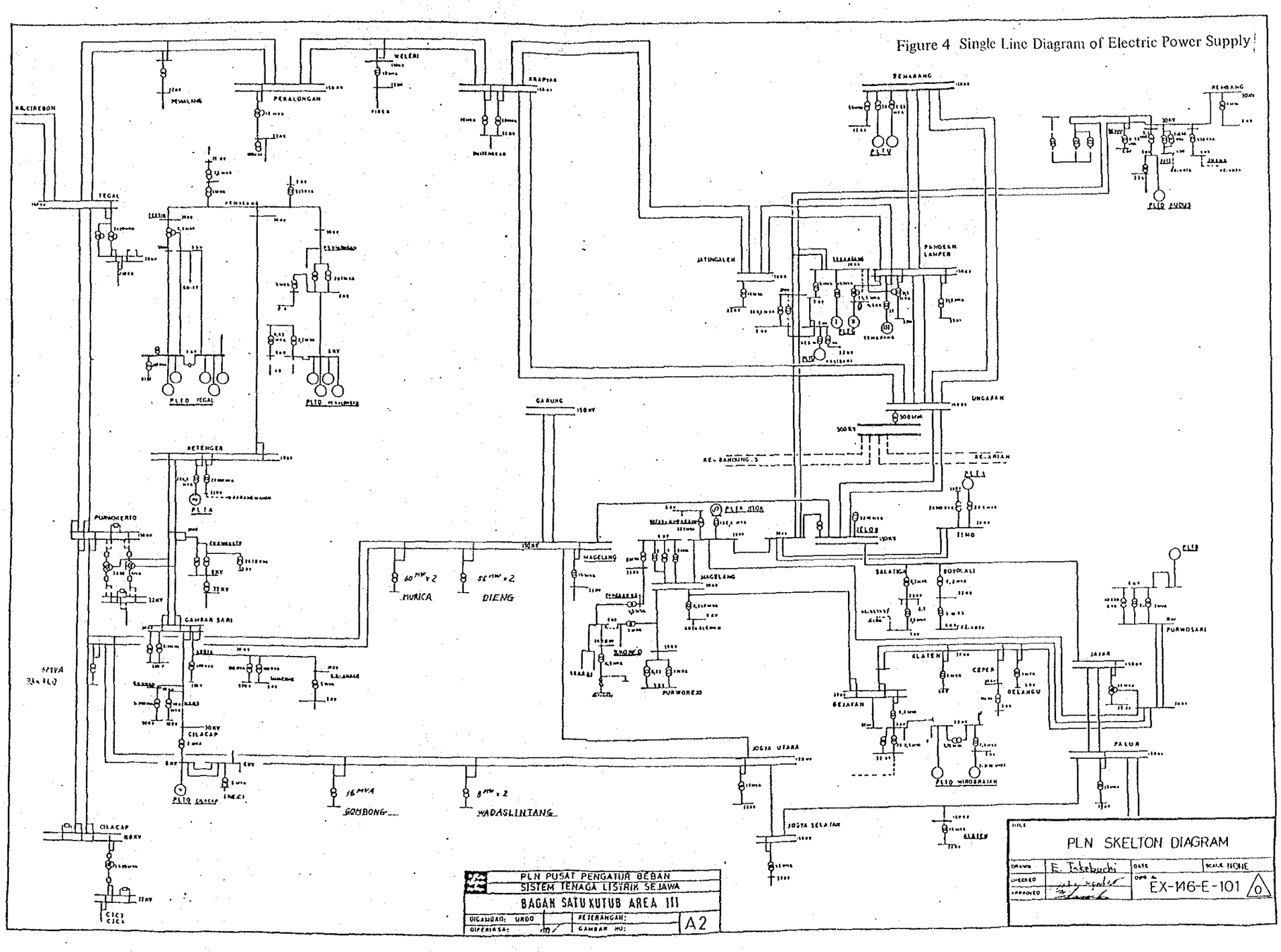
Figure 4 Single Line Diagram of Electric Power Supply



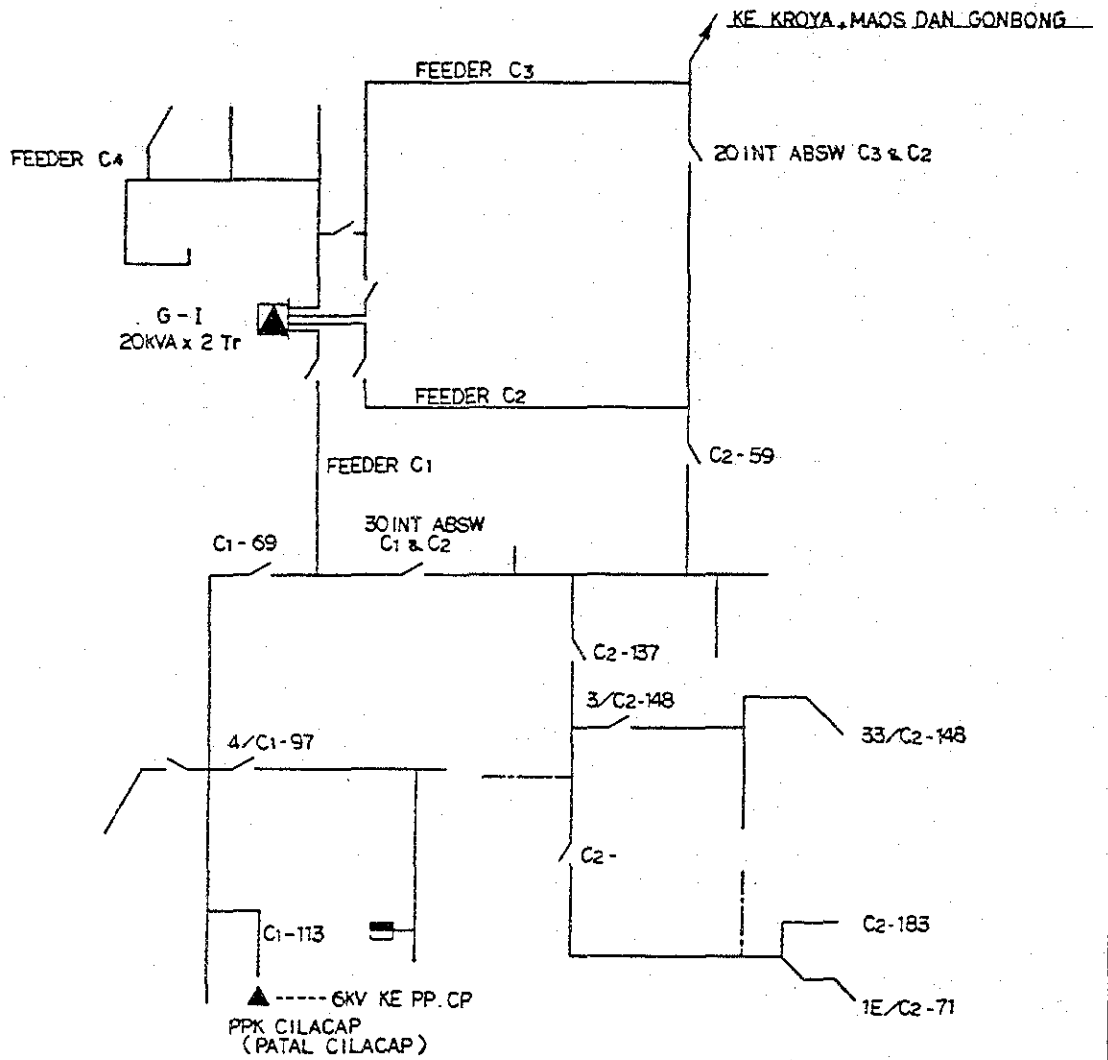


Figure 5 Distribution Line

TITLE	DISTRIBUTION LINE 20KV CILACAP
DRAWN BY E. Takeuchi	DATE 20. SEP. 1984 SCALE NONE
CHECKED BY	DWG. NO. EX-146-E-102
APPROVED BY	

1-4-2 Water Resources:

Present Cilacap spinning mill is taking all of its required water such as industrial and drinking water from well.

Cilacap spinning mill is situated on the tip of a peninsula-like land which is in between Danang river and seashore, protruding like a tongue into the sea. Being distant from the mountain area, source of land water, which changes into underground water, is not abundant. Already it is considered that into well water near to the sea some amount of salt water is admixed and 2–3 wells are found to be with chlorine ion density of over 100 ppm. Rate of taking out underground water is less than 6 m^3 per hour from rather small-sized wells of less than 20 meters depth. However, we consider that in the end this method should be better than other methods such as taking water from deep well, river or water supply. Examination of underground water reveals that the water has characteristics of volcanic ash plateau and shallow well, which means that it has high density of alkari and high hardness, as well as much of cilicic acid.

In addition, being shallow wells much consumption of potassium permanganate byorganic matters is observed. From viewpoint of using this water, attention must be paid to use of heat exchanger, scales at boiler and corrosion by alkari, and for use as drinking water, improvements are required in connection with excluding microorganism and betterment in taste. Well water using situation at places other than Cilacap spinning mill is that at Pertamina Cilacap oil refinery, 350 m^3 of water is pumped up at maximum from 8 positions of 6 m depth shallow well, which is used as supplementary water for cooling tower.

In addition, it is said that 2–3 positions of shallow wells are used at Nusantara cement factory. All of these are rather new wells dug in 1980s. On top of these it seems that there are manually dug wells of private use from old times, however their extent remains unclear.

With development of industries and improvements in people's living, consumption volume of water increases with resultant increase in consumption of underground water, and consequently securing high quality underground water for Cilacap spinning mill would be made more difficult in future.

With the above mentioned background, with a purpose of reorganizing urban environments, a water supply construction work has been underway since 1977 when study for the purpose has commenced by a consultant from Australia. As from March, 1984 a charge system has been established and published and in some areas, supply of clean water has been commenced. The original source for the water supply is taken from up-stream of Serayu river and supplied after cohesion and precipitation process. Its supplying capacity is about 200 liters per second, of which 10% is estimated to be supplied for industrial purposes. As the result of expanding water supply system, it is considered that in future pumping up water from wells will be restricted and economic superiority of the well will be lost.

When the water problem is considered particularly in respect of Cilacap spinning mill, currently it has no alternative but to depend on well water as water supply piping is not yet installed for the mill, as well as by economical reason.

2 STUDY OF MARKETING AND DISTRIBUTION

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2 Study of Marketing and Distribution:

2-1 Marketing Area:

2-1-1 Domestic Market:

The area of Jave island covers only 6.9% of the whole area of Indonesia. However, in this island which is the political and economical centre, much population and industries concentrate.

Jave island, with its mild climate and fertile land, has become densely populated from the old time, bringing about the industrial prosperity. The excessive concentration of the population and industries in Java island, however, has become an issue and the 4th 5-year plan started in April, 1984 stresses the policy for immigrating people to the other islands than Java and industrial development there more than it was done in the 3rd 5-year plan.

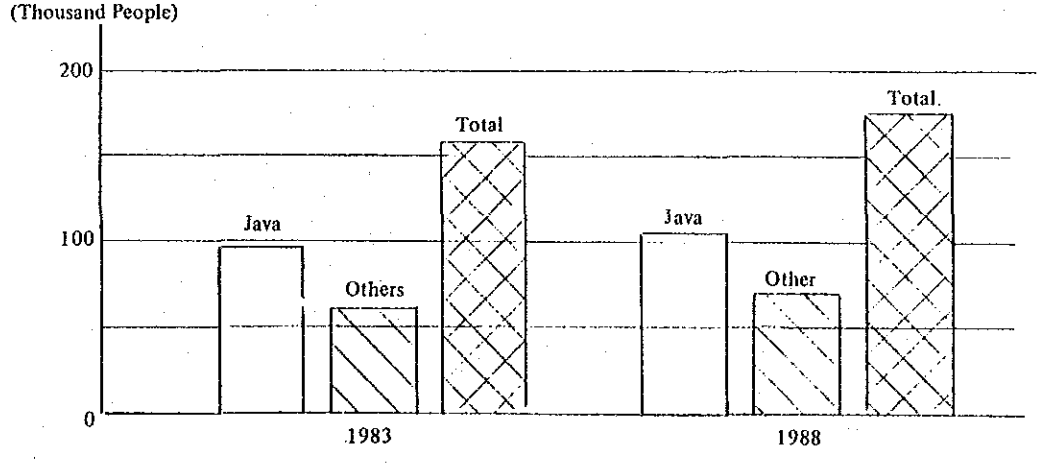
Table 1 and Diagram 1 indicate share of the population in the whole Indonesia, as well as comparison of the population in 1983 for the last year of the 3rd and in 1988 for the last year of the 4th 5-year plan.

Table 1 Comparison of Population in Java Island and Others

Item / Island	Population				Area	Population Density (men/km²)		
	1983		1984					
	Million people	%	Million people	%	1,000 km²	%	1983	1988
Java Island	96.9	61.3	106.0	60.4	132.2	6.9	733	801
Other Islands	61.2	38.7	69.6	39.6	1,787.2	93.1	34	39
Whole Indonesia	158.1	100	175.6	100	1,919.4	100	82	92

(Source; 4th 5-year plan)

Figure 1 Comparison of Population in Java Island and Others



Among other things, concentration of spinning industries in Java island is remarkable. As is known from Table 2 and Disgram 2, Java island occupies 96% of the total registered number of spinning spindles.

The concentration of the textile industry including the spinning on Java island can be understood by the beneficial condition she holds for the spinning mills of larger textile consumption than other islands due to more population and her humid climate.

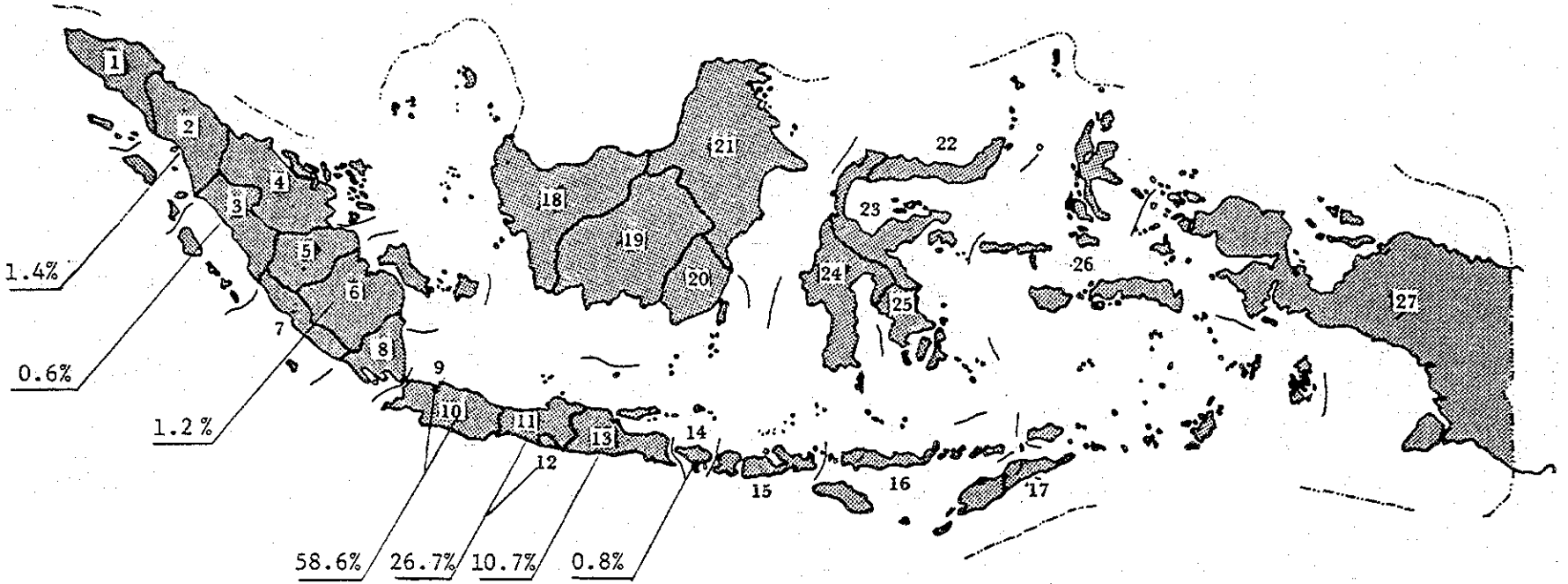
Table 2 Number of Spinning Spindles by Area (1984)

Area	No. of Mills	Spinning Equipment	
		No. of Spindles	%
Java Island	(79)	(2,444,586)	(96.0)
Jakarta	8	262,634	10.3
Western Java	44	1,230,896	48.3
Central Java	17	670,116	26.7
Eastern Java	10	271,940	10.7
Bali Island	1	20,400	0.8
Sumatera Island	(4)	(80,784)	(3.2)
Northern Sumatera	2	36,000	1.4
Western Sumatera	1	14,400	0.6
Southern Sumatera	1	30,384	1.2
Total	84	2,545,770	100

(Source: Indonesian Spinning Association)

Therefore, when considering the domestic marketing area, the consideration on Java island which occupies still more than 60% of the total population and the center of politics and economy of Indonesia should suffice for the purpose. Indonesia, with her area for 5.5 times of Japan and about 1.3 times of Japanese population, is itself a big market, which by her growth in future population and levelling-up of the living standard, will increase her textile consumption more and more.

Figure 2 Ratio of Number of Spindles by Area



Keterangan/Note:

1. Daerah Istimewa Aceh	10. Jawa Barat	19. Kalimantan Tengah
2. Sumatera Utara	11. Jawa Tengah	20. Kalimantan Selatan
3. Sumatera Barat	12. Daerah Istimewa Yogyakarta	21. Kalimantan Timur
4. Riau	13. Jawa Timur	22. Sulawesi Utara
5. Jambi	14. Bali	23. Sulawesi Tengah
6. Sumatera Selatan	15. Nusa Tenggara Barat	24. Sulawesi Selatan
7. Bengkulu	16. Nusa Tenggara Timur	25. Sulawesi Tenggara
8. Lampung	17. Timor Timur	26. Maluku
9. DKI Jakarta	18. Kalimantan Barat	27. Irian Jaya

2-1-2 Overseas Market:

From viewpoint of the national policy, it is more and more required that Indonesia's participation in the overseas market is strengthened.

In the 4th 5-year plan, the emphasis is placed on Indonesia's breakaway from dependence on the excessive oil export, employment and settlement of investment resource problems.

The main points in the policy are;

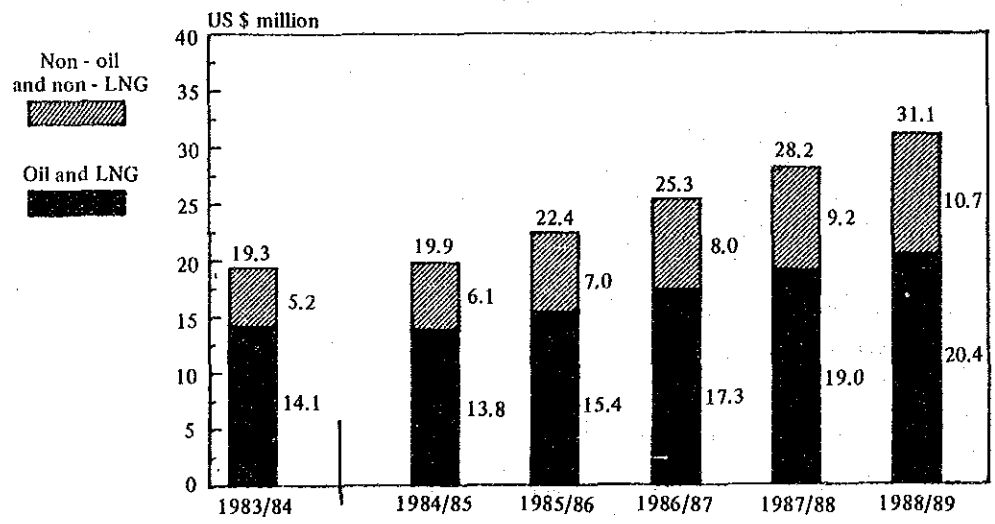
1) Arranging infrastructures such as marine transportation and communication.
2) Promotion of non-petro products exports such as light industrial products.
3) Bringing-up of minor enterprises.
4) Reinforcements for education and vocational training.

Table 3 and Figure 3 indicate export results of the petro and non-petro products and their targets.

Table 3 Gross Value of Exports (FOB) 1983/84 ~ 1988/89

Item	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	Average Rate of Growth (%)
	(US$ million, current prices)						
Oil and LNG (Gross)	14,140	13,825	15,424	17,317	19,008	20,363	7.6
1. Crude oil and Oil Products	11,861	10,644	11,873	13,463	14,664	15,766	5.9
2. Liquified Natural Gas	2,279	3,181	3,551	3,854	4,344	4,597	15.1
Non-oil and non-LNG	5,170	6,050	7,009	8,015	9,215	10,753	15.8
1. Agricultural Products	2,597	2,859	3,123	3,395	3,717	4,160	9.9
2. Mining Products	652	740	841	963	1,066	1,166	12.3
3. Manufactured Products	1,921	2,451	3,045	3,657	4,432	5,427	23.1
TOTAL EXPORTS	19,310	19,875	22,433	25,332	28,223	31,116	10.0

Figure 3 Gross Value of Exports 1983/84 ~ 1988/89



The share of the non-petro products in the total export amount will be increased from 26.8% for 1983/84 period to 34.6% for 1988/89 which is 5 years later. In terms of the amount, against a growth of annual average of 7.6% for the petro-products, the non-petro products shows a growth as large as 15.8% annually. Further, out of $10.8 billion non-petro products export plan, $5.4 billion is for export of the industrial products and it is said that the success of the 4th 5-year plan depends on whether this target could be attained or not. The export items on which the government is most dependent are 9 items (rubber, textile, marine products, lumbers and plywoods), and accordingly their expectation for the textile export is high. Due to giving incentive to the exports by the government, the export of the textile products has increased rapidly from 1983. Study on 1983/84 period reveals that the export amount in this period was $2.9 billion, of which growth rate against the preceding year is 193% (by data from the Industrial Ministry). However, the maker who can export textile products is only some of those who are joint ventures with foreign enterprises, and there is almost none of local maker exporting. Products with high quality and low cost fully acceptable in the overseas markets contribute to increase in exports and become indispensable condition for achieving the 4th 5-year plan.

Up to this moment, the supplying capacity for the textile products is consumed fully by the domestic demand, which unless further outlet is found at exports, more larger expansion of the textile industry in future can not be expected. In future, more attention must be paid to the exporting markets in order that foreign currencies are to be accumulated and the textile industry is to be developed, for which aim the cooperation between official and private sectors could result in expansion of the textile export.

2-2 Demand Analysis:

2-2-1 Population Index and Growth Rate by Sector in the 4th 5-year Plan:

Table 4 indicates the population index shown in the 4th 5-year plan.

