for man-made fibers.

Out of the two cotton lines, one line will be specialized for Ne 30 and Ne 40 with one mixing and cleaning line and two scutchers, and the other for Ne 50 and Ne 60 with one mixing and cleaning line and one scutcher. Three scutchers and two lines are interchangeable each other.

The man-made fiber line will be a pin cylinder and free nip type with good fiber opening property and least possibility of damaging fibers. The line will consist of one line with one scutcher.

Transporting raw cotton from the raw cotton warehouse to the process site is done once a day. Consideration will therefore be taken to provide space to hold more than one day consumption stock of raw cotton and space for bale opening and seasoning (adjustment of moisture content).

Also space for storing cotton and polyester lap and lap holding space at changing time are secured.

b) Carding Process

Machine arrangement and inter-machine space were decided so that lap from the blow room machine can be smoothly conveyed and cans (610 mm dia × 1067 mm high) can be transported smoothly to the lap former in the next process.

The cans waiting space is somewhat small, so cans of 610 mm dia with casters was adopted in order to reduce the running stock at the time of change over as well as for combination of lap and can arrangement.

c) Lap Forming and Combing Processes

A Lap Former that combines the sliver lap machine and the ribbon lab machine was adopted for floor space, quality of lap, and productivity. In consideration of the flow of sliver, the combers are concentrated in the center in order to prevent the spinning condition from being influenced by outer air.

The position of lap formers was decided so as to favorably match the comber layout.

The cans to be used will be 508 mm dia by 1017 mm high with casters.

d) Drawing Process

The drawframes for polyester/cotton blended spinning are located at the eastern end of the mill, and polyester sliver is supplied from the closest carding machine and cotton slivers are supplied from the closest combing machine. Therefore, the flow of polyester/cotton blended spinning is concentrated to the east side of the

mill.

The sliver for cotton combed yarn passes through the two-pass drawing frames which is located at the west side and then forwarded to the roving process.

The cans to be used will be 508 mm dia by 1067 mm high with casters.

Ample space for storage of cans will be secured.

e) Roving Process

Two frames will be installed in each one span of 12 m and total ten frames in five spans along east and west (108 spindles perframe).

For operational reasons and productivity, the frames are set to face each other, but the space between the columns and the sliver cans turned out to be slightly narrow.

f) Ring Spinning Process

There will be 35 ring spinning frames with 960 spindles arranged in the south to north direction.

By arranging the roving, spinning, winding and twisting processes all in one same direction, smoothness flow of product and flow of air can be expected. The space between frames are fully secured and safety is insured even after the auto doffers installed.

g) Winding and Twisting Processes

Conveying of spinning cops, returning of empty bobbins, and conveying of wound cheese will be done smoothly by arranging 12 sets of 60 drum autowinders and eight sets of 120 drum double twisters in the same direction as the spinning frames. Waiting space for cops and bobbins are secured. However, the doubler will be arranged at a right angle to the twister so that conveying of doubled cheese can be readily performed.

The products will be packed in carton cases, and packing space is also considered. One set of steam setter will be installed in the corner of cone packing room.

h) Auxiliary Building (room)

In order to install the winders, doublers, twisters, etc., the existing room for reeling and bundling machines will be withdrawn. After that the above machines will be placed in the area four spans to the south and five spans to the east from the north-west corner of the building.

The laboratory must be moved from the north-east corner to a place adjacent to the office. In addition, the air-conditioning facilities for the winders and twisters will be placed in the room occupying from No.6 air washer room (located on the east side) to the lavatory. Therefore the existing lavatory will have to be relocated.

(2) Banjaran II

The layout of production machines after rehabilitation of Banjaran II is shown in Table 7-10.

Banjaran II is envisaged to mass-produce polyester and cotton blended yarn. This mill is aimed at attaining high quality and achieving high productivity. Except for some machines, most of the present machines and equipment can be used and will not be changed. The flow from the raw material to the final product will not be drastically altered as well.

Explained below is the layout of newly added machines and those which will be relocated and rehabilitated.

a) Blowing Room Process

The existing three sets of scutchers will be replaced with new ones. Modification and repair of the line from the blend feeder (MBK) to the fan condenser (KD) will be limited only to defective parts. In addition to three sets of new scutchers, serviceable parts from the present three sets of scutchers will be salvaged and modified into one scutcher. With this modified scutcher, a new hopper feeder (KD) will be coupled. After all, the blow room process after rehabilitation will be equipped with two mixing and cleaning lines and four scutchers. The following areas can be secured: bale opening room, seasoning room, bale arrangement space next to the machines, and lap waiting space. Net curtains will be required to prevent different fibers from mixing.

b) Carding Process

The carding process layout will be the same as the present one. CK-7 cards will be removed and scrapped, and in their place 35 sets of rehabilitated semi-high production cards will be installed. Since this length is longer than CK-7 cards and the cans of 610 mm dia by 1067 mm high with casters are used, the entire area for this process will become slightly wider but storage space for sliver and empty cans have been secured.

c) Lap Former

Lap Formers that integrates the sliver lap machine and ribbon lap machine were selected considering their operational features and installation space.

The position of lap formers was determined from the viewpoint of operation considering flow of sliver from the carding machine, supply of lap to the combing machine, and the return of empty cans and spools. Deposit space for slivers and empty cans is sufficient.

d) Pre-drawing Process for Synthetic Fiber

Out of the present CHERRY and TOYODA drawframes (five heads), three sets will be relocated to between the carding machines and the drawing frames from south to north as predrawing frames for synthetic fiber. Although the sliver conveying space behind the creel will become slightly narrow, the other deposit space can be secured.

With this relocation, the carding machines at the side of roving machines will produce synthetic sliver.

A net curtain will be needed between the roving frame and the carding machine to prevent fly from becoming mixed, since the flyer side of the roving frames will face the carding machines.

e) Combing Machines

There are 11 sets of TOYODA CM-8 currently used, and three sets of the same type installed in the First Mill, will be relocated so that the total number will become 14 sets. The main parts of the 14 sets of combing machines will be replaced or modified to upgrade product quality. Together with the new lap formers to be introduced, these 14 sets will bring out satisfactory results. Space for conveying and storing laps and sliver is secured.

f) Drawing Process

The present condition will not be changed except for replacement of main parts.

g) Roving Process

There are eight sets of TOYODA FL-16 used at present. One set out of four sets at the east side will be relocated in the center line and the layout will be three, three and two from the east.

Reconditioning will be done mainly on the draft mechanism, flyer parts, and gearings on these frames.

Sliver deposit space and passage way for roving will remain unchanged.

h) Spinning Process

The layout and other matters will remain unchanged. Maintenance and replacement with new parts will be performed on the spindle parts. Replacement of rings and roller parts should be performed as daily maintenance as early as possible to increase the rotating speed and improve product quality.

i) Winding Process

The 22 sets of GILBOS auto winders that are currently not operating will be removed and three sets of auto winders with splicers having 60 drums will be added.

After all there will be a total of 12 sets of autowinders equipped with splicers. There are places where the space between winders are very narrow, so when the three sets are added, the inter-machine space should be rearranged to improve workability.

The space made available after removing the Gilbos auto winders can be utilized as packing space for carton boxes.

j) Steam Setting Process

This process will remain unchanged.

k) Auxiliary Building (rooms)

Most of the rooms will be left as they are without any major changes.

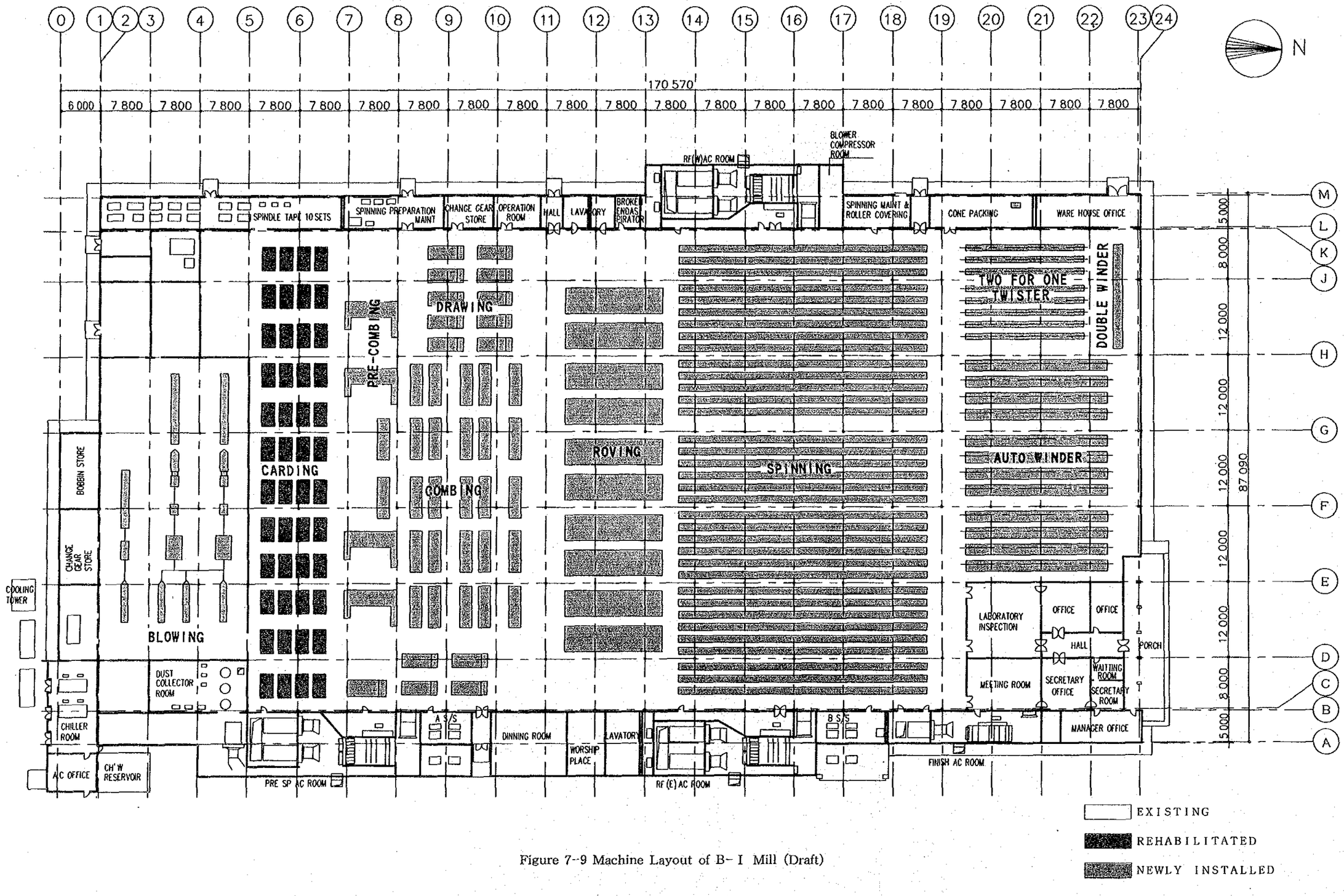


Figure 7--9 Machine Layout of B- I Mill (Draft)

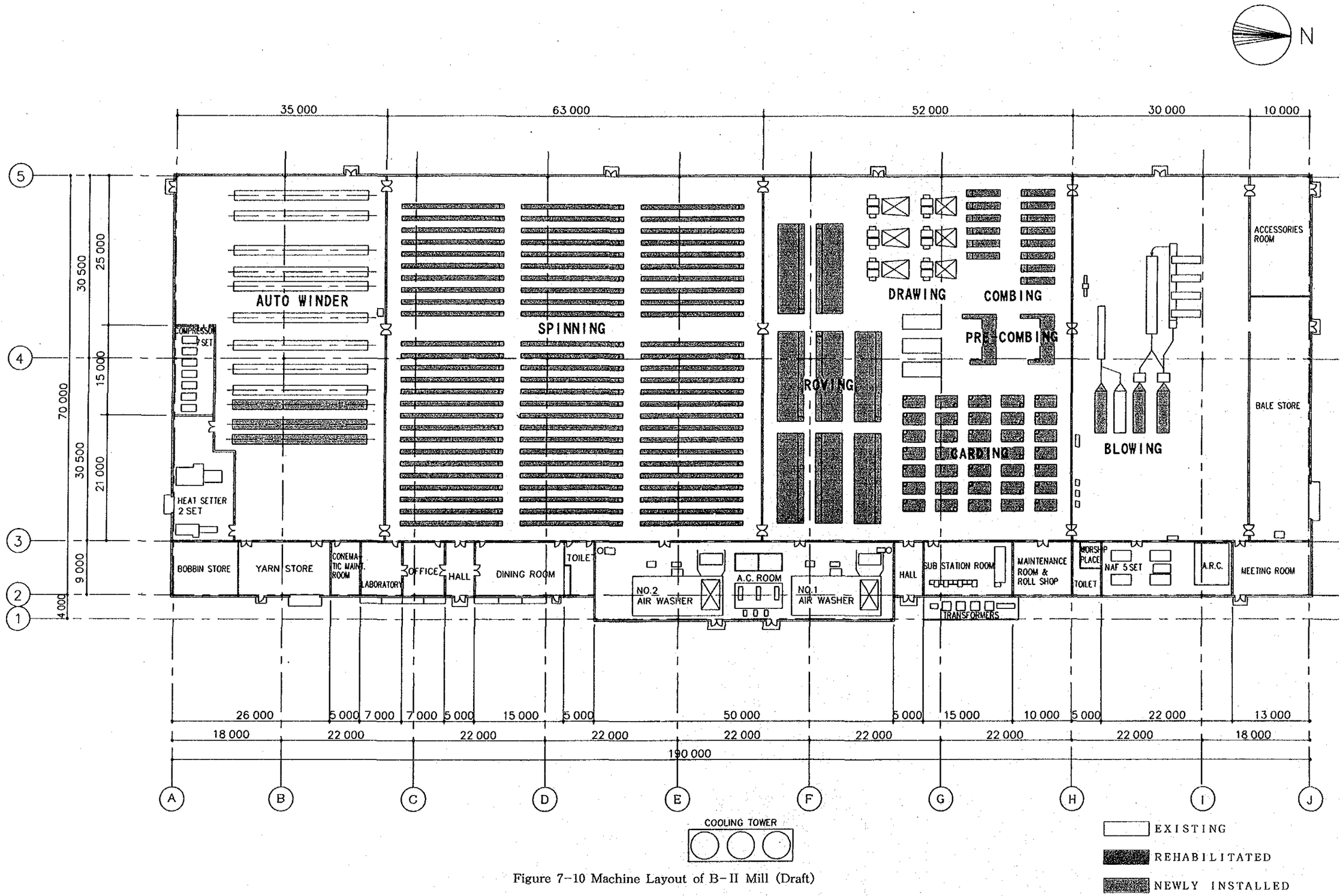


Figure 7-10 Machine Layout of B-II Mill (Draft)

7-4 Utility Equipment

7-4-1 Incoming and Generating Facilities

(1) Power Consumption

With the implementation of this project, the power consumption will substantially rise with the increase of production volume, reinforcement of production equipment and increase of air-conditioning load and will reach a total of 5,484 KW,

Banjaran Mill No.1	2,935 KW
" " No.2	2,460 KW
Other common sectors	89 KW
Total	5,484 KW

The present power contracted with PLN is 4,000 KVA, but with the power factor at 85%, a contract of 6,600 KVA will be required. Indonesia is presently confronted with an acute power shortage, but according to the explanation from PLN, the power shortage problem will be resolved after 1993. This project will be undertaken under the assumption that the contracted power can be increased to 6,600 KVA, and generator capacity up has not been considered.

(2) Incoming Facilities

Figure 7-11 shows a single line wiring diagram of Banjaran I. With the increase of incoming electricity, the following reinforcement will be required.

a) Power Receiving Cable

By increasing the three core cables NYFGbY 240 mm^2 (323 A, 3520 kVA) (the same as the present cables), the total allowable current value becomes 646A, and the allowable power receiving capacity will be 7,040 KVA.

b) Breakers and Disconnect Switches

A breaker and disconnector switch for 6 KVA will be newly installed for the sake of safety adjacent to the existing ones in the switchboard room of the power station.

(3) Power Generating Facilities

The present three diesel engine generator units will be utilized as stand-by units for an emergency or shortage in the power supply. The present facilities will remain as they are, and periodical check and warm-up must be kept on. And spare parts must be secured.

(4) High Tension Distribution Lines

(Refer to the high tension distribution line diagram Figure 7-12.)

a) The present cables from the 6 KV high tension switchboard in the power station to the transformer facilities of the First Mill are deteriorated and will be replaced with new cables.

The new cables will be :

- NYFGbY 6 KV 50 mm2 3 core:

  transformer capacity : less than 750 KVA

- NYFGbY 6 KV 95 mm2 3 core:

  transformer capacity : over 1,000 KVA

Cable laying method:

Directly buried underground(GL-1200 mm); and when buried under roads, cable to be placed in concrete pipes or PVC pipes.

b) The present cable to Banjaran II transformer facilities will be continuously used.

7-4-2 Wiring Method and Voltage

The wiring method from the transformer facilities and voltage at present and after renovation are shown in the table 7-19.

Table 7-19 Wiring Method and Voltage

			Present		New	
			Wiring method	Voltage	Wiring method	Voltage
Refrigerator main motor			3 phase 3 wire	3.3 KV	3 phase 3 wire	6.6 KV
Transformer secondary side	Mill No. 1		3 phase 4 wire	380 - 220 V	3 phase 4 wire	400 - 231 v
	Mill No. 2		〃	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	Mill No. 1	(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
	Mill No. 2	(to distribution panel) (branch circuit)	3 phase 3 wire Single phase 2 wire	220 - 127 V 127 V	3 phase 3 wire Single phase 2 wire	220 V 220 V

a) When the wiring from the distribution panel to lighting fixtures and receptacle is single phase 2 wires type, the cable will have three wires with one wire for grounding.

b) Wiring from the distribution panel for the driving motor to the load equipment will be 4 core cable of which one wire being grounding conductor.

7-4-3 Electrical Facilities of Banyaran I

(1) Transformer Facilities

With the increased electrical load of the production machinery and the deterioration resulting from years of service of the distribution panel and the existing transformer facilities, A substation will be relocated and renovated. B substation will be renovated at its present location. Some facilities will be added to C substation at its present location.

The present four transformer units at A substation and B substation will be continuously used. A 1500 KVA transformer will be newly added to B substation. Disconnector switches (LDS) will be newly added to the primary side of the transformers for safety.

The low voltage bus bars on the secondary side of the transformers and the low voltage switch panels and low voltage phase advance condenser panels for both A and B substations will be totally replaced with new units.

The present transformer and the three KV wiring to the chillers of the C substation will be used as they are. Load disconnect switch (LDS) will be newly added for 6 KV for new chillers and will be connected to their high voltage control panel. The grounding electrode and ground bus bar for A substation will be newly installed, but as for B and C substations, the present grounding electrodes and ground bus bars will be used. The transformer capacity calculation table is shown in the table 7-20.

