Table 6-12-7 (1) Record of Sectional Drive

(1983/1984)

Date	Paper load (g/m²)	Feeder AC (V)	D.C. Power source (V)	(A)		Speed	Wire parts: Wire drive (V)	(A)	Draw		Dandy (A)	Suction couch (V)	(A)		Press parts: Suction press (V)	(A)	Draw		Wringer R. (A)	No. 2 press (V)	(A)	Draw		No. 1 Dryer (V)	(A)	Draw
4:00 Nov.23,'83	50	223	210	30		144	183	28	6100		1.5	151	25		192	34	7799		16	182	40	5000		165	19	3900
Jan.13,'83	Eagle	228	218	31		147	178	18	7880		1.2	150	22		202	50	7300		19	180	35	5000		168	20	3800
8:00 Mar.12,'84	Silver bird 25	229	222	31		146	180	21	7200		1.4	150	20		222	41	8060		20	181	35	5050		163	15	4650
12:00 Mar.12,'84	Golden bird 25 – 26	229	222	31		146	149	22	7400		1.4	149	25		199	39	7700		20	177	35	5100		165	16	4,600
Mar.19,'84	G.B. 25	227	222	30.2		140	176	24	6500		1.3 ~ 1.4	146	21		193	38	6900		19	180	34	5000		165	16.5 ~ 17.5	4150
Mar.'84	Bendrol 40	223	212	31		94	118	17	8900		1.4	99	18		137	40	9200		21	120	30	5000		110	15	3900
Rating of motor								22kW 110A			0.75kW 4.15/3.95A		22kW 110A			15kW 75/74.5A			11kW 57/56A		15kW 75/74A				3.7kW 19.5A	

Date	Chemical press (V)	(A)	Draw	No. 2 Dryer (V)	(A)	Draw	Breaker stack (V)	(A)	Draw	No. 3 Dryer (V)	(A)	Draw	Marking press (V)	(A)	Draw	No. 4 Dryer (V)	(A)	Draw	Reel drum (V)	(A)	Draw	Total
4:00 Nov.23,'83	171	5	5700	182	16	3700	-	-	-	182	14	4200	198	14	8100	170	14	4950	181	14	3200	
Jan.13,'83	177	5.5	5850	188	17	3150	-	-	-	178	14	3550	195	16	7900	177	20	4400	180	17	8456	
8:00 Mar.12,'84	175	6.1	6400	190	22	3650				180	14	4400	199	18	7650	172	19	5100	181	17	2650	
12:00 Mar.12,'84	170	5.0	6500	187	20	3700				170	19	4200	200	18	7650	180	20	5300	179	18	2950	
Mar.19,'84	175	6.5	6650	185	17.5 ~ 18.5	3790	-	-	-	1.82 ~ 185	14.5 ~ 15.5	4345	195	16	7620	175	18 ~ 19	7250	182	15	2750	
Mar.'84	112	2.2	6700	122	19	2615	120	7	5050	121	13	3500	120	13	6500	111	12	4350	126	20	1950	
		5.5kW 28.5A			3.7kW 19.5A			5.5kW 28.5A			3.7kW 19.5A			11kW 57/56.5A			7.5kW 38.5/38A			7.5kW 38.5/38A		133.85kW

Note) Draw: Position of draw adjuster

Table 6-12-7 (2) Record of Sectional Drive (No. 3 Paper Machine)

(1975)

% = (Each part speed/Wire speed m/min x 100

Draw: Position of draw adjuster

Date	Paper kind (g/m²)	Feeder A.C. (V)	D.C. Power (V)	D.C. Power (A)	Master speed (m/min.) Set speed	Master speed (m/min.) Speed	Wire parts: Wire drive (V)	Wire drive (A)	Wire drive Draw	Wire drive (%)	Dandy (A)	Dandy (A)	Dandy Load Adjuster	Suction Couch (V)	Suction Couch (A)	Suction Couch Load Adjuster	Suction Couch (m/min)	Suction Couch (%)	Press parts: Suction press (V)	Suction press (A)	Suction press Draw	Suction press (m/min)	Suction press (%)	Wringer roll (A)	Wringer roll Load Adjuster	No. 2 Press (V)	No. 2 Press (A)	No. 2 Press Draw	No. 2 Press (m/min)	No. 2 Press (%)	No. 1 Dryer (V)	No. 1 Dryer (A)	No. 1 Dryer Draw	No. 1 Dryer (m/min)	No. 1 Dryer (%)
16:00 Oct. 1	Sigaret 24	210	219	30	75	79	100	30	4200	74.58	100	2	57	89	29	29	73.69	93.80	100	30	4500	74.22	100.18	19	67	110	42	5000	79.11	106.07	110	14	4900	80.22	107.56
					(10/10 speedmeter adjust.)																															
20:00 Oct. 12	Sigaret 24	220	219	30	78	83	100	32	4200	74.25	100	2	56	90	32	32	73.37	98.81	100	30	4520	74.43	100.24	20	70	110	41	5000	78.75	106.06	110	14	5400	80.57	108.51
14:00 Oct.14	Doorslag 29.5	214	219	30	91	95	118	30	5300	87.85	100	2	54	103	29	30	85.99	99.02	121	42	5600	88.24	100.44	15	66	125	56	5000	91.22	103.83	122	16	4160	91.72	104.40
4:00 Oct.15	Doorslag 29.5	220	219	30	100	107	130	30	5300	97.90	100	1.8	53	113	30	28	96.90	98.97	130	34	5600	98.28	100.38	20	68	139	45	5000	102.23	104.42	130	13.5	4150	102.23	104.42
8:00 Oct.22	Doorslag 29.5	218	219	30	110	117	141	32	5300	106.89	100	1.8	53	122	29	28	105.57	98.84	143	34	5600	107.30	100.46	22	73	150	45	5000	111.48	104.38	150	16	4150	111.55	104.41
8:00 Nov.11	H.V.O. 50	220	219	30	85	87.5	110	35	6700	84.47	100	1.5	50	95	30	27	83.63	99.00	110	36	7000	84.74	100.31	22	64	110	45	5000	85.96	101.76	110	13	3600	85.18	100.84

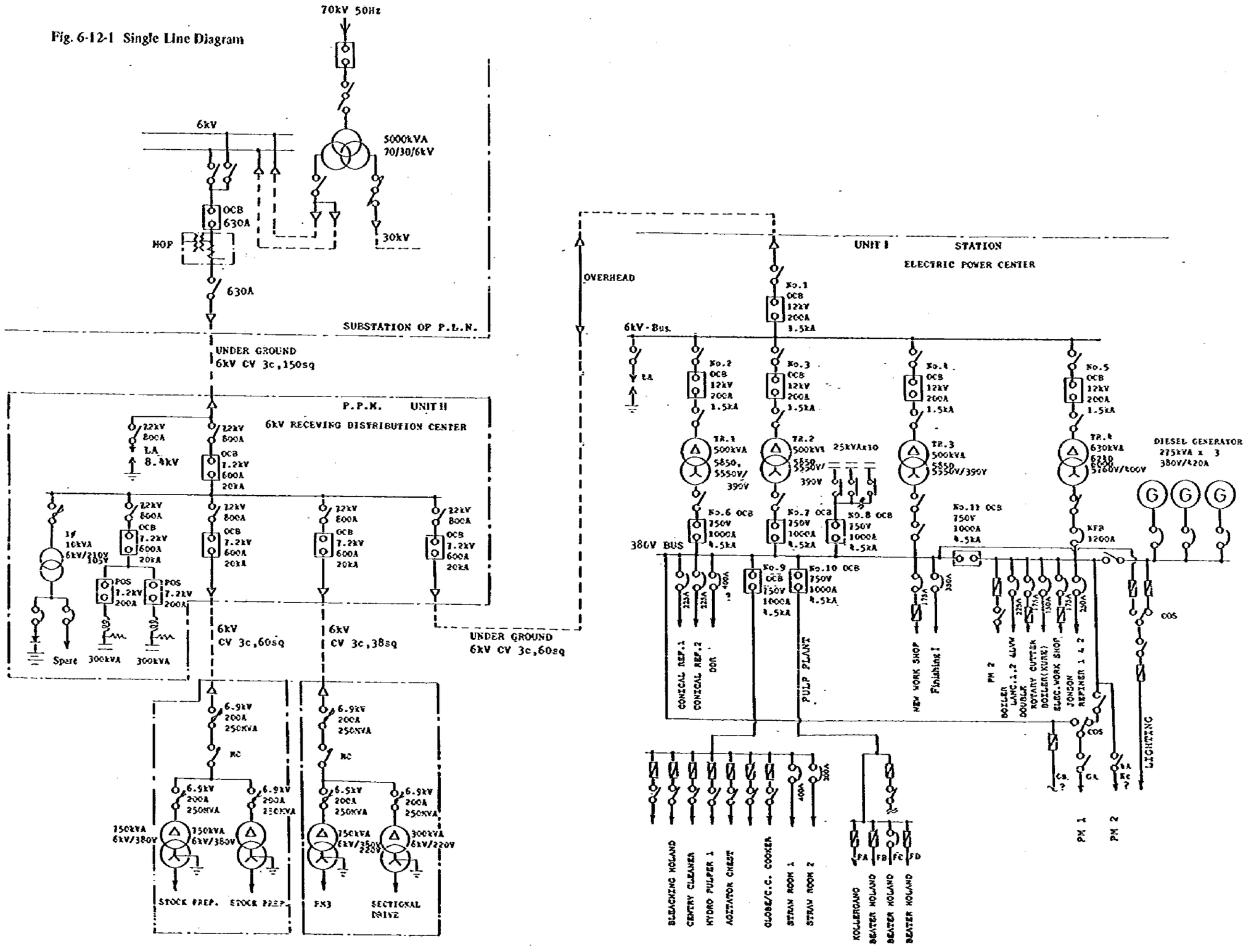
Chemical Press (V)	(A)	Draw	(m/min)	(%)	No. 2 Dryer (V)	(A)	Draw	(m/min)	(%)	Breaker stack (V)	(A)	Draw	(m/min)	(%)	No. 3 Dryer (V)	(A)	Draw	(m/min)	(%)	Marking press (V)	(A)	Draw	m/min	(%)	No. 4 Dryer (V)	(A)	Draw	m/min	(%)	Reel drum (V)	(A)	Draw	(m/min)	(%)
105	5	5290	81.29	108.99	115	14	4500	80.95	108.54	100	3	6000	83.37	111.78	100	9	39.50	80.51	107.95	120	37	62.50	83.42	111.82	105	13	4700	81.73	109.58	113	18	4195	82.35	110.71
108	5.8	5700	81.51	109.77	118	17	4900	81.14	109.27	100	3	6305	83.42	112.35	111	16	4275	80.53	108.45	120	33	6700	83.69	112.71	101	15	5110	81.78	110.14	112	17	4330	82.16	110.65
119	2.5	5700	91.87	107.99	128	15	3445	92.07	104.80	125	9	6000	93.02	105.88	122	13.5	3350	92.12	104.86	119	3	6400	97.27	110.72	122	20	4345	93.63	106.57	125	18	3670	94.13	107.14
130	2.5	5700	105.68	107.94	140	15	3455	102.56	104.75	139	7	6000	107.46	109.76	130	10	3350	102.82	105.02	130	3	6400	108.35	110.67	132	18	4270	104.51	106.75	145	24	3770	105.13	107.38
142	2.5	5700	115.24	107.90	150	15	3455	111.86	104.73	149	7.5	6100	117.00	109.55	140	10	3240	111.76	104.64	143	3.5	6400	118.01	110.49	143	16	4130	113.55	106.32	150	16	3610	114.26	106.98
110	4	5750	89.04	105.41	115	14	3000	85.72	101.47	110	9	5700	90.01	106.55	105	11.5	2755	85.59	101.32	105	2.5	6200	86.72	102.66	105	9	3590	87.04	103.04	119	22	3300	87.36	103.42

Table 6-12-8 Test Instrument & Tool Set

(EXISTING)

No.	Name	Specification		Q'ty	Explanation
1	Tacho-meter	UKS/Tokyo	100 – 400 rpm 300 – 1200 1000 – 4000	1	OK
2	V-A meter (AC)	Germany	0 – 30, 100, 300, 1000A 0 – 100, 300, 1000V	1	Damage
3	Ditto	China	0 – 50, 250, 1000A 0 – 300, 600V	1	OK
4	Megger tester	H.B/Germany	1000V	2	OK
5	Universal Counter	TAKEDARIKEN	TR-5103 DC – 3.2 MHz	1	OK
6	Ditto	Ditto	TR 5104G	1	Damage (Earth)
7	Syncroscope	IWATSU,	SS-4200M DC-15MHz 2CH Serial 1363055	1	OK
8	Multi tester	HIOKI,		3	OK
9	Insulating tester	YEW,	500V	1	OK
10	Ditto		1000V	1	OK
11	Earth tester	YEW,	Type 3235	1	OK