Table 4 Population Index

Item \ Year	1983	1984	Remarks
Total Population	158.1 million	175.6 million	Annual increase rate: 2.1%
Java Island	69.6 million	106.0 million	1.8%
Other Islands	61.2 million	69.6 million	2.6%
Birth Rate	33.8 persons	29.8 persons	for every 1,000 people
Mortality Rate	11.7 persons	10.1 persons	for every 1,000 people
Average Lifetime	56 years	59 years	increment by 3 years
Working Population	63.5 million	72.8 million	increment by 9.3 million

In the 4th 5-year plan, an emphasis is also placed on creation of employment opportunities, where the new working power of 9.3 million generated by investment into the labour-collective sectors in industries over the period of the 4th 5-year plan is designed to be absorbed.

For this reason, employment protection for those employees working in the existing fac-

tories is also important. The textile industry is in particular labour-collective, therefore, if there is any enterprise which is not profitable, that enterprise must try to improve itself and endeavour to secure the employment.

Up to the present time, the population has been increasing at an annual rate of 2.3%, and in the 4th 5-year plan, it is estimated that the population will grow at 2.1% rate for the whole of Indonesia and at 1.8% for Java island where population density is high.

The recession of Indonesian economy keeping on from the latter half in 1981 has not yet shown a sign of recovery without indicating increment in the domestic demand, and it is said that the textile consumption per head remains constant in recent years. However, the population growth from 1983/84 period to 1988/89 period is by 11% or 17.5 million, by which, if estimated the textile consumption per head at 14 m, the increment in the demand will be 250 million meters.

Table 5 shows the growth rate per sector in the 4th 5-year plan.

Plan / Sector	3rd 5-year (result) (Apr. '79 ~ Mar. '84)	4th 5-year (plan) (Apr. '84 ~ Mar. '89)
Agricalture	3.5%	3.0%
Mining	4.0%	2.5%
Industry	11.0%	9.5%
Construction	9.0%	5.0%
Transport & Communication	10.0%	5.2%
Others	8.1%	5.0%
Total	6.1%	5.0%

The growth in the general domestic products (GDP) is annually 5.0% on an average, where the industry represents as high as 9.5%.

When the level of living condition is expected to be more than the equivalent level of the GDP growth rate, the growth in textile consumption for the nation is considered to be more than 5%.

Therefore, owing to increment in the population and levelling-up of the living standard, the textile consumption volume is expected to increase to more than 2.1% + 5% = 7.1%.

2-2-2 Actual Textile Production and Growth Target:

On Table 6, produced result in 1983/84 period and a production plan for 1988/89 period are shown, however, the future growth in weaving yarn (spun yarn) is estimated to be as low as 5% annually (weight ratio) there. On the other hand, for the other items including fabrics and apparrels, a growth target of more than 5% annual rate (length ratio) is assigned (these are irrelevant figures each other, which considering trend of thinner spun yarns and clothes in future, production volume of the spun yarn should be larger).

Table 6 Actual Textile Production and Growth Target

Item \ Year & Rate	1983/84 period (Actual)	1988/89 period (Planned)	Growth Rate	Remarks
Weaving Yarn (1,000 bales)	1,540	1,740	2.5%	Taken from the 4th 5-year plan.
Fabrix (million meter)	2,130	2,860	6.1%	
Garment (1,000 dozen)	20,300	26,000	5.1%	
Weaving Yarn (1,000 bales)	1,540	–	–	Taken from data of the Industrial Ministry
Fabric (million meter)	2,347	*3,303	7.1%	
Garment (1,000 dozen)	22,300	–	–	

Breakdown of the weaving yarn is:

Cotton yarn	32%
Polyester/cotton blended yarn	35%
Polyester/rayon blended yarn	20%
Rayon yarn	6%
Polyester yarn	2%
Acrylic yarn	4%
Others	1%
Total:	100%

Breakdown of woven cloth is:

Shirting	78%
Suiting	10%
Interior	7%
Others	5%
Total:	100%

Majority of the yarn and woven cloth is composed of various kinds of blended yarns and shirting respectively.

2-2-3 Situation of Textile Export:

Table 7 indicates situation of the textile exports for a period from 1979 to 1983, which was obtained from the Industrial Ministry.

Table 7 Export Reqults of Textile Products

(Unit: ton)

Item \ Year	1979	1980	1981	1982	1983
Fiber	200	269	270	661	675
Yarn	1,597	992	507	296	5,403
Fabrics	880	4,996	4,854	6,682	25,757
Garment (including Batik)	4,333	6,544	12,820	16,284	22,430
Others	234	807	467	505	2,178
Total	7,244	13,608	18,918	24,428	56,443

Volume of export effected in 1983 has increased by 135% against the preceding year, which indicated a sharp increment.

The cause for this sharp increment is the devaluation of Rupee's in March, 1983 and the government's export promotion policy, however, on the other hand, recession in the domestic market has also contributed to the result. Against this sharp increment in exports, an apprehension over the import restriction on the side of the importing countries is looming up, which is making the export environment more strict.

Although it is required in the national policy to increase in volume of the exports, we assume that the same ratio of domestic versus overseas demands in 1983 will prevail also in future.

2-2-4 Analysis of Future Demand

In the 4th 5-year plan, fabrics production is estimated to be 3,303 million metres in 1988 (an increment in 41% against 2,347 million metres in 1983). This increment means annual production increment rate is 7.1% and this rate is of same of figure as estimated increment ratio of domestic demand. In other words, if annual increasing rate for export demand can attain 7.1%, the 5-year production plan can be satisfied. This moderate increment rate would be reasonable from the viewpoint that the successful results of export in 1983 attaining 135% increase of the previous year could not be repeated again when considering very severe environment of textile export owing to narrow gate for textile goods to be imported and multiplying restriction to import at developed countries.

It would not be out of place to consider that both internal and external demands for textile goods will keep on increasing at the abovementioned rate on the basis of actual results in 1983.

The demands for spinning yarn which always follows the demand of fabrics is expected to be equal to 7.1% annually.

2-3 Supply Analysis:

2-3-1 Situation of the New and Additional Installations of Spinning Facilities:

As seen in Table 8, the facilities had been increasing from 1971, of which number of spindles installed had reached to 1,724,072 in 1978/79 period, the final year for the 2nd 5-year plan. The increased number of spindles increased over the period of the 2nd 5-year period was 994,452, while the increment in number of spindles over 1979/80 to 1983/84 period of the 3rd 5-year plan was 821,698, which indicated a sharp increase of about 3.5 times over 10 years period from 729,620 spindles in 1973/74 period to 2,545,770 spindles in 1983/84 period.

Supported by this sharp increment, the production volume has also drastically increased, which now reached to a point where the supply will exceed demand. The times when mere production would make money has already passed, and now it came to a point where the quality and cost decide. Also, facilities for weaving and processing works to follow the spinning facilities have increased sharply.

Only materials of polyester, fiber and rayon to be supplied to the spinning facilities are now tight in the supply. Additional installation of the spinning facilities in future should be effected with a severe discretion paid to the demand situation, and in addition, repairs and replacements for the old facilities will be required in future.

Table 8 INCREMENT RESULT IN SPINNING EQUIPMENT

YEAR	TARGET			BEALIZATION		
	PELITA I (1st Plan)	PELITA II (2nd Plan)	PELITA III (3rd Plan)	NUMBER OF SPINDLE	INCREASE	
					SPINDLE	%
1967 ∿ 1968	-	-	-	481,780	-	-
1968 ∿ 1869	-	-	-	481,780	-	-
1969 ∿ 1970	-	-	-	481,780	-	-
1970 ∿ 1971	-	-	-	481,780	-	-
1971 ∿ 1972	-	-	-	552,468	70,688	14.67
1972 ∿ 1973	-	-	-	631,284	70,816	14.26
1973 ∿ 1974	825,000	-	-	729,620	98,336	15.57
1974 ∿ 1975	-	825,000	-	869,660	140,040	19.19
1975 ∿ 1976	-	912,000	-	1,238,500	368,840	42.41
1976 ∿ 1977	-	1,300,000	-	1,394,268	155,768	12.50
1977 ∿ 1978	-	1,400,000	-	1,573,224	178,956	12.83
1978 ∿ 1979	-	1,705,000	-	1,724,072	150,848	9.58
1979 ∿ 1980	-	-	1,745,000	1,776,046	51,974	3.01
1980 ∿ 1981	-	-	1,820,000	1,923,044	146,998	8.27
1981 ∿ 1982	-		1,940,000	2,227,910	304,866	15.85
1982 ∿ 1983	-	-	2,060,000	2,404,522	176,612	7.93
1983 ∿ 1984	-	-	2,200,000	2,545,770	141,248	5.87

2-3-2 Situation of Import:

Owing to problems in import customs tariff, the import volume of the textile products is on a decreasing trend in these years, and import for the general use textile products is considered to be next to none.

The imported products include high-class garments, interior wares, wide bed sheets and towels, however, in all textile products it keeps only low ratio, while on the other hand, almost all of the raw materials for textile are actually dependent on the import.

However, the domestic production of the related raw material for synthetic fibers is already incorporated in the 4th 5-year plan, and currently its domestic production is supplying up to 5% of the total consumption.

Further, increment in planting area for the cotton has been designed, with which an attitude trying to settle problems in raw material supply can be seen. From this point of view, it should be sure that in future, the amount of import including raw materials for the textile will be gradually decreasing.

2-4 Analysis of Demand and Supply:

In respect of demand and supply in future, the growth in demand will be 7.1% annually in accordance with demands in domestic and overseas fields, and if assumed that no import is effected, the domestic output is considered to grow at annual rate of 7.1% (growth from 1983/84 period to 1988/89 is assumed to be about 41%).

The number of the installed spindles in 1983 is shown as 2,546,000 registered according to the data from Indonesia Spinning Association, however, the operable number or actually engaged number of spindles is considered to be 2,464,000 (according to the data from the Industrial Ministry), and further, the actually operating spindles are thought to be 2,300,000. In fact there are some mills here and there where a part of there spinning facilities is suspended from operation due to shortage of spare parts and breakdown of the facilities for a long period.

In the years 1988/89 when the 4th 5-year plan will be terminated after 5 years from now, the installed number of spinning spindles, if simply calculated by the registered numbers of 2,546,000 spindles, would be 3,590,000, adding up by 1,040,000 spindles. If calculated by the actually operating numbers of 2,300,000 spindles, it would be 3,240,000 spindles, adding up by 940,000 spindles. Furthermore, there are about 500,000 spindles of old facilities made in 1950s and 1960s, and in future demolishment of these non-efficient and old facilities and introduction of the new and highly productive facilities will be required.

When considering replacement of the old facilities into the new ones and levelling-up of performances in the old facilities as the result of the renovation, the number of spindles to be newly purchased is deemed to be 600,000 – 800,000 spindles, and the total installed number of spindles (actually operating number of spindles) is assessed to be 2,700,000 – 2,900,000 spindles.

2-5 Merchandising Plan and Prices:

As a spinning mill, if it in the first place tries to produce yarns of high quality acceptable at the overseas markets, to raise the selling price by sales of yarns for the export fabrics and knit products, and to rationalize the mill to keep the cost at an appropriate level, then the competitive power can sufficiently be maintained.

Furthermore, if in Sandang II group, a system can be established by which the fabrics of high quality are produced with yarns of high quality to be sold to the overseas markets as grey cloth, then it would no doubt contribute to the profitability.

As the merchandising plan, from the above viewpoint, the high quality yarns for most general use and with most volume in distribution should be mainly produced, with the capacity reserved partially for production of the yarn numbers with high profitability.

Categories of yarns and selling prices under this project can be determined as follows;

Cotton Combed Yarn, 30's	Rp 757,000/bale
Cotton Combed Yarn, 40's	Rp 771,000/bale
Cotton Combed Yarn, 60's	Rp 990,000/bale
Polyester/cotton 65/35 Blended Yarn	Rp 690,000/bale
Polyester/cotton 48/52 Blended Yarn	Rp 815,000/bale

As the yarn is dependent on the market situation, it is of course required that the production should be changed partially to a kind of more profitable yarn depending on the market situation.

For determining the proce, we have adopted the local quotation for the 1st grade product in Indonesian domestic market as at August, 1984.

2-6 Contributability and Competitiveness of This Project

The execution of this project for Cilacap Mill which is the only mill in 10 mills owned by the government-run Sandang II spinning group, which is now running into red figures, is in fact very appropriate.

By using all of the existing buildings and a part of the existing facilities, the investment amount required will be less than the requirement when a new mill is constructed, and the construction period required can be considerably shortened. In addition to this, by being able to have the experienced workers participated in this project, it is deemed that the renovation works and operation will progress smoothly.

Moreover, by raising the profitability level, the worker's worry over the employment can be removed, and further, by being a successful model in the total Sandang II group, it can pave the way for modernizing other mills than Cilacap Mill.

Now the local makers have not yet reached to a stage where they can produce yarns of high quality acceptable to the overseas markets, therefore, it may well be considered that the yarns being produced by them are all for the domestic market. Consequently, it is considered that the competition between the mill aiming at producing spun yarns for production of textile products for export, and the local makers will be less. Yet, the competition with the joint venture companies with foreign countries can be possible as these companies are supplying spun yarns for production of fabrics and knit wears for export. However, as major joint ventures are in many cases operating through production of spinning, fabrics and processing in chain, which means there is possible competition, but for the time being, the extent of the competition is considered to be less. It is needless to say that as the export environment improves, export volume will increase and the competition will decrease.

3 STUDIES ON RAW MATERIALS

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- 3-1-2 Notes for Use 3-1

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3 STUDIES ON RAW MATERIALS

3-1 Quality Characteristics of Raw Cotton:

As almost all volume of cotton used in Republic of Indonesia is American cotton, our explanation hereafter is based on American cotton.

3-1-1 Quality Analysis per Grade:

The following are natures of cotton and basis for grading cotton:

1) Grading is mainly determined by visual observations, where tint, leaves and preparation are synthetically checked based on appearance.
Table 1 indicates relationship between grades and tints.

2) As for grading for staple length, both visual and touching observations are used, where staple is taken from sample and its representative part is compared with staple type of the approved standard to obtain the grade.
Table 2 indicates general relationship between this staple length and possible spinning yarn counts.

3) By the character, those elements belonging neither to grade nor staple are meant, of which major items are as follows;

- Fineness
- Maturity
- Tensile Strength
- Uniformity of Staple Length

Table 3 shows appraisal standard.

3-1-2 Notes for Use:

It is needless to say that in order to produce high quality yarns in a spinning factory, selection of the raw cotton is the most important factor. In a spinning factory, the accepted raw cotton should be checked by acceptance tester and appropriate use of them according to production categories in respect of checked grade, staple length and character should be required.

On the other hand, spinning condition of production machine should commensurate with the using raw cotton, however, reversely there may be such cases where the raw cotton should be choiced in accordance with specifications of the production machines. In addition to the above, there are following problems which are apt to occur in the factory:

1) Admixture of Foreign Staple:
There are such case where foreign staples such as waste cloth, colored waste thread and chaffs are admixed.
Sometimes, it is found that metal objects such as iron chips, nails, bolts and nuts are included. Therefore, it should be required that these foreign objects are removed with utmost care when raw cotton is fed.

2) Honeydew:

Very frequently this causes roller lapping in factory. In many cases, honeydew is in forms of fine grains in brown, dark green and black colors and is in a condition permeating into staples.

If this honeydew is found before use of the raw cotton, possible troubles in the subsequent processes should be avoidable in advance.

3) Immature Cotton:

Yarns spun from cotton including much of immaturity are inferior in yarn evenness and tensile strength and at the same time frequently cause roller lapping troubles. There is a method of judging quality of raw cotton to some extent by measuring sugar content in the raw cotton, however, the cotton, fineness of which is extremely finer than that of same kind of other cotton through staple measurement by Micronaire method are considered to be immature cotton.

3-2 Analysis of Buying Price for Raw Cotton

Prices of cotton are fluctuating as market values, where leading index is the cotton quotation in New York.

3-2-1 Fluctuation in Raw Cotton Quotation:

Cotton quotations fluctuates very largely by output volume of raw cotton over the world, demand/supply situation for textile products and choice of consumers toward cotton products, however, currently the quotation is comparatively stabler in the latter half of 1984 as compared with it in former half of the year. It is said to be the result of Chinese cotton increasing in output and exports, however, in Indonesia, though small in quantity, Chinese cotton is now being used while so far it was not seen in Indonesia.

Table 4 indicates near-term quotation of cotton in New York.

3-2-2 Buying Price:

The prices of raw cotton now being purchased consist of the price for direct import at every shipping, and that for those supplied through domestic traders in Indonesia.

Table 5 shows their results.

Prices in Table 6 are set on an assumption that using cotton in the renovation project is all imported American cotton. In fact, it is probable that the prices may fluctuate by importing season, however, the set prices are indicated rather higher as compared with future quotation of the cotton.

3-3 Polyester Fiber and other Raw Materials:

3-3-1 General Description of Polyester Fiber:

The reason why polyester fibers became to be produced and consumed in large quantity is attributable to its superior performances, which is extremely superior as the general spinning fibers in the following points;

1) Tensile Strength: It is far stronger than other acrylic fibers, and only second to nylon in respect of durability. Particularly, unchanged tensile strength in both dry and humid conditions is the characteristics of this fiber.

2) Anti-abrasiveness: Second to nylon, it has very higher anti-abrasiveness as compared with natural fibers and acrylic fibers.

3) Absorbabilities for Humidity and Water: With water content ratio of 0.4% at 20°C. and 65%RH, it is considered to be almost nil absorbent of humidity. Also it is less absorbent of water and dries fast when got wet.

4) Crease-preventiveness: Recoverability of crease is extremely superb in this fiber, which is more superior to wool under wet condition at high humidity.

5) Sense of Touch: With elasticity and warm when clad, its woven fabrics are very comfortable when clad.

6) Heat-proofness: This fiber has the most efficient properties in this respect among various synthetic fibers, and its softening point is at 259 ~ 263°C.

7) Chemical-proofness: This fiber is generally resistant to chemicals, and especially resistant to acids.

8) Mold/Worm/Bacteria-proofness: This fiber is resistant to all of mold, worm and bacteria.

9) Heat Setting: Once heat-set, this fiber does not change its shape. Consiquently, this fiber does not shrink, wrinkle, or elongate, and keeps good stability for ruffles, and further, easy for washing and keeps good shape.

10) Mix Spinning Capability with Other Fibers: This fiber has good mix spinning capability with other fibers, which by being mix-spun with any of other fibers, assists to encourage characteristics of other fibers mix-spun.

11) Electrical Properties: This fiber has good insulation properties for the electricity.

In many cases, raw yarns are produced to be used for twills for uniforms and for poplins for shirt clothes, by mix-spinning polyester fibers having aforesaid characteristics together with cotton.

As the standard, physical specifications of polyester fibers to be used is as follows:

Denier	1.4 ~ 1.5D
Variation Ratio of Denier	±5%
Cut Length	38 mm
Percentage of Deviation for Cut Length	±5%
Dry Strength	More than 6.7 g/d.
Dry Elongation Percentage	25.5 ± 4%
25 mm Crimp Count	14 ± 2.5%
Oil Attachment Percentage	0.11 ± 0.05%
Melting Point	262 ± 5C.
Water Content Ratio (at standard condition)	0.4%

3-3-2 Supply Source and Production Capacity:

Although it is thought that due to increment in facilities since 1982, except for the special materials, fibers other than cotton and acrylic fibers are domestically supplied in Indonesia in 1984, however, actually they are still in short supply and the market is in favour of the sellers.

If it is assumed that from now on still 5 ~ 10% consumption increment keeps on, the supplying capability is considered to fall in short considerably, therefore, increment in productive facilities for polyester fibers and rayon fibers would positively be planned.

Current supply sources and supplying capability for fibers being supplied to factories of cotton-spinning type are shown in Table 7, however, the current demand volume of these fibers is estimated as per below:

Polyester Fiber	200 ton/day
Rayon Fiber	100 ~ 105 ton/day

3-3-3 Buying Price:

Actual results of prices for domestically-made fibers now being purchased are as per the Table 8.

For renovation plan, only polyester fiber is purchased and used, of which price is now set as Rpl, 835/kg (Grade A 1.4 ~ 1.5D x 38 mm cut)

3-4 Disposal of Waste:

3-4-1 Kinds of Waste and Disposal Method

In Table 9, kinds of waste originating form each machine during spinning production processes, as well as disposal methods for them are shown. In order to achieve cost saving by improving yield of raw cotton, re-cycling use as far as possible is required.

It is required to try to cut volume of waste threads originating from winder as less as possible, however, generated wastes are better to be used for polishing machines for maintenance.

3-4-2 Selling Price:

There are collectors of wastes, to whom the wastes can be sold at the prices shown in Table 10.

