CHAPTER 6 TECHNICAL DIAGNOSIS OF MEDARI MILLS

6.1 Production Equipment

6.1.1 Spinning Division

- Twenty-six years have rolled since 1960, when Medari Mills was completely constructed and started and machines were made in 1959. In 1971, a partial expansion of its equipment was made and the renovation such as remodelling of roller parts also took place.

- Considering the quality of yarn, however, it is believed that it will be indispensable for Medari Mills to make further technical improvement including the replacement of parts throughout the Division.

- Status of the existing machines are reviewed as follows:

6.1.1.1 Opening/Picking Machines
(Howa-made; partly Ohshima-made)

- Recently, various kinds of effectively-running machines in opening and picking process have been developed to the extent that a machine arrangement for increasing effects of opening and dust-blowoff without any fibre damage.

- The existing line of machineries arranged is:

1) Howa line (1959) 2 lines x 2 pickers

3 B.B.O - L.C - H.O - 1st S.C.C - 2nd S.C.C - H.M -

D.B.O - T.D $\lessgtr$ H.F - S.B.O - L.M / H.F - S.B.O - L.M

2) Ohtori Howa (1978) 1 line x 1 picker

C.L - H.B.B - H.M - S.C.C - D.B.O - H.F - S.B.O - L.M

D.B.O	:	Pocupine beater and 3 Kirschner beater
S.B.O	:	3 Kirschner beater
B.B.O	:	Blending bale opener
L.C	:	Lattice conveyor
H.O	:	Hopper opener
S.C.C	:	Superior cotton cleaner
H.M	:	Hopper mixer
D.B.O	:	Double beater opener
T.D	:	Two-way distributor
H.F	:	Hopper feeder
S.B.O	:	Single beater opener
L.M	:	Lap machine
C.L	:	Clipper Lattice
H.B.B	:	Hopper bale breaker

- In case S.C.C (Superior cotton cleaner) stands at one(1) point, the line in 1959 corresponds to 5 points; that in 1978: 4 points. Therefore, it is advisable to employ the 4-point line in processing SJV or Australian cotton etc., with comparatively fewer impurities, and using the 5-point line, on the contrary, in processing Pakistan cotton, etc.

- It is also advisable to adjust the angle of grid bar and revolutions of hone cylinder taking a look at lap conditions, because S.C.C, may get fibres twisted and open fibres insufficiently sometimes.

- There were a lot of bend of grid bar with unevenness of alignment. So, it will be necessary to improve this. Further, there was a grid by wire at the place connecting between grid bars, where cotton got clogged too much. It is advised to carry out early and periodical cleaning on this part.

- Next, it was found that the pin of Kirschner beater got dropped off and bent and that the bend itself kept holding fibres, which could produce a bad effect on beating function.

- It was also visible that the side of Kirschner beater of double beater opener in the 1959-line was the perforated plate where cotton became clogged so much. It is believed that grid bar will function better.

- Judging from all the data collected, it is considered that there is no problem of lap produced in No.1 Scutcher, because its CV% of gram/meter was 1.57-1.99%. On the contrary, lap made in Nos. 2, 3, and 4 Scutchers seems undesirable from its quality viewpoint, because its CV% was more than 2.0%.

- Seeing that lap is an initial product in the spinning process and that its defect places undesirable effect on yarn eventually, Study Team suggests improving each sets of machines therein.

- Major points are enumerated as follows:

  - Normalization of grid bar of superior cotton cleaner
  - Normalization of pin and remodelling of grid bar belonging to Kirschner beater

- It seems that from the status of lap turned out, effects of cleaning and tuft opening in the opening and picking process are comparatively low. Especially, in processing Pakistan cotton having numerous impurities, it can not be expected to raise

cleaning effect in the existing machinery.

- Besides, two sets of superior cotton cleaners are installed in series in the existing machinery arrangement. It is considered that the said superior cotton cleaners should be reduced to one set, because those get fibres twisted as referred to previously, and that necessary arrangement for increasing the cleaning effect be also made.

Condition of Inferior - Lap Occurrence

- Lap is now weighed with a dial scale. Target value of its control is as below:

Cotton mixing	A and B:	17.24 kg ± 250 gr
Cotton mixing	C and D:	17.64 kg ± 250 gr

- Its actual records as against the target value concerned are as the following: There is a little inaccuracy due to the precision scale and dispersed weight of lap rod. The term of data collection was 26 days from June 2, 1986 through July 9, 1986.

Table 6-1 Lap Rejected

Machine Nos	1	2	3	4
Cotton mixing	A	C	B	D
Number of lap rejected	6	22	2	5
Rejected lap %	0.2	0.5	0.06	0.1

Source: MEDARI

- The percentage of rejected lap shown above may fail in indicating the correct numerical value due to incorrect records of the number of lap produced. As the tendency, however, the fact that there were a lot of rejected lap from No.2 scutcher can not overlooked.

- Regarding CV% of lap (gr/m), its comment can not be made appropriately, because of absence in its periodical test.

- Data obtained in a short space of time, however, shows that No.1 was 1.64%; NO.3: 2.11%; No.4: 2.17%. (No.2: no data available due to its operation stoppage). It is observed that there is no problem in machines installed in 1978, that is, No.1 and that Nos. 3 & 4 (assumably similar to No.2) should be remodelled.

6.1.1.2 Carding Frames (Howa-made CM Type: 108 sets)

- It seems very difficult to put 108 sets of Cards under control successfully. With low production partly caused by idle spinning frames at present, doffers run slowly at 11 RPM with 14" can card, and at 10 RPM with 20" can card. It is afraid that there will be few troubles with its quality such as nep in case of slow speed.

- High-speed cards have widely been adopted on a worldwide scale, those days. Approach to semi-high production by means of remodelling the existing machines enables spinners to increase productivity without any deterioration of its quality, and to lower the cost of repair caused by energy-saving.

- Major points of remodelling above are:
  Adoption of Pre-tuft-opening device, doffing roller and coiler motion for 20" cans only for machines not yet remodelled.

- If practiced as above, sufficient production will be maintained with Cards of 50 sets, even taking increasing production into consideration in the future.

- Drawbacks of the existing Cards are in a lot of damaged parts of M.C.C wire, too long distance between a setting screw for flat bar and chain hole, and rusted screws seen, all of which may lose smoothness one another.

- It is found the tip of taker-in wire of Cards under maintenance worn away, rounded, and stripped. It is necessary to keep the tip of taker-in wire sharpened, because of its effective functioning for dust elimiantion particularly required for processing Pakistan cotton which includes many foreign matters.

The following auxiliary machines are in use, which are quite obsolete. Study Team considers it necessary to replace a flat grinding machine with the new one.

- M.C.C Mounting Machine
- Flat Clipping Machine
- Taker-in Mounting & Griding Machine
- Flat Griding Machine
- Chain Washing Machine

- After polishing flat wire, its guage of R/L sides measured within 2/100mm with a dial gauge, being Kept in good conditions. It is recommended that staff concerned will measure gauge not only R/L sides, but also its central part.

- Flat wire has seemingly been polished once per 10 months. Judging from the current speed of flats, it is considered appropriate.

6.1.1.3 Comber

- Pre-drawing frames and lap formers are satisfactory. But, there is a problem with the cleaning function of cylinders in combing machines. That is, the existing cylinders are of spiral wire-brush type which are liable to hurt the tip of UNICOMB wire and waste fibre piled up in the implanted part of wire brush may produce an effect on its cleaning result.

- Accordingly, it is suggested to switch to Tampico Hair Type or Piano-Wired Tampico Hair Type.

- In feeding method of lap, 4-step method is being adopted now. It is advised to adopt 2-step output method to prevent the tied part of lap from getting thick and eliminating the connected part of lap at its place of turning into sliver.

6.1.1.4 Drawing Frames

- Regarding drawing frames (Hara-made 3 Delivery x 20 diameter) preparatory for the combing process and post-drawing frames (Hora-made 4 Delivery x 20 diameter, 2-passage x 2 sets), it is planned to use those after practicing re-maintenance of them, but it is recommended to replace all sets of drawing frames of 6 delivery and to change from those of 3-passage into those of 2-passage for simplification.

- The main reason lies in the fact that the 2-passage type is normal from the angle of fibre hook, in case the roving process is changed to much the simplified process.

Note: - Fibre forms the hook-looking shape on the card process. At each passage of this hook through the following process either the front-end hook (⊂—) or the rear-end hook (—⊃) is left in turns.

- It is necessary to feed the rear-end hook eventually to the draft part of spinning frames, because of smooth drafting and of preventing from the unevenness of yarn. There is no problem of this kind after the passage through the combing process, since such hooks almost go out then.

6.1.1.5 Roving Frames

- 8 sets of roving Frames of Howa RM-100 type made in 1972 and 1980 will be able to be in use for the time being. Those small packages of 12" lift x 5" diameters are considered not suitable.

- The roller parts consist of 4 sets of 4 over 4 system and 4 sets of 3 over 3 system. It might be preferable to adopt rather than 3 over 3 system as referred to CHAPTER 7.

- 2 sets of Roving frames of Howa RM-5 and 8 sets of those of Howa RM-3 are of the 3 over 3 system. Due to those bottom apron of long type, front under clearers are of fixed type, which cause a lot of troubles.

- As shown in Fig. 6-1 below, clearer waste accumulated in front and rear parts of stational cleaners for front bottom makes the traverse motion of collectors difficult.

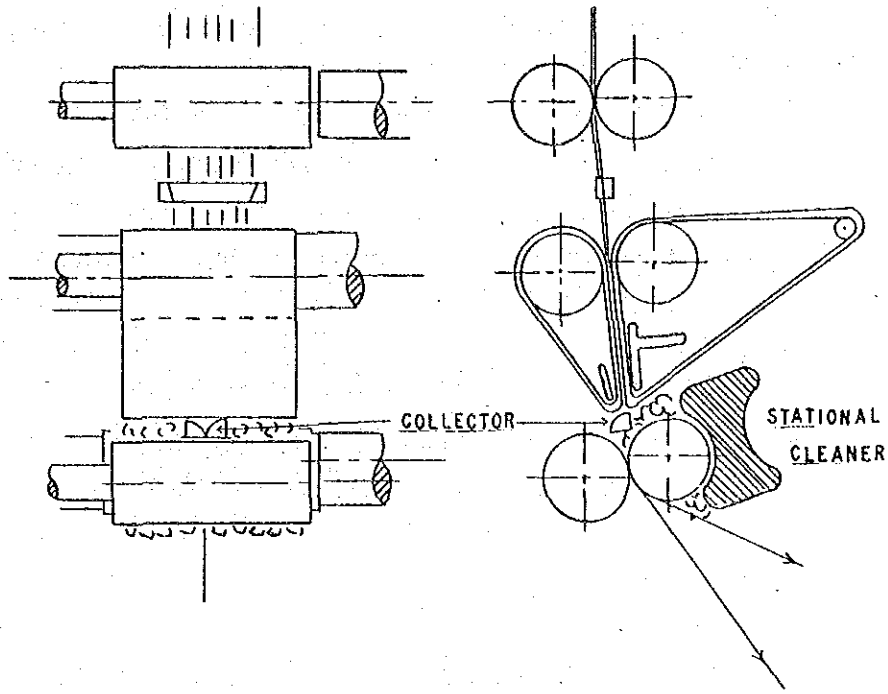


Fig. 6-1 Draft Part of Roving Frame

- Such a condition leads to the unevenness of roving and its quality deterioration. It happens that clearer waste in the forepart of front bottom roller flies onto roving, which causes slub yarn or yarn break. To avoid such, what can be done is only to clean clearers at an early stages.

- As a basic solution, Study Team finds it advisable to change bottom apron into short type and also replace top clearer with armence clearer.

- There is no specific problem with the running part functioning under low revolution. It is necessary, however, to replace it with the new one, taking years of its use into consideration.

- It finds needful to unify creels, because 20" can of drawing frames has been widely in use. It is advisable to take a positive method at guide rollers.

- Seeing that there were damaged parts in top roller alignment of roller part here and there and that some of them became absolete, it is advisable to plan partial replacement.

6.1.1.6 Ring Spinning Frames

- Creels of S.F & H.S Model are of skewer type. Due to its gradient and irregular resistance of skewer bottom, mal-drafting takes place when sliver comes out, which resorts to the unevenness of yarn.

- Study Team wants to work out the renovation scheme in line with an alteration to hanger type, because the said type helps prevent draft unevenness and spin into yarn of high uniformity.

- S.F Model frame (400 spls x 41 sets) employ Nitto-type arm. It is necessary to switch over to SKF arm and also to bearing of bottom rollers neck.

- Rings and spindles of running part are important components having bearing on yarn break and yarn quality. Unless those replacement takes place gradually with checking their lives and wornout condition, their running status becomes out of order.

- The longevity standard of rings, being different according to R.P.M of spindle, kind of fibre and yarn count though, is considered roughly to be 2.5-3 years for cotton yarn of coarse count and 3-4 years for that of middle and fine count. With this view in mind, it is considered preferable to make those replacement in order.

- It was found that some of S.F Model had been left idle for about 3 years and that oxidized film of oil sticked to the surface of spindles and those bottom became round, to the extent of fairly uneasy normal operation. Replacement of those obsolete spindles should be effected.

- S.F & H.S Model of 71 sets are of tin roller type. The maintenance of those tin rollers necessitates high technique. So they are almost out of use being replaced with Tin Pulley Type today. This type brings an energy-saving effect, and a air stream arisen by its revolution is less than that by the revolution of Tin Roller Type, leading to the remarkable decrease of yarn break and defects of cotton flying into yarn.

- Each main motor of those of S.F & H.S Model is of exposed type, the capacity of which is only 9 kW. At present, it is fixed as 8,840 RPM. Study Team finds it feasible to increase up to 10,000 RPM after replacement of running part.

- It was revealed that cotton fibre wrapup around botton roller of roller part. Its spiral sticking to front bottom roller helps spin into thin yarn and that to back bottom roller facilities the making of thick yarn reversely. It is obligatory to do periodical check and cleaning, seeing that such a phenomenon is liable to raise CV% of yarn count and to lower yarn quality eventually.

- Damaged parts of apron were also visible not a few. It is also necessary to replace them, because those could cause cotton fibre sticking thereto.

- Spindle tape now in use consists of urethane and cotton tapes in a mixed way. Due to different slip rate, its uniformed use is required. Study Team finds it advisable to adopt the urethane type producing energy-saving effects.

6.1.1.7 Winders

- The main purpose for using winders is not only in the formation of cheese with yarn rewinding, and but also in eliminating yarn defects. This is never negligible in any case.

- There are mechanical and electric cleaning devices. In order to do more effective cleaning, it is advisable to employ the electronic cleaning device.

- Nowadays, in the selection of modernized looms, first comes the improvement of yarn quality as a requirement, especially, which can eliminate slub yarn and unevenness yarn. Electronic yarn cleaners work effectively to take off such defects. Taking into consideration drum conditions and lowering accuracy of obsolete tension device, even if this device is installed in R.T winder, it cannot expect to achieve its 100% effect, and, therefore, came to the conclusion to adopt auto-winder attached with splicer to meet the needs in the future.

6.1.2 Weaving Division

6.1.2.1 Warpers

- One set of 1959 Kawamoto Industrial Co., made warping machine is scheduled to be renewed to meet requirements for the renewal program of broad width loom shown in the renovation scheme.

- Warp yarn break by cause group is as follows: For information, figures below are analystic results of those mechanical defects.

Table 6-2 Cause of Warp-Yarn Break

	Cause	Yarn break	Ratio (%)
Yarn defect	Weak yarn	7.13	41.1
	Nep	0.20	1.2
	Slub	0.31	1.8
Winder defect	Snarl	0.01	0.1
	Traverse miss	4.00	23.1
	Miss cut	2.05	11.8
	Band wind	1.93	11.1
	Cheese yarn break	0.82	4.7
	Double yarn	0.01	0.1
	Empty cheese	0.87	5.0
	(Total)	17.33	

(Unit) per 495ends x 10,000yd

Source: MEDARI

- Warp-yarn break of 17.33 per 495 x 10,000 yd is extremely higher than the standard warp-yarn break of 2.5. Among them, yarn spot and mechanical defects of winding machines occupy the great portion.

6.1.2.2 Sizers

- 1959 Baba Sangyo-made hot-air sizing machines have been idle for a long span of time due to deteriorated conditions of machines. It is considered advisable to replace them with wide-width sizing machines.

6.1.2.3 Cooking Equipment

- Size cooking tanks to be renewed due to overage condition:

1959 Baba Sangyo-made storage tank of 2 sets; 1974 SUCKER mixing tank of 1 set; cooker of 1 set.

6.1.2.4 Leasing Machines

- 1959 Ishikawa Seisakusho-made long quiller : 88 spls x 3 sets; 1966 Murata Machinery-made pirn winder: 4 spls x 22 sets. It is advisable to renew the above-staged machines due to low productivity, yarn break, and the inferior quality of weft bobbin caused by obsolete machines.

Table 6-3 Efficiency and Yarn Break

Maker	ISHIKAWA	MURATA	SCHERER
Efficiency (%)	66	59	89
Yarn defect (%)	3.06	3.98	1.57
Miss change	4.44	3.52	0.10
Fallout yarn	0.65	0.37	0.10
(Total)	8.15	7.87	1.77

Source: MEDARI

6.1.2.5 Looms

- 27 years have passed since 1959 when looms in No.1 Weaving Mill put into operation, using Howa Mechinery. Since then some of looms were worn out and there were some looms whose automatic weft exchange device were absent, and they have lost their function as automatic looms with a number of yarn break especially, reducing their efficiency to 64.5%.

- On the other hand, 1977 Toyoda-made looms in No.2 Weaving Mill are in the status of being fully usable, those efficiency being 83.5%.

Table 6-4 Cause of Loom Stoppage

Cause \ Loom Nos. of set	HOWA 172	TOYODA 230	Total 402	Stoppage ratio (%) HOWA	TOYODA
Warp yarn break	14	9	23	8.0	3.9
Selvage yarn break	2	-	2	1.2	-
Multi yarn break	6	6	12	3.5	2.6
Filling break	13	10	23	7.6	4.4
Empty bunch	8	3	11	4.7	1.3
Loom out	7	3	10	4.1	1.3
Beam hanging	3	1	4	1.7	0.4
Mechanical trouble	8	5	13	4.7	2.2
Maintenance	-	1	1	-	0.4
(Total)	61	38	99		
Stoppage ratio (%)	35.5	16.5	24.6	35.5	16.5
Efficiency (%)	64.5	83.5	75.4		

Source: MEDARI

- Yarn-break occupies the great portion of stoppage cause. Among them, warp-multi-yarn break and weft-yarn break caused by looms themselves are remarkable in number, which account for inferior maintenance of picking device.

- Study Team finds that mal-function of Howa-made automatic looms caused by lack of parts of shuttle exchange device lowered those efficiency apparently.