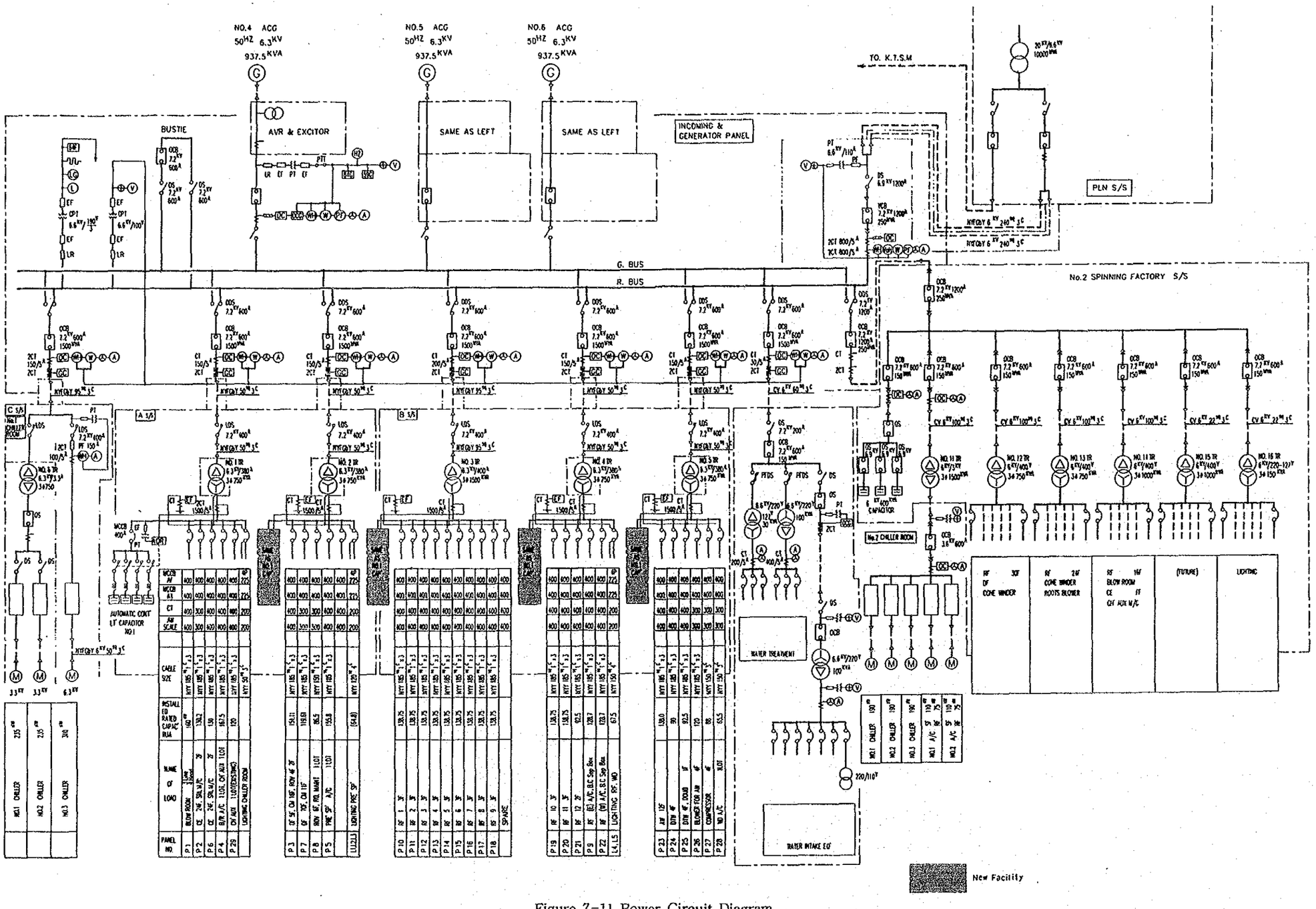


Figure 7-11 Power Circuit Diagram

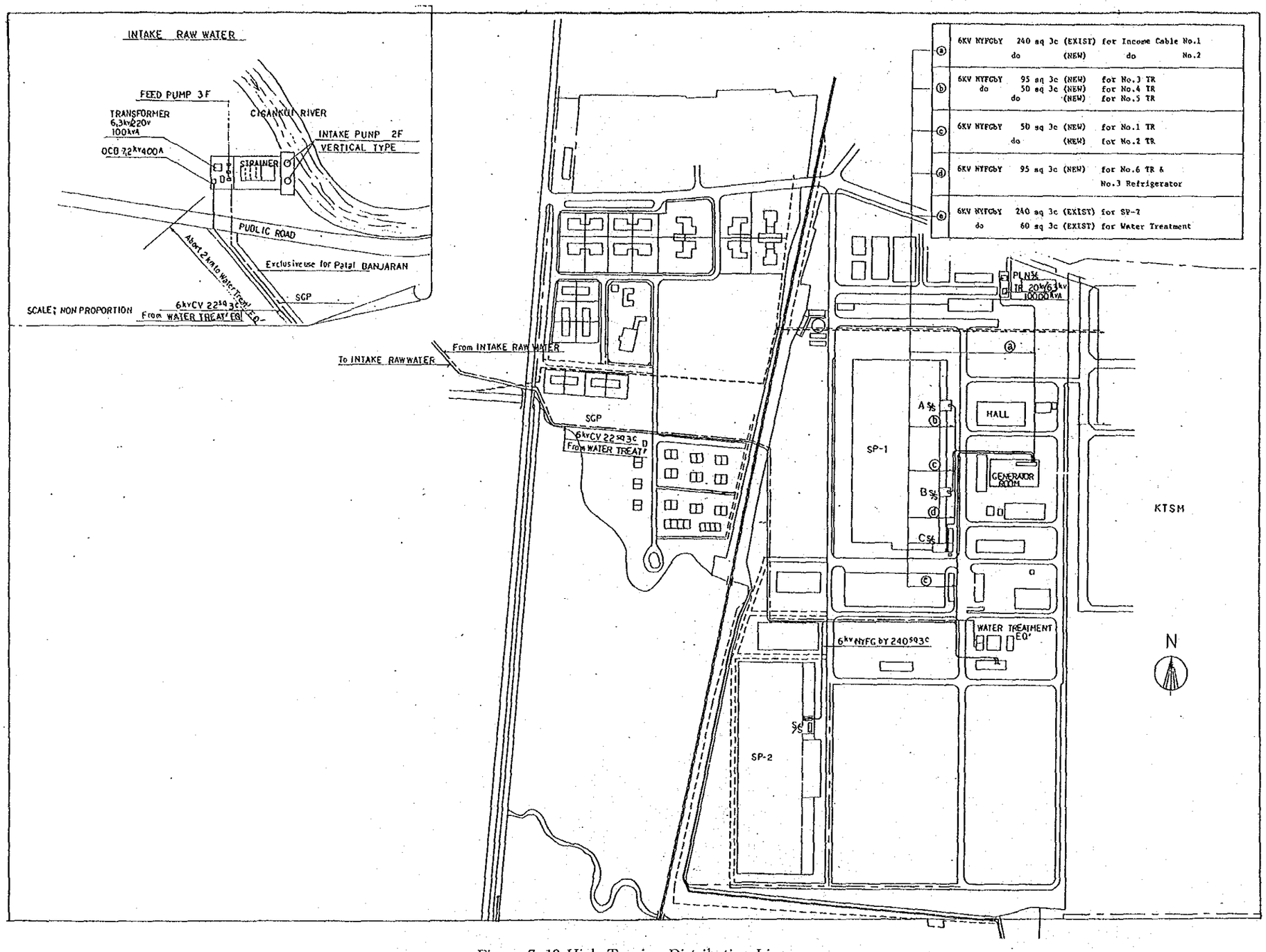


Figure 7-12 High Tension Distribution Line

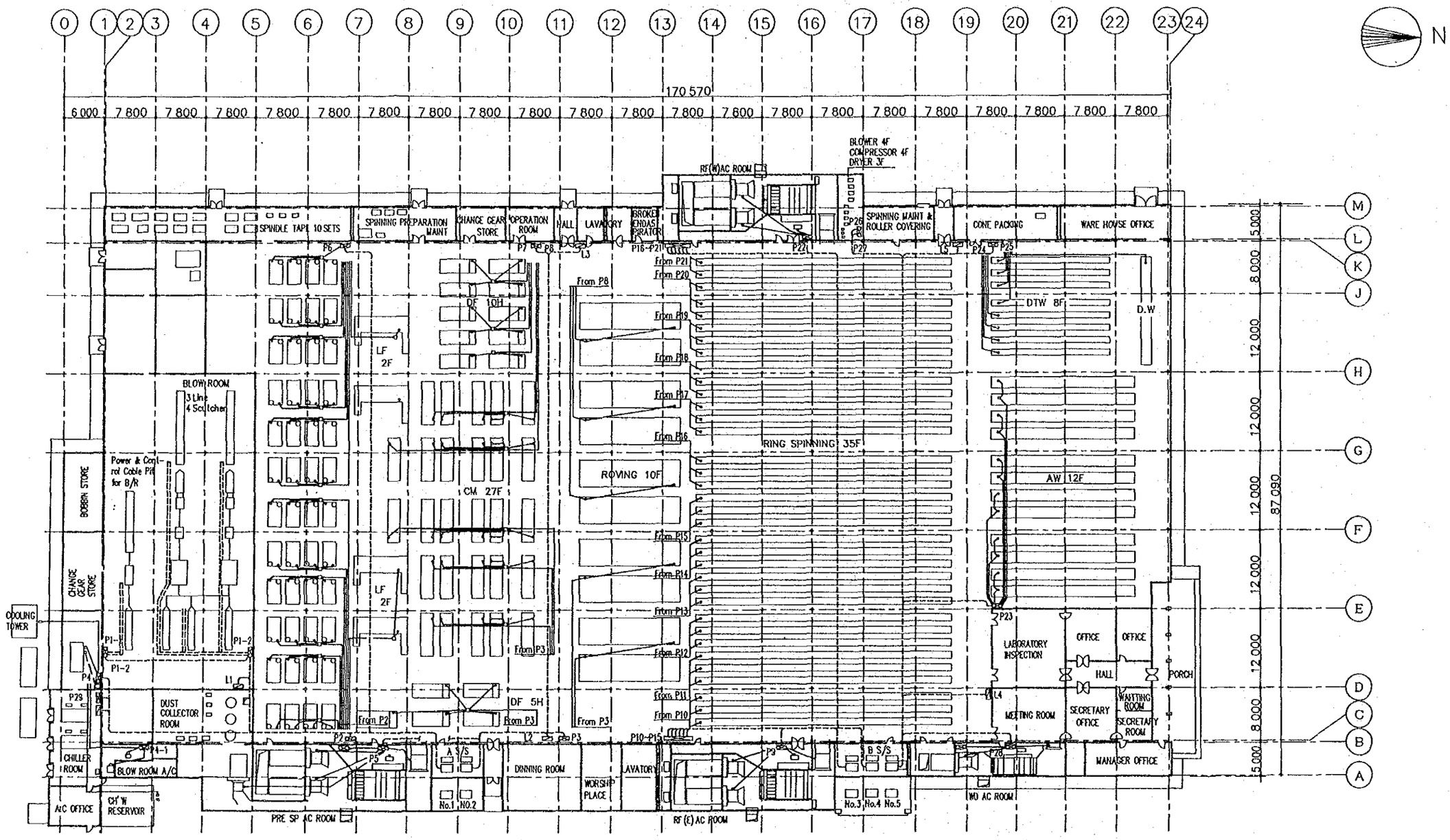
Table 7-20 Trans Capacity Calculation Table

Patal Banjaran

Machine Equipment		Installed Power KW	Actual Load	Necessary Transformer (Calculation Base)	
	Blow Room	160		Voltage	380 V
	Carding	196.8		Average power factor at	
	Lapformer	63.6	Average Demand	actual Load	approx. 72%
	Drawing	105.0	factor	Actual Load	1,090.3 KVA
Pre spinning	Combing	121.8	66%	Installed Capacitor	200 KVA×2 sets
	Roving	133.0		Power factor after	
(A-Substation)	Air Conditioning for		Actual Load	installing Capacitor	approx. 89%
	Prespinning	155.8	785 KW	Trasformer Load	882 KVA
	Air Conditioning for Blow Room	27.5		Necessary Capacity of	
	Roller Shop & Maintenance Room	20.0		Transformer	1,260～1,600 KVA
	Auxiliary Machine of Chiller	140.0		Necessary Transformer	750 KVA 2 sets
	Lighting	65.0			
				Existing Transformer can be used	
	Total	1,188.5			
	Ring Spinning	1,618.8		Voltage	380 V
	Blow Cleaner Separator Box	11.0	Average	Average Power factor	
Ring Spinning	Airconditioning for		Demand factor	at Actual Load	approx. 78%
	Ring Spinning	123.2	75.3%	Actual Load	2,330.8 KVA
and Winding	Auto Winder	138.0		Installed Capacitor	350 KVA×1
	Double Twister	180			200 KVA×2
(B-Substation)	Double Winder	2.7	Actual Load	Power factor after installing	
	Blower for AW	120	1,818 KW	Capactitor	approx. 94%

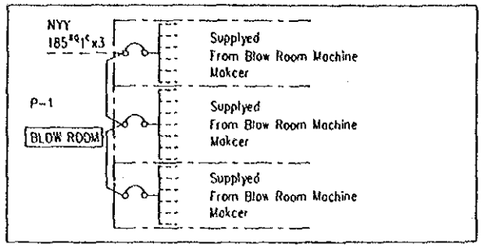
Patal Banjaran

Machine Equipment		Installed Power KW	Actual Load	Necessary Transformer (Calculation Base)
	Compressor Air Condtioning for Winder Lighting Total	88.0 65.5 67.5 2,414.7		Transformer Load 1,934 KVA Necessary Capacity of Transformer 2,763～3,516 KVA Necessary Transformer Adding to existing 2 sets of 750 KVA Transformer, new 1,500KVA Transformer is necessary
Refrigerator (Main Machine) (C-Substation)	Refrigerator	400	Average Demand factor 90% Actual Load 360 KW	Voltage 3,300 V Average power factor at actual Load approx. 85% Actual Load 423.5 KVA Necessary Capacity of Transformer 605～770 KVA Necessary Transformer 750 KVA Existing Transformer can be used



LT, Power distribution panel
Lighting distribution panel
LT, Power Main Cable
LT, Power Wiring
3kv Power Cable
See Drawing Skelton diagram for Patal Banjaran
LT, Power distribution Connection diagram

Figure 7-13 Low Tension Power Distribution Panel

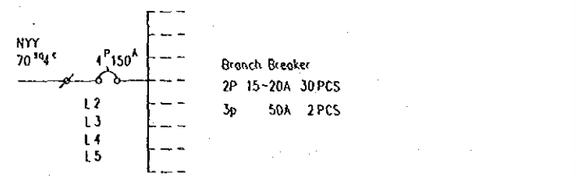


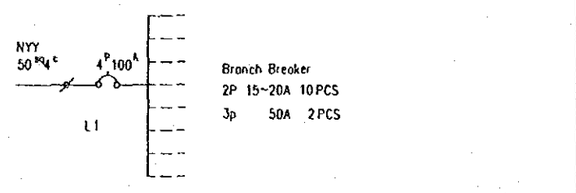
Connection of Branch	Name of Load		Motor Power kw	MCCB P	MCCB A	Cable NYY sq	Cable c
NYY 185sq-1c x3 — P-2 CE . LF	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	LF	1F	15.9	3	60	16	4
	LF	1F	15.9	3	60	16	4
NYY 185sq-1c x3 — P-3 DF . CM . ROV	DF	5F x 7	35.0	3	100	35	4
	CM	5F x 4.5	22.5	3	75	25	4
	CM	6F x 4.5	27.1	3	100	25	4
	ROV	2F x 13.3	26.6	3	100	25	4
	ROV	2F x 13.3	26.6	3	100	25	4
NYY 185sq-1c x3 — P-6 CE . LF	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	CE	4F x 4.1	16.4	3	60	16	4
	LF	1F	15.9	3	60	16	4
	LF	1F	15.9	3	60	16	4
NYY 185sq-1c x3 — P-7 DF . CM	DF	5F x 7	35.0	3	100	35	4
	DF	5F x 7	35.0	3	100	35	4
	CM	5F x 4.5	22.5	3	75	25	4
	CM	6F x 4.5	27.1	3	100	25	4
NYY 150sq-3c — P-8 ROV	ROV	2F x 13.3	26.6	3	100	25	4
	ROV	2F x 13.3	26.6	3	100	25	4
	ROV	2F x 13.3	26.6	3	100	25	4
	Maint Roller Shop		20	3	100	25	4
	Spindle Tape		20	3	100	25	4
NYY 185sq-1c x3 — P-10-P-21 RF	RF	1F	46.25	3	150	50	4
	RF	1F	46.25	3	150	50	4
	RF	1F	46.25	3	150	50	4
NYY 185sq-1c x3 — P-23 AW	AW	2F	23.0	3	100	25	4
	AW	2F	23.0	3	100	25	4
	AW	2F	23.0	3	100	25	4
	AW	2F	23.0	3	100	25	4
	AW	2F	23.0	3	100	25	4
	AW	2F	23.0	3	100	25	4
NYY 120sq-3c — P-24 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
NYY 120sq-3c — P-25 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
	DW	1F	20.0	3	100	25	4
	SS						

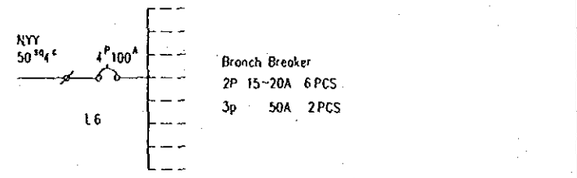
Connection of Control Panel	MCCB P	MCCB A	Starter	Cable NYY sq	Cable c	Motor Power kw	Name of Load
NYY 185sq-1c x3 — P4 — No.3 Chiller Aux m/c (NEW) — 380/220V	3	150	人— △	35	7	37	Cooling W.Pump
	3	100	人— △	25	7	30	Chilled W.Pump
	3	100	INVERTER	25	4	22	Chilled W.Feed Pump
	3	50	人— △	6	7	7.5	Cooling Tower Fan
	3	50		6	4	3.0	Chiller Control Source
	3	150		35	4	27.5	Blow Room A/C to P4-1
	2	10				1.0KVA	Control Source
NYY 185sq-1c x3 — P29 — No.1 Chiller Aux m/c — No.2 Chiller Aux m/c — (EXISTING) — APPROX 100kw — No.1 Chiller Aux, M/C — No.2 — EXISTING PANEL							
NYY 185sq-1c x3 — P5 (PRE SP A/C) — INV — 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	125	人— △	2.5	7	30	CE Return Fan
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	50	INVERTER	6	4	3.7	Chilled W. Return Pump
	3	100		25	4	Approx 20	Dust Collector & Filter Panel
	2	10				1.0KVA	Control Source
NYY 185sq-1c x3 — P9 (RF E A/C) — P22 (RF W A/C) — INV — 380/220V	3	10V	人— △	16	7	22	Supply Fan
	3	10V	人— △	16	7	22	Supply Fan
	3	10V	人— △	25	7	30	Spray Pump
	3	10V	人— △	16	7	22	Return Fan
	3	10V	人— △	16	7	22	Return Fan
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	50	INVERTER	6	4		
	3	100		25	4	Approx 15	Filter & Dust Collector
	2	10				1.0KVA	Control Source
NYY 150sq-3c — P28 (WD A/C) — INV — 380/220V	3	100	人— △	16	7	22	Supply Fan
	3	50	人— △	16	7	15	Spray Pump
	3	100	人— △	16	7	22	Return Fan
	3	10		2.5	4	0.75	Chilled W. Strainer
	3	50	INVERTER	6	4		
	2	10				1.0KVA	Control Source
NYY 185sq-1c x3 — P26 BLOWER for AW — Suppled from Machine Maker — 380/220V	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				1.0KVA	Control Source

Connection of Control Panel	MCCB P	MCCB A	Starter	Cable NYY sq	Cable c	Motor Power kw	Name of Load
NYY 185sq-1c x3 — P27 COMPRESSOR — 380/220V	3	100	人— △	16	7	22	Compressor
	3	100	人— △	16	7	22	Compressor
	3	100	人— △	16	4	22	Compressor
	3	100	人— △	6	7	22	Compressor
	3	30		6	4	3.7	Dryer
	3	30		35	4	3.7	Dryer
	3	30				3.7	Dryer
	2	10				1.0KVA	Control Source

LIGHTING & SOCKET TAP PANEL







PT. IS-1 PATAL BANJARAN-1 (RENOVATION)
CONNECTION DIAGRAM OF
LT. POWER DISTRIBUTION PANEL AND LIGHTING PANEL

Figure 7-14 Power Distribution Panel and Lighting Panel

(2) Electrical Facilities inside the Mills

Figure 7-13 and 7-14 shows the low voltage power wiring diagram and power distribution panel connection diagram.

a) Power Wiring

Power wiring to the production machines and facilities and the air conditioning facilities will be renewed. The low voltage main line cables rise up to the ceiling at A and B substations where the cables are laid in cable racks and dropped down at the power distribution panels or at the lighting distribution panels.

Low voltage power distribution panels will be buried as much as possible so that passage ways in the mill can be secured. Self-supporting types power distribution panels will be firmly fixed to the floor. When wiring to more than two machines from one distribution panel, cables will be connected to the inside of the joint box that is buried in the floor or to the wiring that is connected at the terminal board located inside the control panel of the machine.

The wiring from the control panel of the blow room machine to the respective motor and sensor on the machine will be laid in cable pits, and flexible multicore control cables will be used.

b) Lighting Equipment

Electric lighting provided for production machinery and equipment as well as air-conditioning equipment will be replaced with new lighting.

The distribution panel for electric lighting will be an enclosed dust-proof and hanged on the wall type with a front door made of steel sheet. These panels will be installed in five places.

Wiring will be done along beams in the ceiling or by cable racks. The types and size of the cables will be in accordance with the attached "Selection Standards for Low Voltage Cables and Electrical Wires."

Specifications for electric light appliances shall be:

- Exposed fluorescent lamps inside the production
  40W x 2 or 1 lamp(s)
  Equipped with shade
  High power factor
  Grow switch starter and natural white or white colored globes
- Incandescent lamps (for special places such as the air-conditioner rooms)

Water or dust-proof, 40-100W

Table 7-21 shows the number of electric lighting facilities.

c) Emergency Lighting Equipment

For operational safety and for performing minimum maintenance work in the event of power stoppage during operation, emergency lighting appliances will be newly installed with individual in-housed batteries that will automatically turn on in the event of a power stoppage. Standard for the number of lamps to be installed will be one lamp for approximately 350 to 400 sq. meters.

Table 7-21 Number of Lighting Equipment by Process in the Mill (approx.)

Name of Process	Room Space	Luminous Intensity	Installed of Lights FL 40w × 2/set	Installed of watt par m²
	m²	LX	set	w/m²
Blow Room	1,123	100	63	5.6
Carding	1,260	100	〃 66	5.6
Lapformet Comding Drawing	2,371	100	〃 142	6.0
Roving	1,474	120	〃 120	7.5
Ring Spinning around sareil wire	3,268	150	〃 370	11.3
winding	1,747	150	〃 157	9.
ware House Come Pocking Roller shop comp, Room	255	150	〃 20	7.8
Laboratry	140	200	〃 14	10
meeling Room	94	200	〃 10	10.5
Air Cond. & other			〃 50	
Total			1,012 set	

7-4-4 Electrical Facilities of Banjaran II

(1) Transformer Facilities

The increase of production capacity is limited and the total installed power remains almost unchanged.

Electric power for production machines and equipment, air conditioning facilities, and lighting are specified as:

- Present

Total approximately 3,617 KW

- After renovation

Decrease : approximately 176 KW

Increase : approximately 106 KW

Total : approximately 3,547 KW

The machines to be reduced will be 22 sets of Gilbos Autowinders. Since these Autowinders are not operated at present, these will not effect electric power consumption at all. The main machines and equipment to be increased consist of one additional scutcher for the Blow Room, the modified and replaced Carding Machines and the three additional Autowinders (Mach-coner).

However, due to the increase in the revolution of the Spinning Frames as well as the overall improvement in the operational efficiency, the electric power requirement is expected to increase considerably.

The capacity of the existing transformer is fully capable of meeting the above requirements, so, no replacement and modification will be done.

