous capacity in existence is enough to meet the country's requirement.
11. Bakelite Slit Drums.	5,000 pcs.	2.00	No indigenous capacity.
<i>Processing Machinery</i>			
12. Stentor Clips . .	55,000 pcs.	13.75	Indigenous capacity negligible.
13. Doctor Blades . .	5,000 pcs.	1.00	No indigenous capacity.
14. Copper Printing Rollers.	10,000 pcs.	8.00	Do.

APPENDIX 12—*concl.*

Items	Assessed require- ment	Approximate value in (Rs. lakhs)	Remarks
<i>Processing Machinery—contd.</i>			
15. Washable Blankets	2.5 lakh yds.	12.50	Manufacturing of this item is being developed by M/s Indian Rubber Mfg. Co.
16. Calender Bowls	600 pcs.	42.00	50 per cent of the requirement is likely to be manufactured by the end of 2nd Plan period.
17. Shrinking Blankets for Shrinkage Control Machines.	300 pcs.	15.00	No indigenous angle.
<i>Art Silk Industry Items</i>			
18. Flat Steel Healds	..	20.00	No indigenous angle at present. 50 per cent of the demand is expected to be met from indigenous angle by the end of II Plan period.
19. All metal Reeds	15,000 pcs.	3.00	By the end of 2nd Plan period the entire demand will be met from indigenous system.
20. Metallic Bobbins	..	10.00	By the end of 2nd Plan period 50 per cent of the demand is expected to be met from indigenous sources.
Rs.	Total ..	328.72	

## APPENDIX 13

*Annual requirements of spares, stores and accessories for Cotton Textiles during the Second, Third and Fourth Plan periods (Items where self-sufficiency has been achieved in India)*

Items	Assessed annual requirement
1. Silver Cans .. .. .	2 lakh pieces
2. Ring Travellers .. .. .	700 million pieces
3. Lappets .. .. .	1 lakh pieces
4. Separators .. .. .	3 lakh pieces
5. Bobbins .. .. .	6 lakh pieces
6. Combing Pins .. .. .	2,500 lakh pieces
7. Spindles .. .. .	10 lakh pieces
8. Tin Rollers .. .. .	1 lakh pieces
9. Rings .. .. .	9 lakh pieces
10. Fluted Rollers .. .. .	7,000 Lines
11. Cotton Healds .. .. .	10 lakh sets
12. Wire Healds .. .. .	1,500 lakh pieces
13. Reeds .. .. .	5 lakh pieces
14. Emergy Fillets .. .. .	20 lakh feet
15. Shuttles .. .. .	12,000 gross.
16. Weft Fork .. .. .	2,500 gross
17. Weft Grates .. .. .	4,500 gross
18. Crank Shafts .. .. .	25,000 pieces
19. Picking Shafts .. .. .	150,000 pieces
20. Pickers .. .. .	90 lakh pieces
21. Buffers .. .. .	25 lakh pieces
22. Paper Tubes including Ring Tubes .. .. .	18 lakh gross pieces
Cones .. .. .	2.5 lakh gross pieces
23. Beam Flanges .. .. .	65,000 pairs.



## APPENDIX 14

*Proformas I and II circulated to important Textile Machinery Manufacturers to elicit their views regarding the additional requirements of capital equipment for manufacturing machinery*

## PROFORMA I

Spg. Weaving Processing

1. Your present licensed capacity for each type of machine on double shift working (annual).
2. Actual installed capacity in terms of complete machines on double shift working (annual).
3. Proposed expansion indicating type and number of machines to be manufactured annually, during the remaining period of 2nd Plan, and 3rd and 4th Plan periods (taking into consideration the anticipated demands).
4. Additional capital equipment required (whether imported or indigenously manufactured).
  - (a) Foundry equipment including melting, moulding, fettling core-making etc.
  - (b) Pattern-making machinery .. .. .
  - (c) Actual machines required for heavy planning, surface, grinding, plain and heavy milling.
  - (d) Additional machines required for turning, including centre lathes, turret lathes, vertical and horizontal borers, single-spindles, multi-spindle's automatics and capstans.
  - (e) Milling machines .. .. .
  - (f) Drilling machines .. .. .
  - (g) Gear cutting and generating plant required for bevels, worms, spur and helical wheels.
  - (h) Internal and external grinding machines ..
  - (i) Bar turning and drawing capacity .. ..
  - (j) Heat treatment plant .. .. .
  - (k) Sheet metal and power presses .. .. .
  - (l) All types and numbers of special purposes machines required.
  - (m) Wood-working machinery .. .. .
  - (n) Additional plant for plating, anodizing, spray painting, etc.
  - (o) Laboratory equipment
  - (p) Mechanical handling and internal transportation equipment including fork lift trucks, cranes, etc.
  - (q) Tool room machinery and equipment ..

Spg. Weaving Processing

NOTE—Reply to question No. 4 may be given on the following table.

PROFORMA II (For item No. 4 in Proforma I)

For Spinning						For Weaving						For Processing					
Expansion			Replacement			Expansion			Replacement			Expansion			Replacement		
Indi- genous	Im- por- ted	Remarks Indi- genous/ imported	Indi- genous	Im- por- ted	Remarks Indi- genous/ imported	Indi- genous	Im- por- ted	Remarks indi- genous/ imported	Indi- genous	Im- por- ted	Remarks indi- genous/ imported	Indi- genous	Im- por- ted	Remarks Indi- genous/ imported	Indi- genous	Im- por- ted	Remarks Indi- genous/ imported
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

## APPENDIX 15

*Assessment of Requirement of Additional Capital Equipment for the manufacture of spinning machinery and automatic looms for cotton and art silk industry*

The requirements of capital equipment have been worked out on the basis of machine hours required on different machine tools based on two shift working and are shown in the Statements 'D' and 'E' attached to this appendix. Statement 'D' shows the requirements during the remaining part of the Second Plan period while Statement 'E' shows the requirements during the Third and Fourth Plan periods. The assessment has been made on the basis that three equal units will manufacture the complete range of machinery. For this purpose the requirement of *additional* equipment that would be necessary for one unit has been worked out having taken into account the existing installed capacity. Such additional requirement for one unit has been indicated under column "Basis" in the statements. The requirements under "Basis" have then been multiplied by three and shown in the other column in the statements namely—

"Additional capital equipment required".

It may be added that this estimate of requirement can only be approximate as machine tools design is undergoing such vast changes that what is in use today may be obsolete within the next few months or years and this requirement list is based on the most modern machine tools that are at present available in India and abroad.

## STATEMENT 'D' ATTACHED TO APPENDIX 15

*Requirement of additional capital equipment for the manufacture of spinning machinery and automatic looms for Cotton Textiles and Art Industry during the remaining part of the Second Five Year Plan**Basis*

Additional capital equipment required in the Second Plan for the manufacture of—		Additional capital equipment required in the Second Plan for the manufacture of—	
1. Blowroom lines ..	18	1. Blowroom lines ..	45
2. Carding Engines ..	470	2. Carding Engines ..	1,400
3. Combers .. ..	8	3. Combers .. ..	25
4. Draw Frames ..	40	4. Draw Frames ..	118
5. Speed Frames ..	110	5. Speed Frames ..	330
6. Ring Spg. Machines ..	480	6. Ring Spg. Machines ..	1,440
7. Automatic Looms ..	1,500	7. Automatic Looms ..	3,000

## STATEMENT 'D'—contd.

Item	Indi- genous	Imported	Approximate Value in Rs. lacs		Indige- nous	Imported	Approximate value in Rs. lacs	
			Indige- nous	Imported			Indige- nous	Imported
<i>Foundry</i>								
1. Induction Furnace ..		1	..	2.20C	..	3	..	6.600
2. Turnover Moulding machine.	..	2	..	2.400	..	6	..	7.200
Pin Lift Moulding m/c.	..	1	..	0.220	..	3	..	0.660
Sand Slinger ..	..	2	..	0.330	..	6	..	0.990
Jolting machine (Core Wheels).	..	1	..	0.053	..	3	..	0.159
Jolting machine (Axles and Bosses).	..	1	..	0.063	..	3	..	0.189
3. Disintegrator and Sand Plant ..	..	1	..	07.4	..	3	..	2.220
<i>Wood Working</i>								
1. Wood Working lathe	2	..	0.30	..	6	..	0.90	..
2. Wood Planing machine.	1	..	0.15	..	3	..	0.45	..
<i>Machine Shop</i>								
1. Tool Room lathe ..	3	..	1.80	..	9	..	5.40	..
Bar Auto. (Multi- spindle) ..	..	9	..	11.20	..	27	..	33.60
Chucking Auto. (Multi spindle). ..	..	1	..	1.50	..	3	..	4.50
Radial Drill ..	1	..	0.25	..	3	..	0.75	..
Pillar Drill ..	3	..	0.48	..	9	..	1.44	..
11-B Turret Lathes	..	2	..	1.26	..	6	..	3.78
Small Price Lathes	..	1	..	0.70	..	3	..	2.10
Single spdl. auto.	..	1	..	1.00	..	3	..	3.00
Cold Saw ..	..	1	..	0.25	..	3	..	0.75
Centre Lathes ..	7	..	2.10	..	21	..	6.30	..
Centre Lathe 3' 6" (Taper attach- ment) ..	1	..	0.42	..	3	..	1.26	..
7B Turret Lathes	..	4	..	2.48	..	12	..	7.44
3 spdl. Drill ..	..	1	..	0.31	..	3	..	0.93
Herbert Small piece lathe ..	..	2	..	0.50	..	6	..	1.50
Centreless Bar turner 6" capacity ..	..	1	..	1.60	..	3	..	4.80
Bar Straightening machine. ..	..	1	..	0.40	..	3	..	1.20
2. Small Planner ..	..	1	..	0.90	..	3	..	2.70
Planning machine	..	3	..	3.12	..	9	..	9.36
Shaping machine	1	..	0.24	..	3	..	0.72	..
3. Hand Milling m/c.	..	3	..	0.93	..	9	..	2.79
Vertical Milling m/c.	..	7	..	2.08	..	21	..	6.24
18" Horizontal Mill- ing Machine ..	4	..	0.92	..	12	..	2.76	..
28" Horizontal Mill- ing Machine ..	..	3	..	0.96	..	9	..	2.88
K.G. Plane Miller	..	2	..	9.40	..	6	..	28.20
42" Milling Machine	3	..	1.20	..	9	..	3.60	..



## STATEMENT 'E' ATTACHED TO APPENDIX 15

*Requirement of additional capital equipment for the manufacture of spinning machinery and automatic looms for Cotton Textiles and Art Silk during the Third and Fourth Plan periods*

## REQUIREMENTS FOR THE THIRD PLAN

*Basis*

Additional Capital Equipment required in the Third Plan for the manufacture of—		Additional capital equipment required in the Third Plan for the manufacture of—	
1. Blowroom Lines ..	15	1. Blowroom lines ..	42
2. Carding Engines ..	400	2. Carding Engines ..	1,230
3. Combers .. ..	9	3. Combers .. ..	21
4. Draw Frames ..	40	4. Draw Frames ..	108
5. Speed Frames ..	110	5. Speed Frames ..	304
6. Ring Frames ..	450	6. Ring Spg. Machines ..	1,325
7. Automatic Looms ..	2,350	7. Automatic Looms ..	4,700

Item	Indige- nous	Impor- ted	Approx. value in Rs. lacs		Indige- nous	Impor- ted	Approx. value in Rs. lacs	
			Indige- nous	Impor- ted			Indige- nous	Impor- ted
<i>Machine Shop</i>								
(a) 5' Radial Drill Chuckling Auto. ..	..	1	..	0.20	..	3	..	0.78
(Multi Spindle) ..	..	1	..	1.50	..	3	..	4.50
(b) Special purpose Horiz. Miller ..	..	1	..	1.16	..	3	..	3.48
(c) Sykes Gear Shaper V10 with Rack Attach .. ..	..	1	..	3.30	..	3	..	9.90
David Brewa Hobb- ing Machine ..	..	2	..	1.80	..	6	..	5.40
(d) Miller Drills ..	..	2	..	0.32	..	4	..	0.64
(e) 1 B Turret Lathes ..	..	2	..	1.24	..	4	..	2.48
(f) Small Panner ..	..	1	..	0.90	..	2	..	1.80
(g) Milling Machine ..	..	2	..	0.60	..	4	..	1.20
(h) Hobbing Machine ..	..	1	..	1.60	..	2	..	3.20
<i>Wood Working</i>								
Wood Planning Machine ..	..	1	..	0.15	..	2	..	0.30
								33.68