(1) Warp-yarn break by cause
(Toyoda-made looms; Survey: 1 hr)

Table 6-5 Cause of Warp-Yarn Break

Cause \ Nos. of code Sets	BC100 24	KM202 25	KM206 25	KM303 49	(Total) 123	Ratio (%)
Weak yarn	5	14	3	17	39	38.5
Slub	1	1	1	1	4	4.0
Knot ends	1	2	1	2	6	5.9
Cotton fly	4	4	5	8	21	20.8
Bad sheet	1	2	5	3	11	10.9
Shedding m/o	1	1	1	2	5	5.0
Crack of shuttle		1	2	1	4	4.0
Others	1	2	4	4	11	10.9
(Total)	14	27	22	38	101	100
Ends break per 1H x 1 set	0.58	1.08	0.88	0.78	0.82	

Source: MEDARI

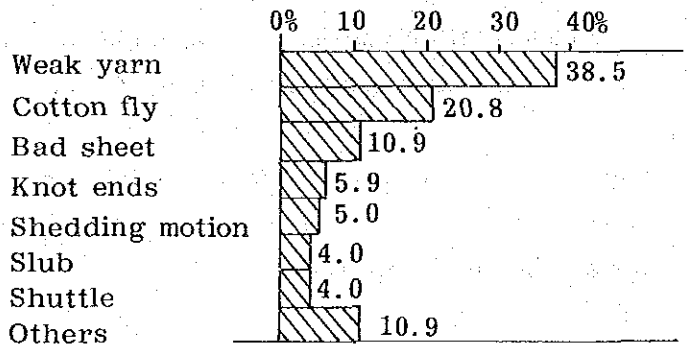


Fig. 6-2 Cause of Warp Yarn Break

- It was found that the present warp-yarn break could be remarkably higher than its standard being less than 0.3 set / hr. It is needful to increase yarn quality in the spinning process to eliminate weak yarn spot occupying the greatest portion.

- Since blown cotton sticking accounts for its readiness at Warper, Study Team finds it necessary to increase cleaning on the lift plate, running out of warper.

- Inferior sheet is caused by cross yarn and missing yarn. So, Study Team also finds it essential to increase yarn quality and operational technique in the warping and sizing process.

(2) Weft yarn break by cause group
(Toyoda looms survey: 1 hr)

Table 6-6 Cause of Weft Yarn Break

Cause \ Nos. of code Sets	BC100 24	KM202 25	KM206 25	KM303 49	(Total) 123	Ratio (%)
Weak yarn	5	4	4	9	22	18.6
Bad shape pirn		4	2	3	9	7.6
Bad bunch	7	3	1	4	15	12.7
Shuttle stop position				3	3	2.5
Bad bobbin	6				6	5.1
Shuttle holder	6		1	5	12	10.2
Cop change m/o	5	5	1	3	14	11.9
Change stop	2	6	3	5	16	13.6
Weft fork				10	10	8.5
Others	1	2	8		11	9.3
(Total)	32	24	20	42	118	100
Filling break per 1H x 1 set	1.33	0.96	0.8	0.86	0.96	

Source: MEDARI

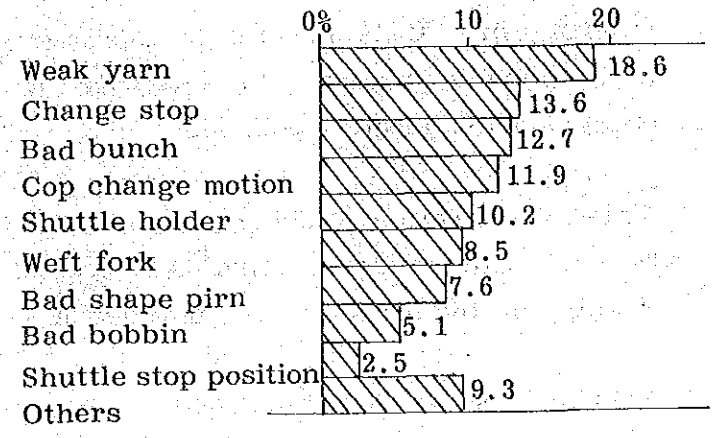


Fig. 6-3 Cause of Weft Yarn Break

- Welf yarn break is remarkably higher than its standard of less than 0.2/hr/set. Weft yarn break is caused by machanical defect of pirn winder, delayed maintenance of packing part of looms, inferior bobbin, and shuttle.

6.1.3 Finishing Division

- Based on technical diagnosis of all the equipment in Finishing Division, Study Team refers to remodelling of production equipment to be adopted and its points of reinforcement in order to keep the quality of Cambric and to maintain the normal operation.

6.1.3.1 Rope Type Continuous Bleaching Range

- The above range consists of 2 sets of J-Boxes and 5 sets of Rope Washers. J-boxes, the main body of bleaching equipment, are nearly in normal condition. While, of the 5 sets of rope washers, one set of them is unable to run, and those 4 sets left are in an abnormal operating condition.

(1) Troubles of D.C Motors

- 2 sets of D.C motors were originally installed in each rope washer, which enable washed cloth to be evenly conveyed to next process.

- It was found that of the 2-set D.C motors in each of 4-set rope washers in operation at Medari Mills, 1 set of D.C motors in each rope washer remained unworkable and that another set kept running only in each rope washer. Therefore, the cloths are washed with high tension.

- Due to overloaded D.C motors under such operation as above, those motors kept running extremely in a critical condition.

(2) Deficient instrumentation

- It was also found that all the meters in the operating panel, showing operating conditions of the bleaching range, were totally out of running. As its operation has been made with operators' sixth sense fostered for ages, so it is no exaggeration to say that "driving by the blind," has been extremely in an abnormal status (speedometer/galvanometer: being idle).

- It is very dangerous that those continuous bleaching ranges have kept running without any aid of such instruments.

- Under such conditions, it is unpreferable by any means to keep those operation from the quality viewpoint, as well as from the standpoint of mechanical safety.

- Fortunately, the present 16-hour operation allows those ranges to be idle for remaining 8 hours, which assumably prevents D.C motors from being worn out, to the great extent.

- It is anticipated that leaving the equipment as it is, some of the 4-set D.C motors keeping operation yet will become unworkable for less than 6 months hereafter.

- Such dangerous operation should be improved as prompt as feasible. It is indispensable to repair/replenish D.C motors, etc., and provide all the instruments completely.

6.1.3.2 Open Width Rapid J-Box Bleaching Range

- 16 years have passed since the above-mentioned ranges were installed. This ranges are in better conditions than rope type continuous bleaching ranges, stated previously. It is considered that the following points should be improved:

(1) Separation of teflon lining in reaction chamber

- Teflon-resin sheets are lined onto the inner part of reaction chamber to assist smooth slippage of cloth to be processed.

- It is observed that a part of teflon-resin sheets got broken and disconnected from reaction chamber, and that accordingly, cloth under processing was hardly moving smoothly in reaction chamber, resulting in uneven scouring and bleaching.

(2) Poor tension control in washing arrangements

- It seems that due to the uneven motion of compensators, its fine adjustment at the start of washing machine can not be made effectively. Imbalance of tension of washing machine keeps those from smooth operation and results in unfacourable quality cloth.

- In the combination of the two factors stated above, such troubles, especially, as uneven bleaching, and cut selvage, are liable to come up in the processing of cloth of high quality, such as Primissima. It is advisable to repair those for maintaining/improving the quality of Cambric.

6.1.3.3 Water Mangle

- The existing water mangles are 15-ton weighed mangles consisting of 3 bowls. Rubber of top rubber rolls was found to be taken off, to the extent that sufficient load could not be placed. Under such circumstances, the water mangles was operating with only one nips with bottom roll. Such operation results squeezing effect of cloth became decreased in lowering the processing speed of dryers in the next process.

- It is preferable to replace those with normal ones so as to enable mangles to fulfill those proper function.

6.1.3.4 Caustic Recuperative Apparatus

- The above apparatus was installed in 1982 for the purpose to have recovered caustic soda from the waste solution of used caustic soda in mercetizing.

- It was found, however, that the apparatus did not function sufficiently as recuperation of caustic soda. The main cause is considered to the insufficient supply of steam volume effective to those functions. That is, the lack of necessary steam volume is caused by improper design of steam piping.

- It is recommended to take a step for the improvement of the piping line for the apparatus, because the recuperation of caustic soda, one of the major chemicals in the Finishing Division, contributes greatly to processing-cost saving.

6.1.3.5 Grey Cloth Preparation Room

- Despite the present production being equivalent to less than 50,000 yd/day at 2 shifts, it was observed that grey cloth was pile onto each pallets everywhere in the finishing mill, to the extent that such piled goods disturbed the general appearance at mill, hampered the transportation flow of grey cloth under processing, and made difficult to feed grey cloth to the next process.

- It was found that reason is the insufficient space of gery-cloth preparation room and also the lack of sewing machines for connecting piece goods. Taking into consideration the increase of production in the future, it is considered that the space of grey-cloth preparation room as the 1st step to the finishing process should be secured at the front part of singeing machines, and that grey cloth should be put in one place together for its preparation and its connection accordingly.

- Furthermore, it is proposed that sewing-machines should be provided exclusively for connecting grey cloth in the grey-cloth preparation room so as to increase working efficiency.

6.1.3.6 Gas Producer

- The above producer had been working effectively in 1960's, when liquefied petroleum gas was hardly available. Today, however, due to its higher fuel cost and its weaker thermal power than those of liquefied petroleum gas, gasoline gas has been replaced with liquefied petroleum gas. From the standpoint of safety, it is recommended to use liquefied petroleum gas instead of using gasoline gas.

- In case of gas singeing machine: unit being capacity of 300,000 kcal/hr, cost comparison between the using of liquefied petroleum gas and the using of gasoline is as follows: It is apparent that liquefied petroleum gas stands more advantageous.

  Gasoline consumption : 38 ℓ/hr (Rp 14,630)
  Liquefied gas consumption: 25 kg/hr (Rp 9,250)
  Gasoline: 10,700 kcal/kg; Sp.Gr.: 0.73; Rp 385/ℓ
  Liquefied gas: Rp 370/kg

- In case using Liquefied Petroleum Gas for gas producer, saving money will be Rp.3,228.000. It is considered that with a small amount of additional equipment cost, switching to liquefied petroleum gas will be feasible and that its investment will be recovered in three years or so.

6.1.3.7 Miscellaneous Matters

- It is advisable to replenish more or less spare parts for maintaining the primary functions of the equipment, as well as those of heat exchanger belonging to starching stenter and of stenter clip.

6.2 Utility Facilities

- It is found that the maintenance of diesel generators and boilers among Utility Facilities in Medari Mills are extremely fine, as if there are new ones replaced since 1960, the year of installation. Results of survey of each facilities are as under:

6.2.1 Electric Installation

- By the time Medari Mills was established, it is found inevitable to have been dependent on non-utility generation due to the absence of electric-supply network. It seems that as power supply plays its major role in their operation, their sufficient maintenance for such has been made. Because of this, the present condition of generators including diesel engines is quite satisfactory in maintenance in spite of the long passage of 26 years.

6.2.1.1 Generators

Generators have been well maintained, replacement of demaged parts has also properly been made, the sound of running being normal.

- It was found necessary to do the ordinary check of cooling tube, because of high-iron content found in cooling water attached therein.

- It is considered that the high volume of lubricant consumption accounts for its leakage due to malfunction in the lubricant line. Further check will be required.

(1) Specification of generators

Table 6-7 Data of Generators

No.	Maker	Model	Capacity	Ampere	Power Factor	Hertz (HZ)
1	AEG	DK BL	1,210 KVA, 1,050 KW	1,732	0.8	50
2	AEG	DG 144/16	1,000 KVA, 800 KW	1,443	0.8	50
3	AEG	DG 144/16	1,000 KVA, 800 KW	1,443	0.8	50
4	AEG	DG 144/16	1,000 KVA, 800 KW	1,443	0.8	50
5	AEG	DG 144/16	1,000 KVA, 800 KW	1,443	0.8	50
6	AEG	DK BL	1,210 KVA, 1,050 KW	1,732	0.8	50

Source: AEG

Table 6-8 Data of Diesel Engine

No.	Maker	Model	Capacity	R/M	Number of Cylinder	Fuel L/H	Lubricant L/H
1	MAN	G6V 30/45 ATL 1978	1430 PK 1050 KW	500	6	250	$500^{L}/400^{H}$
2	MAN	G8V 30/45 MA 1960	1115 PK	375	8	210	$600^{L}/400^{H}$
3	MAN	G8V 30/45 MA 1960	1115 PK	375	8	210	$600^{L}/400^{H}$
4	MAN	G8V 30/45 MA 1960	1115 PK	375	8	210	$600^{L}/400^{H}$
5	MAN	G8V 30/45 MA 1960	1115 PK	375	8	210	$600^{L}/400^{H}$
6	MAN	G6V 30/45 ATL 1979	1430 PK 1050 KW	510	6	250	$510^{L}/400^{H}$

Source: MAN

Remarks: PK : Peak Kilowatt

MAN : MASCHINEN FABRIK AUGSBURG NURNBERG AG

AEG : TELEFUNKEN

(2) Records of oil consumption

Oil consumption of generators listed above is as follows:

Table 6-9 Consumption of Fuel and Lubricant

No.	Year	KW	Lubricant (L)	Lubricant (L/KW)	Fuel (L)	Fuel (L/KW)
1	1982	19,729,810	92,395	0.0047	5,815,287	0.29
2	1983	13,781,445	71,725	0.0052	4,246,430	0.31
3	1984	11,282,168	58,392	0.0052	3,429,370	0.30
4	1985	5,303,020	30,220	0.0057	1,750,440	0.33
5	Average	-	-	0.0052	-	0.31

Source: MEDARI

Comparison between oil consumption calculated from makers' specification and the actual consumption is as below:

Table 6-10 Comparison Table of Oil Consumption

	Model	Fuel (L/KW)	Lubricant (L/KW)
Calculated Figure by Specification	MAN 6V 30/45 ATL	0.24 *1	0.0012 *2
	MAN 8V 30/45 MA	0.26	0.0019
Weighted Average (A)		0.25	0.0017
Actual Figure (B)		0.31	0.0052
B/A x 100%		124	330

Remarks: *1 250 L/1,050 kW = 0.24 L/kW in Table 6-7

*2 1,500 L/400 H) / 1,050 kW = 0.0012 L/kW in Table 6-8.

- At present, consumption ratio of fuel oil is 24%; that of lubricant: 230% over that indicated in related specification. Its efficiency is found to be lower.

(3) Electric cost of generators

- Monthly cost of generators from January to March, 1986 is indicated in Table 6-11:

Table 6-11 Cost of Electricity (1986)

Unit: Rp.

	Jan.	Feb.	Mar.
Fuel & lubricant	67,897,787	69,597,562	68,121,052
Misc.	226,955	236,681	271,030
Labour	5,221,858	5,221,858	5,221,858
Total	73,346,600	75,056,101	73,613,940
kW	900,710	916,000	865,460
Cost (Rp/kW)	81.43	81.94	85.06

Source: MEDARI MILLS

The cost of electricity per kWh is 82.81 Rp in simple average.

(4) Electricity supply of PLN (State-run Power Corp.)

- PLN's capacity of electric power equipment as of March, 1984 was 6,127 megawatt. Other than above, there are, what is called, non-utility generation installations amounting to 3,300 megawatt.

Current status of high tension grid controlled by PLN is shown in Fig. 6-4.

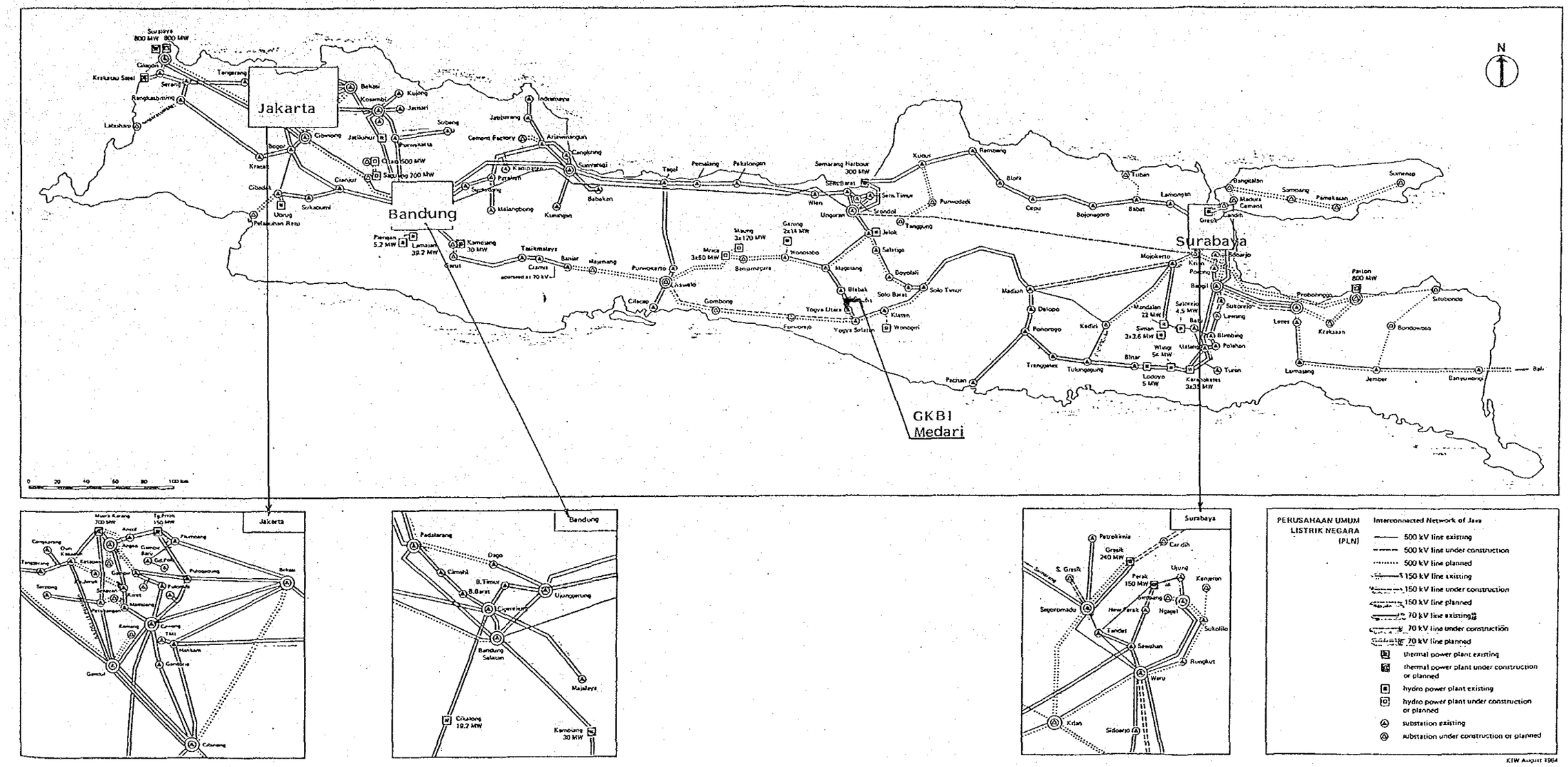


Fig. 6-4 High Voltage Grid in Indonesia

- With enlarging PLN's net of power supply, however, the plan goes to switch from such non-utility generation over to PLN's grid and facilities, gradually. Imports of genarators for non-utility generation have already been banned in Jakarta district.