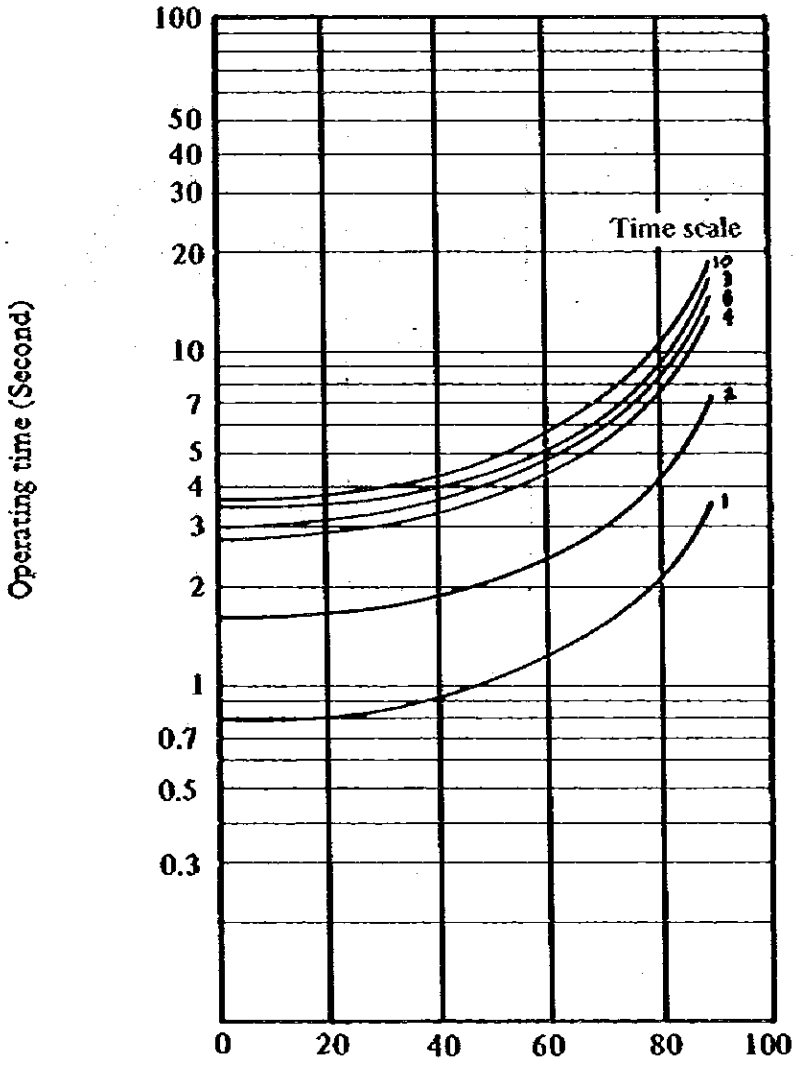
Fig. 6-12-1 Single Line Diagram



2550kVA

Fig. 6-12-2 Under Voltage Relay Characteristic Curve

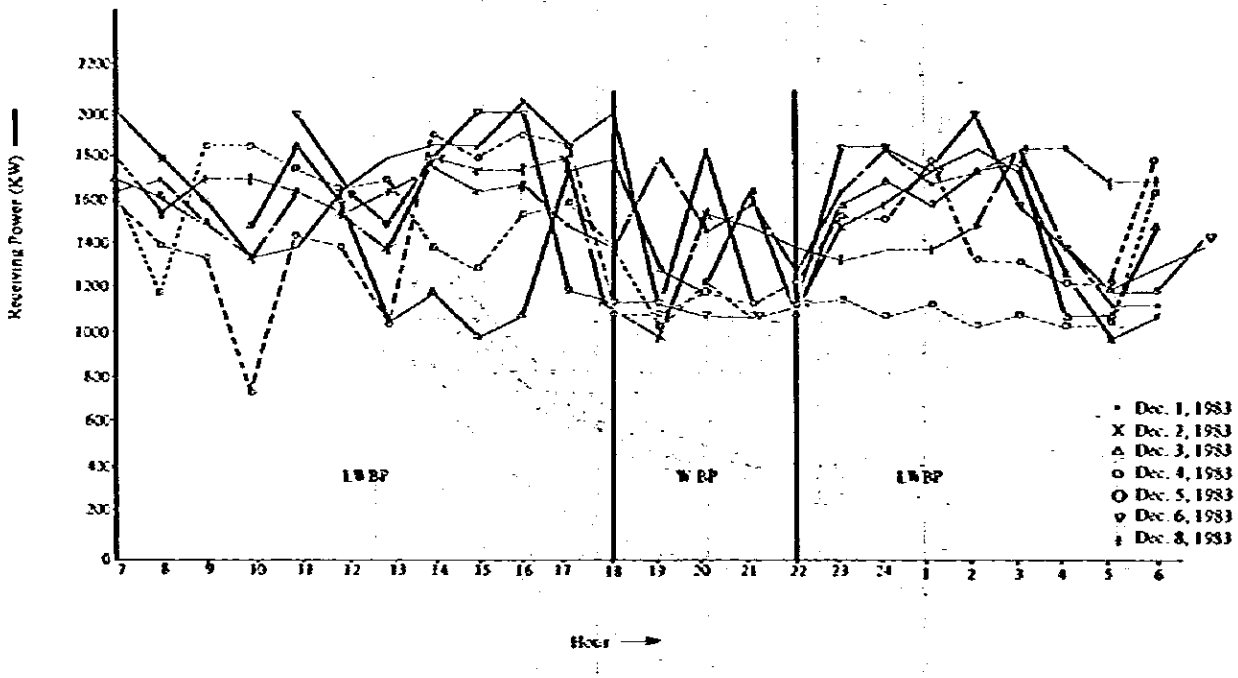
Shape CV-UC-□, Shape CV-UC3-□(Under voltage detection)



Note: 60 - 80V 10VA 50Hz

OMRON

Fig. 6-12-3 Daily Load Curve



6-13 Instrument Section

The instruments installed in this mill are relatively little, and composed of 7 loops for Unit I and 40 loops for Unit II.

The greater part of instruments of Unit I are not effectively used due to problems on trouble or handling.

The most part of instruments of Unit II are pneumatic type level indicators for tanks and chests.

The consistency regulating controller at the machine chest that is the most important instrument for production of paper of superior quality is found in the condition not enabling to say that a good control is being conducted.

On the other side, in the sphere of equipment control it may be found that such instruments are little, measuring instruments and tools are hardly found, and are in the condition that the sufficient maintenance cannot be performed.

The training of instrument personel such as use of Maintenance Manual, ledgers of Equipment Control, operation etc., as well as design technique destined for the equipment instrumentation, etc. is required.

In the renovation reconstruction work the performance raising of every consistency regulating controller and the arrangement or the establishment of mass volume instruments should be performed.

6-13-1 Outline of Instrumentation

1) Present conditions of Unit I

Unit I (Pulp Plant and PM 1, PM 2 group) is old equipment of 50 – 60 years and was equipped with only the minimum field indicators, but during the rehabilitation work in 1973 and new installation work of PM 3 in 1975, some local type instruments were added.
The main gauges are as follows. See the renovation flow sheets.

- Steam flowmeter for No. 4 boiler (Kure)
- Inline type stock consistency recording controller (CRC) to beater
- Inline type CRC, PM 1 and 2 machine chest inlet
- Steam flow recorder, PM 1 and 2
- Open type stock CRC, PM1 machine chest outlet (this was moved from Unit II (PM 3))

But all the instruments except the steam flow recorder for No. 4 boiler are not effectively used because of failure, or equipment and handling problems. The operation often depends on the experience and instinct and it is considered that both the production amount and quality are seriously affected, and it is necessary to service the existing instruments and to promote further instrumentation.

2) Present conditions of Unit II

Unit II (PM 3) was equipped with panel centralized type instruments centering on pneumatic instruments at the time of new installation, and the instruments are not so old and can withstand the use even now.

The main instruments are as follows.

- LIA 24 sets
- LIC 3 sets
- PIC 1 set
- PC 2 sets
- Wire guider 1 set

- Felt guider 7 sets
- Inline type CRC at machine chest outlet

(It was open type CRC in the beginning but it was replaced by EUR product and the removed one was moved to PM 1.)

- Solenoid valve for hydraulic operation, doctor oscillating unit
- Compressed air source for instruments

6-13-2 Problems with Organization and Control of Instruments and Countermeasures

1) Organization

9 persons including instrumentation chief. 3 persons are older than 30 years old (service of more than 10 years) and the remaining have the service of more than 3 years.

(1) 5 persons are assigned in the instrument shop and 4 persons in PM 3.

(2) 1 staff is in charge of design work of instrumentation and also in charge of electric..

(3) It is considered that the number of person is sufficient for the number of instruments installed.

2) Instrumentation control

As in the case of the electrical section, the following points seem to be the problems.

(1) The instrumentation tools, testing equipment and gauges are almost none, and the servicing, calibration and good or bad judgement of the instruments are not achieved nowaday.

(2) Instruments list, operation standard and job standard are not provided or used.

(3) It is necessary to raise the level of the maintenance knowldge of the instrumentation persons on the instruments and the designing technique for new installation and modification.

Countermeasures

Since the description in 6-12-3, Electrical Section also applied to the instrumentation, the details are omitted here.

- It is necessary to promote the productive maintenance by preparing the list of each instrument which should also be used for history recording, determining rational maintenance cycle by ranks in accordance with the degree of importance and preparing a manual to show the inspection and care details. Also needed are basic education on technique, QC and safety.

6-13-3 Controlling Instruments in Process Industry

This mill has only a few controlling instruments and many of the field-mount type instruments are not properly maintained or calibrated.

It is desired to introduce the controlling instruments to stabilize the important points in paper making, such as stock consistency, moisture content of paper and basic weight. It is also necessary to introduce and service the instruments to control production or quantity such as supply quantity of straws, flow rate of stocks and steam flow rate, etc.

Countermeasures

(1) Belt scale should be installed to grasp the supply quantity of straws.

(2) New installation of flowmeter for the stock at unbleached pulp vibrating screen inlet of Unit I

(3) Introduction of basis weight and moisture meters to measure the final quality of paper is helpful in increasing the competitive power in the market. However this meter is very expensive and it may be difficult to introduce it, but at least it is recommended to introduce a 3-color infrared moisture meter which can make fixed point measurement in the online flow direction.

(4) Servicing of the steam flow recorders now being used in PM 1 and 2 of Unit I.

6-13-4 Problems with Instrumentation Equipments and Control thereof and Countermeasures

1) Unit I, CRC is not fully utilized

(1) The CRC transmitter at the outlet of PM 1 machine chest is of open vane type made by Yamatake and it may be usable if the pressure fluctuation of dilution water or lack of water are solved, the controller is serviced and the air leakage in the transmitter is amended, but high accuracy cannot be expected with this equipment because of the head tank construction and rotary vane shape. In the future, it is recommended to change it to the flow shown in Fig. 6-13-1 as in the case of Unit II.

(2) The CRC-3-14 transmitter at the outlet of the finish stock chest of own pulp is installed in the main piping and has such problems as being directly affected by flow fluctuation and fluctuation in dilution water. Therefore, it is necessary to review the fresh water line to reduce the pressure fluctuation of the dilution water, a key point for consistency control.

(3) PM 1 machine chest inlet CRC 5-1-2
PM 2 machine chest inlet CRC 5-2-2

They are not used because the flow is partially changed or it is necessary to solve the same problems as stated above.

2) Steam flow recorder in Unit I, PM 1 and 2

Both transmitter and recorder are deteriorated and it is necessary to repair them by purchasing repair parts

3) Unit II, machine chest outlet CRC

The present consistency control is not providing good results. Inline type consistency transmitter made by EUR-CONTROL is used and it has a structure which is not easily affected by the flow rate, but there is a limit. The piping size and installation position of dilution water piping seem to be all right, but inability to control is occurring from time to time in view of the recording situation of the recorder.

The causes seem to be:

(1) The stock consistency in the chest sometimes exceeds the controlling range of the consistency controller. (Some operator may be unaware of the occurrence of a consistency fluctuation)

(2) The dilution water sometimes does not mix uniformly with the stock.

– Pressure fluctuation of dilution water and insufficient supply capacity.

– When the pressure of the dilution water is high, the dilution water flows into the piping in the state of jet flow and runs separately from the stock.

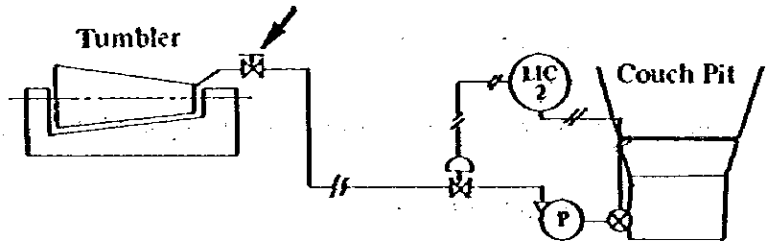
(3) The consistency transmitter is affected by the flow rate and the measured value is apparently changed. When the pressure of dilution water is too high, the consistency is detected apparently high, being affected by the flow rate, and the control is made to increase the opening of the dilution valve, thus decreasing the consistency.

Countermeasures

Presently the water pressure is about 3.7 kg/cm^2. It is recommended to install a dedicated head tank to decrease the water pressure and make it constant. Also necessary is the consistency control before the machine chest so that the consistency in the machine chest will not exceed the specified value. Recently, in order to aim at high accuracy, open type consistency transmitter is generally used, structure of head tank is improved, circulating pump is installed to minimize the quantity returning to the machine chest, and the overall flow is improved. In this mill, too, it is recommended to change the model to the flow shown in Fig. 6-13-1 (1).

4) Unit II, couch pit level control (LIC)

The operation of the couch pit level controller is normal, but the level control is not normally done because the manual valve at the tumbler inlet in the following figure is throttled (due to insufficient capacity of tumbler).



Countermeasures

The insufficient capacity of the tumbler should be coped with by installing a thickener. Automation of water filling in the couch pit during sheet break, intermittent operation of agitator and use of pump agitation should also be planned. The flow is shown in Fig. 6-13-1 (2).

6-13-5 Countermeasures and Summary

1) For the instrumentation, special emphasis should be placed on the consistency controller and modernization should be promoted by purchasing and installing the recommended instruments listed in 1 of the attached sheet.

2) For the maintenance instrumentation, the instruments for maintenance recommended in 2 of the attached sheet should be purchased and utilized.

3) Also recommended is the manufacture or purchase of instrument adjusting table and necessary tools.

1. List of Recommended Instruments

(1) Consistency recording controller (open type)

For stock at PM 3 machine inlet with control valve (Consistency 4.74/4.5%) ..... 1 set

(2) Consistency recording controller (inline type)

(2)-1 For stock at Unit I unbleached pulp vibrating screen inlet with control valve (Consistency 3.5/3%) ..... 1 set

(2)-2 Unit I NL, SBKP line

For stock at refiner chest outlet with control valve (Consistency 4/3.5%)..... 2 sets

(2)-3 Unit I B, RPI, II line

For broke chest No. 1, No. 2 stock (Consistency 3.5/3%)..... 2 sets

(3) Conveyor scale

Straw chip weight measurement with integrator 3 ton/h belt width 1m ..... 1 unit

(4) 6-dot recorder

For Unit I stock preparation..... 4 units

(5) Instrument panel

For Unit I stock preparation..... 1 cub.