## REQUIREMENTS FOR THE FOURTH PLAN

*Basis*

Additional capital equipment required in the Fourth Plan for the manufacture of—		Additional capital equipment required in the Fourth Plan for the manufacture of—	
1. Blowroom Lines ..	23	1. Blowroom Lines ..	58
2. Carding Engines ..	760	2. Carding Engines ..	2,040
3. Combers .. ..	14	3. Combers .. ..	41
4. Draw Frames ..	60	4. Draw Frames ..	158
5. Speed Frames ..	160	5. Speed Frames ..	431
6. Ring Spg. Machines ..	660	6. Ring Spg. Machines ..	1,840
7. Automatic Looms ..	4,091	7. Automatic Looms ..	8,250

## STATEMENT 'E'—contd.

Item	Indigenous	Imported	Approx. value in Rs. lacs		Indigenous	Imported	Approx. value in Rs. lacs	
			Indigenous	Imported			Indigenous	Imported
<i>Wood Working</i>								
Wood Working Lathes	2	..	0.30	..	6	..	0.90	..
Wood Planing Machine	1	..	0.15	..	3	..	0.45	..
<i>Machine Shop</i>								
(a) 11 b. Turret Lathes	..	1	..	0.63	..	3	..	1.89
7B Turret Lathes	..	2	..	1.24	..	6	..	3.72
Centre Lathes ..	7	..	2.10	..	21	..	6.30	..
Turret Lathes ..	..	2	..	0.62	..	6	..	1.86
Centreless Bar Turner 6' capacity ..	..	1	..	1.60	..	3	..	4.80
Bar Straightening Machine ..	..	1	..	0.40	..	3	..	1.20
(b) Shaping Machine	2	..	0.48	..	6	..	1.44	..
16' Planers ..	..	2	..	2.08	..	6	..	6.24
(c) Plan Miller ..	..	1	..	2.20	..	3	..	6.60
Vertical Miller 30"	..	1	..	0.31	..	3	..	0.93
42" Milling Machine	3	..	1.20	..	9	..	3.60	..
(d) Snow Surface Grinder ..	..	1	..	0.35	..	3	..	1.05
Inter Grinder ..	..	1	..	0.60	..	3	..	1.80
(e) Bevel Gear Generator ..	..	1	..	0.66	..	3	..	1.98
Gear Shaper ..	..	1	..	1.36	..	3	..	4.08
Hobbing Machine	..	1	..	1.60	..	3	..	4.80
<i>Special Purpose</i>								
Horizontal Borer	..	1	..	1.60	..	3	..	4.80
Spl. Purpose Machine for milling comber cyl. ..	..	1	..	0.50	..	3	..	1.50
Spl. Purpose Machine for boring comber brkt. ..	..	1	..	0.60	..	3	..	1.80
Die Casting plant for alum. or masac casting upto 7 lbs.	..	2	..	1.60	..	6	..	4.80
<i>Sheet Metal</i>								
Nibbling Machine ..	..	2	..	0.50	..	6	..	1.50
Power Press 70 tons..	..	2	..	1.66	..	6	..	4.98
Banding Rolls ..	..	2	..	0.84	..	6	..	2.52
<i>Welding</i>								
Seam Welding Machine	..	1	..	0.25	..	3	..	0.75
<i>Painting and Electro-Plating</i>								
Chromium Plating Plant upto 16' x 3'	1	..	1.40	..	3	..	4.20	..
							16.89	63.60
<b>Total ..</b>							<b>Rs. 80.49 Lacs.</b>	

## APPENDIX 16

*Assessment of Requirement of additional capital equipment for the manufacture of preparatory machinery and plain looms for cotton textiles and art silk industry*

The requirement of capital equipment has been assessed on the basis of machines hours required for the manufacture of one unit of each different type of machinery. The basis of machine hours is indicated in Statement 'G' attached to this appendix.

Having taken into consideration the existing capital equipment installed in the country, the requirement of 'Additional' capital equipment for the manufacture of the requisite Weaving preparatory machinery and looms for Cotton Textiles and Art Silk Industries has been worked out for the remaining period of the Second Plan and for the Third and Fourth Plans and the combined requirement is given in the Statement 'F' attached to this appendix.

The requirement of capital equipment for the manufacture of fully automatic winding and warping machines (Barbar Colmen) is not included.

## STATEMENT 'F' ATTACHED TO APPENDIX 16

*Requirement of additional capital equipment for the manufacture of preparatory machinery and plain looms for the cotton textile and art silk industries during the Second, Third and Fourth Plans*

	No. of Units	Total Price in Rupees	
<i>Foundry—</i>			
Cupola with Accessories .. ..	1	1,00,000	
Moulding Machineries .. ..	7	3,50,000	
Sound preparation and Sand Condition- ing Plant .. ..	1	20,000	
Fettling Machineries .. ..	2	60,000	5,30,000
<i>Wood Working—</i>			
Wood Working Machinery .. ..	6	35,000	
			35,000
<i>Machine Shop—</i>			
<i>Lathes—</i>			
Capstans and Automatics .. ..	20 & 5	10,75,000	
Lathes .. ..	14	1,40,000	
Bar Turning .. ..	2	2,00,000	
Shapers .. ..	4	64,000	
Planners .. ..	6	6,00,000	
Milling Machines .. ..	13	3,25,000	
Grinding Machines .. ..	4	1,60,000	
<i>Gear Cutting—</i>			
Hobbers .. ..	18	7,42,000	
Bevel cutters .. ..	2	10,000	38,16,000



STATEMENT 'F'—*contd.*

	No. of Units	Total Price in Rupees	
<i>Special Purpose—</i>			
Horizontal and Vertical Borers ..	3	2,25,000	2,25,000
<i>Heat Treatment and Labs. Equipment—</i>			
Heat Treatment furnaces .. ..	3	1,15,000	1,15,000
<i>Sheet Metal—</i>			
Sheet Metal Cutting Machines viz. Guillotine Bending rolls, Presses—			
Presses .. .. .	1	10,000	
Shear .. .. .	2	18,000	
<i>Forging—</i>			
Crane Bender .. .. .	1	1,00,000	1,00,000
<i>Painting and Electro Plating—</i>			
Electroplating equipment including spray painting .. .. .	1	15,000	
<i>Miscellaneous—</i>			
	set	—————	15,000
Cranes and other mechanically handling equipment etc. .. .. .	3	1,00,000	
Compressors and Pneumatic Tools ..	1	50,000	
Material Handling Equipment ..	2	75,000	2,25,000
			<u>50,89,000</u>

STATEMENT 'G' ATTACHED TO APPENDIX 16  
*Plant Hour Requirement for Textile Machinery Manufacture*

Item	Machine hours required for the manufacture of one unit												
	Capstans	Lathes	Milling	Drilling	Planing	Shaper	Gear Hobber	Boring	Shearing	Grind- ing	Press	Bar Turning	Wood Work- ing
1. H.S. Winding Machine (100 Spdls.)	373	176	267	298	37.48	12.12	3.36	4.18	..	28	..	28	..
2. H. Warping Machine (with creel 500 ends) .. ..	202.36	127.24	34.00	49.00	33.36	7.00	4.48	5.12	..	14	..	14	..
3. Sizing machine .. ..	2.15	431.00	100.30	72.30	..	10.00	..	166	16.00	..	0.45	1.08	..
4. Plain loom .. ..	20.18	8.11	9.04	17.01	2.53	3.52	15.25	1.10	1.10	2.30	0.33	1.35	4.48
5. Pirn Winder (6 Spindles per machine) .. ..	46.51	6.51	40.53	33.30	10.48	4.00	9.55	..	..	6.15	..	..	..

## APPENDIX 17

*Assessment of requirement of capital equipment for the manufacture of textile dyeing, bleaching, printing and finishing machinery for cotton textile and art silk industries*

The requirement of capital equipment has been based on the equipment that is envisaged to be installed in a unit with a capacity to manufacture Rs. 24 lakhs worth of machinery annually. The capital equipment of such units has been projected to arrive at the requisite equipment needed for the manufacture of processing machinery worth about Rs. 6 crores. The existing capacity which is considered to be capable of manufacturing processing machinery worth Rs. 1.8 crores annually has been taken into account for ascertaining the 'additional' capital equipment.

On this basis the requirement of capital equipment for the manufacture of processing machinery during the remaining period of the Second Plan and during the Third Plan and Fourth Plan (combined) would be as shown in the Statement 'H' attached to this Appendix.

## STATEMENT 'H' ATTACHED TO APPENDIX 17

*Requirement of Capital Equipment for the manufacture of Processing Machinery for the Cotton Textile and Art Silk Industries during the remaining period of the Second Plan and during the Third & Fourth Plans*

Name of machinery	No. of Units	Price per unit	Total Price	
			(Rs.)	(Rs.)
<i>Foundry—</i>				
1. Cupola 5 ton capacity .. ..	10	40,000		
2. Fettleing machines .. ..	18	7,000		
3. Pneumatic Vibrator .. ..	18	6,000		
4. Coke Oven Furnace .. ..	18	10,000		
				8,14,000
<i>Machine Shop—</i>				
1. Large heavy duty Lathes .. ..	88			
2. Medium .. ..	88			
3. Small .. ..	88			
4. Tooling lathes .. ..	88			
5. Milling Machines .. ..	105			
6. Vertical milling machines .. ..	53			
7. Key settling machines .. ..	18			
8. Cylindrical Grinder .. ..	18			
9. Surface Grinder .. ..	18			

STATEMENT 'H' *contd.*

Name of machinery	No. of Units	Price per unit	Total Price
10. Internal Grinder .. ..	..	18	
11. Planning Machines .. ..	..	35	
12. Plane Mill .. ..	..	18	1,08,50,000
13. Radical Drills .. ..	..	33	
14. Ordinary Drills .. ..	..	35	
15. Jiggers, Fixture, Tooling .. ..	..	..	35,00,000
<i>Special Purpose—</i>			
Boring Machine .. ..	..	18	1,00,000
<i>Sheet Metal—</i>			
1. Nibling Machine .. ..	..	18	25,000
2. Guillotine Shear .. ..	..	18	35,000
3. Bending and Folding Machine .. ..	..	18	42,000
4. Shaping Machine .. ..	..	18	24,000
<i>Welding—</i>			
1. Welding Sets .. ..	..	105	3,000
2. Argon Arc Sets .. ..	..	35	7,000
3. Plate Bending Machine .. ..	..	18	42,000
4. Gas Cutting Machines .. ..	..	35	4,000
5. Gantries .. ..	..	70	2,000
			15,96,000
<i>Forging—</i>			
1. Plate Cutting Machine .. ..	..	18	25,000
2. Plate Straightening Machine .. ..	..	18	30,000
3. Hacksaw Machines .. ..	..	53	4,000
4. Circular Sawing Machines .. ..	..	35	16,000
			17,62,000
			2,25,9,000

## APPENDIX 18

*Summary of Total Capital Equipment required under broad categories for cotton textile and art silk industries by the end of the Fourth Plan Period*

Capital equipment required by the end of the Fourth Plan for the manufacture of	Foundry	Wood Working	Machine Shop	Spl. purpose	Heat treatment & Lab. equipment	Sheet Metal	Welding	Forging	Painting elec. plating	Miscellaneous	Total
1	2	3	4	5	6	7	8	9	10	11	12
1. Cotton and Staple Fibred spinning machinery and auto. looms.	18.18	3.00	268.77	48.03	7.50	21.75	1.50	4.50	13.62	7.29	383.978
2. Weaving preparatory machinery and plain looms for cotton and art silk ..	5.300	0.35	38.16	2.25	1.15	0.28	..	1.00	0.15	2.25	50.890
3. Processing machinery for cotton and art silk ..	8.140	..	143.50	18.00	..	22.68	15.96	17.62	..	..	225.900
4. Stores and accessories @ Rs. 20 lakhs per year for 12 years.										240.00	240.000
Total ..	31.458	3.35	440.43	68.28	8.65	44.71	17.46	23.12	13.77	249.54	900.768
<b>GRAND TOTAL ..</b>										<b>Rs. 9.01 crores</b>	

## APPENDIX 19

*Assessment of Requirement of Machinery for the Silk Industry*

*Silk Reeling machinery*—Machinery to produce improved quality of silk and for endowing it with good winding qualities is expected to be provided partly on cottage basis and partly on filature basis. No special equipment is required for reeling silk on cottage basis and therefore no estimate of requirement for reeling on cottage basis is taken into consideration. For the filature sector, the requirement of reeling machines for expansion would be 500 during each of the Third and Fourth plan periods, while, for replacement purposes, the requirement would be 50 reeling machines during the Fourth Plan period only. The co-ordinated re-reeling equipment would be 125 machines for expansion during each of the Third and Fourth Plans and 15 machines for replacement during the Fourth Plan only. As the silk reeling industry is cost-conscious and as it should rationalise the method of production, it would also have to rationalise the steam supplying equipment and therefore economical boilers consuming oil and coal are also proposed as probable requirements of the Industry.