(2) Electrical Facilities in the Mill

a) Power Wiring

Places where wiring work is required are as follows:

- With one set of scutcher being added in Blow Room, power source wiring, wiring between control panel and scutcher, and control wiring will be required.
- With the modification and addition of 26 sets of Carding Machines, power source wiring is required and changes in the wiring outlets because of change of layout will be required.
- Some wiring will be relocated along with modification performed on the Lap Formers.
- Wiring accompanying relocation of one set of Roving Frame.
- Wiring accompanying installation of 3 additional sets of Autowinders.
- Removal of electrical wiring with the removing of the present Gilbos Autowinders.
- Wiring for compressor accompanying additions of compressors for Autowinders.

b) Lighting Equipment

- Blow Room: No change.
- Carding, Combing, and Drawing room: No changes.
- Roving room: With revision of layout, the number of lamps will increase by 50%. Fluorescent lamps applicances removed from the ring spinning room will be used.
- Ring Spinning room: The illumination measured at snail wire which is currently 70 to 75 lux will be improved and increased to 120 to 150 lux, and for this purpose 300 sets of 40 W two lamps will be added to the present 672 sets of 40 W lamps. Wiring and one electric lamp distribution panel accompanying this reinforcement

will be required.

- Winder room: The present 68 lux on the floor will be improved to 120 lux, and approximately 100 sets of 40 W x 2 lamps will be added to the present 212 sets of 40 W. Wiring for the additional lamps will be required.

c) Receptacle Wiring

The present voltage of 127 volts will be changed to 220 volts, and the connection wiring in the transformer room and distribution panel as well as the receptacle taps will be completely replaced with the standard appliances widely used in Indonesia.

d) Emergency Lighting

For operation safety and to be able to perform minimum safety work in the event of a power stoppage during operation, emergency lighting appliances with individually in-housed batteries will be newly added and will automatically turn on in case of emergencies. The standard for the number of lamps to be installed will be one set of lamps per 350 to 400 sq. meter.

7-4-5 List of Electrical Equipment

In Table 7-22 a list of main electrical equipment that are common for both Banjaran Mill I and II are shown. Table 7-23 lists the main electrical equipment of Banjaran I. (E) indicates equipment that are currently existing, and (N) indicates equipment that will have new additions. Banjaran II has no particular equipment to be added.

Table 7-22 Main Electric Equipment List of Banjaran Mill (common for First/Second Mills)

Item No	Equipment/Specification	Quantity
RBE-0-1	Incoming cable	1 lot
	1)No.1 Incoming cable	
	kaind of cable NYFGBY 240mm² 3C 1 set (E)	
	2)No.2 Incoming cable	
	kaind of cable NYFGBY 240mm² 3C 1 set (N)	
RBE-0-2	Panel room	1 lot
	1)Incoming panel board 1 set (N)	
	Disconnecting switch 6.9KV,1200A	
	Vacuum circuit breaker 7.2KV,1200A	
	Breaking capacity 250MVA	
	Potential transformer 1 set	
	Current transformer 2 sets	
	Over current relay 1 set	
	Various meter 1 lot	
	Operation & control panel 1 set (N)	
	with various meter & operation switch	
	2)HT feeder panel board 7 sets (E)	
	Double throw disconnecting switch 7.2KV,600A	
	Oil circuit breaker 7.2KV,600A	
	Current transformer,Various meter	
	3)HT feeder panel board for B-II 1 set (E)	
	Double throw disconnecting switch	
	7.2KV,1,200A	
	Current transformer,Various meter	
RBE-0-3	Generator room	1 lot
	1)AC Generator 3 sets (E)	
	Capacity 937.5KVA	
	Out put power 750KW	
	Freguency 50HZ	
	Voltage 6,300V	
	2)Generator panel board 3 sets (E)	
	Oil circuit breaker 7.2KV,600A	

Item No	Equipment/Specification	Quantity
	Potential transformer	
	Grounded potential transformer	
	Various meter	
RBE-0-4	HT feeder cable for B-I substation	1 lot
	1)For No.1, No.2, No.4, No.5 transformer	
	Voltage 6.9KV	
	kind of cable NYFGBY 50mm^2 3C	4 lines (N)
	2)For No.3, No.6 transformer	
	Voltage 6.9KV	
	kind of cable NYFGBY 95mm^2 3C	2 lines (N)
	3)For treatment equipment	
	Voltage 6.9KV	
	kind of cable CV 60mm^2 3C	1 line (E)

Table 7-23 Main Electric Equipment List of First Mill

Item No	Equipment/Specification	Quantity
RBE-1-1	A-Substation	1 lot
	1)LDS Panel for transformer primary 7.2KV,400A	2 sets (N)
	2)Transformer	2 sets (E)
	Capacity 3phase 750KVA	
	Voltage 6,300V/380-220V	
	3)Busduct for transformer secondary with Flexible bar	2 sets (N)
	wiring system 3phase 4wires 600V,1,200A	
	4)LT panel for prespinning	2 sets (N)
	.Indoor enclosed MCCB board for blow room,CE & auxiliary machine of chiller	
	MCCB 600V 3P 400AF/400AT 4circuits	
	3P 400AF/300AT 1circuit	
	4P 225AF/200AT 1circuit	
	Current transformer & ampermeter 6 sets	
	Earth fault relay 1 set	
	.Indoor enclosed MCCB board for DF,CM,FF & prespinning A/C	
	MCCB 600V 3P 400AF/400AT 3circuits	
	3P 400AF/300AT 2circuits	
	4P 225AF/200AT 1circuit	
	Current transformer & ampermeter 6 sets	
	Earth fault relay 1 set	
	5)Automatic capacitor controler	2 sets
	Automatic power factor relay	
	MCCB 600V 3P 400AF/400AT 1 piece	
	Magnetic contactor 4 pieces	
	Capacitor 400V 3Phase 50KVA 4 pieces	
RBE-1-2	B-Substation	
	1)LDS panel for transformer primary 7.2KV,400A	3 sets (N)

Item No	Equipment/Specification	Quantity
	2)Transformer	
	.Capacity 3Phase 1,500KVA	1 set (N)
	Voltage 6,300V/400-231V	
	.Capacity 3Phase 750KVA	2 sets (E)
	Voltage 6,300V/380-220V	
	3)Busduct for transformer secondary with frexibkle bar	
	.Wiring system 3phase 4wires 600V,2,400A	1 set (N)
	.Wiring system 3phase 4wires 600A,1,200A	2 sets (N)
	4)LT Panel	
	.Indoor enclosed MCCB board for RF	1 set (N)
	MCCB 600V 3P 400AF/400AT 10circuits	
	Current transformer & ampermeter 10 sets	
	Earth fault relay 1 set	
	.Indoor enclosed MCCB board for RF & RF A/C	1 set (N)
	MCCB 600V 3P 400AF/400AT 6circuits	
	Current tarnsformer & ampermeter 6 sets	
	Earth fault relay 1 set	
	.Indoor enclosed MCCB board for winding & WD A/C	1 set (N)
	MCCB 600V 3P 400AF/400AT 3circuits	
	3P 400AF/400AT 2circuits	
	4P 225AF/200AT 1circuit	
	Current transformer & ampermeter 6 sets	
	Earth fault replay 1 set	
RBE-1-3	C-Substation	
	1)LDS panel for transformer primary 7.2KV,400A	1 set (N)
	2)Transformer for No.1 & No.2 refrigerator	1 set (E)
	Capacity 3phase 750KVA	

Item No	Equipment/Specification	Quantity
	Voltage 6,300V/3,300V	
	3)3KV Oil switch panel for No.1 & No.2 refrigerator	2 sets (E)
	Oil switch 3.6KV,400A	
	4)LDS panel for No.3 refrigerator	1 set (N)
	LDS 7.2KV,400A	
	Power fuse 7.2KV,100A	
	Current transformer,Various meters	
RBE-1-4	LT Power distribution	1 lot
	1)LT power distribution panel	20 sets (N)
	MCCB Branch 4~8 circuit	
	2)LT power control panel	6 sets (N)
	MCCB & Starter 6~10 circuit	

7-4-6 Water Supply and Fire Fighting Facilities

(1) Water Supply Facilities

Current consumption of water and the expected consumption volume after renovation of the Banjaran Mill are shown in Table 7-24.

Table 7-24 Water Supply and Consumption Volume

	Mill No. 1	Mill No. 2	Total
Cooling water for refrigerator	Operating condition 250 USRT USRT・Hr 250 〃 20 hr 18,920 500 〃 24 hr	Operating condition 250 USRT 4hr USRT・Hr 250 〃 20 hr 12,000 250 〃 24 hr	
	Consumption volume 624 m^3/day	Consumption volume 493 m^3/day	1,117 m^3/day
Water for air conditioner	five sets 80 m^3/day	two sets 50 m^3/ day	130 m^3/day
Cooling water for compressor	130 m^3/day	150 m^3/day	280 m^3/day
Water for workers	100 m^3/day	100 m^3/day	200 m^3/day
Total	934 m^3/day	793 m^3/day	1,727 m^3/day

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

Considering the present condition of the facilities (refer to Chapter 4.3), the intake of water and water treatment capability can fully satisfy the above noted consumption, and no problem is anticipated.

(2) Fire Fighting Facilities

a) A new horizontal ceiling installed between carding room and winding room of the First Mill, under which sprinklers will be newly equipped.

The standard for installation of sprinkler heads will be 2.1 meters between sprinkler heads. The floor space and the number of sprinklers to be installed will be as follows:

Pre-spinning room: Approx. 5121 sq. meters
- Approx. 1280 sprinklers

Spinning room : Approx. 3311 sq. meters

- Approx. 830 sprinklers

Winding room : Approx. 1736 sq. meters

- Approx. 435 sprinklers

Total : Approx. 10168 sq. meters

- Approx. 2545 sprinklers

Also with the installation of horizontal ceiling, a portion of the existing main piping must be relocated.

b) Basically the hydrants inside the building will not be changed; however, with changes to be made in the partitions and the doorway, it will become necessary to relocate the hydrants in some places.

c) Systematic collocation of the check valves and other valves adjacent to the sprinklers and hydrants will be required.

d) No changes will be made to the sprinkler facilities and hydrant facilities for the Second Mill.

7-4-7 Air Conditioning Facilities of Banjaran I

(1) Outline

In a spinning mill, the air conditioning facilities play an important role to secure quality by providing stable production conditions and to retain pleasant working environment. In general, spinning characteristics of short fibers are considerably influenced by humidity, and it is therefore necessary to hold the temperature and relative humidity inside the rooms within a fixed range.

Recent spinning machinery have achieved significant advancement in speed and efficiency. This has resulted in a tendency to substantial increase of the machine's power consumption and power requirements per unit area in comparison to previous spinning machinery.

In this renovation project, the electric power for the spinning machinery has considerably increased although the rate of increase varies by processes as can be seen in the following Table.

Table 7-25 Comparison of Power Requirements

	Existing Mill 30,784 sp. (KW)	Planed Mill 33,600 sp. (KW)	Increased Power per Spindle (%)
Blow Room	165.3	160	≒0
Pre-Spinning	358.8	550.5	+ 41%
Ring-Spinning	857.55	1629.75	+ 74%
Winding	298	459.0	+ 41%

To meet the requirements of the production machinery and equipment, they are equipped with a high speed air washer in the air conditioning facilities having a horizontal chamber made of reinforced concrete. As a thermal source, the turbo refrigerator produces chilled water which is supplied to the various air washers.

A principle flow of air is shown in Figure 7-15, and the air conditioning facilities of pre-spinning and ring spinning will be in accordance with this Figure.

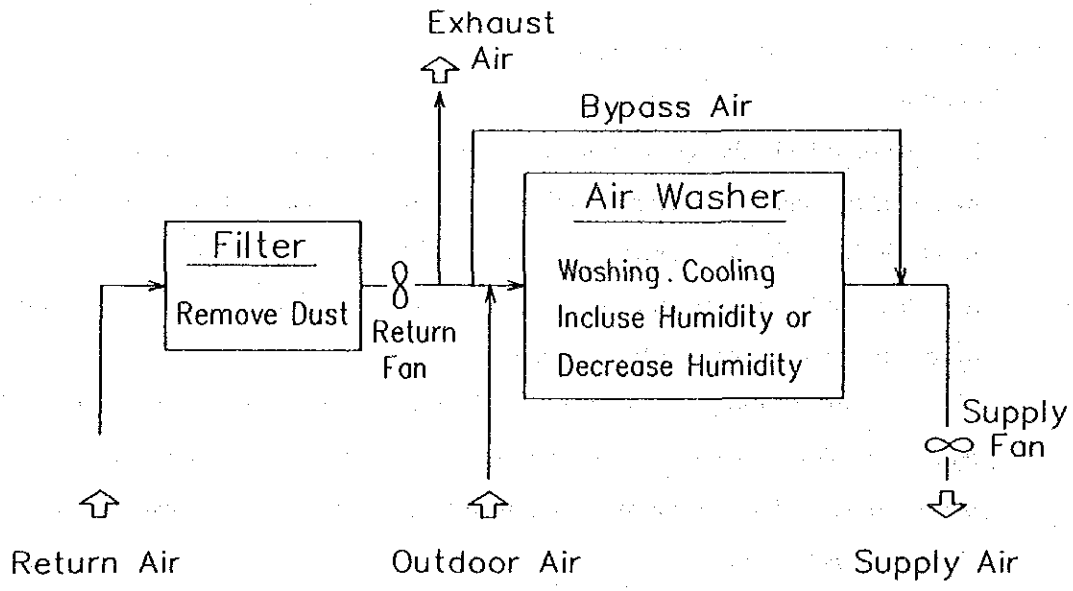


Figure 7-15 Basic Air Flow Diagram

Indonesia for the most part is on the equator, while in Bandung area of Java the outside temperature and humidity conditions vary greatly during the day and night. Therefore, to save energy, the outside air will be actively drawn in during the period of time when the enthalpy of the outside air is low.

An automatic control to keep the temperature and humidity within the controlled

and to intake the outer air by comparison of the return air with the enthalpy of the outer air will be attached to each air-conditioner. In Table 7-26, the design temperature and humidity conditions of the outer air, and in Table 7-27, the design temperature and humidity conditions inside the room are shown.

Table 7-26 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 7-27 Air Conditions inside the Room

	Dry bulb temperature	Relative humidity
Blow room	29.0 ± 3° c	68 ± 5 %
Carding to 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 %

The air-conditioning facilities will consist of Blow Room line, pre-spinning line, two lines for Roving and Sinning (east and west), and Winding and Packaging line (a total of five lines). Figure 7-16 shows the flow chart for the air-conditioning facilities of the First Mill.

(2) Specification of Air-Conditioning for Banjaran I

The installed power and actual load power are shown in Table 7-28; in Table 7-29 and in Figure 7-17, the load calculation table of the air-conditioning facilities and the Psychometric Chart are shown respectively.

Table 7-30 shows the list of machines and facilities that have been designed under the above conditions. The supply ducts and return ducts layout diagrams are shown in Figure 7-18 and Figure 7-19 respectively.

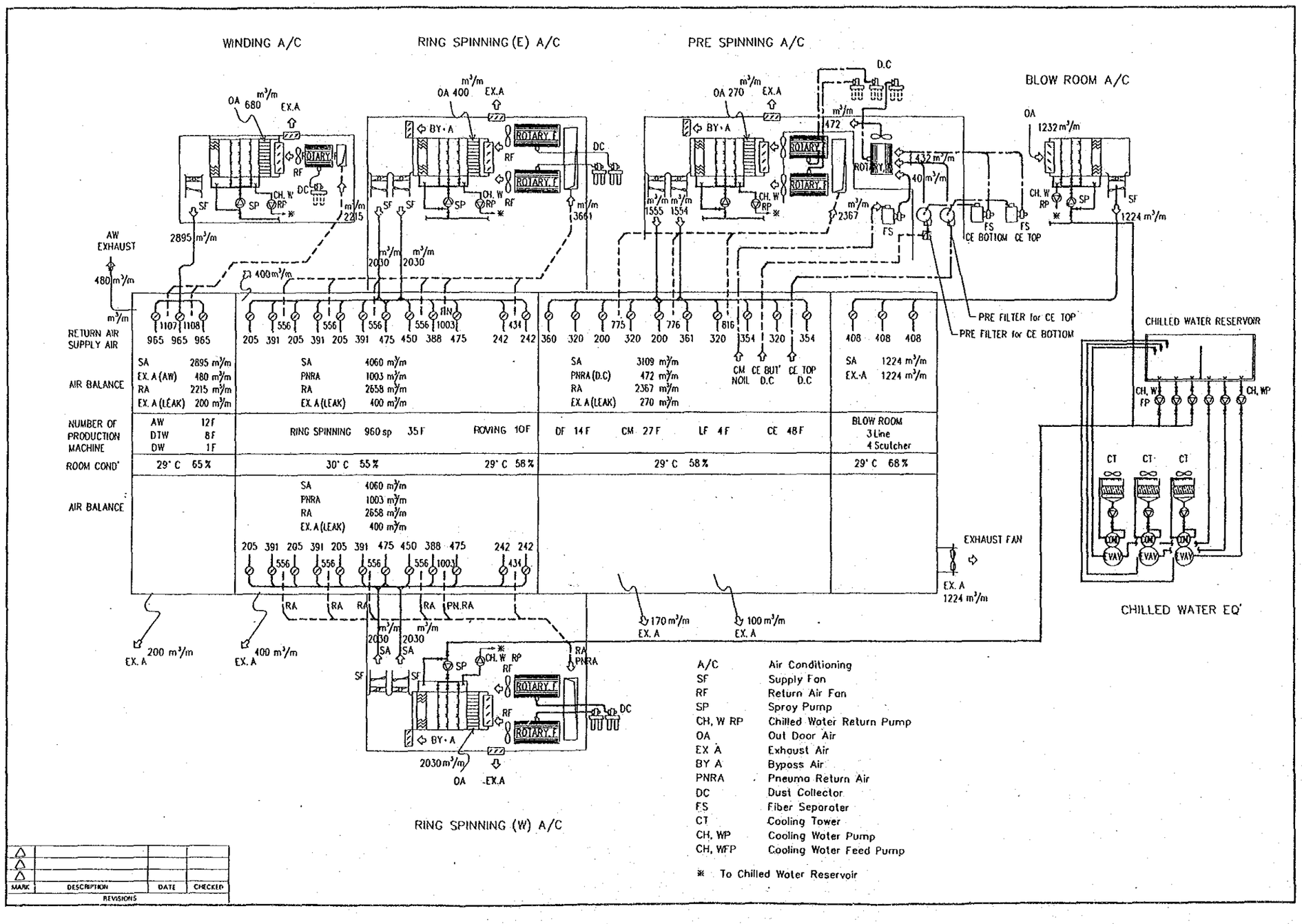


Figure 7-16 Scheme of Air-conditioning Flow Chart: First Mill

Table 7-28 Installed Capacity & Actual Load (First Mill)

Production Machine

Name of Process	Number of M/C	Installed Power Unit	Installed Power Total	Demand factor	Actual load	Load of Air Condiditoning
Blowing Room	3 line 4 Head	KW	160 KW	0.5	80 KW	Blowing A/C 80 KW
Carding	48	4.1	196.8	0.6	118.1	
Drawing	15	7.0	35.0	0.6	21	Pre-Spinning A/C
L.Foring	4	15.9	63.6	0.6	38.2	330.4 KW
Combing	27	4.51	121.77	0.6	73.1	
Roving	10	13.3	133.3	0.6	80.0	
R.Spinning (960 sp)	35	42.6	1,618.75	0.7	1,133.1	R.Spinning (E) A/C R.Spinning (W) A/C
Blow cleaner Separator Box	2	5.5	110	0.9	9.9	1,143 KW
A.Winding	12	11.5	138.0	0.7	96.6	Winding A/C
D.Twisting	8	22.5	180.0	0.6	108.0	207.4
D.Winding	1	4.7	4.7	0.6	2.8	
Lighting			132.0	1.0	132.0	Blowing A/C Pre-Spinning A/C R.Spinning (E) A/C
Laboratory			10.0			R.Spinning (W) A/C
Roller Shop & Maint,Room			10.0			Winding A/C 132 Kw
Blower for AW	4	30	120	0.7	84.0	Not included in A/C Load
Compressor	4	22	88	0.7	61.6	〃
Steam Setter	1		15	0.4	6.0	〃
Sub Total			3,037.92		2,014.6	

Air Cond, Chilled Water. Raw Water

Name of Process	Number of M/C	Installed Capacity Unit	Installed Capacity Total	Demand factor	Actual load	Remark
BL, A/C	1 lot	KW	27.5 KW	0.8	22.0 KW	
Pre-Spinning A/C	1 lot		155.8	0.8	124.6	
R.Spinning(E)A/C	1 lot		123.2	0.85	104.7	
R.Spinning(W)A/C	1 lot		123.2	0.85	104.7	
Chiller(Main)	3 F	New 305 Exist,470	775.0	0.6	465	
Chiller(Aux)	1 lot	New 70 Exist, 80	150	0.7	105	
Water Treatment	1 lot		50	0.5	25	
Intake Raw Water	1 lot		40	0.5	20	
Out Door Light	1 lot		5.0	0.8	4.0	
Office & Other	1 lot		50	0.8	40	
Sub Total			1,499.7		1,092.5	