(6) Flow recorder

Magnetic flowmeter

For stock at Unit I unbleached pulp vibrating screen inlet ..... 1 unit

(7) Instrumentation for couch pit periphery improvement ..... 1 set

PM 3 couch pit agitator to be interlocked with sheet break detector of the machine
Couch pit level controller included

2. List of Recommended Maintenance Instruments

(1) Manometer
For adjusting pneumatic instrument, stanchion type ..... 1 unit

(2) Portable recorder
(Common use with Electrical Maintenance Dept.)
With pneumatic/electric converter 0.2 – 1 kg/cm² → 1 – 5 V ..... 1 set

(3) Portable thermometer ..... 1 unit

Fig. 6-13-1 (1) Recommendable Flow of CRC at Outlet of PM 3 Machine Chest

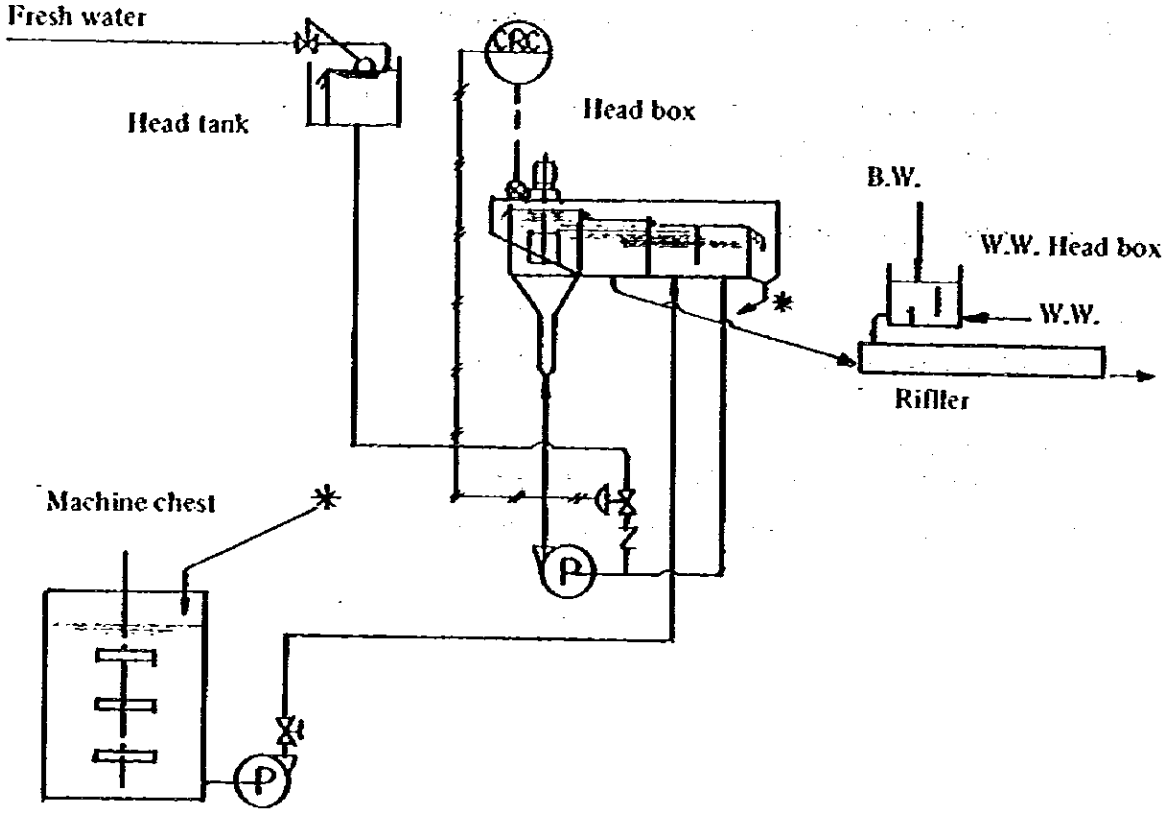
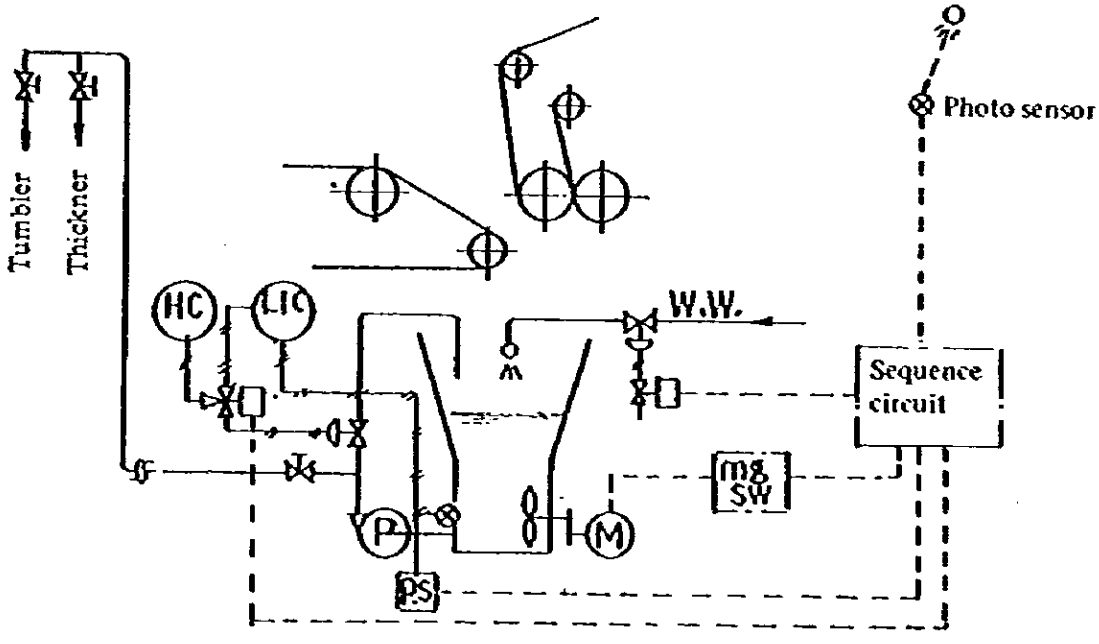


Fig. 6-13-1 (2) Recomendable Flow of PM 3 Couch Pit Level Control



6-14 Water Supply and Treatment Equipment for Effluent

1) No paper can be made without water which constitutes one of the geographical conditions of a paper mill. The mill depends, for the source of water supply, on springs in mountains, which flow to the mill site by natural head. Hence there is no control structure concerning water so rigorous as in Japan. There is an increasing drain on such spring sources to meet the mill's right of water acquisition amounting to 200 l/sec (≠17,000 m^3/d). Two of the original five springs have been used up, reducing effective volume of water to 100 l/sec.

   The elevated water tank provided in the premises is time-worn and not used now. Besides, the water piping premises has serious leakage with many valves unable to be opened or closed, leaving a large quantity of water to be drained wastefully.

   With no elevated water tank in use, water pressure is liable to large variation. This is one of the important contributing factors to variation in product quality.

2) Environmental protection concerning effluent is applied obligatorily to only part of plant groups newly established as measures of regional development. With regard to the existing plants, however, the Indonesian Government, giving the first priority to sustainable improvement of employment, has no alternative but to attach no more than secondary importance to the effluent restrictions and to let local regulations to organize cyclic use of white water.

   The effluent treatment structure of the Padalarang Mill is far from being well organized, allowing discharge of untreated effluent. In fact, however, alkalic black liquor discharged from the pulp plant, which is composed of dissolved solid matter of straw, is welcomed even by farmers as a soil improvement agent, as well as, a useful fertilizer. Viewed from another angle, however, the mill leaves a large quantity of valuable fibers to run out without any effort to recover it, thus contributing one-sidedly to farmers' interest.

6-14-1 The Present Status of the Existing Facilities Together with Problems Involved

1) Source of Mill Water

(1) Presently 100 lit/sec water of good quality is available by conducting it from spring sources located 160m higher than the mill site.

Owing to natural drain, the original five spring sources have now been reduced to three, with a decrease in available capacity from 200 lit/sec to 100 lit/sec.

It is inferred that the possible causes may be a decrease in rainfall in the rainy season or a fall in water pressure of spring veins as a result of increased consumption of well water by private households which began to assemble around the mill site.

(2) Overflow quantity of sedimentation basin for PM 3 has also decreased. As countermeasures for this problem as well as for expected increase in demand for water in consequence of a possible expansion of PM 4 in the future, it becomes urgently necessary to study water quality of deep wells, as well as, to organize cyclic use of white water.

(3) Air vent cocks mounted on conduit tube is in manual model, necessitating daily check-up and air removal by maintenance operators.

With the present 100 lit/sec water in-take, it is particularly necessary to make this air removal a daily routine.

It is also considered necessary to review the location of air vent cocks, as well as, piping gradient.

(4) In order to sustainably maintain paper quality in the paper making process, pressure of dilution water must be held constant.

Asthough the existing elevated water tank has long since reached the limit of its life span, no effort to restore it has yet been done. This accounts for variation not only in basis weight and moisture of the finished paper, but also in its shade to such an extent that each reel shows different shade.

2) Quality of Water from Test Deep Wells

(1) As a countermeasure for spring water sources threathened to dry up year by year, as well as, for expected water requirement for PM 4, two test deep wells were drilled since 1980, namely No. 1 Well beside PM 3 and No. 2 Well in the company residence area. Requests for analysis have been submitted, as often as three times, to the Water and Effluent Research Institute of the Ministry of Industry, in Bandun, for its assessment on water quality.

The available water quantity from these two wells is reported to be 30 lit/sec.

(2) Water analysis of No. 1 Well, made in October, 1980 is shown in Table 6-14-1 on the next page. From the values on this table, it is seen that well water in the Padalarang Mill is tinged with yellow and contains 1 ppm of iron, and, therefore, that it is unsuitable for bleaching purposes, and, even when used for diluting unbleached pulp, it will give a problem in the bleaching process. It is judged, therefore, better not to use it.

(3) Analysis values of No. 2 test well drilled in September, 1980, are additionally shown in Table 6-14-1. Judged from these values, water from No. 2 Well is free from color or odor, and, is usable for bleaching purposes, with its iron content as low as 0.02 ppm.

(4) Judging from the above-mentioned two test wells, it is considered possible that there are several underground water veins, and that different places have water veins of different quality. Accordingly, it is necessary to sink several test wells so as to be able to meet any requirements in the future. It will also be important to study, basing upon such results, whether or not treatment equipment is required.

Table 6-14-1

Deep Well Pit No. 1 & 2 Water Analysis

	No. 1 Deep Well Oct '80	No. 2 Deep Well Sep '83
Colour	Lightly yellowish	None
Smell	None	None
Turbidity (SiO_2 scale)	16	5
Sediment	NIL	None
pH Reaction	7	7
Amonium (NH_3)	0.05	nil
Nitrite (NO_3)	0.6	4
Nitrate (NO_2)	NIL	nil
Phosphate (PO_4)	NIL	nil
Chloride (CL)	7	7
Sulphate (SO_4)	20	3
Shrink Stuff ($KMnO_4$)	2	1
Iron (Fe)	1.0	0.02
Manganese (Mn)	0.1	nil
Calcium (Ca)	20	15
Magnesium (Mg)	9	7
Carbon Dioxide (CO_2)	13	4
Carbonate (CO_3)	NIL	nil
Bicarbonate (HCO_3)	127	98
Silicate (SiO_2)	81	78
Hydrogeen Sulphite (H_2S)	NIL	nil
DHL (MICROMOHS)	200	140
Copper (Cu)	NIL	nil
Arsenic (As)	NIL	nil
Lead (Pb)	NIL	nil
Fluoride (F)	NIL	nil
Calculated Total Hardness (D°)	= 5	3.6
Temporary Hardness	= 5	
Permanent Hardness	= NIL	
(Limit value for paper making	: Fe = 0.1 PPM Max)	
	Mr = 0.05 PPM Max)	

3) Circulation Equipment for Recovery of White Water

Both Units I and II have settling tanks for the recovery of white water and stock. Since the type of paper made differs with each machine, however, each unit adopts an independent circulation system for recovery.

To be more exact, Unit I and II adopt paper making process on acid side and that in neutral nature, respectively, precluding any possibility of joint or supplementary operation between each other.

Although PM 1 and PM 2 of Unit I are based on the same acid paper making process, joint operation of the white water circulation system between these two machines is also impossible owing to considerable difference existing in their respective assortments of colored products and their respective stock furnish ratio.

(1) Under the existing system, white water from both PM 1 and PM 2 is designed to run out of the system, thus giving rise to shortage of white water in back water pit. Now and then, fresh water is supplied to the pit to regulate the volume of water.

Thus, white water downstream suction box, is sent to settling tank, from where it is overflowed into drain ditch. This does not ensure, however, an adequate amount in the back water pit.

(2) Since both PM 1 and PM 2 are run under beater system and by batch operation, removal of tailings from the settling tank is performed only intermittently and not on a constant basis. This results in uneven consistency of white water, as well as, increased quantity of overflow from settling tank.

(3) Although white water recovery at PM 3 is run satisfactorily, limited application of white water entails wasteful discharge, by overflow, into drain ditch.

(4) Excessive quantity of an overflow from the settling tank in PM 3 is partly accounted for, among others, by:

(1) that there is an excessive quantity of wire shower, and

(2) that seal water in the packing gland is not discharged after sealing (presently it is "blinded"), but flows into the pump, thus increasing uselessly the quantity of white water.

Table 6-14-2
Pulp & Paper Industry Effluent Analysis in Indoniesia
As Compared with Proposal from
"Water Problems Research Directorate (WPRD)

No.	Parameter	Pulp Plant*				Paper Plant*				WPRD** (ppM)
		Minimum		Maximum		Minimum		Maximum		
		ppM	Kg/ton	ppM	Kg/ton	ppM	Kg/ton	ppM	Kg/ton	
1	Temp									45°
2	pH	6.2		11		6		7		5.5 – 10
3	Suspended									
	Solid	181	45.25	4570	1142.5	195	29.25	3218	482.7	500
4	Solid	1360	3400	98150	24537.5	127	19.05	5520	828	5000
5	BOD	300	75	3290	822.5	80	12	642	96.3	300
6	COD	–	–	–	–	–	–	–	–	600
7	Dissolved									
	Oxygen	0	0	0.3	0.075	0	0	0.06	–	–
8	Colour	Brown		Yellow		Varieted				
9	Turbidity	–	–	–	–	–	–	–	–	–
10	SO_4	7.7	–	249.6	–	25	–	1478.4	–	–
11	Cl_2	48	–	1259	–	4.7	–	436.8	–	–
12	Ammonium	–	–	–	–	–	–	–	–	2
13	Nitrate	0	–	0.25	–	0	–	0.8	–	–
14	Nitrate	0	–	1.3	–	0	–	3.1	–	–
15	Free Chlorine	–	–	–	–	–	–	–	–	–
16	Sulphur	–	–	–	–	–	–	–	–	2

* Based on water consumption for pulping : 250 M^3 /TON

For paper making : 150 M^3/TON

** H Most light

4) Effluent Treatment Facilities

(1) Table 6-14-2 shows the results of analysis of effluent from the Padalarang Mill as compared with reference values for pulp and paper industry proposed by "Water Problems Research Directorate" (WPRD), a governmental agency.

(2) At present, the mill has no effluent treatment equipment and discharges effluent, as shown in the table, into effluent ditch.

(3) Since effluent from pulp plant has been treated on the soda process and is composed of straw pulp, no harm is done even if discharged into effluent ditch. The farmers even welcome such effluent since it contains black liquor of straw, beneficial to soil improvement and transformed into a good fertilizer. Under the circumstance where the Padalarang Mill is in a state of being protected under regional regulations, its effluent calls for no treatment.

(4) As can be judged from the values shown in the table, however, an excessive quantity of suspended soilid is contained, a fact which is presumably attributable to a large quantity of effluent from the washing and bleaching section after the stock has been cooked by digester. Corrective measures are needed, therefore, for reducing fiber loss in the effluent rather than for the problem of effluent consistency.

(5) Effluent from the paper plant also shows a very high consistency which is accounted for by excessive fiber loss from beater in the existing stock preparation section, and, from the wet part of paper making machines.

6-14-2 Corrective Measures for Problems Concerning Facilities and Operation

1) Facilities for Processing Water

(1) In order to secure the necessary flow quantity from spring sources, review the position of air vent cock in relation to the gradient of water conduit. Also perform daily checkup rigorously.

(2) Renewal of the elevated water tank is required, and effort is to be made to stabilize the pressure conduit system.

(3) Repair leakage on the pressure conduit system in the mill compound and make effort to save water consumption.

(4) Patrol rigorously the mill compound and make effort to enhance "water saving consciousness".

2) Effluent Facilities

(1) Modify the drainer under the digester, repair breakage of thickner wire in the washing and bleaching equipment, among others, in an effort to reduce fiber loss in the effluent.

(2) In order to reduce fiber loss from the pulp plant, install a dumping pit in drain ditch. After pumping up such effluent, send it back to drainer pit and try to recover pulp fibers by means of thickner, etc.