*Silk Testing Equipment*—The demand from export promotion as well as for flawless fabrics would induce the producers and marketing organisations to grade and classify the silk before the same is marketed. For this purpose 7 full sets of testing equipment for grading raw-silk would be needed during the III and IV Plan periods for replacement as well as for expansion purposes.

*Silk Preparatory machinery*—The silk preparatory sector has to feed 1,000 additional looms and has also to be renovated to produce better thrown silk. The existing machinery in this sector is of old design and pattern and as such, a certain amount of modernisation and replacement is called for. It is expected that competition from fabrics produced from rayon and synthetic fabrics will induce the silk preparatory industry to call for higher spindle speeds, larger packages on twisting spindles, less labour for doffing etc.

Warping machinery used by the silk Weaving Industry is generally obsolete and needs large scale replacement. 40 Sectional high speed warping machines would meet the requirement of the industry for replacement during the Third and Fourth Plan periods, 25 for Third Plan period and 15 for the Fourth Plan period. 30 Additional machines would be necessary to feed the 1,000 new looms during the two plan periods.

*Silk Weaving Machinery*—There are 1,000 looms at present in the Industry on real silk. Many of these looms have been modified for use as silk weaving looms and not less than 450 of these would have to be modernised during the two plan periods providing them with dobbies, jacquards etc.

*Silk Finishing Machinery*—It is estimated that finishing machinery consisting of 32 machines for piece dyeing and 19 each in stenters, button breakers, brushing and gasing machines would be needed for replacement as well as for expansion during the Third and Fourth Plan periods.

Screen printing machinery as a common facility for producing plain silk fabrics would have to be established. Two sets one for the Bangalore Weaving Centre and the other for Kashmir have been proposed for expansion purposes, during each of the Third and Fourth Plan periods. The printing facilities now

in existence in Bengal and Bombay are considered adequate for the current production of handloom plain fabrics at these centres. Large scale expansion of screen printing is likely to result in throwing out of employment the block printers who are at present engaged for that purpose.

The silk weaving industry at present is not using modern pirn winding machines. At least 1,150 spindles would be required to rationalise the Industry so as to meet the requirement of the existing looms and also to meet the requirement for additional looms.

It is estimated that 25 per cent of the total production of silk would be processed without preparatory machinery of any kind by loom weavers.

The requirement of machinery has been tabulated in the statement 'I' attached to this appendix.

### STATEMENT 'I' ATTACHED TO APPENDIX 19

#### *Requirement of Machinery for the Silk Industry*

Sl. No.	Name of the item of machinery.	Requirement during III Plan			Requirement during IV Plan				
		Ex-pan-sion	Re-place-ment	Total No.	Value in Rs. lacs.	Expan-sion	Repla- cement	Total No.	Value in Rs. lacs
1	Silk Reeling machine ..	500	..	500	3.00	500	50	550	3.30
2	Silk Re-reeling machine ..	125	..	125	0.3135	125	15	140	0.35
3	Cooking machine ..	5	..	5	0.75	5	2	7	1.05
4	Testing machines (Silk) ..	3	..	3	1.65	3	1	4	2.20
5	Silk Winding machine 50 Spindle each ..	500	80	580	1.16	500	80	580	1.16
6	Silk doubling machine 50 Spindle each ..	50	4	54	2.592	50	4	54	2.592
7	Uptwisters 100 spindles per machine ..	200	200	400	12.80	200	200	400	12.80
8	Downtwisters 200 spindles per machine ..	100	25	125	1.0625	100	25	125	1.0625
9	Sectional Warping machine ..	15	25	40	0.84	15	15	30	0.63
10	Soaking Vats of Sizes for degumming ..	50	15	65	1.95	50	15	65	1.95
11	Hydro Extractors ..	25	10	35	0.875	25	10	35	0.875
12	Looms 60" beam ..	500	200	700	49.00	500	250	750	52.5
13	Piece Dyeing machine ..	15	2	17	1.70	10	5	15	1.5

## STATEMENT 'I'—contd.

Sl. No.	Name of the item of machinery	Requirement during III Plan				Requirement during IV Plan			
		Ex-pen-sion	Re-place-ment	Total No.	Value in Rs. lacs.	Expan-sion	Replace-ment	Total No.	Value in Rs. lacs
14	Pin Stenters, Brushing and Gassing machine	5	5	10	0.30	5	4	9	0.27
15	Screen Printing Machine ..	2	..	2	0.24	..	..	..	..
16	Pirn Winders-Semi Automatic (Spindles) .. ..	500	50	550	2.0	500	100	600	2.18
17	Cottage Steamers	2	..	2	0.10	2	..	2	0.10
18	Boilers (For Weaving Industry Vert X-tube) ..	5	..	5	0.475	5	..	5	0.475
19	Boilers (For filatures 20' × 6½' garnish)	10	8	18	6.12	..	4	4	1.36
20	Boilers (For filatures Small Vert X-tube) ..	10	8	18	1.80	10	4	14	1.33
					<u>88.728</u>				<u>87.0845</u>

Annual value of machinery during III Plan period—Rs. 17.7 lacs.

" " " " " IV " " —Rs. 17.5 lacs.



## APPENDIX 20

*Assessment of Requirement of Machinery for the Woollen Industry.*

*Spinning and Weaving*—The existing capacity and the targets fixed for the plan periods show that while no additional capacity is needed for yarn (woollen, worsted and shoddy) and cloth, the creation of additional capacity would be necessary in the case of wool tops and shoddy wool. While capacity in the case of wool tops to the extent of 10 million lbs. has already been created, the actual production is expected only at the end of the Second Plan period. Since the total target of production for wool tops at the end of the Third Plan is 26 million lbs. an additional capacity of 16 million lbs. of wool tops at the rate of about 4 million lbs. per year would be necessary during the Third Plan period. The machinery required during the Second and Third plan periods for wool tops is given in Statement 'J' attached to this Appendix. The target capacity of 2·5 million lbs. of shoddy wool by the end of the Second Plan and of 11·5 million lbs. by the end of the Third Plan period has to be created at the rate of about 2 million lbs. per year. The only items of machinery required for the production of shoddy wool are (1) Carbonising machines, (2) Rag Tearing Machines and (3) Garnett. These machines are already in existence in the industry and with some additions, the above targets are expected to be achieved. The requirements of these machines during the Second and Third Plan periods are included in the annexed Statement 'K' showing the details of the machines required annually for replacement purposes.

Since targets for the Fourth Plan period have not been fixed, the requirement of machinery for expansion during the Fourth Plan has not been calculated.

*Requirement of machinery for replacement purposes*—It has been stated in the earlier paragraph that the machinery in the woollen industry is very old and needs large scale replacements. The annual rate of requirement of machinery on replacement account has been assumed to be of the same order during the three plan periods, i.e. Second, Third and Fourth and the same is shown in the annexed Statement 'K'.

*Finishing machinery*—Since the weaving capacity for the production of cloth has to increase to 20 million yards during the Second Plan period and to 30 million yards during the Third Plan, it is anticipated that 2 full fledged-additional processing establishments would be necessary for expansion. Besides this, there would be need for replacement, as well as putting up of additional machinery for better processing by the mills. Finishing centres purely for processing of cloth manufactured on handlooms would also be necessary. The creation of processing capacity for processing an additional 10 million yards of cloth during the Third Plan period would serve the demand for the handloom industry also. The annual requirement of machinery for all these purposes also is included in the Statement 'K'.

## STATEMENT 'J' ATTACHED TO APPENDIX 20

*Requirement of additional machinery for the manufacture of wool tops*

Serial No.	Item of machinery	Per year during the Second Plan		Per year during the Third Plan	
		Units	Value in Rs. lacs	Units	Value in Rs. lacs
1	Scouring .. .. .	9	21.51	4	9.56
2	Carding Machines .. .. .	37	20.35	15	8.25
3	Back Washing .. .. .	27	17.55	11	7.15
4	Punch Boxes .. .. .	37	4.218	15	1.71
5	Combing & Recombing machines .. .. .	37	114.33	15	46.35
6	Gill Boxes .. .. .	75	25.00	30	10.00
		202.958		83.02	

## STATEMENT 'K' ATTACHED TO APPENDIX 20

*Requirement of Woollen Machinery for replacement during Second, Third and Fourth Plan Periods including additional machinery for shoddy wool and for processing during 2nd and 3rd Plans*

Item of machinery	Per year during the Second Plan		Per year during the Third Plan		Per year during the Fourth Plan	
	Units	Value in Rs. lacs	Units	Value in Rs. lacs	Unit	Value in Rs. lacs
1. Combined Wool Scouring & Dyeing Machines .. .. .	5	2.50	Same as during the Second Plan		Same as during the Second Plan	
2. Blending Machines :—						
(1) Willow .. .. .	10	1.60		Do.		Do.
(2) Carbonising .. .. .	1	1.00		Do.		Do.
(3) Fear naught .. .. .	10	1.20		Do.		Do.
(4) Garnett .. .. .	10	1.20		Do.		Do.
(5) Rag Tearing .. .. .	3	0.50		Do.		Do.
3. Carding Machines :—						
(1) Automatic Hopper Feed .. .. .	20	44.25		Do.		Do.
(2) Double Scribler .. .. .	20					
(3) Scotch Feed .. .. .	20					
(4) Double Cylinder carding machine .. .. .	20					
(5) Condenser .. .. .	20					
4. Mule Spg. Machinery:—						
(1) Woollen Spg. Mule 20,000 spindles i.e. 50 Frames of 400 spindles each .. .. .	10	7.20		Do.		Do.
(2) Ring Frames of 330 spindle each .. .. .	18	13.00		Do.		Do.
<i>Worsted spinning machinery</i>						
1. 16 Ball Revolving Creel .. .. .	19	0.70		Do.		Do.
2. Raper Auto-Leveller intersecting Gill Box .. .. .	19	4.75		Do.		Do.

## STATEMENT 'K' contd.

Item of machinery	Per year during the Second Plan		Per year during the Third Plan		Per year during the Fourth Plan	
	Units	Value in Rs. lacs	Units	Value in Rs. lacs	Units	Value in Rs. lacs
3. Raper Auto-Leveller Draw box spindles .. .. .	19	7.25			Same as during the Second Plan.	Same as during the Second Plan.
4. Reducer—40 spindles each .. .. .	19	19.00			Do.	Do.
5. Dondy Rower—60 spindles each .. .. .	19	10.50			Do.	Do.
6. Spinning frames of 200 spindles each double sided viz. 100 spindles per side .. .. .	37	24.00			Do.	Do.
7. Two-fold Ring Twisting Frames of 200 spindles double sided viz., 100 spindles per side .. .. .	17	10.00			Do.	Do.
<i>Weaving &amp; its preparatory machinery</i>						
1. (i) Auto pirn winders with magazine holding 18 empty pirns .. .. .	11	1.20			Do.	Do.
(ii) Cross drum winder, double drum winder quick traverse winder, auto pirn winder .. .. .	20	1.00			Do.	Do.
2. High Speed Warping machines .. .. .	6	2.70			Do.	Do.
3. (i) Power looms — Dobby looms R. S. 76" to 110" with speed of 100 to 140 picks per minute with circular or drop box motion .. .. .	400	32.00			Do.	Do.
(ii) Automatic Shuttle changing looms .. .. .	150	14.25			Do.	Do.
<i>Processing machinery</i>						
1. Rope Washing & Scouring Machines .. .. .	14	5.30			Do.	Do.
2. Milling Machines .. .. .	14	2.00			Do.	Do.
3. Drying Machines—						
(1) Hydro Extractors .. .. .	40	3.20				
(2) Cloth Tenting machines .. .. .	10					
4. Raising Machines—						
(1) Teasle raising machines .. .. .	15	3.00			Do.	Do.
(2) Double Action Wire Raising .. .. .	15	5.00			Do.	Do.
5. Shearing Machines .. .. .	10	2.00			Do.	Do.
6. Crabbing & Blowing Machines .. .. .	10	1.50			Do.	Do.
7. Brushing Machines .. .. .	5	1.00			Do.	Do.
8. Rotary Presses .. .. .	5	1.50			Do.	Do.
9. Shrinking, Chlorination & Felting Machine .. .. .	10	1.50			Do.	Do.
10. Folding Machines .. .. .	10	2.50			Do.	Do.
<i>Dyeing machinery</i>						
1. Loose Wool Dyeing Machines .. .. .	2	0.50			Do.	Do.
2. Slubbing Dyeing Machines .. .. .	2	0.50			Do.	Do.
3. Yarn Dyeing Machines—						
(1) Hank Dyeing Machines .. .. .	5	1.00			Do.	Do.
(2) Cheese Dyeing Machines .. .. .	5	1.00			Do.	Do.
4. Piece Dyeing Machines (Winch Dyeing) .. .. .	4	1.00			Do.	Do.
Total .. .. .			232.30	232.30		232.30

## APPENDIX 21

*Assessment of requirement of capital equipment for the manufacture of woollen machinery*

The requirement of capital equipment has been based on the consultations which the licensee for the manufacture of worsted machinery in the country had with the Japanese manufacturers. The requirement of capital equipment for the manufacture of the following machinery is indicated in Statement 'L'.