- According to the long-term plan made by PLN, it is scheduled to increase hydraulic power about 5 times; thermal power by 20%; diesel power 7 times; geothermal power 15 times, over the present capacity respectively; to decrease gas turbine power slightly (1993/94 target).

- The ruling power rate fixed at PLN is shown in Table 6-12. The rate is fixed by 17-item groups of power use. The calculation basis of power rate is power acceptance capacity and the volume of electric power consumed.

- In case of Medari Mills, the volume of electric power to be used after the renovation will stand at 9,520 kVA, as shown in Line No.14 of Table 6-12. corresponding to Rp 61.13/kWh.

- In the event of switching to power supply from PLN, the investment to be needed amounts to Rp 1,963,473,000. When the fixed-amount method of depreciation for 7 years is adopted in this investment, the amount occupied in the cost stands at Rp 5.19/kWh.

- Labour cost is Rp 0.38/kWh and repair cost: Rp 0.07/kWh. So the total cost is estimated at: Rp61.13 + Rp5.19 + Rp0.38 + Rp0.07 = Rp66.77/kWh. Therefore, it is expected that Rp66.77/kWh above shows about 20% decrease than the cost of non-utility generation supply of Rp 82.81/kWh.

Table 6-12 Table of Tariff Schedule 1984

(Effective: March 1984)

US.$ 1 = Rp 1,000.-

No	Code of Tariff	Contracted Power	Demand Charge Rp/kVA	Energy Charge Rp/kWh	Projected Average Revenue Rp/kWh
1	S_1	to 200 VA	*)		
2	S_2	250 VA to 200 kVA		43.50	60.57
3	R_1	250 VA to 500 VA	2,100	70.50	85.19
4	R_2	250 VA to 2200 VA	2,100	84.50	98.41
5	R_3	2201 VA to 6600 VA	3,680	126.50	156.42
6	R_4	6601 VA & Over	3,680	158	184.10
7	U_1	250 VA to 2200 VA	3,680	134	160.10
8	U_2	2201 VA to 200 kVA	3,680	150	185.73
9	U_3/MV	201 kVA & Over	2,300	P=158 OP= 99	123.17
10	U_4		-	307	307
11	I_1	Up to 99 kVA	2,300	P=106 OP= 66	93.97
12	I_2	100 KVA to 200 kVA	2,300	P=100 OP=62.50	85.51
13	I_3/MV	201 kVA & Over	2,100	P=96.50 OP=60.50	75.88
14	I_4/HV	5000 kVA & Over	1,970	P=81.50 OP=52	61.13
15	G_1	250 VA to 200 kVA	3,680	96	120.86
16	G_2/MV	201 kVA & Over	1,970	P=99 OP=65	84.92
17	J	-	-	76.50	76.50
		Average			98.315

*) Tariff S_1 : 100 VA = Rp 2,510.-/month
150 VA = Rp 3,765.-/month
200 VA = Rp 5,025.-/month

Note : P = Peak Hours (18.00 - 22.00)
OP = Off Peak Hours (22.00 - 18.00)

Source: PLN

6.2.2 Boiler Equipment

6.2.2.1 Specification of Boilers

Table 6-13 Data of Boiler

	Maker	Year Made	Fuel (L/H)	Capacity (kg/H)	Max. Pressure (kg/cm^2)
1	STANDARD KESSEL	1960	150	3,780	10
2	STANDARD KESSEL	1960	150	3,780	10
3	STANDARD KESSEL	1970	120	2,500	10
4	STANDARD KESSEL	1970	120	2,500	10
			(Total	12,560)	

Source: STANDARD KESSEL

Although some of boilers are still in use for twenty-five years, the maintenance of them looks apparently fine.

6.2.2.2 Cost of Steam

Cost of steam investigated during field survey is shown in Table 6-14.

Table 6-14 Cost of Steam

	1986		
	JAN	FEB	MAR
Fuel (RP)	33,233,061	33,453,792	28,202,461
Cost of Others	1,001,250	1,040,449	1,063,823
Cost of Wage	456,250	456,250	456,250
Total	34,690,562	34,950,491	29,722,534
Steam (TON)	1,887.22	1,972.35	1,670.69
Cost (Rp/TON)	18,381.83	17,720.23	17,790.57

Source: MEDARI

- It is apparent that the fuel cost for producing steam amounts to 17.15 Rp/kg in average. While the fuel cost per 1kg of steam calculated (consumption figured out from Table 6-13 multiplied by the fuel cost of 242 Rp/ℓ) is 10.6 Rp/kg. It shows that the actual steam cost is 1.6 times higher than theoretical value, indicating lower burning efficiency.

- It was found that the capacity of softeners for boiler feed water was insufficient and that as clarified in Table 6-15, its total hardness shown in the water test was 102 mg/ℓ. It will be necessary to decrease hardness value less than the normal hardness of 60 mg/ℓ.

- It was also found that the decrease of its hardness was being made by using a lot of cleaning agent. Necessary is to keep softeners in sufficient maintenance, because such a continuous condition accelerates the deterioration of the inner part of boiler.

- It is advisable to preserve steam with the header once, then, to supply it to each section separately, in order to lessen the fluctuation in the volume of steam used in the finishing mill.

6.2.3 Water Treatment Equipment

Existing raw water treatment equipment in Medari Mills are shown in Fig. 6-5.

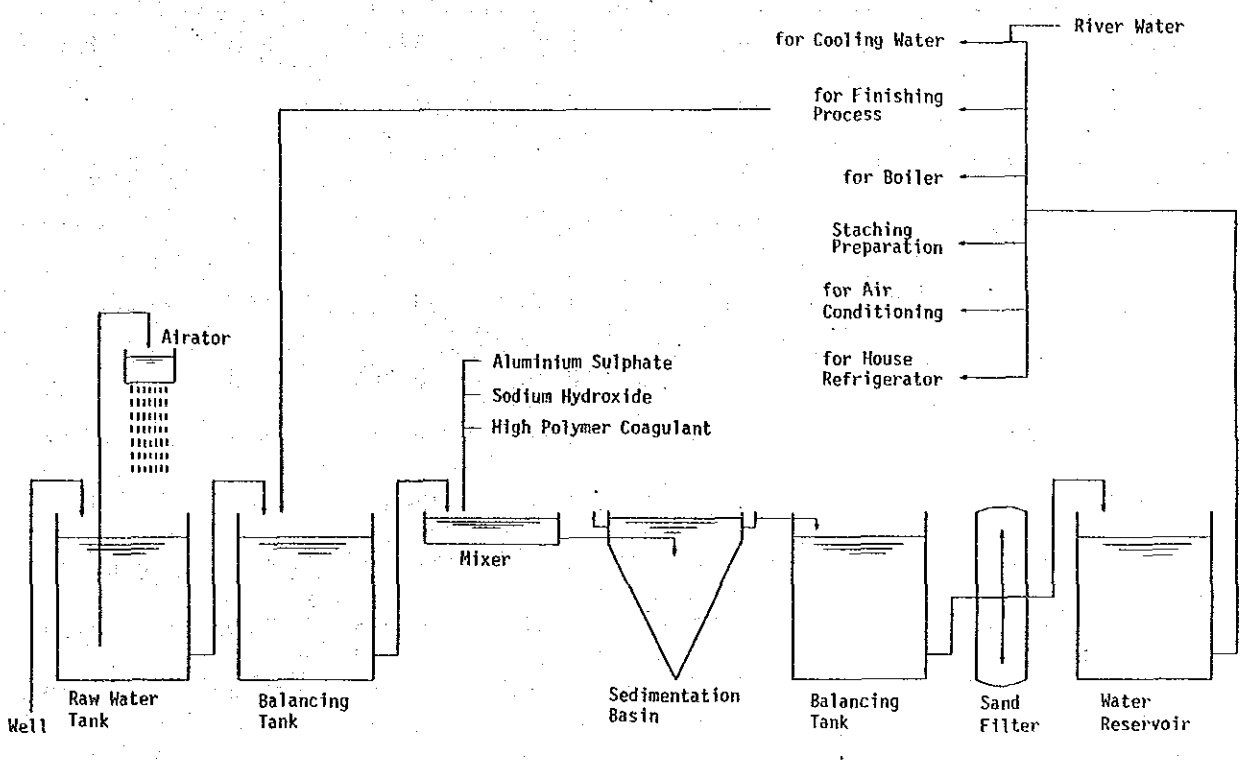


Fig. 6-5 Flow Sheet of Water Treatment

Study Team brought a portion of water in question back to Japan and underwent the quality test. Its results are shown in Table 6-15 as under:

Table 6-15 Results of Water Quality Analysis

	Sample A	Sample B	Sample C	Sample D	Sample E
PH value	7.1	6.9	6.7	7.2	10.1
Color (degree)	18	12	8	5	200
Turbidity(degree)	8	5	3	1	250
Chloride ion (mg/l)	14.0	14.8	13.1	14.3	368
Potassium permanganate consumed (mg/l)	5.7	4.3	6.3	2.9	155
Iron (mg/l)	3.03	0.84	0.36	0.30	2.16
Manganese (mg/l)	0.50	0.27	0.06	0.01	0.17
Total hardness (mg/l)	94.0	102	78.8	102	0
Total residue (mg/l)	140	156	118	120	5100
Ammonia nitrogen (mg/l)	0.72	0.03	0.00	0.00	0.35
Nitrite nitrogen (mg/l)	0.002	0.003	0.003	0.000	12.70
Electric conductivity (s/cm)	-	-	-	-	10600
Dissolved silica (mg/l)	-	-	-	-	286

Sample A; raw water, Sample B; water supply, Sample C; cooling water
Sample D; after softner for boiler, Sample E; boiler inside water

Sample A (Raw Water)

It seems needful to remove iron, mangan, and hardness to meet the requirements for each usage. Abnormal value can not be found as raw water in the well, however.

Sample B (Treated Water)

- As for coagulable precipitation, filter treated water, the method of treatment and its capacity is not clear. But, it is found that the treatment of water to eliminate iron and mangan is more insufficient than that seen in the general case. When such treated water leaves as it is, there is a possibility of self-colouring and forming deposits. Further examination should be made.

Sample C (Cooling Water)

- As to cooling water, lack of its treatment leads to some high content of iron, which is liable to cause any stain on the equipment and the decreasing efficiency.

Sample D (Water for Boilers)

- As water treated for softening to be used for boilers, sufficient removal of hard constituent is not made. So it is essential to examine properties of softener and the way of its control.

Sample E (Boiler drum Water)

- Due to the use of drum cleaner for boiler-drum water, any hard constituent is not found. Much attention should be paid to too much graduation caused by resorting to agents from a control viewpoint.

- Study Team considers the present flow of water treatment as sufficient in its treatment capacity, judging from the quality of well water. In reality, however, value of its chromaticity and turbidity is high due to insufficient elimination of iron and mangan out of treated water.

Major causes are:

(1) Seemingly, lack of the volume of coagulant to be added and want of reaction for flocking. It is needful to confirm the volume of exhaust from the injection pump of coagulant and check the condition of flocking to be made.

(2) Maladjustment of pH at a time of cohesion is seen, which accounts assumably for the decrease of pH value caused by adding "sulphuric-acid Band," coagulant. Too much drop of pH value makes flock formation of aluminum hydroxide difficult, and also makes turning from soluble iron into the solid type of iron hydroxide so hard. Accordingly, removal of co-sediments becomes uneasy. Examination of this should be made.

(3) Efflux of flock

There is a risky possibility of lowering the performance of filters hereinafter due to efflux of fine flock caused by malformation of flock and capacity shortage of settling tanks. So, further study is required.

(4) Mischoice of filteration materials

- In the existing method of water treatment, a great portion of iron is taken off with cohesion precipitating disposal (mangan is not removed).

- A few iron and mangan can be removed by a strainer. But, filtering materials such as sand, anthracite can not work at all for this purpose. Instead, such catalytic oxidic material as mangan sand should be in use. Study Team deems it indispensable to study every sort of filtering materials to be used.

(5) - With or without any oxidizer injection equipment for maintaining the activation of catalytic oxidic filteration material.

- In case of using the above material, the upkeep of the said material always in oxidized condition is definitely requested. For this purpose, the injection of chlorine is normally done. Study Team thinks it necessary to confirm whether the equipment is in a complete status and to examine whether the volume of its injection is proper.

(6) - Insufficient capacity and control of strainers.

- Study Team also deems it necessary to check excessitive quantity of treated water, unsuitable inverse cleaning; damaged switch valves.

- In Sample C; Cooling tower water, the lack of treatment leaves residue of iron and mangan, which assumably causes stained equipment and decreasing its capacity. Therefore, cleaning should be made properly.

- In Sample D; treated water in softening device, no hard constituents are removed at all, ending in no performance really.
Reasons for this assumably are:

(1) - Ageing of resin

- It is necessary to check weather its exchange ability lessens entirely due to further ageing of resin.

(2) Insufficient regeneration and control of resin.

- It seems essential to examine whether the method of resin regeneration and control is periodically and properly made under guidance.

(3) - Decrease of ability stemmed on iron and mangan attached to resin.

- Study Team finds a possibility of water inflow contained iron and mangan directly into the softening device caused by maltreatment at the above-mentioned processing stage. As there is further possibility of failing in removal of hard constituent due to iron and mangan attached to or coated onto resin surface, and salt is usually in use for regeneration of resin, which can not take these attached substance off, Study Team also deems it indispensable to clean them with hydrochloric acid for once.

- In Sample E drum water, it seems that due to malfunction of softening device a lot of agent is being used to make up for such malfunction. Water is graduated from the quality of water to some extent. Leaving as it is, related devices wil become so badly corroded. So, the proper guidance of periodical flow control should be made.

6.2.4 Air-Conditioning

Target of temperature and humidity control by process groups made in Medari Mills is shown in Table 6-16 & 6-17. It seems to be proper and appropriate.

Table 6-16 Target of Temperature & Humidity (Spinning)

Process	Temperature (°C)	Relative Humidity (%)
Blowing of picking	28 ± 2	65 ± 5
Carding	28 ± 2	55 ± 3
Combing	28 ± 2	55 ± 3
Drawing	28 ± 2	55 ± 3
Roving	28 ± 2	55 ± 3
Spinning	28 ± 2	55 ± 3
Winding	28 ± 2	60 ± 3

Table 6-17 Target of Temperature & Humidity (Weaving)

Process	Temperature (°C)	Relative Humidity (%)
Warping	28 ± 3	65 ± 5
Loom	28 ± 3	78 ± 3
Inspecting	28 ± 3	60 ± 5

Source: MEDARI

In case of replacing with air-jet looms, it is desirable to control relative humidity at the range of 75.3%.

Graphic records of temperature and humidity by mill group are obtained and shown in Fig. 6-6, 6-7 and 6-8.

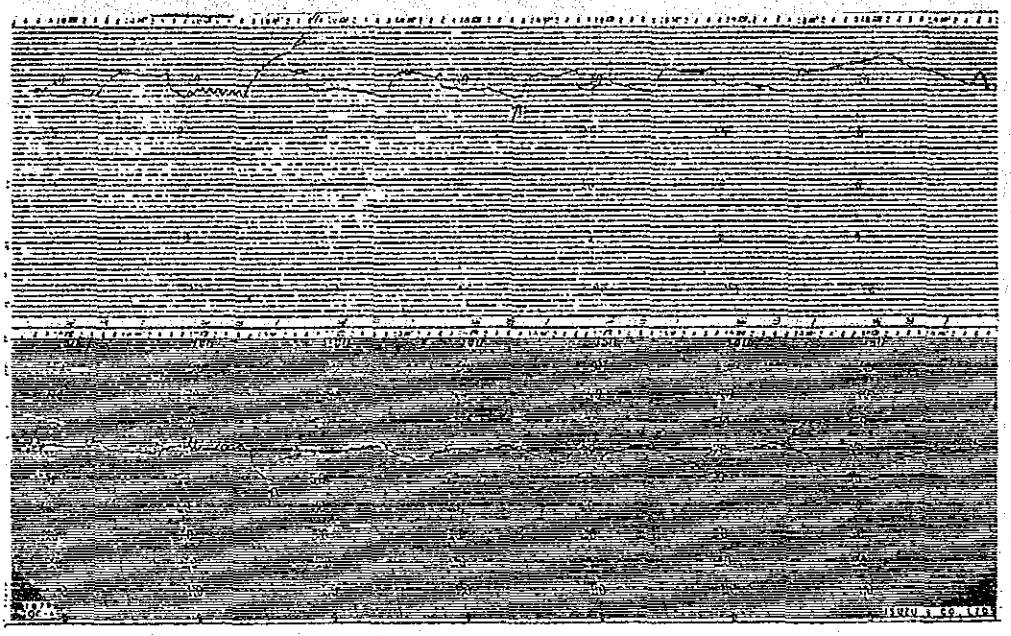


Fig. 6-6 Actual Record of Ring Spinning Room II

Remarks: Jan. 13 1986 - Jan. 19 1986

- Graphic chart in the upper-side shows temperature and that in the downside indicates relative humidity. Temperature/humidity control in No.2 Spinning Room seems comparatively easy. Temperature and humidity fluctuate remarkably as graphic chart shows. The reason for this seems lie in an insufficient control caused by the stoppage of refrigerator.

- It is recommendable to take an action to meet the situation, because temperature/humidity control is steadily made with the use of refrigerator.