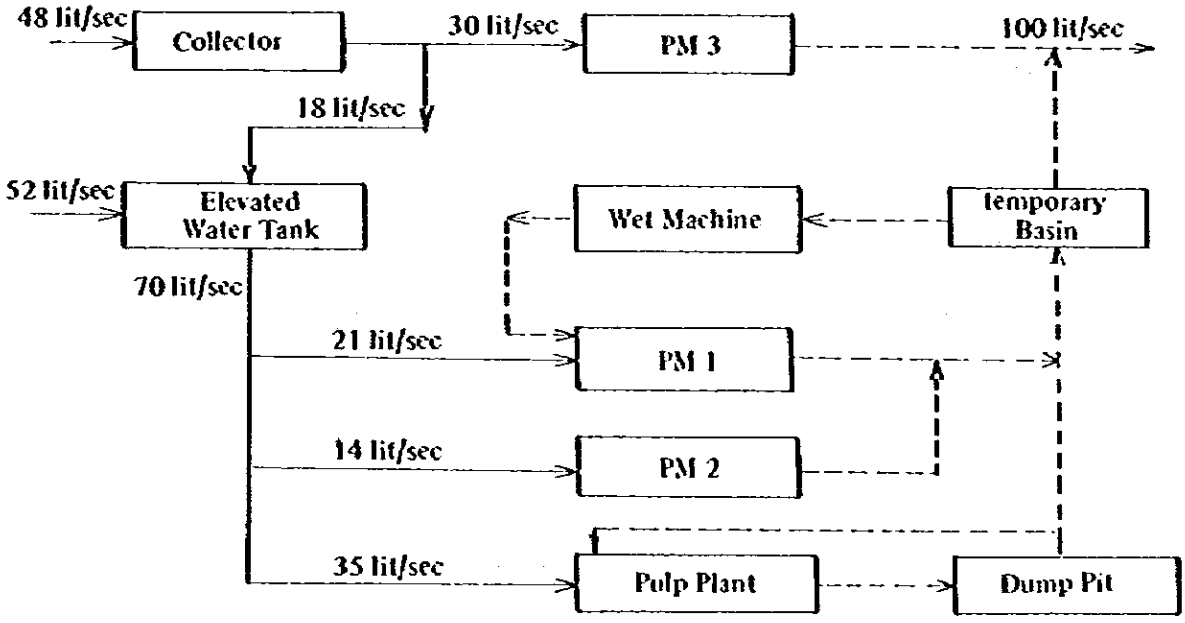
(3) Install simple sedimentation pit in the stock preparation section, and ensure that, by means of lattice, etc., bulky brokes, plastic film pieces, etc. are not discharged.

(4) Install newly simple effluent sedimentation basin as a measure to reduce fiber loss in the effluent. At the same time, make effort to reduce effluent consistency as a part of environmental improvement programs.

(5) Make wet lap, by means of wet machine, from fibers recovered from the above-mentioned sedimentation basin in an effort to blend it with the broke for making certain brands entirely depending on brokes, such as "Omslag", as a part of measures to improve total yield.

(6) When PM 4 is newly installed in the future, a complete system of effluent treatment facilities shall be installed additionally with a view to reprocessing the effluent coming out of the temporary sedimentation basin. It goes without saying, however, that continued efforts shall be made to perform rigorously white water circulation in a closed-loop treatment with a view to reducing water consumption per unit quanity of a product, and, at the same time, decreasing total quantity of effluent.

(7) Schematic Balance Flow



6-15 Machinery and Equipment Maintenance Section

1) This section was organized as a maintenance section for the paper making factory in the Holland rule era, and it has not only engaged in the maintenance job of the paper making equipment but also benefited the outside commercial enterprises.

2) The machine tools equipped are very old, and although they may be used, they have some problems in terms of machining accuracy and work efficiency.

3) Still there is no establishment of big enterprises in the neighborhood of PPM, and naturally few machine workshops are in existence in the vicinity.

   Therefore, for the machine tools for repairing the equipment within the premises of PPM, they must depend on their own equipment investment or contractors in remote places.

4) Of the present equipment, the lacking machine tools for the paper making equipment are as follows.

   (1) Straight knife grinder (renewal) : for all paper machines
   (2) Milling machine (new installation) : for machining parts

Note: The lathes will be renewed at the time of PM 4 expansion.

5) As the future subjects, it is desired that the parts will be standardized, unified and simplified in order to establish a positive preventive maintenance system through the introduction of the above machine tools.

6) The annual ratio of maintenance cost to turnover is low at about 3%. In order to increase the operation efficiency by reducing the frequency of breakdown maintenance, it should be increased to about 5%.

6.15.1 Present Equipment Situation

They possess the following equipment in the workshop of 1,500m².

No.	Name of Equipment	Q'ty	Specification	Supplier's Country	Situation
1	Slitter knife grinder	1	For 250mm dia	Holland	60% possible
2	Ditto	1	For 250mm dia	Japan	80% possible
3	Straight knife grinder	1	760mm L	Holland	50% possible
4	Ditto	1		Australia	50% possible
5	Radial boring machine	1	50mm dia	Holland	60% possible
6	Boring machine	1			60% possible
7	Big dia. lathe	1	3,600 dia	Holland	60% possible
8	Lathe No. 1	1	1,500 L	Germany	Out of date
9	Lathe No. 2	1	1,500 L	England	60% possible
10	Lathe No. 3	1	2,030 L	Germany	65% possible
11	Roll grinder No. 1	1	508mm dia	Japan	90% possible
12	Ditto No. 2	1		Germany	45% possible
13	Shaper	1	500Lx20mmTH	Holland	60% possible
14	Shaving machine	1		England	60% possible
15	Hack saw	1	360mm L	Holland	60% possible
16	Wood saw	1	460mm dia	Holland	60% possible
17	Black smith forge	1	900mm L	Holland	45% possible
18	Electric welder	3			60% possible
19	Gas welder	1			60% possible

6.15.2 Personnel and Control

1) Organically it is a machinery and equipment maintenance section under the manufacturing division. It consists of 3 groups, Unit I Maintenance Group, Unit II Maintenance Group and Machining Group, totalling 60 persons.

2) Organization

Machinery & Equipment Maintenance Sections: manager 1, staff 1

Unit I Maintenance Group: Section chief 1, workers 25
Unit II Maintenance Group: Section chief 1, workers 11
Machining Group: Section chief 1, workers 19

3) Control

(1) All are working in the daytime and in the case of emergency, a call system is adopted.

(2) The Unit I Maintenance Group also covers the old equipment, infrastructure, and water equipment.

6.15.3 Equipment Maintenance Situation

1) The floor of the machine tool room is earth and not paved.

This means that there are some environmental problems for the maintenance of the machine tools.

2) Maintenance work on Unit I equipment

(1) Since all the equipment from the pulp plant of Unit I to paper finishing plant are old, they have not compatibility with the commercially available spare parts. Therefore, old parts are still utilized by manual repair.

(2) There are many idle equipment probably because it is impossible to obtain repair parts or the efficiency of the equipment is low.

(3) If the equipment now in operation is modified a little, it becomes possible to adopt the commercially available parts, but no such improvement has been made.

(4) For the leakage of valuable water, the improvement has not been made probably because of lack of budget or lack of will for improvement.

(5) It seems that they lack the forwardness to challenge the problems and are delayed in preparation for the preventive maintenance system.

(6) In order to materialize the long-life operation of the old equipment, it is necessary to change the machine elements that are available locally.

3) Maintenance work on Unit II equipment

(1) The drainage inspection of the dryer is missing from the daily inspection route and inspection items.

(2) The operating condition of the steam trap and increased temperature of the sectional motor are related with each other. Without removal of the drain, the motor and gear reducer are overloaded.

(3) The marking bottom roll should be periodically inspected and the grinding cycle, etc. should be standardized. The feedback to the paper manufacturing plant should be fast and accurate.

6-15-4 Problems in Maintenance Control and Countermeasures

1) Necessity of increase in turnover/maintenance cost ratio and an increase of budget

(1) Table 6-15-1 shows the annual maintenance costs in the past 5 years.

The maintenance cost of 206.5 million Rp against the annual turnover of 7,562 million Rp is only 2.73%. The average ratio of maintenance cost to turnover in the Japanese pulp and paper industry is 5 – 6%. Most of Unit I facilities of PPM are very old (more than 50 years). Therefore, generally speaking, the ratio should be at least 5% or 7 – 8% on the average.

In Japan some old equipment are improved to become a leader in earning but in such a case, the daily maintenance activities are minimum requirement.

(2) Fig. 6-15-1 shows the repair time for Unit I in the past 5 years.

It seems that the paper manufacturing plant except the pulp plant has decreased the scheduled maintenance since 1982 and even switched to the breakdown maintenance.

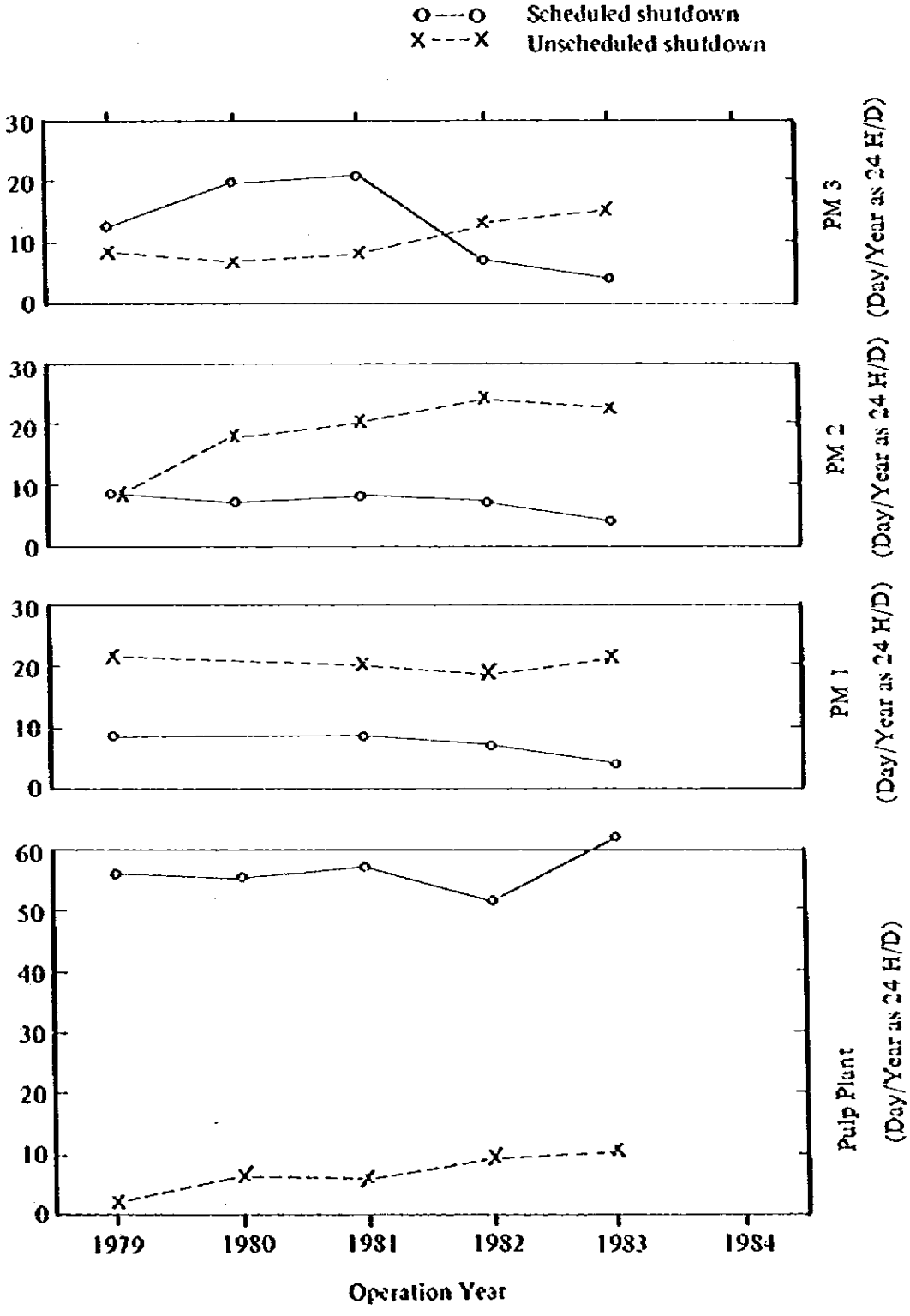
(3) The breakdown maintenance time for PM 1 was steady for the past 5 years at about 500 hours (21 x 24) per annum, but it will start to increase gradually.

(4) PM 2 showed a tendency of increase until 1982, but will show a steady tendency in the future. But it is about 530 hours, same level as that for PM 1.

(5) PM 3 decreased the scheduled maintenance by 360 hours/year, but the increase of the breakdown maintenance in these 2 years is about 200 hours and an effect of the attempt can be recognized. But the tendency of increase in breakdown maintenance has appeared.

(6) On the other hand, in Table 6-15-2 Annual Shutdown Schedule for Unit I Paper Making Plant, the scheduled shutdown of 288 hours per annum is estimated and this is a minimum required for scheduled maintenance, and since there may be many improvement measures to be taken without waiting for the annual overhaul, the review of the schedule contents and efforts to improve the equipment are desired in the future.

Fig. 6-15-1 Actual Record of Shutdowns for Repairs



2) Necessity of Equipment Improvement Efforts

(1) The parts of old equipment have no compatibility in dimension, material and manufacturing accuracy with the commercial products now available in the market. It is high time to make the "investment not related to profit" e.g. the one required at the time of switching from the old inch system to metric system.

(2) The improvement of the table roll bracket for wire part is not in this category, but all the table rolls were made defective by economizing the fund needed for the improvement.

(3) The same thing can be said about the slip improvement of the clutch plate of the drive. Since it was adjusted and repaired several times after stopping the operation, it should have been replaced with a clutch of other type in view of the loss of operating profit due to the downtime.

3) For establishment of preventive maintenance system

(1) Control of spare parts

The desk control is good, but probably because of the lack of budget, expensive parts and purchased parts are not sufficiently stocked.