Description	Machines per annum
1. Punch Boxes for combing process .. .. .	22
2. Gill Boxes (Preparing) for combing intersecting and high speed (replacement) .. .. .	45
3. Revolving Creel .. .. .	19
4. Auto leveller for Autoevener .. .. .	19
5. Auto leveller Draw Box 6 spindles .. .. .	19
6. Reducers 40 spindles .. .. .	19
7. Cone Rover 60 spindles .. .. .	19
8. Spinning Frame 200 spindles .. .. .	37
9. Twisting Frames 200 spindles .. .. .	17
<i>Woollen spindles</i>	
10. Woollen spindles Mule 400 spindles .. .. .	10
11. Ring Frames 330 „ .. .. .	18

Requirement of capital equipment for the manufacture of the following machines is as per Statement 'M'.

Description.	Machines per annum	New
1. Combined wool scouring and drying machines ..	5	11
2. <i>Blending Machines</i> —		
(i) Willow .. .. .	10	
(ii) Fearnaught .. .. .	10	
(iii) Garnett .. .. .	10	
3. <i>Carding Machine</i> —		
(i) Automatic Hopper Feed .. .. .	} 20	22
(ii) Double Scribler Engine .. .. .		
(iii) Scotch Feed .. .. .		
(iv) Double Cylinder Carding Machine .. .. .		
(v) Condenser .. .. .		
4. Card Grinding Machines for worsted cards ..		20
5. Back washing machine .. .. .		16
6. Combing & re-combing machines .. .. .		22

From finishing machines the following machines can also be attached with this section :—

1. Rope Washing and Scouring Machines	..	..	..	14
2. Milling Machines	..	..	..	14
3. Drying Machines—				
(i) Hydroextractor	..	..	..	40
(ii) Stentering machines	..	..	..	10

The requirement of capital equipment for the manufacture of the following machinery is as per Statement 'N'.

Description	Machines per annum
1. Automatic Pirn Winders	11
2. Cross Drum Winder, Double Drum Winder Quick Traverse Winder Automatic Pirn Winder	20
3. High Speed Warping Machine	6
4. Automatic Shuttle Changing Looms	150
5. Power Looms—Dobby Looms	400
<i>Raising machine</i>	
1. Double Action Teazle Raising Wire	15
2. Shearing Machine	10
3. Crabbing & Blowing Machine	10
4. Brushing Machine	5
5. Rotary Presses	5
6. Shrinking Chlorination & Felting m/cs.	10
7. Folding Machine	10
8. Loose Wool Dyeing Machines	2
9. Slubbing Dyeing Machines	2
10. Yarn Dyeing Machines—	
(i) Hank Dyeing Machines	5
(ii) Cheese Dyeing Machines	5
11. Piece Dyeing machine Winch Dyeing	4

## STATEMENT 'L' ATTACHED TO APPENDIX 21

Mark	Name of Machine	Specification	No. of sets.	Price Rs.
<i>Foundry—</i>				
BLO	Blower .. ..	7½ H.P.	1	
CUP	Cupola .. ..	2 tons cap.	2	
MH	Motor Hoist .. ..	2 Do.	1	
SM	Sand Mixer .. ..	No. 2	1	
SF	„ Filter .. ..	No. 1	1	
SML	„ Mill .. ..	No. 2	1	
SB	„ Blast .. ..	No. 2	1	
TB	Tumbler .. ..		3	
SUP	Surface Plate .. ..	3' × 6'	1	
F	Furnace .. ..		1	
DF	Drying Furnace .. ..		1	
			<b>Total</b> ..	<b>1,75,000</b>
<i>Wood Working—</i>				
WL	Wood Lathe .. ..	5 ft.	2	
UD	Upright Drill .. ..		1	
B.Saw	Band Saw .. ..	32"	1	
R.Saw	Round Saw .. ..	16"	1	
WPL	Wooden Planer .. ..	24"	1	
HSM	Hack Sawing Machine .. ..	16"	2	
HG	Hanger Grinder .. ..		4	
DGG	Disk Grinder .. ..		2	
DHG	Double Head Grinder .. ..		6	
			<b>Total</b> ..	<b>40,000</b>
<i>Machine Shop—</i>				
PL	Planer .. ..	6 ft.	3	90,000 IND
PL	Do. .. ..	8 ft.	2	80,000 "
PL	Do. .. ..	10 ft.	1	50,000 IMP
PL	Do. .. ..	12 ft.	1	70,000 "
TG	Tool Grinder .. ..		5	15,000 "
UD	Upright Drill .. ..	18"	1	6,000 "
UD	Do. .. ..	24"	1	10,000 "
RD	Radial Drill .. ..	3 ft.	1	15,000 "
RD	Do. .. ..	5 ft.	1	25,000 "
SH	Shaper .. ..	16"	3	14,000 IND
SH	Do. .. ..	20"	2	10,000 "
SH	Do. .. ..	24"	2	12,000 "
SL	Slotter .. ..	10"	1	20,000 IMP
HBM	Horizontal Boring Machine .. ..	No. 2	2	90,000
HBM	Do. .. ..	No. 3	1	60,000
VM	Vertical Milling Machine .. ..	No. 1½	1	30,000
VM	Do. .. ..	No. 3	1	35,000
VM	Do. .. ..	No. 4	1	40,000
VM	Do. .. ..	No. 5	1	45,000
PM	Plain Milling Machine .. ..	No. 1½	1	20,000
PM	Do. .. ..	No. 2	1	25,000

## STATEMENT 'L'—contd.

Mark	Name of Machine	Specification	No. of sets	Price Rs.	
L	Lathe	.. .. 6 ft.	8	80,000	IND
L	Do.	.. .. 8 ft.	8	96,000	"
L	Do.	.. .. 12 ft.	1	20,000	"
TL	Turret Lathe	.. .. No. 4	3	60,000	
GHM	Gear Hobbing Machine	.. .. 20"	1	30,000	
GHM	Do.	.. .. 24"	2	80,000	
FG.Sh.	Gear Shaper	.. .. 4"	1	10,000	
FG.Sh.	Do.	.. .. 8"	1	12,000	
CL.Gr.	Centreless Grinder	.. .. No. 3	1	10,000	
BD	Bench Drill	.. ..	3	12,000	IND
UM	Universal Milling M/c. No. 2	.. ..	1	45,000	"
SG	Surface Grinder 12" × 36"	.. ..	1	35,000	"
UG	Universal Grinder 30"	.. ..	1	35,000	"
DG	Drill Grinder	.. ..	1	10,000	"
CG	Cutter Grinder	.. ..	1	12,000	"
IG	Internal Grinder	.. .. 100 mm.	1	15,000	IND
BG	Bench Grinder	.. ..	5	5,000	"
			Total	13,49,000	
<i>Special Purpose—</i>					
LV L	Relieving Lathe	.. .. 6 ft.	1	10,000	
	Die casting machine	.. .. 40 kg. capacity	1	40,000	
			Total	50,000	
<i>Heat Treatment &amp; Laboratory Equipments—</i>					
	Blue Printing and Ammonio Printing Machine	.. ..	..	3,000	
	Hardness Tester	.. ..	..	15,000	
	Internal & External Micrometers	.. ..	..		
	Slip Gauges	.. ..	..		
	Dial Indicators	.. ..	..		
	Speedometers	.. ..	..		
	Straight Edges, etc.	.. ..	..		
			Total	18,000	
<i>Welding—</i>					
	Spot welding machine	.. ..	..	2,000	
<i>Forging—</i>					
	Forging Hammer	.. ..	..	5,000	
<i>Painting &amp; Electroplating—</i>					
	Painting Machine	.. ..	..	4,000	
<i>Miscellaneous —</i>					
	Travelling crane	.. .. 1½ tons capacity	..	4,000	
	Air Compressor	.. ..	..	21,000	
				25,000	

## STATEMENT 'M' ATTACHED TO APPENDIX 21

Mark	Name of machine	Specification	No. of sets	Price Rs.
BLO	Blower .. ..	7½ H.P.	1	
CUP	Cupola .. ..	2 tons capacity.	2	
MH	Motor Hoist .. ..	2 Do.	1	
SM	Sand Mixer .. ..	No. 2	1	
SML	„ Mill .. ..	No. 2	1	
SF	„ Filter .. ..	No. 1	1	
SB	„ Blast .. ..	No. 2	1	
TB	Tumbler .. ..		3	
SUP	Surface Plate .. ..	3' × 6'	1	
F	Furnace .. ..		1	
DF	Drying Furnace .. ..		1	
Total				1,75,000

*Wood Working—*

WL	Wooden Lathe .. ..	5 ft.	2	
UD	Upright Drill .. ..		1	
B.SAW	Band Saw .. ..	32"	1	
R.SAW	Round Saw .. ..	16"	1	
W.PL	Wooden Planer .. ..	24"	1	
H.SM.	Hack Sawing Machine .. ..	16"	2	
HG	Hanger Grinder .. ..		4	
DCG	Disk Grinder .. ..		2	
DHG	Double Head Grinder .. ..		6	
Total				40,000

*Machine Shop—*

PL	Planer .. ..	10 ft.	1	50,000 IMP
PL	Do. .. ..	12 ft.	1	70,000 "
TG	Tool Grinder .. ..		4	12,000 "
UD	Upright Drill .. ..	18"	1	6,000 "
UD	Do. .. ..	24"	1	10,000 "
RD	Radial Drill .. ..	3 ft.	1	15,000 "
RD	Do. .. ..	5 ft.	1	25,000 "
SH	Shaper .. ..	16"	3	14,000 IND
SH	Do. .. ..	20"	2	10,000 "
SH	Do. .. ..	24"	2	12,000 "
SL	Slotter .. ..	10"	1	20,000 IMP
PM	Plain Milling Machine .. ..	3	1	30,000 "
L	Lathe .. ..	6 ft.	6	60,000 IND
L	Do. .. ..	8 ft.	6	72,000 "
L	Do. .. ..	12 ft.	1	20,000 "
GHM	Gear Hobbing Machine .. ..	24"	1	40,000 IMP
FG. SH	Gear Shaper .. ..	4"	1	10,000 "
LGR	Centreless Grinder .. ..	No. 3	1	10,000 "



## STATEMENT M—contd.

Mark	Name of machine	Specification	No. of sets	Price Rs.
BD	Bench Drill .. ..	..	3	12,000 IND
UM	Universal Milling M/c. ..	.. No. 2	1	45,000 IMP
UG	Do. Grinder ..	.. 30"	1	35,000 ..
SG	Surface Grinder .. ..	.. 12" × 36"	1	35,000 ..
CG	Cutter Grinder .. ..	..	1	12,000 ..
IG	Internal Grinder .. ..	.. 100 mm.	1	15,000 ..
BG	Bench Grinder .. ..	..	5	5,000 IND
		Total	..	6,32,000
<i>Special Purpose—</i>				
HBM	Horizontal Boring Machine ..	.. No. 3	1	60,000 IMP
	Die Casting Machine .. ..	.. 40 Kg. capacity	1	40,000
		Total	..	1,00,000
<i>Heat Treatment &amp; Laboratory Equipments—</i>				
	Blue Printing and Ammonio Printing machine—			3,000
	(i) Hardness Tester .. ..	.. ..	..	} 15,000
	(ii) Internal & External Micrometers .. ..	.. ..	..	
	(iii) Slip Gauges .. ..	.. ..	..	
	(iv) Dial indicators .. ..	.. ..	..	
	(v) Speedometers .. ..	.. ..	..	
	(vi) Straight Edges etc. .. ..	.. ..	..	15,000
		Total	..	18,000
<i>Welding—</i>				
	Spot Welding Machine .. ..	.. ..	..	2,000
<i>Forging—</i>				
	Forging Hammer .. ..	.. ..	..	5,000
<i>Painting &amp; Electroplating—</i>				
	Painting Machine .. ..	.. ..	..	4,000
<i>Miscellaneous</i>				
	Travelling Crane (1½ tons capacity) ..	.. ..	..	4,000
	Air Compressor .. ..	.. ..	..	21,000
		Total	..	25,000