Table 1 Grades of American Cotton and Code Numbers for Tint

Color Codes	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grades	PLUS	WHITE	LIGHT SPOTTED	SPOTTED	TINGED	YELLOW STAINED	LIGHT GRAY	GRAY
(0) Strict Good Middling		(01) SGM						
(1) Good Middling		(11) GM	(12) GM Lt Sp	(13) GM Sp	(41) GM Tg	(15) GM YS	(16) GM Lt Gray	(17) GM Gray
(2) Strict Middling		(21) SM	(22) SM Lt Sp	(23) SM Sp	(24) SM Tg	(25) SM YS	(26) SM Lt Gray	(27) SM Gray
Middling Plus	(30) M Plus							
(3) Middling		(31) M	(32) Mid Lt Sp	(33) Mid Sp	(34) Mid Tg	(35) Mid YS	(36) Mid Lt Gray	(37) Mid Gray
Strict Low Middling Plus	(40) SLM Plus							
(4) Strict Low Middling		(41) SLM	(42) SLM Lt Sp	(43) SLM Sp	(44) SLM Tg		(46) SLM Lt Gray	(47) SLM Gray
Low Middling Plus	(50) LM Plus							
(5) Low Middling		(51) LM	(52) LM Lt Sp	(53) LM Sp	(54) LM Tg			
Strict Good Ordinary Plus	(60) SGO Plus							
(6) Strict Good Ordinary		(61) SGO						
Good Ordinary Plus	(70) GO Plus							
(7) Good Ordinary		(71) GO						
(8) Below Grade		(81) BG	(82) BG	(83) BG	(84) BG	(85) BG		(87) BG
		Below GO	Below LM Lt Sp	Below LM Sp	Below LM Tg	Below Mid YS		Below SLM Gray

Table 2 Relationship between Staple Length and Possible Spinning Yarn Count

Staple Length	Carded Yarn		Combed Yarn	
	Warp	Weft	Warp	Weft
Up to 1	Up to 28.5	Up to 36.5	-	-
Up to 1.1/8	-	-	Up to 30.5	Up to 40.5
1.1/8 ∿ 1.1/4	30 ∿ 50.5	40 ∿ 60.5	30 ∿ 60.5	40 ∿ 70.5
1.1/4 ∿ 1.3/8	50 ∿ 75.5	60 ∿ 80.5	60 ∿ 70.5	70 ∿ 100.5
1.3/8 ∿ 1.1/2	50 ∿ 75.5	60 ∿ 80.5	70 ∿ 80.5	100 ∿ 120.5
1.1/2 ∿ 1.5/8	75 ∿ 100.5	80 ∿ 120.5	150 ∿ 100.5	120 ∿ 150.5
1.5/8 ∿ 1.3/4	75 ∿ 100.5	80 ∿ 120.5	100 ∿ 180.5	150 ∿ 180.5
More than 1.3/4	-	-	150 ∿ 300.5	150 ∿ 300.5

Table 3 Appraisal Standard on Quality of Raw Cotton

(1) Characteristics of Staple Length

Uniformity of staple length M/UHM (Servo type)

Extremely uneven	less than 74
Uneven	74 ~ 76
Normal	77 ~ 79
Even	80 ~ 82
Extremely even	more than 82

Uniformity of staple length 50/2.5 (Digital type)

Extremely uneven	less than 42
Uneven	42 ~ 43
Normal	44 ~ 45
Even	46 ~ 47
Extremely even	more than 47

Variation coefficient of staple length

Very small variation	less than 26
Small variation	26 ~ 29
Normal	30 ~ 33
Large variation	34 ~ 37
Very large variation	more than 37

(2) Tensile Strength of staple

O-Gauge	Very Appraisal	1,000 psi	g/tex
	Very weak	less than 70	less than 34
	Weak	70 ~ 76	34 ~ 37
	Normal	77 ~ 83	38 ~ 41
	Strong	84 ~ 90	42 ~ 45
	Very strong	more than 90	more than 45

1/8 in Gauge	Staple length (in)	g/tex
	less than 15/16	20
	31/32 ~ 1.1/16	22
	1.3/32 ~ 1.1/4	24
	more than 1.9/32	33

(3) Fineness by Micronaire Method

Extremely fine	less than 3.5
Fine	3.5 ~ 3.9
Average	4.0 ~ 4.4
Rough	4.5 ~ 5.0
Extremely rough	more than 5.0

(4) Maturity (Causticaire Scale)

Very low	less than 72
Low	72 ~ 75
Normal	76 ~ 79
High	80 ~ 83
Very high	more than 83

(5) Sugar Content (%)

Much	more than 0.3
Normal	0.1 ~ 0.3
Less	less than 0.1

(6) pH-Value

Very high	more than 10
High	9 ~ 10
Normal	7 ~ 8
Low	5 ~ 6
Very low	less than 5

Table 4 Near-term Quotation of Cotton in New York (FOB price)
Grade x Staple Length: SM 1.1/16

Years	US¢ Pound		Converted Rp/kg
1981, average	77.17		1.766
1982, average	65.31		1.494
1983, average	74.92		1.714
1984 January	75.50		1.727
February	76.14	Average	1.742
March	80.25	79.29	1.839
April	80.44		1.840
May	83.79		1.917
June	79.59		1.821
July	70.45		1.612
August	65.99	Average	1.510
September	64.27	66.72	1.470
October	66.18		1.514

Note: Conversion Rate US$1 = Rp 1.040

Table 5 Results of Buying Price per Shipping (C & F Price)

Grade	August, 1984	September, 1984	October, 1984	Through Trading House Rp/kg
	(US¢/Pound)	(US¢/Pound)	(US¢/Pound)	(Rp/kg)
M 1" OVAN	71.60	71.60	71.60	-
M 1.1/16" OVAN	74.35	74.35	74.35	-
M 1.1/16" BUCH	80.30	81.30	73.65	-
M 1.3/32"	-	-	-	1,806.50
SM 1.3/32"	-	-	-	1,840.40
SM 1.1/8"	-	-	-	1,863.00

Table 6 Expected Prices in Renovation Project (C & F Cilacap)

Grade	Rp/kg	Conversion Rate ¢/Pound
SM 1.1/16"	2,149.46	93.94
SM 1.3/32"	2,173.27	94.99
SM 1.1/8"	2,197.06	96.02
SM 1.1/4"	2,292.26	100.19
SM 1.5/16"	2,339.86	102.27
SM 3/8"	2,387.46	104.35
PIMA 1.1/4"	2,736.82	119.62

Note: Conversion Rate US$ 1 = Rp 1.040

Table 7 Capacity of Chemical Fiber Facilities for Supplying to Factories of Cotton Spinning Type

Fiber	Name of Maker	Capacity ton/day
Polyester Fiber	PT Kuraray Manunggal Fiber Industries	41
	PT Teijin Indonesia Fiber Corporation	60
	PT Indonesia Toray Synthetics	40
	PT Tri Rempoa Solo Synthetic Factory	60
	Total	201
Rayon Fiber	PT Indo Bharat Rayon	50
	PT South Pacific Viscose	45
	Total	95

Table 8 Actual Results of Prices for Purchasing Chemical Fibers

Fiber	Actual Price Rp/kg
Polyester Fiber (Grade A)	1,780
Polyester Fiber (Grade B)	1,700
Rayon Fiber (Regular)	1,750
Rayon Fiber (High tenasity)	1,785

Table 9 Production Process where Waste is originated and its Disposal Methods

Production Machine	Kinds of Waste	Disposal Distinction
Blow Room Machinery	Dropping Waste	Sale
	Sweeping Waste, Stain, Dust	Sale
Carding Engine	Flat Strip	Sale
	Dropping Waste	Sale
	Sweeping Waste & Dust	Sale
	Lap & Sliver Waste	Re-use
Drawing Frame	Sliver Waste	Re-use
	Sweeping Waste & Dust	Sale
Lap Former	Sliver Waste	Re-use
Comber	Lap & Sliver Waste	Re-use
	Comber Noil	Sale
Roving Frame	Roving Waste	Re-use
	Sweeping Waste & Dust	Sale
Ring Spinning Frame	Pheumafil Waste	Re-use
	Sweeping Waste & Dust	Sale
Winder	Waste Yarn	Used for cleaning

Table 10 Prices of Wastes

Distinction	Kinds of Waste	Price Rp/kg
Dropping Waste	Dropping Waste from Machine	50
	Sweeping Waste, Stain, Dust	50
Flat Strip		650
Noil	Comber Noil	650

4 ANALYSIS OF THE PRESENT CONDITION FOR THE EXISTING MILL

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4 ANALYSIS OF THE PRESENT CONDITION FOR THE EXISTING MILL:

4-1 Material, Production and Quality:

As the fundamental designs for production machines and facilities, the mills are designed and equipped as follows;

No. 1 Mill ..... as spinning mill for pure cotton yarns
No. 2 Mill ..... as spinning mill for blended yarns of synthetic fibers and cotton, and pure cotton yarns

However, in recent years, due to changes in trend of Indonesian domestic demand and in markets, spinning of the blended yarns has taking place also in No. 1 Mill, while in No. 2 Mill, by introduction of the combing machine production of pure cotton combed yarns has been effected though in small size.

4-1-1 Categories and Consumption of the Material:

The materials now in use are as follows:

1) Raw Cotton:
They are:

U.S.S.R. Cotton, Treity	Staple Length 1.1/16"
American Cotton, produced in Arizona, Low Middling Plus	Staple Length 1.1/16"

Theity, U.S.S.R. Cotton, is with poor character and has problem in neps, and is graded as the lowest, which is equivalent to the low middling class of American cotton.

To Japanese standard, this raw cotton is good for coarse and medium yarn counts of Ne 16 ~ Ne 20, and not fit for spinning yarns of Ne 30 ~ Ne 40 yarns. On the other hand, American cotton is, to Japanese standard, the raw cotton for Ne 20 class yarns, and for spinning yarns of Ne 30 ~ Ne 40, the cotton of better quality must be used. Of recent, the middling class of American cotton has been used.

2) Synthetic Fibers:
The following are now in use:

Table 1 Particulars of Synthetic Fibers used

Kinds	Denier	Staple Length	Purchased from
Polyester	1.25 ~ 1.4	38 mm	PT Teijin Indonesia Fiber Corporation
Rayon	1.4 ~ 1.5	38 mm	PT South Pacific Viscose

3) Kinds of the Materials used as at August, 1984:

Kinds of the used materials during our site studies on August were as per the Table 2.

Table 2 Particulars of the Materials used at the Study

Name of Mill	Kinds of Produced Yarn	Materials
CP-1 Mill	Cotton Carded Yarn, Ne 11	Cotton M-1"
	Cotton Carded Yarn, Ne 20	
	Cotton Carded Yarn, Ne 30	Cotton M-1 1/16"
CP-2 Mill	Blended Yarn of Cotton and Rayon, Ne 30	Cotton M-1 1/16" Rayon 1.5d x 38 mm
	Cotton Combed Yarn Ne 40	Cotton M-1 3/32"

4) Used Volume of Raw Cotton per Bale:

Table 3 indicates average used volume per bale of the raw cotton for 6 months period from January to June, 1984. It is obserbed that there is a large discrepancy between used volumes of the raw cotton per bale when American cotton is used and U.S.S.R. cotton is used, which is considered to be stemming from blending pattern of the raw cottons and the spinning condition (for instance, gauges set etc.).

Table 3 Used Volume of Raw Cotton per Bale during 6 months from January to June, 1984

Kinds of Produced Yarn	Used Volume of Raw Cotton per Bale	Waste Ratio %	Countries of Origin of Raw Cotton
Cotton Carded Yarn Ne 11	218.39 Kgs. 199.30 Kgs.	16.92 8.96	Soviet America
Cotton Carded Yarn Ne 20	201.09 Kgs.	9.77	America
Cotton Carded Yarn Ne 21	219.29 Kgs. 201.56 Kgs.	17.26 9.98	Soviet America
Cotton Carded Yarn Ne 30	226.38 Kgs. 209.06 Kgs.	19.85 13.21	Soviet America
Blended Yarn of Polyester and Rayon Ne 20	192.10 Kgs.	5.55	Indonesia

5) Quality Analysis of American Cotton:

Table 4 indicates the results of quality analysis made by Japan Spinning Test Association on American cotton now in use.

Table 4 Tested Results of American Cotton

Tested Items / Test piece			American Cotton
Length of Staple	Fibrograph Method	50% Spun Length (inch)	0.46
		2.5% Spun Length (inch)	1.08
		Uniformity (%)	42.6
Strength	Pressley Index		7.9
	Strength (1,000 Lbs/in^2)		85.1
Fineness (Micronaire reading)			4.7
Maturity (Index, Causticaire Method)			81.6

Sample: Bale No. 1884929
Calcot L10GG (M 1 1/16")

Assessment:

1) Uniformity of Staple Length : Slightly not uniform
2) Strength : Normal
3) Fineness : Normal, but near to Rough
4) Maturity : Slightly high
5) Grade Judged : Strict Low Middling

4-1-2 Production Plan, Results and Operating Conditions:

Table 5 indicates production plans and operating conditions adopted for January, February and March, 1984.

Spinning conditions for each machine to attain the targets as mentioned in tables 5-1 and 5-2 are tabulated in;

Table 6-1 Spinning schedule for CP-1 Mill
Table 6-2 Spinning shcedule for CP-2 Mill

Table 5-1 Production Plan of CP-1 Mill

Month 1984	in No. of operating days	Cotton Carded Yarn Ne 20		Cotton Carded Yarn Ne 30		Total (Bales)
		No.of Spinning Frame	No. of Bale Produced	No.of Spinning Frame	No. of Bale Produced	
Jan.	26	19	370	34	383	753
Feb.	25	19	356	34	368	724
Mar.	25	19	356	34	368	724
Total	76	-	1,082	-	1,119	2,201

Table 5-2 Production Plan of CP-2 Mill

Month 1984	No. of Operating days	Cotton Carded Yarn Ne 30		Cotton Carded Yarn Ne 40		Cotton Carded Yarn Ne 40		Total
		No. of Spinning Frame	No. of bale Produced	No. of Spinning Frame	No. of bale Produced	No. of Spinning Frame	No. of bale Produced	
Jan.	26	18	219	47	405	10	86	710
Feb.	25	18	211	47	389	10	83	683
Mar.	25	18	211	47	389	10	83	683
Total	76	-	641	-	1,183	-	252	2,076

Note: 3 Teams, 3 Shifts, Operating hours: Planned 24 hours/day, Actual 22 hours/day

Table 6-1 Spinning Schedule for CP-1 Mill (January, February and March, 1984)

Item / Process	1 Supply thickness (Grain/yard)	2 No. of doubling	3 Draft	4 Produced thickness (Grain/yard)	5 Twist multiplier (α e)	6 Twist per/inch (TPI)	7 Waste percent (%)	8 Delivery speed or Revolution (per min.)	9 Package	10 100% Production (LBS) (per hour and unit)	11 Working hour	12 Working efficiency (%)	13 No. of spindle (per machine)	14 Actual Production (per machine) (LBS/22Hours)	15 Required Production (LBS/22Hours)	16 Calculated No. of machine	17 No. of machine
1. Blowing Section -1 Blow Room Machinery Ne20	-	-	-	14 oz	-	-	3.5	7.18m=7.852yds	40" Width	412.23	22	70	1	6348.3	(6363.6) 6140.9	0.97	1
-2 Blow Room Machinery Ne30	-	-	-	14 oz	-	-	3.5	7.18m=7.852yds	40" Width	412.23	22	70	1	6348.3	(6587.2) 6356.6	1.00	1
2. Carding Section -1 Card Ne20	14 oz	1	106.95	$333.^{3}/6$	-	-	3.0	16.54m=18.09yds	10"ϕ x 36"H	8.61	22	80	1	151.60	5956.7	39.3	40
-2 Card Ne30	14 oz	1	116.23	$306.^{7}/6$	-	-	3.0	16.54m=18.09yds	10"ϕ x 36"H	7.93	22	80	1	139.50	6165.9	44.2	45
3. Drawing Section -1 Drawing Frame Ne20	$333.^{3}/6$	6	6.52	$306.^{7}/6$	-	-	0.5	35.92m=39.28yds	10"ϕ x 36"H	17.21	22	70	8	2120.30	5926.9	2.8	3
-2 Drawing Frame Ne30	$306.^{7}/6$	6	7.43	247.7	-	-	0.5	35.92m=39.28yds	10"ϕ x 36"H	13.90	22	70	8	1712.42	6135.1	3.6	4
4. Roving Section -1 Simplex Fly Frame Ne20	$306.^{7}/6$	1	9.57	$160.^{26}/30$	0.99	1.24	1.0	750 rpm	10" Lift	0.7715	22	55	124	1157.52	5867.6	5.1	6
-2 Simplex Fly Frame Ne30	$247.^{7}/6$	1	9.02	$137.^{36}/30$	1.06	1.43	1.0	750 rpm	10" Lift	0.5717	22	55	124	857.85	6073.7	7.1	8
5. Spinning Section -1 Ring Spinning Frame Ne20	$160.^{26}/30$	1	12.82	Ne 20	4.15	18.56	2.5	8,000 rpm	6" Lift	0.0428	22	80	400	301.05	5720.9	19.0	19
-2 Ring Spinning Frame Ne30	$137.^{36}/30$	1	16.48	Ne 30	4.15	22.73	2.5	8,500 rpm	6" Lift	0.02473	22	80	400	174.11	5921.9	34.0	34
6. Winding Section -1 Cone Winder Ne20	Ne 20	1	-	Ne 20	-	-	0.5	598.71m=654.75yds	6" x 9°15'	2.34	22	60	100	3086.7	5692.3	1.8	2
-2 Cone Winder Ne30	Ne 30	1	-	Ne 30	-	-	0.5	598.71m=654.75yds	6" x 9°15'	1.56	22	60	100	2057.8	5892.3	2.9	3

Table 6-2 Spinning Schedule for CP-2 Mill
(January, February and March, 1984)

Process \ Item	1 Supply thickness (Grain/yard)	2 No. of doubling	3 Draft	4 Produced thickness (Grain/yard)	5 Twist multiplier (α e)	6 Twist per/inch (TPI)	7 Waste percent (%)	8 Delivery speed or Revolution (per min.)	9 Package	10 100% Production (LBS) (per hour and unit)	11 Working hour	12 Working efficiency (%)	13 No. of spindle (per machine)	14 Actual Production (per machine) (LBS/22Hours)	15 Required Production (LBS/22Hours)	16 Calculated No. of machine	17 No. of machine
1. Blowing Section																	
-1 Blow Room Machinery for Ne30	-	-	-	$13.44^{oz}/y$	-	-	1.0	9.34m=10.21yds	40" Width	514.58	22	70	1	7924.6	3634.9	0.5	
-2 Blow Room Machinery for Ne40 CD	-	-	-	$13.44^{oz}/y$	-	-	1.0	9.34m=10.21yds	40" Width	514.58	22	70	1	7924.6	6722.1	0.8	2
-3 Blow Room Machinery for Ne40 CB	-	-	-	$13.44^{oz}/y$	-	-	1.0	9.34m=10.21yds	40" Width	514.58	22	70	1	7924.6	1693.4	0.2	
2. Carding Section																	
-1 Card for Ne30	$13.44^{oz}/y$	1	113.7	$299.^{40}/6$	-	-	3.5	17.24m=18.85yds	14"ϕ x 36"H	8.06	22	80	1	141.9	3507.7	24.7	25
-2 Card for Ne40 CD	$13.44^{oz}/y$	1	113.7	$299.^{40}/6$	-	-	3.5	17.24m=18.85yds	14"ϕ x 36"H	8.06	22	80	1	141.9	6486.8	45.7	46
-3 Card for Ne40 CB	$13.44^{oz}/y$	1	97.37	$349.^{65}/6$	-	-	3.5	17.24m=18.85yds	14"ϕ x 36"H	9.42	22	80	1	165.7	1634.1	9.9	10
3. Combing Section																	
-1 Pre-Drawing Frame	$349.^{65}/6$	8	8	$349.^{65}/6$	-	-	1.0	94.30m=103.13yds	14"ϕ x 36"H	51.51	22	75	2	1699.9	1617.8	1.0	1
-2 Lap Former	$349.^{65}/6$	44	3.2	800/1	-	-	1.0	63.76m=69.73yds	$10^1/2$" Width	478.15	22	75	1	7889.5	1601.6	0.2	1
-3 Comber	800/1	4	55.15	$299.^{40}/6$	-	-	14.0	46.89m (200NIP x 5.54mm)	20"ϕ x 42"H	28.58	22	75	2	943.2	1377.4	1.5	2
4. Drawing Frame																	
-1 Drawing Frame for Ne30	$299.^{40}/6$	8	8	$299.^{40}/6$	-	-	0.5	89.81m=98.22yds	14"ϕ x 36"H	42.01	22	75	4	2772.7	3490.2	1.3	2
-2 Drawing Frame for Ne40 CD	$299.^{40}/6$	8	8	$299.^{40}/6$	-	-	0.5	89.81m=98.22yds	14"ϕ x 36"H	42.01	22	75	4	2772.7	6454.4	2.3	3
-3 Drawing Frame for Ne40 CB	$299.^{40}/6$	8	8	$299.^{40}/6$	-	-	0.5	89.81m=98.22yds	14"ϕ x 36"H	42.01	22	75	4	2772.7	1370.5	0.5	1

Item / Process	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Supply thickness (Grain/yard)	No. of doubling	Draft	Produced thickness (Grain/yard)	Twist multiplier (α e)	Twist per/inch (TPI)	Waste percent (%)	Delivery speed or Revolution (per min.)	Package	100% Production (LBS) (per hour and unit)	Working hour	Working efficiency (%)	No. of spindle (per machine)	Actual Production (per machine) (LBS/22Hours)	Required Production (LBS/22Hours)	Calculated No. of machine	No. of machine
5. Roving Section																	
-1 Simplex Fly Frame for Ne30	$299^{40}/6$	1	5.988	250/30	0.912	0.912	1.0	600 rpm	11" Lift	1.3053	22	65	80	1493.3	3455.3	2.3	3
-2 Simplex Fly Frame for Ne40 CD	$299^{40}/6$	1	5.988	250/30	0.912	0.912	1.0	600 rpm	11" Lift	1.3053	22	65	80	1493.3	6389.9	4.3	5
-3 Simplex Fly Frame for Ne40 CB	$299^{40}/6$	1	5.988	250/30	0.912	0.912	1.0	600 rpm	11" Lift	1.3053	22	65	80	1493.3	1356.8	0.9	1
6. Spinning Section																	
-1 Ring Spinning Frame for Ne30	250/30	1	30	Ne 30	4.15	22.73	2.0	9,200 rpm	50mmø x 8"L	0.0268	22	80	400	188.5	3386.2	18	18
-2 Ring Spinning Frame for Ne40 CD	250/30	1	40.0	Ne 40	4.149	26.24	2.0	10,000 rpm	47mmø x 8"L	0.0189	22	80	400	133.1	6262.1	47	47
-3 Rins Spinning Frame for Ne40 CB	250/30	1	40.0	Ne 40	4.149	26.24	2.0	10,000 rpm	47mmø x 8"L	0.0189	22	80	400	133.1	1329.7	10.0	10
7. Winding Section																	
-1 Cone Winder for Ne30	Ne 30	1	-	Ne 30	-	-	0.5	648.61m=709.3yds	6" x 9°15'	1.6888	22	60	100	2229.2	3369.3	1.5	2
-2 Cone Winder for Ne40 CD	Ne 40	1	-	Ne 40	-	-	0.5	648.61m=709.3yds	6" x 9°15'	1.2666	22	60	100	1671.9	6230.8	3.7	4
-3 Cone Winder for Ne40 CB	Ne 40	1	-	Ne 40	-	-	0.5	648.61m=709.3yds	6" x 9°15'	1.2666	22	60	100	1671.9	1323.1	7.9	8

Table 7 indicates production plan for January, 1984 and its results. Though it is the data only for one month, the result was found to be largely different from the plan, which makes us worry about operability. Therefore, more endeavour should be required so that more stable operation plan can be established by conducting more thorough studies made on demand in the markets.

Table 7 Production Plan and Resulst for January, 1984

Mill	Kinds of Product	Production (Bales/26 days)	
		Plan	Results
CP-1 Mill	Cotton Carded Yarn, Ne 20	370	211.9
	Polyester/Rayon Blended Yarn, Ne 20	–	29.0
	Cotton Carded Yarn, Ne 30	383	267.1
	Rayon Yarn, Ne 30	–	2.3
	Polyester/Rayon Blended Yarn, Ne 40	–	6.3
	Sub-total	753	516.6
CP-2 Mill	Cotton Carded Yarn, Ne 30	219	221.1
	Cotton Carded Yarn, Ne 40	405	62.1
	Cotton Combed Yarn, Ne 40/2	86	105.0
	Polyester/Rayon Blended Yarn, Ne 40	–	4.4
	Polyester/Cotton Blended Yarn, Ne 45	–	22.3
	Sub-total	710	414.9
Grand Total		1,463	931.5

Due to either changes in production schedule as against production plan or to delayed spinning results of the previous month, the attainment ratio in terms of the actual production is observed as low as 63.7%.