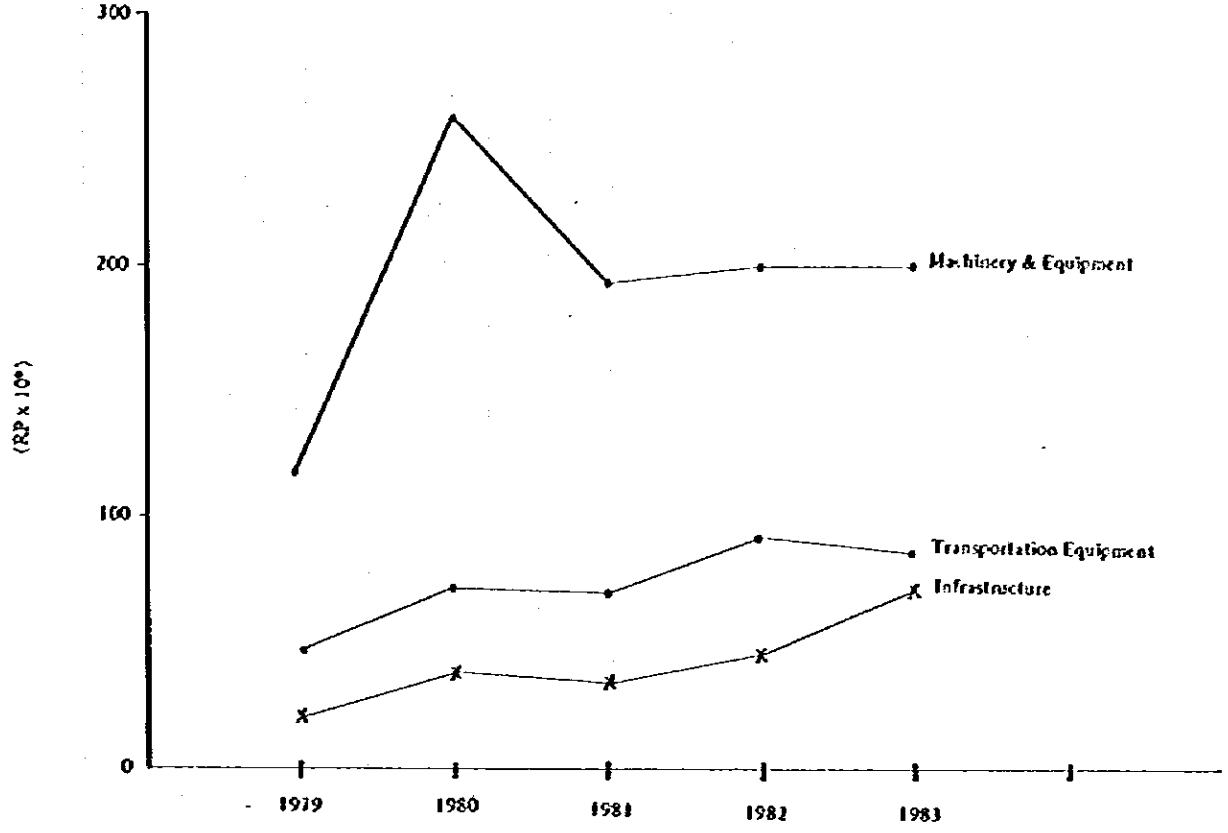
(2) Machine tools

Since there are many parts which are not compatible with the commercial parts available in the market, they must be ordered outside, but if there were proper machine tools available in the premises, the materials could be purchased and machined inside the plant to any desirable dimensional accuracy and the machine components, etc. could be standardized, simplified and unified.

(3) Material purchase and stock control

In order to reduce the dependency on the expensive parts imported and to reduce the repair cost, it is recommended that the materials be purchased and machined at the plant.

Table 6-15-1 Annual Repair Cost in 5 Years



x 1,000 RP

	1979	1980	1981	1982	1983
Machinery & Equipment	126,450	259,971	193,706	203,916	206,519
Infrastructure	22,859	38,998	35,009	46,932	71,178
Transportation Equipment	48,743	73,229	71,651	92,358	87,431
Total	198,032	372,198	300,365	343,206	365,128
Grand Total (Including Others)	201,417	389,514	305,473	346,790	365,696

Table 6-15-2 Annual Shutdown Schedule for Unit I Paper Making Plant (1984)

No.	Month	Time	Holiday	PM 1								PM 2							
				Scheduled shutdown		Uneffective time						Scheduled shutdown		Uneffective time					
				Overhaul	Monthly repair	Effective time	Preparation	Washing (%)	Breakdown (%)	Total	Down-rate (%)	Overhaul	Monthly repair	Effective time	Preparation	Washing (%)	Breakdown (%)	Total	Down-rate (%)
	January	744			27	717	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5		27	717	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5
	February	696			26	670	6 (0.9)	12 (1.8)	50 (7.5)	68	10.1		26	670	6 (0.9)	12 (1.8)	50 (7.5)	68	10.1
	March	744			26	718	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5		26	718	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5
	April	720			26	694	6 (0.9)	12 (1.7)	50 (7.2)	68	9.8		26	694	6 (0.8)	12 (1.7)	50	68 (7.2)	9.8
	May	744			26	718	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5		26	718	6 (0.8)	12 (1.7)	50 (7.6)	68	10.3
	June	720	36	204		480	6 (1.3)	12 (2.5)	28 (5.8)	46	9.6		26	658	6 (0.9)	12 (1.8)	50 (0.9)	79	14.1
	July	744	96	60	26	562	15 (2.7)	14 (2.5)	50 (8.9)	79	14.1	60	26	562	15 (2.7)	14 (2.5)	28 (5.2)	46	8.5
	August	744			26	718	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5	204		540	6 (1.1)	12 (2.2)	50 (7.6)	79	12.1
	September	720	36		26	658	15 (2.3)	14 (2.1)	50 (7.6)	79	12.0		26	658	15 (2.3)	14 (2.1)	50 (7.0)	68	9.5
	October	744			27	717	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5		27	717	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5
	November	720			26	694	6 (0.9)	12 (1.7)	50 (7.2)	68	9.8		26	694	6 (0.9)	12 (1.7)	50 (7.2)	68	9.8
	December	744			26	718	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5		26	718	6 (0.8)	12 (1.7)	50 (7.0)	68	9.5
	Total (%)	8,784	168	264	288	8,064	90 (1.2)	148 (1.9)	578 (7.2)	1,368	10.3	264	288	8,064	90 (1.1)	148 (1.9)	578 (6.5)	816	9.5

Chapter 7.

SPECIAL TECHNOLOGY OF PULP & PAPER MANUFACTURE IN FUTURE

Chapter 7. SPECIAL TECHNOLOGY ON PULP & PAPER MANUFACTURE IN FUTURE

This chapter described about Future Technology for pulp and paper manufacturing in Indonesia, especially as for the Raw Fibrous Material produced locally and Specialty paper such as NCR, etc.

The items described are as follows.

7-1 Raw Fibrous Materials fot Pulp.

7-2 NCR as Specialty Paper.

7-3 Burning Agent for Cigarette paper.

7-1 Raw Materials for Pulp

Straws, bagasse, corn-stalks, etc. can be used as raw materials for the pulp for general-use papers. Pandalarang mill has had a long experience in straw pulping, but the Merang Panjan straw is becoming less obtainable due to the recent breeding of rice plants in Indonesia and consequent shortening of the plant length, and instead of the said straw the mill currently receives more 'Jalami' (stalks of the Segon species). As a whole, however, the total volume of straws that the mill receives has been reduced and furthermore straws received have high moisture content (40%) with a considerable amount being degraded.

Under these circumstances the mill conducts several experiments for pulping with bagasse and corn stalks, etc., but it appeares difficult to obtain quantitative ensurance, and also there is a problem from the viewpoint of equipment cost. Therefore, it will be a more positive solution to study the collecting procedures and cooking process of straws from the new rice plant species (PB-8).

For cigarette papers the 'Rosella' has been tested, however, this plant now cannot be used as raw material for pulp because of its high cost. The mill considers to pulp the 'linum'. As this plant belongs to the proper Flax family it can be used as raw material for the cigarette paper pulp if the process is established through experiments.

7-1-1 Straws

1) Received Amounts of Straws during Last 5 Years
(Based on the estimated moisture content of 20%)

5,747t	: (in 1979)
4,978t	: (in 1980)
5,372t	: (in 1981)
6,523t	: (in 1982)
4,741t	: (in 1983)

2) Types of Straws

(1) Segon local variety, with height of 80 – 90 cm; it takes 8 months until cropping; has long tips of ear and is called 'Merang Panjang'. Even those parts with chaffs are used for pulping.

(2) PB-8; is a new species recently breeded by the guidance of the Ministry of Agriculture; can yield 2 or 3 crops per year, however, is low in height with short tips of ear. It is called 'Merang Kepala'. The parts with chaffs are cut off for pulping.

3) Designation of Straw as Raw Material for Pulp and Percentage of Receiving

1. Merang Panjang (Tips of ear; Segon local variety)	: 8 %
2. Merang Kepala (Tips of ear; PB-8 new species)	: 10%
3. Jalami (Stalks; Degon local variety)	: 82%

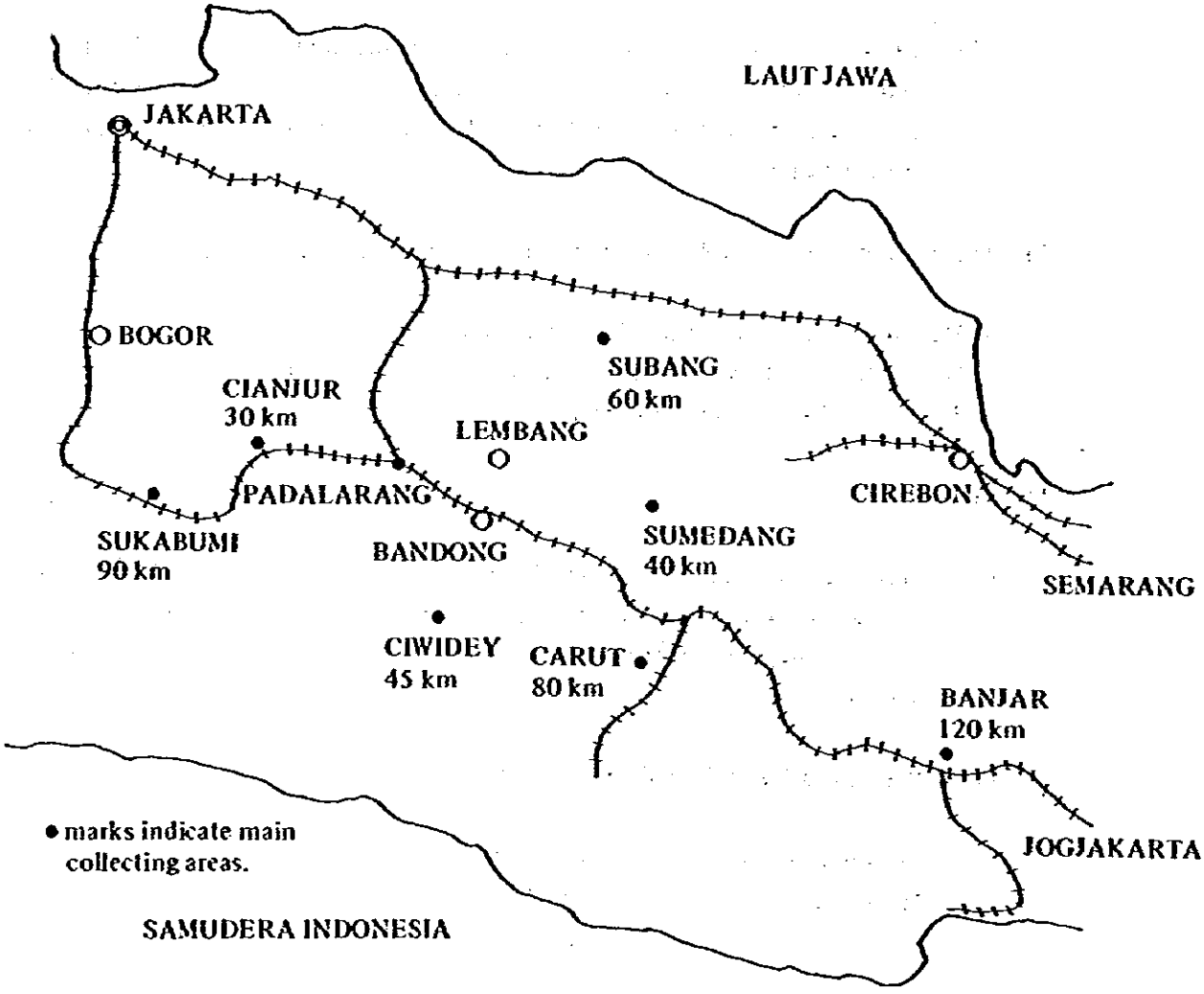
4) Procurement Standards

(1) Moisture content less than 40%: Sampling inspection per each truck delivering straws, and the weight accepted is converted into a 20% mositure content basis. Straws with moisture content of 40% or higher is to be omitted to accept.

(2) Purchase price (delivered to the mill)

Merang Panjang	: Rp. 31.5
Merang Kepala	: Rp. 33.0
Jelame	: Rp. 32.0

5) Collection Areas



All the collecting areas are within the range of 100km from Padalarang mill, no collection of straws in the vicinity of the mill; this probably because there are more PB-8 species.

6) Problems and Countermeasures

As the people lives on rice in Indonesia, straws will not be extinguished and even PB-8 Merang Kepala may serve if an appropriate collecting procedure is established. On the other hand, unlike Japan where only the crop can be yielded annually. Indonesia is bestowed with multiple cropping. Therefore, by adopting an effective cropping and storage system, it seems that straws with less moisture content (20%) would be collected with less in -plant warehousing spaces.

Countermeasures

1) The purchase price is fixed on an arrival/delivery basis at the mill. Taking into consideration transportation costs, it will be more reasonable to fix the said price on a collecting point basis, with calculation of transportation charges separately.

2) It is recommended to educate stock collectors and build up a collecting organization.

3) An effective and thorough guidance for cropping and storage of straws should be given at collecting area so as to minimize fluctuation of moisture content.

4) It is advisable to make a study on how to cook stalks, blades and sheaths of the PB-8 rice plant so that suitable conditions can be arranged and that the species can be utilized more extensively.

5) Procurement of straws should be made in a stable way.

7-1-2 Linum

1) Situation of Cultivation

The normally called 'Flax' has its scientific name of 'Linum Usitatismam', and same having blue flowers is 'Linum Usitatisman Vulgare', fibers of which are generally excellent. A similar variety to this Linum Shitatisman Vulgare is cultivated at present in Lembang Agricultural Experimental Station, although this variety can be cultivated more appropriately in the area located between lat. 48° and 55° North. In warm climate condition this plant grows rapidly, but in turn will have fibers less excellent. Nomal fiber volume obtainable from a flax is said to be 12% -- 17% of its stalk when dried. The flaxes being cultivated in the above mentioned Experi-

mental Station have grown up to about 60cm in height in 85 days after seeding, and we have been told that they will be cropped in 120 days after seeding when they grow up to 120cm in height; they can yield 3 crops per year.

The current cultivated area is 500m² and the estimated crop is 850kg, with moisture content of 75%, according to the Experimental Station.

2) Fiber content

Weight percentage of Pith and Fiber Content of the sample coarsely crushed in the Mill

Sample : 4.85g

Weight %	Weight	%
Fiber content	1.38	28
Pith	3.47	72

It is observed that this linum has an excessive Pith. Generally the maximum allowable limit of Pith must be set at 50%, otherwise,an increased amount of cooking liquor is required, the condition of which may cause damage to fibers.

