Second Mill Cotton: Annual consumption volume 3,410,000 LBS

× $0.75 × 1,954 × 0.5/12 = 208,223 Th.Rp

Polyester: Annual consumption volume 2,265,000 kg

× Rp2,200 × 0.5/12 = 207,625 Th.Rp

Total raw material cost for the Second Mill 415,848 Th.Rp

Total raw material cost 1,156,403 Th.Rp.... Local cost

Pre-operational cost total 4,104,231 Th.Rp ... Local cost

First Mill	3,497,167 Th.Rp
Second Mill	607,064 Th.Rp

(4) Consulting Cost

The total consulting expenses included in the construction cost are assumed to be as follows:

1) Design fees

i) Basic design

Spinning 4 persons × 1.5 months = 6 man-months

Utility 1 person × 2 months = 2 " "

Electricity 1 person × 2 months = 2 " "

Architecture 1 person × 1 months = 1 " "

11 man-months × ¥2,000 = ¥22,000,000

ii) Detailed design ¥20,000,000

- Flight charges for sight investigation

14 round-trips × ¥300,000 = ¥4,200,000

iii) P/Q, tender documentation, tender evaluation

Spinning 4 persons × 1 month = 4 man-months

Utility 1 person × 1 month = 1 " "

Electricity 1 person × 1 month = 1 " "

Architecture 1 person × 1 month = 1 " "

7 man-months × ¥2,000,000 = ¥14,000,000

Design fees total ¥60,200,000

2) Field work cost

i) Construction work supervision

	Rank	Man-month	Rate	Amount
Project manager	A 1 person	× 13 mos	¥2,400,000	¥32,200,000
Assistant manager	A' 1 person	× 15 mos	¥2,200,000	¥33,000,000
Spinning engineer	A' 2 persons	× 5 mos	¥2,200,000	¥22,000,000
" "	B 2 persons	× 5 mos	¥2,000,000	¥20,000,000
" "	C 4 persons	× 5 mos	¥500,000	¥10,000,000
Utility engineer	A' 1 person	× 10 mos	¥2,200,000	¥22,000,000
Electric engineer	A' 1 person	× 10 mos	¥2,200,000	¥22,000,000
Construction engineer	A' 1 person	× 10 mos	¥2,200,000	¥22,000,000
		98 man-months		¥182,200,000

If the construction work supervision for Cipadung Mill is enforced by the same staff:

¥182,200,000 × 1/2 = ¥91,100,000

ii) Miscellaneous expenses

- Air freight 10 round trips × ¥300,000 × 1/2 = ¥1,500,000
- International communication expenses ¥200,000 × 13 months × 1/2 = ¥1,300,000

iii) Local cost

- Local air flight charges JKT-BDG 20 round trips × Rp100,000 = Rp2,000,000
- Domestic business travel expenses Rp150,000 × 400 days = Rp60,000,000
- Housing/domestic transport expenses Rp10,000,000

Local cost total Rp72,000,000 × 1/2 = Rp36,000,000

¥93,900,000

Field work cost total Rp36,000,000

¥154,100,000 - (2,185,816 Th.Rp)

Consulting cost total -- Foreign cost

36,000 Th.Rp -- Local cost

2,221,816 Th.Rp

If this is apportioned based on the ratio of construction cost(1) - (3), the following result is obtained: (Ratio of the First Mill to the Second Mill = 85/15)

Consulting cost for the First Mill 1,888,544 Th.Rp

Foreign cost	1,857,944
Local cost	30,600

Consulting cost for the Second Mill 333,272 Th.Rp

Foreign cost	327,872
Local cost	5,400

(5) Training Cost

1) Cost of OJT by foreign training staff

i) Training fee

Training manager	A	1 person	× 12 mos	× ¥2,400,000	=	¥28,800,000
Spinning trainer	A'	2 persons	× 7 mos	× ¥2,200,000	=	¥30,800,000
" "	B	1 person	× 7 mos	× ¥2,000,000	=	¥14,000,000
Utility engineer	A'	1 person	× 5 mos	× ¥2,200,000	=	¥11,000,000
Electric engineer	A'	1 person	× 5 mos	× ¥2,200,000	=	¥11,000,000
		43 man-months				¥95,600,000

If the training for Cipadung Mill is carried out by the same staff: ¥95,600,000 × 1/2 = ¥47,800,000

ii) Miscellaneous expenses

- Air freight 7 round trips × ¥300,000,000 × 1/2 = ¥1,150,000
- International transport expenses ¥200,000 × 12 mos × 1/2 = ¥1,200,000

iii) Local cost

- Local air flight charges JKT-BDG 10 round-trips × Rp100,000 = Rp1,000,000
- Domestic business trip expenses Rp150,000 × 80 days = Rp12,000,000
- Housing/domestic transport expenses Rp8,000,000

Local cost total Rp21,000,000 × 1/2 = Rp10,500,000

¥50,150,000

OJT cost total Rp10,500,000

2) Overseas training cost

Mill manager-class personnel 1 person × 0.5 mos x ¥2,000,000 = ¥1,000,000

Department/section manager-class personnel 4 persons × 3 mos ×¥2,000,000 = ¥24,000,000

Total ¥25,000,000

Training cost total

¥75,150,000 (1,065,957 Th.Rp)	.... Foreign cost
10,500 Th.Rp	.... Local cost

1,076,457 Th.Rp

Training cost for the First Mill 914,988 Th.Rp

Foreign cost	906,063 Th.Rp
Local cost	8,925 "

Training cost for the Second Mill 161,469 Th.Rp

Foreign cost	159,894 Th.Rp
Local cost	1,575 "

(9) Contingency

No figures are posted for physical contingency expenses to deal with abnormal rain, floods, unusually hot/cold weather, and other abnormal weather conditions, since their possibilities are believed slim because the construction work will be carried out within an existing building. However, price contingency expenses are set to provide against price increases of machinery and supplies due to general inflation expected by the time the project is executed.

Changes in consumer price growth rates of major advanced countries (%)

	1984	1985	1986	1987	1988	1989	1990
U.S.	4.3	3.5	1.9	3.6	4.1	4.8	5.4
Canada	4.4	4.0	4.1	4.4	4.1	5.0	4.7
U.K.	5.0	6.1	3.4	3.8	4.9	7.8	9.5
FRG	2.4	2.0	-0.4	0.6	1.2	2.8	2.7
Switzerland	2.9	3.5	0.8	1.4	1.9	3.2	4.0
Japan	2.3	2.0	0.6	0.5	0.8	2.9	3.1

Source: JETRO

Japan Chemical Fibers Association,

Consumer prices of advanced countries were generally stable in the 1980s, with an annual growth of 3% recorded on an average. Particularly, the rate for West Germany, Switzerland, and Japan, which produced textile machinery, the average rate was less than 3%. Accordingly, the price increase rate as the basis for calculation of price contingency for the foreign currency portion is assumed to be 2%/year.

Changes in the inflationary rate for Indonesia (%)

1983	1984	1985	1986	1987	1988	1989	1990
11.0	8.3	4.4	8.5	8.5	4.8	5.6	9.1

Source: Center for Policy Studies

The rate of inflation in Indonesia has been on the steady increase after the devaluation of Rupiah in 1983. Domestic business showed signs of overheating, and excessive liquidity caused capital flight. In order to curtail inflation, a tight-money policy has been taken since 1990. Because the tight-money policy is expected to be continued to prevent capital flights, it is highly likely that the inflationary rate will be controlled within the range of 5 to 7%. Accordingly, an inflationary rate of 7%/year is assumed for the local portion of the required investment amount under this study. It is also assumed that the project will be implemented three years after the study.

Price Contingency

First Mill Foreign cost 45,837,922 Th.Rp × 2% × 3 years = 2,750,275 Th.Rp

Local cost 9,783,566 Th.Rp × 7% × 3 years= 2,054,549 Th.Rp

Second Mill Foreign cost 9,748,206 Th.Rp × 2% × 3 years = 584,892 Th.Rp

Local cost 883,423 Th.Rp × 7% × 3 years = 185,519

Total Foreign cost 55,586,128 Th.Rp × 2% × 3 years = 3,335,167 Th.Rp

Local cost 10,666,989 Th.Rp × 7% × 3 years= 2,240,068 Th.Rp

Contingency total 5,575,235 Th.Rp

(Accounting for about 7.3 % of the total construction cost for Banjaran Mill)

(8) Interest during the Construction Period

The disbursement of construction funds from the start of the construction to its end are expected to follow a rising line of 45 degrees. For convenience of calculation, however, it is assumed that disbursement will be enforced on the 9th month in the middle of the 18 month construction period.

1) First Mill

Case A

(Foreign currency portion) 48,588,197 Th.Rp × 10% × 9/12

= 3,644,115 Th.Rp

(Home currency portion) 11,838,115 Th.Rp × 18% × 9/12

= 1,598,146 Th.Rp

Total interest during the construction period 5,242,261 Th.Rp

Case B

(Foreign currency portion) 3,644,115 Th.Rp × 70% = 2,550,881 Th.Rp

(Local currency portion) 1,598,146 Th.Rp × 70% = 1,118,702 Th.Rp

Total interest for the construction period 3,669,583 Th.Rp

2) Second Mill

Case A

(Foreign currency portion) 10,333,098 Th.Rp × 10% × 9/12 = 774,982 Th.Rp

(Local currency portion) 1,068,942 Th.Rp × 10% × 9/12 = 80,171 Th.Rp

Total interest during the construction period 855,153 Th.Rp

Case B

(Foreign currency portion) 774,982 Th.Rp × 70% = 542,487 Th.Rp

(Local currency portion) 80,171 " × 70% = 56,120 Th.Rp

Total interest during the construction period 598,607 Th.Rp

Interest for Total Banjaran Mill

Case A (Foreign currency portion)	4,419,097 Th.Rp
(Local currency portion)	1,678,317 Th.Rp
Total	6,097,414 Th.Rp
Case B (Foreign currency portion)	3,093,368 Th.Rp
(Local currency portion)	1,174,822 Th.Rp
Total	4,268,190 Th.Rp

CHAPTER 8 CIPADUNG MILL RENOVATION PLAN

Tables and Figures

CHAPTER 8 CIPADUNG MILL RENOVATION PLAN

8-1 Production Plan and Raw Material

8-1-1 Production Plan

The rehabilitation plan of Cipadung Mill is basically the same as the one of Sandang's, however, Cipadung Millwill be specialized in producing polyester/rayon blended yarn and the equipment and facilities will be installed to produce high quality synthetic yarn by using 51 mm cut length fibers which has the advantage of productivity and can fully stand for export. The plan is also expected to produce a wide range of yarns as well as make cost saving through the reduction of yarn breakage. It is summarized as follows.

	Present	Corporate Plan of Sandang	Renovation Plan
Type	Cotton Yarn (open-end) Polyester/cotton blended yarn Polyester/rayon blended yarn	Polyester/cotton blended yarn	Polyester/rayon blended yarn
Average Count	Ne 31.3	Ne 32.2	Ne 28.0
Installed Capacity	29,388 spindles	29,388 spindles	36,000 spindles
RPM of Spindle	12,000 rpm	13,000 rpm	13,500 - 14,000 rpm
Annual Praduction	14,594 bale (Year 1989)	15,425 bale	35,673 bale/year

Presented in Table 8-1 below is a production plan of the mill assuming annual operation of 8,250 hours (24 hrs/day × 345 days/yr) with the workers working under three shifts in four groups.

Table 8-2 is a production plan by stages for the first year after the commencement of operation.

Table 8-1 Annual Production Plan

Unit: Bale/year

Product type	Production Volume
Polyester/rayon 65/35 blended yarn Ne 20	15,665
〃 〃 30	9,835
〃 〃 40	4,836
〃 〃 45	3,567
〃 〃 40/2	1,770
Total	35,673

Table 8-2 Production Schedule of 1st Year of Operation

Unit: Bale

Month	Polyester rayon 65/35 Ne20	Polyester rayon 65/35 Ne30	Polyester rayon 65/35 Ne40	Polyester rayon 65/35 Ne45	Polyester rayon 65/35 Ne40/2	Total
1	652.7	409.8	201.5	148.7	73.8	1,487
2	1,305.4	819.6	403.0	297.3	147.5	2,973
3	ditto	ditto	ditto	ditto	ditto	ditto
4	ditto	ditto	ditto	ditto	ditto	ditto
5	ditto	ditto	ditto	ditto	ditto	ditto
6	ditto	ditto	ditto	ditto	ditto	ditto
7	ditto	ditto	ditto	ditto	ditto	ditto
8	ditto	ditto	ditto	ditto	ditto	ditto
9	ditto	ditto	ditto	ditto	ditto	ditto
10	ditto	ditto	ditto	ditto	ditto	ditto
11	ditto	ditto	ditto	ditto	ditto	ditto
12	ditto	ditto	ditto	ditto	ditto	ditto
Total	15,012	9,425	4,635	3,419	1,696	34,190

8-1-2 Raw Material

(1) Consumption of Raw Material

Materials to be employed at the Cipadung Mill include polyester staple fiber of 1.4 denier × 51 mm and 2 denier × 51 mm, and rayon staple fiber of 1.5 denier × 51 mm, with all machines being of the specifications for the spinning for fiber cut length of

2-inch.

Material consumption under full operation is as presented in Table 8-3 below. The rate of yield of materials assumed at 97% on the basis of the previous results must be targeted to at least 98%.

Table 8-3 Annual Consuption of Raw Material

kg/ year

Product type	Production volume (bale/year)	Polyester consumption	Rayon fiber consumption
Ne 20	15,665	1,904,544	1,025,520
Ne 30	9,835	1,195,776	643,872
Ne 40	4,836	587,964	316,596
Ne 45	3,567	433,752	233,556
Ne 40/2	1,776	215,196	115,872
Total	35,673	4,337,232	2,335,416

Note: The yield has been calculated at 0.97 as the same as polyerster/rayon.

Polyester fiber and rayon fiber of domestic production are to be adopted. For Ne 20, 2 denier polyester fiber for reducing neps and preventing yarn unevenness shall be employed.

(2) Raw Cotton Initially Required

Required amount for ring spinning frame is:

- Bleded yan of 65% polyester and 35% rayon
- 50 units × 720 spindles = 36,000 spindles

The amount of initial fibers required upon start-up and the expected amount of material concumption in the first year are as indicated in Table 8-4, and Table 8-5 respectively.

Table 8-4 Required Raw Materials for Initial Operation

Yarn count	Ne 20	Ne 30	Ne 40	Ne 45	Ne 40/2
Production volume (bale/month)	1305.4	819.6	403.0	297.3	147.5
Total	2972.8 bale				
Required Volume (kg)	Plyester 66,228 kg Rayon 35,508 kg				

Table 8-5 Planned Consumption of Raw Material for One Year of Operation Start

kg/month

Month	Ne20		Ne20		Ne40		Ne45		Ne40/2		Total	
	Polyester 65%	Rayon 35%	Polyester 65%	Rayon 35%	Polyester 65%	Rayon 35%	Polyester 65%	Rayon 35%	Polyester 65%	Rayon 35%	Polyester	Rayon
1	79,356	42,730	49,824	26,828	24,499	13,192	18,079	9,735	8,973	4,831	180,731	97,316
2	158,712	85,460	99,648	53,656	48,977	26,383	36,146	19,463	17,933	9,656	361,436	194,618
3	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
4	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
5	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
6	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
7	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
8	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
9	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
10	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
11	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
12	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
Sub Total	1,825,188	982,790	1,145,952	617,044	563,466	303,405	415,685	223,828	206,236	111,047	4,156,527	2,238,114
										Total		6,394,641

Remark) Yield calculated at 0.97 for Polyester and Rayon.

8-1-3 Quality

The quality of yarn to be produced after completion of the renovation project must gain high appraisal within the country as well as satisfy the international high quality standards. In general, utilizing the data of USTER statistics is convenient to numerically express quality standards.

The targets regarding quality of the products after the renovation project has been completed are set in the USTER line of 50 - 25% as shown in Table 8-6. The detailed data are listed in Figures 8-1 to 8-3. In Table 8-7 the conditions for establishing the USTER statistics table are shown.

Table 8-6 Yarn Quality Target

Mill	Type		Single Yarn Strength (g)	U%	Thin	Thick	Nep
					Pieces/1,000 m		
Cipadung	Polyester/rayon	Ne 20	562 - 701	11.5 - 10.0	23 - 8.1	60 - 27	62 - 28
	〃	Ne 30	375 - 464	12.2 - 10.5	40 - 17	84 - 40	90 - 48
	〃	Ne 40	281 - 343	12.7 - 11.5	58 - 26	110 - 55	120 - 70
	〃	Ne 45	250 - 302	13.0 - 11.8	68 - 32	120 - 60	130 - 78
(Reference) Currently Mesured Value	Polyester/rayon	Ne 30	383.6	13.4	15	10	35
	Polyester/rayon	Ne 45	292.1	12.2	10	18	145