Consequently, it is considered that the planning establishment system for the production to be agreed among relative departments of business and sales, as well as Mill side must be more strengthened.

Following changes in demand in the market, the production plan for March, 1984 was amended into the particulars in Table 8.

Table 8 Production Plan for March, 1984

	Kinds of Product	Production (Bales/25 days)	No. of Spinning Frame
CP-1 Mill	Ne 20 Polyester/Rayon Blended Yarn	460	19
	Ne 30 Cotton Carded Yarn	380	34
	Sub-total	840	53
CP-2 Mill	Ne 30 Cotton/Rayon Blended Yarn	516	37
	Ne 40 Cotton Carded Yarn	308	38
	Sub-total	824	75

Spinning condition for each machine due to the above changes is as follows;

Table 9-1: Spinning Schedule for CP-1 Mill
Table 9-2: Spinning Schedule for CP-2 Mill

As CP-1 Mill is not equipped with the blowing machinery for synthetic fibers, they are tiding this situation over by having laps brought from CP-2 Mill. In the facilities for spinning synthetic fibers, there are some of the machines observed which are not equipped for spinning synthetic fibers, such as metalic wires for the carding engines.

Table 9-1 Spinning Schedule for CP-1 (March, 1984)

Item / Process	1 Supply thickness (Grain/yard)	2 No. of doubling	3 Draft	4 Produced thickness (Grain/yard)	5 Twist multiplier (α e)	6 Twist per/inch (TPI)	7 Waste percent (%)	8 Delivery speed or Revolution (per min.)	9 Package	10 100% Production (LBS) (per hour and unit)	11 Working hour	12 Working efficiency (%)	13 No. of spindle (per machine)	14 Actual Production (per machine) (LBS/22Hours)	15 Required Production (LBS/22Hours)	16 Calculated No. of machine	17 No. of machine
1. Blowing Section																	
-1 Blow Room Machinery for Ne20 TETORON	-	-	-	12.4 oz/y	-	-	1.0	7.18m 7.85yds	40" Width	365.03	22	70	1	5621.4	3792.5	0.8	1
-2 Blow Room Machinery for Ne20 Rayon	-	-	-	12.4 oz/y	-	-	1.0	7.18m 7.85yds	40" Width	365.03	22	70	1	5621.4	3792.5	0.8	1
-3 Blow Room Machinery for Ne30 Cotton	-	-	-	14 oz/y	-	-	3.5	7.18m 7.85yds	40" Width	412.13	22	70	1	6346.8	6559.2	1.0	1
2. Carding Section																	
-1 Card for Ne20 TETORON	12.4 oz/y	1	112.06	289.02/6	-	-	0.5	22.35m 24.44yds	10"ϕ x 36"H	10.09	22	80	1	177.6	3773.5	21.2	22
-2 Card for Ne20 Rayon	12.4 oz/y	1	112.06	289.02/6	-	-	0.5	22.35m 24.44yds	10"ϕ x 36"H	10.09	22	80	1	177.6	3773.5	21.2	22
-3 Card for Ne30 Cotton	14 oz/y	1	144.19	247.72/6	-	-	3.0	16.54m 18.09yds	10"ϕ x 36"H	6.39	22	80	1	112.4	6362.4	56.6	57
3. Drawing Section(3 Passage)																	
-1 Drawing Frame for Ne20 T/R	T= 289. 02/6 R= 289. 02/6	3 3	5.58	310.56/6	-	-	0.5	35.92m 39.28yds	10"ϕ x 36"H	17.43	22	70	8	2147.0	7509.2	3.5	4
-2 Drawing Frame for Ne30 Cotton	247. 72/6	6	5.41	274.73/6	-	-	0.5	35.92m 39.28yds	10"ϕ x 36"H	15.42	22	70	8	1899.3	6330.6	3.3	4
4. Roving Section																	
-1 Simplex Fly Frame for Ne20 T/R	310. 56/6	1	9.32	166.67/30	0.99	1.21	0.5	750 rpm	10" Lift	0.818	22	65	124	1450.9	7471.7	5.1	6
-2 Simplex Fly Frame for Ne30 Cotton	274.73/6	1	10.00	137.36/30	1.06	1.43	1.0	750 rpm	10" Lift	0.572	22	55	124	857.9	6267.3	7.3	8

Item / Process	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Supply thickness (Grain/yard)	No. of doubling	Draft	Produced thickness (Grain/yard)	Twist multiplier (α e)	Twist per/inch (TPI)	Waste percent (%)	Delivery speed or Revolution (per min.)	Package	100% Production (LBS) (per hour and unit)	Working hour	Working efficiency (%)	No. of spindle (per machine)	Actual Production (per machine) (LBS/22Hours)	Required Production (LBS/22Hours)	Calculated No. of machine	No. of machine
5. Spinning Section																	
-1 Ring Spinning Frame for Ne20 T/R	166.67/30	1	13.33	Ne 20	3.50	15.65	1.0	8,000 rpm	6" Lift	0.0507	22	85	400	379.3	7397.0	19.5	20
-2 Ring Spinning Frame for Ne30 Cotton	137.36/30	1	16.48	Ne 30	4.15	22.73	2.5	8,500 rpm	6" Lift	0.0247	22	80	400	174.1	6110.6	35.1	35
6. Winding Section																	
-1 Cone Winder for Ne20 T/R	Ne 20	1	-	Ne 20	-	-	0.5	598.71m 654.8yds	6" x 9°15'	2.3386	22	60	100	3086.9	7360.0	2.4	3
-2 Cone Winder for Ne30 Cotton	Ne 30	1	-	Ne 30	-	-	0.5	598.71m 654.8yds	6" x 9°15'	1.5590	22	60	100	2057.9	6080.0	3.0	3

Table 9-2 Spinning Schedule for CP-2 (March, 1984)

Item / Process	1 Supply thickness (Grain/yard)	2 No. of doubling	3 Draft	4 Produced thickness (Grain/yard)	5 Twist multiplier (α e)	6 Twist per/inch (TPI)	7 Waste percent (%)	8 Delivery speed or Revolution (per min.)	9 Package	10 100% Production (LBS) (per hour and unit)	11 Working hour	12 Working efficiency (%)	13 No. of spindle (per machine)	14 Actual Production (per machine) (LBS/22Hours)	15 Required Production (LBS/22Hours)	16 Calculated No. of machine	17 No. of machine
1. Blowing Section																	
-1 Blow Room Machinery for Ne30 Cotton	-	-	-	13.44oz/y	-	-	1.0	9.34m 10.21yds	40" Width	514.58	22	70	1	7924.6	4453.6	0.6	1
-2 Blow Room Machinery for Ne30 Rayon	-	-	-	11.57oz/y	-	-	1.0	9.34m 10.21yds	40" Width	442.99	22	70	1	6822.0	4319.3	0.6	1
-3 Blow Room Machinery for Ne40 Cotton	-	-	-	13.44oz/y	-	-	1.0	9.34m 10.21yds	40" Width	514.58	22	70	1	7924.6	5316.7	0.7	1
2. Carding Section																	
-1 Card for Ne30 Cotton	13.44oz/y	1	113.71	299.40/6	-	-	3.5	17.24m 18.85yds	14"ϕ x 36"H	8.06	22	80	1	141.90	4297.7	30.3	31
-2 Card for Ne30 Rayon	11.57oz/y	1	100.93	299.40/6	-	-	0.5	17.24m 18.85yds	14"ϕ x 36"H	8.06	22	80	1	141.90	4297.7	30.3	31
-3 Card for Ne40 Cotton	13.44oz/y	1	113.71	299.40/6	-	-	3.5	17.24m 18.85yds	14"ϕ x 36"H	8.06	22	80	1	141.90	5130.6	36.2	37
3. Drawing Section(2 Passage)																	
-1 Drawing Frame for Ne30 Cotton /Rayon	C= 299.40/6 R= 299.40/6	4 4	8	299.40/6	-	-	0.5	89.81m 98.22yds	14"ϕ x 36"H	42.01	22	75	4	2772.7	8552.3	3.1	4
-2 Drawing Frame for Ne40 Cotton	299.40/6	8	8	299.40/6	-	-	0.5	89.81m 98.22yds	14"ϕ x 36"H	42.01	22	75	4	2772.7	5104.9	1.8	2
4. Roving Section																	
-1 Simplex Fly Frame for Ne30 Cotton/Rayon	299.40/6	1	4.79	312.50/30	1.02	0.912	1.0	600 rpm	11" Lift	1.631	22	65	80	1866.0	8466.8	4.5	5
-2 Simplex Fly Frame for Ne40 Cotton	299.40/6	1	5.99	250.00/30	0.912	0.912	1.0	600 rpm	11" Lift	1.305	22	65	80	1493.3	5053.9	3.4	4

Process / Item	1 Supply thickness (Grain/yard)	2 No. of doubling	3 Draft	4 Produced thickness (Grain/yard)	5 Twist multiplier (α e)	6 Twist per/inch (TPI)	7 Waste percent (%)	8 Delivery speed or Revolution (per min.)	9 Package	10 100% Production (LBS) (per hour and unit)	11 Working hour	12 Working efficiency (%)	13 No. of spindle (per machine)	14 Actual Production (per machine) (LBS/22Hours)	15 Required Production (LBS/22Hours)	16 Calculated No. of machine	17 No. of machine
5. Spinning Section																	
-1 Ring Spinning Frame for Ne30 Cotton/Rayon	312.50/30	1	37.5	Ne 30	4.10	22.46	2.0	9,000 rpm	50mmø x 8"L	0.0265	22	80	400	186.60	8297.5	44.5	45
-2 Ring Spinning Frame for Ne40 Cotton	250.00/30	1	40.0	Ne 40	4.15	26.25	2.0	10,000 rpm	47mmø x 8"L	0.0189	22	80	400	133.05	4952.8	37.2	38
6. Winding Section																	
-1 Cone Winder for Ne30 Cotton/Rayon	Ne 30	1	-	Ne 30	-	-	0.5	648.61m 709.33yds	6" x 9°15'	1.6889	22	60	100	2229.3	8256.0	3.7	4
-2 Cone Winder for Ne40 Cotton	Ne 40	1	-	Ne 40	-	-	0.5	648.61m 709.33yds	6" x 9°15'	1.2667	22	60	100	1672.0	4928.0	2.9	3

4-1-3 Control Items and Concept of Control Standard:

Currently, the control items and the test execution plan therefore have been established as per Table 10 as the standard for the whole Sandang II Spinning Mill, according to which the Patal Cilacap Mill has been also controlled for their process.

In this table, the testing cycle and size of the test pieces are itemized, however, in order to cope with the yearly increasing needs and complicating demand for the quality of the consumers, also the target control limit shall be noted to prepare for those needs of the consumers.

Table 11 indicates the results of survey made by the Japan Spinning Test Association on the yarn quality characteristics of the following pirn yarn out of ring spinning frame now spun in Patal Cilacap Mill by picking up 5 pieces from each of the yarn categories.

For the surveying method, General Spinning Test Method (JIS-L-1095) of the Japan Specification Association was applied.

Table 12 indicates the standard yarn characteristics value per yarn kind in Japan.

The above table indicates the target values, and the production process (quality) is controlled to attain the values.

Figure 1 shows U% graph of the cotton carded yarns Ne 20 and 30. The other yarn kinds have the similar tendency. Figure 2 indicates the result of the spectrogram (cyclical unevenness).

Figure 3, the tested results of Uster Classimat Test are indicated.

The results of blending ratio analysis for cotton/rayon blended yarn Ne 30 indicate as follows (Test Method JIS-L-1030)

Cotton: 48%, Rayon: 52%

Table 10 STANDARD TESTING SCHEDULE IN SANDANG II

No.	Process	Materials/ Products	Kind of testing	Frequency				Sampling size			Remarks
				1-shift	1-day	2-day	1-week	Machine	Del/Spd/Frm	N	
1.	Bale Store	Raw Cotton	- Grade, S.L., Micro., Pressley		1 x					100%/10%	Grade & Staple Length, N=100%
			- Staple Diagram	at change of raw cotton				machine			Micro. & Pressley, N=10%
2.	Blowing	Lap	- Staple Diagram	at change of raw material				machine			
			- Each Lap Weight		1 x					10	
			- OZ/Yard & CV%				2 x		1 x 1 Lap	100%	
		Waste	- %				1 x	1			
3.	Card	Sliver	- Weight & CV%		1 x			5		4	Weight grain/6yards
			- U%				1 x	5		1	
			- Nep		1 x			5		4	
			- Staple Diagram	at change of raw material				machine			
		Waste	- %				1 x	1		1	
4.	Lap Former	Lap	- Weight & CV%				2 x	1 x 1-Lap		100%	Weight grain/yard
5.	Comber	Sliver	- Weight & CV%		1 x			all	all	4	Weight grain/6yards
			- U%				2 x	all	all	1	
			- Staple Diagram	at change of raw material				machine			
		Noil	- %				2 x	all	all	1	Should be measured
6.	Drawing	Sliver	- Weight & CV%	2 x				all	all	1	Weight grain/6yards
			- U%				2 x	all	all	1	
7.	Simplex Fly Frame	Roving	- Weight & CV%			1 x		all	5	1	Weight grain/30yards
			- U%				2 x	1	5	1	
			- End Break				1 x	all	all		
8.	Ring Spinning	Yarn	- Weight & CV%		1 x			5	4	1	Weight grain/120yards
			- Lea Breaking Strength & CV%		1 x			5	4	1	
			- Lea Elongation & CV%		1 x			5	2	4	
			- Twist per Inch				2 x	5	2	4	
			- U%				2 x	5	2	1	
			- Imperfection Indicator				2 x	5	2	1	
			- End Break			1 x		all	all	100%	Snap reading
			- End Break				1 x	1	all	100%	Observation 1-machine x 1-hour
			- Idle Spindle		1 x				all	100%	
9.	Cone Winder	Yarn	- Cone Weight & CV%				2 x			20	Random
			- End Break/10,000m				1 x	1	20	2	
			- Defective Winding	each shift							All cone
			- Hardness of Cone				2 x			20	

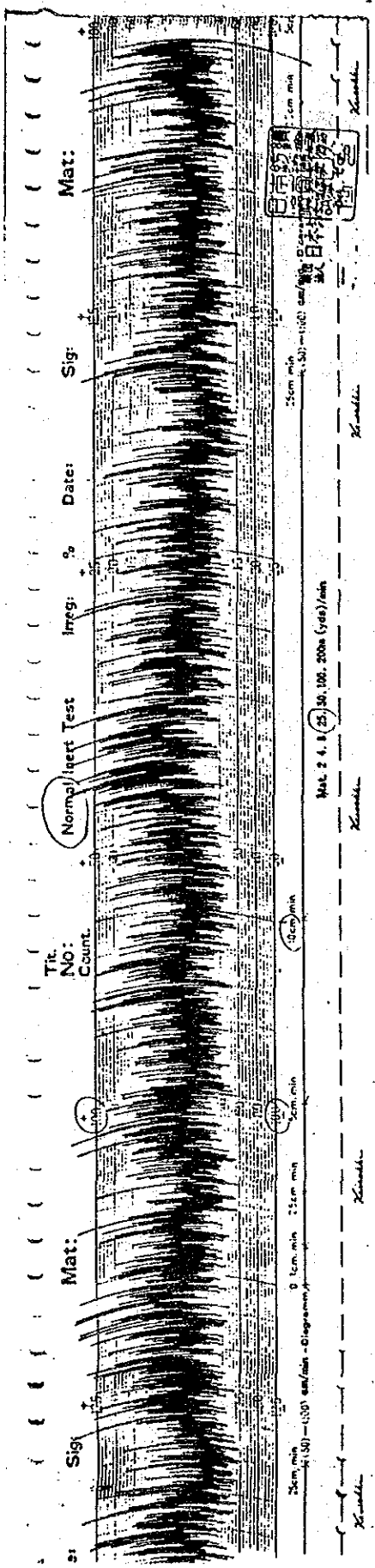
Table 11 Results of Yarn Test

Items		Cotton Carded Yarns				Cotton/Rayon Blended yarn Ne 30
		Ne 11	Ne 20	Ne 30	Ne 40	
Yarn No. based on corrected weight (Ne)		11.47	20.20	29.79	38.60	30.11
Yarn No. deviation percentage (%)		+4.3	+1.0	−0.7	−3.5	+0.4
Yarn No. variation coefficient (%)		9.6	7.6	2.5	3.7	2.4
Single yarn breaking strength (g)		663.2	306.7	231.8	183.6	194.9
Variation coefficient of single yarn breaking strength (%)		21.7	19.9	13.0	18.6	10.9
Elongation percentage of single yarn (%)		8.0	6.9	6.2	5.1	5.8
Lea strength (kg)		70.9	35.3	25.7	20.9	24.0
Lea strength variation coefficient (%)		19.0	12.2	6.4	8.3	7.5
Lea elongation percentage (%)		6.5	6.0	5.5	5.1	4.8
No. of twist per inch (TPI)		13.0	18.6	23.7	24.8	23.5
Variation coefficient of No. of twist (%)		7.9	6.2	7.6	7.4	6.9
U%		17.1	20.9	21.5	21.6	17.4
I.P.I Value Piece/200m N=5, average	Thin	28	200	216	174	29
	Thick	62	258	303	307	62
	Nep	16	81	244	217	79

Table 12 Spinning Yarn Quality Target in Japan

Test pcs. / Items		Cotton Carded Yarn			Cotton Combed Yarn		Polyester/cotton blended yarn
		Ne 20	Ne 30	Ne 40	Ne 30	Ne 40	
Yarn No. deviation percentage (%)		±1.5	±1.5	±1.5	±1.5	±1.5	±1.5
Yarn No. variation coefficient (%)		1.8	1.8	1.8	1.7	1.7	2.0
Single yarn strength (g)		380	250	190	290	205	245
Average strength for minimum 6 pcs (g)		300	200	150	240	170	185
Variation coefficient of single yarn strength (%)		10.8	11.0	11.5	10.0	10.5	13.0
U%		14.5	16.4	16.4	12.5	13.2	13.5
I.P.I. Value Piece/200m	Thin	17	47	50	4	12	14
	Thick	44	92	96	9	16	20
	Nep	54	90	110	10	15	26

Figure 1 U% Graph



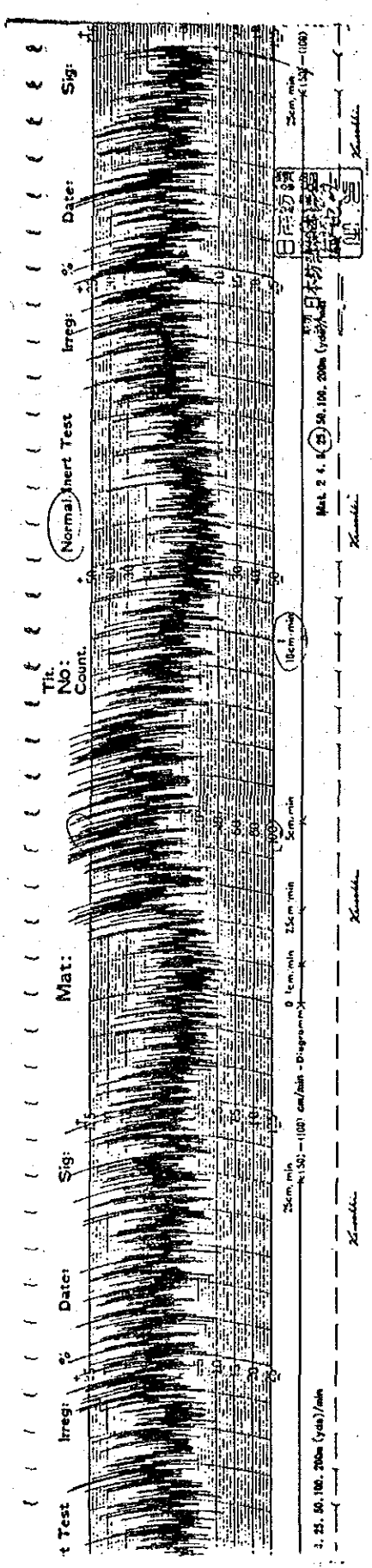
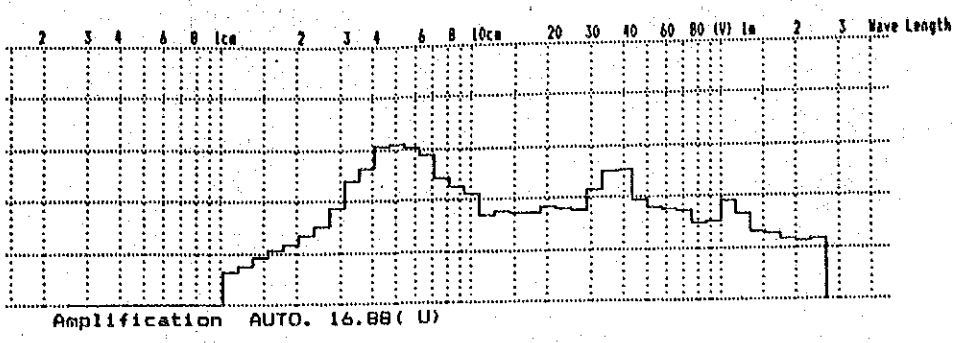
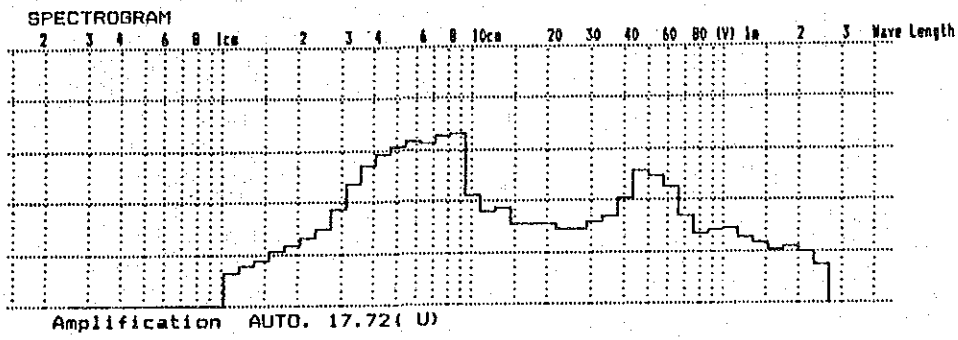
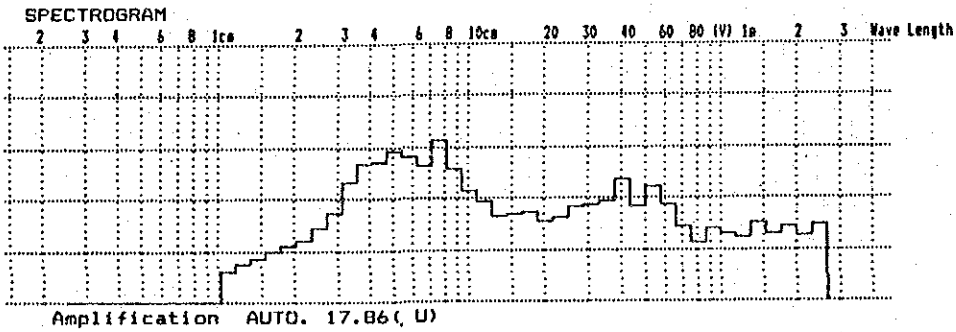