Total			4,537.62		3,107.1	

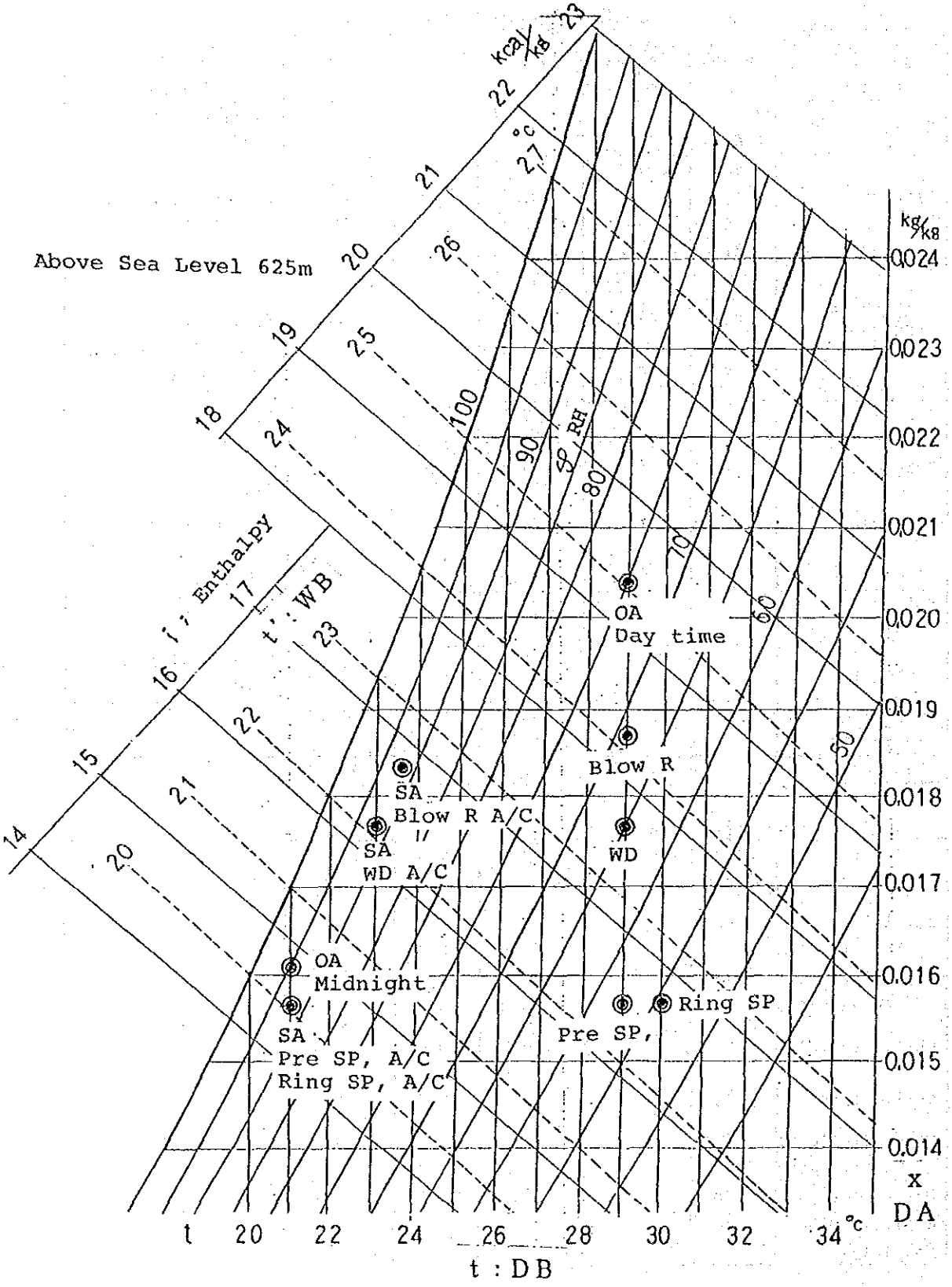


Figure 7-17 Psychometric Chart of First Mill

Table 7-29 Calculation of Air Conditioning Load (First Mill)

		Blow Room A/C	Pre-Spinning A/C			R. Spinning-(E) Roving(½) A/C	R. Spinning-(W) Roving (½) A/C	Winding A/C	Total
			Carding	Drawing & Combing	Sub Total				
Air Conditioning Load	Room Area (Heat Value)	㎡ Kcal/hr 1,632 (57,120)	㎡ Kcal/hr 1,185.6 (41,496)	㎡ Kcal/hr 2,371.2 (82,992)	Kcal/hr (124,488)	㎡ Kcal/hr 2,371.2 (82,992)	㎡ Kcal/hr 2,371.2 (82,992)	㎡ Kcal/hr 2,060 (72,100)	11,991.2 ㎡
	Load of LT.Power (〃)	KW Kcal/hr 80.0 (68,800)	158.4 (136,224)	160.7 (138,202)	(274,426)	581.4 (500,004)	581.4 (500,004)	207.4 (178,364)	1,819.5 KW
	Load of Lighting (〃)	KW Kcal/hr 12.1 (10,423)	9.5 (8,170)	23.7 (20,382)	(28,552)	28.5 (24,510)	28.5 (24,510)	20.6 (17,716)	119.72 KW
	Number of Worker (〃)	10 Kcal/hr (1,000)	10 (1,000)	25 (2,500)	(3,500)	40 (4,000)	40 (4,000)	85 (8,500)	210
	Total (〃)	Kcal/hr (137,343)	(186,890)	(244,076)	(430,966)	(611,506)	(611,506)	(276,680)	
Room Condition	Temperatur ℃	29.0	29.0	29.0		ROV 29.0 RF 30.0	ROV 29.0 RF 30.0	29.0	
	R.Humidity %	68	58	58		ROV 58 RF 55	ROV 58 RF 55	65	
	Enthalpy Kcal/kg	18.3	16.6	16.6		ROV 16.6 RF 16.8	ROV 16.6 RF 16.8	17.7	
Supply Air Condition	Temperatur ℃	23.5			21.0	21.0	21.0	23.0	
	R.Humidity %	92			92	92	92	92	
	Enthalpy Kcal/kg	16.6			14.5	14.5	14.5	16.2	
Out Door Air Condition	Day Time Temperatur ℃	29.0			29.0	29.0	29.0	29.0	
	R.Humidity %	75			75	75	75	75	
	Enthalpy Kcal/kg	19.4			19.4	19.4	19.4	19.4	
	Midnight Temperatur ℃	21.0			21.0	21.0	21.0	21.0	
	R.Humidity %	95			95	95	95	95	
	Enthalpy Kcal/kg	14.8			14.8	14.8	14.8	14.8	
Existing Supply Air m³/m		1,224	1,348	1,761	3,109	4,061	4,061	2,895	15,350
Discherge of Pneuma Air m³/m			432	40	472	1,003	1,003	480	
Room Return Air m³/m		0	816	1,551	2,367	2,658	2,658	2,115	
Exhaust Air (Day Time) m³/m		1,224	100	170	270	400	400	200	
Intake OA (Day Time) m³/m		1,224	100	170	270	400	400	680	
Required Refrigerating Load USRT		74.8			161.1	252.8	252.8	116.7	856.2

Table 7-30 Air Conditioning Equipment List

Item No	Equipment/Specification	Quantity
RBU-1-1	Refrigerator Capacity : 250 USRT Turbo hermetic type Motor : 3,000V 50HZ 220KW Auxiliary Condenser water pump : 2 sets Chilled water pump : 2 sets Cooling tower : 2 sets Chilled water feed pump : 2 sets Chilled water reservoir : 1 lot	2 sets (E)
RBU-1-2	Refrigerator Turbo hermetic type Cpacity 580 USRT Motor output Approx. 400KW Auxiliary Chilled water pump 6,250 ℓ/min 30KW 1 set Cooling water pump 7,400 ℓ/min 45KW 1 set Cooling tower 600 USRT 1 set Chilled water feed pump 3,000 /min 30KW 2 sets Piping for chilled & cooling water 1 lot	1 set (N)
RBU-1-3	Air conditioner for blow room Air washer ; Made of reinforced concrete 1 lot (reconstruct exsting concrete chamber) Spray stand 3 stages Eliminater,Baffle plate Damper intake air from outside 1 set Supply fan 1,242m³/min x40mmAq Limit load fan 1 set Supply pump 1,600ℓ/min x 40mmAq 1 set Supply ducting Main duct to be reconstructed 2 sets Direct humidifier for blow room 10 /hr 1 lot	1 set (N)

Item No	Equipment/Specification	Quantity
RBU-1-4	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 1,555m³/min x 40mmAq	2 sets
	CE, CM, Waste collector return fan 472m³/ min x 160mmAq	1 set
	Room return fan 1,184m³/min x 50mmAq	2 sets
	Spray pump 3,800ℓ/min x 25mAq	1 set
	Water strainer rotary type	2 sets
	Chilled water return pump	1 set
	CE, Waste collector Pre filter 400m³/min	1 set
	CE, Waste collector(top) Pre filter 240m³/min	1 set
	Fiber separator with transfor fan for CE,CM	3 sets
	Rotary filter for CE,CM waste collector	1 set
	Room return filter 1,200m³/min	2 sets
	Automatic control	1 lot
	Supply air ducting	1 lot
	CE waste collecting (top) ducting	1 lot
	CM waste collecting ducting	1 lot
RBU-1-5	Air conditioner for ring spinning	2 sets (N)
	Air washer ; Made of reinforced concrete	2 lots
	Spray stand 3 stages	
	Eliminater	
	Baffle plate	
	Damper	8 sets
	Supply fan 2,031m³/min x 40mmAq	4 sets
	Return fan 1,829m³/min x 50mmAq	4 sets
	Spray pump 4,950ℓ/min x 25mAq	2 sets
	Water strainer rotary type	4 sets
	Chilled water return pump	2 sets

Item No	Equipment/Specification	Quantity
	Return air filter	4 sets
	rotary filter 1,831m³/min with dustcollector	
	Automatic control ;	2 lots
	Supply Air ducting ;	2 lots
RBU-1-6	Air conditioner for winding	1 set (N)
	Air washer ; Made of reinforced concrete	1 lot
	Spray stand 3 stages	
	Eliminater	
	Baffle plate	
	Damper	4 sets
	Supply fan 2,795m³/min x 40mmAq	1 set
	Return fan 2,115m³/min x 50mmAq	1 set
	Spray pump 3,400ℓ/min x 25mAq	1 set
	Water strainer rotary type	1 set
	Chilled water return pump	1 set
	Return air filter	1 set
	rotary filter 2,115m /min with dust collector	
	Automatic control	1 lot
	Suplly air ducting	1 lot
RBU-1-7	Compressed air equipment	1 lot (N)
	Compressor	
	Dryer, Filter, Receiver	
RBU-1-8	Auxiliary for steame setter	1 lot (N)
	Fuel tank, others	

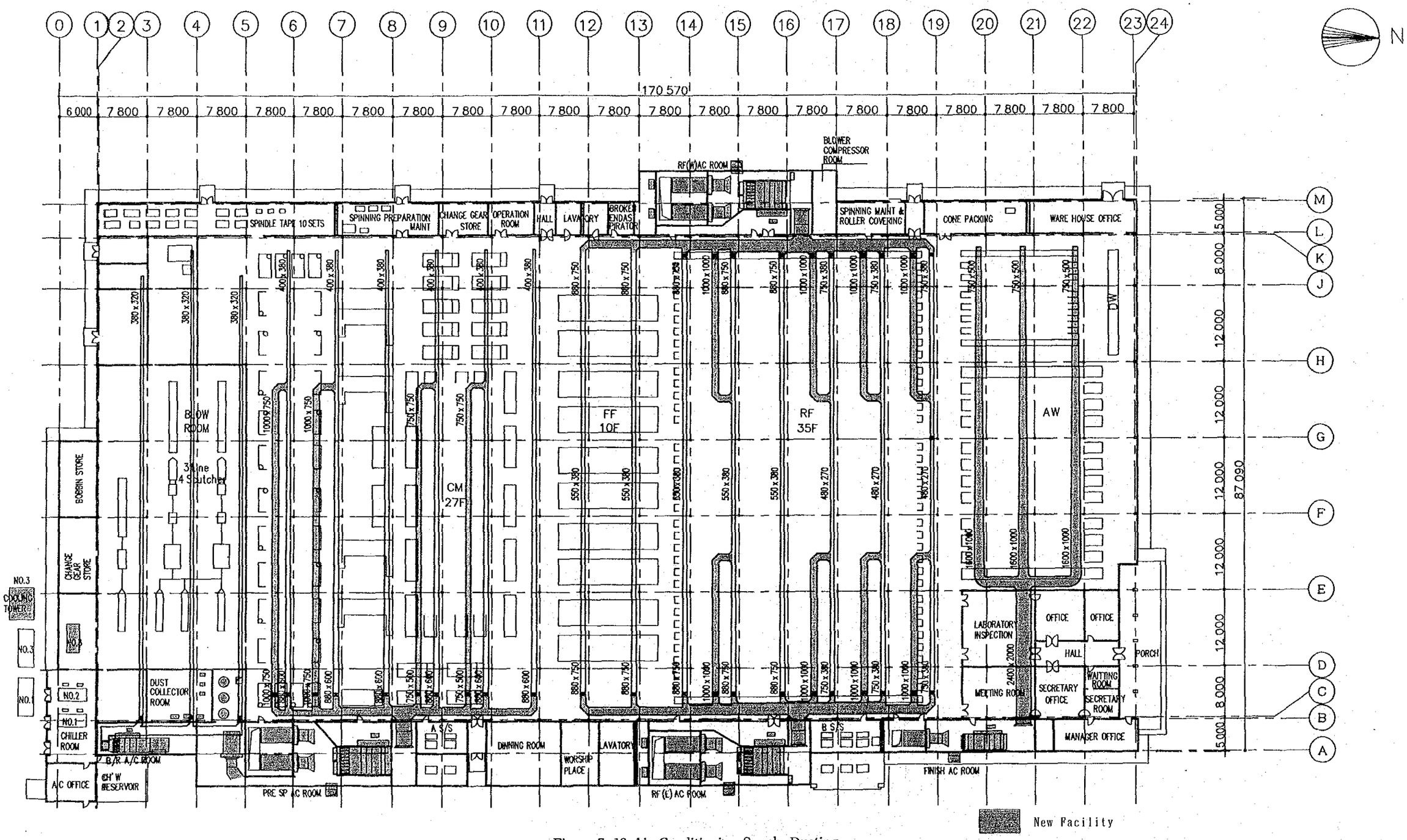


Figure 7-18 Air Conditioning Supply Ducting

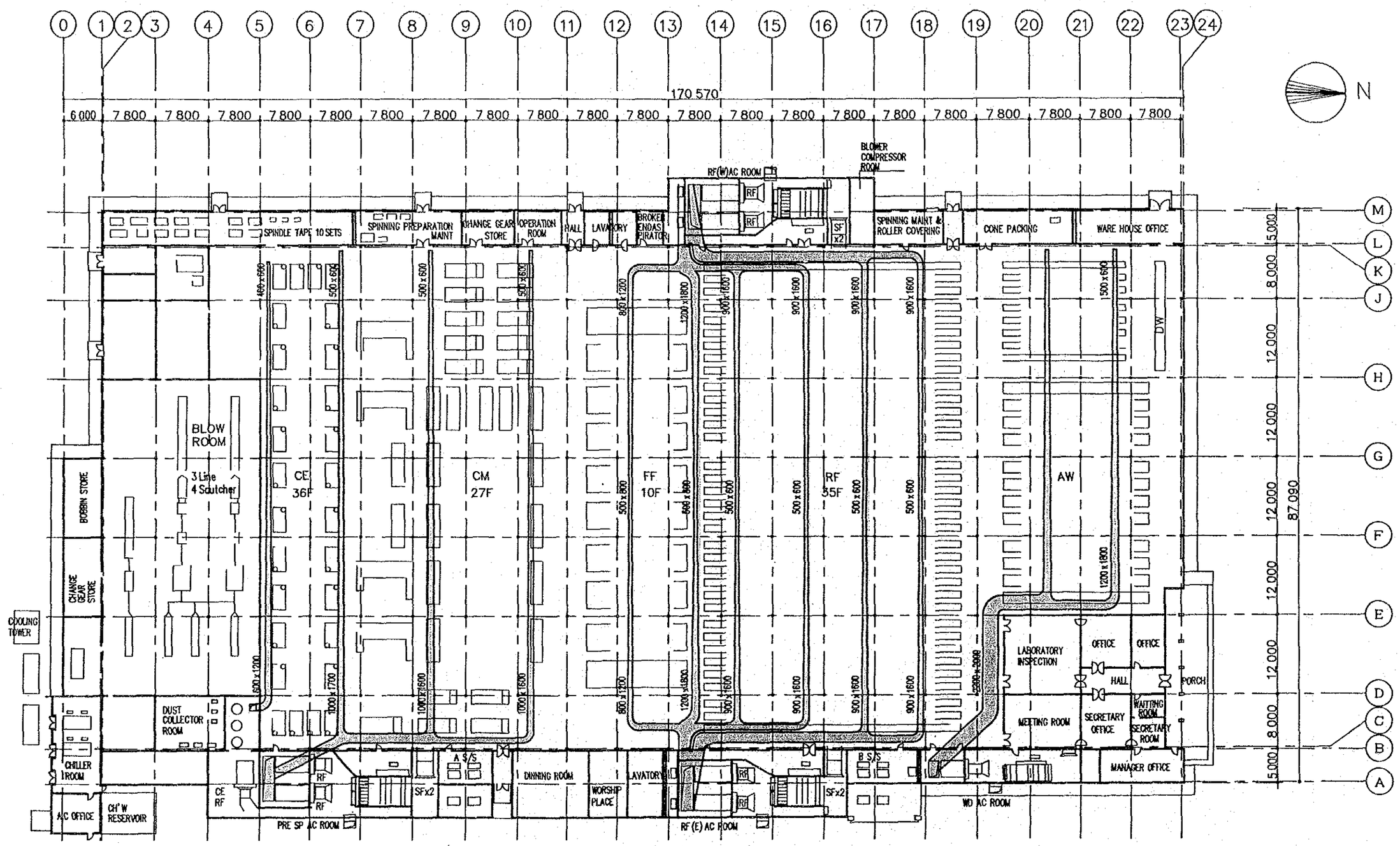


Figure 7-19 Return Ducting

New Facility

a) Air-Conditioning Equipment for Blow Room

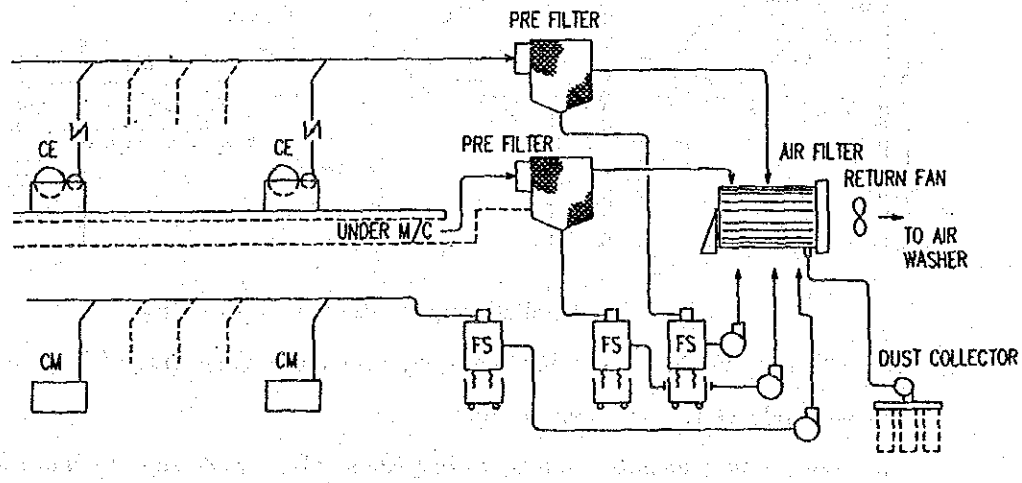
Because the Blow Room process requires high humidity, an independent air-conditioning facility will be installed for the Blow Room. For the air washer, the existing concrete air washer chamber will be repaired and used. The spray device and the eliminator will be completely replaced with new ones. The suction air from the air conditioner will be taken entirely from the outside, and inner air will not be returned. Supply air alone would not suffice for retaining the designated relative humidity inside the room, therefore, direct atomizers will be supplemented.

The supply fan will be replaced, but the existing supply ducts will be used. The connections and the antisweat and heat insulation of the main ducts will be repaired. No antisweat insulation will be applied on branch ducts. Air in the room will be expelled by exhaust fans at dust collecting room.

b) Air-Conditioning Equipment for Pre-spinning Process

Almost all of the supply air to carding process, combing process, and drawing process will be returned to the air conditioner. The returned air will be sent to the air washer if the temperature of the outer air is high in daytime.

The dust and waste collecting of the Carding Machines and the collecting of comber noil will be in accordance with the system shown in Figure 7-20.



FS : FIBER SEPARATOR

Figure 7-20 Waste Collecting System

Flat strips generated in the machine will be sucked up to the ceiling duct and cotton dust under the machine will be sucked into the underground duct. 48 carding

machines are devided into three even groups and flat strip of every group is collected by automatic operation through the hanged duct (one group at a time). Cotton dust under the machines is collected into fiber separator through pre-filter. Comber noil is sucked by operating one machine at a time in sequence by automatic operation per machine at a time, and then collected in the fiber separators.

The exhaust air separated from dust and waste will be through the rotary air filter forwarded to the air washer by return fan. The return fan must have a static pressure capacity of approximately minus 200 mm Aq.

Room air is returned to the air conditioner through the underground duct. The pre-spinning room will have a new flat ceiling. The main supply duct will be enlarged as well as renewed, but the branch ducts will be reused after applying antisweat and heat insulation. Figure 7-21 shows the rough sketches of the relative positions of branch ducts and main ducts that will be replaced as well as newly installed branch bypass ducts.

Diffusers will be replaced with new Anemo types equipped with adjustment dampers. The underground ducts will be used as the return air ducts, and the new suction grills will be equipped with adjustment dampers.