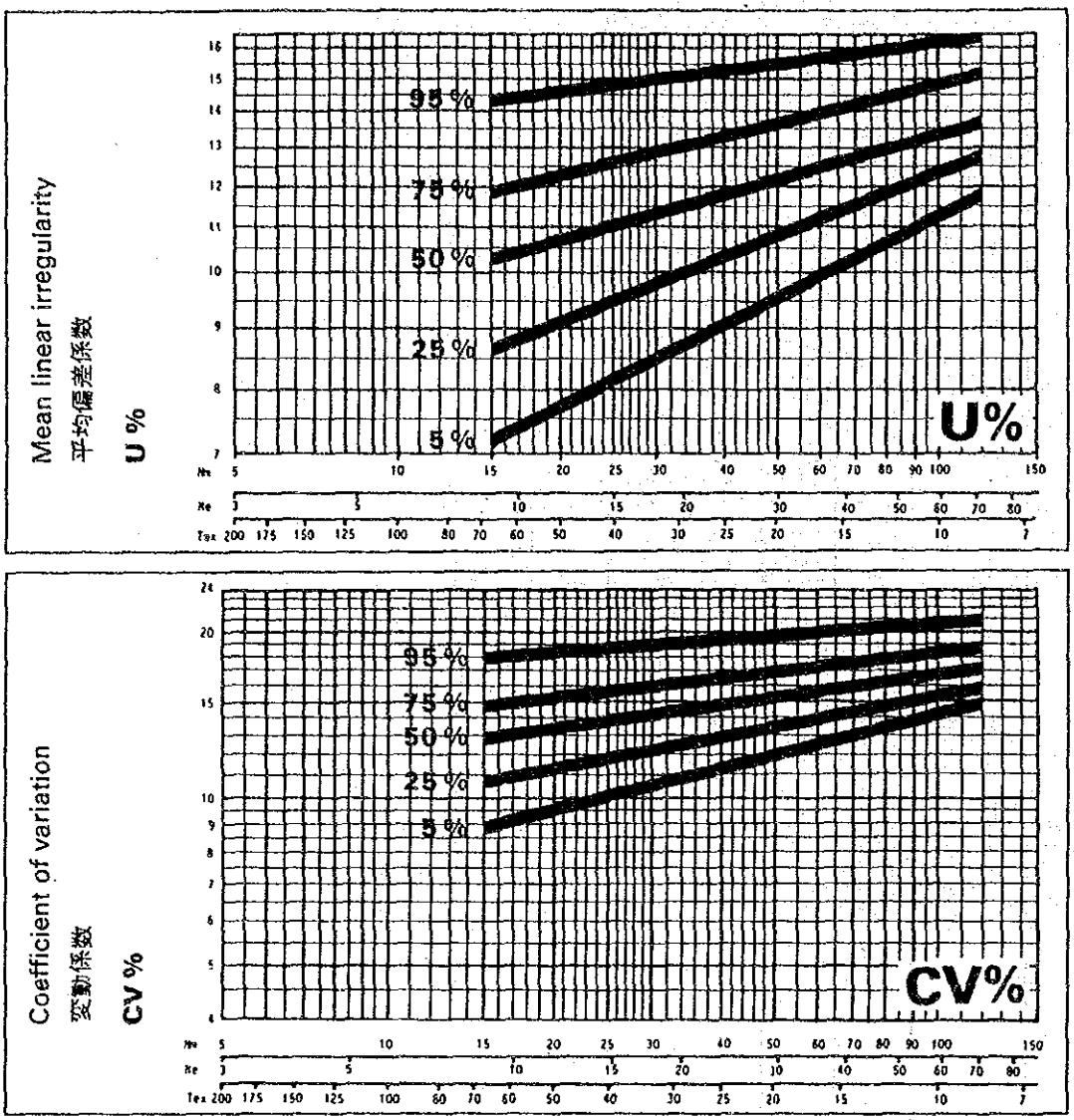


Figure 8-1 USTER Line (1): U% and CV% of Blended Yarn

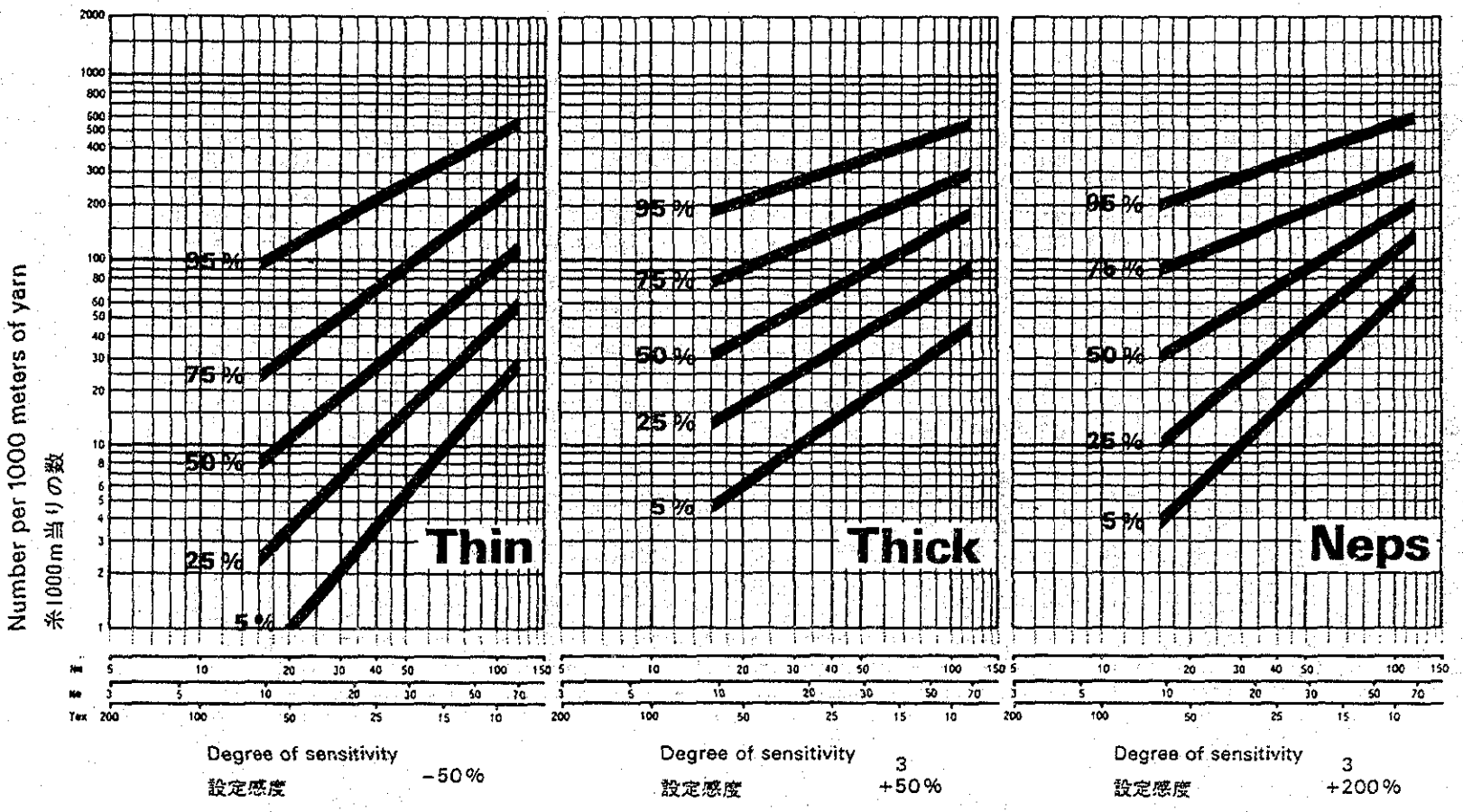


Figure 8-2 USTER Line (2) : IPI of Blended Yarn

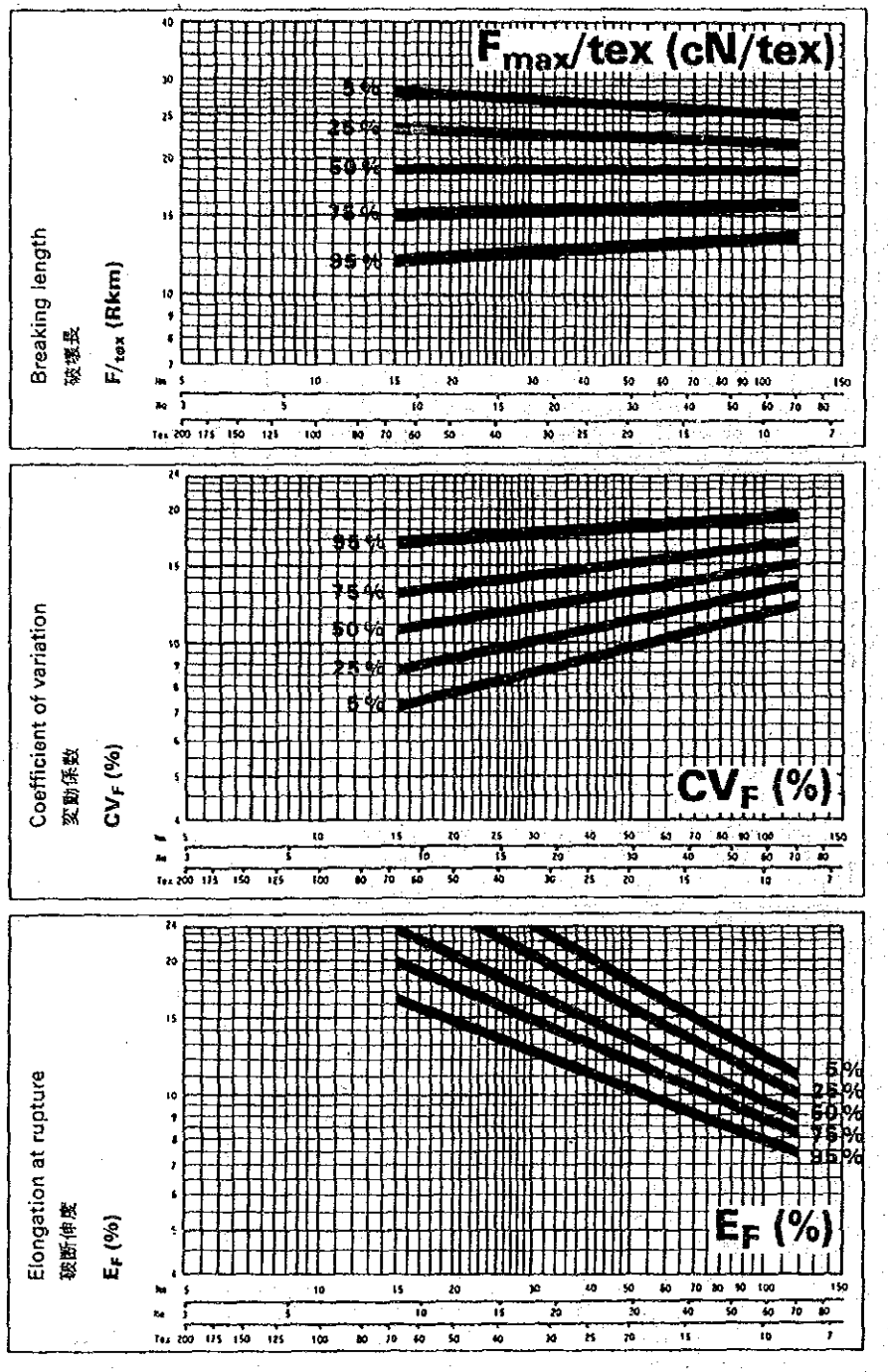


Figure 8-3 USTER Line (3) : Strength of Blended Yarn

Table 8-7 Setting Conditions of USTER Statistic Diagram

Properties	Note and established conditions
Yarn unevenness U % CV % Thin yarn Thick yarn Neps	Unevenness and imperfection would vary and are subject to the yarn count, raw material, type of fibers, machine condition and setting.
Breaking length Tenacity variation coefficient Breaking elongation	Experience values gained through tests performed on the USTER DYNAMAT automatic strength tester (constant velocity load type) Test conditions Use as many packages as possible and repeat tests 100 to 400 times with USTER DYNAMAT strength tester under the following conditions. Standard atmospheric conditions: Temperature 20° C ± 2° C Humidity 65 % ± 2 % Material to be tested must be fully refined before test. Average breaking time: 20 ± 3 sec Initial tensile force: 0.5 CN/tex (Corresponds to weight of 500 meter of yarn)

Note: The relationship of breakage length and single yarn strength based on the data of USTER statistics are shown as follows.

Breakage strength(km)

$$\frac{\text{Single yarn strength(g)} \times \text{single yarn count} \times 1.69}{1.000}$$

As mentioned in Chapter 4, U% of Ne 30 is basically related to the periodical unevenness of Roving Frame and this is the most critical point to be noted for rehabilitation. The fact that Ne 30 and Ne 45 spinning count deviation rates are +4.9% and +3.1% respectively is due to the big change of water contents caused by rayon's water absorption. It should remain less than 2% after the renovation in which dryers are installed to control humidity.

8-2 Production Control and Quality Control

Basic principles on production and quality control can be applied to any mill. Refer to 7-2-1 and 7-2-2 of Chapter 7 "Patal Banjaran" for details. Described below are some of the points to be kept in mind in handling polyester-rayon blended yarns.

(1) The relationship between fineness and staple length, and the number of fiber in a minimum cross section should be determined to satisfy the following two conditions:

Staple length (inches)/Fineness (deniers) $\leqq 1$

Number of fiber in cross section $\geqq 60$

If the fineness is too small in relation to the staple length, it causes difficulty of spinning due to damages of the fiber and drafting troubles, or generates many neps on the produced yarn. Moreover, insufficient number of fiber in cross section leads to lack of strength and deteriorates spinning performance.

(2) High humidity causes an increase of yarn entwisting due to surface stickiness of the rayon fiber. Low humidity also causes running of fleece caused by static electricity generated on the polyester fiber, resulting in an inerease of yarn entwisting.

Presented in Table 8-8 are optimal temperature and humidity for each process.

Table 8-8 Appropriate Temperature and Humidity

Process	Temperature	Humidity
Blow room	29.0 ± 2° c	68 ± 3 %
Carding, Drawing, and Doving	29.0 ± 2° c	58 ± 3 %
Spinning	30.0 ± 2° c	55 ± 3 %
Winding	29.0 ± 2° c	65 ± 3 %

(3) Multiple lots for both polyester and rayon should be employed to even out the differences among the lots. Also, after opening the bale, it is preferable to let is acclimatize to the room environment by leaving it for a whole day and night before use.

(4) Although the blending ratio will be stabilized by the use of automatic weigh pan the blending condition must be checked once per month by performing a dye test on the drawing sliver, while the blending ratio must by test of yarn once every three months.

a) Sliver Dyeing Test

Use a dye that colors either polyester or rayon, then visually check the dyed sliver to inspect whether polyester or rayon is evenly blended. Generally in Japan, this test is performed by using a fiber identification stain (product name:BOKEN-STAIN)in a laboratory of a mill. 5cc of the reagent is mixed in 100cc of water, to which 1g of the sample is immersed and boiled for 2 minutes. After being rinsed with water and thoroughly dried, the sample is visually inspected.

b) Method of Measuring the Blending Ratio

- Reagent

70% sulfuric acid: Gradually inject, while cooling, 605 ml of concentrated sulfuric acid (specific gravity: 1.84) into approximately 395 ml of distilled water to reduce its specific gravity to 1.610 at 20 ℃

- Procedure

A sample (sliver) and the reagent are mixed at the ratio of 1 to 100 at the temperature of 23 - 25 ℃. Shake the mixture vigorously for 10 minutes in an ERLENMEYER's flask so as to dissolve rayon. Suction and filter the obtained solution, and wash the residue with 70% sulfuric acid of the same amount and temperature and then rinse

it with water.

Transfer this to a beaker and neutralize the sample with 50 times amount of ammonias water (approximately 1%) and suction and filter it again.

Wash the residue on the filter with water and obtain its absolute dry weight.

- Blending ratio equation

$$\text{Polyester (\%)} = \frac{\text{Absolute weight of residue} \times 1.004}{(\text{Absolute weight of sample} - \text{Absolute weight of residue}) \times 1.13 + (\text{Absolute weight of residue} \times 1.004)}$$

Rayon (%) = 100 - polyester (%)

8-3 Production Machines and Equipment

8-3-1 Calculation of Production Machines and Equipment

1) Spinning Calculation Table

The number of production machines is calculated on the basis of given conditions. Such conditions are to be determined by assessing various relevant factors, such as, the level of technology, expected product quality,level of skill of the employess and the quality of used materials.The Renovation Plan has been devised by assuming a very high level of product quality suitable for exporting. The results of calculations are presented in Table 8-9 in to the order of processes. The calculations are for producing Ne 20, 30, 40, 45, 10/2 of 65/35 polyester-rayon blended yarn according to the Renovations Plan.

Table 8-9 Calculation Table for Cipadung Mill .

CIPADUNG

Item / Process	1 Supply thickness Grain/yard	2 No of doubling	3 Draft	4 Produced thickness Grain/yard	5 Twist multiplier αe	6 Twist per inch TPI	7 Waste percent %	8 Delivery speed or Revolution		9 Package		10 Production 100% LBS per hour	11 Working hour	12 Working efficiency %	13 No of spindle /machine	14 Actual Production LBS/Shift	15 Required Production LBS/Shift	16 Calculated No of machine	17 No of machine
1 Blow Room Machinery				oz/yard				rpm	yds	mm	mL								
-1 Polyester/Rayon Blend				13.5			0.5	13.0	10.77	960	50	545.23	7.5	89	1	3639.42	14302.02	3.9	4
2 Carding Machine	oz/yard			Grain/6yds			Reusable 0.5	rpm	yds	φ	mmH								
-1 Polyester/Rayon Blend	13.5	1	97.45	360			1.0	27.0	63.6	610	1067	43.74	7.5	90	1	295.24	14159.00	48.0	48
3 1st Drawing Frame	Grain/6yds			Grain/6yds				yds	m	φ	mmH								
-1 Polyester/Rayon Yarn(A)	360	8	8.00	360			0.3	284.3	260	508	1067	146.21	7.5	83	2	1820.33	10085.10	5.5	6
-2 Polyester/Rayon Yarn(B)	360	8	8.23	350			0.3	251.5	230	508	1067	125.75	7.5	80	2	1509.00	4031.43	2.7	3
4 2nd Drawing Frame	Grain/6yds			Grain/6yds				yds	m	φ	mmH								
-1 Polyester/Rayon Yarn(A)	360	8	8.00	360			0.3	284.3	260	508	1067	146.21	7.5	83	2	1820.33	10054.84	5.5	6
-2 Polyester/Rayon Yarn(B)	350	8	8.24	340			0.3	251.5	230	508	1067	122.16	7.5	80	2	1465.89	4019.33	2.7	3
5 Simplex Fly Frame	Grain/6yds			Grai/30yds				rpm		φ	mmL								
-1 Polyester/Rayon Yarn(A)	360	1	7.20	250	0.86	0.66	0.5	900		152	406	2.7056	7.5	83	108	1818.99	10004.57	5.5	6
-2 Polyester/Rayon Yarn(B)	340	1	7.73	220	0.84	0.79	0.5	900		152	406	1.9892	7.5	83	108	1337.31	3999.24	3.0	3
6 Ring Spinning Frame	Grai/30yds			Ne				rpm		mmR	mmL								
-1 Polyester/Rayon Yarn	250	1	20.00	20	3.30	14.76	1.0	13000		47	203	0.0874	8.0	93	720	468.06	6084.79	13.0	13
-2 Polyester/Rayon Yarn	250	1	30.00	30	3.20	17.53	1.0	13500		47	203	0.0509	8.0	93	720	272.84	3819.74	14.0	14
-3 Polyester/Rayon Yarn	220		35.20	40	3.20	20.24	1.0	14000		44	203	0.0343	8.0	93	720	183.79	2573.12	14.0	14
-4 Polyester/Rayon Yarn	220	1	39.60	45	3.20	21.47	1.0	14000		44	203	0.0288	8.0	93	720	154.01	1386.12	9.0	9
7 Auto Winder	Ne			Ne				yds	m	mm	Angle								
-1 Polyester/Rayon Yarn	20	1		20			0.5	1039	950	152	5.57	3.7107	7.5	85.5	60	1427.70	6054.36	4.2	4
-2 Polyester/Rayon Yarn	30	1		30			0.5	1039	950	152	5.57	2.4738	7.5	85.5	60	951.80	3800.64	4.0	4
-3 Polyester/Rayon Yarn	40	1		40			0.5	1039	950	152	5.57	1.8554	7.5	86.5	60	722.20	2560.26	3.5	4
-4 Polyester/Rayon Yarn	45	1		45			0.5	1039	950	152	5.57	1.6492	7.5	86.5	60	641.95	1379.19	2.1	2
8 Doubler Winder	Ne			Ne				yds	m	mm									
-1 Polyester/Rayon Yarn	Ne 40/2	2		40			0.5	492	450	152		1.7571	7.5	85.0	120	1344.21	687.56	0.5	1
9 Two for One Twister	Ne			Ne				rpm		mm	Angle								
-1 Polyester/Rayon Yarn	Ne 40/2	1		40		18.00	0.5	10000		152	3.30	0.1102	8.0	93.0	120	98.41	684.12	7.0	7

8-3-2 Basic Conditions for Design of Production Machinery and Auxiliary Equipment

(1) Production Machinery

Reference is made to Chapter 7 for the basic design conditions for production machinery. The Cipadung Mill is to be designated as a spinning plant specialized for producing polyester-rayon blended yarn using man-made fibers with cut length of 51 mm. The major types of man-made fiber are those with circular section, and therefore, the degree of entwining among the fibers is low. The spinning for fiber cut length of 2-inch. which is the leading type of machine employed for spinning man-made fibers, is designed to enable smooth spinning by setting the cut length at 51 mm to compensate for the low degree of entwine. Its advantages include:

- Little fluff and therefore good external appearance due to scarce fluff
- Higher yarn strength
- High productivity is obtained by setting low twist coefficient
- Fluffs and flies are generated very few

Therefore the spinning for fiber cut length of 51mm is to be adopted at the Cipadung Mill as the plant is specialized for spinning the man-made fibers.

It is preferable that the current open-end spinning machines be transferred elsewhere and be set up in a separate plant specializing in open-end spinning. Except for carding machines and some of the drawing frame, and roving frame the existing machinery at the Cipadung Mill is to be renewed. After the renovation, the blow room machinery composed of 2 line/4 scutchers with 3 hoppers equipped with the weight pan enables the production of blended yarns of wide range.

(2) Auxiliary Equipment

As the Cipadung Mill is a plant currently in operation, the existing Auxiliary Equipment and articles for operation should be made the most of.