Figure 2-1 Cotton Carded Yarn 11's Spectrogram







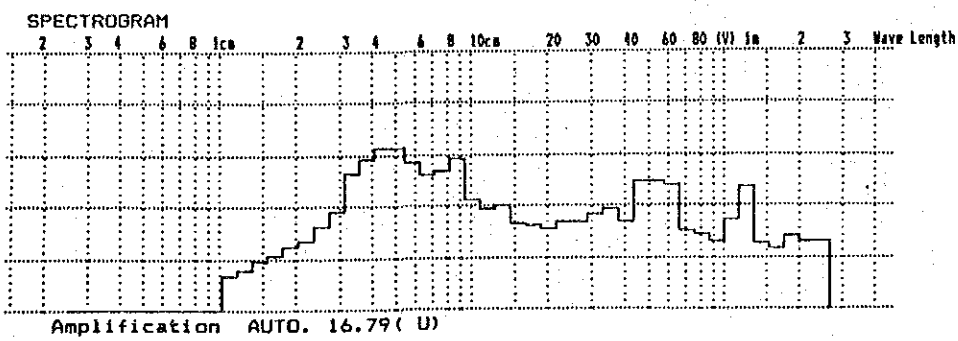
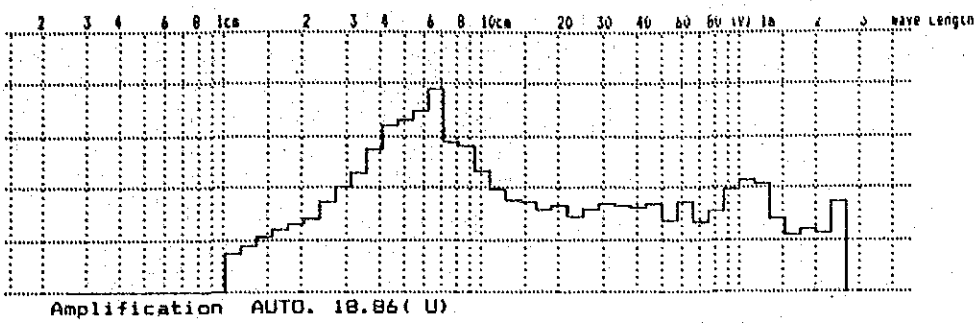
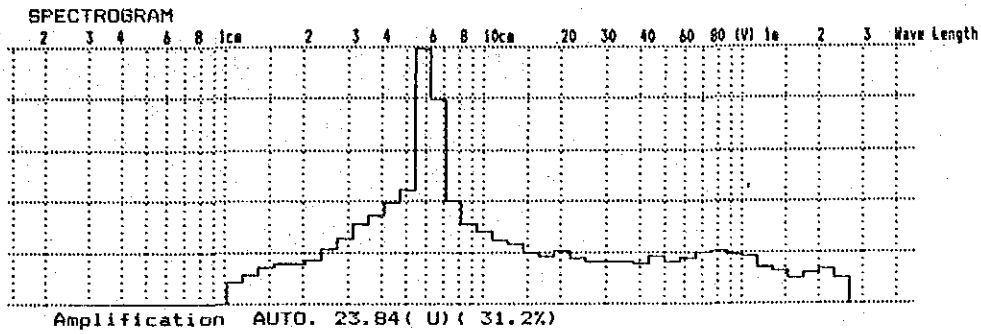
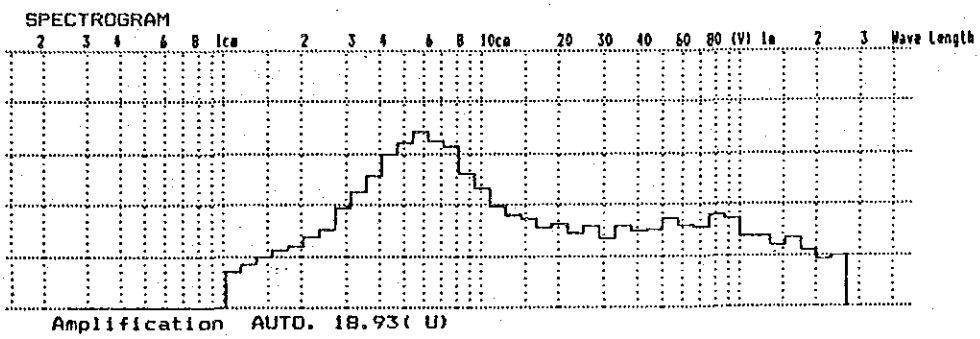


Figure 2-2 Cotton Carded Yarn 20's Spectrogram







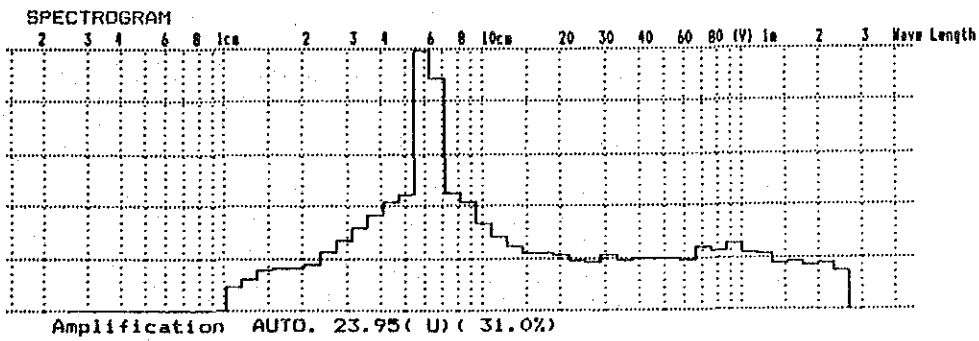
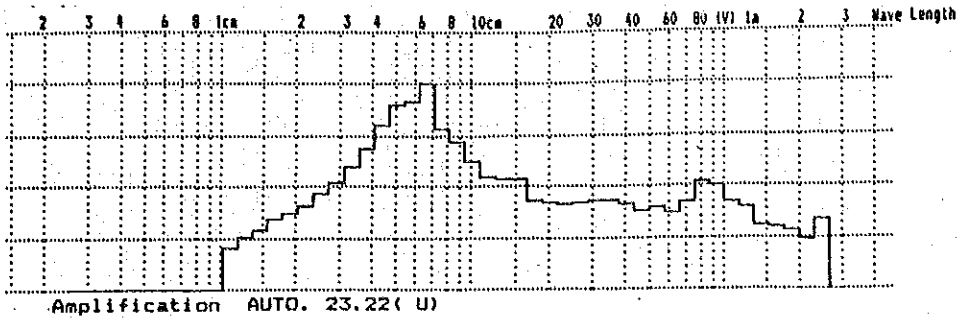
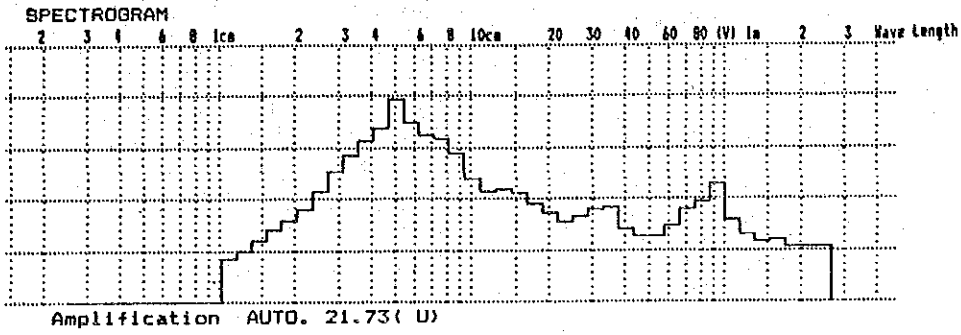
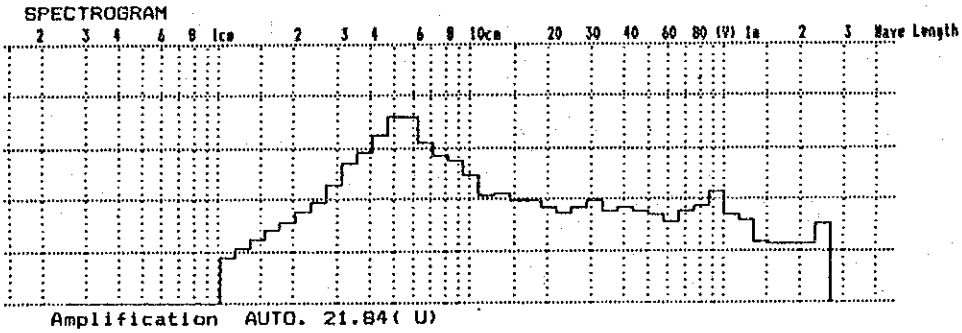


Figure 2-3 Cotton Carded Yarn 30's Spectrogram







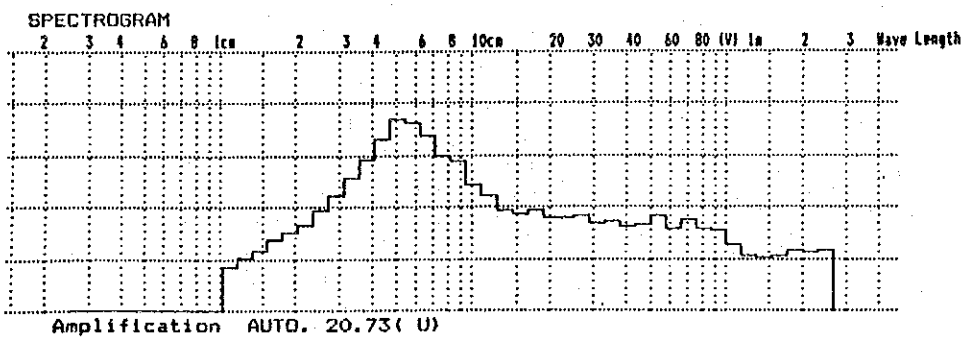
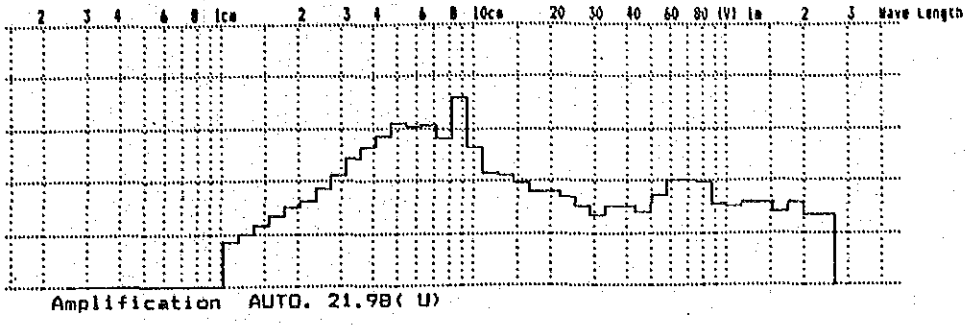
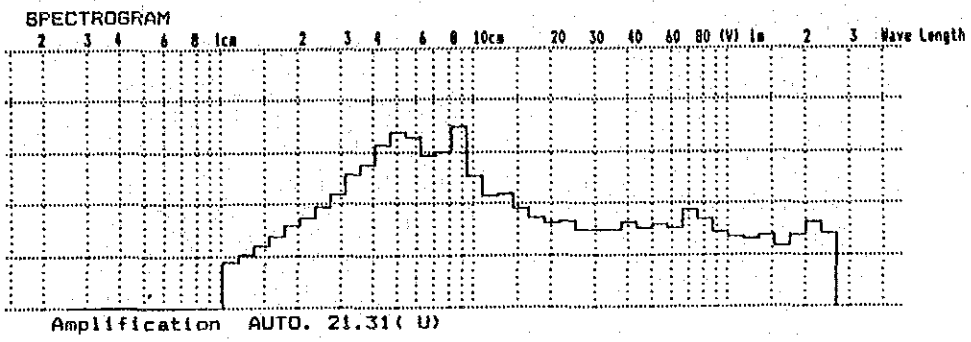
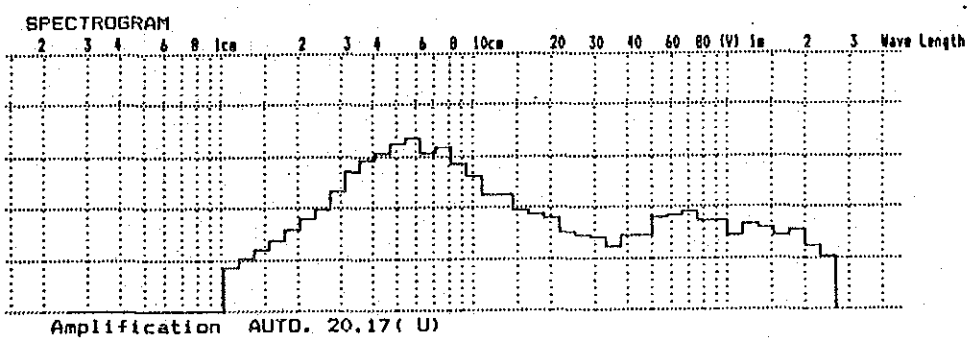


Figure 2-4 Cotton Carded Yarn 40's Spectrogram







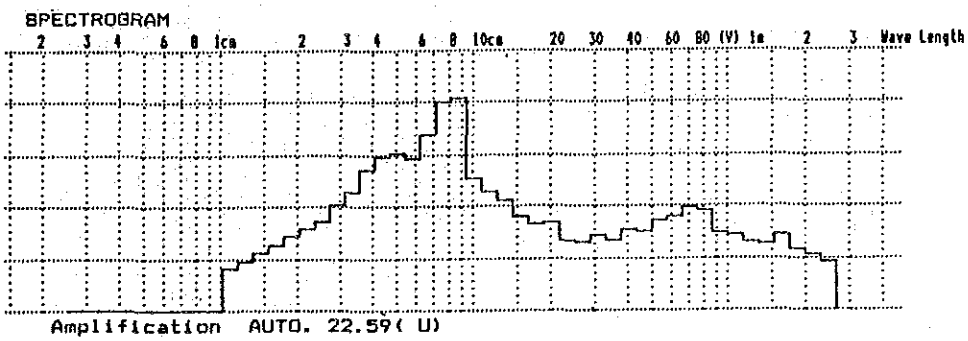
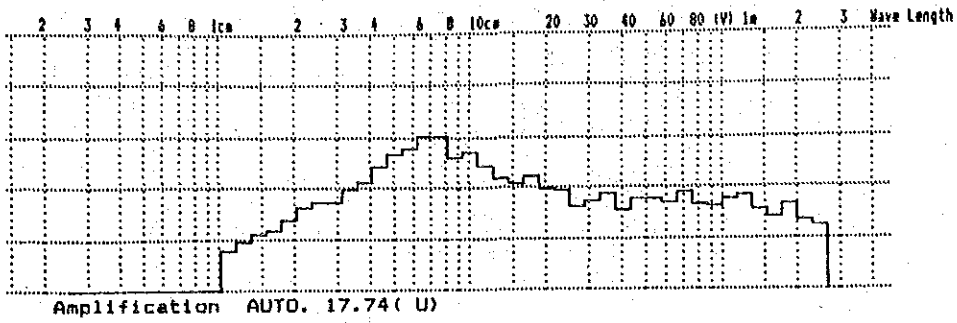
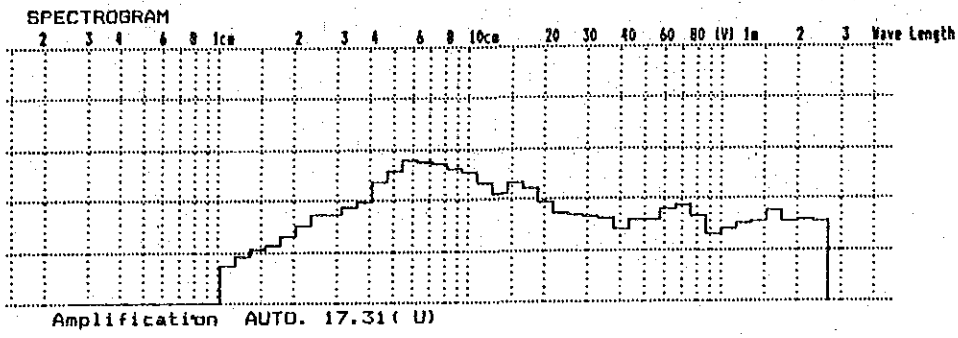
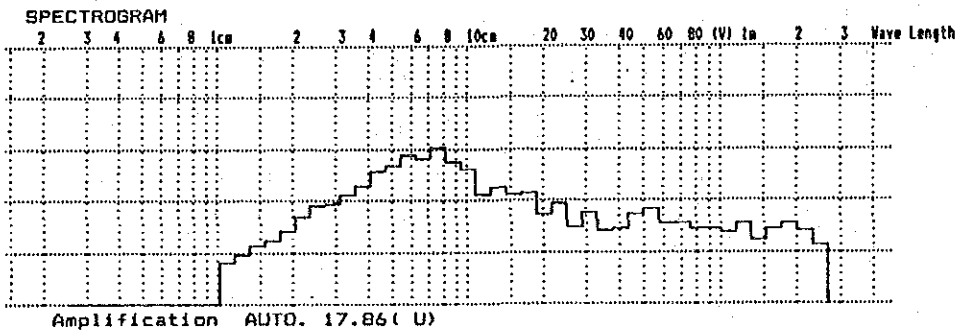


Figure 2-5 Cotton/Rayon Blended Yarn 30's Spectrogram







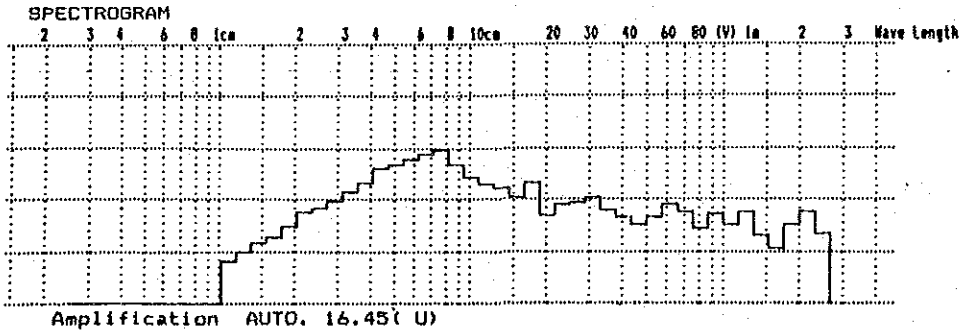
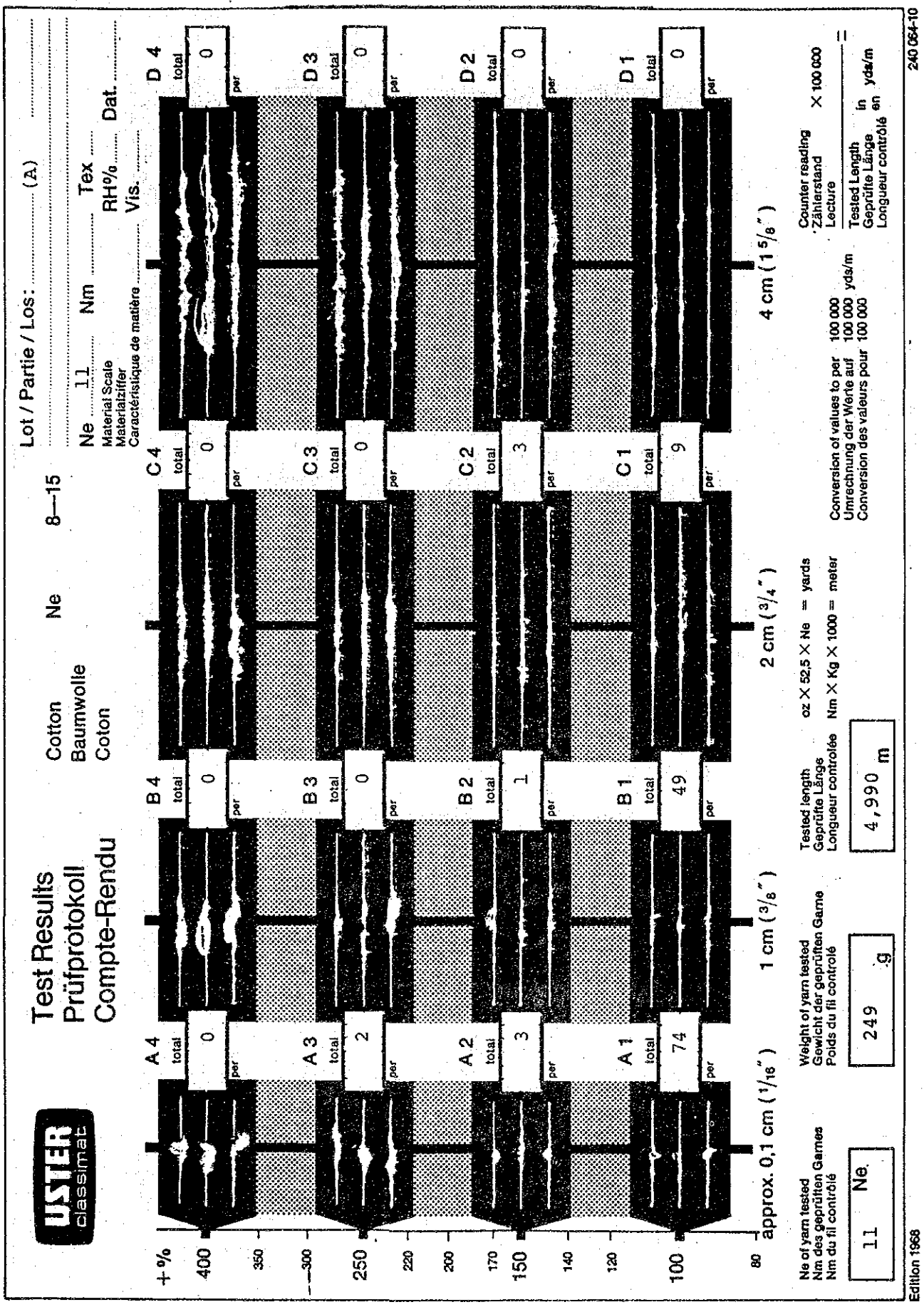