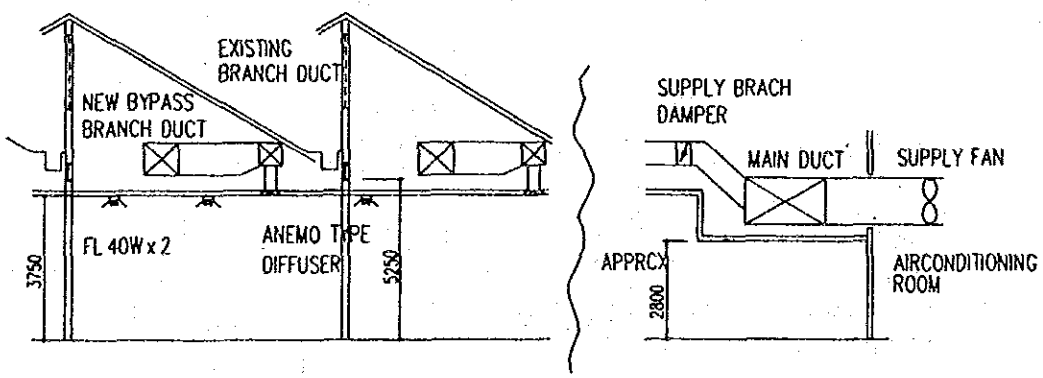


Figure 7-21 Installed Supply Duct in the Ceiling

c) Air-Conditioning Equipment for Spinning Room (E) (east side of Spinning Room and east side of roving room by half)

Air Conditioning Facilities for Spinning Room (W) (west side of Spinning Room and west side of roving room by half)

Since the Ring Spinning Frames in the spinning room generate considerable amounts of heat, a large volume of supply air and return air is needed.

The Roving Frames belong to the pre-spinning area, but as the existing supply

ducts are utilized, they will be included in the air-conditioning facilities for ring spinning frames. There would be no problem as the air supply condition is the same. The pneumatic suction air from the Ring Spinning Frames will be of considerable volume and the temperature will rise. Thus, the Spinning Frame pneumatic suction air will directly enter into the return duct. Pneumatic suction air from the Roving Frames will be discharged in the room.

The supply air from the overhead ducts will be fed from both the east and west side of the room by the air conditioning facilities of (E) and (W) respectively. In the same way as the pre-spinning room, the existing branch ducts will be reused. To supplement the branch ducts where the cross sections are insufficient, branch bypass ducts will be installed as needed.

The main ducts will be replaced, and they will be connected to the branch ducts and bypass branch ducts though the branch dampers. The position of each duct will be same as the pre-spinning room.

The return ducts will be newly installed as the underground ducts. The diffusers will be renewed as a line type or anemo type with adjustment dampers.

d) Air-Conditioning Equipment for Winding Room

Because the winder process requires high humidity, air-conditioning equipment exclusive for the winding room will be provided.

The exhaust of suction air for the knotting part of the Auto-Winders will be performed by centralized blowers. As the enthalpy of the exhaust air is usually high in comparison to the air in the room, the entire exhaust air is expelled to the outside. Air inside the room is returned to the air conditioning room passing through the underground duct and is routed to the air washer after passing through the filter. The main supply duct runs over the ceiling of the office from the air-conditioner and reaches the winding room where it connects to branch ducts and branch dampers. The existing branch ducts will be partly used and partly renewed. The diffusers will be replaced with new anemo types.

The relation with the ceiling will be same as the pre-spinning room.

The centralized blower for the Auto-winders will be in-stalled in the blower room adjacent to the spinning (W) air conditioning room.

The ducts from each Autowinder to the centralized blower will be made of steel sheets that can withstand static pressure of 1000 mm Aq. The main duct will

be installed inside the ceiling or firmly fixed below the ceiling.

e) Chillers

Chilling load required by the-air conditioning equiment of Banjaran I will be at maximum of approximately 850 USRT. To meet this requirement, one chiller with a capacity of about 500 USRT will be newly added in addition to the existing two sets of refrigerators (each with 250 USRT).

The total chilling capacity will therefore become 1,000 USRT, but the excess will be considered as spare capacity for maintenance work.

The existing chillers, ancillary equipment and the chilled water tank will remain unchanged. The new chiller will be installed putting partitions in the present blow room and waste collecting room.

The chilled water return piping from the air conditioning rooms will be replaced and will be routed to the existing chilled water tank. The chilled water supply pump and piping from the chilled water tank to the respective air-conditioner will be replaced as well.

7-4-8 Other Utility Facilities of Banjaran I

(1) Boiler Facilities

A small size boiler with accessories will be purchased together with a steam setter. Fuel receiving and storage facilities will be provided, and relevant water supply and steam piping will be performed.

(2) Compressed Air Equipmeet

a) Compressed air equipmeet for the Autowinder is provided together with it.

The piping arrangement will include all pipings including cooling water piping around the compressed air equipment and compressed air piping to the auto-winders.

b) A summary of the compressed air equipment for cleaning purposes and for miscellaneous use and its piping are as follows

- Screw compressor :Pressure 7 kg/㎠, motor 22 kw, one set.
- Accessories for above : one lot.
- Hose coupling for cleaning : 30
- Coupling for clearer picker : 10

7-4-9 Air-Conditioning Facilities of Banyaran II

(1) Outline

By renewing a part of the production machinery and equipment and rehabilitating the remaining of it, production quantity will be increased in Banjaran II and installed power capacity only slightly increases, but power consumption for operation increases. Table 7-31 shows the assumed room temperature and humidity (the outside atmospheric condition will be the same as BanjaranI. See Table 7-26.).

The existing air-conditioning equipment can be used subject to repairs or rehabilitation on some equipment that are not functioning now.

Table 7-32 shows the installed capacity of power and the actual power load while on Table 7-33 and Figure 7-22 the calculation results of air-conditioning load are shown.

Table 7-31 Room Temperature and Humidity (Assumed Value)

	Dry bulb temperature	Ralative humidity
Blow room	29 ± 2° c	68 ± 5 %
Carding, drawing, and combing	29 ± 2° c	60 ± 5 %
Roving	29 ± 2° c	59 ± 5 %
Spinning	30 ± 2° c	55 ± 5 %
Winding	28 ± 2° c	65 ± 5 %

(2) Specifications of Air-Conditioning Equipment in Banjaran II

The flow chart of the air-conditioning equipment of the Second Mill is shown in Figure 7-23.

a) Blow Room

The blow room requires high humidity, therefore, five sets of direct atomizers will be added so that the relative humidity can be retained at approximately 68%.

The air supply volume of 300 m³/min makes temperature rises to some extent which is suppressed by the evaporative latent heat of the atomized humidity spray.

Air inside the room where the enthalpy is high is expelled directly to the outside. Exhaust air from the Blow Room machine bag filter is released into the room.

Table 7-32 Installed Capacity & Actual Load (Second Mill)

Production Machine

Name of Process	Number of M/C	Installed Power		Demand factor	Actual load	Load of Air Condiditoning
		Unit	Total			
Blowing Room	2 line 4 Head	KW	146.66 KW	0.5	73.3 KW	
Carding	35	4.525	158.38	0.6	95.0	
Lapformer	2	4.3	8.6	0.6	5.2	
Pre Drawing	3	4.65	13.95	0.6	8.37	No.1 A/C
Combing	11	3.7	40.7	0.6	24.42	No.2 A/C
Drawing	6	6.45	38.7	0.6	23.22	
Roving	8	11.3	90.4	0.6	54.24	1,521.3 KW
Ring'Spinning	78	17.45	1,361.1	0.75	1,020.8	
Blow cleaner Separator Box	4	1.9	7.6	0.8	6.1	
A.Winding	12	11.5	138.0	0.7	96.6	
Lighting			114.0	1.0	114	
Blower for AW	4	30	120.0	0.68	81.0	
Compressor	4		88		60.0	
Steam Setter	2		17.1	0.5	8.6	
Roller Shop & Maint, Room			15.0	0.3	4.5	
Sub Total			2,358.2		1,675.4	

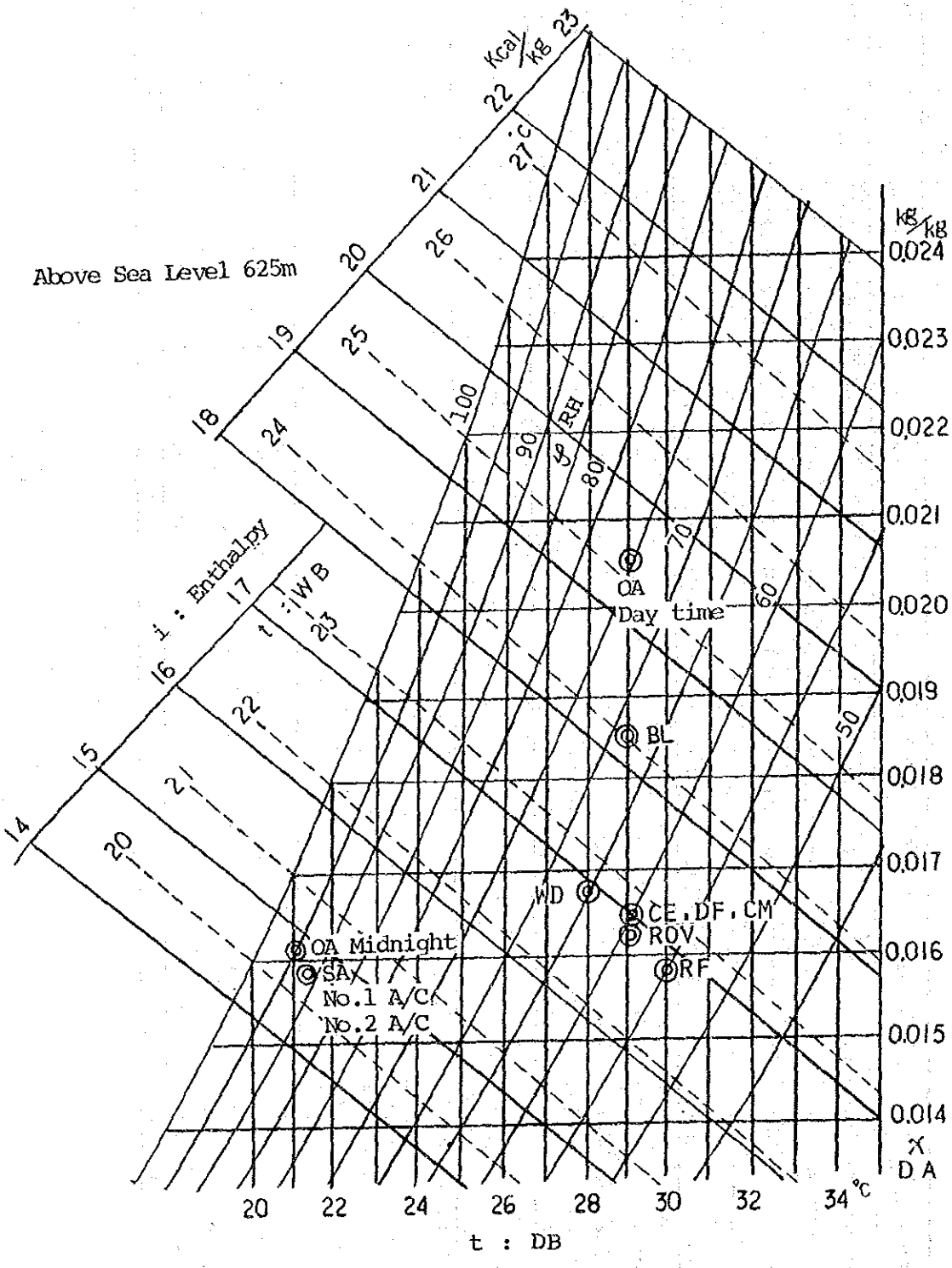
Air Cond, Chilled Water. Raw Water

Name of Process	Number of M/C	Installed Power		Demand factor	Actual load	Remark
		Unit	Total			
No.1 A/C	1 lot	KW	177.5 KW	0.8	142.0 KW	
No.2 A/C	1 lot		177.5	0.8	142.0	
Chiller (Main)	3	190	570	0.6	342.0	
Chiller (Aux)	3		100.5	0.6	60.3	
Roots Blower	2		41.0	0.9	36.9	
Water Treatment	1 lot		30	0.4	12.0	
Other			100	0.3	30	
Sub Total			1,196.5		765.2	

Total			3,554.7		2,440.6	

Table 7-33 CALCULATION OF AIR COND' LOADITIONING FOR BANJARAN-II

		Blow Room	Carding, Drawing Combing	Roving	Ring Spinning	Winding	No.1 A/C & No.2 A/C Total
Air Conditioning Load	Room Area (Heat Value)	1,800 m² (54,000) Kcal/hr	1,960 m² (58,800) Kcal/hr	1,260 m² (37,800) Kcal/hr	3,780 m² (113,400) Kcal/hr	1,788 m² (53,640) Kcal/hr	10,488 m² (317,640) Kcal/hr
	Load of LT'Power (〃)	73.3 KW (63,038) Kcal/hr	156.2 (134,332)	45.12 (38,803)	902.24 (775,926)	96.6 (83,076)	1,273.46 (1,095,175)
	Load of Lighting (〃)	1.5 KW (1,290) Kcal/hr	18.6 (15,996)	12.6 (10,836)	45.4 (39,044)	17.9 (15,394)	96.0 (82,560)
	Number of Worker (〃)	10 (1,000) Kcal/hr	35 (3,500)	10 (1,000)	70 (7,000)	85 (8,500)	210 (21,000)
	Total (〃)	(119,328) Kcal/hr	(212,628)	(88,439)	(829,370)	(160,610)	(1,510,375)
Room Condition	Temperatur ℃	29.0	29.0	29.0	30.0	28.0	
	R.Humidity %	68	60	59	55	65	
	Latent Heat of Vaporiation for Spray Kcal/Hr	44,405	27,562	8,572			
	Enthalpy Drop Kcal/kg	1.68	0.348	0.232			
	Enthalpy Kcal/kg	18.2	17.0	16.9	16.8	16.9	
Supply Air Condition	Temperatur ℃						21.3
	R.Humidity %						92
	Enthalpy Kcal/kg						14.7
Out Door Air Condition	Day Time Temperatur ℃						29.0
	R.Humidity %						75
	Enthalpy Kcal/kg						19.4
	Midnight Temperatur ℃						21.0
	R.Humidity %						95
	Enthalpy Kcal/kg						14.8
Existing Supply Air	m³/m	400	1,200	560	6,750	1,340	10,250
Discherge of Pneuma Air	m³/m		CE,CM DC 750	200	1,950	Exhaust 480	2,150
Room Return Air	m³/m	100	330	360	4,500	810	6,850
Exhaust Air (Day Time)	m³/m	300	120	0	300	50	770
Intake OA (Day Time)	m³/m	300	120	0	300	530	1,250
Required Refrigerating Load	USRT						641



PSYCHROMETRIC CHART

Figure 7-22 Psychrometric Chart of Second Mill

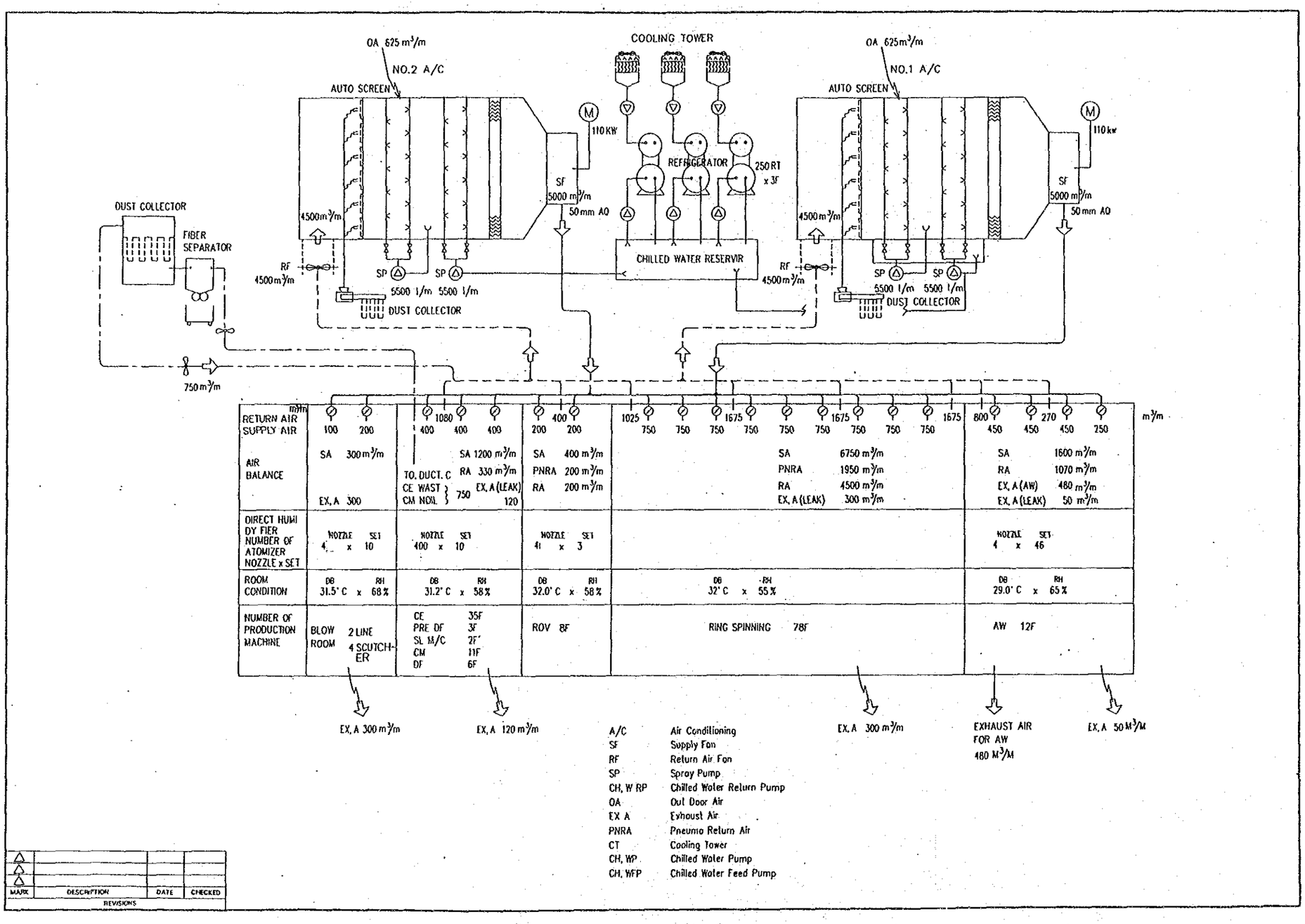


Figure 7-23 Scheme of Air-condtioning: Second Mill

b) Carding, Drawing, and Combing Rooms

The target relative humidity inside the rooms cannot be retained with the air volume from the existing equipment, therefore, humidity is supplemented by atomizers. Collected cotton waste and dust are routed to the existing fiber separators and filters, and the exhaust air is routed to the return duct from where the air is then sent the auto-screen inside the air-conditioner.

The return air from the room is routed through the underground duct and flows in together with fly through the suction grill.

c) Roving Room

Similarly to the carding, drawing, and combing rooms,the relative humidity of the roving room is supplemented by atomizer to retain target relative humidity. Return air route is the same as in the case of b) above.

d) Ring Spinning Room

The spinning room temperature will be 30℃ by supply air only from the air-conditioner. Return air from suction cleaner will directly enter the return duct from the machines, and the return air from the room will flow together with fly into the suction grill.

e) Winding

The winding room temperature becomes 28℃ by the supply air from the air conditioner, and the relative humidity can be retained at 65%. Usually the existing atomizer does not need to be operated, but when the supply air decreases due to relation with the pre-spinning room, it should be operated to supplement humidity. Exhaust air from all Autowinders are directly released to the outside.

Return air from the room is routed to the underground return duct through the suction grill.

f) Items Requiring Repair for Air-Conditioning Equipment

Air-conditioners for the Second Mill will require the following repairs and restoration:

- To install suction nozzle on the auto-screen and replace the filter net.
- To restore the partition plates of the return fan in the underground duct.
- To repair by patching corroded parts on the supply fan, casing and steel sheets.
- To remove completely corrosion, on the inside of the fan (casing and rotors) and to coat with tar epoxy.
- To remove the steel nets covering the suction grills for the return air from the

room.

g) Chiller

For the required chilled load of 672 USTR, the three sets of existing facilities with 250 USRT are sufficient.

7-4-10 Other Utility Facilities of Banjaran II

(1) Boiler Facilities

The specifications of the existing boiler and its ancillary facilities present no functional problems for use for steam setter.

(2) Compressed Air Equipment

For compressed air equipment for cleaning and clearer picker of the ring spinning frames, surplus compressor among the existing ones for winding should be used.

(Note: Newly installed mach coners will use the air compressors attached.)

30 hose coupling for cleaning and 10 couplings for clearer picker will be set at necessary places.

7-4-11 Environmental Preservation

In general pollution and environmental problems are not caused by a spinning mill of staple fibers.

In Japan, the only environmental problem which arose in relation to such mills was noise problem at places where the mills are closely located to the residential areas. Environmental problems to be generated by the present renovation project which involves only the renovation of the existing spinning mills will be very small at negligible level. The types of environmental problems that may be caused by a mill include: water pollution by waste oil, dispersion of dust into the atmosphere, and noise. As regards the working environment, the noise of the machinery can be a cause of discomfort within the mill.

(1) Drainage

Waste oil generated from the oils used for fuel and lubrication of the power stations and boilers is retained in the oil embarkment or oil pits which are separated from water drainage channel.

The waste oil generated by the maintenance of machinery in the mill is of small quantity and it is collected by hand and incinerated.