The equipment with significantly deteriorated, however, will be thoroughly checked and replaced as needed. As for the articles for operation, the minimum amount necessary for enabling a smooth flow of production should be prepared.

The existing carriers will be continued to use. Should they shortfall, local manufacturing is possible.

(3) Laboratory Equipment

Of those currently in use, significantly deteriorated testing devices shall be replaced. The new devices are to be carefully selected so that the results of the tests conducted

with them will prove useful in improving the quality and productivity through feeding them back to maintenance and operation.

8-3-3 Concept and Specifications of Production Machines

(1) Production Machines

a) Blow Room Machines

The equipment will be 2 lines and 4 scutchers, with 3 units of blend feeders equipped with automatic adjustment weigh pan to enable spinning of a variety of man-made fibers at specified blending ratios.

The blended materials are further mixed by a 4-chambered super blender to obtain laps of very low variation of blending ratio.

The opener will be a non-lattice, non-grip type for improving the opening property and reducing the damages on the fiber. As for the scutchers, the same type as those employed at Patal Banjaran will be employed, and the weight of a single lap is planned to be set at 20 to 24 kg.

b) Carding Machine

The Carding Machine to be installed at the Cipadung Mill is a high-speed type capable of accommodating the 51 mm cut length of the fiber. Below summarizes the conditions of its installment.

1. Rotation of the cylinder: max. 400 rpm with perfect dynamic balance
2. Metallic wire, garnet wire, and flat needle: those for synthetic fibers
3. Length of nose of dish plate: to be for fiber cut length of 2-inch.
4. Width and number of flat bar:1 9/16 inches and 90
5. To be equipped with spare fiber opening roller
6. To be equipped with automatic dust collector
7. Doffing device: roller doffing type Rotation of 23 - 27 r.p.m.
8. Considering the floor space and the weight per lap, the size of cans is to be 24 inches in diameter and 42 inches in height.

Since the quality of yarn is greatly influenced by the carding machine, it is necessary to provide some allowance in rotating speed of this machine.

According to the renovation plan, a total of 48 Carding Machines with a rotation speed of doffers 27 r.p.m. is to be envisaged.

c) Drawing Frame

High speed and high quality Drawing Frames with small power consumption and easy maintenance and operation are to be selected. 5-over-4 pressure bar type shall be adopted for the draft part so as to optimize the pressure applied to the fleece, effectively control the fiber, and to improve the quality of the sliver.

A built-in electric type automatic dust collector will be provided. The size of the cans to be employed is 20 inches in diameter and 42 inches in height. As for the D-400 MT and DY-2C currently in operation, except for the one for open-end spinning, all of them are planned to be employed as first head drawframe after appropriate maintenance.

d) Roving Frame

A model which demonstrates the highest stability as regards such requirements as high speed and high quality, as well as large packaging, shall be selected.

The size of the roving is to be enlarged to 152 mm diameter and 405 mm lift so as to extend the doffing cycle.

Doffing operation of large-size bobbins is to be facilitated by the upper support flyer. There shall be hardly any oscillation of the flyer top and little vibration of the frame itself even under high speed rotation.

In addition, because there will be little air turbulence caused by the rotation of the flyer, the flow of the roving yarn will be stabilized with little generation of fluffs and flies.

The twist is not necessary to increase, which should lead to an improvement of productivity.

Other necessary auxiliary equipment include:

- Cone belt automatic return device
- Roving yarn tension fine adjustor
- Full bobbin stop device at appropriate position
- Device for preventing stoppages of roving in shoulder part of bobbin
- Device for preventing unevenness of roving yarn
- Fly blower and suction cleaner
- Device for releasing fixation of bobbin
- Device for stopping the operation when the sliver or the roving yarn is broken
- Safety device for gear end and side door

The draft system will be a 4-line 2-apron type equipped with an SKF top arm

e) Ring Spinning Frame

To facilitate operation and for quality, 45 mm and 47 mm dia. rings with 205 mm (8") lift will adopted to reduce the work volume by extending the doffing interval as much as possible. The out end drive method is selected and thus the gear end is completely sealed. Therefore flow of air in and out is prevented, and no fly can enter.

The gears for the draft, twist, and lifter are lined up orderly in front of the head stock and this easy handling mechanism is convenient in performing maintenance as the gears are interchangeable.

The roller part adopted is a three wire double apron system equipped with SKF top arm.

Many automatic devices will be adopted for the purpose of contributing to operational stability. For example, here are some types of devices to be used:

- Device to automatically stop at full cop winding.
- Device to automatically lower the ring rail and to stop at optimum position.
- Device for stop at optimum position of cops not fully wound and emergency stop.
- Cushion starter and snarl prevention device.
- Spindle automatic speed changer.
- Lappet automatic reversing and returning device.

f) Doubler

Taking into consideration such factors as quality, operability and work environment, the doubler will be provided with a cradle drum, tension, device (to stop at end breakage) and a brake plate.

In addition, measures and improvement have been made to simplify maintenance and for safety.

g) Double Twister

The feature of this twister is that the number of knots is limited by winding up into a package of 250 mm diameter while performing twisting. This twister would contribute to a substantial power saving and is capable of twisting yarn from low yarn count to high yarn count of over Ne 100. Another advantage is its excellent operability.

Also full consideration has been made to simplify maintenance and safety. Various means for improvements have been taken in the spindle part, tenser for

winding mechanism, gear box, and driving belt automatic tension adjusting device to satisfy the above requirements.

h) Auto Winder

The Winder is a one drum with one knotter system with a very short waiting time for knotting and is therefore a high efficiency machine. The knotter employed deviates from the previous concept of tying yarns together and is a newly revolutionized air splicer knotter system which joins yarn without knots. Hence, this knotter has eliminated all problems caused by knots arising in the weaving and knitting processes.

Concerning quality, the following additional considerations have also been made:

- The electrical slub catcher perfectly cuts defective parts off.
- The yarn length counter is equipped and the yarn length of cheese is very closely controlled.
- When knotting yarn, the yarn ends from the winding side and from the feeding side are alternately caught by the electrical slub catcher. This eliminates double yarn and triple yarn.
- The ribbon breaker is equipped with an independent drum motor for each spindle with intermittent speed change mechanism, which will prevent ribbon winding.
- The measure employed to prevent adhesion of fly and waste is to blow air whenever knotting operation is done.

With this machine, it is possible to readily monitor the surroundings of the splicer knotter, electrical slub catcher and peg, and this helps check on each part. Almost all of the maintenance work can be performed easily while the machine is in operation by tilting forward one unit of the machine. Similarly, each unit can be readily removed independently.

Further, each part of the splicer knotter and the tenser are cassette type, and maintenance is very simple.

A high powered air blower and compressed air device will be a centralized system which can save energy.

i) Other Equipment

A roving stripper (of air opening method) will be installed for opening and recycling the roving yarn waste to economize material consumption.

(2) Specifications of Main Production Machinery

Table 8-10 indicates the number and specifications of production machinery. The mark (N) in the column means the equipment to be purchased, the mark (RN) means that the existing equipment will be reused after partial rehabilitation, and the mark (E) means to use the existing equipment.

(3) Specifications of Auxiliary Equipment and Laboratory Equipment

Table 8-11 shows the specifications and number of auxiliary equipment to be purchased. Table 8-12 shows the specifications of laboratory equipment.

(4) Production Flow Chart

The flow of process based on the spinning calculation and production machinery lists is shown in Figure 8-4.

The machines marked with double circles are planned to rehabilitate, and those with single mark are to be newly installed.

Table 8-10 Specifications of Main Production Machinery

Item No	Machine/Equipment	Quantity
	Blowing Section	
RCS-1	Blow Room machinery	2 lines (N)
	1)For synthetic fiber (51mm cut)	
	2)Lap feeding system to card	
	3)Line arrangement for 1 line(2 scutcher)	
	3 - Belt conveyor(Length 3m)	
	3 - Blending feeder with automatic weigh pan	
	3 - Display weighing controller	
	1 - Weighted value printer	
	1 - Belt conveyor opener	
	1 - Transport fan	
	1 - Multi mixer(4 chambers)	
	1 - Micro tuft opener	
	2 - Two way distributor	
	2 - Fan condensor	
	2 - Filter	
	2 - Spiked feeder	
	2 - Single cage scutcher	
	2 - Digital lap scale	
	1 - Control panel	
	Carding Section	
RCS-2	Carding Machine	48 sets (RE)
	1)Lap feeding system	
	2)Roller doffing system	
	3)Sliver can size : 610mm(24") x 1067mmH(42")	
	4)90 Flats (for 51mm cut length fiber)	
	5)Group system dust collecting device	
	Drawing Section	
RCS-3	Drawing Frame (HARA D 400MT)	4 sets (E)
	1)Number of feeding slivers per delivery : 8 slivers	
	2)Number of deliveries per set : 2 deliveries	
	3)Delivery can size : 508mm(20") x 1067mmH(42")	

Item No	Machine/Equipment	Quantity
RCS-4	Drawing Frame 1)Number of feeding sliver per delivery : 8 slivers 2)Number of deliveries per set : 2 deliveries 3)Feeding can size : ϕ508mm(20") x 1067mm(42")H 4)Delivery can size : ϕ508mm(20") x 1067mm(42")H 5)Drafting system : 5 over 4 roller with pressure bar 6)Automatic can changer	14 sets (N)
	Roving Section	
RCS-5	Roving Frame (TOYODA FL-16) 1)Number of spindles per set : 108 spindles 2)Lift : 406mm(16") 3)Nominal full bobbin dia meter : 152mm(6") 4)Drafting system : 4 roller double apron 5)Feeding can size : ϕ508mm(20") x 1067mm(42")H 6)Weighting arm : SKF PK-1500 7)Light alloy metal flyer	2 sets (E)
RCS-6	Roving Frame 1)Number of spindles per set : 108 spindles 2)Lift : 406mm(16")lift 3)Nominal full bobbin diameter : 152mm(6") 4)Drafting system : 4 roller double apron 5)Feeding can size : ϕ508mm(20") x 1067mmH(42") 6)Weighting arm : SKF PK-1500 7)Light alloy metal flyer	7 sets (N)
	Spinning Section	
RCS-7	Ring Spinning Frame 1)Number of spindles per set : 720 spindles 2)Spindle gauge : 75mm 3)Lift : 205mm(8") 4)Draft system : 3 line roller double apron 5)Weighting arm : SKF PK 2025	50 sets (N)

Item No	Machine/Equipment	Quantity
	6)Pneumatic suction under clearer	
	7)Spindle insert : SKF HF 21	
	8)Diameter of single flange ring : 45mm	
	9)Overhead travelling cleaner	
	Winding Section	
RCS-8	Automatic Cone Winder (Magazine Type)	14 sets (N)
	1)Number of drums per set : 60 drums	
	2)Take-up package : 152mm(6")traverse x 5 57'cone	
	3)Supply package : Ring spinning bobbin	
	4)Air splicer knotter : Individual type	
	5)Centralized compressed air & exhaust air system	
	6)Auxiliary equipment	
	◦Electronic slub catcher	
	◦Waxing device	
	◦Yarn length control device	
	◦Package brake device	
	◦Splicer dust collector device	
	◦Ceramic cutter device	
	◦Overhead travelling cleaner	
RCS-9	Double Winder	1 set (E)
	1)Rotary traverse type wind from cone to cheese	
	2)Number of drums per set : 120 drums	
	3)Take-up package : 152mm(6")Traverse x Parallel	
	4)Overhead travelling cleaner	
RCS-10	Double Twister	7 sets (N)
	1)Number of spindles per set : 120 spindles	
	2)Take-up package : 152mm(6")traverse x 3 30'cone	
	3)Overhead travelling cleaner	
	4)Waxing device for knitting yarn 3 sets	
RCS-11	Roving Waste Opener	1 set (E)

Table 8-11 Specifications of Newly Purchased Auxiliary Equipment

Item No	Equipment/Accessories	Quantity
RCA-1	Roving Stripper	1 set
	1)Cleaning capacity Max 1,800 bobbin/hour	
	2)Bobbin length up to 460mm	
	3)Bobbin diameter up to 70mm	
RCA-2	Gum Cot Grinding Machine with attachment	1 set
	1)Maximum working length : 500mm	
	2)Maximum working outer diametre : 180mm	
	3)Traverse speed : 435mm, 706mm, 1,153 mm/min	
	4)Revolution of grinding wheel spindle : 2100, 2400, rpm	
	5)Outer diametre of grinding wheel : 305mm	
	6)Width of grinding wheel : 38mm	
	7)Bore diametre of grinding wheel : 44.45mm	
	8)Auxiliary equipment & accessories	
	(a)Attached equipment : 1 lot	
	(b)Exhaust equipment : 1 set	
	(c)Tool & gauges : 1 lot	
RCA-3	Can with Spring & Caster for Carding	296 sets
	1)Can size	
	Diameter : 610mm(24")	
	Height : 1,067mm(42")	
	2)Spring size	
	Diameter of plate : 590mm	
	Free height : 970mm	
	3)Single caster 3pcs/set	
RCA-4	Can with Spring & Caster for Drawing & Roving	1,170 sets
	1)Can size	
	Diameter : 508mm(20")	
	Height : 1,067mm(42")	
	2)Spring size	
	Diameter of plate : 490mm	

Item No	Equipment/Accessories	Quantity
	Free height : 1,052mm 3)Single caster 3pcs/set	
RCA-5	Bobbin for Roving 1)Size Diameter of straight part : 45mm Total length : 445mm 2)Material : Plastic resin	54,000 sets
RCA-6	Bobbin for Ring Spinning 1)Specification of spindle Spindle type : Taper touch Lift : 205mm 2)Bobbin length : 235mm 3)Material : Plastic resin	144,000 sets
RCA-7	Cart for Roving 1)Size Length : 1,200mm Width : 560mm Height : 1,645mm 2)Wheel Fixed wheel : 200mm 2 pcs Swivel wheel : 130mm 2 pcs 3)Loading cappacity approx. 400Kg	12 sets

Table 8-12 Specifications of New Laboratory Equipment

Item No	Equipment	Quantity
RCL-1	Evenness Testing Installation (U%)	1 set
	1)Measuring range :	
	(a)Measuring range :	
	(apporoximate) 12Ktex 4tex	
	(10g/m Nm 250)	
	(b)Sensitivity :	
	4 ranges (12.5%, 25%, 50% & 100%)	
	(c)Material feed :	
	25, 50, 100, 200, & 400 m/min	
	(d)Evaluating time : 1, 2.5, 5, 7.5,10 and 20 min	
	(e)Diagram speed : 2.5, 5, 10, 25, 50 and 100 cm/min	
	2)Spectrograph with spectrogram recorder	
	(SPG) : 1 set	
	Analysing range from 2 cm to 40 m	
	wavelength in one measurement at 400	
	m/min material feed and at least 5	
	minutes evaluating time	
	3)Imperfection indicator (IPI) : 1 set	
	Electronic counting	
	Thin places : -30, -40, -50, and -60 %	
	Thick places : +35, +50, +70 and +100 %	
	Neps : +140, +200, +280 and +400 %	
	4)Small unrolling device : 1 set	
	5)Air compressor : centralized compressed air	
	system	
	Pressure : minimum 2 bar	
	Consumption : maximum 16 m /hr	
	6)Recommended reserve material : 1 lot	
	Diagram paper	
	Recording ink	
	Recording pen	
	Filter	
RCL-2	Dry Range	1 set

Item NO	Equipment	Quantity
	1)Max power consumption 2.8 KW	
	2)Balance capacity 500 grams	
	3)Balance sensitivity 50 mg	
	4)Inner size of oven 50 x 50 x 40 cm	
RCL-3	Yarn Fault Classifying Installation with Existent R.T Winder to be modified	1 set
	1)Classimat	
	(a)Classifying instrument with built-in printer for data distribution and length measuring arrangement	1 set
	(b)Measuring heads	6 sets
	(c)Data transducers	6 sets
	(d)Testing instrument	1 set
	(e)Fitting material	6 sets
	(f)Spare parts & printer-paper	
	2)R.T. Winder	
	(a)To modify all existent R.T. cone winder	
	(b)Number of drums per machine : 6 drums	
	(c)Take-up package : 6"traverse x 5 57'cone	
	(d)Supply package : Ring spinning bobbin & 6" traverse x 5 57'cone	
	(e)Auxiliary equipment	
	Yarn length counter	3 drums
	Electronic yarn clearer	3 drums

Process Flow Chart of Cipadung

Main Machinery	No. of M/C	Chart
		Polyester 65 / Royon 35
Blow Room Machinery	2 line	2Lx4S
Carding Machine	48	48
(2D/Frame) 1st-drawing Frame	9	2 4 3
(2D/Frame) 2nd-drawing Frame	9	2 4 3
Simplex Fly Frame	9	2 4 3
Ring Spinning Frame	50	13 14 14 9
Automatic Winder	14	4 4 4 2
Double Winder	1	1
Two-for-one Twister	7	7
Production LBS/Shift		Blended Yarn
		Ne 20: 6084.8 / Ne 30: 3819.7 / Ne 40: 1878.6 / Ne 40/2: 691.1 / Ne 45: 1386.1

○ New Machine ◎ Rehabilitation Machine

Figure 8-4 Process Flow Chart

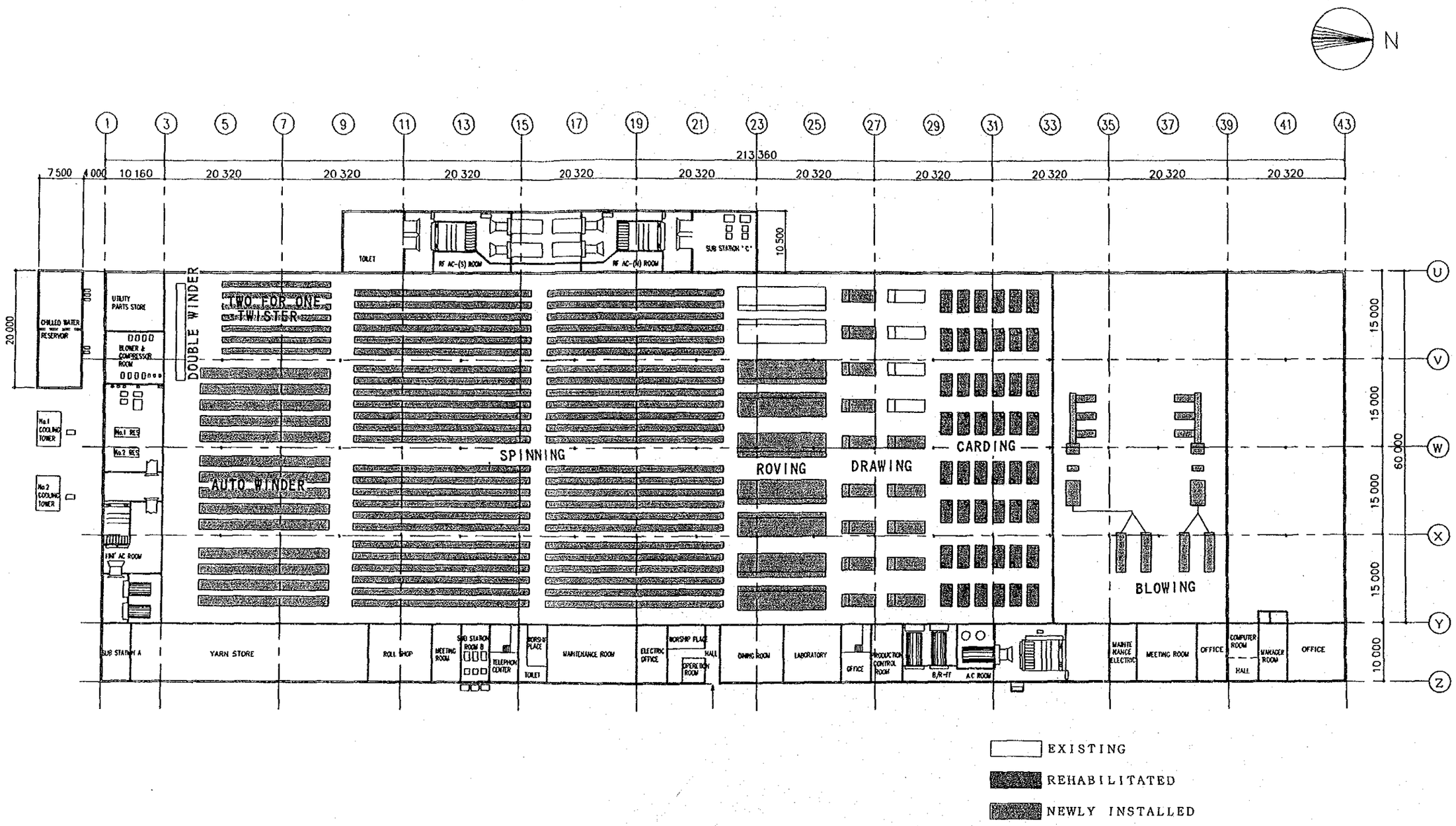


Figure 8-5 Machine Layout of Cipadung Mill

8-3-4 Layout of Production Machines

Below are some of the conditions to be considered in determining the layout of machinery.