Figure 3 Result of Uster Classimat Test



USTER classimat

Test Results
Prüfprotokoll
Compte-Rendu

Cotton / Baumwolle / Coton — Ne 15—30

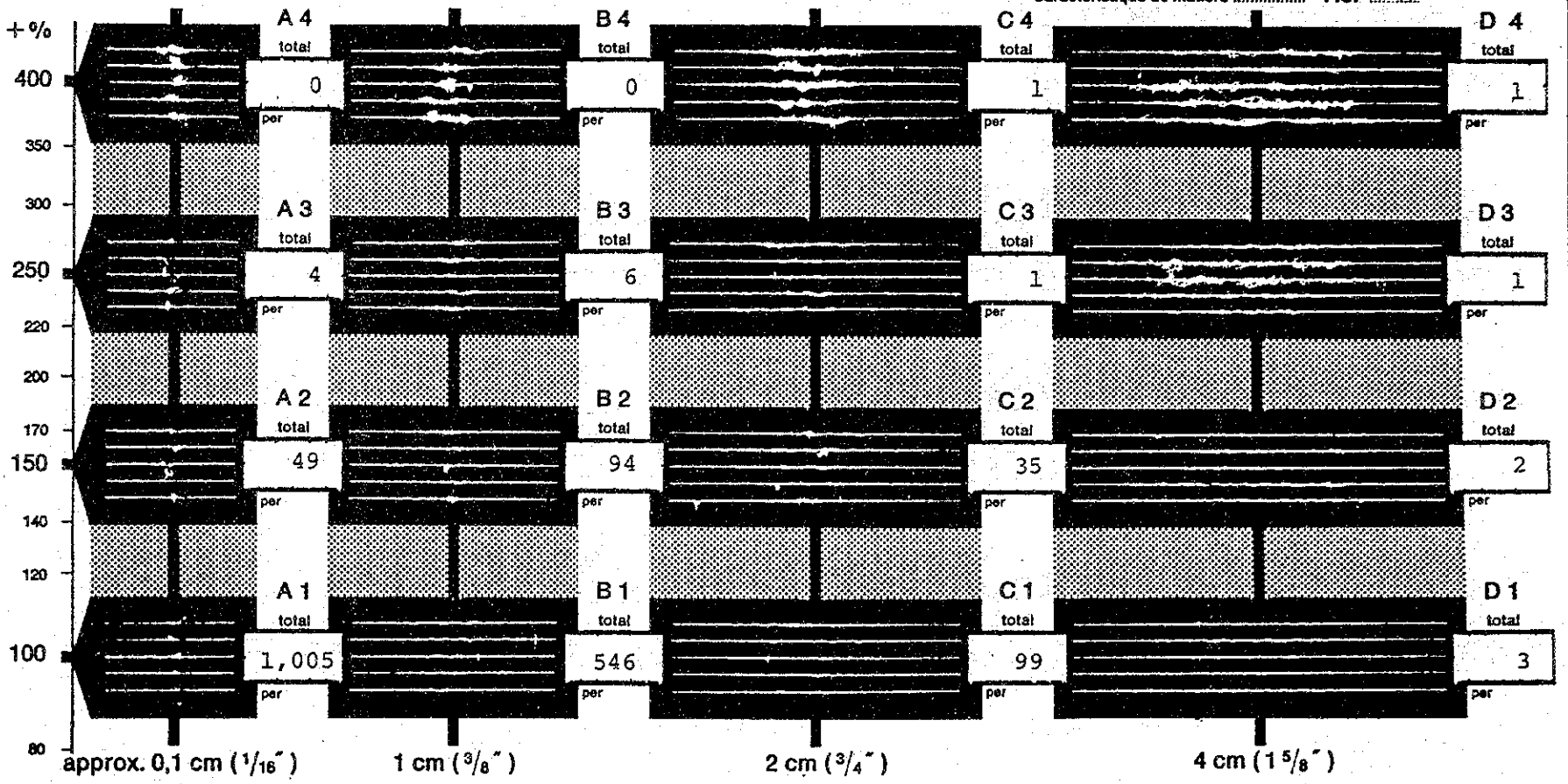
Lot / Partie / Los: (B)

Ne 20 Nm ..... Tex .....

Material Scale / Materialziffer / Caractéristique de matière .....

RH% ..... Dat. .....

Vis. .....



Ne of yarn tested / Nm des geprüften Garnes / Nm du fil contrôlé: 20 Ne.

Weight of yarn tested / Gewicht der geprüften Garne / Poids du fil controlé: 308 g

Tested length / Geprüfte Länge / Longueur controlée: oz × 52,5 × Ne = yards; Nm × Kg × 1000 = meter: 10,735 m

Conversion of values to per 100 000 / Umrechnung der Werte auf 100 000 yds/m / Conversion des valeurs pour 100 000

Counter reading / Zählerstand / Lecture × 100 000 =

Tested Length / Geprüfte Länge / Longueur contrôlé in en yds/m

USTER classimat

Test Results
Prüfprotokoll
Compte-Rendu

Cotton
Baumwolle
Coton

Ne 30— 60

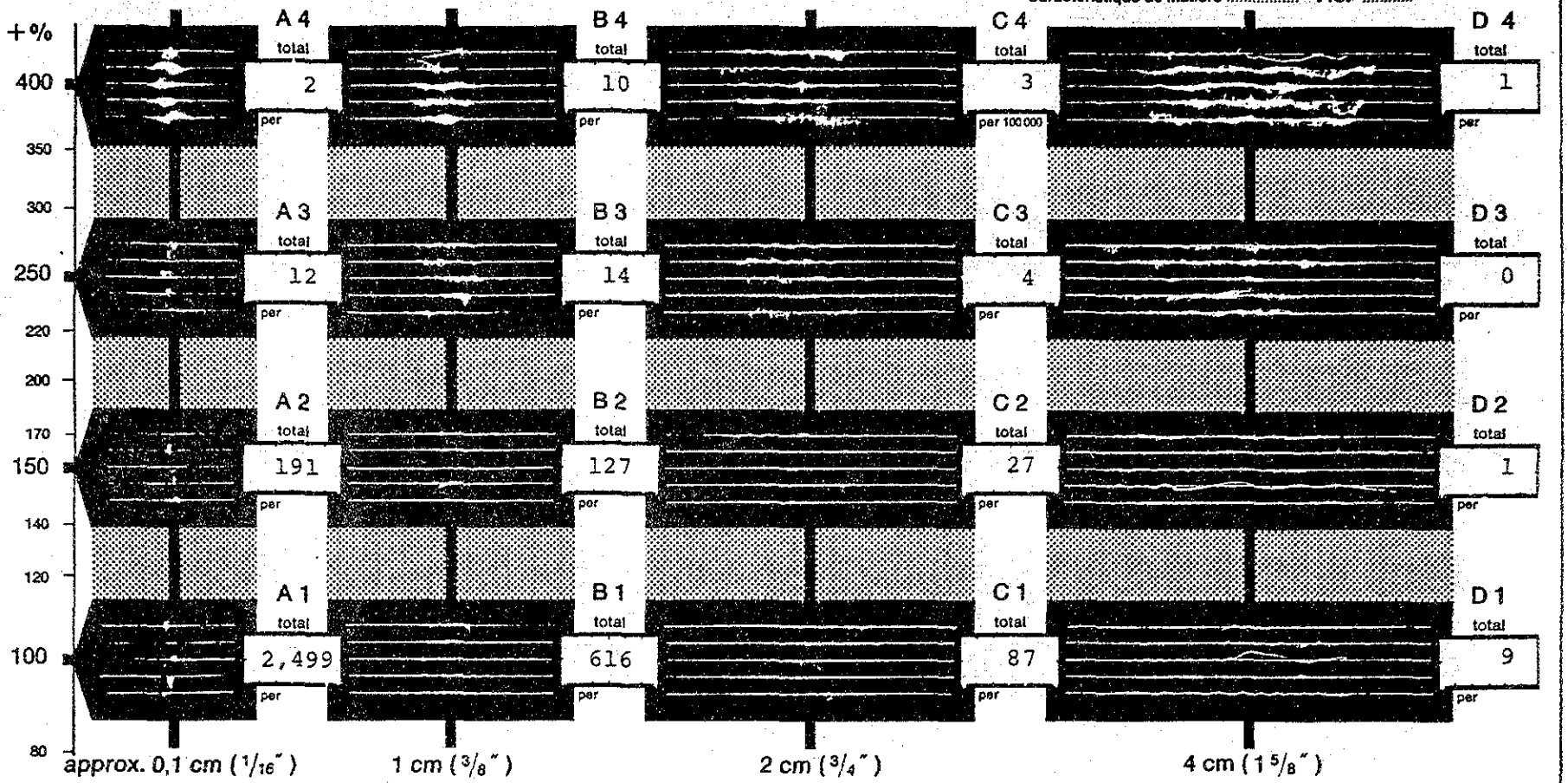
Lot / Partie / Los: (C)

Ne 30 Nm Tex

Material Scale
Materialziffer
Caractéristique de matière

RH% Dat.

Vis.



Ne of yarn tested
Nm des geprüften Garnes
Nm du fil contrôlé
30 Ne

Weight of yarn tested
Gewicht der geprüften Garne
Poids du fil controlé
322 g

Tested length
Geprüfte Länge
Longueur controlée
oz × 52,5 × Ne = yards
Nm × Kg × 1000 = meter
16,653 m

Conversion of values to per 100 000
Umrechnung der Werte auf 100 000 yds/m
Conversion des valeurs pour 100 000

Counter reading
Zählerstand × 100 000
Lecture

Tested Length
Geprüfte Länge in yds/m
Longueur contrôlé en

Edition 1968

240 064-40

USTER classimat

Test Results
Prüfprotokoll
Compte-Rendu

Cotton
Baumwolle
Coton

Ne 30— 60

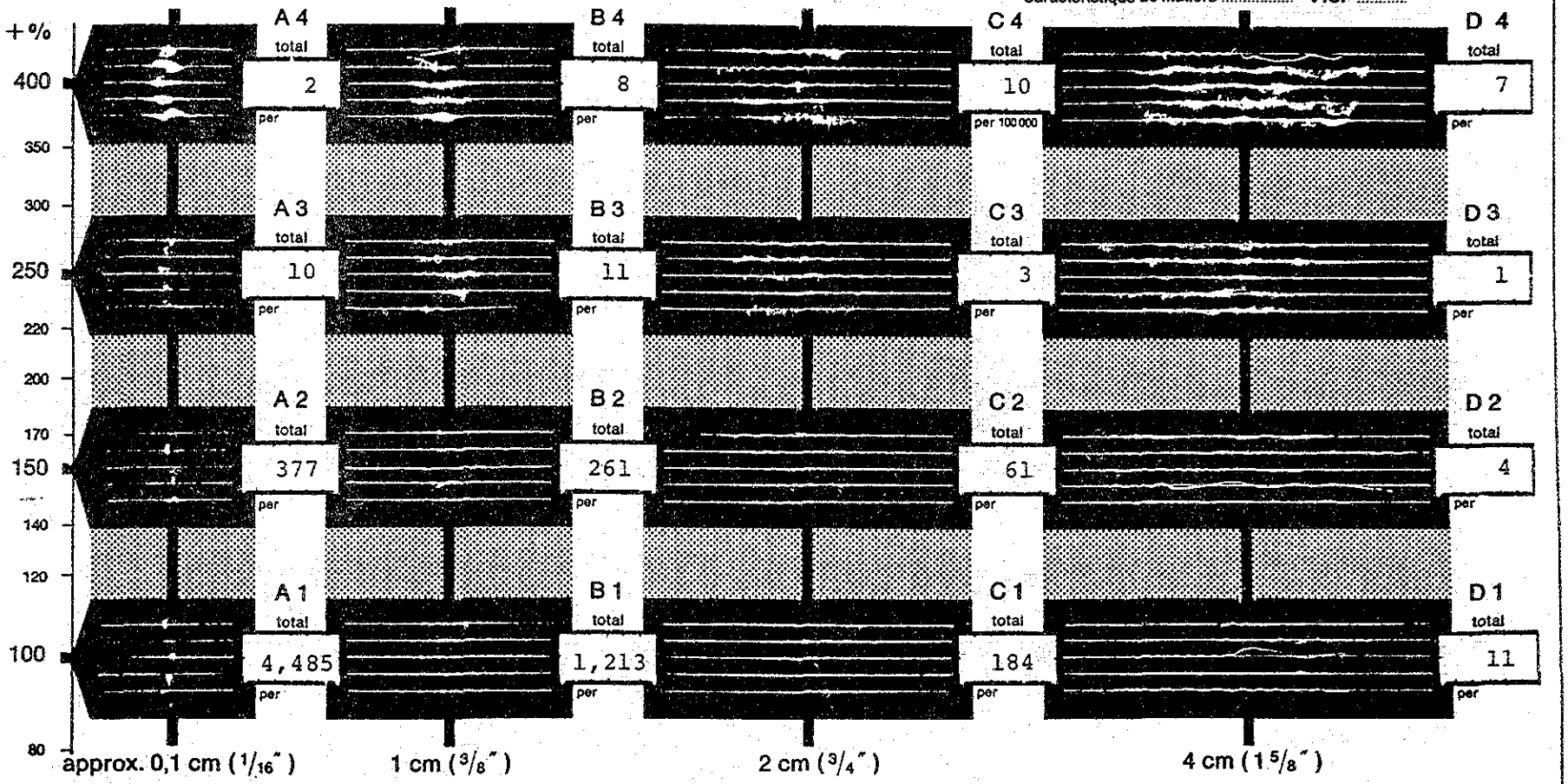
Lot / Partie / Los: (D)

Ne 40 Nm Tex

Material Scale
Materialziffer
Caractéristique de matière

RH% Dat.

Vis.



Ne of yarn tested
Nm des geprüften Garnes
Nm du fil contrôlé
40 Ne

Weight of yarn tested
Gewicht der geprüften Garne
Poids du fil controlé
431 g

Tested length
Geprüfte Länge
Longueur controlée
oz × 52,5 × Ne = yards
Nm × Kg × 1000 = meter
29,212 m

Conversion of values to per 100 000
Umrechnung der Werte auf 100 000 yds/m
Conversion des valeurs pour 100 000

Counter reading
Zählerstand
Lecture
× 100 000
=

Tested Length
Geprüfte Länge
Longueur contrôlé
in
en
yds/m

Edition 1968

240 064-40

USTER classimat

Test Results
Prüfprotokoll
Compte-Rendu

Rayon.Cotton Ne 30— 60
52/48 Blended

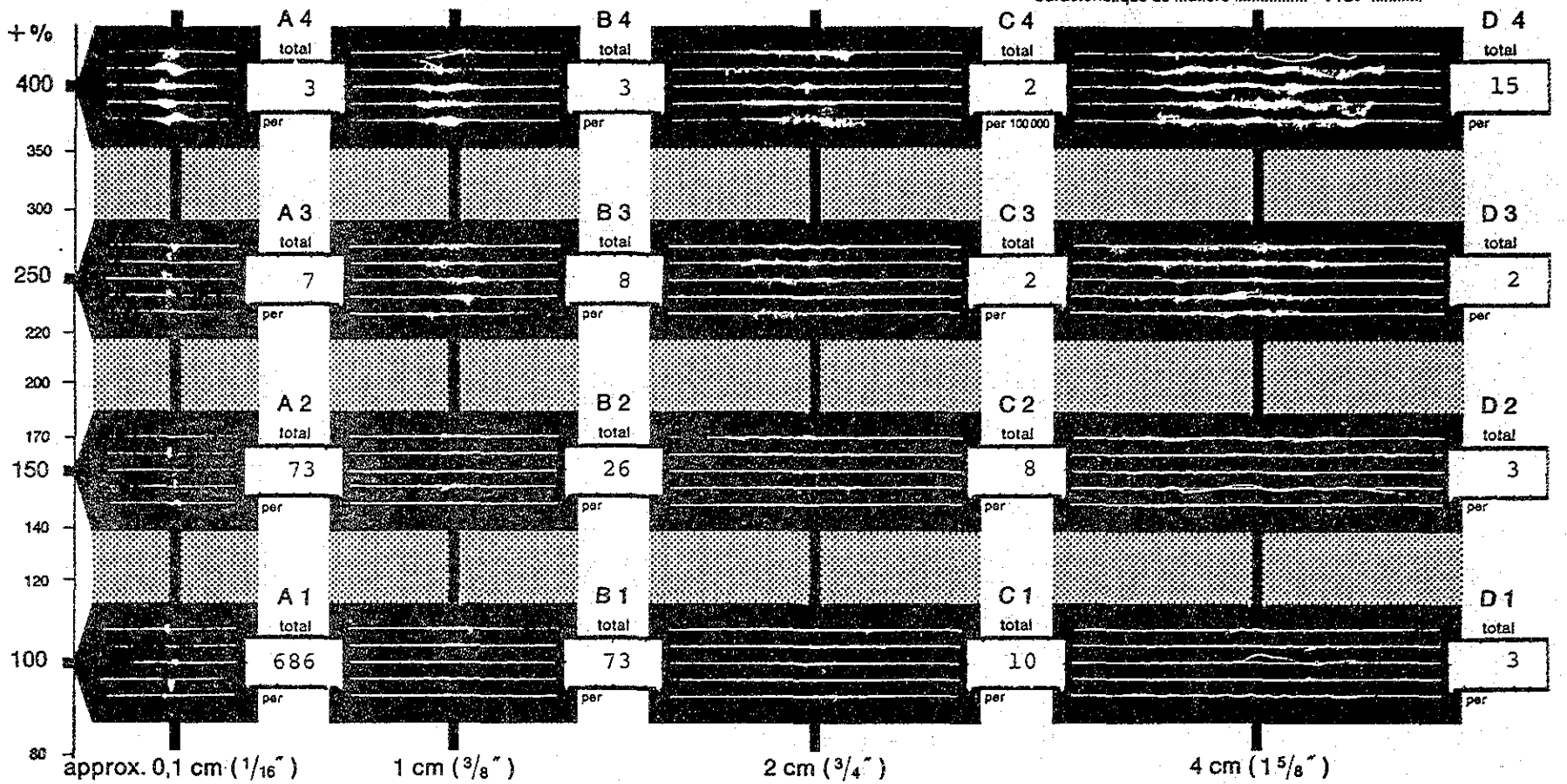
Lot / Partie / Los: (E)

Ne 30 Nm Tex

Material Scale
Materialziffer
Caractéristique de matière

RH% Dat.

Vis.



Ne of yarn tested
Nm des geprüften Garnes
Nm du fil contrôlé
30 Ne

Weight of yarn tested
Gewicht der geprüften Garne
Poids du fil controlé
480 g

Tested length
Geprüfte Länge
Longueur controlée
oz × 52,5 × Ne = yards
Nm × Kg × 1000 = meter
24,842 m

Conversion of values to per 100 000
Umrechnung der Werte auf 100 000 yds/m
Conversion des valeurs pour 100 000

Counter reading
Zählerstand
Lecture
× 100 000 =

Tested Length
Geprüfte Länge
Longueur contrôlé
in en yds/m

Edition 1968

240 064-40

Results of the attached yarn quality tests are as follows;

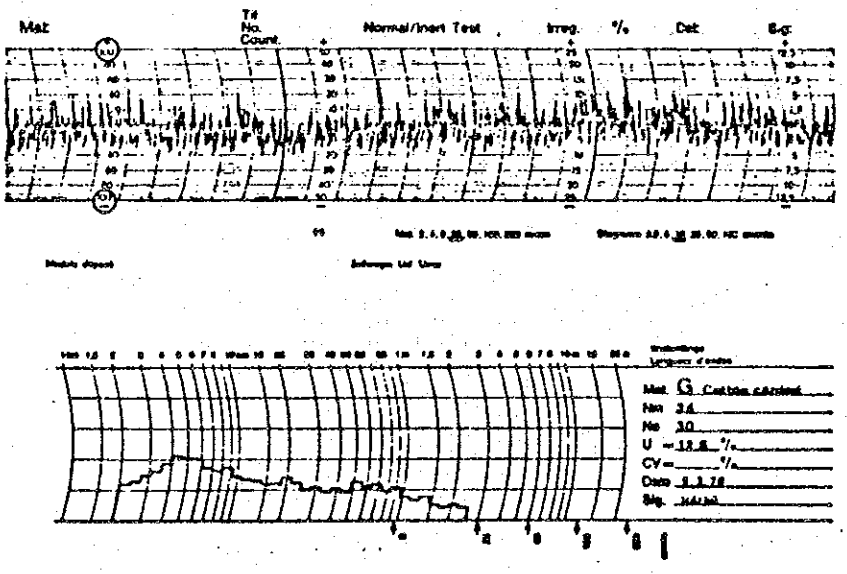
1) Yarn count deviation percentage, yarn count variation coefficient, U% as well as thin places, thick places and nep items are all observed to be very poor. In particular, as indicated in Figure 1, U% (unevenness) graph indicates larger amplitude, which poses big problem.

Table 13 Measured Value of U% for each 5 pcs Cop

n	Ne 11	Ne 20	Ne 30	Ne 40	Cotton/Rayon Ne 30
1	16.9	18.9	23.2	22.0	17.7
2	17.7	23.8	21.7	21.3	17.3
3	17.8	18.9	21.8	20.2	17.9
4	16.8	23.9	20.7	22.6	16.5
5	16.3	19.0	20.3	21.8	17.8
X	17.1	20.9	21.5	21.6	17.4

2) As the results of the spectrogram and U% graph, depending on the test pieces, the cyclical unevenness are observed. The cause thought of seems to be the cyclical unevenness caused by eccentricity of rollers of the ring spinning frame or fly frame.
As the normal gramme specimen, Figure 4 indicates the results of the irregular yarn diagram and spectrogram of non-defective yarn.

Figure 4 Non-defective Gramme



3) In Japan it is the fundamental practice that evaluation of the strength characteristics are measured by single yarn. What poses problem in the warping process and knitting process is the single yarn strength value, however, in Cilacap Mill it is equipped with the Lea Strength gauge, but the single yarn strength cannot be measured.
Therefore, at the new project the system shall be converted so that the single yarn strength measurement can be effected.

4) From the results of the quality tested, the problem involved in the control technique for the working process (quality) are considered to be as follows;

- Among the control items now under execution, the necessary data to be the basis of the process (quality) control are picked up, however, they are not effectively used.
- The consciousness toward target control is observed poor, and attention to the fundamental cycle P.D.C.A. (Plan, Do, Check and Action) of the work is observed poor.
- Positive introduction of the quality control technique (use of control chart etc.) is observed insufficient, where systemization of use and follow-up by grasping, analysing, numerating and graphicalizing current situation of the standard movements, training program, as well as clear working standards are urgently required.

4-2 Production Machinery and Equipment;

4-2-1 List of Machines and Equipments and their Main Specifications

1) List of Production Machines and their Main Specification;

The current number of production machines installed and their major specifications are as per Table 14.