The amount of waste oil is expected to increase, however, with the renewal

and acceleration of the operating speed of the machines, therefore, construction of a stationary incinerator for treating inflammable wastes in general is recommended. Waste oil of low tenacity shall be burnt in the boiler by mixing it into the fuel, and that of high tenacity, by mixing it with sludge. For this reason, the persons in charge should be instructed to be especially careful in identifying and handling the waste oil.

The general residual water to be discharged from the kitchen, etc. will not cause any problem, as the number of workers tends to become less after the renovation. The waste water from the air-conditioners is basically clean. Residual water of the Banjaran Mill and neighboring KTSM, flows into a small river of 3 m width adjacent to the road (JL. Banjaran) along the west side of the mill. The rain water flowed out of the mill site should not cause trouble to the neighboring areas even in cases of heavy rain.

(2) Dust

Dust-containing air generated at the mill will be exhausted only after being filtered and removed of dust.

(3) Noise

The exhaust noise of the diesel engine of the power generator and that of the concentrated blower of the Autowinder of Mill I are those which may possibly cause noise problem. However, since the distance between the mill and residences is at least 200m, such noises do not affect the outer environment.

The noise is also a possible cause of discomfort within the working environment. In the First Mill the noise of ring spinning frames sometines exceeds 90 db, which is a relatively low value for a noise heard inside a mill.

7-5 Civil and Building

7-5-1 Summary of Remodelling Plan

Building and repair works to be performed along with the renovation of production and utility facilities are as follows. The production machinery for Mill I are scheduled to be completely replaced. As it has been explained in Chapter 3, many parts of the building have become obsolete and deteriorated, requiring and reinforcing such parts are indispensable. However, for Mill II, use of the existing production machinery will be continued except

for the Carding Machines, and the civil and building work involved there will be limited to the modification of part of the floor.

Except for the construction of the air conditioning room there will be no construction of a new building. Since the flow of man and material will remain unchanged, there will be no change in the entire layout of the mill after its renovation.

(Building Expansion)

B I : Air conditioning room

B II: None

(Modification and repair)

B I : Floor, underground duct, machine foundation, ceiling, partition, furniture

B II: Floor (partial), machine foundation (partial)

(Repair Work)

B I : Wall mortar, roof, valley gutter, outside down pipe, toilet (one place only), ceiling

B II: None

The entire layout of Banjaran Mill after renovation is shown in Figure 7-18.

7-5-2 Summary of Expansion Work, Modification and Repair Work

The additional construction of an air conditioning room is planned adjacent to the west side of the existing First Mill. Building 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. Details of works above are enumerated hereunder:

(1) Expansion Work

Air-conditioning room to be additionally constructed (B I)

- Building area: 3,740.10 sq. meters.
- Steel frame construction; brick walls with mortar finish.
- Floor to be RC with mortar.
- Roof to be corrugated asbestos cement sheet and ceiling to be flat asbestos cement sheet with V.P.

(2) Modification Work

Floor Modification and Repair (B I and B II)

- For Mill I a new concrete floor will be laid on top of existing floor. Expoxy dust-proof paint will be applied on the concrete floor under the machines and other parts will have terrazzo floor for durability.

New Ceiling (B I)

- New ceilings will be installed in all production room area except the blow room in order to improve the air-conditioning efficiency. Wooden frames with flat asbestos cement sheet applied and VP finished and heat insultation material to be laid over the ceiling.

Modification of Wall (B I)

- Accompanying the installation of the laboratory and with the change in the layout of the production machinery, a portion of the existing walls will be removed or new walls will be installed.

Underground Duct Construction Work (B I)

- The entire underground duct of Mill I will be completely modified or newly installed to achieve higher efficiency of return air to the air-conditioning equipment.

Machine Foundation Work (B I and B II)

- Accompanying the introduction of new machines and equipment, machine foundations will be constructed with consideration for firmly fixing the machines and preventing vibration.

Fitting Work (B I)

- Openings will be modified, repaired, or replaced to improve the sealing of building.

(3) Repair Work

Replacement of Roofing (B I)

- The entire roofing materials will be replaced together with the asphalt bed.

Replacement of Valley Gutters (B I)

- Due to the many cases of rain water leakage in the corrosion of the valley gutters, the entire valley gutters will be replace on this occasion. The down pipes on the east and west walls will also be replaced.

Repair of Upper Windows (B I)

- In order to improve air-conditioning conditions, the existing upper windows will be thoroughly examined, and all damaged parts will be repaired.

Wall Mortar Repair (B I)

- Since the wainscot portion is extremely damaged, the entire surface mortar will

be recoated and repaired. Only the damaged portion of the upper part of the wall will be repaired. A joint will be set as a parting with the wainscot.

The entire wall surface will be repainted with vinyl paint.

Repair of Ceiling (B I)

- The broken flat slates, deteriorated material, and corroded fixing nails of the ceiling will be repaired (for portions where no new ceiling installed).

Repainting will be performed over the entire ceiling.

Repair of Toilet (B I)

- New sanitary euipment, water taps, and toilet stools and wash basins will be installed, and wall and floor titles will be remodelled. (One area only).

Painting Work (B I)

- In addition to painting of above mentioned walls and ceilings, painting will be performed on fixings and steel parts.

In relation to the renovation to be performed, color coordination will be considered for B I. This is considered very effective to promote productivity and efficiency with a mental and psychological approach through improving the working environment in the Mill.

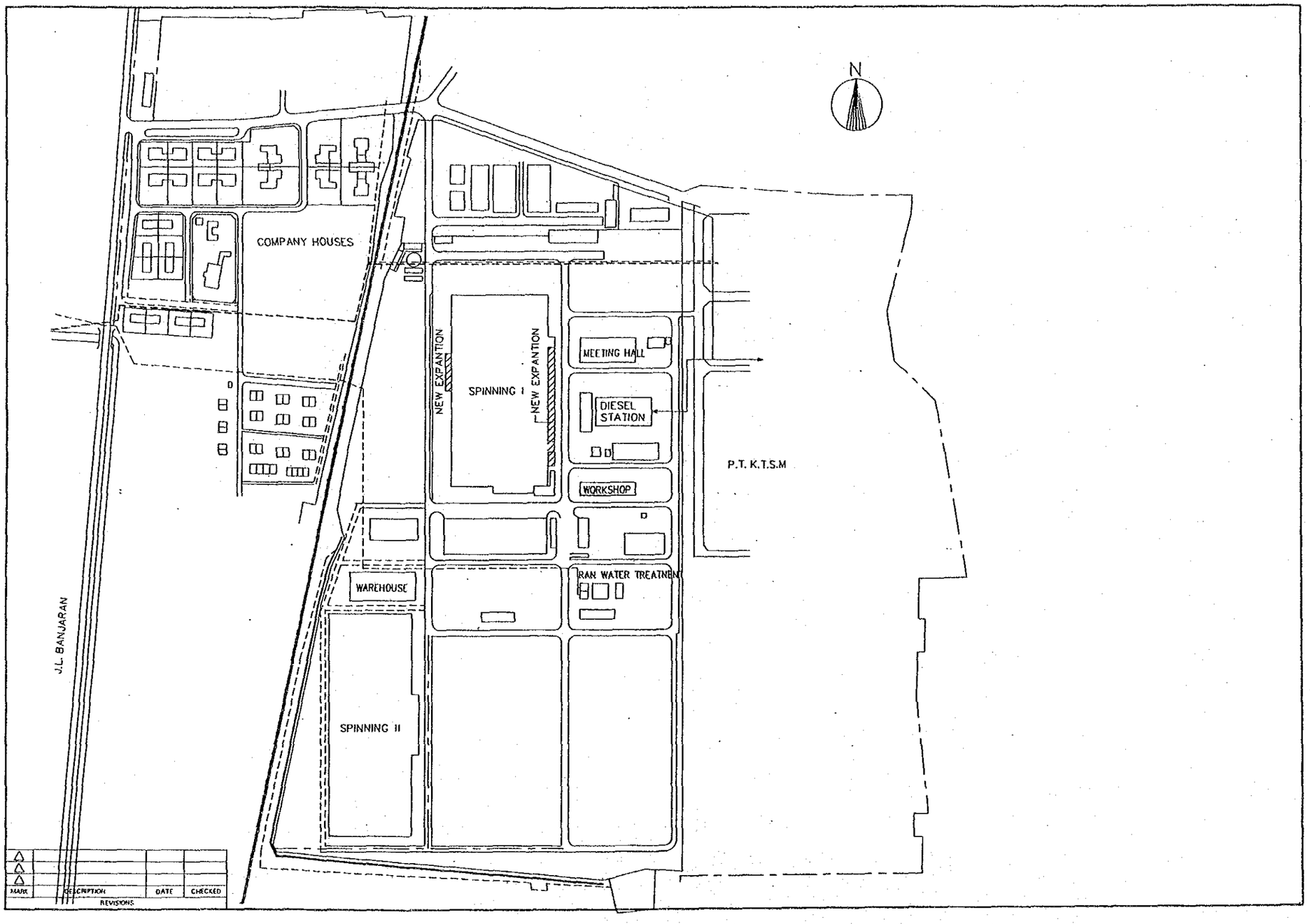


Figure 7-24 Layout of Building (after renovation)

7-5-3 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 pecial 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 materals. Moreover, it is also necessary that the specifications and standards of construcion and materials be clearly defined, especially regarding the mix and strength of concrete as well as the quality of reinforcing bars.

7-5-4 Construction Plans

(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 dis-cussions 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 ar-rangement 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 work-ers, 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. For Mill I, completely repainting the

ceilings and walls is planned. 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.

7-6 Implementation schedule

With the formal starting of the project, site works begins following the completion of the various activities and procedures such as detailed design, bidding, and selection of the contractors. These works will be done in the order of civil works, utility work, and machinery installation work. Following the test-run and commissioning of the production machinery, operation will commence. When a governmental organization is to be an enforcing body of the project, various procurements are done through an open bid method. Also numerous applications, approval, and permission procedures for higher government authorities are required. These matters must be fully considered when preparing an implementation schedule of the project.

This project also extends over three units mills of two mills. To achieve the most efficient results, studying the project from various aspects is required, such as determining what part of which unit should be started.

In Figure 7-25, a tentative implementation schedule has been prepared, which is incorporated following conditions.

(1) The period of time from the signing of consultanting agreement to the signing of contractor (supplier) agreement is 12 months.

(2) The project implementation period has been assumed to be 18 months, and construction

work and utility work at both mills i.e. Banjaran Mill and Cipadung Mill shall be carried out in parallel. For the smooth installation and test-run of machinery, such machine installation and tests for Cipadung Mill will take place three months earlier than Banjaran Mill. In consequence, Cipadung Mill will commence operation 15 months after start of work on the project and three months later for the operation of Banjaran I will follow.

(3) For Banjaran II, the main renovation will be limited to the modification of the 35 sets of Carding Machines and introducing Pre-drawing Frames. Such modification will be performed step by step while continuing the present production and to be completde by the time when operation of First Mill starts.

(4) The period of technical guidance by the training firm will be for one year after completion of Cipadung Mill.

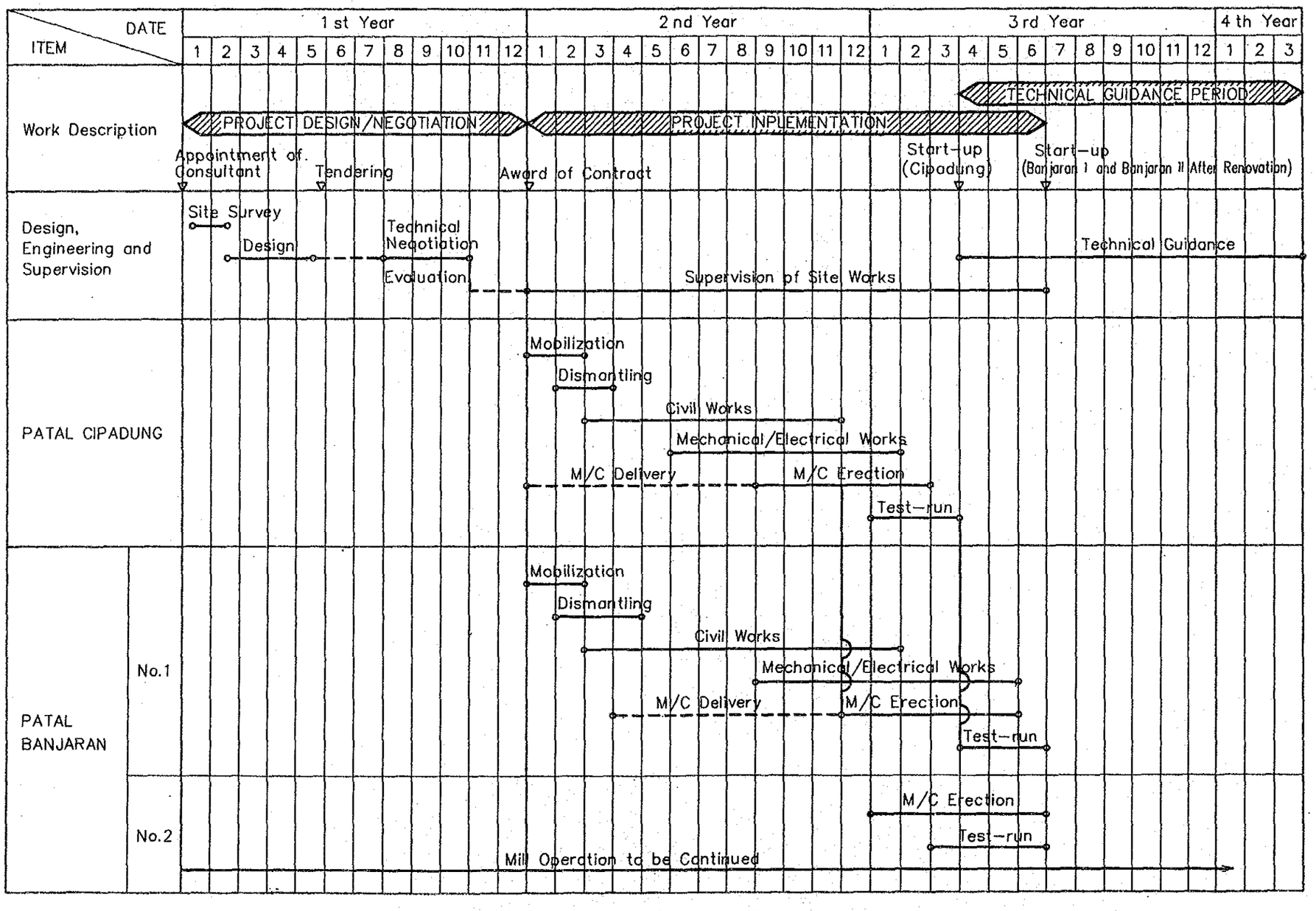


Figure 7-25 Renovation of Banjaran/Cipadung Mill

Tentative Implementation Schedule

7-7 Operation Plan

To obtain the desired result of the renovation, it is necessary to produce high quality products at high productivity by incorporating the items of improvement (based on the analysis of the present situation). A plan must be conceived to permit production activities under an organization where the channel of instructions and orders are simplified and where operation of the new machinery are performed by a limited number of well qualified people. Explained below are matters regarding personnel, organization, and maintenance of machinery.

7-7-1 Personnel Plans

In regards to qualified operators for the new machinery, 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 machine and same number of drums as the Japanese operators. The plan was drawn up considering various factors such as education and training of the employees, base wages, and the labor environment.

(1) Local Staff Before and After the Start Up

Consideration to the local staff by departments are as follows.

a) Local Staff in Administration Department

From the start of renovation the First Mill the workload of the administration department will be substantially reduced (although the workload of the Second Mill will remain unchanged). This would possibly allow the number of local staff to be reduced to the proper number during the renovation of the First Mill and renovation of the Second Mill. Its number will be maintained thereafter.

b) Local Stall in Auxiliary Department

All the construction and maintenance work will be performed with the present number of local staff until the project for the Second Mill 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 workforce will be reduced to the proper level by the time of completion of renovation. Full scale operation will be performed,by the reduced number of personnel.

Table 7-34 summarizes the above and compares it with the present situation.

The natural decrease in number by retirements for operator's own reason and other reasons are also included in the operator decreasing ratio.

Table 7-34 Change of Number of Staff

	Dept.Chief	Supervisor	Ass. Supervisor	Foreman Operator	Total	Decrease %
Present						
Banjaran I	1	5	21	771	798	
Banjaran II	1	6	16	379	402	
Utility	1	4	10	90	105	
Administration	5	14	24	131	174	
Total	8	29	71	1,371	1,479	
Construction Period						
Banjaran I	1	6	21	498	526	34.1
Banjaran II	1	6	16	379	402	0
Utility	1	4	10	90	105	0
Administration	5	13	20	91	129	25.9
Total	8	29	67	1,058	1,162	21.4
Decrease %	0	0	5.6	22.8	21.4	
After Start Up						
Banjaran I	1	6	21	498	526	34.1
Banjaran II	1	6	21	344	372	7.5
Utility	1	4	9	65	79	24.8
Administration	5	13	20	91	129	25.9
Total	8	29	71	998	1,106	25.2
Decrease %	0	0	0	27.2	25.2	

Note: Mill manager is not included.

(2) Number of Workers for each process After Start of Operation

For production to proceed smoothly under proper number of workers, the workers must exhibit their capability and the workload must be evenly distributed. A standard workload can be determined by doing work analysis of each machine and calculating the reguired working hour. With the standard work load, the required number of workers for each process can be determined, thus equalizing workloads. The proper number of workers for each operation and maintenance are listed in Table 7-34 and Table 7-35 (Personnel of higher class than foreman is not included.)

Table 7-35 Operation Staff for each Process (4 groups 3 shigts)

	Blowing ~ carding	Pre Comber ~Roving	Spinning	Winding packing	Total
Banjaran 1	14× 4 +(6)	20× 4	34× 4 +(18)	31×4	99×4(14)
Banjaran 2	6 × 4 +(5)	11× 4	27× 4 +(6)	19×4	63×4(11)

( ) 1 shift

Table 7-36 Maintenance Staff for Each Process

	Blowing ~ carding	Pre Comber ~Roving	Spinning	Winding packing	Roller shop	total
Banjaran 1	6	9	19	6	7	47
Banjaran 2	5	8	16	5	6	40

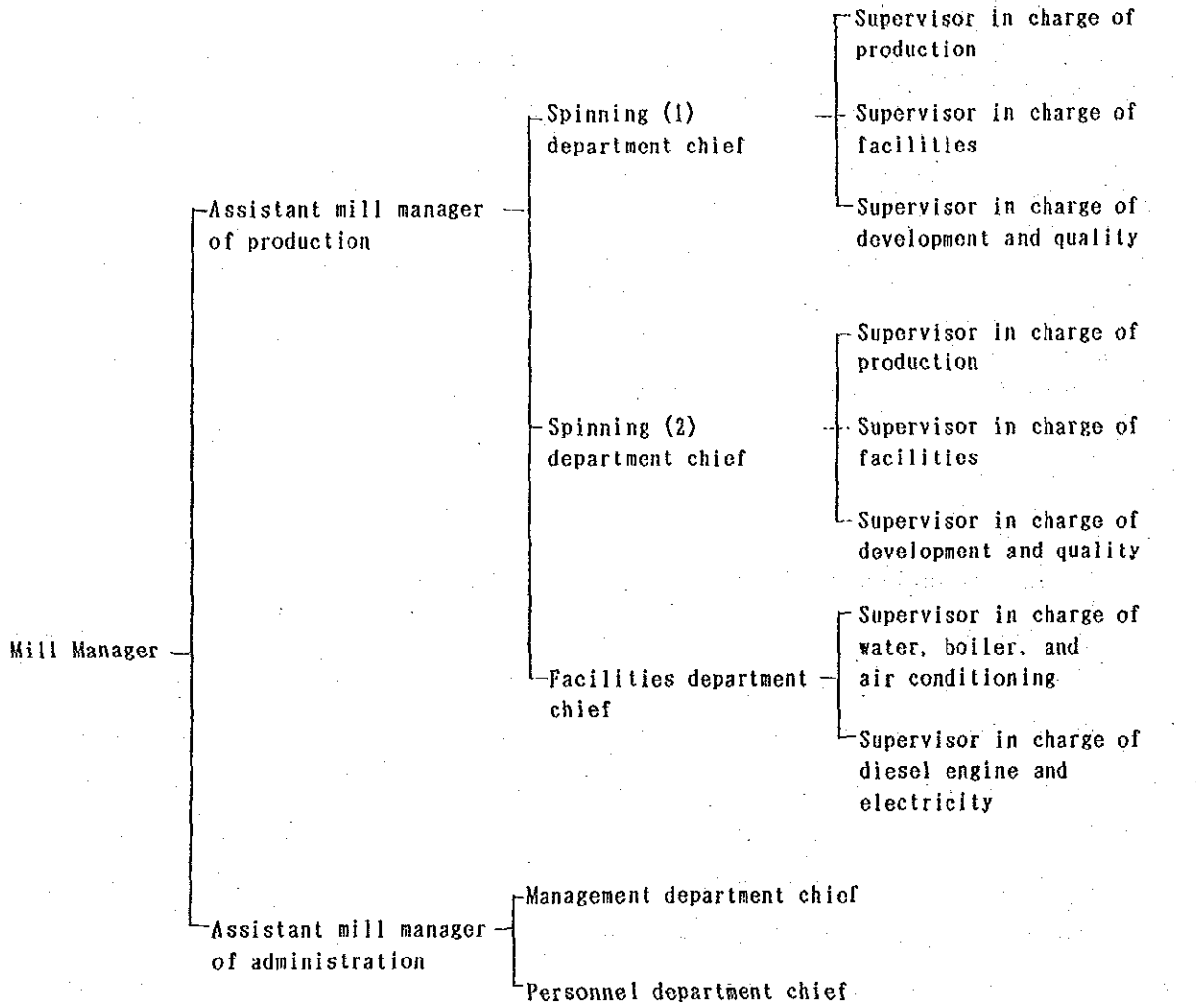
7-7-2 Organization

For the organization to function properly and efficiently, it is essential that the scopes of authority and responsibility are clarified and that the organization be simplified as much as possible. The two main lines in the production department include the operation sector that engages in production and the maintenance sector that retains and controls the machines in good operable condition. The organization should operate so that these sectors would be able to exchange information, technology, and man-power throughout the entire processes. As explained in Chapter 3 presently the manager of each department assumes the entire responsibility of the operation and maintenance, and all other aspects of his department, and it is appeared that this system makes difficult smooth communication among departments. If the organizational aspect can be improved through the renovation project, the renovation will be more effective.