3) Proposed cooking conditions:

Sulfite soda (Na_2CO_3)	: 25% – 30%
Caustic soda (NaOH)	: 3%
Liquor ratio	: 1:3
Cooking pressure	: 9kg/cm²
Cooking temperature	: 175°C
Cooking time	: 8h

4) Yield and Pulp Cost for Bleached Pulp from 1,000kg of Linum

		Unit price (RP)	Cunsumption ratio	Moisture content	Volume	Amount (RP)	
Linum		150					
Bone dry		176		15%			
Coarsely crushed	90%	196			1,000 kg	196,000	
Sulfite soda		389			25%	97,000	
Caustic soda		437.5			3%	13,125	
Electric power		73.72/kW	149 kW/t		149 kW	10,980	
Steam		21,591/t	600 kg/t		600 kg	12,955	
						330,314	
Cooking yield	35%				350 kg	944	Rp/kg
Bleaching process							
Pulp cooking cost					350 kg	330,314	
Bleaching liquor		2,000			6%	42,000	
Electric power		73.72/kW	1,700kW/t		595 kW	43,863	
						416,177	
Bleaching pulp yield	85%				297 kg	1,401	Rp/kg

5) It is recommended to conduct a sufficient cooking test with the autoclave in the Institute of Fiber Technology in Bandong, before entering into tests by the mill equipment.

6) Cooking cycle

Feeding to digester	: 4h
Temperature raising	: 3h
Cooking	: 8h
Steam stop/idle running	: 2h
Gas and black liquor blowing	: 2h
Unloading from digester	: 1h
Total	: 20h

7) Washing and Beating

Feeding consistency	: 2.5%
Beating time	: 5h
Freeness	: 250cc – 300cc

Fly bars and bed plates of the beaters for washing and beating should be replaced. A 50-mesh washing drum wire should be used in consideration of washing effect.

8) Bleaching

Bleaching consistency	: 4%
Hypo (Cl_2)	: 6%
Brightness	: 75 or more

Since the linum has much Pith, bleaching in 3 stages is to be considered in case of lack of brightness.

9) Estimated Production Volume with Existing Equipment

Bleached linum pulp of 1,040 kg/day can be produced with conditions of: 20h of cooking cycle, 1 cycle per day, 3.5BDt of feeding volume and pulp yield of 29.7%.

7-1-3 Rosella

1) Operating Guidance

By request of PPM, we undertook the guidance for pulping of Rosella in 1977. Actually, because of delay in collecting the stock we carried out the following pulping by use of Kenaf made in Thailand.

Cooking : 6 batches Pulping : 18,000BDkg
Cigarette paper making : 20% mixing, 54t in 7 days

In 1978, we gave a guidance for pulping of Flaxes made in China; 3 papermaking tests were conducted using existing paper machines with satisfactory results.

2) Background

Raw stock costed 110 Rp./kg in 1978, but currently it costs 500 Rp./kg; probably because of this increase of cost the Flax pulp is imported from Spain. Maybe because of lack in consciousness of demand-supply structure, the Rosella does not serve as pulp stock currently.

Countermeasures

Rosella, in its properties, can serve as a substitute for Flax; however, to be so it must cost less than the Flax when pulped.

In addition, the Rosella stock is more susceptible to pinholes, compared with the Flax stock. Therefore, it will be difficult to be used in a mill such as PPM where pinholes are not permitted.

7-1-4 Bagasse

1) Procurement of bagasse stock:

A volume of 3,000t/year is currently available from a sugar manufactory in Cirebon.

2) Equipment:

A high equipment cost is required to install a crusher to remove pith, a sorter, etc., therefore, a small-scale production does not pay.

3) Cooking conditions:

Pulping of the bagasse can be operated under the following conditions, subject to prior removal of pith to support the quality of pulp:

Caustic soda (NaOH)	: 12% – 20%	3% – 4%
Sulfite soda (Na_2CO_3)	:	12% – 14%
Cooking temperature	: 130°C – 170°C	170°C
Cooking time	: 2h – 6h	2h
Liquor ratio	: 1:4	1:4

7-1-5 Corn Stalks

1) It is necessary to carefully study collecting volume and procedures, which will be more difficult than for straws.

2) Corn stalks can be pulped in the same conditions as those for the bagasse subject to a complete removal of pith.

7-2 The NCR

7-2-1 Trend of the NCR

The demand for the NCR will continue to increase further. In Japan also an increase of demand is estimated at about 10% on an annual basis, while the export increase is forecast by 10% –13%. The NCR therefore is as promising as it may be involved in a severe competition of price and quality. Under these circumstances, as a matter of course some rigorous restrictions have been set up and a number of specifications have been established for the base paper.

7-2-2 Key Points for NCR Base Paper Making

The main stocks of the NCR base paper are wood chemical pulp, NBKP andLBKP. Its basis weight has a wide range from 30g/m² – 157g/m², the standard being 40g/m² in Japan and 50g/m² in other countries. The following points should be taken into acount:

1) The NCR base paper must have a good formation.

   An imperfect formation will produce spotting upon coating with water soluble coloring agent and/or developer.

2) No dirt nor impurities are permitted by any means.

   It is necessary to make a perfect dust removal off the stock pulp and before the paper machine. If the base paper has some protruding impurities, microcapsules cannot be applied evenly. Dirt and impurities may also be confused with periods and/or commas, which may cause an erroneous reading.

3) No pinhole is allowed.

   If a pinhole is produced, microcapsule developer will have a strike through causing some troubles.

4) It must have an even thickness.

   Since the NCR paper is used in piles as slip forms, its bulkness is an important factor. Therefore, a stricter control of allowable thickness limits is required for this type of paper than for other general-use papers.

5) Being used for slip or voucher forms, a higher stiffness is required for the NCR paper, compared with the basis weight.

Application of a certain chemical additive in the pulp stock and a starch agent, this last one by means of a sizing press, is required.

6) It is required to inspect the full width of paper surface with a spot-hole-detector during paper making.

7) As the base paper is processed in roll form, it should have no unevenness in thickness and bulk density for both cross and machine directions. If the base paper is not smooth, creasing and spotting will be produced during application of microcapsules by a coater.

8) The base paper should have dimentional stability. As the paper is used folded or in piles, any insufficient dimentional stability may cause irregular slip forms.

9) The base paper must have a wet strength to a certain degree.

The wet paper strength is required to prevent breakage during application of water coloring agent and developer.

7-2-3 Future Considerations on the NCR

1) The most important requirement is the examination on equipment problems.

2) It is required to select a type of pulp with less dirt, shives and specks.

3) Considerations must be given to the capacity of NCR paper machines. In Japan the minimum required capacity for this type of paper machine is 50t/D.

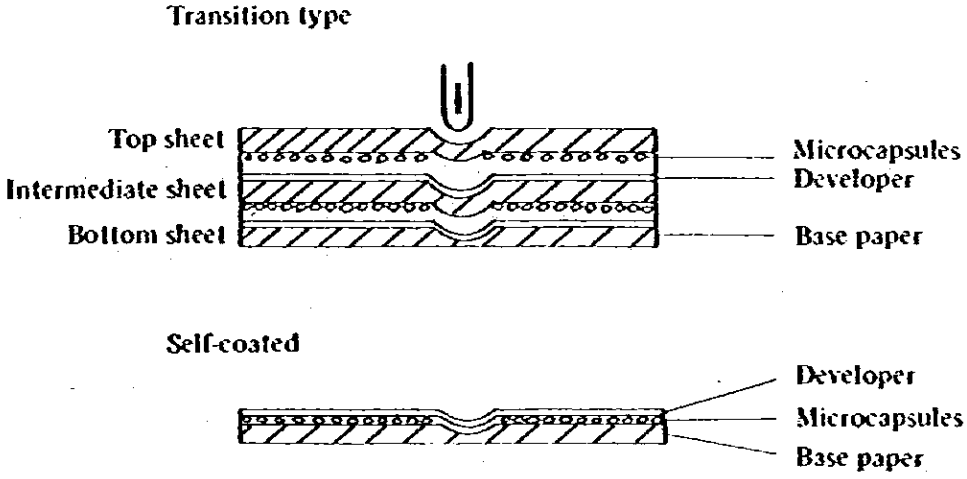
4) Installation of a size press is required for ensuring the quality of paper.

5) It is necessary to build up quality control during paper making.

6) The future trend of the NCR should be investigated and all possible information should be obtained.

7-2-4 Formation and Coloring Mechanism of the NCR and the method of Processing.

1) Formation



The base paper includes top sheet, intermediate sheet, bottom sheet, and self-coated sheet and its top sheet.

2) Coloring mechanism and processing

For the top sheet, microcapsules are applied to the wire-side of the base paper. (Microcapsules have achromatic dye which colors by electron donation; nonvolatile oil solution is covered with a polymeric material such as gelatine, etc.)

For the intermediate sheet, electron-accepting active clay or other similar developer is applied to the felt-side of the base paper and microcapsules to its wire-side in the same way as for the top sheet.

When more than 3 copying papers are required, the number of this intermediate sheet is increased.

For the bottom sheet, the same developer as for the intermediate sheet is applied to the wire-side of the base paper.

The coloring mechanism upon copying is based on the principle that the micro-capsules, when they receive local pressure by means of a writing pen or typing, are

broken, the achromatic dye solution inside transfers to the developer layer and is absorbed for coloring.

For self-coated sheet, microcapsules and developer are applied on the felt-side of the base paper.

7-2-5 Applicator

Capsules are susceptible to breakage due to mechanical pressure and/or friction, therefore, an air knife coater is usually used. Recently capsules made of synthetic polymeric materials have been developed and these capsules allow a high-density applicaiton. For these capsules the gravure or offset type of coating is used at some plants.

For developers an air knife coater is used when active clays are applied. Also roll coaters and blade coaters are used when resin developers are applied. To be competitive in the future cost competition, a manufacturer must use a coater with a speed of 1,000m/min or higher, and also requirments will be more rigorous as to base paper quality stability (removal of dirt, shives and specks), improvement of strength (wet strength), etc.

7-2-6 Other Conditions

1) Copied letters of notes and certificates should not fade away at least for 10 years.

2) Shelf life of unused paper sheets

3) Lightfastness of copied letters and characters

4) Printability

As described above, ther are many requirements for the NCR paper making, and the demand is on the increase everywhere in the world. Therefore, a severe competition exists. A careful planning and stable quality maintenance is indispensable even at stage of base paper making.

The NCR paper is not so profitable in Japan because of very strict quality requirements considering the relatively low selling price of ¥217/kg of the base paper.

7.2.7 Proposals and Future Countermeasures

We have described quality requirements and manufacturing conditions for the NCR paper above.

Our recommendation is that commercial purposes should be eliminated at the initial stage and that for example, a test coater can be installed in the Insitute of Fiber Technology and production technologies for capsules, developers etc. can be introduced while production tests are conducted using imported base papers, and then to test-make a base paper fit to such a coater machine. In this case, it is not necessary to follow the mass production, but it will be enough to consider a production volume suitable for the production cost of the machine. From the viewpoint of quality, a special attention should be paid to dust, moisture-resistant strength, thickness, break-free operation, etc.

Such trial products are to be delivered to the market to know the evaluation of the customers in the market, thus taking time to achieve a full-scale installation on a paying basis.

7.2.8 No. 4 Papaer Machine

1) It is recommended to install a machine having a trim of 2,440mm in consideration of compatibility with spare parts for No.3 paper machine.

Basis weight	: 25g/cm^2
Machine speed	: 160m/min
Daily production	: 11t (Total yield: 90%)

2) Layout

It is suggested to place a left-haded paper machine on the South side of the existing No.3 paper machine. Labor saving should also be considered as No.3 and No.4 paper machines can be operated with about 6 operators.

3) Stock preparation equipment

It is recommended to introduce an energy-saving constant-gap type double disk refiner, and install a beater according to the increase of flax mixing ratio (more than 50%).

4) Pulping equipment

With an increased use of flax, cooking equipment must be installed additionally. It is recommended to install an independent cooking and bleaching equipment in the same area where No.3 and No.4 paper machines are housed, separately from the currently existing straw pulp section.

7-3 Burning agent for cigarette paper

Currently potassiumnitrite (KNO 3) is used for combustion improver to cigarette paper in Indonesia.

The KNO 3 so called potassium nitrite has a properties in cigarette paper manufacturing such as good combustibility and easy treatment for application.

However there is some hygienic reason in application of potassium nitrite therefore PPM expected to get some introduction the other burning agent instead.

On this viewpoint some instruction in manufacturing technology of those such sodium fumaric acid and potassium maleic acid are described.

Sodium fumaric acid: $Na_2C_4H_2O_4$
Potassium maleic acid: $K_2C_4H_2O_4$

7-3-1 Sodium fumaric acid

1) Molecular formula $Na_2C_4H_2O_4$

Fumaric acid $C_4H_4O_4$
Caustic soda NaOH

2) Reation formula

$$\begin{matrix} H-C.COOH \\ \| \\ HOOC.C.H \end{matrix} + 2NaOH = \begin{matrix} CH.COONa \\ \| \\ CH.COONa \end{matrix} + 2H_2O$$

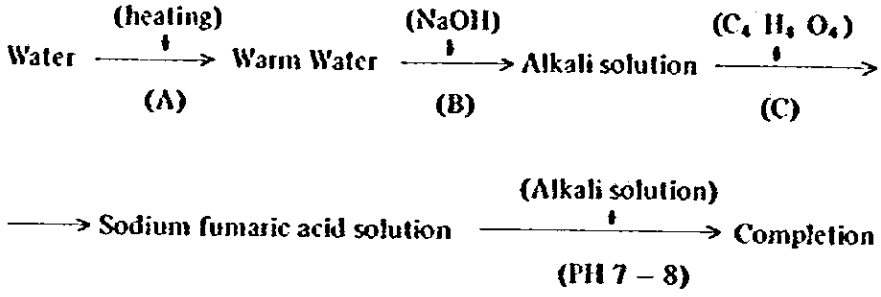
molecular weight

116 80

196 160

$81.6 \fallingdotseq 82\%$

3) How to make sodium fumaric acid solution.



hence (A): temperature about 40°C

(B): exothermic reaction exists and irrigating smell at 80°C

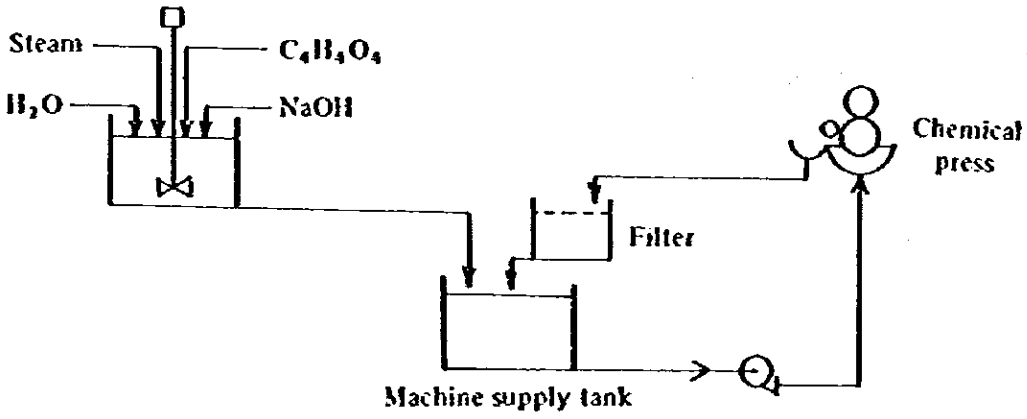
(C): gradually add and do not add at once

4) In case 500 kg solution of sodium fumaric acid is expected.