Table 14-1 indicates the production machines and facilities installed at CP-1 Mill.
Table 14-2 shows the production machines and facilities installed at CP-2 Mill.

2) List of Auxiliary Equipments and Laboratory Equipments;

Particulars of the auxiliary equipments and laboratory equipments currently installed are as per Table 15.

Table 15-1 indicates the list of major auxiliary equipments installed at CP-1 Mill.
Table 15-2 shows the list of major auxiliary equipments installed at CP-2 Mill.
Table 15-3 represents the list of laboratory equipments.

Table 14 -1 SPECIFICATION FOR MAIN PRODUCTION MACHINERY

(CP-1 Existing Mill)

Item No.	Machine/Equipment	Quantity
S-1-1	Blow Room Machinery (HOWA) 1) Year of manufacture: 1952 2) Lap feeding system to card 3) Line arrangement (a) Opening line: 3 lines 1-Creeper lattice 1-Hopper bale breaker 1-Hopper opener 1-Porcupine opener 1-Single crighton opener 1-Hopper feeder 1-Lattice feeder with regulator 1-Single crighton opener 1-Exhaust opener & lap machine (b) Single scutcher & lap machine : 5 sets	3 lines
S-1-2	Revolving flat carding engine (HOWA) 1) Type of machine: CM 2) Year of manufacture: 1952 3) Lap feeding system 4) Number of flats: 106 5) Fly comb system 6) Sliver can size: 10" diametre x 36" height	112 sets
S-1-3	Drawing Frame (HOWA) 1) Type of machine: DF 2) Year of manufacture: 1952 3) Number of passages: 3 passages x 11 sets 4) Number of deliveries per frame: 8 deliveries 5) Number of feeding slivers per delivery: 6 slivers 6) Weighting system: dead weight 7) Delivery can size: 10" diametre x 36" height	33 sets
S-1-4	Simplex Fly Frame (HOWA) 1) Type of machine: RM 2) Year of manufacture: 1952 3) Number of spindles per machine: 124 spindles 4) Lift: 10" lift 5) Drafting system: 4 roller dead weighting system	19 sets

Item No.	Machine/Equipment	Quantity
S-1-5	Ring Spinning Frame (HOWA) 1) Type of machine: SF 2) Year of manufacture: 1952 3) Number of spindles per machine: 400 spindles 4) Spindle gauge: 2-5/8" 5) Lift: 6" lift 6) Drafting system: 3 roller dead weighting system 7) Overhead travelling cleaner	75 sets
S-1-6	Ring Doubling (Twisting) Frame (HOWA) 1) Type of machine: SV 2) Year of manufacture: 1952 3) Wet type system 4) Number of spindles per machine: 400 spindles 5) Spindle gauge: 2-1/2" 6) Lift: 7" lift	6 sets
S-1-7	Ring Doubling (Twisting) Frame (HOWA) 1) Type of machine: SV 2) Year of manufacture: 1961 3) Dry type system 4) Number of spindle per machine: 400 spindles 5) Spindle gauge: 76.2 mm (3") 6) Lift: 229 mm (9")	2 sets
S-1-8	Ring Twisting Machine 1) Type of machine: TD/A 2) Year of manufacture: 1952 3) Number of spindle per machine: 400 spindles	3 sets
S-1-9	Ring Twisting Machine 1) Type of machine: TD/C 2) Year of manufacture: 1952 3) Number of spindle per machine: 200 spindles	2 sets
S-1-10	Ring Twisting Machine 1) Type of machine: TD/D 2) Year of manufacture: 1952 3) Number of spindle per machine: 40 spindles	2 sets

Item No.	Machine/Equipment	Quantity
S-1-11	Quick Traverse Winder (HOWA) 1) Type of machine: SW 2) Year of manufacture: 1952 3) Number of drum per machine: 100 drums	6 sets
S-1-12	Doubler Winder (KAMITSU) 1) Type of machine: D.R.T 2) Year of manufacture: 1961 3) Number of drum per machine: 100 drums 4) Take-up package: 6" traverse x parallel cheese	2 sets
S-1-13	Cone Winder (KAMITSU) 1) Type of machine: R.T 2) Year of manufacture: 1961 3) Number of drum per machine: 100 drums 4) Take-up package: 6" traverse x 9°15'	8 sets
S-1-14	Single Reeling Machine (HOWA) 1) Type of machine: PR 2) Year of manufacture: 1952 3) Number of hanks: 40 hanks 4) Circumference of wooden swift: 54"	45 sets
S-1-15	Bundling Press (HOWA) 1) Type of machine: BP 2) Year of manufacture: 1952 3) Length of box bar: 12" 4) width of box bar: 9-1/2"	4 sets
S-1-16	Baling Press	1 set
S-1-17	Roving Waste Opener (HOWA) 1) Type of machine: OR 2) Year of manufacture: 1952 3) Width of machine: 24"	1 set
S-1-18	Thread Extractor with Hopper (HOWA) 1) Type of machine: TE 2) Width of extractor: 43" 3) Width of hopper: 22"	1 set

Table 14-2 SPECIFICATION FOR MAIN PRODUCTION MACHINERY

(CP-2 Existing Mill)

Item No.	Machine/Equipment	Quantity
S-2-1	Blow Room Machinery 1) Year of manufacture: (a) for cotton line: 1961 (b) for synthetic line: 1971 2) Lap feeding system to card 3) Line arrangement (a) for cotton line: 2 lines 2-Blending bale opener 1-Waste opener 1-Hopper mixer 1-Superior cleaner 1-Economic cleaner 1-Hopper mixer 1-Garnett opener 1-Blending reserve box 1-Single beater & lap machine (b) for synthetic line: 1 line 1-Creeper lattice 1-Hopper mixer 1-Cylinder opener 1-Control feeder 1-Single beater & lap machine	3 lines
S-2-2	Revolving Flat Carding Engine (HOWA) 1) Type of machine: CM 2) Year of manufacture: 1961 3) Lap feeding system 4) Number of flats: 106 5) Fly comb system 6) Sliver can size: 356 mm (14") diametre x 914 mm (36") height	91 sets

Item No.	Machine/Equipment	Quantity
S-2-3	Drawing Frame (HOWA) 1) Type of machine: DF 2) Year of manufacture: 1961 3) Number of passages: 2 passages x 6 sets 4) Number of deliveries per frame: 4 deliveries 5) Number of feeding slivers per delivery: 8 slivers 6) Drawing system: 4 over 5 drafting system 7) Delivery can size: 356 mm (14") diametre x 914 mm (36") height	12 sets
S-2-4	Pre Mixing Drawing Frame (HOWA) 1) Type of machine: DF 2) Year of manufacture: 1971 3) Number of deliveries per frame: 4 deliveries 4) Number of feeding slivers per delivery: 8 slivers 5) Drawing system: 4 over 5 drafting system 6) Delivery can size: 356 mm (14") diametre x 914 mm (36") height	3 sets
S-2-5	Simplex Fly Frame (HOWA) 1) Type of machine: RS 2) Year of manufacture: 1961 3) Number of spindles per machine: 80 spindles 4) Lift: 279 mm (11") lift 5) Drafting system: 4 roller 2 zone drafting system	8 sets
S-2-6	Ring Spinning Frame (HOWA) 1) Type of machine: SF 2) Year of manufacture: 1961 3) Number of spindles per machine: 400 spindles 4) Spindle gauge: 76.2 mm (3") 5) Lift: 203 mm (8") 6) Drafting system: 3 line 2 zone double apron 7) Overhead travelling cleaner	75 sets
S-2-7	Cone Winder (KAMITSU) 1) Type of machine: RT 2) Year of manufacture: 1961 . . . 4 sets 1971 . . . 7 sets 3) Number of drum per machine: 100 drums 4) Take-up package: 6" traverse x 9°15'	11 sets

Item No.	Machine/Equipment	Quantity
S-2-8	Doubler Winder (KAMITSU) 1) Type of machine: DRT 2) Year of manufacture: 1961 . . . 1 set 1971 . . . 1 set 3) Number of drum per machine: 100 drums 4) Take-up package: 6" traverse x parallel cheese	2 sets
S-2-9	Ring Twisting Machine (HOWA) 1) Type of machine: SV 2) Year of manufacture: 1961 3) Dry type system 4) Number of spindle per machine: 400 spindles 5) Spindle gauge: 76.2 mm (3") 6) Lift: 229 mm (9")	22 sets
S-2-10	Single Reeling Machine (KYORITSU) 1) Year of manufacture: 1961 . . . 15 sets 1971 . . . 10 sets 2) Number of hanks: 50 hanks	25 sets
S-2-11	Bundling Press (KYORITSU) 1) Year of manufacture: 1961	2 sets
S-2-12	Baling Press (KYODO) 1) Year of manufacture: 1961	1 set
S-2-13	Roving Waste Opener 1) Year of manufacture: 1961	1 set
S-2-14	Willow Waste Opener (HORIGOE) 1) Year of manufacture: 1962	1 set
S-2-15	Lap Former (HOWA) 1) Type of machine: DY 2) Year of manufacture: 1971 3) Number of feeding slivers per frame: 48 slivers 4) Feeding can size: 356 mm (14") diametre x 914 mm (36") height 5) Drafting system: 2 over 3 drafting system 6) Automatic lap changing motion	1 set

Item No.	Machine/Equipment	Quantity
S-2-16	Comber (HOWA) 1) Type of machine: KATORY 2) Year of manufacture: 1971 3) Number of combing heads per frome: 8 heads 4) Number of deliveries per frame: 2 deliveries 5) Delivery can size: 508 mm (20") diametre x 1067 mm (42") height 6) Drafting system: 2 over 2 system	2 sets
S-2-17	Vacuum Steam Setter (NIKKU) 1) Type of machine: SBR-4 2) Year of manufacture: 1971 3) Full automatic vacuum system 4) Housing capacity of cop: approx. 200 kg/charge 5) Construction	1 set
	(a) Vacuum chamber	1 set
	(b) Desuperheater	1 set
	(c) Separator	1 set
	(d) Retum pump	1 set
	(e) Vacuum pump	1 set
	(f) Condenser	1 set
	(g) Control panel	1 set
	(h) Valves and piping	1 set
	(i) Air compressor	1 set
S-2-18	Hank Dyeing Equipment	1 unit
S-2-19	Mercerizing Equipment	1 unit
S-2-20	Hank to Cone Winder 1) Year of manufacture: 1971 2) Number of drums: 20 drums	11 sets

Table 15-1 LIST FOR AUXILIARY EQUIPMENT

(CP-1 Existing Mill)

Item No.	Equipment	Quantity
AUX-1-1	Flat Clipping Machine	2 sets
-2	Flat Grinding Machine	2 sets
-3	Portable Flat Cleaner	1 set
-4	Licker-in Roller Mounting Machine	1 set
-5	Gum Cot Grinding Machine	1 set

Table 15-2 LIST FOR AUXILIARY EQUIPMENT

(CP-2 Existing Mill)

Item No.	Equipment	Quantity
AUX-2-1	Flat Clipping Machine	1 set
-2	Flat Grinding Machine	2 sets
-3	Licker-in Roller Mounting Machine	1 set
-4	Chain Washing Machine	1 set
-5	Gum Cot Grinding Machine	1 set
-6	1t-Fork Lift	4 sets
-7	Ring Spinning Bobbin for 8" Lift	10,000 pcs

Table 15-3 LIST FOR LABORATORY EQUIPMENT

(Existing Mill)

Item No.	Equipment	Quantity
LAB-1	Twist Tester	2 sets
-2	Evenness Testing Installation USTER Integrator Recorder	1 set
-3	Bear Sorter	1 set
-4	Shirley Analyser with Balance	1 set
-5	Pressley Cotton Fiber Strength Tester	1 set
-6	Micronaire Installation	1 set
-7	Conditioning Oven	1 set
-8	Yarn Inspection Winder (Seri Plein)	1 set
-9	Analytical Balance	2 sets
-10	Torsion Balance	1 set
-11	ACME Material Indentifier	1 set
-12	BAUMES Hydrometer	1 set
-13	Projector Microscope	1 set
-14	Microscope	1 set
-15	Staple Length Tester	1 set
-16	Lea Tester	2 sets
-17	Wrap Block	2 sets
-18	Yarn Inspector for one black board	1 set
-19	Wrap Reel (Hand Driven)	2 sets
-20	Grain Balance	2 sets
-21	Balance 10 kg	1 set
-22	Scale 30 kg	1 set

4-2-2 Lay-out of Production Machines:

The compound of Cilacap Mills is a rectangular shape of about 700 m East and West and about 220 m South and North, in which about 160,000 m² site following Mill buildings are built:

CP-1 Mill	about 10,965 m²	30,000 spindles
CP-2 Mill	about 12,462 m²	30,000 spindles
Total:	about 23,427 m²	60,000 spindles

The two mills hold 60,000 spindles spinning facilities, where the machines and facilities are positioned respectively.

Figure 5 indicates buildings lay-out.

Figure 6 shows lay-out of machines in CP-1 Mill

Figure 7 represents lay-out of machines in CP-2 Mill.

1) Lay-out of Production Machines in CP-1 Mill

(a) Summary:

The blowing machines are positioned in the South of the mill building and working semiproducts are processed in succession to the North through carding engines, drawing frames, fly frames, ring spinning frames and finally to packing room through positionings of winders, twisting frames and reeling machines, where as the whole, the flow of semiproducts are laid out smoothly, however, space between machine and machine, process and process is observed narrow, which causes difficulty in carriage of laps and cans and it is observed that normal storing places between the processes are insufficiently secured.

In the annex building of about 6.7 m width to the mill building houses air-conditioning room, maintenance room and field office, which for a mill of 30,000 spindles, the air conditioning facility has only small capacity and equipped only at one place.

The distance between pillars to the South and North direction are standardized by 6,706 mm, however, those to the East and West direction are different such as 4,877 mm, 6,095 mm, 6,706 mm and 7,925 mm which is designed to the need of every installed machine.

(b) On Blowing Section:

At the South-west side of the mill, a sufficient space is secured for storage of raw cotton and opening bales, as well as for storage of laps out of blowing machines.

(c) On Carding Section:

112 sets of carding engine are installed with the minimum distance between the machines. Cans used are rather small with 10ϕ x 36" (H), however, these are observed inconvenient to be brought behind drawing frames. Further, space in front of and behind cards are observed narrow with about 1.3 m and in particular, the distance to a pillar is about 1.2 m at the center, which is observed obstructive to carriage of laps.

(d) On Drawing and Roving Section:

11 sets of drawing frames for 3 passages are positioned in parallel. 19 sets of fly frames are installed at right angle to the drawing machines. The storage places behind drawing frames and fly frames are provided to their maximum limit available.

(e) On Ring Spinning Section:

75 sets of ring spinning machine with each 400 spindles are positioned in 2 lines. The machines are positioned with the minimum distance between them and distance between North side partition, however, they are too narrow for carrying cops and rovings, which seems to be somewhat obstructive in respect of workability.

(f) On Winding, Twisting and Reeling Section:

Due to co-existence of various different kinds of machines in the same place, the flow in the processes is observed complicated. However, it seems that the normal storage places between machines are secured to the maximum limit available.

2) Lay-out of Production Machines in CP-2 Mill

(a) Summary:

In CP-2 Mill, as compared with CP-1 Mill, longer distance are adopted between pillars, therefore, number of pillars are fewer than CP-1 Mill, which allows the machines positioning ample room as the whole.

For flow of the process, blowing machines are positioned in the North-west direction and laps are applied to carding engines placed in the Northern side. Then, the flow goes through drawing frames, fly frames and ring spinning frames to the Southern direction, and further through machineries of winding, twisting and reeling which are separated by partition, the products are packed at the South side to be brought into products warehouse there.

In an annex near to a boiler room to the South-west side, there are your dyeing facilities. In another annex to the opposite side (East), there are air-conditioning, maintenance room and field office provided respectively and independently.

(b) On Blowing Section:

Cotton lines and synthetic fiber line are installed separately in distinct chambers to avoid admixture of raw cottons of varying kinds, where it was observed that sufficient spaces were secured for storing raw cotton and opening bales.

(c) On Carding Section:

91 sets of carding engine for feeding laps and cans of 14"ϕ x 36" (H) are positioned efficiently for carriageability and workability.

(d) On Drawing and Roving Section:

These processes are, due to the reinforcement project of drawing frames and fly frames including installment of combing machines being underway, installed provisionally.

(e) On Ring Spinning Section:

75 sets of ring spinning machine with 400 spindles each are positioned in 2 lines, where distance between the machines are secured to the required minimum. No. 38 machine positioned near to the side of the air-conditioning room is right below the air-conditioning duct, therefore, the circumstance does not keep the travelling cleaner, which poses a problem in spinning condition.

(f) On Winding, Twisting and Reeling Section:

These processes are positioned in a chamber separated by partitions from the ring spinning process. Yarn dyeing equipments are, for dyeing in hanks, positioned near the dyeing room in consideration of the flow from the twisting process to the winding process.

(g) On Yarn Dyeing Section:

This process is positioned concentratedly in a chamber near the boiler room. Due to recent introduction of mercerizing facilities, rewinding machines are reinstalled in the position indicated on the Figure 7.