- Shape, area, and distance between columns of the building
- Type and number of machines, and their combination
- Method of operation, required product-mix, flow of products
- Method of machine maintenance, location of maintenance room
- Power wiring, location of ducts, method of air-conditioning
- Possibility of future expansion and remodeling of the plant

It is necessary that each of these and other conditions be thoroughly considered prior to determining the layout of the equipment. Layout of production machinery after the renovation is illustrated in Fig. 8-5. Basic design concept and characteristics are to be as follows.

a) Outline

Basic overall layout shall be decided according to the following concepts:

- The extent to which the existing building is remodeled or enlarged shall be minimized.
- Direction of the flow of processes will remain the same with raw cotton being fed at the northern end, the Winder for the final process installed at the southern end, and products being shipped from the southeastern part of the building.
- The direction in which the machines face as well as the distances between the machines shall be determined to eliminate waste of labor and energy by taking such factors as the ease of monitoring the operation the distances of material and product transportation.
- The equipment will be laid out so that there will be sufficient space between the processes for storing adequate amounts of semi-products.
- The air-conditioner is to be located as close as possible to those machines with large loads to obtain better results.

b) Blow Room Process

The equipment for this process consists of a total of 6 blend feeders (BF) and 4 scutchers provided in 2 lines each having 3 blend feeders and 2 scutchers.

Since this process is designed to blend multiple kinds of man-made fibers, considerations are given in providing places for storing the materials and seasonings after opening the bale.

Also available are the spaces for storing the produced laps and for making the

changeover in cases of altering the kinds of products to be produced. A net curtain will be installed between the lines to prevent mixing of foreign fibers.

c) Carding Process

A total of 48 units of semi-high production cards arranged in 8 rows of 6 units each will be installed.

Considerations are given in determining the direction in which the machines are faced and the inter-machine spaces to ensure smooth transportation of laps from the blow room and to facilitate the delivery of 640 mm diameter × 1067 mm height sliver cans (with casters) to the subsequent drawing process. Also to be provided are a place for storing the cans prior to the subsequent process and ample working space for the workers.

d) Drawing Process

2 passage of 9 units, a total of 18 heads will be installed, of which 4 heads will be adopted from D 400 MT presently in operation and the remaining 14 heads to be newly purchased. The cans with casters to be used in this process are 508 mm in diameter × 1067 mm in height and are very easy to transport. Also secured for this process is a space for storing the sliver and empty cans.

e) Roving Process

2 units of 96-spindle TOYODA FL-16 (1 of them installed in 1961) and 7 newly purchased units of 108 spindles will be installed for the roving process.

The direction and the spaces between the machines are determined by considering the workability of such operations as the arrangement of cans and transportation of roving yarn after doffing. The machines will be faced in the same direction and laid out in such a way that semi-products will flow smoothly from north to south, between the drawing and twisting processes. Also provided is a space, though somewhat limited, for storing the sliver.

f) Ring Spinning Process

50 units with 720 spindles will be installed in 4 groups, all facing the same direction: 2 groups of 12 units on the western side and 2 groups of 13 units on the eastern side. Sufficient space is provided for the aisles for transporting the roving yarn and returning the roving yarn bobbins.

The units are to be adequately spaced for the efficiency of operation as well as for possible future adoption of automatic doffers. An air-conditioner room will be

provided on the outside of the western wall. The air will be supplied from the ceiling duct and sucked in to underground return ducts.

Sufficient space will be provided for organizing the bobbins as well as for transporting the cop from the spinning process to the subsequent winding process.

g) Winding and Twisting Process

14 units of 60-drum Autowinders equipped with splicers, one unit of 120-drum Double Twisters will be installed. The machines will be faced in the same direction as the Spinning Frames, and the products are to flow from north to south.

After completing the winding, the products will be packed in carton cases in a separate room provided in the south-eastern side of the building.

While the distance between the final twisting machine and the western wall of the building is slightly narrow due to the given width of the building, the other equipment are laid out with sufficient space provided on both sides. One of the doublers is placed perpendicular to the twisting machines for the efficiency of spacing as well as for the ease if supplying the doubling yarn cheese to the twisting machine.

h) Ancillary Building (room)

A new air-conditioner room for the spinning room is to be constructed outside along the western wall of the mill.

Also, an air conditioner for the finishing room and a chiller room will be newly provided inside the existing room located on the south eastern corner of the mill. The air-conditioner room for the pre-spinning process will be provided by enlarging the northern side of the existing eastern room and installing an air-conditioner and a dust collector there. Since the room will be enlarged to the north, some of the other rooms will have to be moved even further north. Transformer room A, for instance, will be moved north from its present location.

8-4 Utility Equipment

8-4-1 Incoming Equipment

(1) Power Consumption

As at Patal Banjaran, the electricity load at Cipadung Mill will be increased to accommodate the renovation of the production equipment and the resultant increase in the amount of production.

Actual load of power for production and air-conditioning facilities —— 2,874 KW

Estimated load of power for electric power station, water facilities, etc. — 74 KW

Total 2,948 KW

Since this amounts to 3,468 KVA assuming a power factor of 85%, it is therefore necessary to increase the current contract demand with PLN from 2,770 KVA to 3,500 KVA.

(2) Incoming Equipment (See Fig. 8-6. Power Circuit diagram)

To accommodate the expected increase in the amount of power received, the present receiving transformer of 20KV/3.3KV 3000 KVA will have to be either expanded or replaced. Under the present project, it was decided that the transformer be extended by adding a new transformer which is to be used for the chiller.

Transformer to be added 20KV/3.3KV 1,500 KVA ———————— 1 unit

Primary and secondary switches to be added ———————— 1 set

Place of installment: adjacent to the existing transformer

(3) Power Station Equiment

The existing 4 diesel engine generators are to serve as spares operated in the case of emergency or shortages in the power receiving capacity. The generators and the ancillary equipment will be warmed up on a daily basis and periodically inspected as before. Equally important for the mill is securing spare parts of these equipment for repairs.

(4) High Tension Distribution Lines (See Fig. 8-5. Single wiring diagram and Fig. 8-7. Diagrams of high tension distribution cable and low tension distribution cable)

The high tension power cables extending from the 3 KV switch board inside the power station to substations A, B, and C will be either renewed or replaced.

Types of cables for renewal or replacement

-NYFGbY 3KV/6KV 120 ㎟ 3 cores . . . . . Transformer 750 KVA or less

-NYFGbY 3KV/6KV 240 ㎟ 3 cores . . . . . Chiller circuit

Method of laying

-Directly embeded underground GL - 1200 ㎜

Concrete tubes or PVC tubes are to be employed for embedding under roads.

One changeover switch will be newly added.

A wattmeter will be newly installed on the 3 KV changeover switch panel for the purpose of improving power control.

8-4-2 Wiring Method and Voltage

Indicated in the table below are the present and renovated distribution lines and voltage for each of the high and low tension lines coming from the transformer.

Table 8-13 Wiring Method and Voltage

	Present		New	
	Wiring method	Voltage	Wiring method	Voltage
Refrigerator main motor	3 phase 3 wire	380 V	3 phase 3 wire	3.3 KV
Transformer secondary side	3 phase 4 wire	380 - 220 V	3 phase 4 wire	400 - 231 V
Low voltage drive motors	3 phase 3 wire	380 V	3 phase 3 wire	380 V
Service water facility motor	〃	220 V		
Lighting facilities (to distribution panel) (branch circuit)	3 phase 4 wire Single phase 2 wire	380 - 220 V 220 V	3 phase 4 wire Single phase 2 wire	400 - 231 V 220 V
Receptacle facilities (to distribution panel) (branch circuit)	3 phase 4 wire Single phase 2 wire	380 - 220 V 220 V	3 phase 4 wire Single phase 2 wire	380 - 220 V 220 V

a) If the distribution line from the distribution board for lights and receptacles to the equipment is a single phase two wire system, the cable will be of three wires, one of which will be grounded.

b) If the distribution line from the distribution board for the power motor distribution is a four core cable, one line will be grounded.

8-4-3 Electrical Facilities

See Fig. 8-6. One-line wiring diagram and Fig. 8-7. 6KV high tension and low tension power distribution diagrams.

1) Transformer Facilities

Owing to the increase in the electric load of the production equipment and the poor condition of the existing transformation systems, switch boards, etc., substation A will be moved to the west side of the present refrigerator room for renewal. Substation

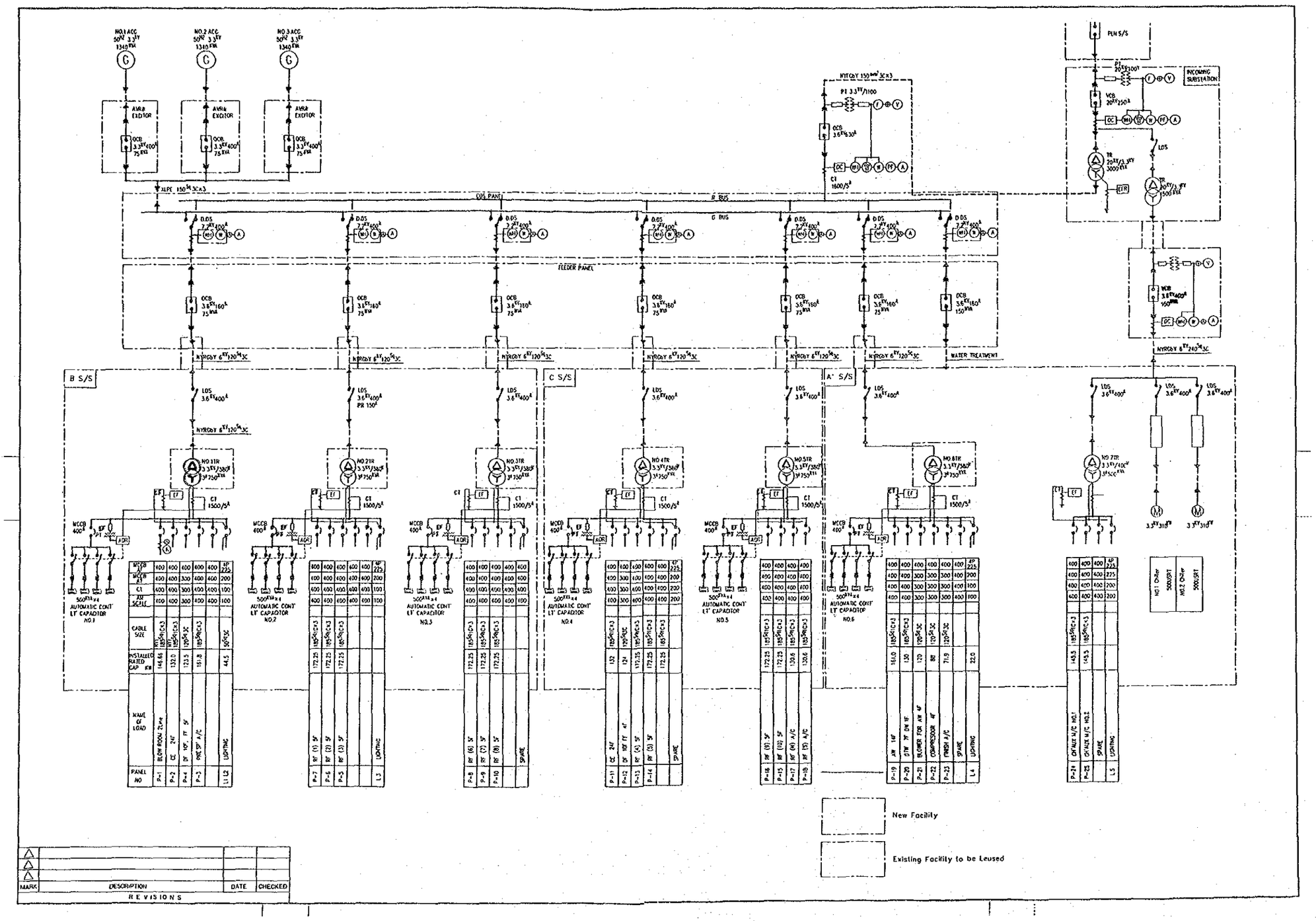


Figure 8-6 Power Circuit Diagram

B is to be renewed at the present location. As for substation C, it will be newly installed in the air-conditioner room of spinning process scheduled to be constructed. The two 3KV controllers for the main motor of the chiller, one 3.3KV/400V 500 KVA transformer for the accessory, and one set of low tension switch board will be newly installed in substation A. For the purpose of operation and safety, a load disconnecting switch (LDS) will be installed on the primary side of every transformer.

Presented in Table 8-14 are the factors on the basis of which the transformer capacities have been computed.

All of the existing transformers of substations A and B will be readopted. The load disconnecting switch is placed on the primary side of the transformer. The low voltage buses on the secondary side of the transformer, low tension switch boards, and low tension static capacitors will be all replaced.

As for the grounding electrodes and grounding buses, they will be preserved and reused in substation B. At substation C and substation A containing the chiller equipment, however, the grounding electrodes and grounding buses will be newly installed.

2) Electrical Facilities

See Fig. 8-7. 6KV high voltage and low voltage power distribution line diagram and Fig. 8-8. Power distribution board connection diagram.

a) Power Wiring

All of low tension trunk cable, the distribution boards and power distribution lines of production and air-conditioning equipment within the mill are to be renewed. The low tension trunk line cable will be raised above the ceiling and buried in cable racks at substations A, B, and C, and brought down in PVC sheathing at places where there are distribution boards for power or for lights.

The distribution boards for power are to be buried into the wall where possible. This applies to the self-standing types as well as wall hanged types. The distribution lines from the distribution boards to respective equipment to be loaded will be either contained in PVC sheathing and buried under the floor or be buried in cable pits. In cases where power is distributed from the distribution board to two or more machines, the cable will be connected within a joint box buried under the floor or with the terminal block within the control panel of the machine.

Refer to the annexed "The standards for selecting low tension cables and power lines" as regards the types and size of cables.

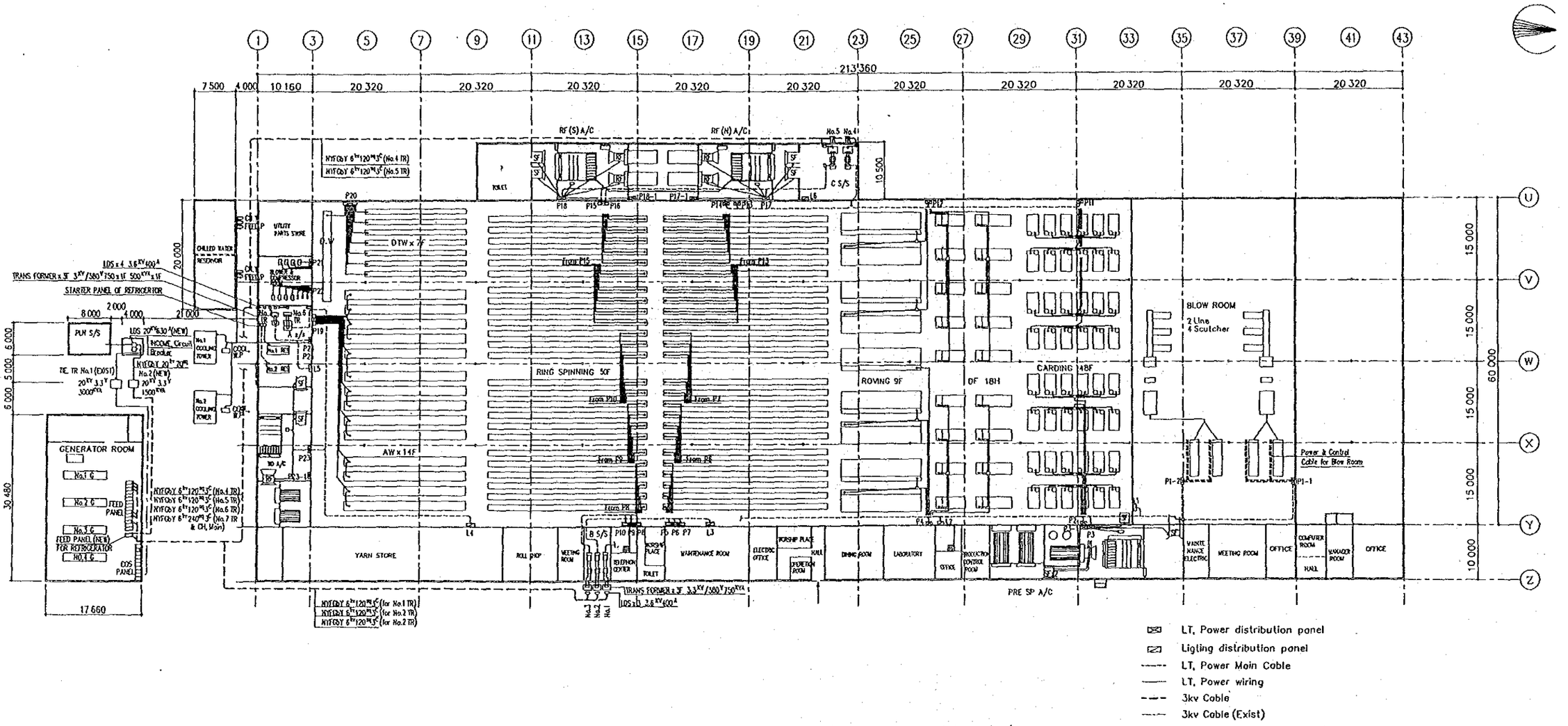
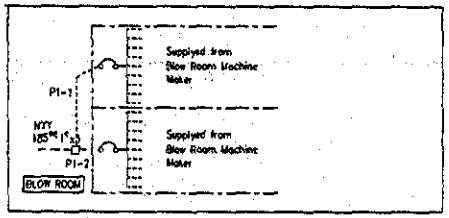