## STATEMENT 'N' ATTACHED TO APPENDIX 21

Mark	Name of machine	Specification	No. of sets	Price Rs.
<i>Foundry—</i>				
BLO	Blower .. ..	7½ H.P.	1	
CUP	Cupola .. ..	2 tons capacity	2	
MH	Motor Hoist .. ..	2 Do.	1	
SM	Sand Mixer .. ..	No. 2	1	
SML	„ Mill .. ..	No. 2	1	
SF	„ Filter .. ..	No. 1	1	
SB	„ Blast .. ..	No. 2	1	
TB	Tumbler .. ..		3	
SUP	Surface Plate .. ..	3' × 6'	1	
F	Furnace .. ..		1	
DF	Drying Furnace .. ..		1	
			Total	1,75,000
<i>Wood Working—</i>				
WL	Wooden Lathe .. ..	5 ft.	2	
UD	Upright Drill .. ..		1	
B.SAW	Band Saw .. ..	32"	1	
R. SAW	Round Saw .. ..	16"	1	
W. PL	Wooden Planer .. ..	24"	1	
H. SM.	Hack Sawing Machine .. ..	16"	2	
HG	Hanger Grinder .. ..		4	
DCG	Disk Grinder .. ..		2	
DHG	Double Head Grinder .. ..		6	
			Total	40,000
<i>Machine Shop—</i>				
PL	Planer .. ..	8 ft.	2	80,000
PL	Do. .. ..	12 ft.	1	70,000
TU	Tool Grinder .. ..		5	15,000
UD	Upright Drill .. ..	18"	2	12,000
UD	Do. .. ..	24"	2	20,000
RD	Radial Drill .. ..	3 ft.	1	15,000
RD	Do. .. ..	5 ft.	1	25,000
SH	Shaper .. ..	16"	3	14,000
SH	Do. .. ..	20"	2	10,000
SH	Do. .. ..	24"	2	12,000
SL	Slotter .. ..	10"	1	20,000
VM	Vertical Milling M/c. .. ..	No. 4	1	40,000
PM	Plain Milling M/c. .. ..	No. 2	1	25,000
L	Lathe .. ..	6 ft.	8	80,000

## STATEMENT 'N'—contd.

Mark	Name of machine	Specification	No. of sets	Price Rs.
L	Lathe .. ..	8 ft.	8	96,000
L	Do.	12 ft.	1	20,000
TL	Turret Lathe .. ..	No. 4	3	60,000
GHM	Gear Hobbing Machine	24"	1	40,000
FG. SH	Gear Shaper .. ..	4"	1	10,000
FG.SH	Gear Shaper .. ..	8"	1	12,000
CLGR	Centreless Grinder .. ..	No. 3	1	10,000
BD	Bench Drill .. ..		3	12,000
UM	Universal Milling M/c. .. ..	No. 2	1	45,000
UG	„ Grinder .. ..	30"	1	35,000
SG	Surface Grinder .. ..	12" × 36"	1	35,000
CG	Cutter Grinder .. ..		1	12,000
BG	Bench Grinder .. ..		5	5,000
			<b>Total</b>	<b>8,30,000</b>
<i>Special Purpose—</i>				
HBM	Horizontal Boring M/c. .. ..	No. 3	1	60,000
RV.L.	Relieving Lathe .. ..	6 ft.	1	10,000
	Die Casting Machine Capacity 40 kg.			40,000
			<b>Total</b>	<b>1,10,000</b>
<i>Heat Treatment &amp; Laboratory Equipments—</i>				
	Blue Printing & Ammonio Printing Machine			3,000
	(i) Hardening Tester .. ..			} 15,000
	(ii) Internal & External Micrometers .. ..			
	(iii) Slip Gauges .. ..			
	(iv) Dial indicators .. ..			
	(v) Speedometers .. ..			
	(vi) Straight edges, etc. .. ..			
			<b>Total</b>	<b>18,000</b>
<i>Welding—</i>				
	Spot Welding Machine .. ..			2,000
<i>Forging—</i>				
	Forging Hammer .. ..			5,000
<i>Painting &amp; Electroplating—</i>				
	Painting Machine .. ..			4,000
<i>Miscellaneous—</i>				
TCR	Travelling Crane .. ..	1½ tons capacity		4,000
AC	Air Compressor .. ..			21,000
			<b>Total</b>	<b>25,000</b>

## APPENDIX 22

*Requirements of Processing Machinery for the Art Silk Industry during the Third and Fourth Plan periods*

Name of the machine	C.I.F. value in rupees	Annual 3rd Plan requirements	Value in rupees	Annual 4th Plan requirements	Value in rupees
Pin & Clip type stentering machine ..	40000	3	120000	8	320000
Hot Air stentering machine .. ..	200000	5	1000000	12	2400000
Felt Calendar .. ..	15000	5	75000	12	180000
Embossing Calendar .. ..	25000	5	125000	8	200000
Schreindiner Calendar .. ..	60000	3	180000	8	480000
3 or 4 Bowl Silk Calendar .. ..	50000	5	250000	12	600000
Pneumatic Padding Mangles .. ..	40000	10	400000	24	960000
Polymerising machines .. ..	70000	5	350000	12	840000
Automatic screen Printing machine ..	200000	3	600000	8	100000
Automatic/semi-automatic Jiggers ..	6000	25	150000	60	360000
Dyeing Winches .. ..	3000	15	45000	36	10800
Folding machines .. ..	10000	10	100000	24	240000
Solvedge Ptg. machines .. ..	30000	3	90000	8	240000
Decatising machines .. ..	40000	3	120000	8	320000
Shearing machines .. ..	45000	5	225000	12	540000
Raising machines .. ..	45000	5	225000	8	360000
Centrifugal Hydroextractors .. ..	15000	5	75000	12	180000
Open Width Suction Hydroextractor with drier .. ..	60000	5	300000	12	720000
Resin Finishing Range .. ..	250000	3	750000	8	2000000
Open width continuous boil off, scouring and crepening machine .. ..	150000	3	450000	8	1200000
Pleating machines .. ..	75000	3	225000	8	600000
Roller Ptg. machine .. ..	100000	5	500000	12	1200000
Vertical Horizontal dyeing ranges ..	60000	5	300000	12	720000
Flock Printing Machine .. ..	3000	5	15000	5	15000
Total value of the processing machinery required to be manufactured in the—					
3rd Plan period ..			Rs. 66,70,000		
4th Plan period ..			Rs. 1,63,83,000		

## APPENDIX 23

*Machinery required for a Viscose Yarn Plant of 8 million lbs. per annum capacity*

Name of machine	Quantity required	Value
Steeping presses	3	Rs. 4 lakhs approx.
Shredders	4	Rs. 14 lakhs.
Xanthators	4	
Dissolvers	4	
Blender	1	Indigenous,
Filter Presses	7 to 10 depending on surface area of plates	"
Dialisors	6	"
Spinning positions	6250 with fittings	Rs. 160 lakhs.
Stainless Steel Washing	2 Washing machines can be made indigenously— as N.R.C. have done.	
Tunnel Dryers	2	"
Cone winding machines	2150 spindles	
Spin. both recovery section consisting of an evaporator, crystalliser, vacuum filter, all construction from Karbate and rubber lined equipment.	1	Rs. 11 lakhs.
Steam jet ejectors, special liquor pumps, etc.		
Various types of viscose spin bath liquor pumps.		
Heat exchangers made of stainless steel, nickel and steel.		

APPENDIX 23—*contd.*

Name of machine	Quantity required	Value
Air conditioning equipment with a capacity of 500 ice tons. . . . .	With fittings	Rs. 40 lakhs.
Boiler with a capacity of 50,000 lbs. steam per hour.		Rs. 4 lakhs.
Back pressure turbine for above:—		
Air Washers		
Exhaust Fans		
Electric Motors		
Electrical Switch Gear		
Distribution Board		
Transformer		
Fork Trucks . . . . .		5.
Battery driven lift trucks		
Several tanks and tank like structures such as Ageing cones, ripening tanks, caustic storage tanks, tanks for bleaching machine, air conditioning ducts . . . . .		Approximately 1000 tons of steel may be required for the manufacture of this.
Sulphuric Acid Plant . . . . .		Machinery for this would be dealt with by the Standing Committee for Chemical Industries.
CS <sub>2</sub> plant		
Water treatment plant.		

## APPENDIX 24

*Major items of machinery required for one unit of Viscose Staple Fibre of about 16 million lbs. per annum capacity*

Name of machine	Quantity required
Slurry Mixers .. .. .	3
Slurry Presses .. .. .	3
Maturing Drums .. .. .	2
Xanthators—Simplex Type .. .. .	2
Dissolvers .. .. .	4
Blenders .. .. .	2
Bleach Line .. .. .	1
Dry Line .. .. .	1
Baling Press .. .. .	2
Recovery Section consisting of an evaporator, crystalliser, vacuum filter all construction from Karbate and rubber lined equipment.	
Steam jet ejectors, special liquor pump, etc., similar to the one described for rayon filament plant ..	2
Dializers .. .. .	12
Filter Presses .. .. .	20
Staple Fibre Spg. Machine various types of viscose pumps .. .. .	2
Spin bath liquor pumps	
Several heat exchangers of stainless steel, nickel, steel, etc.	
Air-conditioning system with a capacity of 500 ice tons	
Tank and tank like structures such as ageing cones, ripening tanks, caustic storage tanks.	
Exhaust fans	
Electric Motors	
Electrical Switchgear	
Distribution Board	
Transformer	
Fork Trucks	
Battery driven lift trucks	
Sulphuric Acid Plant .. .. .	Machinery for this would be dealt with by the Standing Committee for Chemical Industries.
CS <sub>2</sub> Plant	
Water Treatment Plant	

## APPENDIX 25

*List of machinery required for a Nylon/Perlon Plant with a capacity of 1.6 million lbs. per annum*

Item No.	Quantity	Description
<i>I. Polymerization and Chip preparation—</i>		
<i>The monomeric salt epsilon amino capro actam is molten and after filtration mixed with catalysers, stabilisers, and dulling agents, then polymerized by a continuous process, extruded in water and cut in to chips.</i>		
1	1	Melting tank for lactam, of stainless steel construction, equipped with heating jacket made of mild steel and an agitator with its drive, with spray for nitrogen as well as connection and valve for nitrogen, including gauge glass and opening for filling.
2	1	Connecting piping from lactam melter to piston pump, including bypass piping, for by passing the pump, of stainless steel construction, with heating jacket of mild steel pipe, with all necessary connections and valves.
3	1	Piston pump for lactam, plunger type, with a capacity of 120 liters per hour against 5 atu, made of stainless steel, including heating jacket and direct coupled motor.
4	1	Connecting piping to connect the lactam pump to the lactam filter, made of stainless steel, including heating jacket of mild steel pipe, and including all necessary connections and expansion joints.
5	1	Lactam filter of stainless steel construction, filtering area 6 sq. meters, including heating jacket made of steel with removal cover for easy exchange of filter with all necessary connections for steam or hot water, nitrogen, spray and lactam.
6	1	Connecting piping between lactam filter and lactam storage tank of stainless steel construction with heating jacket of mild steel pipe and all necessary connections.
7	1	Storage tank for lactam of stainless steel construction, with heating jacket of steel, including manhole and the necessary connections for steam, condensate and lactam. Capacity 1000 liters.
8	2	Connecting piping between storage tank and metering mixing is installation of stainless steel construction including heating jacket of mild steel piping.
9	2	Metering installation, hand regulated for two liquids. (a) Metering of lactam with small heatable metering pump, piston diameter 18 mm, and a maximum capacity of 60 liters per hour at 30 mm, stroke ; piston and valves of stainless steel.