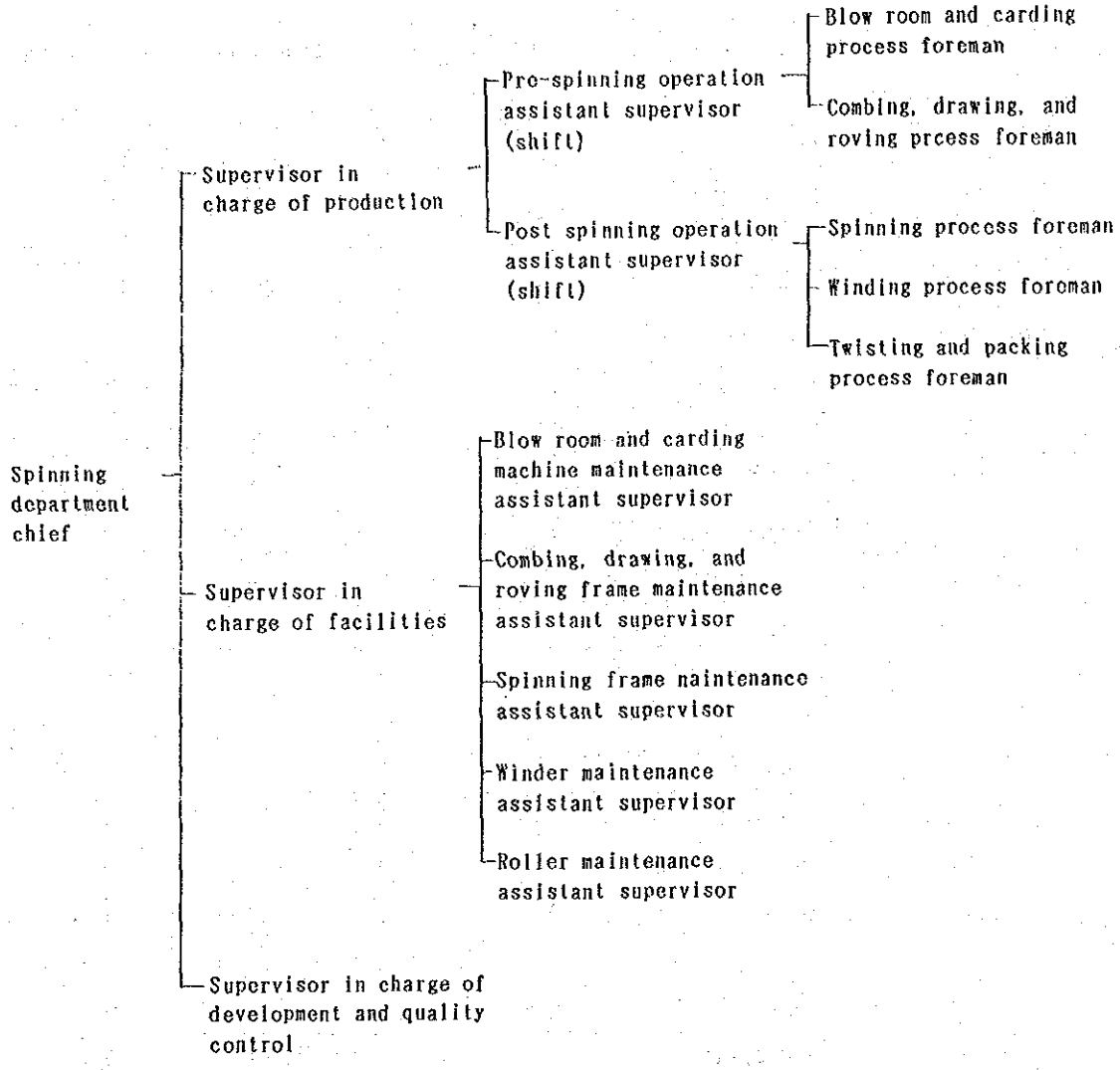
The improvement plan of the organization has been studied and is shown below. It should be understood that the organization will be reflection of circumstances at that time and influenced by the policy of the top management. Therefore, this organization plan was made only for reference.

Under the mill manager, there will be an assistant mill manager for production control (production, equipment, and engineering control), and an assistant mill manager for administration control (administration and labor control). Under the assistant mill manager for produetion, there will be two department chieves for spinning and utilities. Under

the spinning department chief there will be three supervisors who will head over the entire processes of production (operation), machinery maintenance, and others (development and quality control).



Organization under the spinning department chief is as follows:



Works are better to be imtegrated and performed by fewer persons as much as possible to reduce the number of intermediate supervisors, so that instructions and orders can be smoothly transmitted. The proper number of personnel based under the present organization is shown in Table 7-37.

Table 7-37 Proper Staff of Banjaran Mill

Mill Manager	Dept chief		Supervisor		Ass. Supervisor	Foreman	Operator	Total
	B-I Production	1	Production	4	12	20	410	
			Maintenance	1	5	8	47	
			Laboratory	1	4	3	10	526
	B-II Production	1	Production	4	12	20	263	
			Maintenance	1	5	8	40	
			Laboratory	1	4	3	10	372
	Utility	1	Electric	1	3	10	15	
			Utility	2	3	9	12	
			Workshop	1	3	4	15	79
	General	1	Admiinistration	1	2	1	3	
			House Keeping	1	2	1	32	44
	Planning	1	Production	1	1	1	2	
			Technical	1	1			
			General	1	2			11
	Financial	1	Financial	1	2		2	
			Book Keeping	1	1		3	
			Ware house	1	1	2	11	32
			Sale	1	1		1	
			Parchase	1	1		1	
	Personal	1	Personal	1	2	1	2	
			Prosperity	1	1		4	
			Safety	1	2	3	16	35
	Health	1			1		5	7
						(Mill Manager)		1
1		8		29	71	94	904	1107

7-7-3 Maintenance of Machinery

In the effort to maintain and improve productivity and quality after completing renovation and rehabilitation projects, measures must be taken to assure that the functions of the new machinery will be maintained. For this purpose, it will be required to prepare and establish a maintenance standard for the new machinery employed, to promote maintenance personnel to acquire technical skill, to establish a reasonable allocation of funds for maintenance, and to prepare personnel plan and traning program based on scientific data, not sticking necessarily to the previously practiced maintenance techniques and maintenance cycles. Preparation should be made so that such plans can be implemented immediately after the new machinery are introduced.

(1) Implementing Preventive Maintenance

Preventive maintenance shall be carried out using a check list and recording the extent of wear or damage on the main parts of the machines. When a detected part is unable to maintain its proper function until the next periodical maintenance, it should be promptly repaired.

Parts that require replacement will be reviewed and replaced.

Data recorded over an extended period of time will be utilized for drafting annual maintenance programs. As explained above preventative maintenance is a method of increasing machine efficiency by adding a check function to the regular maintenance and detect in advance defective part and repair it. Although breakdown of new machinery are not so frequent, failures can occur on electrical parts and lubirication related parts.

Assigning an electrical engineer to each shift to shorten down time due to electrical failures is also a type of preventive maintenance.

(2) Useful Lives

For performing preventative maintenance, the useful lives of main parts in case of Japan are shown for reference.

a) Metallic Wire for Carding Machine

Fiber	Wire	Cotton Passing Amount	Duration
Cotton		ton	
	Taker-in	200 - 250	8 months - 1 year
	Cylinder	400 - 500	2 - 2.5 year
	Doffer	Unknown	
	Flat	500 - 600	2.5 - 3 year
Polyester (Semi-dull)		ton	
	Taker-in	170 - 200	7 months - 1 year
	Cylinder	250 - 300	1.2 - 1.5 years
	Doffer	Unknown	
	Flat	400 - 500	2 - 2.5 year

b) Rubber Top Rollers

The rubber top rollers should be replaced when the thickness of the rubber becomes less than 3 mm, and for the detaching rollers, less than 2 mm. The thickness of grinding at one time is from 0.2 mm to 0.3 mm, and the remaining useful lives will be estimated from the rubber thickness after grinding. The useful lives under normal use in Japan are as follows:

- Comber detaching roller : 30 to 36 months
- Drawing front : 12 to 18 months
- Other top rollers : 48 to 60 months
- FL-6 bottom apron : 12 to 15 months
- Other aprons : 18 to 22 months

c) Combing (24 hour operation)

Cylinder half lap unicomb - :> approx. 6 years

Top comb - :> approx. 1 to 1.5 years

Cylinder brush - :> approx. 4 years

d) Drawing and Roving

Clearer cross : approx. 1 year

e) Spinning

Ring (41 mm dia, 16,000 rpm, polyester 65/cotton 35 : approx. 2 to 3 years

Traveller : approx. 20 to 30 days

(3) Establishing the Annual Maintenance Cost

To maintain and upgrade yarn quality and productivity, a condition that an annual repair cost corresponding to the annual maintenance plan must be established as a prerequisite.

Although new machinery will require minimum repair cost installation, a target repair cost equivalent of approximately 10% for the total production cost should be established (this target should be achieved in three to five years). Necessary funds for repair without being influenced by the market situation should be allocated. The maintenance should be performed in accordance the annual maintenance program which should be established based on scientific data in order to determine what and when to purchase, how such items would effect production and quality, and when and how many machines should be repaired, etc.

7-8 Education and Training Program

After the renovation is completed, the production technology for the new machinery, technique of related quality control and preventive maintenance, control technology, and knowledge of periphery machines and equipment must be completely acquired. Such technology and technique are steadily progressing together with the advancement of the production machinery and peripheral machines as well as with the higher quality requirement in the international market. The technology acquired in the past only cannot satisfy the requirement.

The best method for education and training is to be done throughout the project, beginning with the selection of the machines, then the modification and repair of existing machines along with the installation and test-run, and finally to production operation. It is frequent that technical assistance for engineering work and education/training come from different consultants.

This, however, results in lacking coherence between the equipment and education, therefore, not effective way. It is therefore necessary to integrate engineering and education and training into a set. Selecting a firm with high integrated technical standards with rich experiences would greatly influence whether success of the project can be achieved

or not.

The desirable method of education and training will be that-firstly, chiefs of departments directly receive education and training to fully master the technology. The chiefs will then undertake to educate and train their own personnel.

On-the-site training is a basic rule of education and training in order to acquire practical knowledge of the machines as well as to learn the related technology. However, actual observation of advanced control techniques may expedite learning and understanding; therefore, a training abroad for a short period of time could prove to be significant. The details of the education and training method are as follows:

(1) To perform education and training regarding selection of machines, modification and repairs, and construction work through actual engineering work such as in basic design, detailed design, and preparation of bid documents and drawings.

(2) To perform basic study and training abroad in various fields for a short term in a modern mill.

(3) To perform education and training on basic maintenance and operation techniques of the machines through construction work, installation of machines, and test-run and commissioning.

(4) To perform education and training on production, quality control, preventive maintenance and control technology after the mill has been completed along with actual production.

To improve the results of education, those in positions of foreman or above in the area of operation and those with technical skills of level B or above in maintenance should be ranked up. (Technical level A: those with thorough knowledge and skills on the assigned duty, capable of teaching the subordinates; Technical level B: those who can be entrusted with a duty, but require occasional checking; Technical level C: those who can perform simple tasks but insecure when left alone)

It is advisable that the workers at the work place be composed of 15% level A, 50% level B, and 35% level C. If the levels of the workers are short of fulfilling this optimum composition, an intensive training for strengthening the weak points of individual workers must be promptly carried out.

In educating and training the workers, it is important that the trainer and the trainee should have the same understandings on technical levels. For this purpose, the items and the content of skills and knowledge to be acquired at each level must be clearly stated respectively for levels A, B, and C, and the instructions should be designed to fulfill the

specified qualifications of each level. At present, there is a problem of lack of sufficient skill on the part of a those who are in positions requiring either level A or B. Education must be provided so that at least 50% of the workers attain the upper two levels.

7-8-1 Training Period

Tentatively the period of training will start with the engineering contract coming into effect and end 12 months after the completion for renovation of the Chipadung Mill. When this period is divided into stages, the stages will be as follows although some places will overlap.

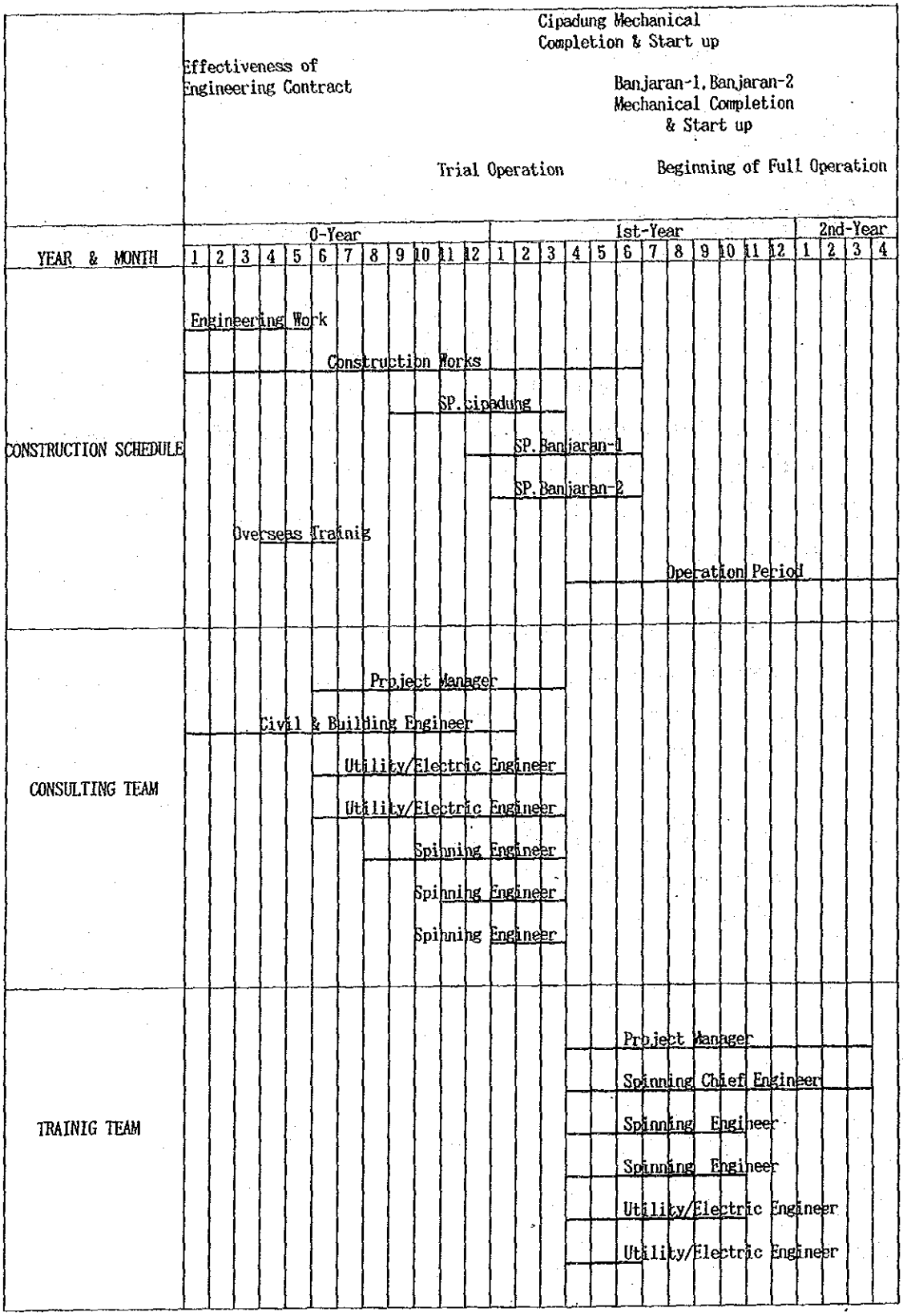
(1) 1st stage : Training period performed through engineering work : Approx. 5 months
(2) 2nd stage : Study and training period for local staff overseas : Approx. 3 months
(3) 3rd stage : Training period through construction work, installation of machines, and test-run and commissioning: Approx. 8 months
(4) 4th stage: Final stage of training period when operation advances into normal operation while increasing production (technical guidance period): Approx. 12 months

7-8-2 Trainees to be Despatched Abroad

The number of trainees and period of training to be performed overseas in various fields during the short period are planned as follows:

Type of Work	Number of trainees	Period
Overall management of the spinning mill	3	2 weeks
Overall spinning operation	3	3 months
Overall spinning maintenance	3	3 months
Total	9	19 people/month

Figure 7-26 Dispatch Schedule of Training Staffs



7-9 Required Funds

7-9-1 Basic Concept of Estimating Total Construction Cost

(1) Demarcation between Imports and Local Procurement of Spinning machinery and supplies

As a matter of fact, there are only Japanese and European manufacturers. Purchase from Japanese makers is assumed, however, because placing orders with European manufacturers is difficult since their financial conditions have deteriorated seriously in recent months and also because technological study of European products would be difficult. (As for accessories and operational supplies, the products currently used can be applied. Therefore, only those required to be newly purchased were posted.)

Utility equipment and construction work: Imports/Local procurement

All products possible to be procured locally are to be purchased at the local market.

Electrical equipment/supplies and construction work: All products and services are to be procured locally.

Construction materials and work: All products and services are to be procured locally.

(2) Estimation Standard

1) Timing for estimation

Imports: June 1991

CIF prices were calculated based on Ex-Go prices of manufacturers.

Local procurement portion: March 1991

The domestic market price of Indonesia.

In this study, the construction cost is an estimate based on the market prices as of March and May 1991. Since price increases are naturally expected to occur hereafter, it will become necessary to adjust the construction cost to the latest price levels, if this project is actually enforced.

2) The currency to be used and the exchange rage

Import portion: Japanese yen (for the convenience of calculation, it will be converted into Indonesian Rupiah.)

Local procurement portion: Indonesian Rupiah.

Exchange rate: The average exchange rate for June 1991 is to be used.

U.S.$1 = ¥137.75 = Rp1,954

1 Rp = ¥0.0705

(3) Fund Procurement Terms

In calculating the interest for the construction period, the following terms have been set:

1) Interest on borrowing

For foreign currency-denominated loans: 10%

For home currency loans: 18%

2) Loan/capital contribution ratio:

Case A: 100/0

Case B: 70/30

(4) Tax imposition on imported machinery and supplies

In Indonesia, it is required to pay customs in accordance with tariff schedules. The taxes to be paid are added value tax (PPN), luxury product tax (PPnBM), and prior payment portion of the income tax in addition to the customs. In case of imports of the machinery and supplies to be procured under this rehabilitation project, however, customs will be exempted since the PMDN account, authorized by the Investment Adjustment Committee (BKPM), is considered to be used for the settlement of import prices. As for the value added tax related to the imports of capital goods, the payment of such tax at the time of imports will be exempted as a special treatment if such handling is applied for to a tax office, with import-related documents submitted together with an application form, and is approved by the office.

If this project is implemented, furthermore, it is highly likely that it will become a governmental development project designed to utilize foreign loans. In that case, a contractor for the project will benefit by the exemption from the value added tax on the imports of the products relating to the project. Since PPH will be refundable, it may be considered to be virtually nil. Such being the case, calculation will be made on the assumption that no customs will be imposed on the machinery and supplies to be procured.

(5) Labor Expenses as the Pre-Operational Expenses

The labor expenses of the installation personnel during the construction period are considered differently between the First and Second Mills. Since the work on the First Mill will be a large-scale project designed to completely replace the equipment, the appropriate post-start-up personnel will carry out all of equipment withdrawal, construction, installation preparation, installation, and power/electric wiring activities

(in principle, no subcontractors will be required). Since the work on the Second Mill will represent a renovation project involving the existing equipment, on the other hand, the factory will continue operation during the renovation work. Therefore, special consideration is given to the renovation (installation) personnel, and expenses to be required for such personnel are posted as pre-operational labor expenses.

(6) Consulting Cost

The consulting cost is shown in the Japanese yen after reference was made to major international organizations' remuneration for consultants as of May 1991.

(7) Training Cost

Upon the completion of the construction work and start-up of operation, it will be necessary to train the employees in the use of rehabilitated or newly-installed facilities, etc. Therefore, for the period of a maximum of 12 months, a training staff will be invited from overseas, and an OJT will be conducted for the employees at the mills. Moreover, overseas training of cadre employees will be imple-mented on a short and collective basis. The former will be enforced as soon as the termination of the construction work and start of operation, while the latter will be held at suitable time during the construction period. The relat-ed cost was assumed and posted.

(8) Contingency

As for the contingency during the period of the rehabilitation project, we assumed the price contingency forthe construction cost and posted it.

(9) Others

Of the spinning machines to be withdrawn for renewal, there are the machines that have been completely written off and the machines that have not. In Banjaran Mill, with spinning machines to be removed will not include the machinery for which depreciation has not yet been finished, but in Cipadung Mill, the facilities that are supposed to be not yet completely depreciated are included in the the machines to be removed. Based on the view that such sunk cost will approach zero through the purchase, it is notincluded in the capital to be disbursed.