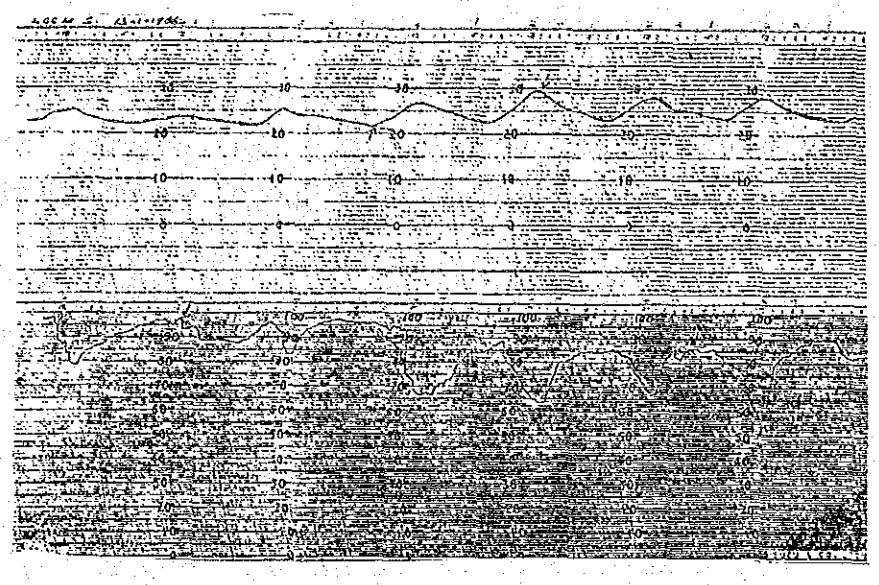


Fig. 6-7 Actual Records of Weaving No.1 Mill

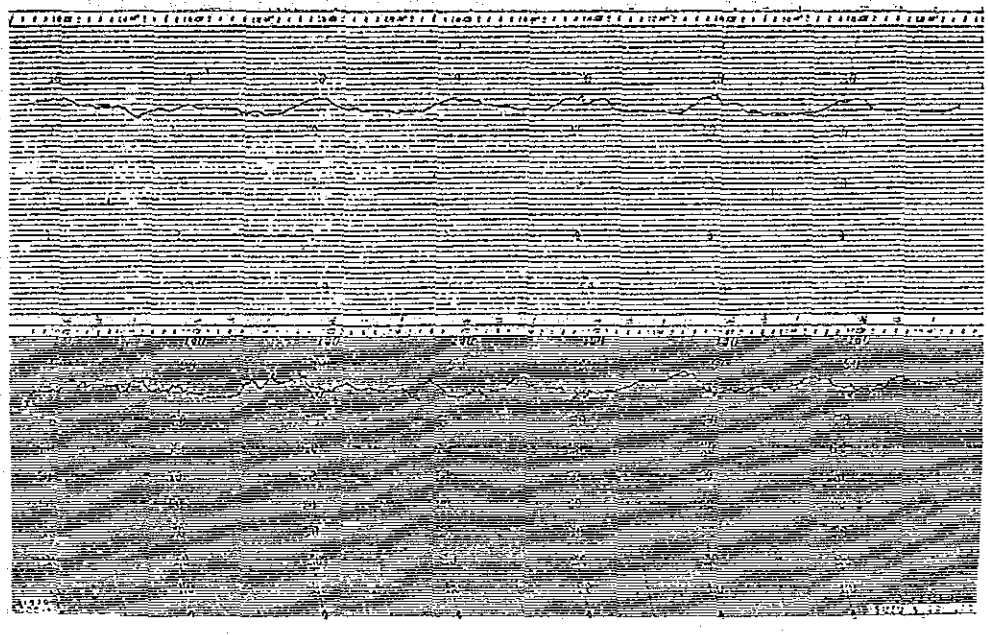


Fig. 6-8 Actual Record of Weaving No.2 Mill

- As shown in Fig. 6-7, No.1 Weaving Mill was entirely in absence of temperature/humidity control. The reason was assumably in the complete stoppage of air-conditioningat that time.

- It is found that No.2 Weaving Mill is generally under the sufficient control as seen in Fig. 6-8.

- In the absence of self-recorder, partial records of temperature and humidity in Spinning Rooms except 2nd Spinning Room in the Spinning Mill, which were shown in thermometer/hygrometer on the wall, are as below:

Table 6-18 Records of Temperature/Humidity in Spinning Process

	Maximum		Minimum	
	Tempera-ture (°C)	Relative Humidity (RH%)	Tempera-ture (°C)	Relative Humidity (RH%)
JAN	33.7	66.0	27.5	44.5
FEB	35.0	62.0	27.0	45.0
MAR	32.5	63.5	26.5	46.0
APR	31.5	60.0	26.5	45.5

Source: MEDARI

- Difference between the highest temperature and the lowest one stands at 8°C and difference of the same in relative humidity is 20%. Those fluctuation tells of an easygoing control. It is believed that the upkeep of a steady operation in the spinning process could hardly be done to the least expectation for the increase of yarn quality. It is indispensable to fulfill air-conditioning as one of the control techniques in the modern spinning mill.

- In air-conditioning equipment of No.1 Weaving Mill, the line of air-type automatic damper control for air blowing and the lone of water-temperature control got damaged. Besides, the air-return line is suction type from the side wall. So, even adjustment of temperature and humidity could hardly be made. It was almost impossible to keep its operation due to corroded eliminator, clogged spray and nozzle.

- Supersaturated type air-conditioner is housed in No.2 Weaving Mill under an automatic control, and its operational condition is being kept smoothly. It is found the duct corroded. So it is better repair it as soon as possible.

- It is found that in the main air-conditioner installed in Spinning Mill, the line of air-type automatic damper control become damaged and idle, and that the maintenance of eliminator and nozzle is being made satisfactory, to the possible malfunction.

- The air-return line in Back Process is suction type from the side wall. So even adjustment of temperature and humidity could hardly be made.

- Air-conditioning in the 2nd Spinning Room is comparatively new, and is capable of its sufficient use, accordingly.

- Across the board, the existing chilling unit left idle. According to the staff concerned in Medari Mill, the reason was in energy-saving. It is needless to say that the effective adjustment of temperature and humidity is inevitably required for keeping the stabilized operation and that for this an effective utilization of refrigerators should be made.

- Building structure is of saw-teethed roof type, which is sensibly affected by the outdoor temperature. Therefore, it is indispensable to board ceiling definitely in order to increase its adiabatic effects which raise the capacity of air-conditioning.

6.2.5 Preservation of the Environment

- There are three items such as noises, air pollution, industrial pollution of a river to be taken up as environmental problems. Study Team assumes that although there are a lot of unclear points in those control in Indonesia, some kind of regulations on these matters will be enforced in the future.

- Countermeasures which seem necessary today are as the following:

6.2.5.1 Noises

- In case of 24-hour operation, a trouble with noises is liable to happen at night. Study Team figures out that a mark value should roughly be 70 phones. It is possible to reduce noises from non utility generation by switching to PLN's grid supply and also lower those from an air-conditioning by changing into the inverter system. Outflow of noises out of No.1 Weaving Mill could be reduced by boarding a ceiling.

6.2.5.2 Air Pollution

- The above pollution applies to exhaust fumes from boilers. The volume of nitrogen oxides substance including in exhaust fumes and soot/smoke are the crux of the problem. Study Team estimates that in case of using solar oil, contents of nitrogen oxid is 120 p.p.m. The use of quality oil will not lead to any soot/smoke trouble.

6.2.5.3 Contamination by Drainage

- pH value found in the waterways at Medari Mill is as under:

Drained water in the Finishing Mill	:	pH 10.0
Cooling water of generator	:	pH 8.5
Neutralized treatment water	:	pH 7.5

- In Medari Mills, drainage waste water is being made mainly at the Finishing Mill.

- The analysis of drainage waste water is in Table 6-19:

Table 6-19 Quality of Drainage Waste Water from Finishing Mills

	P.H.	BOD	COD	S.S.
After desizing process	6.0	2,760	1,670	1,800
After scouring process	11.4	101	741	30
After mercerizing process	12.8	-	-	-
Waste water	10.1	954	581	610

- In case of high pH value, it is necessary to effect neutralized treatment on drainage waste water to avoid ill-effect to be produced directly on animals and plants on the downstream.

- Neutralized treatment has been made in the waterway at Medari Mills. Study Team finds it feasible to attain that purpose much steadily by practicing the neutralized treatment in the course of having drained water left in a tank to be newly installed for 5-6 hours.

- It was found that of the total volume of water drained from the Finishing Mill, water flown off after designing process contained high rate of BOD and COD and that the rate of its BOD content was much higher, because of using the natural size particularly.

- It was also apparent that water being drained at scouring process showed high pH rate, because of using caustic soda. It is a common practice in Japan that regarding BOD and COD, the activated sludge method is being adopted. Study Team assumes that the said method will necessarily be adopted in Medari Mill in the future.

CHAPTER 7 RENOVATION SCHEME

7.1 Product-Mix in the Medari Mills

- Based on results of market survey for cotton fabrics and Batik, forecast of each demand is made. The forecast will be used as a basis to establish policies for the renovation of Medari Mills.

  1) The improvement of machinery and equipment, chiefly of No.1 Weaving Mill will be made, and the subsequent production of grey cloth earmarked for exports will be effected there.

  2) The production of grey cloth for cambric in No.2 Weaving Mill will continuously be made as it is now.

  3) In parallel with conversion of cloth now in production and of machineries in the Weaving Mill, necessary reinforcement and remodelling of machinery and equipment will be carried out also in both the Spinning Mill and Finishing Mill.

  4) Only the improvement of machinery and equipment will end fruitless in the strict sense of terms, unless any improvement of management, such as organization, operation of GKBI takes place as a prerequisite for attaining the purpose.

- The new product-mix after the renovation is shown in Table 7-1.

Table 7-1 Product-Mix of Weaving Mill

Weaving Mill	Production item		Composition	USE
No. 1	Sheeting	63"	20 %	Export
	Poplin	63"	20	"
	Twill	62"	10	"
	Sateen	63"	10	"
	Sheeting	56"	20	Domestic & Export
	Poplin	56"	20	"
No. 2	Biru	46"	40	Domestic
	Prima	44"	15	"
	Primissima	44"	30	"
	Buffing Cloth	46"	15	Export

- The production of necessary yarn of various counts will be made in the Spinning Mill so as to be able to turn out its product-mix smoothly. And also yarn to be sold at market will be produced by its surplus capacity in the spinning mill.

- While, major function of Finishing Mill will be in finishing of grey cloth fed from the Weaving Mill to cambric, with spare production capacity available, of grey cloth sent from PRIMER, and also of grey cloth upon receiving orders from the general market on a commission basis.

7.1.1 No.1 Weaving Mill

- As the items of double width definitely required for the export today, grey cloth of 57"-63" will be scheduled to be produced.

- So far as export markets are concerned, the target will be confined to American and European markets as forecasted in

Market Trend falling under 4.2 .

- With a positive sales approach, particularly, to European markets where the items for interior use are popular, it is planned to produce sheeting, twill, and satin, the plan of which is also identical with that of GKBI.

- In addition, it has been also planned to produce poplin, most rich in its marketability, in the amount up to 40% of the total production of product-mix. And Study Team has scheduled to appropriate about a half of sheeting and poplin production for domestic demand, clothes to be made of which could be available for the export, or items to be made of which could be added to the interior items for domestic demand.

- There is no finishing factory where grey cloth of 63" width can be processed for domestic demand in Indonesia. So, it is planned to adopt the width of grey cloth to be made as 57". (due to limited working range of machines in Medari Finishing Mill, even grey cloth of 57" width can not be processed.)

- Products planned for domestic use can be switched over to the export use, if needful in the export market in the future. Or, in conformity with the change of domestic demand, grey cloth or general cotton cloth can be fed to those machinery and equipment.

- As described above, Study Team has dealt with this matter enabling the counterpart to make a flexible adjustment to cope with an unexpected fluctuation of the balance between demand and supply, on which product-mix in this project is based.

7.1.2 No.2 Weaving Mill

- As the weaving factory so far used to turn out grey cloth for cambric, it seems natural that the No.2 Weaving Mill will be kept in existence in the future.

- Working out product-mix in the No.2 Weaving Mill, the following special attention is paid to the production of Primassima:

- That is, a prerequisite is in an effective utilization of Combing machines in the spinning mill. And it is planned to fix the volume of production of Primassima in comparison with the total volume of yarn production matched with the production capacity of combing machines.

- Production ratios of Biru and Prima are about 2:1.

- Seeing that Buffing cloth, GKBI's only export item, has rather steadily been exported to the United States, it is advisable to keep the production of Buffing cloth on in No.2 Weaving Mill.

7.2 Scale and Plan of Production

- Based on reports made by S/W Mission in working out the renovation scheme, it is planned to adopt. Shuttle looms as Case 1, and air-jet looms being rapidly employed in various countries recently as Case 3, and Case 2 is the combination of the two stated above.

- Considering that the acceptability of air-jet looms in textile industry in world and that Indonesia weavers are fully able to operate those looms, it is believed recommendable to add those to the project scheme from necessity of increasing mill's competitive power in the future.

Basic plan and scale of production of No.1 Weaving mill are as the following:

a) Reed space of looms will be 75"(190 cm).

b) Description of woven products will be plain, satin, and twill.

c) Grey cloth earmarked for export: 60%; grey cloth marked for domestic use: 40%.

d) Number of sets of looms and production scheme.

- In compliance with the counterpart's request, layout has been examined for the purpose of increasing the number of looms to be installed, and project schemes are established as follows:

Case 1:

100% Shuttle looms: 216 sets; 6,600,000 yd/year

Case 2:

Shuttle looms	:	72 sets	
Air-jet looms	:	50 sets	7,300,000 yd/year

Case 3:

100% Air-jet looms	:	100 sets	10,200,000 yd/year

- The production plan in No.2 Weaving mill remained unchanged.

- Study Team has dealt with all the matters, seeing that in any of the cases above, the basic requirement lies in improving the quality of raw yarn to be supplied and effect of loom replacement will not be observed at all, unless the renovation of spinning process is carried out for the said purpose.

- As to the finishing process (scouring/bleaching), grey cloth being wider than 48 inch width can not be processed in the existing facilities, and therefore, the finishing process can process only cambric for Batik. Basically, no alteration of the equipment will be made.

- Wide-width grey cloth that can not be processed in the finishing process will be delivered to market as grey cloth, in principle.

- With the fundamental ideas, indicated above, production by each division after the renovation is as under:

7.2.1 Spinning Division

- As clarified previously, 3 cases are planned in the renovation scheme for weaving division. The renovation to be made in the spinning process will cover requirements of each of the three renovation cases. So the spinning production itself will not be changed by each renovation scheme for weaving.

- Yarn spun produced on the Spinning Division will be supplied to the Weaving Division of Medari Mills in principle. Surplus yarn, if any, will be delivered for sales, however.

- Combed yarn of 50's made in 1986 will all be sold out. The said yarn to be spun after 1987, however, will be supplied to the Weaving Division.

Table 7-1-A Yarn Production in Post-Renovation

	Yarn Count	Production (Tons/yd)
Carded	20's	209
- do -	30's	909
- do -	32's	621
- do -	36's	561
- do -	40's	1,059
- do -	44's	149
Combed	40's	351
- do -	50's	348
	Total	4,207

Remark: Operation: 343 days/yr. x 24 hr/day

7.2.2 Weaving Division

- So far as the renovation scheme is concerned, the three cases are planned in conformity with the counterpart's intention regarding the replacement of obsolete looms in No.1 Weaving Mill. Production of grey cloth applied to each case is indicated in Table 7-2.

- A plan is worked out that commission work of Prima would be 1,612,000 yds and that of Primissima be 2,502,000 yds in 1986, reflecting actual production during field survey in July, 1986. There is no plan for commission weaving after 1987.

- Planned weaving for Prima and Primissima is as follow:

	1986	1987	After 1988
Prima	Commission Weaving	Supply to Finishing Div.	Supply to Finishing Div.
Primissima	- do -	Delivery in Grey Cloth	Supply to Finishing Div.

Table 7-2 Production Quantity of Grey Cloth (After Renovation)

		Production (1,000 yds/yr)		
		Case 1	Case 2	Case 3
No. 1 mill	Biru (1)	1,406	1,385	2,556
	Biru (2)	1,406	1,576	2,343
	Biru (3)	-	-	-
	Prima	-	-	-
	Poplin (1)	1,347	1,428	1,632
	Poplin (2)	1,347	1,408	1,837
	Twill	580	845	966
	Satin	511	639	852
No. 2 mill	Biru (3)	3,766	3,766	3,766
	Prima	2,015	2,015	2,015
	Primissima	3,127	3,127	3,127
	Buffing	1,435	1,435	1,435
Total		16,940	17,624	20,530

Operation: 343 days/yr x 24 hr/day

7.2.3 Finishing Division

- The basic principle will be to maintain the volume of production as close as the production capacity from a mill management viewpoint. It is feasible to make the production of grey cloth closer to its capacity to the possible extent, because after repair and improvement is made, no qualitative trouble will occur in the finishing process. So, any replacement of machines is not planned basically. Study Team thinks it necessary to make a minimum improvement, such as replenishment of parts, replacement and repair of obsolete parts.

- As the finishing mill, it is necessary to finish grey cloth from Primer (Capacity: 18,000,000 yds/yr) in addition to grey cloth fed from the weaving mill. It is planned that within its surplus capacity, its production can be maintained with additional finishing of grey cloth fed by organization outside GKBI's group on a commission basis.

- Furthermore, it will be necessary to conduct sales activities so as to keep those production scheduled in this plan, because any decrease of production resorts to the rise of cost, that is, the drop of profits.

- Production after renovation work is shown in Table 7-3.

Table 7-3 Production Quantity of Finished Fabric
(After Renovation)

	Production (1,000 yds/yr)
Biru	3,766
Prima	2,015
Primissima	3,127
Commission	20,192
Total	29,100

Operation: 300 days/yr x 24 hr/day

7.2.4 In Case that Renovation Scheme is not implemented.

- It is the opinion of Study Team that it will be difficult to restore normal operation even at the sacrifice of maintenance cost at this stage, because machines running since 1960, the year of establishment, have become badly obsolete and replenishment of parts and maintenance of those machines are not maintained at satisfactory conditions.

- As for Spinning and Weaving Divisions where there are many sets of same-type machines, it is possible to continue running machines left by cannibalizing. On the contrary, in the Finishing Division where only one set of each machine is running, it is essential to spend a proper repair cost temporarily.

To be concrete:

- Spinning Division will produce raw yarn necessary for the Weaving Division in its quantity. Its production, however, will be on the decrease year after year. It will be feasible to run all the sets of machines before the end of 1986, because the maintenance of spinning frames have gradually been made and the number of those frames have been increased. Accordingly, the working ratio and production of those machines in 1987 will assumably be higher than those in 1986.

- Taking into consideration the difficulty of all-machine operation with the ordinary cost of repair after 1988 and the annually decreasing working ratio, a tentative production program was provided.

- Weaving Division restarted running obsolete looms of 350 sets (70%) in No.1 Mill, the efficiency of which being 64.5%, badly low. Since manufacturers of those looms suspended the making

of related parts, the present operation of those looms will hardly be kept in the future. The operation of No.1 Mill will be discontinued in 1988.

- It seems needful to replace parts drastically in No.2 Mill. In the event the renovation scheme is not implemented, the amount of investment will assumably be equivalent to the normal repair cost, and the operation ratio will be on the decrease year by year.