Figure 5 Layout for Cilacap Spinning Mill

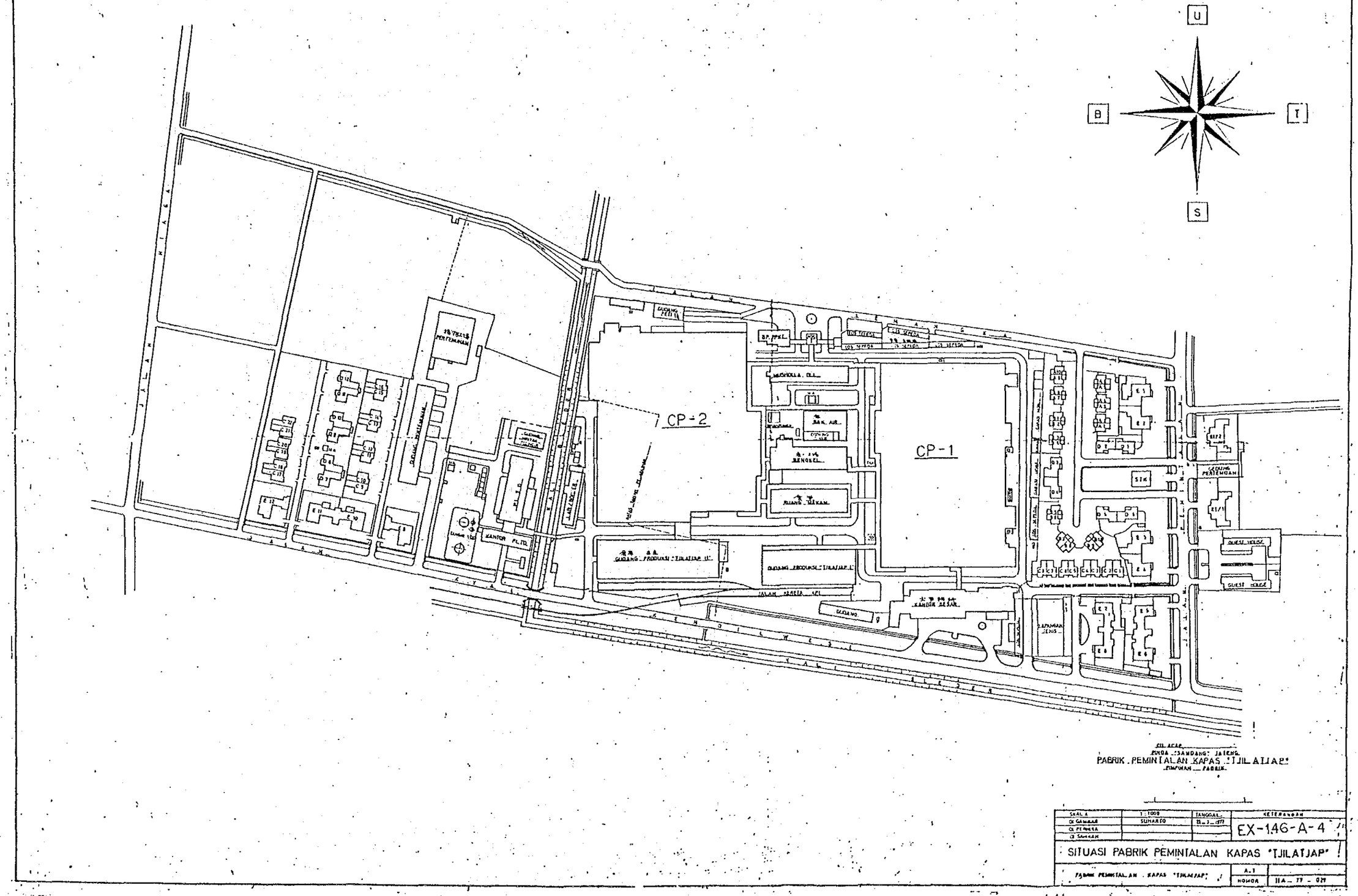


Figure 6 Layout for Machinery of CP-I

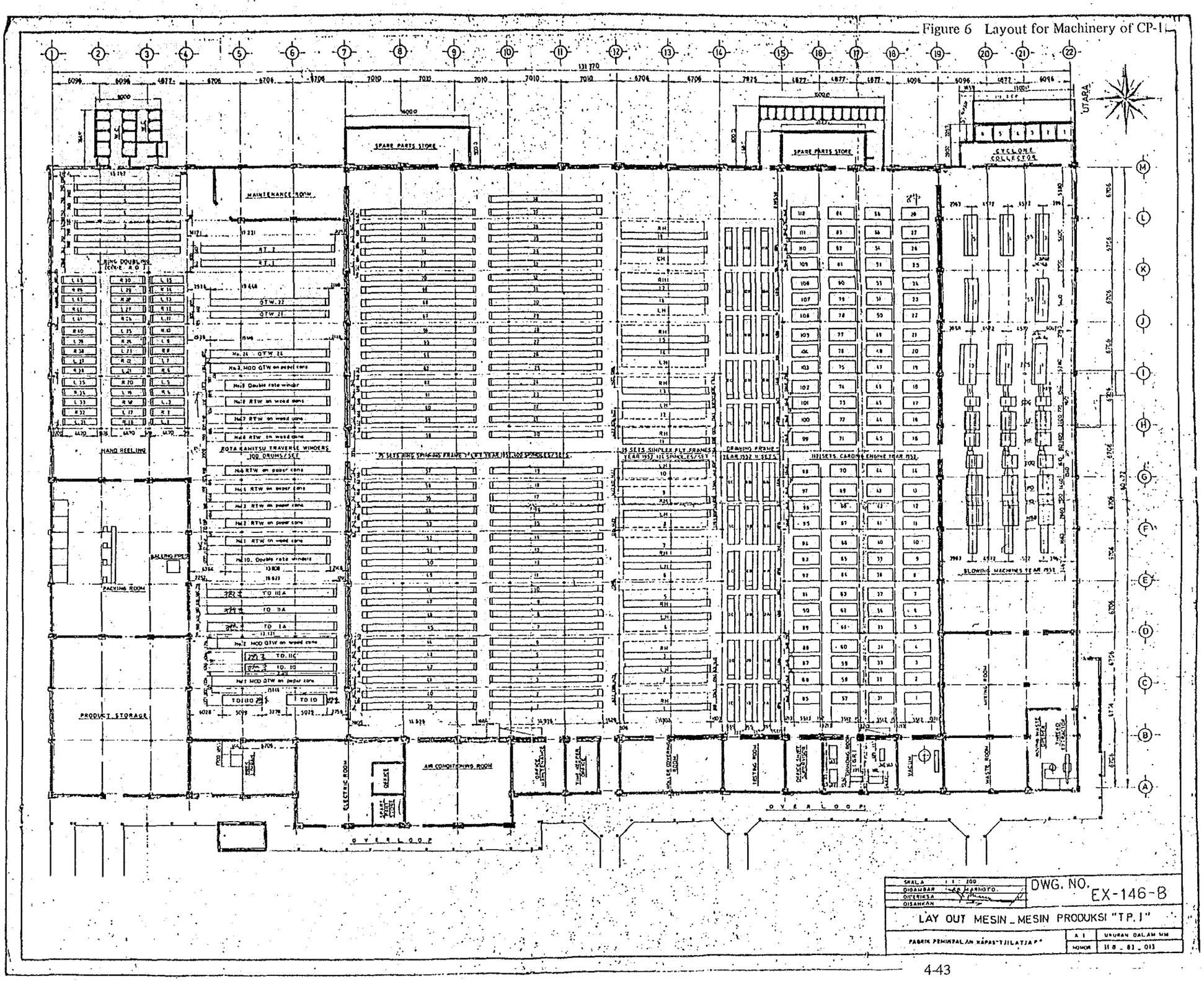
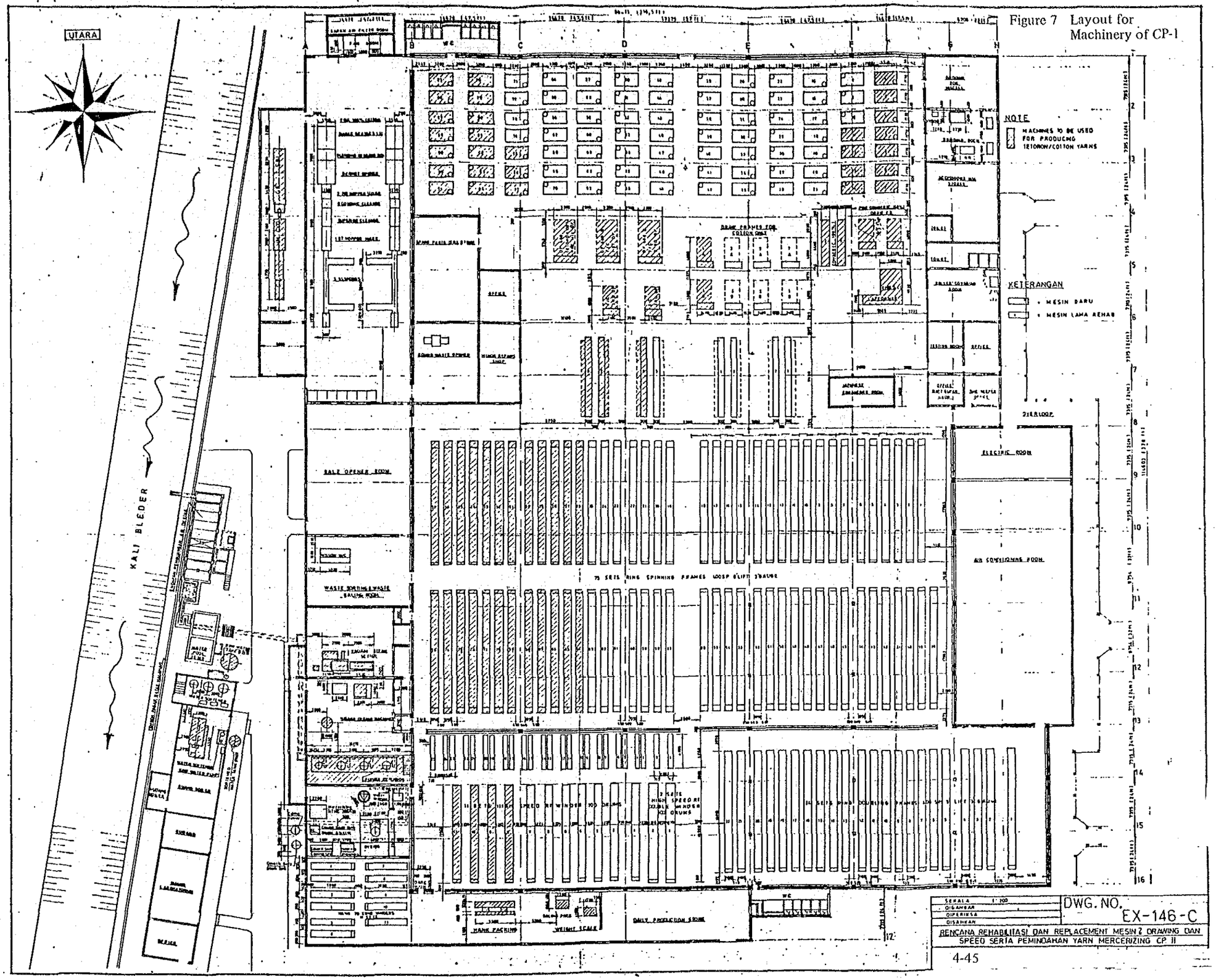


Figure 7 Layout for Machinery of CP-1



4-2-3 Maintenance Condition of Machines and their Usability:

1) Purpose and Importance of Maintenance

Although the maintenence plan and working manuals are available, insufficiant maintenance condition and deterioration of machinery is affecting considerally the quality of products.

The purpose of maintenance works is to keep machines in a perfect condition, where the perfect condition for a machine can be summarized into the following 3 items:

- The product made by the machine should be of superb quality.
- Capability of the machine should be used up to its full extent.
- Life of the machine should be kept to the maximum.

Consequently the machine has to be maintained in conformity with its own purpose. In other words, although decrease in its performances and specifications is inevitable for a machine with days of operation increased when a machine is operated all the time, in order to prevent these effect in advance, to maintain high mechanical performances, to elongate life of the machine, and to produce products of better quality, periodical cleaning, overhaul, repair and oiling are required, and checking of performances and specifications shall be carried out to realize perfect maintenance as well.

The maintenance technique is "the daily activities to maintain the facilities in a better operating conditions with a purpose of bearing the maximum revenue from the investments of the company".

For the production, maintenance and operation are so to speak wheels of a cart, without both of which, the production could not be attained. With complexity of the modern facilities advanced, the importance of the maintenance techniques is growing more and more. The maintenance department keeps their right and responsibility for the company to render the production department to be most effective and efficient by providing more better services and more speedy services. Therefore, usual checks on whether the maintenance is conducted in the prescribed orders, whether specified parts are used, or whether perfect products are produced in normal condition after the maintenance work should be maintained.

2) Installed Condition of Production Machines in CP-1 Mill and their Usability:

As the whole, the machineries (made by HOWA Machinery, Ltd.) and auxiliary facilities are made in 1952, which are remarkably old and obsolete, as well as with inferior quality. Moreover, all machine kinds are old-fashioned, which even if repaired and remodelled, its effect is not expectable. Therefore, in order to produce products of high quality, it should be required that all of them are to be replaced by the new kinds of machines.

(a) Blowing Section:

With old types machines used, the process is composed of 2 passages. Particularly, the opening condition of the cotton blocks is observed poor. Abrasion and play at bearing parts of machine and abrasion at needle tops are observed. There is much fluctuation of lap grains.

(b) Carding Section:

Their deteriorated condition is severe, where strain at cylinders and doffers and damage to metallic wires and Garnett wires were observed remarkable and neps were found in produced webs. Diameter of cans is observed small with 10" dia causing to be obstructive to operability, and accepting condition for slivers is also found to be disorderly.

(c) Drawing Section:

All machines are of old types for through process of 3 passages. As the cans of 10"ϕ x 36" (H) are used, operability is also found low. On the other hand, abrasion at metallic elements, eccentricity at bottom rollers and top rollers are observed. In addition, because weighing system of the roller is by means of dead weight system, the effect of doubling and drafting on the quality which is the main purpose of the drawing machine, is observed poor.

(d) Roving Section:

As roving winding lift is small with 10", operability is observed poor. The weighing system of roller is balance weight system, therefore, perfect drafting effect is difficult to be achieved. Caused by welded repairs for abrasion at every roller and breakage of rollers, eccentricity of the roller is observed here and there. On the other hand, also vibration of spindles is observed and as the result, cob-webbing and shoulder deformation of the wound roving are numerously observed. Moreover, of fibers are often caught by fliers.

(e) Ring Spinning Section:

Spinning of coarse yarn despite short lift (6") of cop causes doffing done more often than necessary, which lowers the operating efficiency. Instances of yarn breakage caused by vibration of spindles, defective bobbins and defects of rings, snail wires and rollers are observed very numerous (Instantaneous yarn breakage is about 24 pcs/400 spindles). Because the roller weighing system is dead weight system, it also causes drafting irregularity.

Overhead blow cleaner is equipped at a rate of 1 set thereof to 9 sets of ring spinning frames, with a circulating type, however, this system produces not much cleaning efficiency on coarse yarns.

(f) Winding Section:

Machines are Q.T. winders and R.T. winders made by Kamitsu in 1961. Due to abrasion and insufficient maintenance of the machines, numerous cases of cobwebbing are observed, which cause yarn breakage in the succeeding processes.

Removal device of yarn defects also includes slub catchers of old mechanical type, which produces not much removal effect.

(g) Other Machines:

Doublers, twisters and reeling machines are installed, however, almost of these machines were not used. In order to secure the required space for the installation following the renovation project, those machines are desirably removed.

3) Installed Condition of Production Machines in CP-2 Mill and their Usability:

CP-2 Mill has been erected about 10 years later than CP-1 Mill, majority of which machine are of 1961-made by HOWA Machinery, Ltd. Particularly carding engines and ring spinning frames are considered to be improvable in their performances by repairs and remodels.

(a) Blowing Section:

In the cotton line, the maintained condition of machines are observed poor, with which ineffective opening condition of the cotton is observed. Here and there, abrasion at top of needles, flaws at rollers and caught cotton are observed, causing following larger variation of grains for lap's weight.

On the other hand, in the line for the synthetic fibers machine in 1971 are adopted. Maintained condition for this machine is observed better than the cotton line, however, more detailed maintenance and adjustment are observed desirable (improvements in maintenance techniques). In particular, deterioration at scutcher element is remarkable. By this reason, beating cotton condition is observed yet insufficient and due to inefficient blowing to cage, the following larger variation of grains in lap's weight is observed. It is considered that improvements in products quality is expectable by remodelling those scutcher element by new ones.

(b) Carding Section:

The machines are composed of 91 sets.

The maintained condition of them is observed to be better than those in CP-1 Mill, therefore, these can remain in service provided partial repair is carried out and large package and high production system is adopted.

Namely, centering of the cylinders and doffers are to be corrected to rectify their vibration, metallic wires and flat clothings are to be replaced by the new wires appropriate for the renovation, defective parts are to be changed, winding coilers and cans are to be changed from 14"ϕ x 36" (H) to 36"ϕ x 42" (H) and thus they have to be made large-packaged, and 37 sets out of total 91 are recommendedly retained in CP-2 mill at the renovation, sending the remaining 54 sets to CP-1 Mill for re-installation and use there.

(c) Drawing Section:

CP-2 Mill keeps 12 sets of old-type drawing frame made in 1961 and 3 sets of delivery-type drawing frame made in 1971.

There are some of machine repaired by welding due to breakage of front bottom rollers by lapping at the rollers, from which eccentricity and vibration of the bottom rollers and noise are observed.

(d) Roving Section:

There are problems involved in productivity and operability. Namely, with shorter lift of 11", doffing cycle is short and long time is required for doffing work.

On the other hand, insufficient maintenance for machines is noted, which produces uneven and dirty shapes and layers of rovings, supposedly being caused by numerous breakage of roving yarns. Vibration of rollers and machines are seemingly caused by abrasion at metallic parts or inferior centering of parts concerned. Fibers caught at fliers are seen here and there.

(e) Ring Spinning Section:

75 sets of machines with each 400 spindles are adopted. Their specification is with 8" lift x 3" spindle gauge. Due to insufficient maintenance of roller and spindle parts, instances of yarn breakage are numerously noted. Similar to CP-1 Mill, an overhead blow cleaner is equipped for every 9 sets of ring spinning frame, with circulating type, however, the cleaning effect is noted low.

As the fine spinning frame's structure and foundation are sturdily made, improvements in performances and quality are expectable by the following repair and remodel;

Replacement of Draft Part,
Repair at Spindle Part,
Replacement of Overhead Blow Cleaner,
Large-packaging of Creel, and
Repair at Driving Part.

(f) Winding Section:

4 sets of R.T. type winder made in 1961 and 7 sets of R.T. type winder made in 1971, total 11 sets are installed.

All above machines are observed in bad maintenance condition and instances of cobwebbing to wound cheeses are numerously noted, indicating the defect having been caused by usual insufficient maintenance condition. For removal device of yarn defect, slub catcher of mechanical system is adopted, however, this is noted unable to remove the yarn defect completely. 3 sets of winder made in 1971 are considered to be improvable in performances and quality by repair and remodel.

(g) Other Machines:

Majority of doubler, twisting frame and reeling machine out of use except a part in service had better be abondoned, but some are better to be maintained after transferring. Yarn dye equipment is not mentioned here, because it is not included in the scope of the project.

4) Installed Condition of Auxiliary and Laboratory Equipments and their Usability:

Usabilities of the major auxiliary and laboratory equipments now held in CP-1 and CP-2 Mills are as indicated in table 16 by marks of O and X.

Talbe 16-1 LIST FOR AUXILIARY EQUIPMENT

(CP-1 Existing Mill)

Item No.	Equipment	Quantity	
AUX-1-1	Flat Clipping Machine	2 sets	X
-2	Flat Grinding Machine	2 sets	X
-3	Portable Flat Cleaner	1 set	O
-4	Licker-in Roller Mounting Machine	1 set	X
-5	Gum Cot Grinding Machine	1 set	X

Table 16-2 LIST FOR AUXILIARY EQUIPMENT

(CP-2 Existing Mill)

Item No.	Equipment	Quantity	
AUX-2-1	Flat Clipping Machine	1 set	X
-2	Flat Grinding Machine	2 sets	X
-3	Licker-in Roller Mounting Machine	1 set	O
-4	Chain Washing Machine	1 set	O
-5	Gum Cot Grinding Machine	1 set	X
-6	1t-Fork Lift	4 sets	O
-7	Ring Spinning Bobbin for 8" Lift	10,000 pcs	O

Table 16-3 LIST FOR LABORATORY EQUIPMENT

Item No.	Equipment	Quantity	
LAB-1	Twist Tester	2 sets	O
-2	Evenness Testing Installation USTER Integrator Recorder	1 set	O
-3	Bear Sorter	1 set	O
-4	Shirley Analyser with Balance	1 set	O
-5	Pressley Cotton Fiber Strength Tester	1 set	O
-6	Micronaire Installation	1 set	X
-7	Conditioning Oven	1 set	O
-8	Yarn Inspection Winder (Seri Plein)	1 set	O
-9	Analytical Balance	2 sets	O
-10	Torsion Balance	1 set	O
-11	ACME Material Indentifier	1 set	O
-12	BAUMES Hydrometer	1 set	O
-13	Projector Microscope	1 set	O
-14	Microscope	1 set	O
-15	Staple Length Tester	1 set	O
-16	Lea Tester	2 sets	O
-17	Wrap Block	2 sets	O
-18	Yarn Inspector for one black board	1 set	O
-19	Wrap Reel (Hand Driven)	2 sets	X
-20	Grain Balance	2 sets	X
-21	Balance 10 kg	1 set	O
-22	Scale 30 kg	1 set	O

4-3 Electricity and Utility Equipment

4-3-1 Electricity and Utility Equipment List and Main Specifications:

Table 17 indicates the number of existing major electricity equipment and their specifications, and Table 18 shows the number of major utility equipment and their specifications. In these tables, the particulars are shown for CP-1 and CP-2, and for the joint-use facility as well.

Table 17 ELECTRIC EQUIPMENT LIST

(CP-1 Existing Mill)

Item No.	Equipment/Specification	Quantity
E-1-1	Incoming substation for PLN 1) Demand : 2,175KVA 2) Voltage : 6KV	1 set
E-1-2	Transformer for process 1) Year of Manufacture: 1,936 2) Capacity: 400KVA continuous 3) Voltage : prim. . . . 6^{KV} second. . $400^{V}/231^{V}$, $231^{V}/133^{V}$	5 sets
E-1-3	Transformer for Air Conditioner 1) Year of Manufacture: 1,952 2) Capacity: 500KVA continuous 3) Voltage : prim. . . . 6^{KV} second. . $233^{V}/230^{V}$	1 set
E-1-4	Transformer for Refrigerator 1) Year of Manufacture: 1,952 2) Capacity: 500KVA continuous 3) Voltage : prim. . . . 6^{KV}, second. . $40^{V}/230^{V}$	1 set
	(CP-2 Existing Mill)	
E-2-1	1,100KVA Diesel Generator Year of Manufacture: 1,962	4 sets
E-2-2	1,250KVA Diesel Generator Year of Manufacture: 1,972	1 set
E-2-3	Transformer for Process 1) Year of Manufacture: 1,952 2) Capacity: 600KVA continuous 3) Voltage : prim. . . . 6^{KV}, second. . $233^{V}/230^{V}$	2 sets
E-2-4	Transformer for Air Conditioner 1) Year of Manufacture: 1,952 2) Capacity: 750KVA continuous 3) Voltage : prim. . . . 6^{KV}, second. . $233^{V}/230^{V}$	1 set

Table 18 UTILITY EQUIPMENT LIST

(CP-1 Existing Mill)

Item No.	Equipment/Specification		Quantity
U-1-1	Refrigerator		5 sets
	1) Year of Manufacture: 1,955		
	2) Capacity: 75 USRt		
	3) Type : Reciprocating Compressor		
	4) Subsidiary Apparatus		
	(a) Chilled Water Pump	3 sets	
	2 m^3/m x 19KW		
	(b) Chilled Water Return Pump	2 sets	
	2 m^3/m x 5KW		
	(c) Cooling Water Pump	2 sets	
	3.417 m^3/m x 22KW		
U-1-2	Air Conditioner		14 sets
	1) Year of Manufacture: 1,955		
	2) Capacity: 240 m^3/m		
	3) Accessories		
	(a) Air supply duct with air outlet		
	(b) Air washer		
	(c) Air humidifier		
	(d) Air supply fan: 240 m^3/m x 5.5KW		

(CP-2 Existing Mill)

Item No.	Equipment/Specification		Quantity
U-2-1	Refrigerator		2 sets
	1) Year of Manufacture: 1,962		
	2) Capacity: 420 USRt		
	3) Type : Turbo Compressor		
	4) Subsidiary Apparatus		
	(a) Chilled Water Pump	2 sets	
	5.15 m^3/m x 55KW		
	(b) Cooling Water Pump	2 sets	
	4.55 m^3/m x 30KW		
	(c) Cooling Tower	3 sets	
	Fan Motor: 5.5KW		

Item No.	Equipment/Specification	Quantity
U-2-2	Air Conditioner for Ring 1) Year of Manufacture: 1,962 2) Capacity: 5,666 m^3/m 3) Accessories (a) Air supply duct with air outlet (b) Air Return duct with air inlet (c) Air washer (d) Air filter (e) Air Supply fan: 5,666 m^3/m x 55KW x 1 set (f) Air Return fan: 1,600 m^3/m x 15KW x 2 sets	1 set
U-2-3	Air Conditioner for Finishing 1) Year of Manufacture: 1,962 2) Capacity: 990 m^3/m 3) Accessories (a) Air supply duct with air outlet (b) Air return duct with air inlet (c) Air washer (d) Air filter (e) Air supply fan: 990 m^3/m x 15KW (f) Air return fan: 710 m^3/m x 7.5KW (g) Humidifier: 4 sets Centrifugal type	1 set

(CP-1/2 Existing Mill)

Item No.	Equipment/Specification	Quantity
U-3-1	Boiler 1) Year of Manufacture: 1,971 2) Capacity: 2,000Kg/h 3) Max pressure: 8.5Kg/cm^2 4) Type: Smoke Tube Boiler 5) Accessories (a) Feed water tank: 6 m^3 (b) Water Softener: Capacity . . . 25 m^3/h--Cycle (c) Full Oil service tank: 1,000ℓ	1 set

U-3-2	Water Service	1 lot
	1) 18 m^3/h Well, pump capacity 7.5KW	3 sets
	2) 30 m^3/h Well, pump capacity 7.5KW	5 sets
	3) 4.2 m^3/h Well, pump capacity 3.7KW	4 sets
	4) Central water tank Volume: 900 m^3	1 set
	5) Elevated water tank for Drinking water Volume: 15 m^3 Height: 15 m	1 set
	6) Elevated water tank-I (for fire fighting) Volume: 50 m^3 Height: 22 m	1 set
	7) Elevated Water tank-II (for fire fighting) Volume: 15 m^3	1 set

4-3-2 Outline of Electricity Equipment:

1) Facility for Incoming Power:

At present, the contracted incoming power volume is 2,175 KVA.

At the receiving power point, the voltage is 6,000 volts, whereas the distribution circuits in urban area bear 20,000 volts.

These 20,000 volts circuits were recently installed. Because the old power distribution system was for 6,000 volts, Cilacap Spinning Mill is receiving the power transformed from 20,000 volts down to 6,000 volts by the electric power company (PLN). The transformer used for changing the power from 20,000 volts to 60,000 volts is installed very near the Mill, of which secondary wiring cables are buried under ground. The capacity of this voltage-dropping transformer was for 5 KVA and with automatic tap switching voltage regulator.

PLN is considering the power supply with 6,000 volts to be a special treatment and wishing the supply with 20,000 volts for new installations as well as for increment in contracted power supply. Already, Cilacap Spinning Mill is scheduled to be completed for themselves by the end of 1984, where they are planning repairs for themselves and their application for the additional power supply, 2.175 KVA to meet the requirements due to the repairs and remodels has already been made to PLN in Janauary, 1984. Following this application submitted by Cilacap Spinning Mill, PLN has already extended their power supply cables for 20,000 volts up to within the Mill as at August, 1984. Therefore, from now on, the purchasing power from PLN will be with 20,000 volts, for which the new installations of the incoming power station and equipments will be made accordingly.