Cons (%)	$C_4H_4O_4$ (Kg)	NaOH (Kg)	H_2O (Kg)
15	54.5	37.5	408
10	36.3	25.0	438.7

NaOH to be applied with a hood additive grade.

5) Dissolving, storage and its machine supply.



6) Applicating consistency

While considering the combustibility, adjust the applicating amount of sodium fumaric acid, it depends on the consistency of the solution. Usually it should be adjusted in the range of 7 to 15%.

In addition to the facilities for this purpose, the existing equipment is also able to reuse.

7) Combustibility (burnability)

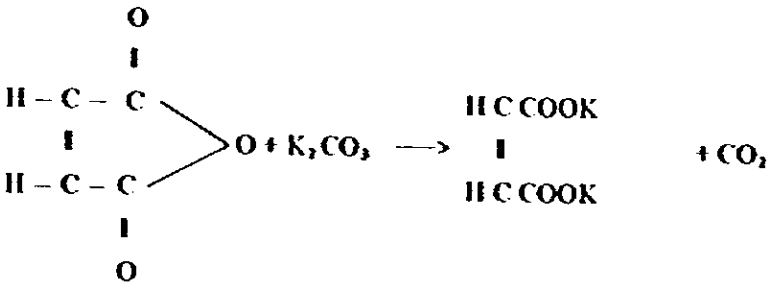
Potassium nitrite (KNO 3) now in use at PPM has high combustibility however sodium fumaric acid is applied in Japan because of higienic reason only.

7-3-2 Potassium maleic acid

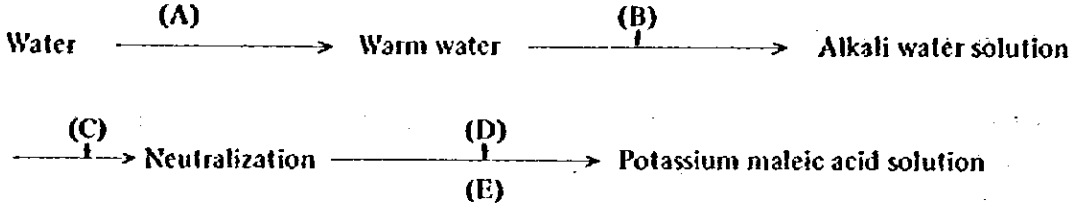
1) Molecular formula $K_2C_4H_2O_4$

Maleic anhydride	$C_4H_2O_3$
Potassium carbonate	K_2CO_3

2) Reaction formula



3) How to make potassium maleic acid solution



hence (A): heating up to abt 50°C

(B): K_2CO_3 to be added

(C): Maleic anhydride to be added

(D): CO_2 gas discharged

(E): pH to be of 7 – 8

Potassium maleic anhydride should be only gradually put in because a lot of CO_2 will be generated.

4) In case 240 kg solution of potassium maleic acid is expected.

Cons (%)	$C_4H_2O_3$ (Kg)	K_2CO_3 (Kg)	H_2O (Kg)
14	17.1	25.0	206.0

Potassium maleic acid ($K_2C_4H_2O_4$) 33.6 kg and water 206 kg equal to 240 kg of potassium maleic acid.

5) Dissolving, storage etc are same as sodium fumaric acid.

6) Applicating consistency : 10 – 14%

Chapter 8.

No. 4 PAPER MACHINE

Chapter 8. No. 4 PAPER MACHINE

8-1 No. 4 Paper Machine

Padalarang factory has a long history as a factory to produce cigarette paper, and even now the PM2 is producing about 100 tons annually of special type of cigarette paper. In 1975 a new cigarette paper machine was installed.

It is 9 years since the No. 3 paper machine started the production of cigarette paper. In the beginning the annual production was 1,500 tons (with 300 operating days per year) meeting 15% of the domestic demand but through the technological development and equipment improvement, the production steadily increased to 3,000 tons per year (with 300 operating days per year), or up to the full capacity of the existing equipment with a share of 25% of the domestic market (12,000 tons/year). Thus, the technological progress is remarkable. But still this country must depend on the imported product for 75% of the domestic requirement. We had the impression that the quality had not reached the level of the imported product, but some brands (such as Eagle) can compete in quality with the French product and the production technology should be highly evaluated. However, the products for general use are a little lower in quality because they place the emphasis on mass-production. The prices are evaluated at a lower side, accordingly. But under such circumstances that 75% of the domestic consumption must depend on the imported product, it is an urgent necessity to install another cigarette paper machine (No. 4 paper machine).

It should be materialized by all means because the domestic production of the cigarette paper is in conformity with the national policy (saving of foreign currency). The project will bring about a big benefit to the management of the Padalarang factory and will also contribute to the progress of the community.

Already in 1978 the Padalarang factory planned the installation of a cigarette paper machine for the annual production of 6,000 tons and subsequently obtained the approval of the Industry Ministry for a concrete equipment plan.

Although there is a room for more share, the quality, manufacturing cost and sales strategy are important for the future of the enterprise in the liberalized competition, and there-

fore, it is necessary to accumulate the technology to meet the diversifying quality requirements by utilizing the manufacturing technology of the Eagle quality with the No. 3 paper machine and to meet the needs of the customers by always watching the trend of the market.

In order to do so, it is necessary to start improving the existing equipment including the investigation of the raw materials (research on filler, mixing ratio of flax fiber, own production of flax pulp, etc.) and improvement of equipment (refiner, etc.) required for the production of higher quality cigarette paper (bobbin product, etc.) and to establish the quality prior to the installation of a new machine.

The installation of the No. 4 paper machine should be judged on the basis of the supply and demand balance of the cigarette paper, including the upcoming demand for plug paper.

As the machine to be installed the same scale as the No. 3 paper machine is desirable from the viewpoint of operation cost including cost incurred for spare parts but from the manufacturing viewpoint, it should be larger and in consideration of the quality to be maintained and easier control of operation, it will be safe to have the width of about 3000mm at the maximum.

But in order to achieve the compatibility of the equipment and reduce the running stock of spare parts, the same width as the existing PM3 should also be considered.

8-2 Betterment of Environment for Installation of No. 4 Machine

8-2-1 Location

A left-handed machine should be installed on the south side of the No. 3 paper machine and the labor-saving should also be considered, i.e. about 6 operators for 2 paper machines.

8-2-2 Pulp Equipment

As the use of the flax pulp increases, it will be necessary to increase the equipment for cooking, washing, and bleaching, and the continuous digester and multi-stage bleaching equipment should be installed in the same area as the Nos. 3 and 4 paper machines are located.

The equipment should have a capability of cooking flax and straw alternately taking into consideration the portion of the superannuated vertical digester. The installation of a continuous digester will make it possible to cook bagasses also.

8-2-3 Stock Preparation Equipment

By taking into consideration the reduction of the power consumption unit and change in the refining condition (cutting), the fixed gap type double disk refiner should be considered for refining and, if possible, the continuous refining method should be adopted.

8-2-4 Paper Machine

The machine speed should be about 180 m/min. within the range of 120 m/min. to 250 m/min. as the design, and for the screen the closed type should be chosen to prevent the floating fiber blocks.

And it is desirable to use the hydro-wheel to increase the dewatering effect.

8-2-5 Finishing Equipment

1) Rewinder or Bobbin slitter

The paper machine Pope reel should be euqipped with a slitting device to make two rolls and such rolls should be transferred to the bobbin unreel.

No need of this if the paper machine has the same specifications as those of the existing No. 3 machine.

2) Bobbin slitter

A full-width bobbin slitter may be considered if the paper width is about 2000mm, but in consideration of any sudden accidents etc., the use of 2 half-width bobbin slitter is desirable.

Chapter 9.

CONCEPT OF BASIC DESIGNING FOR RENOVATION PROJECT

Chapter 9. CONCEPT OF BASIC DESIGNING FOR RENOVATION PROJECT

This project has been planned to diagnose and rehabilitate comprehensively and intensively such those equipments causing production decrease and cost increase in the working plants currently existing in the Mill; and through this rehabilitation of the equipments, to obtain product quality improvement, higher efficiency and performance, and cutdown of production cost.

To achieve these renovation purposes, we, the project survey team, have set up the master plan for improvement per each plant or section as described hereafter.

Compared with the other government own papermaking companies, Padalarang Paper Mill is located at a very faborable site. Environmental conditions are also good. Also its production items or lines do not require the Mill to be competitive with others because of their specialty. Therefore, with its management efforts, the Mill can have considerably higher profitability in the future.

Most of existing equipments currently in operation are very old, and some of them can hardly meet the operating conditions initially designed. However, there is no problem since they are actually used in full service with efficiencies somewhat levelled down.

On the other hand, however, while these premodern equipments render lower efficiencies, they are yet a type of equipment that can produce a certain unique quality very close to hand-made paper. This kind of paper with unique hand-made sheet appearance or quality is not available with any type of new installation, therefore, the rehabilitation of these currently existing equipments is very significant.

9-1 Master Plan for Improvement: Straw Pulp Plant in the Plant of Unit I

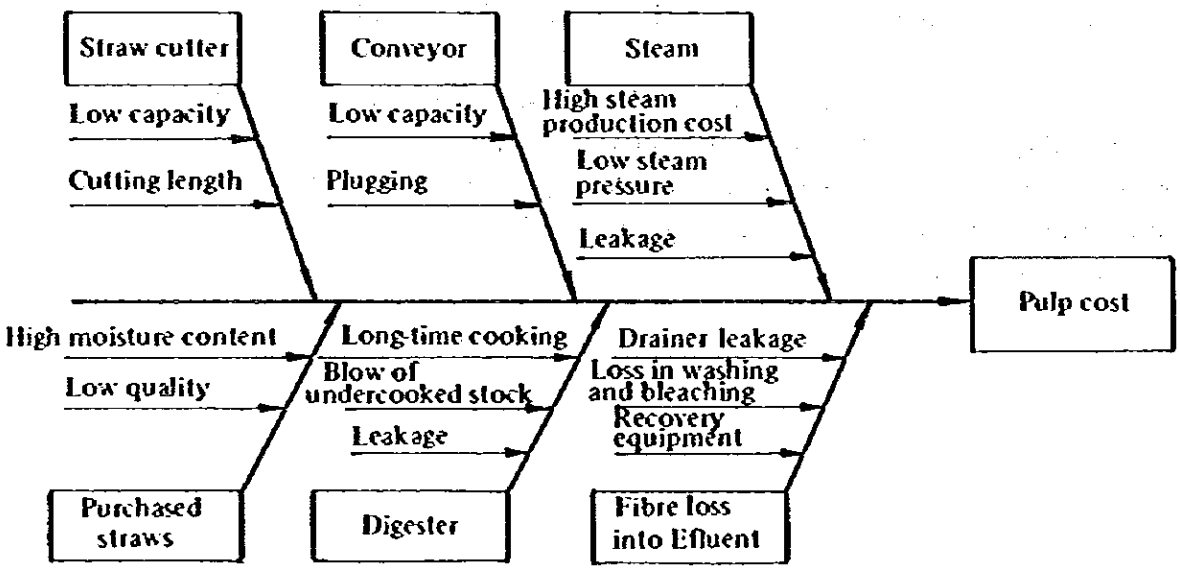
9-1-1 Objective and Outline

With the recent worldwide economic recession, the cost of imported pulp has been depressed at a low level. However, the world economy now backs on an upward path and the said cost shows an active recovery, the latest LBKP cost being US$ 500/ADT, that is, receiving cost of LBKP at PPM reaches Rp. 550/kg.

Reviewing LBKP cost during these 5 years, the lowest price was US$ 370.-, and on a spot basis sometimes the price was even US$ 320.- or lower.

Whereas, the PPM's self-made straw pulp costs comparatively expensive, being at a level of Rp. 499/BDT.

The Plan therefore aims to eliminate the causes of this high manufacturing cost to realize a cost reduction and increased use of own pulp so that profitability of the whole Mill may be improved considerably.



9-1-2 Proposed Measures for Improvement of Straw Quality

1) Quality selection of purchased straws

The people in Indonesia live on rice, therefore, rice plant straws are abundant in the country. Especially, Sunda area in the suburbs of Padalarang City is known with its production of good-quality rice straws. Except the problem existing in transportation, these rice plant straws can be said to be a very good papermaking raw material samely as the bagasse since they are byproducts of foodstuffs.

One of the main reasons for current low yield is attributable to low appearance quality of collected straws. This presumably because suppliers in remote areas do not want to deliver straws as a result of increased oil price which brings about very high trucking costs, and therefore, straws currently collected are from only those suppliers who can deliver nearby rice plant straws with lower appearance quality.

The following countermeasures are recommended:

(1) To organize a purchase system of straws from distant areas, which should allow removal of non-conforming straws at such areas of production and transportation of straws in good conditions (covering them with sheets, etc.), so that transportation cost at receiving point may be reduced.

On the assumption that 20% of collected straws, before transportation, have high moisture content or are already rotten into the form of compost, the majority of these defective straws might be discharged in the form of black liquor after consumption of considerable amounts of chemicals and utilities. This is nothing else than a "double loss". It is important to take into account this double loss, that is, it is not only a loss of 20% of straws, but also a loss in many other aspects.

(2) To review and renew straw purchase contracts to eliminate "cost and freight condition", adopting in its place the condition of freight paid separately. In this way even when a purchase price is set up high so that distant suppliers may be willing to place offers, the high yield potentially obtainable may pay off, or more precisely, the production cost can be reduced on the

contrary. (see our trial calculation attached) This renewal of contract is an indispensable requirement for realization of an improved yield.

(3) To establish a "raw material" section by partly reorganizaing the Mill so that such a section may take an active and positive charge of the purchase of high quality straws through periodical deliveries of the staff to the places where straws are collected, for giving constant guidance and advices regarding storage method before shipping, etc.

2) Establishment and Utilization of Contractors

Our another recommendation is to establish a special contract firm or firms who will dedicate itself or themselves to collect and deliver straws exclusively for the Mill.

This contractor system is utilized in the Japanese waste paper industry: contractors visit each home, buy, collet waste papers and distribute them to paper makers. This system is very useful as contractors make sorting of collected waste papers according to the user's purposes and furthermore, the cost can be maintained more stable.

It will be advisable to put this contractor system into practice after studying the actual situation in Japan, so as to ensure a stable straw stock quality as well as a constant amount of straws to meet the production. It is suggested to include the study and practice of this system by some training at overseas.

3) Distributed Installation of Straw Baling Machines

(1) To divide straw production areas into blocks and install one straw baling machine in each block.

(2) To bale straws immediately after thrashing and to store them in a place not exposed to rainwater.

(3) Baling machines have a simple construction, therefore, it may be provided locally by own expenses.

Implementing the items described above will enable the reduction in transportation cost and also an improved quality of straw pulp.

An alternative for baling machines, when the number of them should be reduced, will be the utilization of a certain reduced number of baling trucks. This type of truck can be delivered to a site for baling straws, at the same time giving instructions regarding storage and transportation, and then the truck is delivered to the next site for the same mission, and travelling several sites in this way. This may be a double purpose solution.