- Commission-base weaving will be scheduled in 1986 as in the case with the renovation scheme to be practiced. In 1987, however, grey cloth for Prima will be supplied to Finishing Division, and grey cloth for Primissima will be on the sales. Grey cloth for both Prima and Primissima will be forwarded to Finishing Division, after 1988 on. It will be inevitable to suspend the production of Primissima in 1994, judging from the conditions of looms and required high quality of Primissima among cambric.

- Regarding Finishing Division, it will be essential to keep its production close to its capacity as stated previously in the case that the renovation scheme is implemented. In short, a positive approach for enabling to process grey cloth on the commission basis outside Medari Mill must enthusiastically be made, in addition to the finishing of grey cloth to be fed from Weaving Division.

- To attain this purpose, the following minimum investment is required:

Reinforcement of Rope-type of J Box:	¥ 4,603,000
Spare Parts	¥14,789,000
Total	¥19,392,000

- Production will be kept constant all the time, expecting that the commission-base processing should be on the increase in order to compensate the decreasing quantity of grey cloth to be supplied from Weaving Division, year by year in the production schedule.

- Regarding the required number of enrolled staffs and workers in each Division, it is assumed that number of personnels will be decreased, correspondingly to decrease of operation rate in the Spinning Division and suspending operation of looms in the No.1 Weaving Mill. In the Finishing Division, there will be no decrease of the personnels as its production will be continued at a same level.

7.3 Renovation Scheme in No.1 Weaving Mill

7.3.1 Special Feature of Renovation Scheme

- Three (3) renovation schemes for No.1 Weaving Mill are examined. Each special feature is as following:

- Case 1: Shuttle looms 100% (216 sets)

- There is no problem in this field, because Medari staff have long experiences in the operation of shuttle looms.

- Case 2: Combination of Shuttle looms: 72 sets
  with Air-jet looms of 50 sets

- In case of adopting air-jet looms in weaving process, it will be essential for Medari Mills to improve, especially, yarn quality in spinning process and the technical level of preparation process in weaving process.

- Since the renovation including the spinning process will be scheduled to be practiced this time. The quality of raw yarn in spinning process is applicable enough to be fed to air-jet looms. And it is necessary to make assiduous efforts for feeding intermediate quality products to looms by the modernized equipment, chiefly sizing machine and by well-trained workers.

- Special feature of Case 2 lies in keeping sufficient production scheduled in Case 1, trying to curtail investment, and to secure sufficient space by examining machine layout.

- Case 3: Air-jet looms 100% (100 sets)

- Production amount on this case shows about a 40% increase over that in Case 1 or Case 2. There are little differences in investment from the others. The cost of production for Case 3 is the lowest of the three.

- In the event of employing shuttle looms, remarkable is the decrease of cloth quality caused by those mechanical defects. On the contrary, there are extremely less defects arisen in air-jet looms, thus increasing A-grade rate of cloth.

7.3.2 Selection of Machine Types

- All the machines to be newly adopted in the renovation scheme should be selected, upon examining the following conditions:

7.3.2.1 Warper

- Wide-width looms necessitates wide-width sizing machines workable for those new looms, of course. In accord with this, the width of warp sheets in the sizing part will be determined by the width of beam flange, by the working width of warpers.

- The working width of warpers so far running causes warp density high, and does not allow operators to practice adequate sizing for high speed looms. Therefore, it is recommendable to select wider warpers of 66.5" of working width.

7.3.2.2 Sizer

- It will be necessary to install one set of wide-width sizer newly, and that in the event of shuttle looms. The size box 2 sheet separate pre-dry system should be applied, since fluff of warp does not cause the stoppage of looms.

- In case of air-jet looms, it is necessary to lesson the fluff of sized yarn. For this, it is advisable to adopt double size box, 4-sheet separate pre-dry system in sizes.
  Further, the arrangement of double size box will be horizontal type in order to achieve easy operability.

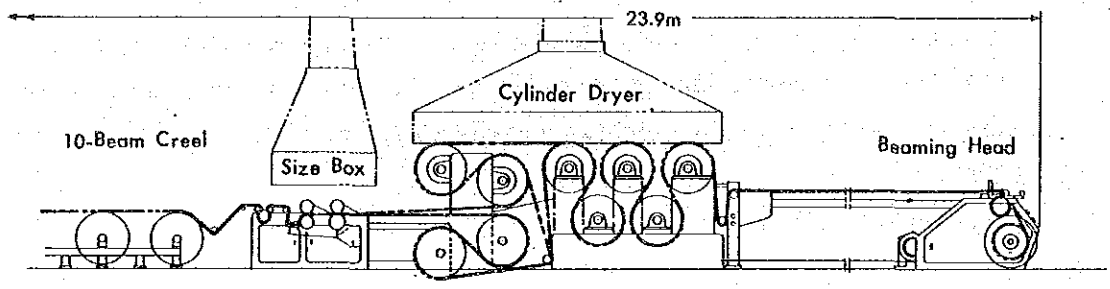


Fig. 7-1 Sizer for Shuttle Loom

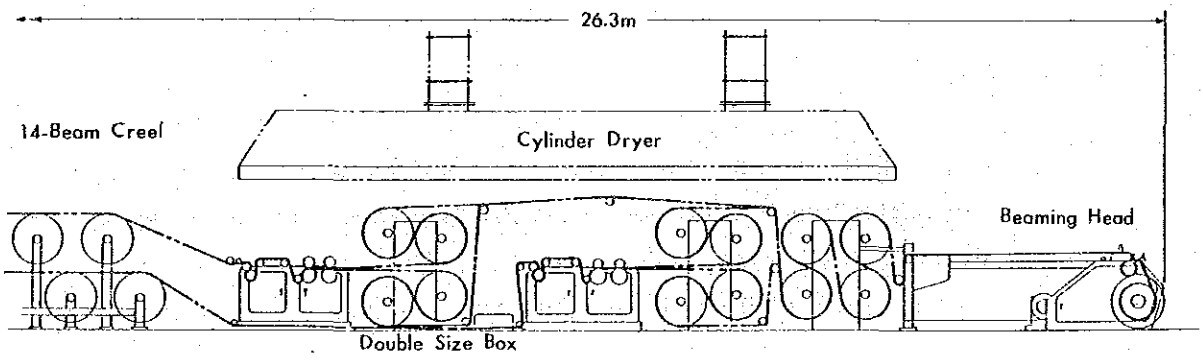


Fig. 7-2 Sizer for Air-Jet Loom

7.3.2.3 Leasing Machine

In adopting air-jet looms, it is necessary to improve warp-sheet conditions, and to employ leasing machine so as to eliminate warp cross-end.

7.3.2.4 Shuttle Loom

- In the selection of shuttle loom types, Study Team examined comparison profitability between hopper type of weft-feeding device with medium-speed loom and loom winder type of the above device with high-speed loom. Those results are shown in Table 7-4.

- In the latter case, there is no advantageous point by labour saving, and any withdrawal of funds are impossible.

Table 7-4 Comparison Table

	Medium speed, hopper type	High speed, loom winder type
R/M (R/S 75")	180	200
Loom cost (¥1,000)		
1. Loom (Inc. accessories)	4,150	5,040
2. Pirn winder	200	-
3. Loom winder	-	1,000
(Total)	4,350	6,040
Nos of Loom	216	194
Investment amount (¥1,000)	939,600	1,171,760
Nos of Worker		
1. Weaver	48	40
2. Hopper	20	-
3. Pirn winder operator	20	-
(Total)	88	40
Increase investment amount for High speed loom with loom winder	Rp 7.2/¥ x ¥232,160,000 x 1.065 = Rp 1,780,210,000 (note interest 13% p.a.)	
Saving personnel cost	Rp 50,000/month x 48 P. x 12 month = Rp 28,800,000	
Pay back year	61.8 years	

Remarks: The production amount for above is based on Case 1 (6,600,000 yd/yr).

7.3.2.5 Air-Jet Loom

Air-jet looms are divided broadly into 3 types.

(1) Single nozzle, closed guide type

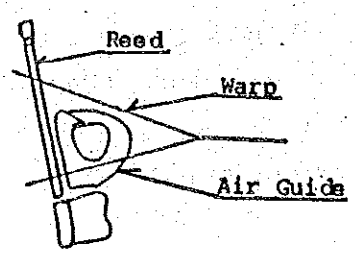


Fig. 7-3
Single Nozzle, Closed Guide

There is one air-jet nozzle into which weft is inserted. There is air-guide to air-jet flows.

Low energy cost is needed.

An ordinary reed is usable. But grey cloth woven with it is limited in its use. Its revolution is low.

(2) Multi nozzle, closed guide type

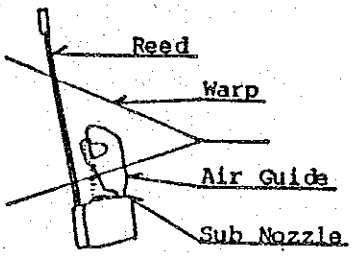


Fig. 7-4
Multi Nozzle, Closed Guide

There are several air-jet nozzles. There is air guide, too.

Wide-width cloth can be turned out.

As referred to above, an ordinary reed is usable. But its revolution is low.

(3) Multi nozzle, open guide

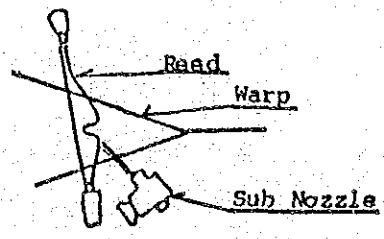


Fig. 7-5
Multi Nozzle, Open Guide

There are several air-jet nozzles.

No special air guide attached. The special reed of tunnel type is used.

High in energy cost. Due to no air guide, however, grey cloth woven with it is not limited in use. High revolution is feasible.

- Since air-jet looms are required largely of easy weaving, wide application, and high productivity, it is recommended to adopt air-jet loom of multi nozzle open type for the renovation scheme.

- In view of easy operability of air-jet looms, the following mechanisms should be equipped with:

1)	Weft insertion	2 pin system	To equip measuring grip and pooling grippin separately
2)	Shedding cam	package type	Integral type of cam, gear and bush
3)	Pick finder		miss picking : 3 actions warp yarn break: 2 actions

7.3.2.6 Profitability of Air-Jet Loom

Results obtained by simple comparison between shuttle looms and air-jet looms are indicated as the following:
High profitability of air-jet looms is understandable.

Table 7-5 Production Cost (Loom only)

	Shuttle loom	Air jet loom
Nos of set	216	65
R/M (R/S 75")	180	600
Efficiency (%)	88	88
Production per year (yd)	6,596,832	6,617,193
Investment amount (¥1,000)		
1. Loom (Inc. accessories)	896,198	511,715
2. Pirn winder	62,000	--
3. Compressor for air jet loom	--	80,500
4. Air piping cost	--	4,300
5. Travelling cleaner	--	10,000
(Total) unit ¥1,000	958,198	606,515
Production cost (Rp 1,000)		
1. Personnel cost		
1) Weaver	48 person	28 person
2) Hopper	20	-
3) Pirn winder operator	20	-
(Total)	88	28
at Rp 55,000 x 12 month = Rp 660,000	58,080	18,480
2. Electric cost Rp 75/KWH	151,695	176,175
3. Maintenance cost (m/c x 0.01)	68,990	43,669
4. Depreciation (10 years)	689,903	436,691
5. Interest (13% p.a. x 10 years)	493,272	312,229
(Total) unit Rp 1,000	1,461,940	987,244
Production cost per yd (Rp/yd)	222	149
Ratio of production cost	1	0.67

7.3.3 Number of Looms After Renovation

The number of looms figures out in an attempt to increase those looms to be installed as many as possible at the counterpart's request is shown in Table 7-6:

Table 7-6 Number of Looms After Renovation

Kind of loom	Read space	No. 1 mill		
		Case 1	Case 2	Case 3
Shuttle loom	56"	-	-	-
	75"	216	72	-
Air-jet loom	190 cm (75")	-	50	100
Total		216	122	100

7.3.4 Fabrics Constructions Produced After Renovation

7.3.4.1 No.1 Weaving Mill

Fabric construction after renovation of No.1 Weaving Mill will be as shown in Table 7-7

Table 7-7 Fabric Construction

Fabric	Material	Count		Density		Dimension		Yarn weight (lb/yd)	
		Warp	Weft	Wp	Wt.	Width	Length	Wp	Wt.
Biru (1)	Cotton 100%	32	36	70	68	63"	150 yd	0.180	0.158
Poplin (1)	"	CM40	CM40	133	71	62.5	124	0.292	0.142
Twill	"	30	30	128	60	62	126	0.377	0.159
Satin	"	30	30	78	102	63	122	0.211	0.284
Biru (2)	"	32	36	70	68	56	150	0.160	0.140
Poplin (2)	"	40	40	133	71	56	124	0.262	0.128

7.3.4.2 No.2 Weaving Mill

Fabric construction of No.2 Weaving Mill will be as shown in Table 7-3.

Table 7-8 Fabric Construction

Fabric	Material	Count		Density		Dimension		Yarn weight (lb/yd)	
		Warp	Weft	Wp	wt.	Width	Length	Wp	Wt.
Biru (3)	Cotton 100%	32	36	70	68	46"	150 yd	0.131	0.115
Prima	"	40	44	92	86	44	182.5	0.135	0.127
Primissima	"	CM50	CM50	105	95	44	182.5	0.125	0.109
Buffing Cloth	"	20	30	86	80	46	120	0.276	0.163

7.3.5 Number of Machines Required After Renovation (other than looms)

- The number of each machines to be required is shown in APPENDIX AP9. The number of machines to be required by each case and major specifications of machine are indicated in the following tables:

Case 1 : Table 7-9
Case 2 : Table 7-10
Case 3 : Table 7-11

TAble 7-9 Required Number of Machine (Case 1)

No.	Machine	Necessary set	Existing machine	New machine	
1	Warper	3	2	1	
2	Sizer	3	2	1	
3	Cooking Tank				
	1) Solution Tank	1	1	-	
	2) Mixing Tank	2	2	-	
	3) HP Cooker	2	1	1	
	4) Storage Tank	4	2	2	
4	Reaching m/c	12	6	6	
5	Tying m/c	4	2	2	
6	Pirn Winder	317 spdls	160	36 spdls x 5 sets	
7	Bobbin Cleaner	2	2	-	
8-1	No.1 Mill Shuttle Loom	216	-	216	
8-2	No.2 Mill Shuttle Loom	408	408	-	
9	Inspecting m/c	12	6	6	
10	Folding m/c	4	2	2	
11	Beam Truck	10	-	10	
12	Cloth Doffer Truck	7	-	7	
13	Cloth Roll Truck	35	20	15	
14	Rewinder	1	1	-	
15	Air Compressor for Cleaning	1	-	1	Capa 15 KW

Table 7-10 Required Number of Machine (Case 2)

No.	Machine	Necessary set	Existing machine	New machine	
1	Warper	3	2	1	
2	Sizer	3	2	1	
3	Cooking Tank				
	1) Solution Tank	1	1	-	
	2) Mixing Tank	2	2	-	
	3) HP Cooker	2	1	1	
	4) Storage Tank	4	2	2	
4	Leasing m/c	1	-	1	
5	Reaching m/c	12	6	6	
6	Tying m/c	4	2	2	
7	Pirn Winder	224 spdls	160	36 spdls x 2 sets	
8	Bobbin Cleaner	2	2	-	
9-1	No. 1 Mill Shuttle Loom	72	-	72	
9-2	No. 1 Mill Air Jet Loom	50	-	50	
9-3	No. 2 Mill Shuttle Loom	408	408	-	
10	Inspecting m/c	12	6	6	
11	Folding m/c	4	2	2	
12	Beam Truck	10	-	10	
13	Cloth Doffer Truck	7	-	7	
14	Cloth Roll Truck	35	20	15	
15	Rewinder	1	1	-	
16	Reed Washing m/c	1	-	1	
17	Air Compressor for Air Jet Loom	3	-	3	Capa 132 KW
18	Air Compressor for Cleaning	1	-	1	Capa 15 KW
19	Travelling Cleaner	2	-	2	
20	Bobbin Winder	1	-	1	

Table 7-11 Required Number of Machine (Case 3)

No.	Machine	Necessary set	Existing machine	New machine	
1	Warper	3	2	1	
2	Sizer	3	2	1	
3	Cooking Tank				
	1) Solution Tank	1	1	-	
	2) Mixing Tank	2	2	-	
	3) HP Cooker	2	1	1	
	4) Storage Tank	4	2	2	
4	Leasing m/c	1	-	1	
5	Reaching m/c	13	6	7	
6	Tying m/c	4	2	2	
7	Pirn Winder	183 spdls	160	36 spdls x 1 sets	
8	Bobbin Cleaner	2	2	-	
9-1	No. 1 Mill Air Jet Loom	100	-	100	
9-2	No. 2 Mill Shuttle Loom	408	408	-	
10	Inspecting m/c	14	6	8	
11	Folding m/c	4	2	2	
12	Beam Truck	10	-	10	
13	Cloth Doffer Truck	7	-	7	
14	Cloth Roll Truck	35	20	15	
15	Rewinder	1	1	-	
16	Reed Washing m/c	1	-	1	
17	Air Compressor for Air Jet Loom	5	-	5	Capa 132 KW
18	Air Compressor for Cleaning	1	-	1	Capa 15 KW
19	Travelling Cleaner	4	-	4	
20	Bobbin Winder	2	-	2	

7.3.6 Main Specification of Machines

- Major specification of machines, etc., to be preferably employed in putting the renovation into effect is shown as under for reference.

Table 7-12 Main Specification for New Machine

No.	Machinery	Specification
1	Warper	66.5" width, H-creel 640 pegs
2	Sizer	72" width, horizontal double size box, 12 cylinder, 4 sheets pre-dry, 14 beam stand, R/S 75", 800 m/mφ beam
3	Cooling tank	
	1) H.P. Cooker	1,000 litters
	2) Storage Tank	1,200 litters
4	Leasing m/c	75" width
5	Reaching m/c	80" width, without lease
		90" width, with lease
6	Tying m/c	75" width, stationary type
7	Pirn Winder	36 spindles, with package feeler and cleaner
8-1	Shuttle Loom	R/S 75", Hopper type, 26" φ Beam Shoe type center picking, Loose reed system
	Loom accessories	
	1) Beam	
	2) Cloth roller	
	3) Heald frame	
	4) Flat heald	2.5 m/m W x 0.35 T x 330 L
	5) Repair flat heald	"
	6) Dropper	11 m/m W x 0.2 T x 120 L
	7) Dropper bar	
	8) Reed	
	9) Shuttle	
	10) Bobbin	203 m/m L x 30.2 φ - 4 Ring
8-2	Air Jet Loom	R/S 190 cm, Tunnel reed type, Cam shed. 800 m/m φ Beam 2 grip pin type weft insertion. Package type shedding cam. 2 or 3 action pick finder

No.	Machinery	Specification
	Air Jet Loom Accessories	
	1) Beam	
	2) Cloth roller	
	3) Heald frame	
	4) Flat heald	5.5 m/m W x 0.3 T x 302 L
	5) Repair flat heald	"
	6) Dropper	11 m/m W x 0.3 T x 145 L
	7) Dropper bar	
	8) Reed	
9	Inspecting m/c	1,800 m/m W, with roller stand.
10	Folding m/c	1,800 m/m W, holding height 400 m/m
11-1	Beam Truck	56" - 85" width, 26" ϕ Beam, Capa 0.5 Ton
11-2	Beam Truck	190 cm width, 800 m/m ϕ Beam, Capa 1 Ton
12-1	Cloth Doffer Truck	Capa 200 kg
12-2	Cloth Doffer Truck	Capa 300 kg
13	Cloth Roller Truck	R/S 75" Width x 6 Roller
14	Reed Washing m/c	R/S 190 cm
15	Air Compressor for Air Jet Loom	Capa 132 KW, oil free screw type
16	Air Compressor for Cleaner	Capa 15 KW
17	Travelling Cleaner	
18	Bobbin Winder	2 spindls
19	Testing Equipment	
20	Run Way Scale	Capa 1 Ton
21	Electric Hoist	Capa 1 Ton

7.4 Renovation Scheme in Spinning Mill

- As stated in Section 5.1.1.1, the upkeep of quality yarn is required at the employment of brandnew looms on No.1 Weaving Mill.