APPENDIX 25--*contd.*

Item No.	Quantity	Description
		(b) Metering of concentrated acetic acid with heatable metering pump, piston diameter 5 mm. and a maximum capacity of 3.0 liters per hour, made of stainless steel and including direct coupled motor.
10	2	Settling and mixing tanks for titanium dioxide stabilisers and catalyzers, made of stainless steel and including rapid agitater, driven by direct coupled motor, including connection for nitrogen.
11	2	Candle filters made of stainless steel, with rapid closing device for changing of filter, equipped with heating jacket of mild steel pipe.
12	2	Connecting piping between candle filter of item 11 and the storage tank of item 13, made of stainless steel including heating jacket of mild steel pipe and all necessary flanges.
13	2	Storage tanks for the additions to the caprolactam, of stainless steel construction, including heating jacket of steel, manhole with the necessary connections for the additions, nitrogen, hot water or steam and condensate.
14	2	Connecting piping between tank of item 13 and metering pump of item 9, made of stainless steel, including heating jacket of mild steel pipe.
15	2	Connecting piping for lactam between metering installation of item 9 and the V. K. tube, made of stainless steel, including heating jacket of mild steel pipe and all necessary connections
16	2	V. K. tubes for the continuous polymerization of caprolactam made of stainless steel, including a heating jacket of mild steel, capacity 750 liters, corresponding to a daily average polymerisation capacity of 1000 kg per 24 hours at a process time of 16 hours.
17		Each V. K. tube consists of—
		(a) 1—Upper part with connection for lactam and mixing jet for the additions, a flange cover with gauge glass and connection for nitrogen, a connecting flange for level control, a connecting flange for lactam condensate, a connecting flange for steam and condensate of heating jacket, a connection for a resistance thermometer.
		(b) 2 V. K. Tube parts each 3.5 meters long having a diameter of 320 mm. including heating jacket with heating element welded to the lower part. A water level indicator, connecting flange for Dowtherm condensor with built in

APPENDIX 25—*contd.*

Item No.	Quantity	Description
		thermometer nozzles the nozzle for the discharge of Dowtherm including two thermometer nozzles for control and measuring of the temperature in the polymer.
		(c) Flow resistance installation consisting of 2 shafts each 3, 510 mm. long and 20 mm. diameter on which a total of 15 flow resistance discs are mounted.
		(d) Extrusion head provided with a flange for connection to the lower end of the V. K. Tube including connecting piping, block for the gear pump and the jet block, all welded in a heating jacket of steel, equipped with nozzles for an electric resistance thermometer for measuring the temperature in the polymer, a nozzle for an electric resistance thermometer for measuring and controlling the Dowtherm temperature. The jet block consists of a soft aluminium packing, jet holder, jet plate, and three filters.
18	2	Gear Pumps, 30 cc/rev.
19	2	Pump drives consisting of PIV with direct coupled motor.
20	2	Spinning troughs made of stainless steel, installed in a structural steel support equipped with 4 wheels, with connections for cold water and equipped with guide rods for the extruded polymer rods.
21	2	Conduct pipes to transport the extruded rods from the spinning trough of item 19 to the chip cutter of item 21, made of aluminium or polythene with a connecting flange at the upper end of the upper part for cold water.
22	2	Cutter for chips designed for the cutting of up to 24 rods with a maximum diameter of 3 mm. The speed of the cutter can be adjusted between 15 and 90 m/min. The machine is equipped with one pair of nip rollers, 24 rolls made of stainless steel, funnels for the individual rods, knives of special steel, including drive, consisting of PIV, motor and V Belt drive and equipped with a collecting funnel for chips and connection to the chip storage tank.
23	1	Dowtherm storage tank made of steel, with a capacity of 2,000 liters, equipped with level indicators, manometers, safety valve, connection for the condensate, return from the Dowtherm condensers (item 3), connection for the transport of the dowtherm to the individual heating positions of the V. K. Tube, and outlet valve for filling of cans.
24	8	Dowtherm condensers made of steel, including coils for cooling water.

APPENDIX 25—*contd.*

Item No.	Quantity	Description
25		Connecting piping between the Dowtherm storage tank, the heating positions of the V. K. Tube and the condensers, as well as between the dowtherm condensers and the exhaust.
26	1	Warm water tank for the preparation of hot water for the various equipment to be heated, made of steel and having a heat exchange surface of 6 sq. meters.
27	1	Automatic temperature control instrument for temperature from 0-120 degrees C, for regulation of the hot water temperature in the heat exchanger of item 5.
28	1	Centrifugal pump for hot water complete with base plate, coupling and motor with a capacity of 12 cu. m. per hour.
29	2	Instrument panel boards for the regulation and control of the temperatures in the V. K. Tube.
30		All connecting piping between above mentioned equipment as required for the transfer of lactam polymer and additions, including the necessary valves and fittings. All necessary valves and fittings for the dowtherm pumping and heating installation.

*II. Extraction and drying of Polymer Chips—*

*During the polymerisation as described in Chapter I. a 9-10% extractable content will remain in the polymer. This will consist of up to 80% monomers, the remainder being oligomers, and will be extracted from the chips with hot water.*

- |   |   |  |
|---|---|--|
| 1 | 2 | Storage tank for chips made of stainless steel with a capacity of 1,500 liters, corresponding to about 1,000 kg. The chip container is connected to the inlet funnel of the chip cutting machine |
| 2 | 2 | Chip extraction and washing installation with a capacity of 500-550 kg. of chips per batch, washing time 9-10 hours, capacity 1,000 to 1,400 kg. per day.  |

Each installation consists of—

- |   |   |
|---|---|
| 1 | Treatment tank with a diameter of 1,250 mm. made of stainless steel, equipped with heater for indirect heating of the wash water and chips, designed so as to heat the mass in 35 mins. to 100 degrees C. at a steam pressure of 5—8 atu. 1 complete pumping unit for circulation of the wash water consisting of a centrifugal pump with drive and flexible coupling, mounted on a common base plate, a connecting piping and fittings. Capacity 100 cu.m. per hour against 3.8 to 4.8 atu. 2 Chip carriers for 500 to 550 kg. chips each. |
|---|---|

APPENDIX 25—*contd.*

Item No.	Quantity	Description
	2	Settling tanks of stainless steel with the same capacity as the abovementioned treatment tank, equipped with a heater for indirect heating of the mass, designed to heat the maximum in 35 minutes from 20—100 degrees C, including connecting piping and valves.
3	1	Electric lift for a weight of 1,500 kg. with a lift of 3·5 meters.
4	1	Transfer pump for the transfer of the wash water to the wash water tank, complete with coupling, motor and common base plate, capacity: about 10 cu.m. per hour against 30 m.
5		Necessary connecting piping, valves and fittings to connect the wash water tanks with the pump storage tanks.
6	2	Instrument panel boards for the automatic control of the temperature of the wash water.
7	1	Funnel and connecting pipe of stainless steel for filling of the chips into the dryer.
8	1	Tumbling dryer, volume 4m. with the inner part made of stainless steel, consisting of a cylindrical drum of stainless clad steel, including heating jacket of steel for heating with either steam or hot water, including all necessary connections and drive motor.
9	1	High vacuum unit for the dryer of item 8 consisting of—
..	1	Pumping unit for the production of vacuum up to 0·1 torr including drive.
..	1	Surface condensor with a cooling surface of 8m <sup>2</sup> with connection for cooling water and condensates.
..	1	Dust separator for the cleaning of the dryer steam.
..	1	Complete piping system to interconnect the high vacuum units, complete with valves and fittings.
..	1	Vacuum measuring unit for the control of the vacuum in the dryer.
10	1	Temperature control instrument for the control of temperature in the dryer.
11	1	High pressure blower made of steel complete with drive and starter.
12	1	Funnel for discharging the chips from the dryer on to the chip conveyor.
13	1	Piping system for the pneumatic transport of the chip from the dryer into the chip storage tanks including chip separator.

APPENDIX 25—*contd.*

Item No.	Quantity	Description
14	2	Chip valves.
15	2	Chip storage tanks, stainless steel, complete with manhole and 3 gauge glasses, mixing screw and drive system.
16	2	Chip valves.
17	1	Chip transport chute, of stainless steel, including connection to the chip valve item 16 and 12 lower flanges including chip valves for connection to the individual chip storage valves of the spinning heads.
18	1	Ditto, but with 6 lower flanges.
19		All piping to interconnect the above mentioned equipment.
<i>III. Spinning and Winding—</i>		
<i>The dried extracted chips are molten in an oxygen free atmosphere, extruded through jets in a cross current of air, drawn off through a spinning shaft and wound into the winding unit.</i>		
1	18	Chip hoppers including connecting flanges to the spinning heads, made of stainless steel.
2	18	Spinning heads, each with 4 jets. Each spinning head consists of— 1 pump block with 4 measuring pumps 1 Pressure pump 1 Electrical heating unit 4 Jet blocks. 1—Melting unit with cylindrical jacket made of stainless steel. 1 Spinning head proper complete with connection to the melting unit. 1 temperature control instrument 4 jet assemblies. 1 Dowtherm condensor.
3	2	Metering pump drives consisting of— 2 Synchronous motor 2 PIVs
4	1	Frame for the installation of 12 spinning heads, including metering pump drives.
4(a)	1	Ditto, except for 6 spinning heads.
5	36	Plenum chambers.
6	72	Conditioning ducts made of aluminium.

APPENDIX 25—*contd.*

Item No.	Quantity	Description
7	1	Instrument panel containing temperature control instruments for the control of the spinning head temperatures.
8	1	Electrical pre-heater for the pre-heating of jet assemblies and spinning pumps equipped with a temperature control unit.
9	..	Piping, fittings, etc. Each spinning head is provided with a gate valve for high pressure steam as well as a monometer for measuring the dowtherm pressure.
10	1	Winding machine double sided for a total of 24 winding positions. The machine is equipped with 24 Traverse mechanism 12 per side 2 Drive Drums per side. 24 Levers including bobbin holders. 24 Upper and 24 Lower godets Measuring instruments complete drive, consisting of :— (a) for the traverse mechanism 1—drive motor with BIV. (b) for the pattern disturbing unit 1 drive motor with PIV. (c) For the finish preparation units 2 drive motors with PIVs. (d) for the drive drum 1 motor with PIV. (e) For the godets 48 Reluctance motors. The motors for driving drums and the godets are driven from the main drive which consists of :— 1 AC drive motor 1 Gear reducer 1 AC Generator 1 Complete panel board containing all necessary starters, push buttons, fuses, safety devices and sign lamps
11	1	Winding Machine as above, but for a total of 48 winding positions.
12	8	Bobbin transport trucks, each for 40 bobbins.

APPENDIX 25—*contd.*

Item No.	Quantity	Description
<i>IV. Anti Static Finish Preparation—</i>		
<i>The finish which is applied to the finish rolls of the winding machines is of a special type processing anti-static properties. This finish is prepared in a special installation consisting of—</i>		
1	2	Stainless steel oil storage tanks.
2	1	Stainless steel finish storage tank.
3	1	Stainless steel candle filter.
4	1	Stainless steel centrifugal, complete with drive motor.
5	1	Portable mixer, including motor.
6		All necessary piping, fittings and valves to inter-connect the above-mentioned equipment.
<i>V. Cleaning Equipment for Spinning Heads, Pumps &amp; Jets.—</i>		
<i>The individual spinning head parts, such as jet block, melting unit, pumps, jets, jet assemblies etc., are cleansed by burning off the adhered polymer in an oven at a temperature of 350 degrees C. Subsequently, the parts are washed, cooled and dried with compressed air.</i>		
1	1	Electric oven for temperature up to 400 degrees C, including automatic temperature controls
2	1	Wash tanks made of stainless steel, including steam coil and automatic temperature controls.
3	1	Centrifugal pump, of stainless steel, complete with drive motor and starter.
4	3	Baskets, of stainless steel.
5	1	High pressure hose with spray jets.
<i>VI. Stretch Twisting Installation—</i>		
<i>The spun yarn collected on cylindrical bobbins must be stretched from 1:3 to 1:5 in order to obtain the desired denier and final physical properties.</i>		
1	8	Stretch twisting machines. Each machine will have 156 positions, doublesided for a maximum stretch speed of 750 m/min. Each position equipped with delivery roll covered with "Acotex" friction roll with hard chrome surface stretch godet, surface hard chrome, ring of 4½" diameter ring spindle and drive. Each machine includes. 1 drive motor, 1,500 rpm, with sleeves for three speeds.
2	1	Ditto., but for 84 positions.
3	1	Bobbin transport trucks, each for 128 pirns.

APPENDIX 25—*contd.*

Item No.	Quantity	Description
<i>VII. Uptwisters—</i>		
1	7	Uptwisters with 252 spindles each, 126 on each side. Their spindle speed is variable and the spindles are constructed to allow up to 12,000 rpm. Drive motors and starters are included.
<i>VIII. Yarn Washing, Twist setting and after Treating Installation—</i>		
<i>The twisted yarn is collected on perforated bobbins, washed, twist set and sized on the washing machine in one single operation. It is later dried in a tunnel dryer.</i>		
1	3	Washing machines made of stainless steel and consisting of 1 treatment tank 1 circulation pumping unit 2 bobbin carriers, each for 216 bobbins 1 water containers.
2	1	Electric lift
3	1	Tunnel dryer for 12 trucks including fans and temperature indicating instruments.
4	24	Bobbin transport trucks.
<i>IX. Doublers—</i>		
<i>In order to obtain heavier deniers than those produced in spinning and stretch twisting departments, or in order to use out of limit denier yarn, several ends may be spooled together for further use for knitting.</i>		
1	2	Doubling machine with 84 spinning positions each for the doubling of up to four ends.
2	4	Bobbin transport trucks.
<i>X. Coning Machines (for multifilament yarn only)—</i>		
13		Coning Machines, each machine with 24 spindles and operates at a wind up speed of 250 meters per minute. The machines are equipped with attachment for pineapple type cones, drive motors and starters are included.