If improvement of welfare facilities becomes necessary in the course of the rehabilitation work, required expenses will be handled as separate funds and will not be included in the investment amount.

7-9-2 Total Funds Required

Total funds required for the rehabilitation plan are shown below. The amount required for Banjaran Mill will total Rp76,094 million (equivalent to ¥5,364,630,000).

Unit: Million Rp

	First Mill	Second Mill	Banjaran Mill total	Share %
Construction cost	3,571	60	3,631	5.0
Procured machinery, supplies (CIF)	45,346	9,431	54,777	76.3
Import customs	0	0	0	0
Customs clearance, inland transport	306	18	324	0.4
Import premiums	96	20	116	0.2
Pre-operational expenses				
Labor expenses	2,407	152	2,559	3.6
Utility Cost	349	39	388	0.5
Raw material cost	740	416	1,156	1.6
Consulting expenses	1,889	333	2,222	3.1
Training expenses	915	162	1,077	1.5
Contingency	4,805	771	5,576	7.8
Sub total	60,424	11,402	71,826	100
Interest during construction period	3,670	598	4,268	
Total funds required	64,094	12,000	76,094	

Note: The interest rate during the construction period will beunder Case B.

Details of total required funds are shown in Table 7-38.

7-9-3 Details of Total Construction Cost

(1) Construction Work Expenses

Construction work is to be implemented by local contractors, and all construction materials are to be procured locally. Construction cost, calculated in accordance with the equipment installation plan on a trial basis, is as follows:

Breakdown of construction work	Local currency (Th.Rp)
1) First Mill	
Temporary work	253,000
Expansion of buildings work	1,321,400
- Air-conditioning room expansion work Remodeling Work	1,388,900
- Floor improving work	
- Ceiling construction work	
- Wall improving work	
- Underground duct work	
- Machinery foundation work	
- Door and window work	
Repair work	449,700
Roof slate replacement, valley gutter replacement, top light repair, wall mortar repair, ceiling repair, toilet repair, coating work	
Miscellaneous work	158,000
First Mill sub-total 3,571,000 Th.Rp	
2) Second Mill	
Repair work	60,000
- Floor repair work	
- Machinery foundation work	
Second 2 Mill sub-total 60,000 Th.Rp	
Total construction cost 3,631,000 Th.Rp -- Local cost	

(2) Cost of Imports/Locally Procured Machinery and Supplies

Tables 7-39 to 44 show the cost of machinery and supplies required for new construction and repair (including construction cost of contractors in the case of utility and electrical work). When summarized, they are as shown below:

Table 7-39 Production Machinery Cost (Banjaran-I Mill)

Item No.	Machine Name	Q'ty	Unit Price (Ex-Go ¥1,000)	Amount
RBS-1-1	Blow Room Machinery for Cotton	2 lines 3 scutchers		285,740
	Blow Room Machinery for M.M.F/line	1 line 1 scutcher		54,400
RBS-1-2	Card (to be rehabilitated)	48 sets	4,300	206,400
RBS-1-3	Lap Former	4 sets	27,600	110,400
RBS-1-4	Combing Machine	25 sets	12,400	310,000
RBS-1-5	Pre-Drawing Frame	1 set		5,200
RBS-1-6	Drawing Frame	14 sets	5,200	72,800
RBS-1-7	Roving Frame	10 sets	15,600	156,000
RBS-1-8	Ring Spinning Frame	35 sets	24,200	847,000
	Overhead Travelling Cleaner	35 sets	1,130	39,550
RBS-1-9	Automatic Cone Winder	12 sets	30,900	370,800
	Travelling Cleaner	12 sets	950	11,400
RBS-1-10	Double Winder	1 set		12,000
RBS-1-11	Double Twister	8 sets	8,900	71,200
	Travelling Cleaner	8 sets	950	7,600
RBS-1-12	Thermo Setter with Boiler	1 set		23,800
RBA-1-1	Roving Stripper	1 set		8,000
RBA-1-2	Can for Carding	260 pcs	14.07	3,658
RBA-1-3	Can for Drawing & Roving	1,730 pcs	11.5	19,895
RBA-1-4	Roving Bobbin	50,400 pcs	0.288	14,515
RBA-1-5	Ring Bobbin	134,400 pcs	0.111	14,918
RBA-1-6	Roving Cart	12 sets	80	960
RBA-1-7	Carrier for Setter	16 sets	190	3,040
RBL-1-1	Evenness Tester	1 set		17,000
RBL-1-2	Yarn Fault Classfying Installation	1 set		8,600
	TOTAL			2,674,876
	(Measurement)			(178,315cft)

Table 7-40 Production Machinery Cost (Banjaran-II Mill)

Item No.	Machine Name	Q'ty	Unit Price (Ex-Go ¥1,000)	Amount
RBS-2-1	Scutcher with Lap Scale	3 sets	27,000	81,000
RBS-2-2	Card (to be rehabilitated)	35 sets	4,300	150,500
RBS-2-3	Lap Former	2 sets	27,600	55,200
RBS-2-4	Combing Machine (to be rehabilitated)	14 sets	2,850	39,900
RBS-2-7	Roving Frame (to be rehabilitated)	8 sets	10,930	87,440
RBS-2-8	Ring Spinning Frame (to be rehabilitated)	78 sets	1,235	96,330
RBS-2-10	Automatic Cone Winder	3 sets	31,850	95,550
RBA-2-1	Gum Cot Grinding Machine	1 set		3,300
RBA-2-2	Can for Carding	250pcs	14.07	3,517
RBL-2-1	Evenness Tester	1 set		17,000
RBL-2-2	Dry Range	1 set		2,090
	Total			631,827
	(Measurement)			(12,470cft)

Table 7-41 Cost of Utility Equipment & Work (Banjaran-I Mill)

Item No.	Equipment Name	Description	Measurement cft.	Q'ty	Amount Import CIF Jakarta ¥1,000	Amount Local Rp.1,000
RBU-1-2	Chilled Water Equipment	Refrigerator 500USRT	1000	1 set	23,000	
		Cooling Tower, Pump	300	1 lot	10,000	
		Piping	50	1 lot	1,200	25,200
		Return Water Piping		1 lot		70,000
			1,350		34,200	95,200
RBU-1-3	Air Conditioning Equipment for Blow Room	Air Washer		1 lot	4,000	28,000
		Fan, Pump, etc.		1 lot	5,000	
		Supply Ducting		1 lot		15,000
		Automatic Controller		1 lot	2,000	
			3,000		11,000	43,000
RBU-1-4	Air Conditioning Equipment for Preparatory Section	Air Washer		1 lot	12,000	56,000
		Fan, Pump, etc.		1 lot	20,000	
		Waste & Dust Collector		1 lot	28,500	35,000
		Supply Ducting		1 lot	1,500	63,000
		Automatic Controller		1 lot	8,000	
			11,000		70,000	154,000
RBU-1-5 (1)	Air Conditioning Equipment for Ring Spinning Section (East Side)	Air Washer		1 lot	14,000	56,000
		Fan, Pump, etc.		1 lot	22,000	
		Dust Collector		1 lot	10,000	
		Supply Ducting		1 lot	1,500	63,000
		Automatic Controller		1 lot	8,000	
			8,500		55,500	119,000
RBU-1-5 (2)	Air Conditioning Equipment for Ring Spinning Section (West Side)	Air Washer		1 lot	14,000	56,000
		Fan, Pump, etc.		1 lot	22,000	
		Dust Collector		1 lot	10,000	
		Supply Ducting		1 lot	1,500	63,000
		Automatic Controller		1 lot	8,000	
			8,500		55,500	119,000
RBU-1-6	Air Conditioning Equipment for Finishing Section	Air Washer		1 lot	9,000	42,000
		Fan, Pump, etc.		1 lot	14,000	
		Dust Collector		1 lot	8,000	
		Supply Ducting		1 lot	1,500	63,000
		Automatic Controller		1 lot	5,000	
			7,500		37,500	105,000

Table 7-41 Cost of Utility Equipment & Work (Banjaran-I Mill)

RBU-1-7	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
RBU-1-8	Boiler Equipment	Fuel Tank, etc.				42,000
RBU-1-9	Sprinkler & Hydrant	Extension of Sprinkler		1 lot		203,000
		Rehabilitation of Main Pipe		1 lot		98,000
		Hydrant		1 lot		14,000
						315,000
	Total		40,300		278,700	1,076,200

Table 7-42 Cost of Utility Equipment & Work (Banjaran-II Mill)

Item No.	Equipment Name	Description	Measurement	Q'ty	Amount	
					Import CIF Jakarta	Local
			cft.		¥1,000	Rp.1,000
U-2-2	No.1 Air Conditioning Equipment	Overhaul/Repair of Air Washer and Supply Fan		1 lot		30,000
U-2-2	No.2 Air Conditioning Equipment	Ditto		1 lot		30,000
		Rehabilitation of Auto-Screen		1 lot	3,000	20,000
			200		3,000	50,000
U-2-2	Return Duct	Repair of Return Fan and Suction Grille		1 lot		10,000
U-2-3		Extension of Atomizer in Blow Room		1 lot	3,000	4,000
		Ditto Preparatory Sec.		1 lot	3,000	3,000
		Ditto Roving Frame		1 lot	2,600	3,000
			100		8,600	10,000
	Total		300		11,600	100,000

Table 7-43 Cost of Electrical Work (Banjaran-I Mill)

Item No.	Equipment Name	Description	Measurement	Q'ty	Amount	
					Import CIF Jakarta ¥1.000	Local Rp.1.000
RBE-0-1/2	Incoming Station cable & panel			1 lot		120.000
RBE-0-4	HT Feeder			1 lot		76.000
RBE-1-1	A-Substation	Panels, Busduct		1 lot		83.000
RBE-1-2	B-Substation	Panels, Transformer, Busduct		1 lot		177.000
RBE-1-3	C-Substation	Panels		1 lot		36.000
RBE-1-4	LT Wiring	LT Distribution Panel		1 lot		155.640
		Main Cable		1 lot		186.000
		Power Wiring		1 lot		134.900
						476.540
	Lighting	Lighting Distribution Panel		1 lot		16.500
		Fixture & Wiring		1 lot		118.845
						135.345
	Other Works	Socket, Tap, Wiring		1 lot		7.500
		Speaker System		1 lot		2.000
		Interphone System		1 lot		19.200
		Fire Alarm		1 lot		13.800
		Time Signal		1 lot		8.000
		Fault Alarm		1 lot		5.000
		Earth Work		1 lot		3.000
		Lighting Work		1 lot		5.000
						63.500
	Instrument & Tester for Control of Electricity			1 lot		30.000
	Total					1.197.385

Table 7-44 Cost of Electrical Work (Banjaran-II Mill)

Item No.	Equipment Name	Description	Measurement	Q'ty	Amount	
					Import CIF Jakarta ¥1,000	Local Rp.1,000
	LT Wiring & Control Cable for Blow Room			1 lot		22,000
	LT Wiring for Card	35 sets		1 lot		7,500
	LT Wiring for Drawing Frame	3 sets		1 lot		1,000
	LT Wiring for Roving Frame	1 set		1 lot		500
	LT Wiring for Auto-Winder	3 sets		1 lot		1,600
	LT Wiring for Blower	4 sets		1 lot		5,400
	LT Wiring for Compressor	1 set		1 lot		1,000
	Main Cable of Finishing Sec.			1 lot		10,000
	Lighting Work	for Preparatory Section		1 lot		5,000
		for Ring Spinning Section		1 lot		12,500
		for Finishing Section		1 lot		5,000
						22,500
	Total					71,500

	Ex-Go price (¥1,000)	FOB price (¥1,000)	CIF price (¥1,000)	Local procurement price (RP1,000)
Spinning facilities				
First Mill	2,674,876	2,695,072	2,758,011	
Second Mill	631,827	633,239	641,261	
Total	3,306,703	3,328,311	3,399,272	
Utility facilities				
First Mill			278,700	1,076,200
Second Mill			11,600	100,000
Total			290,300	1,176,200
Electrical facilities				
First Mill				1,197,385
Second Mill				71,500
Total				1,268,885
First Mill total			3,036,711	2,273,585
Second Mill total			652,861	171,500
Banjaran total			3,689,572 (Foreign cost)	2,445,085 (Local cost)

1) CIF price of spinning machinery and supplies

Spinning facilities are assumed to be imported from Japan. The conversion from the ex-godown price and the FOB price and the CIF price is as follows:

[FOB price] Ex-godown price + Shipping charges

First Mill ¥2,674,876,000 + ¥20,196,000 = ¥2,695,072,000

(5,049 m³(178,315 cft) ×¥ 4,000 = 20,196,000)

Second Mill ¥631,827,000 + ¥1,412,000 = ¥633,239,000

(353 m³(12,470 cft) × ¥4,000 = ¥1,412,000)

Total ¥3,328,311,000

[C&F price] FOB price + Maritime transport charges (Japanese ports to Jakarta)

First Mill ¥2,674,876,000 + ¥69,550,000 = ¥2,744,426,000

(5,049 m³ × US$100 × 137.75 = ¥69,550,000)

Second Mill ¥633,239,000 + ¥4,863,000 = ¥638,102,000

(353 m³ × US$100 × 137.75 = ¥4,863,000)

Total ¥3,382,528,000

[CIF price] C&F price + Marine insurance premium

(C&F × 110% × 0.45%)

First Mill ¥2,744,426,000 + ¥13,585,000 = ¥2,758,011,000

(2,744,426,000 × 110% × 0.45% = ¥13,585,000)

Second Mill ¥638,102,000 + ¥3,159,000 = ¥641,261,000

(¥638,102,000 × 110% × 0.45% = ¥3,159,000)

Total ¥3,399,272,000 ... Foreign cost

2) Customs clearance charges and inland transport charges

Rates for unloading, customs clearance, and on-ground transport after the arrival of machinery and supplies beyond the Jakarta Port will be as follows:

In-port work/shipping broker commissions	Rp6,000/F.Ton
Customs clearance commissions	Rp2,000 "
Transport charges (Jakarta Port - Bandung)	Rp35,000 "
At-site unloading charges	Rp4,000 "
Secondary transport charges	Rp9,000 "
	Rp56,000/F.Ton

Expenses for each mill, calculated through the application of these rates, are as follows:

First Mill	Spinning machinery/supplies measurement	178,315 cft
	Utility "	40,300 "
	Total	218,615 "

218,615 × 1/40 × Rp56,000 = 306,061 Th.Rp

Second Mill	Spinning machinery/suppliers measurement	12,470 cft
	Utility	300 "
	Total	12,770 "

12,770 × 1/40 × Rp56,000 = 17,878 Th.Rp

Total Rp323,939 Th.Rp ..... Local cost

3) Insurance premiums

The insurance to be effected during the construction period is the construction work (installation) insurance.

(Facilities and supplies cost + Maintenance expenses + Installation expenses x 0.2%)

First Mill Facilities and supplies cost

43,073,915 Th.Rp (¥3,036,711,000) + 2,273,585 Th.Rp

Custom clearance & inland transportation charge 306,061 "

Installation expenses 2,460,401 "

Total 48,113,962 Th.Rp × 0.2% = 96,228Th.Rp

Second Mill Facilities and supplies cost

9,260,440 Th.Rp (¥652,861,000) + 171,500 Th.Rp

Custom clearance & inland transpotation charge 17,878 "

Installation expenses 553,335 "

Total 10,003 Th.Rp × 0.2% = 20,006 Th.Rp

Construction insurance total 116,234 Th.Rp ...

Local cost

Total price of the machinery and supplies to be procured

55,219,613 Th.Rp

(Breakdown)	First Mill	Second Mill
Price of machinery & supplies	¥3,036,711,000 (43,073,915 Th.Rp) ¥2,273,585 Th.Rp	¥652,861,000 (9,260,440 Th.Rp) 171,500 Th.Rp
Customs clearance expenses & inland transport expenses	306,061 Th.Rp	17,878 Th.Rp
Insurance premiums	96,228 Th.Rp	20,006 Th.Rp
Total for First Mill 43,073,915 Th.Rp 2,675,874 " 45,749,789 "		.... Foreign cost .... Local cost
Total for Second Mill 9,260,440 Th.Rp 209,384 Th.Rp 9,469,824 "		.... Foreign cost .... Local cost

Total of the two mill	52,334,355 Th.Rp	.... Foreign cost
	2,885,258 "	.... Local cost
	55,219,613 "	

(3) Pre-Operational Expenses (Installation Expenses)

1) Labor expenses

	Manager	Super-visor	Assistant super-visor	Foreman	Worker	Total
[Clerical sector]						
General Affairs Dept.	1	2	4	2	35	44
Personnel Dept.	1	3	5	4	22	35
Health Dept.	1	-	1	-	5	7
Finance Dept.	1	5	6	2	18	32
[Engineering sector]						
First Mill	1	6	21	31	467	526
Second Mill	1	6	21	31	313	372
Utility	1	4	9	23	42	79
Planning & Control	1	3	4	1	2	11
Sub-total of two sectors	8	29	71	94	904	1,106
Mill manager						1
Total	8	29	71	94	904	1,107

Labor expenses for 526 production staff members of the First Mill during the construction period are calculated as follows:

Manager @ 550,448 × 1.1 × 1 person × 18 months = 10,899 Th.Rp

Supervisor @ 415,380 × 1.1 × 6 persons × 18 months = 49,349 Th.Rp

Assistant supervisor @ 232,112 × 1.1 × 21 persons × 18 months = 96,512 Th.Rp

Foreman @ 172,900 × 1.1 × 31 persons × 18 months = 106,126 Th.Rp

Worker @ 131,408 × 1.1 ×467 persons × 18 months = 1,215,077 Th.Rp

Sub-total 1,477,963 Th.Rp

Source: Income & Facilities For PTIS I Personnel

The average salary was set at the amount derived by multiplying the average of total hierarchal salaries and fringe benefits of the entire Sandan I Mill (fiscal 1990/91) by 1.1.

As for the Department Manager, who is missing from this table,the 1990 figure at Banjaran Mill was used as the standard.

For a worker (operator), the average for an organic operator and control operator is adopted.

Although the appropriate number of the Second Mill staff is 372, the addition of installation personnel is considered as follows (30 persons).

Supervisor @ 415,380 × 1.1 × 2 persons × 18 months = 16,449 Th.Rp

Assistant supervisor @ 232,112 × 1.1 × 3 persons × 18 months = 13,787 Th.Rp

Foreman @ 172,900 × 1.1 × 5 persons × 18 months = 17,117 Th.Rp

Worker @ 131,408 × 1.1 × 20 persons × 18 months = 52,038 Th.Rp

Sub-total 99,391 Th.Rp

Labor expenses for 342 operating staff members of the Second Mill, other than the aforementioned installation staff, are not included in the construction cost, since they are engaged in ordinary operations.

As for 209 employees in the clerical sector, utility, and Planning and Control Dept., after allotted to the Second Mill for its ordinary operations in accordance with the share of the mill personnel in the two mills, the remaining personnel are assigned to two mills based on the aforementioned installation staff ratio of two mills, with their salaries added to the labor expenses classified under installation cost.

Mill manager @ 810,213 × 1.1 × 1 person × 18 months = 16,042 Th.Rp

Manager @ 550,448 × 1.1 × 6 persons × 18 months = 65,393 Th.Rp

Supervisor @ 415,380 × 1,1 × 17 persons × 18 months = 139,817 Th.Rp

Assistant supervisor @ 232,112 × 1.1 × 29 persons × 18 months = 133,279 Th.Rp

Foreman @ 172,900 × 1.1 × 32 persons × 18 months = 109,549 Th.Rp

Worker @ 131,408 × 1.1 × 124 persons × 18 months = 322,633 Th.Rp

Sub-total 786,713 Th.Rp

786,713 − (786,713 × 402 / 1,200) = 523,164

× 526/556 = 494,936 Th.Rp .... Allotted to the First Mill

× 30/556 = 28,228 Th.Rp .... Allotted to the Second Mill

In addition, 400 Th.Rp/person/year are allotted as various kinds of allowances and employee tax.

	Direct personnel	Indirect personnel	
First Mill	(400 × 1.5 × 526 persons)	+ 118,634	= 434,234 Th.Rp
Second Mill	(400 × 1.5 × 30 persons)	+ 6,766	= 24,766 Th.Rp

Total labor expenses

First Mill 2,407,133 Th.Rp

Second Mill 152,385 Th.Rp

Banjaran Mill Total 2,559,518 Th.Rp

2) Utility Costs during the construction period

	Electric power	Water	Fuel
Estimated consumption	3,655,000 KWH	100,000 m³	15 kl
Expenses	374,560 Th.Rp	10,000 Th.Rp	3,750 Th.Rp
Basic rates	(82,160 Th.Rp)		
Specific rates	(292,400 Th.Rp)		

Total utility costs 388,310 Th.Rp ... Local cost

When assigned to each mill, they are as follows:

First Mill Th.Rp 349,479

Second Mill Th.Rp 38,831

3) Raw material expenses for trial operation

It is assumed that the volume equivalent to 0.5 month portion of the normal operational level will be consumed astrial operation adjustment.

First Mill Cotton : Annual consumption volume 9,988,000 LBS

Of which, M+ for 40-blended cotton

8,148,000 LBS x $0.75 x 1,954 × 0.5/12 = 497,537 Th.Rp

Of which, SM for 60-blended cotton

1,840,000 LBS × $1.20 × 1,954 × 0.5/12 = 179,768 Th.Rp

Total cotton price 677,305 Th.Rp

Polyester: Annual consumption volume 690,000 kg

× Rp2,200 × 0.5/12 = 63,250 Th.Rp

Total raw material cost for No.1 Mill

740,555 Th.Rp