- To meet the requirement above, it is found that the existing equipment are not workable. Accordingly, an overall improvement of equipment in the spinning process is definitely required. A renovation scheme is prepared by the following measures as basically indicated in Progress Report:

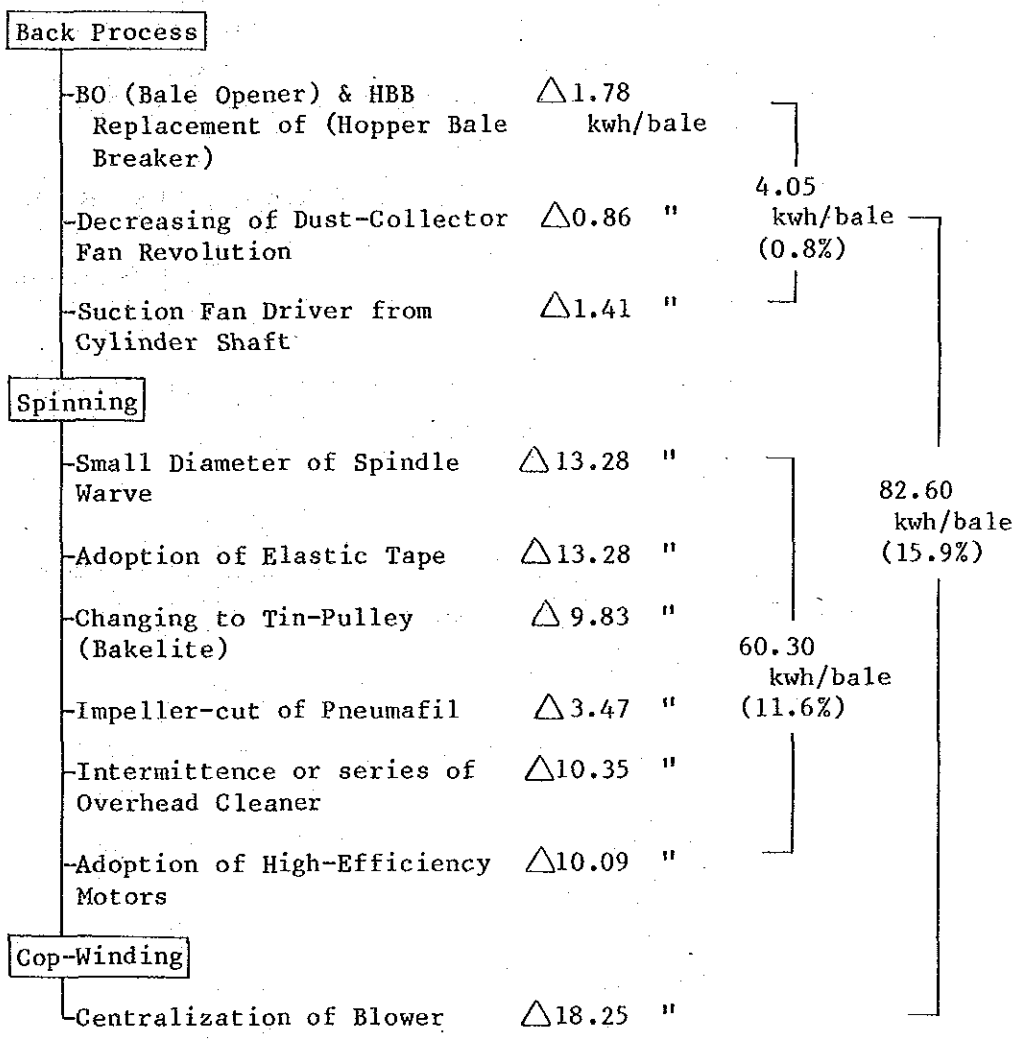
Table 7-13 Basic Renovation Scheme of Spinning Section

Process	Measures
Opening & Picking	Reconditioning with partial replacement
Carding	Conversion into semi-high production card
Drawing	Complete replacement
Roving	Complete replacement
Ring Spinning	Conversion - roller part creel part running part
Winding	Replacement

- In the practice of renovation scheme, it will be needful to attain labour-saving effect in replacement with new types of machines and parts.

- For this, Study Team tried to select suitable types of machines and apparatus with reference of the following data:

Typical Energy-saving Effect

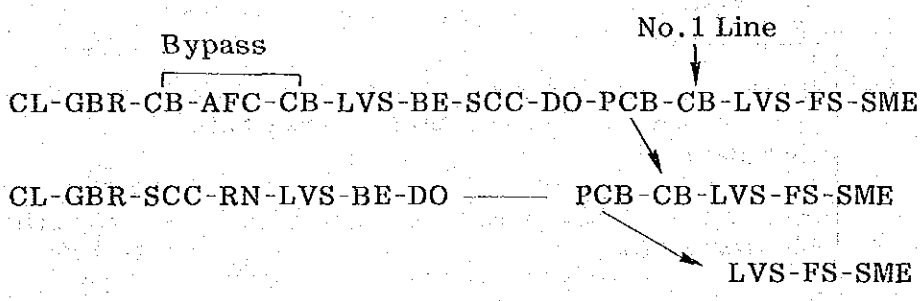


Note: Mark△: Volume of Power-Saving per Bale

7.4.1 Opening and Picking Machines

- In placing its emphasis on opening and dust-collecting, it is recommended to change the machine arrangement for the purpose of keeping about 1% CV of gr/m of lap.

- Further, in order to increase the workability of cotton supply part, clipper Lattis type shall be adopted similar to the existing 1st machines, which is available as it is.



- For the necessity of effective cleaning of raw cotton having many impurities, it is recommended to adopt Axi-Flo type cleaner (only 1 line).

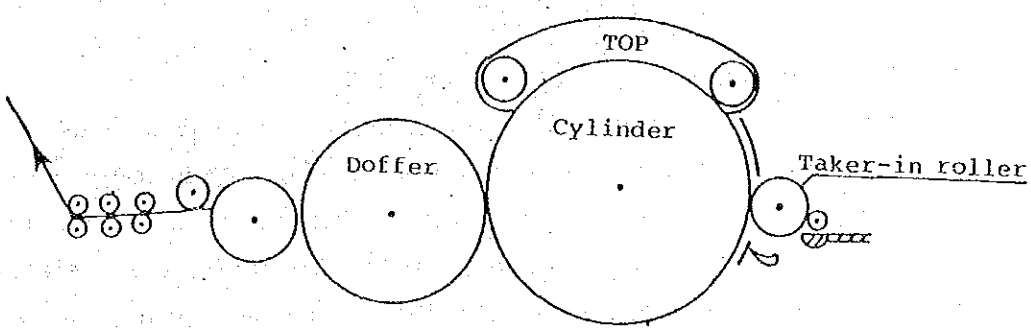
- Due to badly obsolete part of lap formation, it is recommended to replace the 2nd - the 4th machines as a unit.

CL	:	Clipper Lattice
GBR	:	Super Bale Opener
AFC	:	Axi-Flo Cleaner
LVS	:	Fan Condenser
BF	:	Feeding Unit
DO	:	D-Opener
PCB	:	Distributor
CB	:	Distributor
FS	:	Pneumatic Control Feeder
SME	:	Scutcher
SCC	:	Superior Cotton Cleaner
RN	:	Cleaner

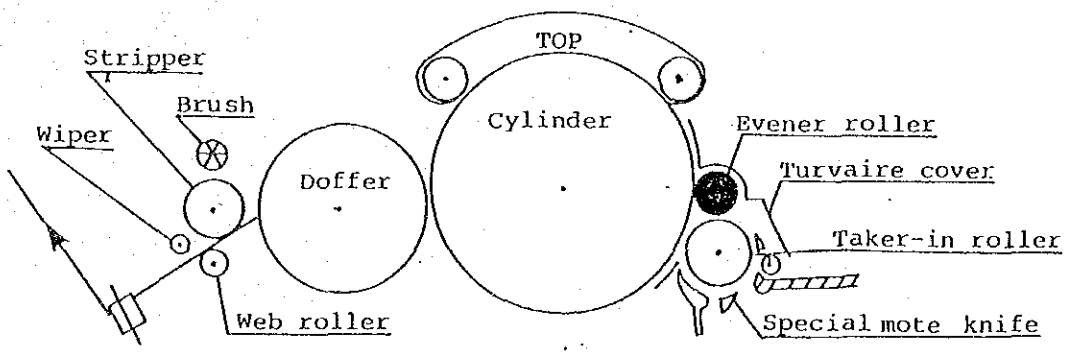
7.4.2 Carding Frames

- Study Team considers it necessary to employ cards with the following new mechanism set in for semi-high production in principle.

- The Fig.7-6(a) under indicates the mechanism of conventional type and the Fig.7-6(b) the new mechanism. That is, an Evener Roller is placed on the upper part of Taker-in Roller, which adjusts the volume of cotton to fed to Top and Cylinder where the main carding is performed and enables to make smooth carding by its preparatory opening function. It results an preventable effect to produce nep being yarn defect.



(a) Conventional Mechanism



(b) New Mechanism

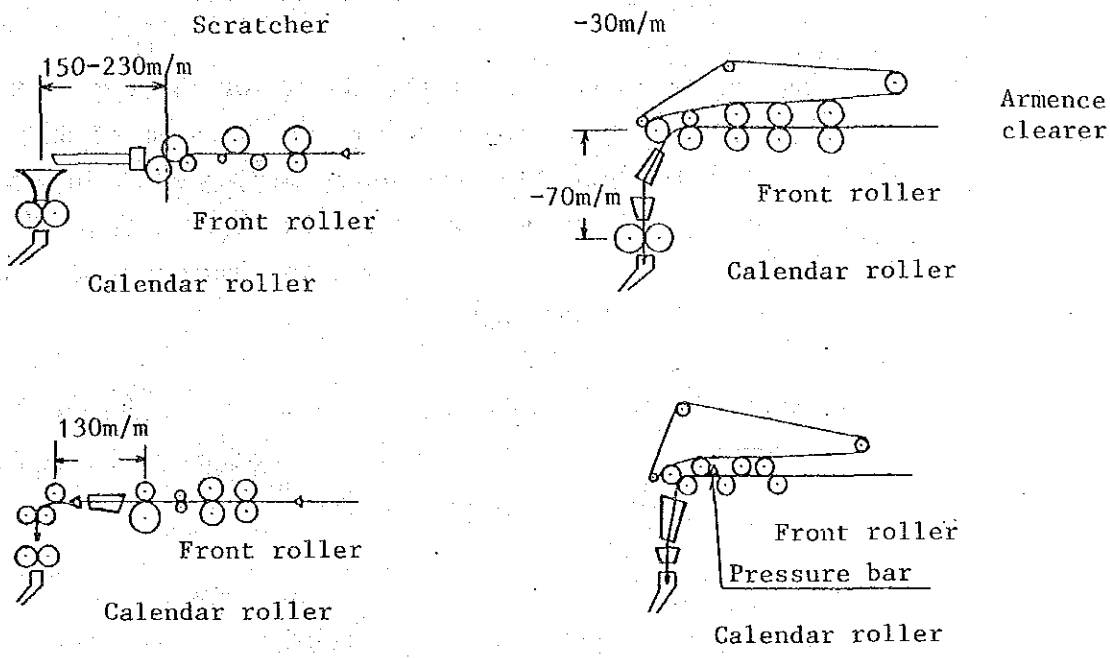
Fig. 7-6 Carding Mechanism

- Data for the number of machines to be required as attached in APPENDIX A-13 tells that reconditioning of 40 set cards could keep the balance of production. Study Team considers that 50 sets of cards should be reconditioned, taking into consideration flexible adaptability for any change of production planning and sufficient maintenance.

7.4.3 Drawing Frames

- Due to an effete roller part in three head passage of the existing 1959-made drawing frames, there is a possibility to produce uneven draft by doubling. According, it is recommended to replace those drawing frames and employ those attached with draft part made with the new technology.

- New Mechanism of Drawing Frames (Fig. 7-7)
  The Fig. (a) shows the conventional mechanism. The distance from Front Roller Nip to Calendar Roller Nip is long, and those frames are drawn horizontally, which are liable to produce defective draft and uneven sliver. To take such defects off, the said distance became shortened. Those frames were revised to be drawn nearly vertically as shown in the Fig. (b) and Pressure Bar was placed forming curve draft, enabling to do sufficient staple control and to get even sliver.



(a) Conventional Draft Mechanism (b) Improved Draft Mechanism

Fig. 7-7 Draft Mechanism

7.4.4 Fly-Frames or Roving Frames

- It is afraid that judging from the passage of years since the existing RS-3 and RM-5 Model roving frames was installed, deflection will occur, accounting for the obsolete lower part of Spindle and the imbalance of flyer. Such the deflection leads to the irregular tension producing uneven slivers.

- As for the mechanism of draft, as shown in Fig. 7-8, the sliver entwists up to front roller nip in case of 4/4 Draft System. With its high speed running, cutting of sliver does not occur and even sliver not so fluffy is available. It is advisable to replace RS-3, RM-5 Model roving frames which became particularly obsolete with new ones.

- For the employment of Bottom Armence Clearers, it is considered that Long Apron should be changed to Short Apron. Finally, the installation will be as follows:

Model	Installation set	Remarks
RM-3	4	Change to short Apron; Recondition of Armence Clearer
RM-5	2	Ditto
RM-100	8	Maintenance
New	3	New frame

- Draft Mechanism of Roving Frames

Fig. 7-8 shows the draft mechanism. It is preferable to plan 4-roller system to 3-roller system. As shown in (a), the main drafting is made between a front roller and a middle roller in the 3-roller system. So throttling by a front collector can not practiced, and the fleece produced by the front roller becomes wide. Entwisting does not work up to the roller nip point, producing a lot of sliver-end with striking fluffy sliver.

- On the contrary, as for the 4-roller system shown in (b), after drafting made, the throttling is made by the collector which prevents from being fluffy on the sliver. Its entwisting extends to the nip point. So, its high-speed operation leads to a few sliver-end, producing quality sliver.

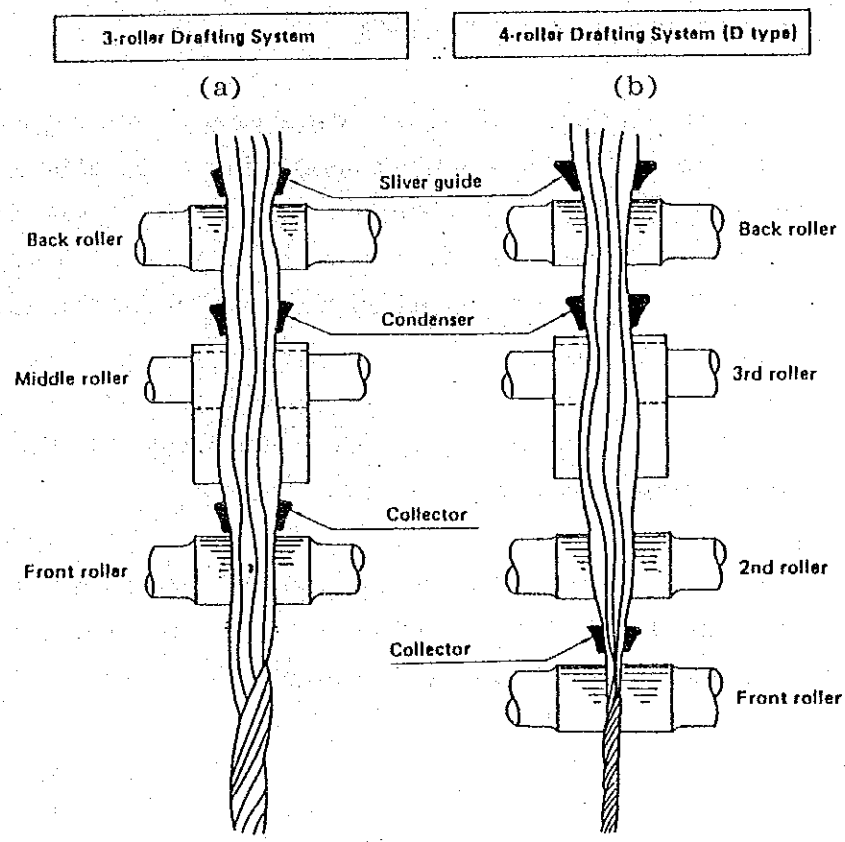


Fig. 7-8 Drafting System

7.4.5 Ring Spinning Frames

- 41 sets of 1959-made S.F. Model ring spinning frames had been replaced with Nitto-type draft mechanism some time ago. The bearing part of bottom roller is made of plain metal. The deflection of roller caused by the worn metal could work against the quality of yarn. So, Study Team considers it indispensable to change to ball bearings and also to replace that draft mechanism to S.K.F. Arm system.

- So far as 31 sets of H.S. Model ring spinning frames in addition to the above machines amounting to 72 sets in total are concerned, Study Team changes from Skewer type creels into hanger type creels. It is the way to prevent from defective draft and uneven yarn caused by irregular sliver tension.

- Furthermore, the plan will have a merit of energy-saving effects and also prevent yarn break accounted for the turbulent air by changing from tin roller to tin pulley.

- Besides, as to rings and spindles, Study Team finds it effective to replace those 16,400 spindles with new ones for reducing yarn break and for increasing productivity.

7.4.6 Winders

- It is desirous that the cleaning will be made effectively by a sufficient function of widers. For this, Study Team thinks that the electronic yarn cleaner works most well. One solution may be in an additional installation of yarn clearer to the existing R.T. winders. But from the necessity of employment of spricers to produce knotless yarn, the existing R.T. winders should be replaced to auto winders. With those installation to be made within the space now in mind, Study Team finds it necessary to limit the adoption of auto winders of 50 drums.