Figure 8-7 Wiring Diagram of High Tension and Low Tension Power

Figure 8-8 Power Distribution Panel and Lighting Panel

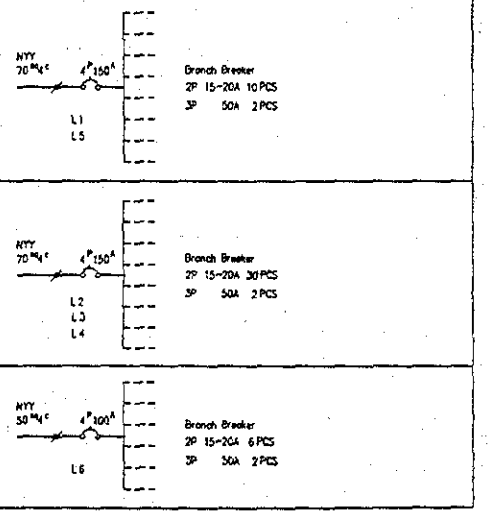


Connection of Branch	Name of Load	Motor Power kw	MCCB P	MCCB A	Cable NYY sq	Cable c
NYY 185㎟ 1C x3 — P7 P11 — PRE SP	CC	6F x 5.5	33.0	3	100	35	4
	CC	6F x 5.5	33.0	3	100	35	4
	CC	6F x 5.5	33.0	3	100	35	4
	CC	6F x 5.5	33.0	3	100	35	4
NYY 185㎟ 1C x3 — P4 P12 — PRE SP	DC	5F x 7.0	35.0	3	100	35	4
	DC	5F x 7.0	35.0	3	100	35	4
	ROV	2F x 13.3	26.6	3	100	25	4
	ROV	2F x 13.3	26.6	3	100	25	4
	ROV	1F	13.3	3	50	16	4
NYY 185㎟ 1C x3 — P5~P10 P13~16 — RF	RF	1F	34.5	3	100	35	4
	RF	1F	34.5	3	100	35	4
	RF	1F	34.5	3	100	35	4
	RF	1F	34.5	3	100	35	4
	RF	1F	34.5	3	100	35	4
NYY 185㎟ 1C x3 — P19 — AW	AW	2F x 11.5	23.0	3	100	25	4
	AW	2F x 11.5	23.0	3	100	25	4
	AW	2F x 11.5	23.0	3	100	25	4
	AW	2F x 11.5	23.0	3	100	25	4
	AW	2F x 11.5	23.0	3	100	25	4
	AW	2F x 11.5	23.0	3	100	25	4
	AW	2F x 11.5	23.0	3	100	25	4
NYY 185㎟ 3C x2 — P20 — DTW	DTW	1F	22.5	3	100	25	4
	DTW	1F	22.5	3	100	25	4
	DTW	1F	22.5	3	100	25	4
	DTW	1F	22.5	3	100	25	4
	DTW	1F	22.5	3	100	25	4
	DTW	1F	22.5	3	100	25	4
	DTW	1F	22.5	3	100	25	4
	DW	1F	2.7	3	50	16	4

Connection of Control Panel	MCCB P	MCCB A	Starter	Cable NYY sq	Cable c	Motor Power kw	Name of Load
NYY 185㎟ 1C x3 — P3 — PRE SP A/C — 380/220V	3	100	人—△	16	7	22	Supply Fan
	3	100	人—△	16	7	22	Supply Fan
	3	100	人—△	25	7	30	Spray Pump
	3	100	人—△	16	7	22	Return Fan
	3	100	人—△	16	7	22	Return Fan
	3	100	人—△	25	7	30	CC Return Fan
	3	50	INVERTER	16	4	5.5	Chilled W. Return Pump
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	100		25	4	20	Dust Collector & Filter Panel To P3-1
	2	10				1 KVA	Control Source
NYY 185㎟ 1C x3 — P17 P18 — RF A/C — 380/220V	3	100	人—△	16	7	22	Supply Fan
	3	100	人—△	16	7	22	Supply Fan
	3	100	人—△	25	7	30	Spray Pump
	3	100	人—△	16	7	22	Return Fan
	3	100	人—△	16	7	22	Return Fan
	3	50	INVERTER	16	4	5.5	Chilled W. Return Pump
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	100		25	4	20	Dust Collector & Filter Panel To P17-1 or P18-1
	2	10					Control Source
NYY 120㎟ 3C — P23 — RO A/C — 380/220V	3	100	人—△	16	7	22	Supply Fan
	3	100	人—△	16	7	18	Supply Fan
	3	100	人—△	16	7	22	Spray Pump
	3	100	人—△	25	7	30	Return Fan
	3	30	INVERTER	10	4	3.7	Chilled W. Return Pump
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	100		16	4	10	Dust Collector & Filter Panel To P23-1
	2	10					Control Source
NYY 185㎟ 1C x3 — P24 P25 — CHILLER AUX — 380/220V	3	150	人—△	35	7	37	Cooling Water Pump
	3	100	人—△	25	7	30	Chilled Water Pump
	3	50	人—△	6	7	7.5	Cooling Tower Fan
	3	100	INVERTER	25	4	22	Chilled Water Feed Pump
	3	50		6	4	3.0	Control Source for Refrigerator
	2	10					Control Source
NYY 185㎟ 1C x3 — P21 — BLOWER for AW — 380/220V — Supplied from Machine Maker	3	100	人—△	25	7	30	Blower for AW
	3	100	人—△	25	7	30	Blower for AW
	3	100	人—△	25	7	30	Blower for AW
	3	100	人—△	25	7	30	Blower for AW
	2	10				1.0KW	Control Source

Connection of Control Panel	MCCB P	MCCB A	Starter	Cable NYY sq	Cable c	Motor Power kw	Name of Load
NYY 120㎟ 3C — P22 — COMPRESSOR	3	100	人—△	16	7	22	Compressor
	3	100	人—△	16	7	22	Compressor
	3	100	人—△	16	7	22	Compressor
	3	100	人—△	16	7	22	Compressor
	3	30		6	4	3.7	Dryer
	3	30		6	4	3.7	Dryer
	3	30		6	4	3.7	Dryer
	2	10				1 KVA	Control Source

LIGHTING & SOCKET TAP PANEL



PT. IS-1 DATAL CIPADUNG (RENOVATION)
LT. POWER DISTRIBUTION PANEL AND LIGHTING PANEL

Table 8-14 Transformer Capacity Calculation Base

Patal Cipadung

Machine Equipment			Installed Power KW	Actual Load	Necessary Transformer (Calculation Base)	
Pre Spinning and Ring Spinning (B-Substation)	Blow Room		146.6	Average of Demand factor 72.4%	Valtage	380 V
	Carding	24 sets	132.0		Average Power Factor at Actual Load	approx. 74%
	Drawing	8 sets	56.0		Actual Load	1,649 KVA
	Roving	5 sets	67.5		Installed Capacitor	200KVA×3 sets
	Ring Spinning	30 sets	1,033.5	Actual Load 1,220.3 KW	Power Factor of After Installing Capacitor	approx. 92%
	Air Conditioning of Pre Spinning		161.8		Transformer Load	1,326 KVA
	Lighting		89.0		Necessary Capacity of Transformer	1,894～241 KVA
					Necessary Transformer	750 KVA×3 sets
	Total		1,686.46		Existing Transformer can be used	
Pre spinning and Ring spinning (C-Substation)	Carding	24 sets	132	Average of Demand factor 74%	Voltage	380 V
	Drawing	10 sets	70		Average Power Factor at Actual Load	approx. 75%
	Roving	4 sets	54		Actual KVA Load	1,190 KVA
	Ring Spinning	20 sets	689	Actual Load 892.6 KW	Installed Capactitor	200KVA×3 sets
	Air Conditioning for Ring Spinning (N)		130.6		Power Factor of After installing Capacitor	approx. 94%
	Ring Spinning (S)		130.6		Transformer Load	950 KVA
					Necessary Capacity of Transformer	1,357～1,727 KVA
					Necessary Transformer	750 KVA×2 sets
	Total		1,206.2		Existing Transformer can be used	

Patal Cipadung

Machine Equipment		Installed Power KW	Actual Load	Necessary Transformer (Calculation Base)	
	Auto Winder	161.0	Average of	Voltage	380 V
	Double Twistor	157.5	Demand factor	Average Power Factor at	approx. 75%
	Double Winder	2.7	68%	Actual Load	
Winding	Blower for A.W	120		Actual KVA Load	565 KVA
	Compresssor	88	Actual Load	Installed Capacitor	200 KVA
(A-Substation)	Air Conditioning of Winding	71.9	423.6 KW	Power Factor of After Installing	
	Lighting	22.0		Capacitor	approx. 94%
				Transformer Load	451 KVA
				Necessary Capacity of Transformer	644～820 KVA
				Necessary Transformer	750 KVA 1 set
	Total	623.1		Existing Transformer can be used	
	Ancillary Equipment of Chiller	200	Average of	Voltage	380 V
Chilled Water			Demand Factor	Average power factor at	
Equipment			90%	actual Load	approx.78%
(A-Substation)			Actual Load	Actual KVA Load	231 KVA
			180 KW	Necessary Capacity of Transformer	330～420 KVA
				New 500 KVA transformer is necesssary	

b) Lighting

All the lighting equipment of all the processes as well as those of air-conditioning facilities shall be renewed.

The distribution boards for lighting equipment shall be installed at 5 locations. They are to be enclosed, dust-proof, wall type made of iron plate with a door in front. Wiring will be installed above the ceiling either along the beam or in cable racks. Please refer to the annexed "Standard for LT Cable and wire" for types and size of cables. Below indicates the specifications of lighting equipment. Please refer to the following table for the number and types of lights for the processes and other places.

- Fluorescent lamps inside the production room

  40W x 2 or 1 lamp(s)

  Open Type and equipped with shade

  High power factor

  Glow starter type

  Tubes and bulbs: natural white or white

- Incandescent lamps (for special places such as the air-conditioner rooms)

  Water or dust-proof type, 40 to 100W

Table 8-15 Lighting Equipment for Each Process in the Mill (Estimate)

Process	Room space	Luminous Intensity	Installed Light FL40W× 2/set	Installed watt per ㎡
Blow Room	1,800 ㎡	100 LX	Approx. 100 Set	5.6 W/㎡
Carding	1,260	100	70	5.6
Drawing	990	100	60	6.0
Roving	1,080	120	80	7.4
Ring Spinning around Snail wire	3,990	150	460	11.3
Winding	1,800	150	125	9
Air cond, & Other			50	
Total			947 Set	

c) Emergency Lighting

For operational safety and minimum maintenance in cases of power failures during operation, emergency lights equipped with a built-in automatic battery switch will be newly installed.

- Standard for determining the number of emergency lights to be installed: 350 - 400 m2/set

d) Receptacles

Receptacles are to be provided at appropriate locations in each process to serve as power sources for operating electrical tools, stroboscopes, oil feeders, clearers, vacuum cleaners, etc. They are to be extended from the distribution boards for lights by means of single phase two-line wiring of 220V with a grounding line. Number of receptacles to be provided: approx. 30

8-4-4 Electrical Equipment List

In table 8-16, the list of main electrical equipment and its specifications for renovation of Cipadung Mill is shown. The items marked (E) in the column of Quantity are already existing and those marked (N) are to be newly installed.

Table 8-16 Specifications of Main Electrical Equipment

Item No	Equipment/Specification		Quantity
RCE-1	Incoming substation		1 lot
	1)Incoming circuit breaker panel	1 set (E)	
	Vacuum tube type circuit breaker		
	20KV,250A		
	Current transformer,Over current relay		
	Ampermeter		
	2)Incoming tie transformer(No.1)	1 set (E)	
	Capacity 3,000KVA		
	Voltage primary 20KV(500V step 5 taps)		
	secondary 3.3KV		
	3)LDS panel for incoming tie transformer	1 set (N)	
	Load disconnecting switch		
	20KV,630A		
	4)Incoming tie transformer(No.2)	1 set (N)	
	Capacity 1,500KVA		
	Voltage primary 20KV(500V step 5taps)		
	secondary 3.3KV		
RCE-2	HT Panel		1 lot
	1)Circuit breaker panel for 3.3KV main	1 set (E)	
	Oil tank type circuit breaker		
	3.6KV,630A		
	Current transformer,Over current relay		
	Potential transformer,Various meters		
	2)Circuit breaker panel for 3.3KV No.2 main	1 set (N)	
	Vacuum tube type circuit breaker		
	3.6KV,630A		
	Current transformer, Ampermeter		
	3)HT Cable for No.2 incoming tie	1 lot (N)	
	Transformer,secondary		
	kind of cable NYFGBY 240mm 3C		
	4)HT Change over switch board	7 sets (E)	
	Double throw disconnecting switch		
	7.2KV,400A		

Item No	Equipment/Specification	Quantity
	Current tramsformer,Ampermeter	
	(Complementary)	
	Potential transformer 3.3KV/110V	1 set (N)
	Current transformer 3.6KV 200A/5A	7 sets (N)
	Watt hourmeter 3Phase 3W 110V 5A	7 sets (N)
	5)HT feeder panel board	7 sets (E)
	Oil circuit breaker 3.6KV,160A	
	6)HT feeder panel board	1 set (N)
	Double throw disconnecting switch 7.2KV, 400A	
	Oil circuit breaker 3.6KV,400A	
	Current transformer,Watt hour meter	
	Watt meter,Ammper meter,Over current relay	
RCE-3	Generator room	1 lot
	1)AC Generator	4 sets (E)
	Capacity 1,340KVA	
	Out put power 1,072KW	
	Frequency 50HZ	
	Voltage 3,300V	
	2)Generator panel boad	4 sets (E)
	Oil circuit breaker 3.3KV,400A	
	Automatic voltage regulator & Various meters	
	3)HT feeder cable	1 lot (N)
	Kind of cable NYFGBY 6KV 120mm^2 3C 6 Feeder	
	NYFGBY 6KV 240mm^2 3C 1 Feeder	
RCE-4	A-Substation	1 lot
	1)LDS Panel for transformer primary 3.6KV,400A	1 set (N)
	2)Transformer	1 set (E)
	Capacity 3Phase,750KVA	
	Voltage 3,300V/380V	
	3)Busduct for transformer secondary	1 set (N)

Item No	Equipment/Specification	Quantity
	with Flexible bar Wiring system 3phase 4wires 600V, 1,200A	
	4)LT panel for winding	1 lot (N)
	Indoor enclosed MCCB Board MCCB 600V 3P 400AF/400AT 3 Circuit 3P 400AF/300AT 3 Circuit 4P 225AF/200AT 1 Circuit Earth fault relay device 1 set	
	5)Automatic capacitor controler	1 lot (N)
	Automatic power factor relay MCCB 600V 3P 400AF/400AT 1 piece Magnetic contactor 4 pieces Capacitor 400V 3Ph 50KVA 4 pieces	
RCE-5	B-Substation	1 lot
	1)LDS Panel for Transformer primary 3.6KV,400A	3 sets (N)
	2)Transformer Capacity 3Phase 750KVA Voltage 3,300V/380V	3 sets (E)
	3)Busduct for Transformer secondary with Flexible bar Wiring system 3Phase 4wires 600V, 1,200A	3 sets (N)
	4)LT panel for prespinning & ring spinning	3 lots (N)
	.Indoor enclosed MCCB board for pre spinning MCCB 600V 3P 400AF/400AT 4 circuits 3P 400AF/300AT 1 circuit 4P 225AF/200AT 1 circuit Current transformer & ampermeter 6 sets Earth fault relay 1 set .Indoor enclosed MCCB board for ring spinning	

Item No	Equipment/Specification	Quantity

MCCB 600V 3P 400AF/400AT 5 circuits
4P 225AF/200AT
Current transformer & ampermeter 6 sets
Earth fault relay 1 set
.Indoor enclosed MCCB board for ring spinning
MCCB 600V 3P 400AF/400AT 5 circuits
Current transformer & ampermeter 5 sets
Earth fault replay 1 set

5)Automatic capacitor controler 3 sets (N)
Automatic power factor relay
MCCB 600V 3P 400AF/400AT 1 piece
Magnetic contactor 4 pieces
Capacitor 400V 3ph 50KVA 4 pieces

RCE-6 C-Substation 1 lot

1)LDS Panel for No.5 Transformer primary 2 sets (N)
Voltage 3.6KV,400A

2)Transformer 2 sets (E)
Capacity 3phase 750KVA
Voltage 3,300V/380V

3)Busduct for transformer secondary 2 sets (N)
with Flexible bar
Wiring system 3phase 4wires
Voltage 600V
Rating cusrent 1,200A

4)LT panel for prespinning & ring spinning 2 sets(N)
.Indoor enclosed MCCB board
MCCB 600V 3P 400AF/400AT 4 circuits
3P 400AF/300AT 1 circuit
4P 225AF/200AT 1 circuit
Current transformer & ampermeter 6 sets
Earth fault relay 1 set
.Indoor enclosed MCCB board
MCCB 600V 3P 400AF/400AT 4 circuits

Item No	Equipment/Specification	Quantity
	Current transformer & ampermeter 4 sets	
	Earth fault relay 1 set	
	5)Automatic capacitor controler	2 sets (N)
	Automatic power factor relay	
	MCCB 600V 3P 400AF/400AT 1 piece	
	Magnetic contactor 4 pieces	
	Capacitor 400V 3ph 50KVA 4 pieces	
RCE-7	Chiller room	1 lot
	1)LDS Panel for No.7 transformer primary & Refrigerator 3.6KV,400A	3 sets (N)
	2)Transformer for refrigerator auxiliary machine	1 set (N)
	Capacity 3Phase 500KVA	
	Voltage 3,300V/400-231V	
	3)Busduct for transformer secondary with Flexible bar	1 set (N)
	Wiring system 3Phase 4wires	
	Voltage 600V,750A	
	4)LT panel for refrigerator auxiliary machine	1 set (N)
	.Indoor enclosed MCCB board	
	MCCB 600V 3P 400AF/400AT 2circuits	
	4P 225AF/200AT 1circuit	
	Current transformer & ampermeter 3 sets	
	Earth fault relay 1 set	
RCE-8	LT Power distribution	1 lot
	1)LT power distribution panel	16 sets (N)
	MCCB branch 4～8circuits	
	LT power control panel	7 sets (N)
	MCCB & starter 6～10circuits	

8-4-5 Water Supply and Fire Fighting Equipment

(1) Water Supply Equipment

Required water consumption of the Cipadung Mill are as follows.

Table 8-17 Water Consumption

Usage	Consumption volume
Cooling water for chiller	Operating condition 1) 580 USRT 24 hr 18,560 USRT・Hr 2) 580 USRT 8 hr Consumption volume 0.033 m^3/USRT・hr X 18,560 = 612m^3/day
Water for air conditioner	four sets 16 m^3/set・day 64m^3/day
Cooling water for compressor	Air compressor for winding About 100 l/min 144m^3/day
Water for workers	Per head 100 l/day As for 800 persons 80m^3/day
	Total 900m^3/day

Note: Cooling water for in-plant power generation is not included.

Pumping capacity of existing

2 sets of deep wells: 42 m3/hr

West well: 18 m3/hr

South well: 24 m3/hr

1,008 m3/day

Pumping capacity of existing water treatment facility: 1,000m3/day

The existing water intake and treatment facilities are adequate for handling the estimated amounts of water above. However, since the facilities will have to be operated at almost full capacity, in the case that inhouse generators are used, a new deep well may become necessary.

(2) Fire Fighting Equipment

a. Sprinklers: No particular problem with continuous use of the existing equipment

b. Hydrants: Some need to be relocated due to enlargement, repartitioning, and/or

new locations of doorways at some parts of the building

8-4-6 Air Conditioning Equipment

(1) Outhine

As stated in the section on Patal Banjaran, the air-conditioning system is a particularly important element for a spinning mill. As indicated in Table 8-18, significant increases in the installed power of spinning machinery is expected.

Table 8-18 Comparison of Power(KW) Requirement

	Existing Mill 29,388 sp.	Renovated Mill 36,000 sp.	Increased Power/sp.
Blow room	140	146.7	≒0
Carding to roving	253	511.5	+65%
Spinning	837	1,722.5	+68%
Winding	290	553.7	+56%

To accommodate such increases in power consumption, the air-conditioning system to be employed at Cipadung Mill will be an air washer type installed for every group of processes. The air will be cleaned, humidified, or dehumidified by chilled water spray inside the washer. Listed in Table 8-19 and 8-20 are the temperature and humidity conditions of air outside and inside the room.