APPENDIX 25—*contd.*

Item No.	Quantity	Description
<i>XI. Lactam Evaporation and Distribution—</i>		
<i>The extraction waters contain dissolved lactam and must be evaporated to recover the dissolved lactam. These waters which contain 4-5% lactam are first evaporated to 70%. In a second stage evaporation they are concentrated to 99% lactam. The 99% lactam contains a small quantity of dimers and trimers which must be removed by distillation before the recovered lactam can be used again.</i>		
1	2	Recycling lactam evaporator, concentrators and stills, equipped with agitators, motors and ejectors for vacuum evaporation and distillation. All parts in contact with the lactam are of stainless steel.
2	2	Stainless steel metering feed pump complete with motor, based plate and starter.
3	2	Vacuum pump complete with motor, base plate and starter.
4	2	Condensate pumps with motors, base plates and starters.
5	2	Surface condensers. All parts in contact with the lactam waters are of stainless steel.
6	1	Steam jacketed stainless steel tank for the 99% crude lactam concentrate.
7	1	Stainless steel tank for collecting the 70% concentrate.
8	1	Steam jacketed stainless steel tank for the pure lactam distillate.
9	1	Stainless steel transfer pump to return pure lactam to the polymerisation system, with motor, base plate and starter.
		All necessary stainless steel piping for the interconnection of item 1 to 9.
		Fittings, including
		Stainless steel valves
		Normal steel valves.
		Instruments, including
		Steam traps
		Monometers
		Rotameter
		Thermometers.

*XII. Air Conditioning and Refrigeration—*

- |   |   |  |
|---|---|--|
| 1 | 1 | Refrigeration machine of the Freon type, equipped with instrumentation to control coolant and chilled water, including chilled water cooler and condenser, as well as the chilled water and condenser pumps. Drive motor and starter are included. |
|---|---|--|

APPENDIX 25—*conold.*

Item No.	Quantity	Description
2	3	<p>Air conditioning units for the conditioning of the air in the spinning and textile departments. Each unit will be equipped with fans, water, tanks, spray headers and nozzles, water circulating pumps and all drive motors and starters.</p> <p>The units will be equipped with a by-pass damper and control system to maintain constant temperature and humidity.</p>
		<p><i>XIII—Water Deionization Plant—</i></p>
		<p>Complete equipment for water deionizing as determined by the analysis of the water at site.</p>
		<p><i>XIV. Laboratories—</i></p>
		<p>Complete equipment for the physical and chemical testing laboratories, required to test the chemical and physical properties of the yarn.</p>
		<p><i>XV. Maintenance Shop—</i></p>
		<p>Machine shop equipment for normal maintenance of the plant</p>
		<p><i>XVI. Steam Plant—</i></p>
		<p>Oil fired, packaged type boiler plant of suitable capacity with automatic control.</p>
		<p><i>XVII. Operating Supplies and Spares—</i></p>
		<p>Uptwist bobbins.</p>
		<p>Uptwist supports.</p>
		<p>Uptwist caps.</p>
		<p>Rubber seals.</p>
		<p>Spin buggies.</p>
		<p>Stretch buggies.</p>
		<p>Uptwist buggies.</p>
		<p>Cone buggies.</p>
		<p>Cone trays.</p>
		<p>Spin bobbins caps.</p>
		<p>Stretch bobbins.</p>
		<p>Metering pumps.</p>
		<p>Pressure pumps.</p>
		<p>Jets.</p>
		<p>Jet mounts.</p>
		<p>Yarn strippers.</p>
		<p>Hopper scale.</p>
		<p>Platform scale.</p>
		<p><i>XVIII. Operating Supplies and Spares—</i></p>
		<p>Print weight scale.</p>
		<p>Pump testing equipment.</p>

## APPENDIX 26

*Machinery required for a 5-ton Cellophane Plant working in conjunction with a Rayon Plant*

## 1. Soda Station—

Circulating Pumps	..	..	2	} Common to staple fibre plant.
2. Alkalisation, shredding and ageing—				
Slurry Mixer	..	..	1	
Slurry Press	..	..	1	
Slurry Pumps	..	..	2	
Ageing Drum	..	..	1	
3. Xanthation & Dissolving—				
Xanthator Simplex Type	..	..	1	
Dissolver with heat exchanger and disintegrator	..	..	1 to 2	
4. Blending & Ripening—				
Flash dearator	..	..		
Viscose pumps	..	..		
5. Cellulose Film Cashing M/s.				
6. Refrigeration Plant—				
250 ice-ton capacity.				
7. Cellulose Film cutting & rewinding—				
Guillotine	..	..	1	
Slitting and Rewinding M/s	..	..	1	
Laminating M/s	..	..	1	

## APPENDIX 27.

*Machinery required for a Tyre yarn unit of 10 million lbs. capacity per annum*

Name of machine	Quantity required
Steeping Presses .. .. .	4
Shredders .. .. .	5
Xanthators .. .. .	5
Dissolvers .. .. .	5
Blender .. .. .	1
Filter Presses .. .. .	10
Dialisers .. .. .	8
Spinning machines (3) Position .. .. .	..
Stainless Steel Washing Machines .. .. .	2
Tunnel Driers .. .. .	2
Cone winding machines .. .. .	..
Spin bath Recovery Section consisting of 1 Evaporator, Xtalliser, Vacuum filter, all construction from Karbate and rubber lined equipment .. .. .	1
Steam jet ejectors, special liquors pumps .. .. .	..
Various types of viscose spin bath liquor pumps .. .. .	..
Heat Exchangers made of stainless steel, nickle and steel .. .. .	..
Air conditioning equipment with a capacity of 500 ice tons .. .. .	With fittings.
Boiler with a capacity of 50,000 lbs. steam an hour .. .. .	..
Back pressure turbine for above .. .. .	..
Air Washers .. .. .	..
Exhasut fans .. .. .	..
Electric Motors .. .. .	..
Electrical Switchgear .. .. .	..
Distribution Board .. .. .	..
Transformer .. .. .	..
Fork Trucks .. .. .	..
Battery driven lift tracks .. .. .	5
Several tanks and tank like structures such as Ageing cans, ripening tanks, caustic storage tanks, tanks for bleaching machines, air conditioning ducts .. .. .	Approx. 1000 tons of steel may be required for the manufacture of this.
Sulphuric Acid Plant .. .. .	Machinery for this would be dealt with by the Standing Committee for Chemical Industries.
CS2 Plant .. .. .	..

## APPENDIX 28

*Estimated requirement of Sliver Spinning Spindles to meet the production target during the remaining period of the Second Plan*

## 1. Rate of Production—

	Efficiency	Yarn requirement		Total
		Fine Side	Coarse Side	
Hessian per loom hour ..	83%	11.5 lbs.	Nil	11.5 lbs.
Sacking per loom hour ..	88%	10.6 ,,	15.9 lbs.	26.5 lbs.

## 2. Looms to be worked—

	Looms		Total
	Hessian	Sacking	
Installed looms .. ..	44,078	24,875	68,953
Deduct—12½% sealing under the working time Agreement of I.J.M.A. .. ..	8,137	..	8,137
	35,941	24,875	60,816

## 3. Calculated Production—

	Hessian	Sacking	Total
Per Working Hour .. ..	4,13,321 lbs.	6,59,188 lbs.	10,72,509 lbs.
Per Year .. ..	4,42,900 tons	7,06,300 tons	11,49,200 tons
			or say 11.5 lakh tons

## 4. Analysis of total production per working hour—

	Fine Side		Coarse Side	
	Hessian Warp	Hessian Weft	Sacking Warp	Sacking Weft
	(45%)	(55%)	(40%)	(60%)
Yarn in cloth .. ..	Lbs. 1,85,995	Lbs. 2,27,326	Lbs. 2,63,675	Lbs. 3,95,513
Add—Yarn wastage upto winding—				
Basis Fine Side : 7½%)				
Coarse Side : 10%)	13,950	17,050	19,776	39,551
Yarn requirement ..	1,99,945	2,44,376	2,83,451	4,35,064

## APPENDIX 28—contd.

## 5. Spindle requirement to give the above yarn production—

	Yarn required	Production per spindle hour	Spindles required
Fine side—			
Hessian Warp .. ..	1,99,945 lbs.	0·76 lbs.	2,63,086
Hessian Weft .. ..	2,44,376 lbs.	0·85 lbs.	2,87,501
Sacking Warp .. ..	2,83,451 lbs.	0·94 lbs.	3,01,543
			8,52,130
Coarse Side—			
Sacking Weft .. ..	4,35,064 lbs.	2·82 lbs.	1,54,278

## 6. Spindle requirement after allowing for Yarn wastage in weaving single shift Basis—

	Fine Side	Coarse Side
Spindles as per above calculation .. ..	8,52,130	1,54,278
Add 2½% for weaving wastage .. ..	21,303	3,858
Spindle requirement on single shift Basis ..	8,73,433	1,58,136
Spindle requirement on <i>Treble Shift</i> basis taking 23½ hrs. in 3 shifts per day ..	2,97,339	53,834
No. of sliver spinning spindles installed upto 31st March 1959 .. ..	1,90,206	34,400
Balance to be installed .. ..	1,07,133	19,434
Equivalent No. of frames to be installed ..	1,072	243

## APPENDIX 29

*Estimated Requirement of Sliver Spinning Spindles to meet the production target during the Third Plan period*

I. *Production per working hour* .. .. Sacking 86,250 lbs. (3,255 looms  
× 26.5 lbs.)

II. *Analysis of production per working hour—*

	Fine Side	Coarse Side
	Sacking Warp 40%	Sacking Weft 60%
Yarn in cloth .. .. .	34,500 lbs.	51,750 lbs.
Add yarn wastage of 7½% on fine side and 10% on coarse side .. .. .	2,588 lbs.	5,175 lbs.
	37,088 lbs.	56,925 lbs.

III. *Spindle requirement to give the above yarn production—*

	Yarn required	Production per spindle hour	Spindles required
Fine Side .. .. .	37,088 lbs.	0.94 lbs.	39,455
Coarse Side .. .. .	56,925 lbs.	2.82 lbs.	20,186

IV. *Spindle requirement after allowing for yarn wastage in weaving on single shift basis—*

	Fine side	Coarse side
Spindles as per above calculation ..	39,455	20,186
Add 2½ % for weaving wastage .. .. .	986	504
Spindle requirement on single shift basis ..	40,441	20,690
Spindle requirement on treble shift basis ..	13,767	7,044
Equivalent number of spinning frames ..	138	88

## APPENDIX 30

*Estimated requirement of Sliver Spinning Spindles to meet the production target during the Fourth Plan period*

I. Production per working hour .. .. Sacking 129,377 lbs.  
(4,882 looms × 26.5 lbs.)

II. Analysis of production per working hour—

	Fine Side	Coarse Side
	Sacking Warp 40% lbs.	Sacking Weft 60% lbs.
Yarn in cloth .. ..	51,749	77,624
Add Yarn wastage of 7½% on fine side and 10 per cent on coarse side ..	3,881	7,762
	55,630	85,386

III. Spindle requirement to give the above yarn production—

	Yarn required	Production per spindle hour	Spindles required
		lbs.	
Fine side .. ..	55,630	0.94	59,181
Coarse side .. ..	85,386	2.82	30,278

IV. Spindle requirement after allowing for yarn wastage in weaving on single shift basis—

	Fine side	Coarse side
Spindles as per above calculation .. ..	59,181	30,278
Add 2½ per cent for weaving wastage .. ..	1,479	756
Spindle requirement on single shift basis .. ..	60,660	31,034
Spindle requirement on treble shift basis .. ..	20,650	10,564
Equivalent No. of spinning frames .. ..	207	132



APPENDIX 31

*Estimated Requirement of Modern Preparatory and Spinning Machinery during the remaining period of the Second Plan and also during the Third and Fourth Plans*

Serial No.	Machinery	Total requirement during remaining 2 years of second plan period		On Order		Balance		Requirement during third plan period		Requirement during fourth plan period		Total requirement		Remarks	
		Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse		
1.	Breaker Card .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	Old machinery renovated and used.
2.	Finisher Card .. ..	96	24	48	12	48	12	14	9	20	12	82	33		
3.	First Drawing Frame ..	16	14	5	7	11	7	2	5	5	7	18	19		
4.	Second Drawing Frame ..	147	..	81	..	66	..	20	..	29	..	115	..		
5.	Finisher Drawing Frame ..	217	118	97	59	120	59	35	44	52	66	207	169		
6.	Sliver Spinning Frame ..	1,072	243	564	128	508	115	138	88	207	132	853	335		

APPENDIX 32

*Total Requirement of Modern Jute Mill Machinery,—its estimated weight and value*

Serial	Machinery	Total Nos.		Weight (in tons)		Value in Rs. Lacs.		Remarks
		Fine	Coarse	Fine	Coarse	Fine	Coarse	
1	Finisher Card .. ..	82	33	410	165	32·80	13·20	
2	First Drawing Frame .. ..	18	19	54	57	6·48	6·84	
3	Second Drawing Frame .. ..	115	..	345	..	41·40	..	
4	Finisher Drawing Frame .. ..	207	169	620	507	74·52	60·84	
5	Sliver Spinning Frame .. ..	853	335	4,265	2,010	426·50	167·50	
6	Weaving Machine (Looms) .. ..	9,178	8,428	13,765	12,640	1,376·40	1,264·20	
7	Winding Machines .. ..	350	464	350	464	79·80	105·79	
8	Beaming Machines .. ..	130	140	455	490	63·70	68·60	
				20,264	16,333	2,101·60	1,686·97	
								Total Rs. 3,788·57 lacs.