- What is stated above is basic ideas to establish the renovation scheme in the spinning process. The number of those machines to be installed based on this, is indicated in APPENDICES as per attachment.

7.5 Renovation Scheme in Finishing Mill

- Based upon results of technical diagnosis in Medari Mills, Study Team considers that in order to increase and stabilize the quality of cambrics in the Finishing Division, spare parts should be replenished and a partial alteration of mill layout should also be practiced.

Table 7-14 Renovation Scheme of Finishing Division

Machine/Apparatus to be renovated	Descriptions
Rope Type Continuous Bleaching Range	To replace/supplement D.C. motors and to reorganize electric pannel to auto-breake system
Open-width Rapid Bleaching Range	To replace Teflon sheet and to supplement the spare parts
Water Mangle	To replace top rubber roll
Starching Stenter etc.	To supply various spare parts
Improvement of Gas Producer	To change to L.P.G. Gas Producer System
Extension of Grey Cloth Preparing Room	To extend the grey cloth preparing room and to prepare two sewing machines
Steam Piping of Caustic Soda Recuperative Apparatus	To change steam piping line for Caustic soda recuperative apparatus

7.6 Renovation Scheme of Utility Facilities

7.6.1 Electric Power Installation

The capacity of power installation after the renovation is shoqn in Table 7-15.

Table 7-15 Capacity of Electric Equipment

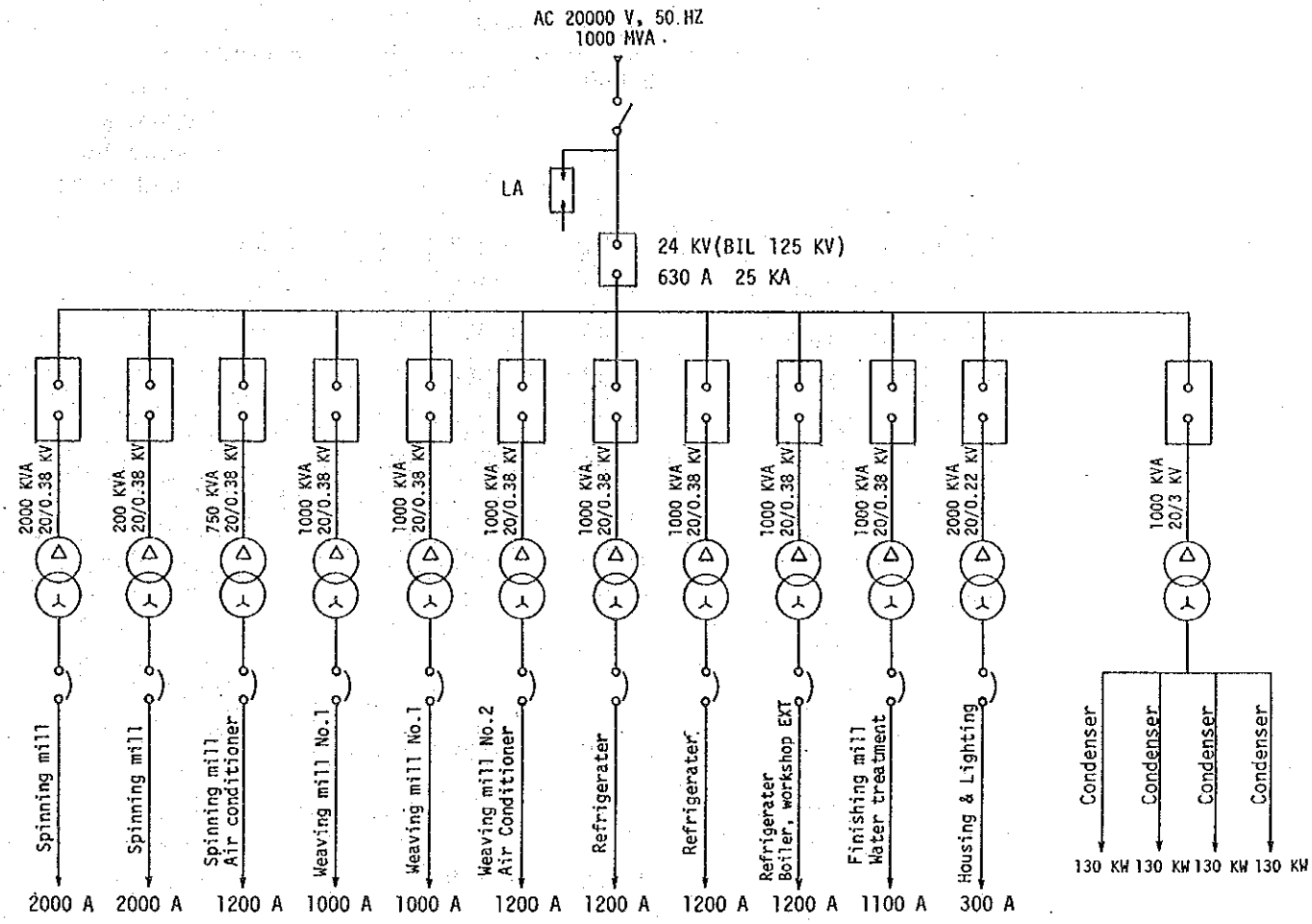
kW

		Existing Capacity	After Renovation		Balance
1	Spinning	1,963		2,378	+415
2	Weaving	853			
	Case 1			1,037	+184
	Case 2			1,314	+461
	Case 3			1,484	+631
3	Finishing	824		824	0
4	Air-Conditioning	A/C 668	Spinning	445	
		Ref. 1,232	Spinning (New)	77.5	
			Weaving 1	250	
			Weaving 2	105.6	
			Ref. (Exist.)	1,232	
			Ref. (New)	375	
	Total	1,900		2,485	+585
5	Boiler	48		70	+22
6	Work Shop	60		60	0
7	Water treatment	205		205	0
8	Lighting	70		100	+30
9	Others	70		70	0
	Total	5,993			
			Case 1	7,229	+1,236
			Case 2	7,506	+1,513
			Case 3	7,676	+1,683

- After the renovation, power receiving equipment for PLN's supply will be scheduled to be in use. The power distribution skelton in this case is indicated in Fig. 7-9.

- It is recommended to leave the existing generators as they are for emergency use.

Fig. 7-9 Power Distribution Skelton



7.6.2 Boiler Equipment

- Following the renovation practiced, consumption of steam, water and fuel oil is indicated in Table 7-16 as below:

Table 7-16 Consumption Table of Steam, Water, and Fuel

		Steam (kg/H)		Water (m^3/H)	Fuel (L/H)	Remarks
		Capacity	Actual			
Weaving	Sizing M/C	3,000	2,400	3		
				2.4		Cooling water for compressor
Finishing	Singeing M/C (Kyoto)	500	250	3	35	
	Singeing M/C (Sando)	500	250	3.5	43	
	J-box (Rope type)	2,500	1,500	12		
	J-box (Open type)	2,000	1,500	12		
	Cylinder Dryer	1,000	700	1		
	Mercerizing M/C	1,500	1,000	53		
	Starching Dryer	1,500	1,000			
	Starching Stenter	1,500	1,100			
	Hot Stenter	1,000	700			
	5 bowl-Calender	100	50			
	7 bowl-Calender	-	-			
	Compressive Shrinking M/C	1,000	500	4		
	Caustic Recuperative Apparatus	1,500	1,300	30		
	Laboratory	2,000	1,000	5		
	Total	19,600	13,250	128.9	78	

- The capacity of the existing boiler equipment is 12,560 kgs/hr, (Table 6-13).

- In case of its 80% efficiency, its capacity drops to 10,048 kgs/hr as against the real consumption of 13,250 kg/hr after the renovation. The deficit is 3,202 kgs/hr. So, Study Team thinks it necessary to install one set of boiler of capacity 4,000 kgs/hr, newly.

- At present, the steam is being fed to water-softening tank for boilers in order to raise water temperature. For energy saving, a heat economizers should be installed in boiler room as drawn in Fig. 7-10.

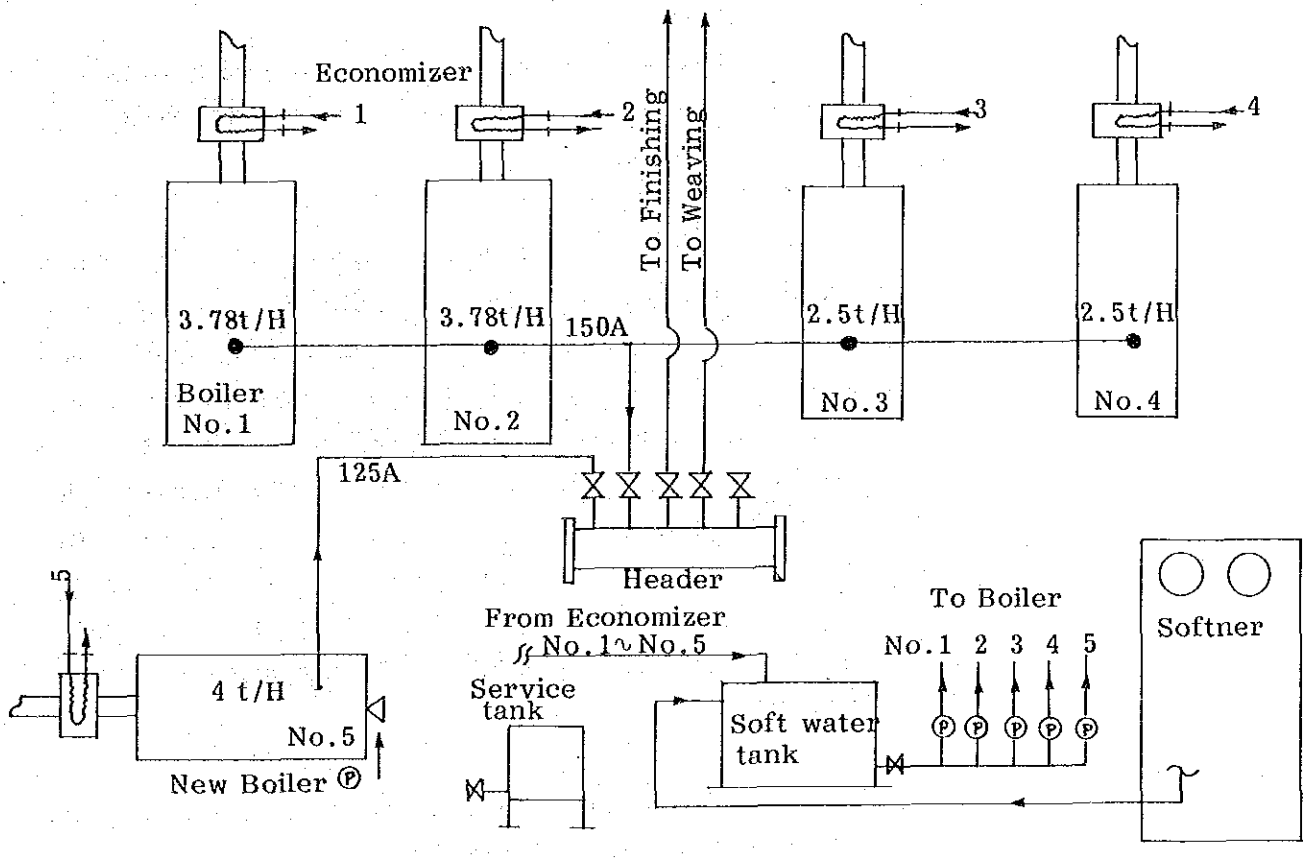


Fig. 7-10 Boiler Equipment After Renovation

7.6.3 Water Treatment Equipment

- Study Team recommends employing the following equipment as a result of water-quality analysis made, as referred to 6.2.3.

  (1) One set of sand filter (capacity 140 m^3/H) will additionally be installed.

  (2) One set of water softener (capacity 20 m^3/H) will newly be installed. The existing water softener will be removed, because of its lowering capacity.

7.6 4 Air Conditioning

- Remodelling plan of air-conditioning equipment is as below:

  (1) Supersaturated-type air-conditioning equipment will be installed so as to raise the relative humidity in opening/picking room.

  (2) It is necessary to remodel the existing whole air-conditioning No.1 & No.2 equipment in spinning process. To be concrete, replacement of eliminator, automatic control line, and spray nozzles will be made, and at the same time one set of chilling unit (capacity: 230 refrigerating tons) will be installed. Furthermore, an undergound return duct will be made so as to keep the flow of return air smoothly in the front spinning process. An air-filter will also attached at the end of return duct, that is, in front of the inlet of air conditioner for the purpose to clean the air.

  (3) The existing air conditioning equipment in No.1 Weaving Mill will be taken off and installed newly a central-type air-conditioning equipment instead.

In order to improve the temperature control in the loom shed, one set of chilling unit (capacity: 370 refrigerating ton) will additionally be installed, and an underground pit for air return will be made.

(4) It is necessary to board a ceiling in the Spinning and No.1 Weaving Mill so as to make the temperature control in the room effectively.

7.7 Necessary Funds for Renovation Practice

- Necessary amount of money needed for renovation is shown for each of the following items classified by hard and soft groups of foreign currency.

- Hard items: Each cost of production machines; supplementary machines; testing instruments; spare parts; erection

- Soft items: Each cost of engineering, supervision for installation; education and training

7.7.1 Production and Utility Equipment (Foreign currency)

Table 7-17 Machinery Cost

Unit: 1,000 yen (FOB Japan)

	Case 1	Case 2	Case 3
Spinning Div.			
Production M/C	1,052,197	1,052,197	1,052,197
Auxiliary M/C	45,500	45,500	45,500
Testing M/C	25,350	25,350	25,350
Spare parts	44,510	44,510	44,510
Erector charge	19,500	19,500	19,500
Sub total	1,187,057	1,187,057	1,187,057
Weaving Div.			
Production M/C	1,100,591	907,605	1,002,764
Auxiliary M/C	25,823	108,106	169,462
Testing M/C	7,330	7,330	7,330
Spare parts	34,250	26,665	24,830
Erector charge	19,500	21,000	25,500
Sub total	1,187,494	1,070,706	1,229,886
Finishing Div.			
Production M/C	4,603	4,603	4,603
Auxiliary M/C	940	940	940
Testing M/C	-	-	-
Spare parts	40,345	40,345	40,345
Erector charge	1,500	1,500	1,500
Sub total	47,388	47,388	47,388
Utilities Div.			
Electricity	178,000	178,000	178,000
Boiler	41,463	41,463	41,463
Air-conditioning	266,000	256,500	256,500
Water treatment	25,575	25,575	25,575
Fire extinguisher	6,640	6,640	6,640
Spare parts	15,700	15,200	15,200
Erector charge	25,500	25,500	25,500
Sub total	558,878	548,878	548,878

Breakdown of Machinery Cost Estimation

(1) Costs of main production machines and supplementary machines to be newly installed or modified are shown in Table 7-18, 19, 20, 21, 22.

(2) Cost of spare parts covers 2-year use of them.

(3) Each cost concerned is calculated based on each price in 1986.

(4) The calculation basis for the cost of supervisors to be dispatched for erection from machine manufacturers is as follows:

Spinning Division	:		13 M/M
Weaving Division	:	Case 1	13 M/M
		Case 2	14 M/M
		Case 3	17 M/M
Finishing Division	:		1 M/M
Utility Division	:		17 M/M

Each cost is figured out based on monthly cost of ¥1,500,000 per person.

7.7.1.1 Spinning Division

Table 7-18 Machinery Cost of Spinning Division

Unit: 1,000 yen (1986, F.O.B. Japan)

Name of M/C	No. of M/C		Amount	Remarks
	New M/C	Conversion		
(Production M/C)				
Opening and picking M/C	-	2 line	127,800	2 lines x 3 scatcher partly replacement.
Carding M/C	-	50 sets	133,250	108 sets to 50 sets (Convert to semi-high production card.)
Drawing Frame	8 Frames	-	43,200	2 passage x 4 sets
Roving Frame	3 sets	6 sets	49,750	
Ring Spinning Frame			(281,662)	
Roller part	-	41 sets	184,750	
Tin pulley	-	72 sets	41,760	
Creel	-	72 sets	9,396	
Spindle			41,656	400 spdls x 41 Frames
Ring			4,100	400 spdls x 41 Frames
Winder	14	-	395,750	Automatic winder with splicer.
(Auxiliary M/C)				
Dust collector	2 lot		45,500	
(Testing M/C)				
Evenness Tester	1	-	13,200	Includes Spectro-graph, and I.P.I.
Degital Fibrograph	1	-	10,900	for raw cotton
Auto-sorter	1	-	1,250	
(Accessories)				
Can	1,400 pcs		16,625	20" dia. x 42" H.
Roving bobbin	13,000 pcs		4,160	

7.7.1.2 Weaving Division

Case 1

Table 7-19 Machinery Cost of Weaving Division

Unit: 1,000 yen (1986, F.O.B. Japan)

Name of M/C	No. of M/C		Amount	Remarks
	New M/C	Conversion		
(Main machine)				
Warper	1		26,545	
Sizer	1		48,620	
Size cooker	1 lot		14,050	
Reaching M/C	6		4,440	
Tying M/C	2		7,550	
Pirn winder	5		60,000	36 spdls/set (No. 1 & No. 2 mill)
Loom	216		871,128	Shuttle loom (R/S 75")
Inspecting M/C	5		16,150	
Folding M/C	2		7,100	
Carrier	1 lot		45,008	
(Testing equipment)	1 lot		7,330	
(Auxiliary M/C)	1 lot		25,823	Includes spare parts for No. 2 mill (25,000)

Case 2

Table 7-20 Machinery Cost of Weaving Division

Unit: 1,000 yen (1986, F.O.B. Japan)

Name of M/C	No. of M/C		Amount	Remarks
	New M/C	Conversion		
(Main machine)				
Warper	1		26,545	
Sizer	1		74,875	
Size cooker	1 lot		14,300	
Leasing M/C	1		3,870	
Reaching M/C	6		5,280	
Tying M/C	2		7,550	
Pirn winder	2		24,000	36 spdls/set (No. 1 & No. 2 mill)
Loom	72		288,216	Shuttle loom (R/S 75")
Loom	50		387,627	Air jet loom (R/S 190 cm)
Inspecting M/C	6		19,300	
Folding M/C	2		10,850	
Carrier	1 lot		45,192	
(Testing equipment)	"		7,330	
(Auxiliary M/C)	"		108,106	Includes spare parts for No.2 mill (25,000)

Case 3

Table 7-21 Machinery Cost of Weaving Division

Case 3 Unit: 1,000 yen (1986, F.O.B. Japan)

Name of M/C	No. of M/C		Amount	Remarks
	New M/C	Conversion		
(Main machine)				
Warper	1		26,545	
Sizer	1		74,875	
Size cooker	1 lot		14,300	
Leasing M/C	1		3,870	
Reaching M/C	7		6,650	
Tying M/C	2		7,550	
Pirn winder	1		12,000	36 spdls/set (No. 2 mill)
Loom	100		775,254	Air jet loom (R/S 190 cm)
Inspecting M/C	8		25,800	
Folding M/C	2		10,650	
Carrier	1 lot		45,270	
(Testing equipment)			7,330	
(Auxiliary M/C)			169,461.5	Includes spare parts for No.2 mill (25,000)

7.7.1.3 Finishing Division

Table 7-22 Machinery Cost of Finishing Division

Unit: 1,000 yen (1986, F.O.B. Japan)

Name of M/C	No. of M/C		Amount	Remarks
	New M/C	Reinforce-ment		
(Production M/C)				
Rope J-Box	-	1	18,892	(Including instrumentation)
Rapid J-Box	-	1	682	(ditto)
Water Mangle	-	1	1,050	
Cylinder Dryer	-	1	196	
Hot Stenter	-	1	1,685	
Starching Stenter	-	1	22,443	
(Auxiliary M/C)				
Sewing machine	2	-	420	
Gas Producer	-	1	520	

7.7.2 Soft Portion (Foreign currency)

Table 7-23 Soft Portion (Foreign currency)

Unit: ¥1,000

	Case 1	Case 2	Case 3
Engineering cost	50,000	50,000	50,000
Erection Supervisors cost	54,000	54,000	54,000
Education/Training cost	101,000	101,000	101,000
Total	205,000	205,000	205,000

Breakdown of Soft-Item Cost-Estimating

(1) Engineering cost sums up to ¥50,000,000, major functions of which are provision of machinery layout, making-up of process chart for replacement of machines in manners to keep the production in a minimum decrease, and making-up of the construction drawings concerning with utility constructions.