Table 8-19 Outside Air Conditions

	Dry bulb temperature	Wet bulb temperature	Relative humidity
At maximum enthalpy	29° c	25° c	75 %
At minimum enthalpy	21° c	20.5° c	95 %

Table 8-20 Air Conditions inside Room

	Dry bulb temperature	Relative humidity
Blow room	29.0 ± 3° c	68 ± 5 %
Carding, drawing, and roving	29.0 ± 3° c	58 ± 5 %
Spinning	30.0 ± 3° c	55 ± 5 %
Winding	29.0 ± 3° c	65 ± 5 %
Laboratory	29.0 ± 3° c	58 ± 2 %

While Indonesia is a country located right at the equator, the temperature and humidity outside greatly fluctuates in the Bandung district on the Java Island. Therefore, the air is to be taken in during those hours when the enthalpy is low outside so as to save energy by lowering the load of chiller.

Also, an automatic controller is planned to be installed on every air-conditioner. The controller will maintain the temperature and humidity within the given range and regulate the intake of air by comparing the dew-point temperature of the air outside to a specified value.

Table 8-21 shows estimated loads during operation based on installed power and Table 8-22, the calculated loads of the air-conditioners.

All the air-conditioners will be either renewed or newly installed, and high-speed horizontal type air washers with reinforced concrete chambers will be adopted. The air-conditioning equipment will consist of 4 units systems respectively serving the pre-spinning line, the two ring spinning lines (one each for north and south lines), and the winding-twisting-packing line. Fig. 8-10 is a flow chart of air-conditioning.

(2) Specifications

Indicated in Table 8-23 are the specifications of the equipment. Table 8-11 and 8-12 respectively shows the layout plans for the supply ducts and return ducts.

Table 8-21 Power Load and Consumption

Production Machine

Name of Process	Number of M/C	Installed Power Unit	Installed Power Total	Demand factor	Actual load	Load of Air Conditioning
Blowing	2 line 4 Head	KW	146.66 KW	0.5	73.33 KW	Pre Spinning A/C 380.23 KW
Carding	48	5.5	264.0	0.6	158.4	
Drawing	18	7.0	126.0	0.6	75.6	
Simplex F.F	9	13.3	121.5	0.6	72.9	
Ring Spinning (720 SP)	50	34.45	1,722.5	0.7	1,205.8	R.Spinning (N) A/C R.Spinning (S) A/C 1,215.7 KW
Blow Cleaner Separator Box	2	5.5	11.0	0.9	9.9	
A.Winding	14	11.5	161.0	0.7	112.7	Winding A/C 223.5 KW
Twist.Winding	8	22.5	180.0	0.6	108	
D.Winding	1	4.7	4.7	0.6	2.8	
Lighting			111	1.0	111	Pre Spinning A/C R.Spinning (N) A/C R.Spinning (S) A/C Winding A/C 119 KW
Laboratory			10.0		3.0	
Roller Shop & Maint Room			10.0		5.0	
Blower for AW	4	30	120	0.7	84.0	Not Included Air Condtioning Load
Compressor	4	22	88	0.7	61.6	
Sub total			3,076.36		2,010.7	

Air Cond, Chilled Water, Raw Water

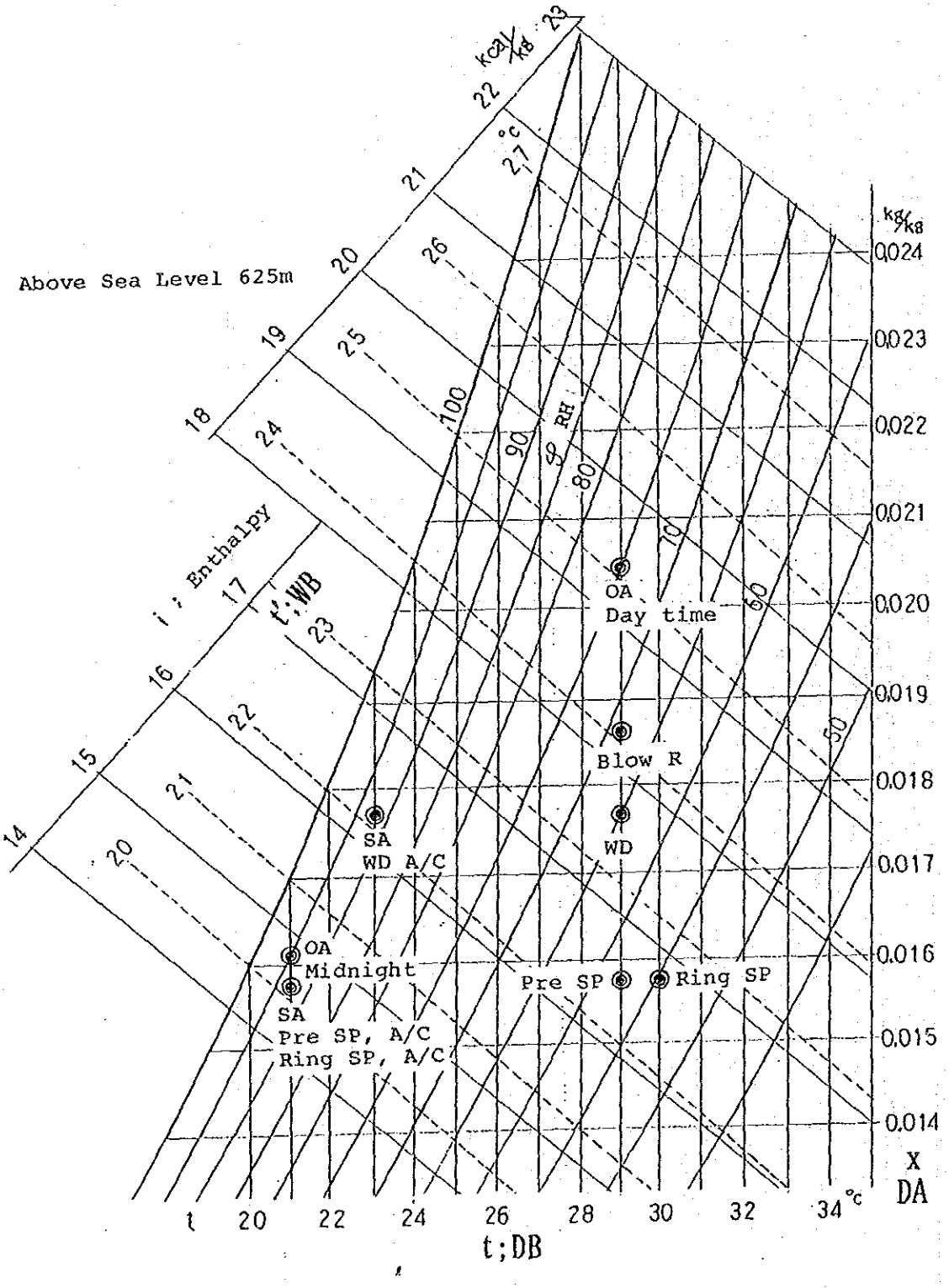
Name of Process	Number of M/C	Installed Capacity Unit	Installed Capacity Total	Demand factor	Actual load	Remark
Pre Sp, A/C			161.8 KW	0.8	129.4 KW	
R.Spinning(N)A/C			130.6	0.8	104.5	
R.Spinning(S)A/C			130.6	0.85	104.5	
Winding A/C			71.9	0.85	61.1	
Chiller(Main)			610	0.6	366	
Chiller(Aux)			140	0.7	98	
Water Treatment			60	0.5	30	
Out Door Light			5	0.8	4	
Office & Other			50	0.8	40	
Sub Total			1,359.9		937.5	

Total			4,289.6		2,948.2	

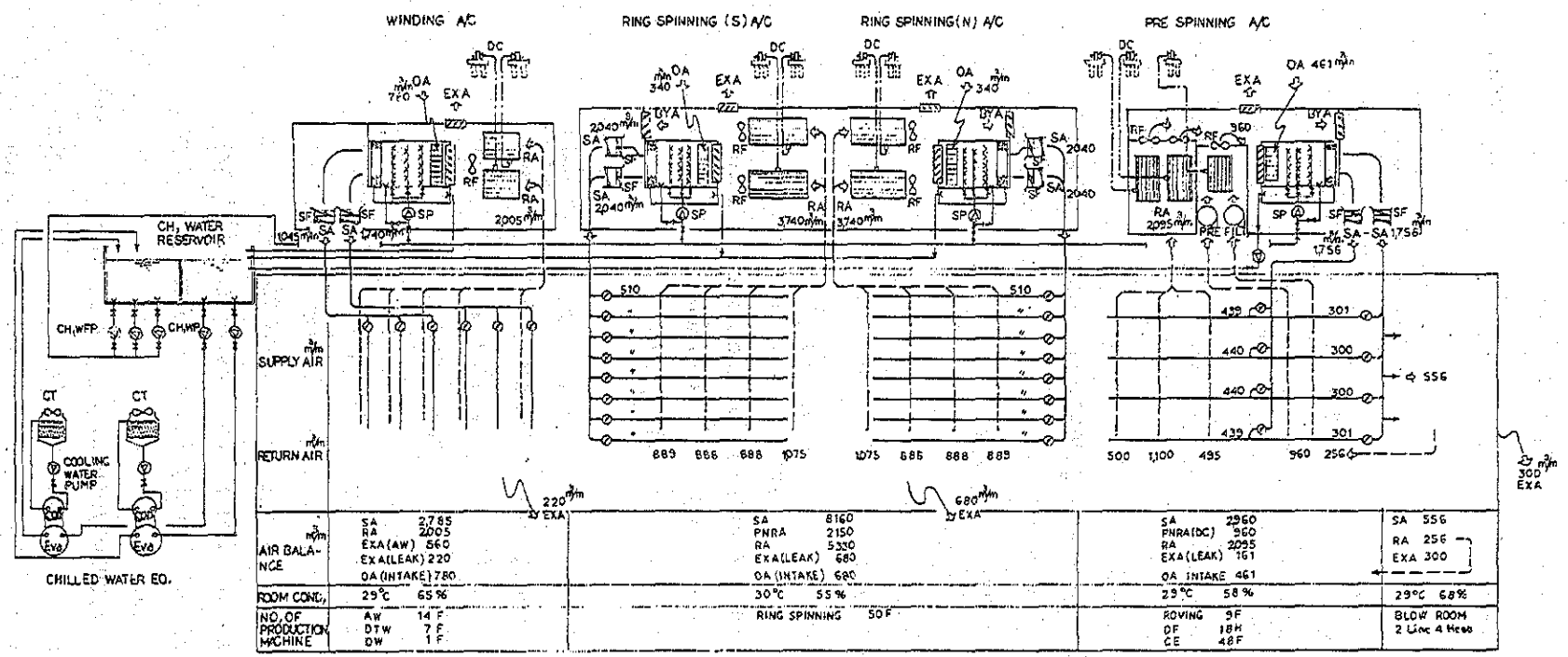
Table 8-22 Calculation of Air Conditioning Load

		Pre-Spinning A/C				R, Spinning-(E) A/C	R, Spinning-(W) A/C	Winding A/C	Total
		Blow Room	Carding	Drawing & Simplex	Sub Total				
Air Conditioning Load	Room Area (Heat Value)	1,800 ㎡ (63,000) Kcal/hr	1,260 ㎡ (44,100) Kcal/hr	2,100 ㎡ (73,500) Kcal/hr	5,160 ㎡ (180,600) Kcal/hr	2,010 ㎡ (70,350) Kcal/hr	2,010 ㎡ (70,350) Kcal/hr	1,800 ㎡ (63,000) Kcal/hr	10,980 ㎡
	Load of LT Power(〃)	73.3 KW (63,064) Kcal/hr	158.4 (136,244)	148.5 (127,710)	380.2 (326,998)	603 (518,580)	603 (518,580)	223.5 (192,210)	1,809.7 KW
	Load of Lighting(〃)	14.4 KW (9,288) Kcal/hr	10.8 (9,288)	17.88 (15,377)	43.08 (37,048)	24.12 (20,743)	24.12 (20,743)	18.0 (15,480)	109.32 KW
	Number of Worker(〃)	10 (1,000) Kcal/hr	10 (1,000)	30 (3,000)	50 (5,000)	35 (3,500)	35 (3,500)	50 (5,000)	170
	Total (Heat Value)	(139,448) Kcal/hr	(180,612)	(219,587)	(549,647)	(613,173)	(613,173)	(275,680)	
Room Condition	Temperatur ℃	29.0	29.0	29.0		30.0	30.0	29.0	
	R,Humidity %	68	58	58		55	55	65	
	Enthalpy Kcal/Kg	18.3	16.6	16.6		16.8	16.8	17.7	
Supply Air Condition	Temperatur ℃				21.0	21.0	21.0	23.0	
	R,Humidity %				92	92	92	92	
	Enthalpy Kcal/Kg				14.5	14.5	14.5	16.2	
Out Door Air Condition	Daytime Temperatur ℃				28	29.0	29.0	29.0	
	R,Humidity %				75	75	75	75	
	Enthalpy Kcal/Kg				19.4	19.4	19.4	18.4	
	Midnight Temperatur ℃				21.0	21.0	21.0	21.0	
	R,Humidity %				95	95	95	95	
	Enthalpy Kcal/Kg				14.8	14.8	14.8	14.8	
Required Supply Air ㎥/min		556	1,375	1,584	3,515	4,039	4,039	2,785	14,378
Discharge of Pneuma Air ㎥/min		To Room	860 to DC	To Room	860	1,075	1,075	560	
Room Return Air ㎥/min		256	415	1,424	2,095	2,664	2,664	2,005	
Exhaust Air (Daytime) ㎥/min		300	0	160	460	300	300	220	
Intake OA (Daytime) ㎥/min					460	300	300	780	
Required Refrigerating Load. USRT					193.4	247.8	247.9	120.1	809.3

Figure 8-9 Psychrometric Chart



PSYCHROMETRIC CHART



A/C	Air Conditioning
SF	Supply Fan
RF	Return Air Fan
SP	Spray Pump
CH, W RP	Chilled Water Return Pump
OA	Out Door Air
EX A	Exhaust Air
BY A	Bypass Air
PNRA	Pneumo Return Air
DC	Dust Collector
FS	Fiber Separater
CT	Cooling Tower
CH, WP	Cooling Water Pump
CH, WFP	Cooling Water Feed Pump

Figure 8-10 Scheme of Airconditioning

Table 8-23 Utility Equipment List

Item No	Equipment/Specification	Quantity
RCU-1	Refrigerator	2 sets (N)
	Turbo hermetic type	
	Capacity 580USRT	
	Motor output Approx. 400KW	
	Auxiliary	
	Chilled water pump 6,250ℓ/min 30KW	2 sets
	Cooling water pump 7,400ℓ/min 45KW	2 sets
	Cooling tower 600USRT	2 sets
	Chilled water feed pump 3,000ℓ/min 30KW	3 sets
	Chilled water reservoir	1 lot
	Made of reinforced concreate	
	Semi-underground type	
	Capacity approx. 450m³	
	Piping for cooling & chilled water	1 lot
RCU-2	Air conditioner for pre-spinning	1 set (N)
	Air washer ; Made of reinforced concrete	1 lot
	Spray stand 3 stages	
	Eliminater,Baffle plate	
	Damper	4 sets
	Supply fan 1,758m³/min x 40mmAq 30KW	2 sets
	CE,Return fan 960m³/min x 160mmAq 55KW	1 set
	Room return fan 2,095m³/min x 50mmAq 37KW	1 set
	Spray pump 4,250ℓ/min x 25mAq 30KW	1 set
	Water strainer rotary type	2 sets
	Chilled water return pump	
	2,500ℓ/min x 10mAq 7.5KW	1 set
	CE Waste collector pre filter 720m³/min	1 set
	CE Waste collector pre filter 240m³/min	1 set
	CE Waste collector rotary filter 960m³/min	1 set
	Room return filter	
	rotary filter 2,095m³/min with dust collector	1 set
	Fiber separator with Transfor fan	2 sets
	Automatic control	1 lot

Item No	Equipment/Specification	Quantity
	Direct humidifier for blow room 10 /hr	10 sets
	Supply air ducting	1 lot
	CE wast collecting duct	1 lot
RCU-3	Airconditioner for spinning	2 sets (N)
	Air washer ; Made of reinforced concreter	2 lots
	Spray stand 3 stages	
	Eliminator	
	Baffle plate	
	Damper	8 sets
	Supply fan 2,020m³/min x 40mmAq 30KW	4 sets
	Return fan 1,870m³/min x 50mmAq 30KW	4 sets
	Spray pump 4,890ℓ/min x 25mAq 30KW	2 sets
	Water strainer	4 sets
	Chilled water return pump	2 sets
	3,000ℓ/min x 10mAq 15KW	
	Return air filter	4 sets
	rotary filter 1,870m³/min with dust collector	
	Automatic control	2 lots
	Supply air Ducting	2 lots
RCU-4	Airconditioner for winding	1 sets (N)
	Air washer ; Made of reinfarced concrete	1 lot
	Spray stand 3stages	
	Eliminater	
	Baffle plate	
	Damper	4 sets
	Supply fan 1,740m³/min x 40mmAq 30KW	1 set
	1,045m³/min x 40mmAq 19KW	1 set
	Return fan 2,005m³/min x 50mmAq 30KW	1 set
	Spray pump 3,370ℓ/min x 25mAq 22KW	1 set
	Water strainer	1 set
	Return air filter	2 sets
	rotary filter 1,003m³/min with dust collector	

	Automatic control	1 lot	
	Supply air ducting	1 lot	
RCU-5	Compressed air equipment		1 lot (N)
	Compresser		
	Dryer, Filter, Receiver		