## APPENDIX 33

*Major Items of Spare Parts of Modern Drawing and Spinning Machinery being allowed to be imported*

Serial No.	Machinery	Spares allowed to be imported	Remarks
1	Drawing Frames	Front Roller Delivery Roller Boss Delivery Pressing Roller Boss. Sliver Traps P.M. Stop Motion Feelers Can Packer Slide Rod Bushes, Top and Bottom *Faller Bars .. .. Front Roller complete Delivery Roller Bosses Top Faller Cams Bottom Faller Cams Front Rulers Back Rulers Can Packer Bushes Top and Bottom. Ruler Rocker Oilite Bushes Faller Slides Sliver Trap Assemblies Top Cams Bottom Cams Delivery Pressing Roller Assembly Fallers	*The manufacture of this item has already been taken up.
2	Spinning Frames	Bottom Rollers Top Rollers Hearts Tansion Pulley Bushes N. K. Flyer Eyes Intermediate 'V' Roller Oilite Bushes. Flyers Porcelain eyes for Flyer Heads.	

APPENDIX '33—*contd.*

Serial No.	Machinery	Spares allowed to be imported	Remarks
2	Spinning Frames— <i>contd.</i>	Bottom Roller Bushes Lower and Upper. Cork Rings for Bobbin Carriers. Bottom Roller Conductors Slide Rod Bracket Bushes Top and Bottom. Slide Rods Bobbin Rail Plates Bobbin Rail Pins Large and Small. Bobbin Carriers Dead Spindles Oilite Bushes for Fluted Roller. Idler Roller Complete with Stud and Cap. Bottom Roller Bush Lower and Upper.	

## APPENDIX 34

*Estimated Annual Requirement of some Major Items of Jute Mill Stores including Motors and Starters*

Serial No.	Items	Annual Requirement in Nos.	Value in Rs. Lacs.
1.	Card and Gill Pins .. .. .	556,000,000	91.74
2.	Sliver Cans .. .. .	92,500	19.42
3.	Staves .. .. .	140,000	9.80
4.	Bobbins .. .. .	3,116,800	155.84
5.	Shutters .. .. .	102,400	14.80
6.	Electric Motors—		
	(a) 10 H.P. .. .. .	30	0.36
	(b) 15 H.P. .. .. .	250	3.62
	(c) 5 H.P. .. .. .	1,200	9.60
7.	Starters .. .. .	1,480	6.66
8.	Card Laggings .. .. .	16,630	6.48
9.	Loom Lay Blocks .. .. .	5,810	5.22
10.	Picking Arms .. .. .	88,000	2.86
11.	Pickers .. .. .	600,000	300.00
12.	Wooden Centres for Rolls .. .. .	4,000	0.08
13.	Jute Cutting Knives .. .. .	1,600	0.67
			627.13

APPENDIX 35

Statement showing Actual Production and Licensed Capacity of the Three Major Manufacturing Units

Serial No.	Names of the Manufacturers	Actual Production			Licensed Capacity				Capacity per month	Remarks
		Item	Year	Quantity (Nos)	Item					
1	The Britannia Engineering Co. Ltd., Titaghur.	Spinning	1954	6	(i) Spinning Frame	..	..	..	20	They have not yet taken up manufacture of items other than spinning frame.
		Frame	1955	11	(ii) H.S. Centrifugal Spinning Frame	..	..	..	8	
		Do.	1956	46	(iii) H.S. First Drawing Frame	..	..	..	2	
		Do.	1957	18	(iv) H.S. Second Drawing Frame	..	..	..	2	
		Do.	1958	24	(v) Modern High Efficiency Broad looms upto 254" R.S.	..	..	..	} To be manufactured against firm order	
		Do.	1959	7	(vi) Jute Spreader	..	..	..		
		(Upto May)			(vii) Roll Former	..	..	..		
2	The Lagan Jute Machinery Co. Ltd., Angus.	Do.	1956	6	80 tons of finished jute machinery (including 10 sliver spinning frames) and parts				10	They have since been permitted to manufacture more than 10 frames per month.
		Do.	1957	113						
		Do.	1958	146						
		Do.	1959	89	Spinning Frame	..	..	..		
		(Upto May)								
3	The Textile Machinery Corp. Ltd., Belghurriah.	Do.	1956	4	Spinning Frame	..	..	..	25	They have not yet taken up manufacture of items other than spinning frame.
		Do.	1957	7						
		Do.	1958	Nil	Cards (Breaker & Finisher)	..	..	..	15	
		Do.	1959	21	Drawing Frame	..	..	..	24	
		(Upto May)								

## APPENDIX 36

*Component Parts of Sliver Spinning Frames which are now allowed to be imported*

One set of parts comprising

Sl. No.	Description
<b>LAGAN</b>	
1*	1 Cylinder, comprising 5 sections complete with couplings.
2*	„ Builder Shaft Bracket Oilite Bush.
3	„ Set Mackolyte Bushes for Builder Shaft Bracket comprising 10/set.
4*	„ Set Builder Shaft coupling bolt special, comprising 6/set.
5	„ Set pressed steel supports, oil boxes and connections, complete comprising 10/set.
6	„ Set of 28 parts of top and bottom loaded Graphite Mackolyte Bottom roller Bushes.
7	„ Set of 14 parts fluted rollers oilite bushes.
8	„ Set of 14 parts of top roller bushes (Top half 'compo' oil retaining.)
9	„ Set Rack Shaft Mackolyte Bushes, comprising 11/set.
10*	„ Set of Stopper Dogs, comprising 20 dogs, 20 bobbin rail studs, 20 stopper dog studs, 20 dog pins and 20 stopper pins.
11	„ Set Special Chain Bolts and Nuts, comprising 22/set.
12	„ Set of hardened and ground steel pin rail plates, comprising 20/set.
13	„ Set Powdered Iron Bushes for Lifter Brackets, comprising 22/set.
14*	„ Set of Bright Roller Lifter Bracket tie bars, comprising 5/set.
15	„ Set of Builder Chains.
16	„ Set of Chain Runners complete with Axle and Scrapers.
17	„ Mackolyte Handle.
18*	„ Set of special hardened and ground pins for bobbin rails 40/set.
19*	„ Set of firthag steel spindles complete with base, comprising 202 spindles/set.
20*	„ Set of patent wharves, 2" diameter 'E' type, complete comprising 101/set.
21*	„ Set Ancillary Equipment for wharves, comprising box key, piecing hook, grease gun, oil pump, lubrication chart, doffing knife and two tins mercurial ointment.
22	„ Set of patented Finlayson tape drive.
23	„ Fluted Roller Oilite Bush for Frame end.
24*	„ Set Bottom Roller Traverse Motion comprising worm stud, nut for worm stud, thrust bearing for FATH (to suit RH or LH Frame).
25*	„ Set Gearing Frame and Bronze Bushes comprising 2/set.

APPENDIX 36—*contd.*

Sl. No.	Description
26	1 Set of parts for gearing frame and comprising 1 cylinder chain pinion, 1 connecting bar for roller traverse, 1 single chain for cylinders, 1 connection link for chain, 1 steel end for adjusting screw, 1 stud in twist gearing lever.
27*	„ Set of RH or alternatively LH steel covers for gearing frame end, comprising 2 sections.
28*	„ Set of aperture covers on gearing frame end, comprising 5 parts.
29	„ Set special lubricator blocks and brass Visual oil gauge.
30	„ Set of Lap Guards for gearing frame end.
31*	„ Heart for Right or Left Hand Doffing frame end.
32	„ Hardened steel heart runners complete.
33*	„ Top connecting rod and fork.
34*	„ Bottom connecting Rod.
35*	„ Stud for top connection rod washers.
36	„ Chain for Bottom Connection Rod.
37*	„ Stud of covers for doffing frame end to suit either right or left hand frame.
38*	„ Set of aperture covers, comprising 1 top roller cover, 1 bottom roller cover.
39	„ Set of parts for builder shaft comprising 1 boss plunger-1 knob for boss plunger, 1 socket, 1 spring for plunger, 1 right or left hand spring for end builder boss suitable for either right or left hand machine.
40*	„ Set of parts for Auto lock for frame and cover.
41	„ Set pressed steel idler arms complete with roller, comprising 182 pcs/set.
42*	„ Set of pressed steel breast plates and conductors (top, inter and bottom).
43*	„ Set pressed steel top pressing rollers and levers (51 RH and 51 LH).
44*	„ Set Automatic Sliver Stop Motion weight levers, fulcrum pins and stopper pins comprising 102 pcs/set.
45*	„ Set Automatic Sliver Stop Motion Detectors, Sliver Stop Motion Detectors and links, comprising 102 pcs/set.
46*	„ Set Automatic Sliver Stop Motion, Detector Link Guide, 50 pcs/set.
47*	„ Jockey Pulley Lever Pivot Bracket Stud.
48	„ Pins for Detector Lift Shaft Hand Lever.
49*	„ Stopper Pin for Detector Lift Shaft hand Lever.
50*	„ Stud for Swinging Lever Latch.
51*	„ Latch stopper stud.



## APPENDIX 36—concl'd.

Sl. No.	Description
52*	1 Seamless tube jockey roller complete.
53*	„ Set of parts for drive at doffing end, comprising 1 pin for KO Lever catch, 1 jockey pulley link stud, 1 washer for KG lever catch, 1 spring for KO lever catch, 1 handle for KO lever catch.
54	„ Axle for Bolt Tension Pulley, 2 oil retaining bushes.
55	„ Set of chains for frame drive at doffing and 2 chains/set.
56*	„ Set of covers for frame drive at doffing end (RH or LH).
57*	„ Set of parts ITI support for hinged back covers 9/set.
58*	„ Set of parts for bottom roller rubbers, comprising 15 roller rubbers.
59	„ Set of synthetic bottom pressing rollers complete with oilite bushes and sleeves.
60	„ Set of pressed steel hangers complete with Mackolyte handle and tension device.
61	„ Set ancillary, equipment comprising one set spindle setting gauge one conductor setting gauge.

## TEXMACO

- 1\* 8" Drum perigrip Brake.
- 2 D.O.C. 402 F contact Starter.
- 3 Controlled start Box.
- 4 H.V. Motor KNB 324-15 HP RPM 1460.
- 5 Cable Run for Electrical Equipment.
- 6 Dynamic Relay (Full set).
- 7\* Sub-Assy of Clutch.
- 8\* (S.A.) Sub-Assy. of Flyer.
- 9\* Cot for Pressing Boss.

## BRITANNIA

- 1\* Driving Cylinders.
- 2 Flyers.
- 3 Ball Bearings.
- 4 Ball Bearing Tension Pulleys.

\* The manufacture of these items may be progressively developed in India.

## APPENDIX 37

*Extra Items of Capital Equipments likely to be required by the Existing Units for Manufacture of new items of modern Machinery*

Serial No.	Item of Capital Equipment	Requirement	
		Nos.	Value (in Rs. lacs)
<b>MACHINE TOOLS</b>			
(a)	Lathes-Capstan, Turret, Automatic etc. ..	23	11.50
(b)	Shapers, Planers, Slotters, Keo-Seaters, etc. ..	12	8.00
(c)	Milling Machines—Plain, Universal, Plano-miller and Production-miller etc... ..	20	10.50
(d)	Grinder—Plain, Cylindrical, Centreless, Plano Grinders, Rotary Grinders, Tool and Cutter Grinders etc. .. ..	9	7.75
(e)	Gear Cutting Machines .. ..	8	4.50
(f)	Sheet Metal Cutting Machines .. ..	5	1.75
(g)	Special Purposes Machines .. ..	27	13.00
		104	57.00

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