(2) Supervisors to be paid under Erection Supervisors' Cost in this category does not mean supervisors for erection to be dispatched by machine manufacturers, but coordinating supervisors for civil/utility/machine foundation work and also for coordination activities between each machine manufacturer.

Spinning Division : 2 persons x 6 months
Weaving Division : 2 persons x 6 months
Utility Division : 1 person x 12 months

One supervisor's cost is estimated as ¥1,500,000 per month.

(3) Education/training cost

- Foreign supervisor

Spinning Division : 2 persons x 12 months
Weaving Division : 2 persons x 12 months
Finishing Division : 1 person x 6 months

One supervisor's cost is based on ¥1,500,000 per month.

- For acceptance of counterparts' trainees in industrialized countries.

6 persons x 3 months

One trainee's cost : ¥1,000,000 per month
plus airway charges, etc. of ¥2,000,000 for 6 persons

7.7.3 Funds to be Raised in Indonesia

Table 7-24 Domestic Funds

Unit: 1,000 Rp

	Case 1	Case 2	Case 3
Inland transportation cost, etc.			
Spinning	170,268	170,268	170,268
Weaving	170,331	153,579	176,412
Finishing	6,797	6,797	6,797
Attached equipment	80,164	78,730	78,730
Civil/Building cost	427,603	499,059	568,247
Erection cost	1,122,883	1,145,568	1,162,581
Contingency	163,000	172,653	181,727
Total	2,141,648	2,226,651	2,344,761

Inland freight and local store cost sums up based on calculation of machines by each Division group in cubic measure unit.

Cost of civil building includes lease cost of heavy machines for construction works.

Breakdown of civil/building, and construction cost is shown in Table 7-25.

Table 7-25 Breakdown of Civil/Building and Construction Cost

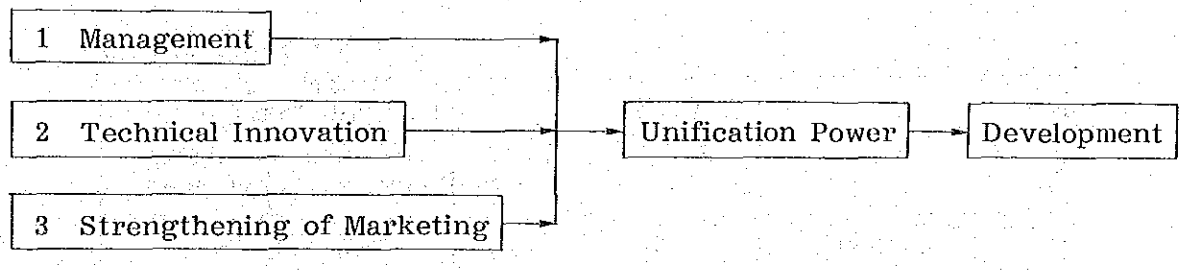
Unit: 1,000,000 Rp

		Civil building cost	Construction cost		
			Labour cost	Electric work cost	Piping work cost
Case 1	Spinning	133	10	185	15
	Weaving	207	20	246	16
	Finishing	-	-	30	8
	Utility	37	17	443	-
	Sub total	377	47	904	39
	Total	377		990	
Case 2	Spinning	133	10	185	15
	Weaving	270	20	246	22
	Finishing	-	-	30	8
	Utility	37	17	457	-
	Sub total	440	47	918	45
	Total	440		1,010	
Case 3	Spinning	133	10	185	15
	Weaving	331	20	246	28
	Finishing	-	-	30	8
	Utility	37	17	466	-
	Sub total	501	47	927	51
	Total	501		1,025	

7.8 Modernization of Management

7 8.1 Management of GKBI

- In order to achieve good success of the renovation in Medari Mills owned by GKBI, mere renovation of the equipment in Medari Mills will not be sufficient. It is desirous to strength the marketing division in Headquarters in order to decide a direction of their management.



- Its operation should be carried out with above three functions being linked effectively one another. If even one of them dropped off, its prosperity will disappear.

(1) Renovation of management

- Many enterprises have been adopting T.Q.C. (Total Quality Control) up to now. The reason for such the trend lies not only in practicing quality control merely, but in checking each duties of their own belonging to respective division from top to bottom for increasing the work efficiency, including administration and sales divisions as a matter of course.

- Staff being engaged in State-run enterprises are inclined to become less cost-minded and quality-mineded. So it is of the great importance to realize revolution in

consciousness thoroughly in competition with private enterprises of the same line.

- To attain this purpose, important is to make an effective reorganization and to do a drastic rationalization in management, mere coasting in management, endangers its existance.

(2) Technical revolution

- Technical advance in the world has made all the industry active and progressive. The textile industry has also made its rapid development in many fields.

- So, at working out the renovation scheme, it is planned to adopt a major plan for employing so-called "revolutionary looms," air-jet looms.

- As air-jet looms are high in productivity and grey cloth processed therein is even in its quality, many countries have been importing those looms more and more.

- Seeing that private enterprises began adopting air-jet looms recently in Indonesia, it is considered that air-jet looms should positively be employed, judging also from the level of textile technology in Indonesia.

- As mentioned in CHAPTER 5, yarn to be fed to those looms should be of even quality. In this respect, the technical level of spinning should necessarily be increased, which requires modernized equipment and a series of education and training of staff members to operate those improved machines satisfactory.

(3) Marketing

- GKBI is an organization producing Cambrics for Batik use, and its production of general cotton cloth is limited.

- In case of Medari Mills, Buffing Cloth is being exported to the U.S.A., and the said cloth is being sold through Japanese trading companies.

- Taking such situation into consideration, Study Team propose the renovation scheme with product-mix in which general cotton cloth to be produced for export is included.

- This scheme aims at promoting its full-scale export. So, suitable organization for exports has to be organized from now on.

- Furthermore, Study Team considers it indispensable to understand needs of exporting countries, to collect effective information in exports, and to endeavor to plan and cultivate exporting goods with a group of experts in planning devision and development division.

- For the time being, GKBI could be dependent on traders' marketing staffs and sales forces, making its foundation for marketing instead.

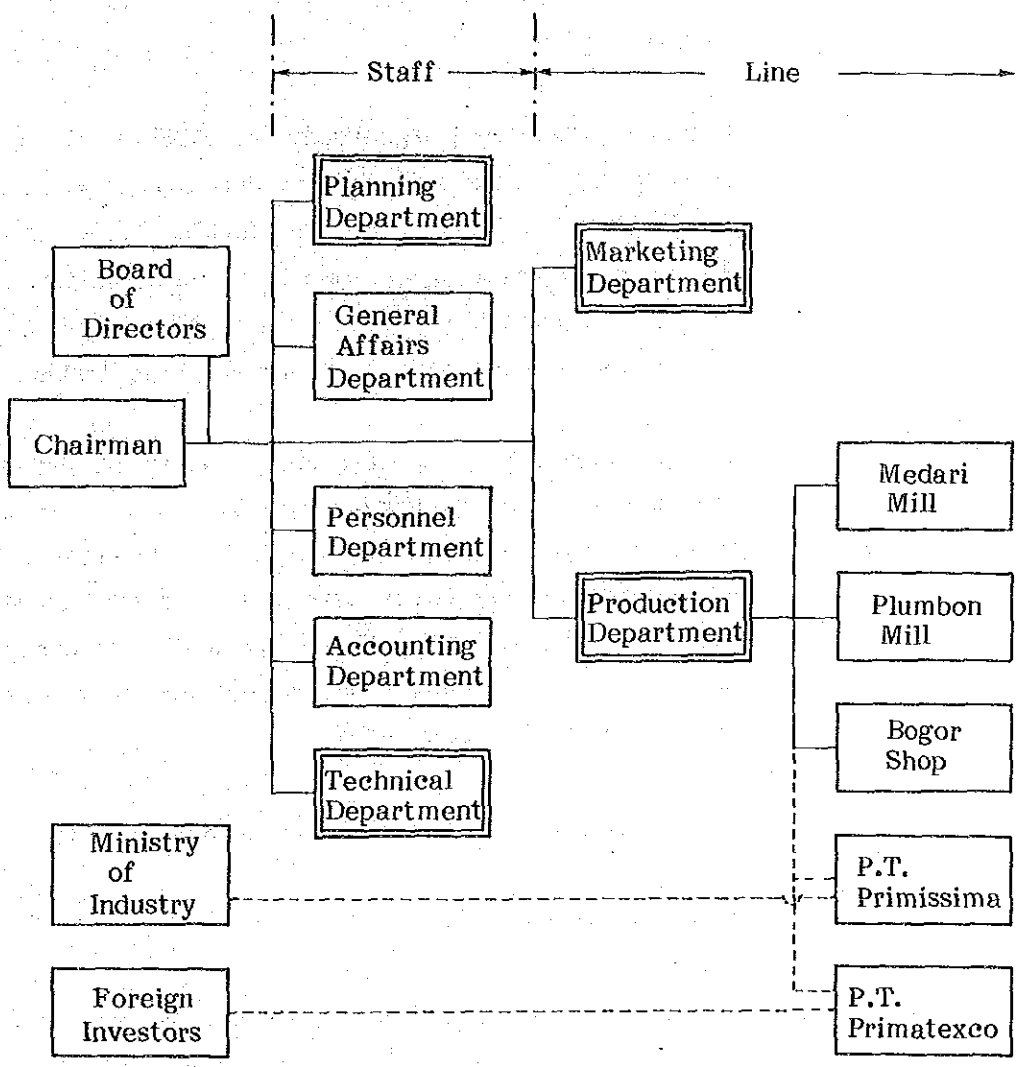
- GKBI must make up its unique organization for marketing, planning, cultivating, and sales in the future.

- To facilitate such, Study Team considers that, if possible, one of the effective ways will be in dispatching

prospective staff members from GKBI to trading companies for receiving sufficient training.

(4) Typical Organization Chart

A typical organization chart is shown hereunder :



Organization of productin companies are usually divided into two functional groups, namely, Line Division which is in charge of production and sales, and Staff Division which shall assist Line Division to make them work effectively and efficiently.

This organization is called "professionally functioning organization." There is other organization which is "independent accounting management organization." Judging from present situation of GKBI, renovation of managerial organization is necessary and it will be appropriate to adopt "professionally functioning organization." In functional organization, intent and will of top management can be transmitted in fast manner down to working level and professional staff can be educated and fostered rather easily.

It seems that present organization of GKBI is not divided properly to staff division and line division and responsible persons are not well defined. Departments in double frame in the typical organization chart are important departments in view of managerial operation. It seems that these departments are not well defined nor functioned well in GKBI organization.

After renovation of Medari Mill, variety of products will be increased and most of the products are planned for export. It is recommended to establish marketing department as a line organization within GKBI Headquarter as well as strengthening production department. Further as staff organization, planning department and technical department are to be established as means to fulfil functions of staff.

Job description of each department is to be as follows :

Marketing Department

. Market research activities	:	Understanding of market trend, sales planning, product planning etc.
. Sales activities	:	Overall adjustment of short term and long term planning

. Advertising activities : Overall coordination regarding sales promotion

Sales activities will be main work of Marketing Department, however, market research activity is also important role.

Following work will be included in market research activities.

- Information on demand of currently available products in market and forecast of its potential demand
- Understanding of taste of consumers and buying pattern
- Information on change of consumer's needs
- Follow up of chronological change of market share
- To maintain competitiveness of price and quality with other companies
- Trend of technical development
- Trend of oversea market
- Understanding of the governmental policy of textile industry

Based on information obtained through marketing activities as mentioned above, Marketing Department should advise to staff departments and line departments as for production plan and sales plan to achieve optimum profitability of GKBI as a whole. Marketing Department should also furnish information to Planning Department in order to formulate future planning of GKBI.

In establishing Marketing Department, it is recommended to receive guidance of wholesalers as far as possible and to formulate a practical organization.

Planning Department

- Establishment of short term and long term management policy and business development plan based on the results of market research and the results of technical innovation.

Planning Department is to plan management policy incorporating managerial strategy of short term and long term after having reviewed managerial problems presented by line departments. Planning Department is a department to be strengthened in addition to Marketing Department.

It is imperative to assign competent staff who are capable of exercising overall judgement on managerial matters. Since this department will function as nucleus of the company, it is necessary to train capable staff selected from GKBI organization and to be prepared themselves for the future.

Production Department

- Planning and administration work (Coordination of production plan with sales plan, delivery control and administration, formulation of production plan)
- Production work (Equipment administration, schedule control, quality control, etc.)

Main role of Production Department is to produce specified quality products at competitive price within specified time schedule in accordance with management policy. Production Department should plan production program based on sales plan of Marketing Department and instruct the mills to fulfill the specified production.

Technical Department

Development	:	New technology, new products
Technical Control	:	Overall technical control including that of utility facilities

Technical Department should grasp and follow technical trends on international basis, and be actively engaged in development of new products utilizing new technology. Technical Department should also furnish technical information to Productin Department.

7.8.2 Management of Medari Mills

Study Team referred to the organization of Medari Mills in CHAPTER 5. The following matter is one of ideas how to improve the imbalance in age distribution of employees at present.

The adjustment of employment is a hard task, indeed. Much harder is to adjust employment, particularly, in the state-run enterprise, because of its policy saddled for promoting employment.

- At this stage, it will be essential to activate the factory under modernized personnel control and to reorganize all the systems hitherto applied therein for its stabilized growth.

- It is needless to say that, without positive cooperation and humanism oriented approach by a personnel administrator, the mill management of GKBI's headquarters and the Government's support, those measures will result in vain.

- In its adjustment, the retirement of too many employees at a time should, by any means, be avoided.

- A tentative staffing plan and measures is drawn to be fitted in Medari Mills, expecting to put this matter into practice in a systematic way.

1988: Employment of workers for construction of renovation work will be made on the assumption that those workers above will be employed by Medari Mills in the future, and those screening will be made by taking their age structure into consideration. In this case, the number of new employees will be determined in comparison between the present number of enrolled staff (Table 5-17) and the number of such staff after the renovation (Table 5-18).

1989: Employees will, temporarily, become excessive in number. This shall be adjusted by adopting the layoff system matched with the training progress of newly joined employees.

1990 In case any employees who desire to retire prior to their retirement limit, necessary solution shall be made by adding the special allowance to the due retirement pay.

1991 In the event the Mills judges it necessary to keep employment of some workers in spite of their retirement age from the standpoint of job description and staff lineup, the Mills will extend their job upon their agreement.

Study Team advises adjusting staff lineup of Medari Mills based on the above framework, and getting the staffs and the workers to be well balanced in their age group systematically.

CHAPTER 8 PROJECT IMPLEMENTATION SCHEDULE

8.1 Basic Points of View

- Study Team considers that with the use of, what is called, I.E. Method (Industrial Engineering Method), the project should be put into practice in such manners as to minimize the production decrease in the existing mills under operation and to save every possible idleness.

- Every careful attention should paid to the making of procedure and schedule for the renovation implementation work.

- The following premises and preconditions for executing the renovation program are considered.
  Order placement for machines (contract award) September, 1987
  Machine arrival at the site June, 1988. Accordingly, implementation schedule is prepared for each division group including the construction plan to be effected prior to the arrival of machines at the site as follows:

8.2 Divisional Procedures to be Taken on Priority Basis

8.2.1 Weaving Division

- Study Team considers that the implementation of renovation should be done keeping the production of preparatory machines firmly, in order to maintain the operation in No.2 Weaving Mill.

- The procedures for removal and transfer of operating machines, and erection of the new machines are as the following:

Table 8-1 Renovation Procedure

Step	Procedure
1	Evacuation HOWA loom 500 sets
2-1	Transfer MURATA pirn winder 22 sets and bobbin cleaner 1set
2-2	Evacuation ISHIKAWA pirn winder 3 sets
3	Transfer KAMITSU winder 10 sets (spinning section)
4-1	Evacuation KAWAMOTO warper 1 set
4-2	Transfer KAWAMOTO warper 1 set (Case 2 and Case 3)
4-3	Transfer SCHLAFORST warper 1 set (Case 2 and Case 3)
5	Evacuation BABA hot air sizer 1 set
6	Erection new winder 14 sets (spinning section)
7	Erection new warper 1 set
8-1	Erection new sizer 1 set
8-2	Evacuation cooking tank 4 sets
8-3	Erection new cooking tank 3 sets
9	Erection new pirn winder Case 1, 5 sets Case 2, 2 sets Case 3, 1set
10	Erection new loom Case 1, shuttle loom 216 sets Case 2, shuttle loom 72 sets and air jet loom 50 sets Case 3, air jet loom 100 sets
11	Transfer GH-8 R/S 56" 12 sets
12	Transfer TODO reaching m/c 5 sets
13	Erection new tying m/c 2 sets
14	Erection new reaching m/c Case 1 and Case 2, 6 sets Case 3, 7 sets
15	Erection new leasing m/c 1 set
16	Transfer inspecting m/c 6 sets
17	Transfer folding m/c 2 sets
18	Erection new inspecting m/c Case 1 and Case 2, 6 sets Case 3, 8 sets
19	Erection new folding m/c 2 sets