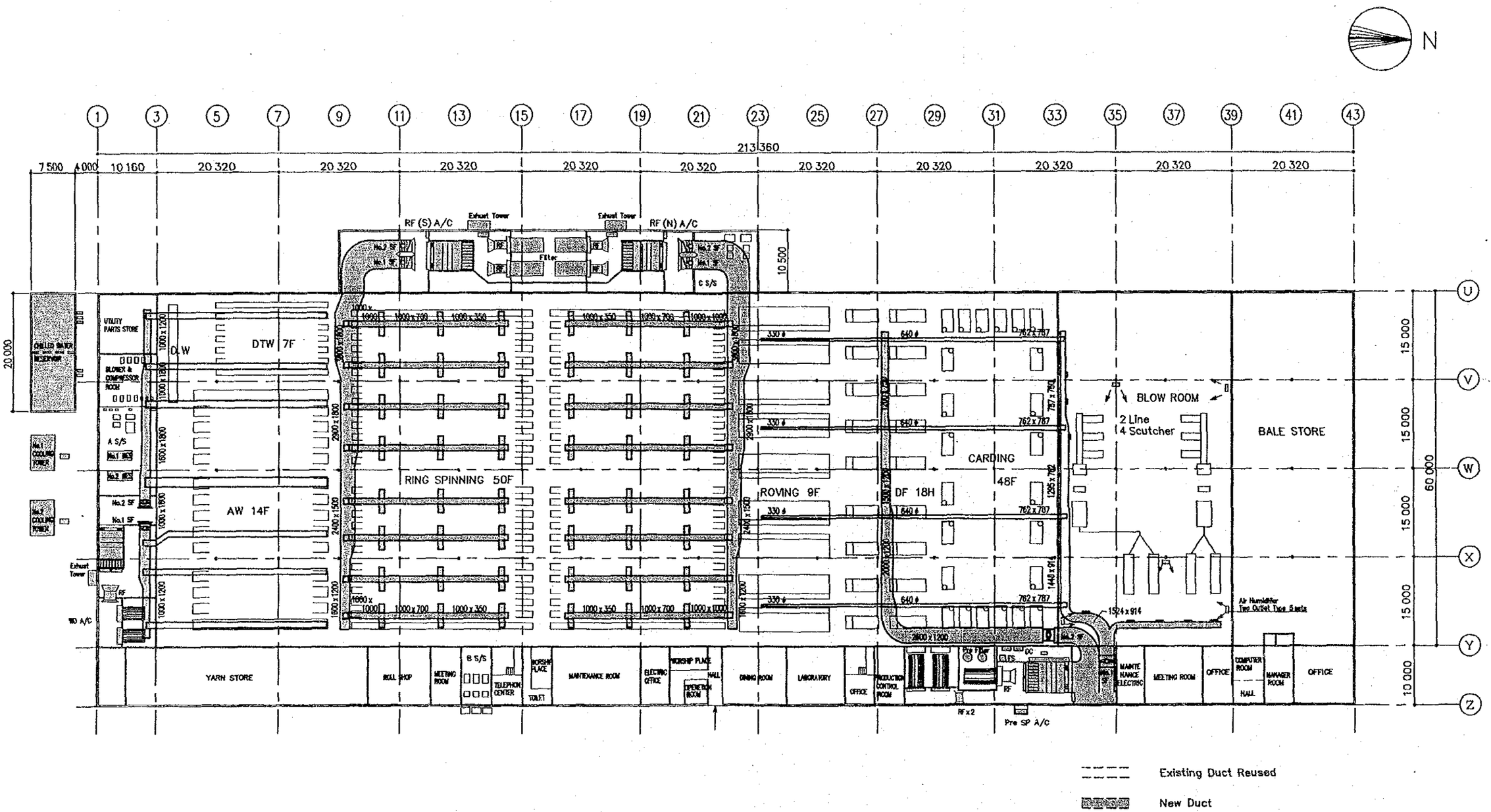


Figure 8-11 Air Conditioning Supply Ducting

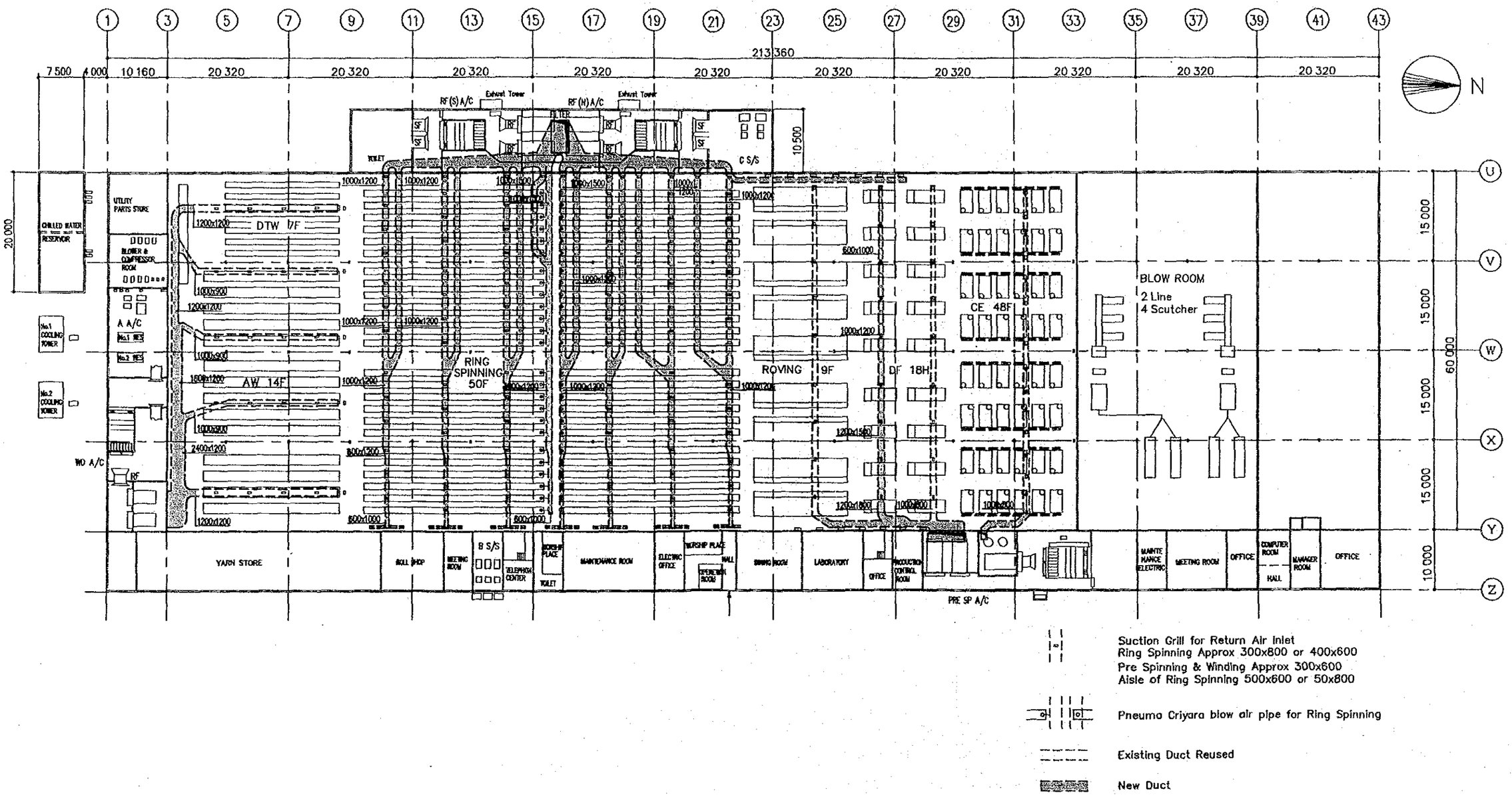


Figure 8-12 Return Ducting

a) Air Conditioning Equipment for Pre-spinning Process

The air from the air washer is sent by supply fan No. 1 to the existing main duct which is to be partially transferred, then fed from the supply openings provided in the branch and main ducts of the blow room. Since high humidity is required for the blow room, the air supplied there by the air conditioner of the pre-spinning process alone is not enough for maintaining the relative humidity inside the room. For this reason, the room will be directly humidified by atomizers as well. The excess air will be directly exhausted outside to offset the amount supplied.

As for the carding room, drawing room, and the roving room, the existing branch duct will be connected to supply fan No. 2 and the newly-installed second main supply duct. The air will be additionally supplied to the carding room via supply fan No. 1 and the existing main duct as well. The diffuser will be renewed. A temperature and humidity sensor is to be installed in the vicinity of the drawing room in order to maintain the relative room temperature at a certain level by controlling the by-pass air of the air-conditioner. The dust collector of the carding machine will be renewed.

The configuration will be as illustrated in the diagram (Fig. 8-13). The air inside the carding room,drawing room, and the roving room will be sent through the return air duct and the rotary air filter and returned to the air-conditioner together with the dust and waste resulted by carding. The air of the suction cleaner from the drawing and roving frames will be emitted inside the room. The existing underground ducts and the underground ducts that are newly installed in the carding and drawing rooms are to serve as return ducts.

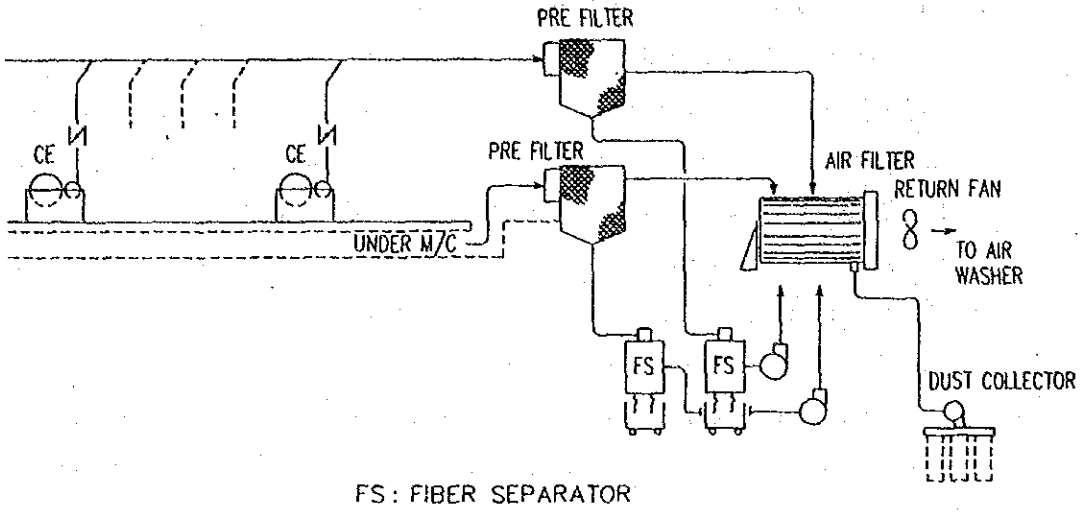


Figure 8-13 Dust Collecting System

b) Air Conditioning Equipment for Spinning Room

(North and South)

Because of the heat emitted by the ring spinning frames, large amounts of air must be supplied and returned to and from the rooms.

Linear type diffusers are preferred for the diffusion of supply air, and they are to be lain out in such a way that the air flows parallel to the frames. The supply air duct will be installed on the lower surface of the ceiling along the aisles on the roving room side and winding room side of the spinning rooms. While some of the existing branch ducts will be used as they are, those with shall sectional areas will be renewed. As mentioned above, the existing diffusers are planned to be replaced by linear types.

As for the return ducts, they will be renewed, as the existing ones are inadequate both in terms of location and capacity. A required number of underground ducts of approximately 1.0 m in width will be newly installed by threading them through the many cylindrical reinforcement footings placed below the spinning room. The air will be taken in from the floor via suction grills equipped with dampers. The blow of suction cleaner from the ring spinning frames will be directly exhausted into the return duct.

c) Air Conditioning Equipment for Winding Room

Since high humidity required in the winding room, large amounts of supply air of slightly high temperatures will be made available. The exhaust from the

Autowinders will be entirely released outside by a centralized blower.

A main duct for air supply will be newly installed and connected to the existing branch ducts. The diffusers are to be replaced by anemones types. The branch duct leading to the spinning rooms will be closed so that the ducts will exclusively serve the winding room. A new main duct for air return will be installed and connected to the existing underground ducts.

The existing air conditioner room will be preserved despite its floor level being approximately. 75 cm lower than that of the winding room, and be restructured so that the return air will be horizontally blown into the filter room.

d) Chiller

The existing chiller is deteriorated with its efficiency being very poor compared to up-to date models.

In addition, since it is expected that it will become increasigly difficult to obtain its parts in the future,the chiller will be renewed. As the power consumption of the production machinery will increase significantly after the renovation, so should be the chilled capacity.

Two new refrigerators of 580 USRT will be installed against required loads of 800 USRT, to accommodate minimum operation at the times of maintenance.

The water supplied from the chilled water tank will be 10 to 12℃, while the return water will be 17 to 19℃. A new chilled water tank with a capacity of approximately 450 ㎥ of water will be newly installed to serve as a buffer for ensuring stable operation even during the peak load of the chiller. This tank will be of reinforced concrete and be buried halfway underground.

8-4-7 Other Utility Equipment

1) Compressed Air Equipment

a) The air-compressing equipment for the Autowinders will be those attached to the machinery. Piping to be installed include that for the cooling water around air compressing equipment, as well as that for supplying the compressed air to the Autowinders.

b) For cleaning and other miscellaneous purposes, compressors and their necessary piping will be provided according to the following general specifications.

- Screw compressor and auxiliary equipment

Amount of pressure : 7kg/cm2 : 1 unit

Motor : 22KW

- Hose coupling for cleaning : Approx. 30
- Coupling for clearer pickers of the spinning room : Approx. 10

2) Central Exhaust Duct for Autowinders

To exhaust suction air around the knottings of the autowinders, dust collectors will be installed and connected so that the air will be exhausted outside by a centralized blower. The blower and overhead ducts will be installed for this purpose, with the former being attached to the Autowinders.

8-4-8 Environmental Preservation

The environmental problems that may be caused by a mill include: water corruption by drainage, flood by heavy rain, dispersion of dust into the atmosphere, and noise. As regards the working environment, the noise of the machinery can also be a cause of discomfort within the mill.

(1) Drainage

Water corruption, which is caused by waste oil from the power stations, can be prevented by the oil retaining embarkment and oil pits which are not connected to the channel of general drainage.

The waste lubrication oil from production machinery is expected to increase. It is recommended to, construct of a brick-made incinerator for treating inflammable wastes.

Handling method of waste oil is described in Chapten 7.

The general waste water to be discharged from the kitchen will not cause problem, as the number of workers after the renovation will not increse.

The cooling water of the air-conditioners and air compressors is basically clean. Residual water and rainwater flows in the mill site to the south until it enters small river. The site has relatively big reservoir capacity owing to a fishpond, etc, so the heavy rain water dose not cause inconvenience to the neighborhood.

(2) Dust

There is no exhaust air containing the dust. The exhaust air from the return duct, etc. is released only after filtered.

(3) Noise

The exhaust noise of the diesel engine of the power station is maintained and that of the centralized blower of the Autowinder tends to increase. However, since the distance between the mill and residences is 100m to 140m it will not be recognized as noise.

Like Banjaran Mill, the noise of spinning frames is expected to be greater than 90 db, which is a relatively low value for a noise heard inside a mill.

8-5 Civil and Building Work

8-5-1 Summary of Remodelling Plan

Below summarizes building and repair works to be performed along with the renovation of the production and utility equipment. Because many parts of the building is out-dated and deteriorated, a number of repair and improvement works must be executed together with the renovation of the equipment.

Like at Patal Banjaran, the construction of an air-conditioner room is the only expansion work required on the building. Also scheduled is the construction of new toilets (for both males and females) by using the space under the supply duct, which should solve the current shortage of toilets at the plant.

So as not to alter the traffic lines of people and products, few changes will be made on the overall layout of the plant.

(Expansion works)

Air-conditioner room (Part used for construction of new toilets)

(Improvement works)

Floor, underground ducts, partitions, machine foundation, fittings, interior drainage

(Repairs)

Wall mortar, ceiling, toilets Fig. 8-14 illustrates the block plan of the Cipadung Mill after the renovation.

8-5-2 Summary of Expansion Work, Modification and Repair Work

The additional construction of an air conditioning room to be constructed adjacent to the west side of the existing Mill is regarded as expansion work. Work directly related with the renovation of the production machinery and utility equipment will be categorized as

modification work. Such works as water proofing, rust prevention, reinforcement, painting to be performed on the occasion of the renovation project will be classified as repair work. Detailes of work above are enumerated hereunder:

(1) Expansion Work

Air conditioning room to be additionally constructed

- Building are: 746.8 sq meters (including the toilet area of 107.0 sq meters)
- Steel frame construction: brick walls with mortar finish with being partially tiled.
- Floor to be RC with mortar and partially Terrazzo
- Roof to be corrugated Asbestos cement sheet; ceiling to be flat slate with V.P. (only in toilet)

(2) Modification Work

Floor

With the introduction of new production machinery, the floors of blowing and carding rooms will be completely renovated. As for the floor between drawframe and winding room, however, the bearing power of soil is insufficient, and at present this floor is reinforced by a special patented method. It is necessony to do detailed technical analysis as for the stabilization of the ground with the consultant who possesses the patent at the stage of implementation.

Walls

Due to the rearrangement of the layout of production machinery, the walls will be either partly removed or newly constructed.

Underground Ducts

The existing ducts shall be completely reconstructed, and new ducts shall be installed, both for obtaining more effective air return.

Machine Foundation

Foundations for new machines and equipment shall be prepared by giving due consideration to machine stability and prevention of vibration.

Doorways

The doors and openings shall be improved or replaced to reinforce air-tightness of the building.

Painting

Walls and ceilings shall be repainted so as to improve the durability of building as well as for the purpose of color coordination.

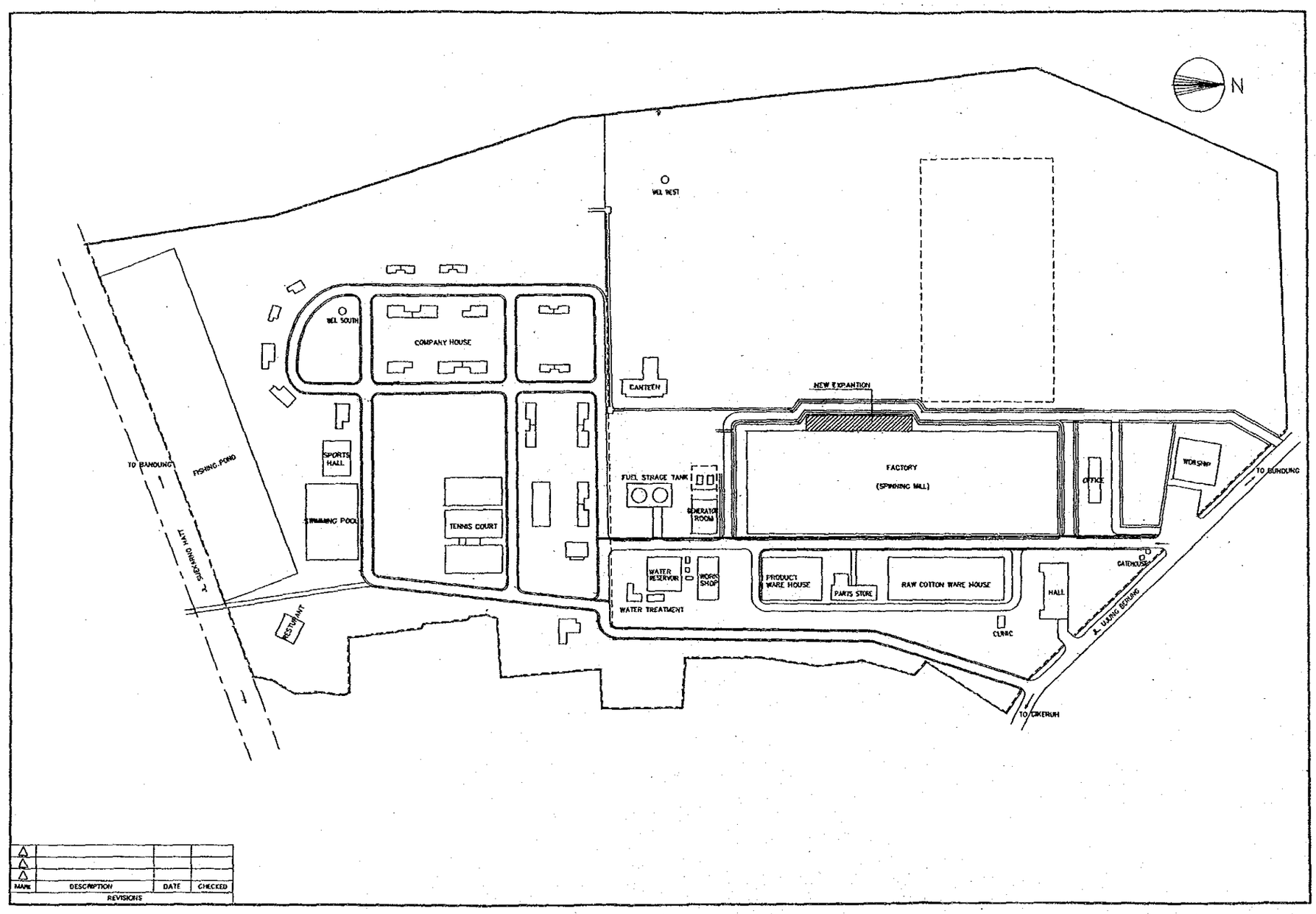


Figure 8-14 Mill Layout

(3) Repair works

Wall mortar

The badly damaged wainscot part shall be entirely remortared. The upper part, on the other hand, shall be repaired by correcting only the damaged parts. The two parts shall be separated by a joint in between.

Also, the entire wall shall be repainted with a vinyl-paint.

Ceiling

The damaged parts of flat slates, deteriorated materials, and corrosion of fixing nails shall be corrected.

Toilets

Installment of sanitary facilities, especially the faucets, repairs on toilet stools and sinks, replacement of floor tiles are some of the works to be performed.

Painting

Besides the painting of the wall and ceiling described above, doorways and iron parts shall be also repainted. To heighten productivity and efficiency, incorporated into the present plan is color coordina tion for improving mental and psychological comfort of the working environment.

8-5-3 Design Plan

Since neither the records nor the design drawings of the previous construction was not available the designs for the scheduled expansion, remodelling and repair works will have to be prepared by actually measuring the building, at site.

As no special structure or finish is being required in the renovation plan, it is considered best to prepare necessary drawings through assistance and cooperation with the local consultants as well as those experts in the mill. In Indonesia, "Standards on Architecture in the Republic of Indonesia" prepared by the Bandung Architectural Research Institute under the direction of Departamen Pekerjaan Umun (Ministry of Public Works) seems to be a general regulation for construction works. When the drawings for the project are completed, arrangements will be made to consult proper authorities of Bandung City concerned. In designing, no major obstacles is foreseen but due considerations must be paid to such matters as the bearing power of soil, underground-water level and the earthwork, drainage works, and the avalability of obtaining certain types of materials. Moreover, it is also necessary that the specifications and standards of construction and

materials be clearly defined, especially regarding the mix and strength of concrete as well as the quality of reinforcing bars.

8-5-4 Construction Plan

(1) Placement of Project Order

After the basic and detailed designs are completed, the procedures toward selecting the contractors would be tendering, an evaluation of the bids contract negotiations and the contract. The most important point here is the selection of a contractor who must be competent and trustworthy. This factor poses as an influential factor on the construction period and workmanships. When the scope of civil and building work relating to this renovation project is considered, it is recommended to award a contract with a trustworthy contractor as a one package with the viewpoint of controlling of construction period and workmanship.

(2) Temporary Work

While temporary power and water is readily accessible from the existing mill, having temporary material storage and site office space may be a problem. Extensive discussions with the client in advance must be done.

(3) Preparatory Work

The main preparatory work is to remove the existing floor and foundation for the machines, provide temporary enclosure, and secure the passageway for hauling scrap material to be disposed. When existing portions are removed, precaution must be exercised for safety, dust prevention, and curing.

(4) Excavation Work

Good quality soil must be used for backfilling and banking, and soil must be firmly packed to prevent any caving in or sinking in future. The underground water level is two meters below ground level and therefore, before any deep excavations are done, a study must be made on how to handle the ground water.

(5) Reinforced Concrete Work

Reinforced concrete work is the most important and the most costly among the civil and construction work. To clarify the quality standards of cement and steel pans material test, to carry out strength test of concrete and bar arrangement inspecttion at the site, are all important.

In the underground duct work a thorough examination is necessary as the ground

water level is high, on prevention of water leakage measures such as laying water tight concrete and inserting check plates at the construction joint.

(6) Steel Work

The strength test of steel material and bolts, physical dimension inspection, and steel product inspection must be undertaken. Particularly, inspection for weld defects and bolt tightness after erection must be thoroughly performed.

(7) Wall Construction and Plaster Work

The wall will be made to match the existing walls and, as a rule, be done with brick and mortar coating with vinyl paint finishing. In order to make the wall rigid, RC made columns and beams will be installed at appropriate spacing. When the mortar coating is applied, finishing will be made into a smooth flat way with attention of and mixing, thickness of coat, curing, and drying period of mortar. In this work, many defects will depend on the skills of the workers, so competent workers must be selected. To prevent the walls from cracking, joints will be installed at appropriate spacings

(8) Painting Work

In accordance with the type of backing and with the availability of paint at the site, appropriate painting methods will be selected.

Care must be exercised in the treatment of the previous paint and the surface treatment by primer. In addition, color coordination will be incorporated together with the painting work.

(9) Floor Work

The floor over the base concrete will be finished with epoxy paint, applied around the foundation of machines, and all other parts with terrazzo tiles to achieve durability and dust preventing, A complete study will be made as to color samples of materials as well as test applications.

(10) General Building Repair Work

The repair of roofings, replacement of valley gutters, repair of ceiling flat slates, sealing of top lights, and repair of wall mortar are involved. Additionally, detailed repair plans must be prepared and a study must be made on the scope of work to be subcontracted, repair method, and work procedures in advance.

8-6 Project Implementation Schedule

Refer to 7-6 for the implementation schedule of the renovation works. The works at Cipadung and Banjaran are to be executed together. As shown in Table 7-37, the works on the Cipadung Mill are supposed to be completed 3 months earlier than those on the Banjaran Mill. When the works are completed, the machinery shall be installed and put into trial operation.

8-7 Operation Plan

As the basic idea has been already explained in the Chapter 7 dealing Banjaran Mill, refer to the sections which are duplicate.

8-7-1 Personnel Plans

In regards to the number of operators required, there is a significant difference in the labor situation of Indonesia in comparison to Japan where there is a labor force shortage. Under this circumstance, it would not be necessary for the Indonesian operators to handle the same number of machines and same number of drums as the Japanese operators. The plan is based on the education and training of the employees to be implemented for the productivity up, differences in basic wages, and the labor environment not well prepared in Indonesia, etc.

(1) Local Staff Before and After Operation

Concepts regarding the local staff by departments are described below.

a) Local Staff in Administration Department

The current number of local staff will be reduced to the proper number required for the project and full scale operation after renovation.

b) Local Stall in Auxiliary Department

The present number of local staff will be kept until the project is completed. After the project has been completed, the number of local staff will be reduced to the proper level as in other departments.

c) Local Staff in Production Department

The production department local staff force will be reduced to the proper level required for the project and full scale operation after renovation.

The above has been compiled and shown in Table 8-24.

Table 8-24 Change of Personnel Numbers

	Dept.Chief	Supervisor	Ass. Supervisor	Foreman Operator	Total	Decrease %
Present						
Production	1	5	20	628	654	
Utility	1	3	6	65	75	
Administration	5	13	23	100	141	
Total	7	21	49	793	870	
Construction Period						
Production	1	6	21	511	539	17.6
Utility	1	3	6	65	75	0
Administration	5	13	19	79	116	17.7
Total	7	22	46	655	730	16.1
Decrease %	0	+4.8	6.1	17.4	16.1	
After Start Up						
Production	1	6	21	511	539	17.6
Utility	1	3	5	53	62	17.3
Administration	5	13	19	79	116	17.7
Total	7	22	45	643	717	17.6
Decrease %	0	+4.8	8.2	18.9	17.6	

Mill manager not included

(2) Number of Workers for each process After Start -up

For production to proceed smoothly under proper number of workers, the workers must exhibit their capability and the work load must be evenly distributed. A standard work load can be determined by analyzing each machine type and establishing standard times and calculating the require work manhour. With the standard work load, the required number of workers for each process can be determined.

The proper number of workers for each operation and maintenance are listed in Table 8-25 and Table 8-26 (Personnel above the position of foreman is not included.)

Table 8-25 Operation Staff for Each Process (4 groups 3 shifts)

	Blowring ~Carding	Drawing ~Roving	Spinning	Winding ~ Packing	Total
Operation	14× 4 +(6)	12× 4	44× 4 +(8)	33× 4	103× 4 +(14)

Table 8-26 Maintenance Staff for Each Proces

	Blowing ~ Carding	Drawing ~ Roving	Spinning	Winding ~ Packing	Roller shop	Total
Maintenanse	7	6	18	6	7	44

Note: Mill manager is not included.

8-7-2 Organization

This has been already described in Chapter 7. The difference from the Banjaran Mill is that the Cipadang Mill has only one spinning department. Table 8-27 shows the proper personnel allocation on the basis of the present organization.

8-8 Education Training Plans

This has been dealt in Chapter 7 where the overall plans including the Banjaran Mill was mentioned.

Table 8-27 Proper Number of Staffs

Mill Manager	Dept chief		Supervisor		Ass. Supervisor	Foreman	Operator	Total
	Production	1	Production	4	12	20	426	
			Maintenance	1	5	8	44	
			Laboratory	1	4	3	10	539
	Utility	1	Electric	1	2	8	14	
			Utility	1	1	4	7	
			Workshop	1	2	5	15	62
	General	1	Administration	1	2	1	7	
			House Keeping	1	2	1	27	43
	Planning	1	Production	1	1			
			Technical	1	1			
			General	1	2		2	10
	Financial	1	Finance	1	2		1	
			Book Keeping	1	1		2	
			Ware house	1	1	2	4	
			Sale	1	1		1	
			Parchase	1	1		1	23
	Personal	1	Personal	1	1		2	
			Prosperity	1	1		3	
			Safety	1	2	3	20	36
	Health	1			1		2	4
						(Mill Manager)		1
1		7		22	45	55	588	718

8-9 Required Funds

8-9-1 Basic Concept of Estimating Total Construction Cost

This is basically the same as the case of Banjaran Mill.

Therefore, see 7-9-1.

8-9-2 Capital Required

The total fund required for the rehabilitation plan is shown below. As seen in this table, the total amount required for Cipadung Mill reaches 56,716,000,000 Rp (equivalent to ¥3,998,480,000).

	Cipadung Mill Million Rp	Share %
Construction work cost	1,397	2.6
Machinery, supplies to be procured (CIF)	42,250	77.9
Customs clearance, inland transport	312	0.6
Insurance premiums	90	0.2
Pre-operational expenses		
Labor expenses	1,832	3.3
Service expenses	405	0.7
Raw material cost	817	1.5
Consulting fees	2,162	4.0
Training expenses	906	1.7
Contingency	4,055	7.5
Sub-total	54,226	100
Interest during the construction period	2,490	---
Total amount required	56,716	---

Note: The interest during the construction period shows the figure under Case B.

The breakdown of the total amount required is shown in Table 8-28.

8-9-3 Details of the Total Construction Cost

(1) Construction Work Expenses

Construction work is to be executed by local enterprises, and all necessary materials are to be procured locally.

Table 8-28 Total Construction Cost

Unit: Mil. Rp ¥: Mil. YEN

	Cipadung Mill				Cipadung Mill Total	
	Foreign Cost	Local Cost	Foreign Cost	Local Cost	Foreign Cost	Local Cost
Architecural Cost	0	1,397			0	1,397
	¥0	1,397			¥0	1,397
Machinery Procurement	40,184	2,468			40,184	2,468
	¥2,833	42,652			¥2,833	42,652
Cif	40,184	2,066			40,184	2,066
	¥2,833	42,250			¥2,833	42,250
Import Duties	0	0			0	0
	¥0	0			¥0	0
Port Clearance Inland	0	312			0	312
Transport	¥0	312			¥0	312
Insurance	0	90			0	90
	¥0	90			¥0	90
Pre-operational Expenses	0	3,054			0	3,054
	¥0	3,054			¥0	3,054
Labor Cost	0	1,832			0	1,832
	¥0	1,832			¥0	1,832
Utility Cost	0	405			0	405
	¥0	405			¥0	405
Raw Material Cost	0	817			0	817
	¥0	817			¥0	817
Consulting Cost	2,126	36			2,126	36
	¥150	2,162			¥150	2,162
Training Cost	896	10			896	10
	¥63	906			¥63	906
Contingencies	2,592	1,463			2,592	1,463
	¥183	4,055			¥183	4,055
Interest d/ Construction	1,870	620			1,870	620
	¥132	2,490			¥132	2,490
Total Construction Cost	47,668	9,048			47,668	9,048
	¥3,361	56,716			¥3,361	56,716

Construction work expenses based on equipment rehabilitation plans are as follows:

Breakdown of construction work — Local currency (Rp1,000)

Temporary work	99,000
Expansion of buildings - Air conditioning room expansion	274,400
Remodeling work - Floor improving work - Wall improving work - Underground duct work - Machinery foundation work - Door and Window work	815,000
Repair work - Coating work	144,000
Total construction work cost	1,397,400 Th.Rp ..

(Local cost)

(2) Cost of Imports and /Locally Procured Equipment Table 8-29 - 31 show prices of the machinery required for new construction or rehabilitation (contractor work costs are included in the case of utility and electricity).

They can be summarized as follows:

	Ex-Go price (¥1,000)	FOB price (¥1,000)	CIF price (¥1,000)	Local procurement price (Rp1,000)
Spinning equipment	2,420,946	2,441,638	2,528,497	--
Utility facilities			304,500	763,000
Electric facilities			--	1,303,490
Total			2,832,997	2,066,490

1) CIF prices of spinning machinery/supplies

Spinning machinery are assumed to be imported from Japan. Conversion from Ex-Go prices to FOB prices and further to CIF prices is as follows:

[FOB prices] Ex-Go prices + Shipping charges

¥2,420,946,000 + ¥20,692,000 = ¥2,441,638,000

(5,173 m³ (182,696 cft) × ¥4,000 = ¥20,692,000)

[C&F prices] FOB prices + Marine transport charges (Japanese ports to the Jakarta Port]

Table 8-29 Production Machinery Cost (Cipadung Mill)

Item No.	Machine Name	Q'ty	Unit Price (Ex-Go ¥1,000)	Amount
RCS-1	Blow Room Machinery	2 lines	130,000	260,000
RCS-2	Card	48 sets	5,000	240,000
RCS-4	Drawing Frame	14 sets	5,200	72,800
RCS-6	Roving Frame	7 sets	15,600	109,200
RCS-7	Ring Spinning Frame	50 sets	21,700	1,085,000
	Overhead Travelling Cleaner	50 sets	1,000	50,000
RCS-8	Automatic Cone Winder	14 sets	30,900	432,600
	Overhead Travelling Cleaner	14 sets	950	13,300
RCS-10	Double Twister	7 sets	8,900	62,300
	Overhead Travelling Cleaner	7 sets	950	6,650
RCA-1	Roving Stripper	1 set		8,000
RCA-2	Gum Cot Grinding Machine	1 set		3,300
RCA-3	Can for Carding	296pcs	14.07	4,165
RCA-4	Can for Drawing & Roving	1,170 pcs	11.5	13,455
RCA-5	Roving Bobbin	54,000 pcs	0.288	15,552
RCA-6	Ring Bobbin	143,910 pcs	0.111	15,974
RCA-7	Roving Cart	12 pcs	80	960
RCL-1	Evenness Tester	1 set		17,000
RCL-2	Dry Range	1 set		2,090
RCL-3	Yarn Fault Classifying Installation	1 set		8,600
	Total			2,420,946
	(Measurement)			(182,696cft)

Table 8-30 Cost of Utility Equipment & Work (Cipadung Mill)

Item No.	Equipment Name	Description	Measurement cft.	Q'ty	Amount Import CIF Jakarta ¥1.000	Amount Local Rp.1.000
RCU-1	Chilled Water Equipment	Refrigerator 500USRT		2 sets	45.000	
		Cooling Tower. Pump		2 sets	20.000	
		Piping		1 lot	2.000	42.000
		Return Water Piping		1 lot		70.000
			4.000		67.000	112.000
RCU-2	Air Conditioning Equipment for Preparatory Section	Air Washer		1 lot	14.000	56.000
		Fan. Pump. etc.		1 lot	22.000	
		Dust Collector		1 lot	23.000	28.000
		Ducting		1 lot	1.500	49.000
		Filter (Wall Side)		1 lot	3.000	
		Automatic Controller		1 lot	7.000	14.000
			10.600		70.500	147.000
RCU-3 (1)	Air Conditioner Equipment for Ring Spinning Section (North Side)	Air Washer		1 lot	14.000	56.000
		Fan. Pump. etc.		1 lot	22.000	
		Dust Collector		1 lot	10.000	
		Ducting		1 lot	1.500	63.000
		Automatic Controller		1 lot	7.000	14.000
			8.800		54.500	133.000
RCU-3 (2)	Air Conditioning Equipment for Ring Spinning Section (South Side)	Air Washer		1 lot	14.000	56.000
		Fan. Pump. etc.		1 lot	22.000	
		Dust Collector		1 lot	10.000	
		Ducting		1 lot	1.500	63.000
		Automatic Controller		1 lot	7.000	14.000
			8.800		54.500	133.000
RCU-4	Air Conditioning Equipment for Finishing Section	Air Washer		1 lot	9.000	42.000
		Fan. Pump. etc.		1 lot	18.000	
		Dust Collector		1 lot	10.000	
		Ducting		1 lot	1.000	42.000
		Automatic Controller		1 lot	5.000	14.000
			7.800		43.000	98.000
RCU-5	Compressed Air Equipment	Compressor for Auto-Winder&General Use	300	4 sets	10.000	
		Dryer. Filter. Receiver	100	1 lot	3.000	
		Piping	50	1 lot	2.000	84.000
			450		15.000	84.000
	Sprinkler & Hydrant	Sprinkler		1 lot		42.000
		Hydrant		1 lot		14.000
						56.000
	Total		40.450		304.500	763.000

Table 8-31 Cost of Utility Equipment & Work (Cipadung Mill)

Item No.	Equipment Name	Description	Measurement	Q'ty	Amount	
					Import CIF Jakarta ¥1.000	Local Rp.1.000
RCE-1	Incoming Substation	Tie transformer		1 lot		45.000
RCE-2	HT Panel	VCB Panel		1 lot		57.000
RCE-3	HT Cable	6KV Feeder		7 sets		95.265
RCE-4	A-Substation	Panels. Busduct. etc.		1 lot		50.000
RCE-5	B-Substation	Panels. Busduct. etc.		1 lot		161.213
RCE-6	C-Substation	Panels. Busduct. etc.		1 lot		117.542
RCE-7	Chiller Room	Panels. Transformer. Busduct. etc.		1 lot		35.747
RCE-8	LT Power Wiring	LT Distribution Panel		1 lot		159.720
		LT Main Cable		1 lot		204.603
		LT Power Wiring		1 lot		148.391
						512.714
RCE-9	Lighting Work	Lighting Distribution Panel		1 lot		16.500
		Fixture & Wiring		1 lot		118.845
						135.345
	Other Works	Socket. Tap. Wiring				7.664
		Speaker System				2.000
		Interphone System				19.200
		Fire Alarm				13.800
		Time Signal				8.000
		Fault Alarm				5.000
		Earth Work				3.000
		Lightning Work				5.000
						63.664
	Instrument & Tester for Control of Electricity					30.000
	Total					1.303.490

¥2,441,638,000 + ¥71,258,000 = ¥2,512,896,000

(5,173 m³ × US$100 × 137.75 = ¥71,258,000)

[CIF prices] C&F prices + Marine insurance premiums

(C&F × 110% × 0.45%)

¥2,512,896,000 + ¥15,601,000 = ¥2,528,497,000

(¥3,151,776,000 × 110% × 0.45% = ¥15,601,000)

2) Customs clearance charges and inland transport expenses

These expenses are calculated by applying the rates for unloading, customs clearance, and land transportation after the arrival of the machinery at the Jakarta Port.

Measurement of spinning machinery	182,696 cft
Measurement of utility facilities	40,450 "
Total	223,146 "

223,146 × 1/40 × Rp56,000 = 312,404 Th.Rp ...Local cost

3) Insurance premiums

Construction work (installation) insurance premiums are posted:

Facilities/equipment	40,184,355 Th.Rp (¥2,832,997,000)
	2,066,490 "
Maintenance expenses	312,404 "
Installation expenses	2,517,286 "
Total	45,080,535 Th.Rp × 0.2% = 90,161 Th.Rp .... Local cost

Total prices of the machinery to be procured -- 42,653,410 Th.Rp

Facilcties/equipment	40,184,355 Th.Rp (¥2,832,997,000)
	2,066,490 "

Customs clearance transport expenses & inland transportation charge 312,404

Insurance premiums 90,161

Foreign cost 40,184,355 Th.Rp (¥2,832,997,000)

Local cost 2,469,055 "

(3) Pre-Operational Expenses

1) Labor expenses

Just like the case of Banjaran I, work on Cipadung Mill will be a large-scale construction work due to complete replacement of facilities. Removal of old equipment, construction work, installation preparation, installation, and power and electrical wiring