(4) (Reference information) Trucking Frequency

Assuming that the bulk density of straws is triplicated after baled and that a daily production of 15BDt of bleached pulp is planned, the required number of trucks for current yield of 25% will be as follows, subject to the loading capacity of a truck being 4 tons:

$$No = 15 \times 100/25 \times 1/0.6 \times 1/4 = 25 \text{ trucks/day}$$

After baling, it will be:

$$N = No \times 1/3 = 8.3 \text{ trucks/day}$$

Since the yield is improved as a result of the collection of conforming straws, the number may be reduced down to 9 trucks/day.

9-1-3 Improvement of Cooking Cycle

As already pointed out in Section 6, the current cooking cycle of 14.7 hours is excessively long while a normal cooking cycle for straw pulp is 10 – 12 hours. A pressure increase up to about 3 – 3.5 kg/cm^2 can be made for the existing digester though its worn state gives us a certain degree of concerns.

The present long cooking cycle is attributable to the prolonged time for feeding, temperature raising and cooking.

1) To reduce feeding time,

(1) Installation of a 3ADt/h belt conveyor and removal of air blow system is suggested. By this, the present feeding time of 3 – 7 hours can be reduced to 2 – 2.5 hours.

(2) As appurtenant works. The top cover at feeding of the digester is modified to ensure a prompter and more stable opening/closing operation of the cover and also to eliminate the leak of steam and chemicals currently being caused because of the wear of pressure sealing surfaces so that raising time of pressure and temperature can be reduced.

(3) Also mounting of a weighing scale to the belt conveyor is suggested to enable and ensure measuring of feed amount.

2) To reduce cooking time,

Renewal of a straw cutter is suggested so that the cut length of straws can be made uniform in about 50mm. Also the steam pressure currently applied (2.4 kg/cm^2) should be increased to 3.5 kg/cm^2. With these measures, the present cooking time of 4 – 7.5 hours may be reduced to 3 – 3.5 hours.

3) To reduce temperature raising time,

Renewal of boiler is suggested so that the steam supply capacity can be upgraded. Since airtightness is improved by the modification of the feeding of inlet of the digester above-mentioned, pressure drop due to leakage of steam can be eliminated. Therefore, the current temperature raising time of 2.75 – 5.5 hours may be reduced to about 2 hours.

4) Figs. 9-1-1 and 9-1-2 attached show the improvement plans 1) – 3) described above. These improvement plans will hopefully contribute to the Mill to increase its daily production capacity of unbleached straw pulp:

Production capacity from 2.63 – 8.34 BDt/day up to 10.5 – 13 BDt/day

9-1-4 Improvement of Steam Cost

The current high manufacturing cost incurred in the Mill is mainly attributable to the excessively high steam consumption rate of the digester and also to the high steam production cost because of low efficiency rendered by the old boilers.

1) For reduction of steam consumption rate,

(1) The modification of the feeding inlet of the digester will achieve a satisfactoiy airtightness to reduce heat loss, and

(2) By combined effects of other measures, the yield will be improved and the unit ratio of steam consumption can be reduced.

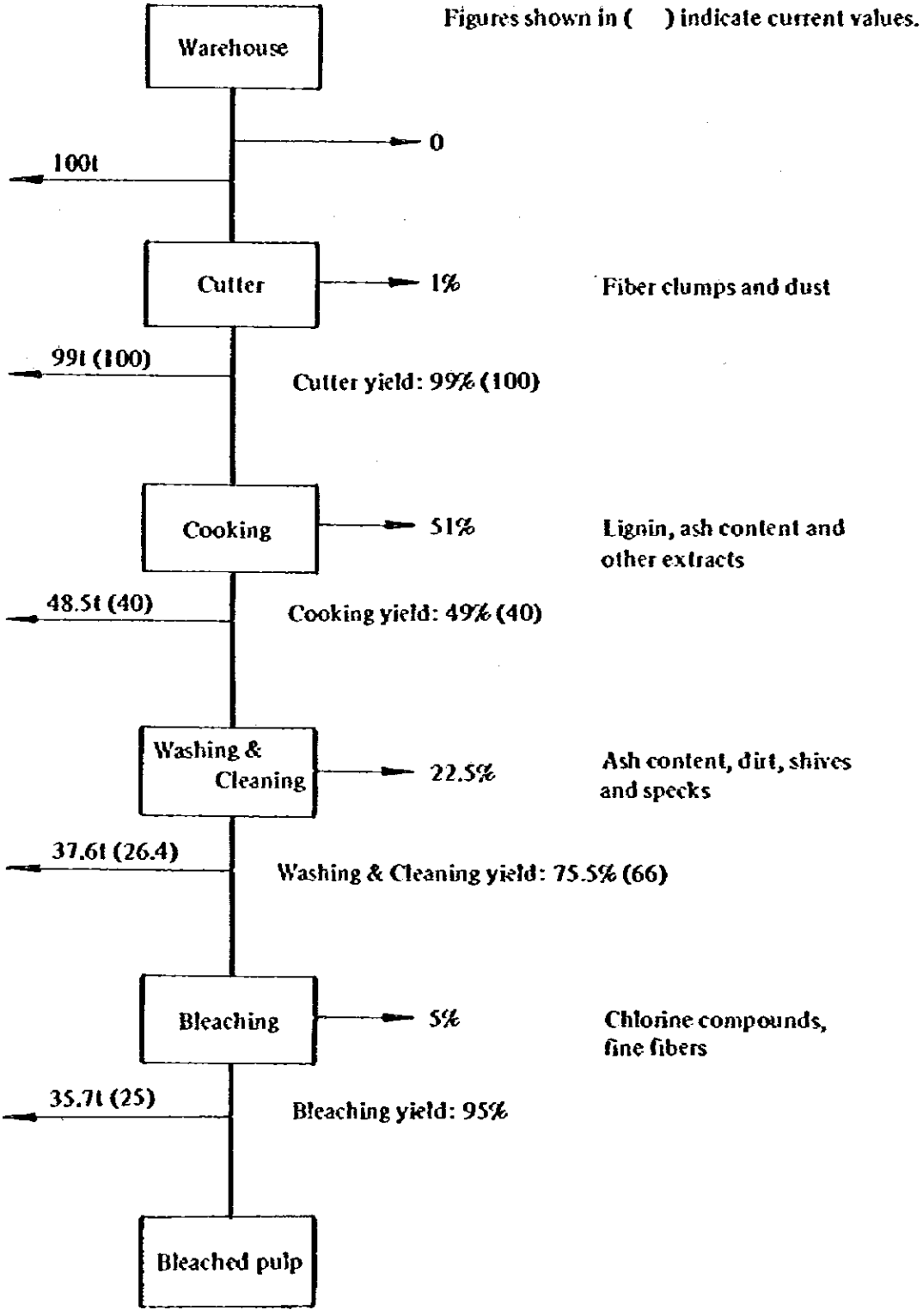
(3) Through the above-mentioned measures, the current unit ratio of steam consumption of 6t/t can be reduced back to the value of 10 years ago: 4.5t/t.

2) Reduction of steam production unit cost

(1) This may be achieved by the above-mentioned renewal of boiler which also aims to reduce the current steam production cost for the entire Mill.

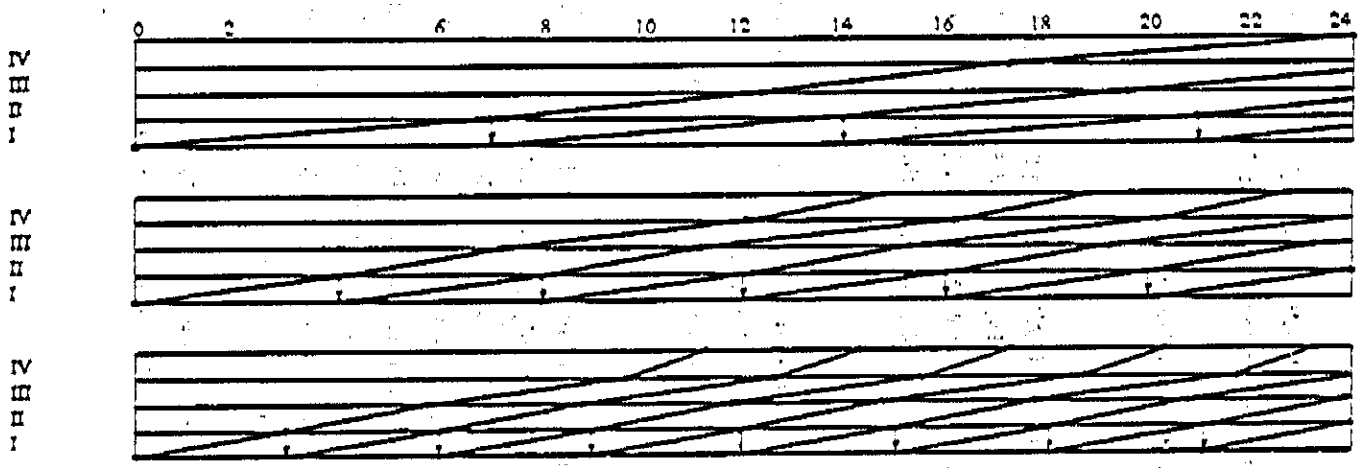
(2) The actual unit cost of Rp. 21,670/t (108.35 ℓ/t X Rp. 200/ℓ) will be reduced to Rp. 16,000/t (80 ℓ/t X Rp. 200/ℓ) after renovation.

Fig. 9-1-1 Flow Chart: Improvement Plan for Straw Pulp Yield



NOTE: I : STRAW FEEDING
II : RISING TEMP
III : COOKING
IV : BLOW OFF

Fig. 9-1-2 UNIT I – PULP PLANT DIGESTER COOKING CYCLE DIAGRAM



(LONGEST CYCLE)

1 = 17/24 + 10/24 + 3/24 = 2.25 Batch/d
3.9 BDt/Batch x 0.3 x 2.25 = 2.63 BDt/d UBKP

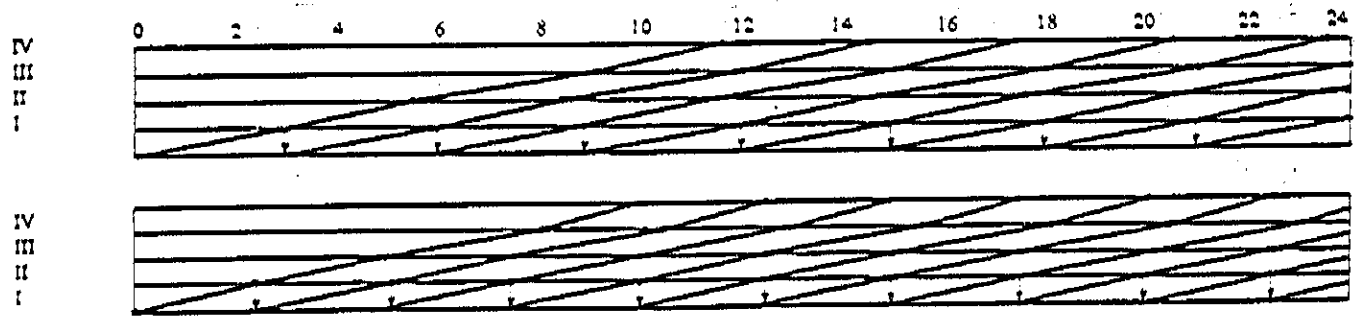
(MEDIUM CYCLE)

3 = (12+8+4)/14.7 = 4.63 Batch/d
3.9 x 0.3 x 4.63 = 5.42 BDt/d UBKP

(SHORTEST CYCLE)

5 = (15+6+3)/11.25 = 7.13 Batch/d
3.9 x 0.3 x 7.13 = 8.34 BDt/d UBKP

EXISTING COOKING CYCLE



(LONGEST CYCLE)

5 = (9+6+3)/11.5 = 6.56 Batch/d
4 x 0.4 x 6.56 = 10.5 BDt/d UBKP

(SHORTEST CYCLE)

6 = (9+6.5+4+15)/10 = 8.1 Batch/d
4 x 0.4 x 8.1 = 13 BDt/d UBKP

COOKING CYCLE AFTER RENOVATION

9-1-5 Reduction of Fibre loss into effluent

1) In general terms, cooking yield of unbleached straw pulp is 50 – 60 %. Analytical results of straw composition show that various cellulosic components represent about 65% after deduction of lignin and ash content in absolute dry condition. A 45% yield for bleached pulp is therefore an available value.

2) The effluent drain concentration (suspended solids) from the existing pulp plants (this will also be described in the section regarding water and drainage) is as follows:

– Water volume : 250 M^3/ton of pulp

	Max.		Min.	
	(ppm)	(kg/ton)	(ppm)	(kg/ton)
– Suspended solids	181	45.25	4,570	1,142.5
– Dissolved solids	1,360	3,400	98,150	24,537.5

(See Table 6-14-2 based on the data offered by PPM)

3) As shown also in Table 6-1-3 attached to Chapter 6, cooking yield test results for these several years show that the majority of unbleached pulp yield values are higher than 47.5%, and that there is no value lower than 30% even for bleached pulp yield.

4) And, however, the current bleached pulp yield remains very low, being at a level of 25%. This low yield may be attributable not only to very bad quality of purchased straw stock, but also to a large amount of stock lost in the effluent presumably after cooking. It is presumed that the minimum value of suspended solids in the effluent would be produced immediately before cooking blow, and the maximum value, immediately after the blow. Based on this presumption, the loss of fibers in to effluent under the current production of 5.42 BDt/day and the estimate of 11.75 BDt/day after renovation can be estimated as follows:

– Current : 5.42 X 1,142.5 = 6,192.4 BDt/day
– After renovation : 11.75 X 1,142.5 = 13,424.4 BDt/day

5) The above calculation includes suspended solid only and excludes dissolved solid in the effluent. For informational purpose, the cooking yield will be:

- Current : 5.42 / (5.42 + 6.19) = 46.7%

6) Based on the above description, it is necessary for prevention of fiber loss in to effluent and upgrading of yield, to implement modification of drainer pit and improvement work on the post-treatment equipment. By taking these measures, the bleached pulp yield may be upgraded from the current 25% to 35%. (See Table 9-1-2: Trial Calculation of Straw Pulp Producton Cost.)

Table 9-1-2 Trial Calculation of Straw Pulp Production Cost

	Unit Consumption Ratio	Unit Price	Feb. 1984 Actial Record Yield 25%		Unbleached Yield 26.4%		Bleached Yield 35.7%		Unbleached Yield 37.6%		
		RP	Consumption Rate	Amount of Payment (RP)	Consumption Rate	Amount of Payment (RP)	Consumption Rate	Amount of Payment (RP)	Consumption Rate	Amount of Payment (RP)	
1. Straw	20%	33/kg 40/kg	488t	16,104,000	488t	16,104,000	488t	19,520,000	488t	19,520,000	1. Based on a straw price of Rp. 40.
2. Caustic Soda (NaOH)	7% 6.8%	437.5/kg 437.5/kg	34.16t	14,945,000	34.16t	14,945,000	33.184t	14,518,000	33.184t	14,518,000	2. Steam production cost for straw stock is based on the estimate of: 1.5T/T current and 1.125T/T after renovation.
3. Sodium Sulfite (Na_2SO_3)		224.35/kg									
4. Steam	6t/t. 4.5t/t	21,591.16/t 16,000/t	732t	15,804,729	732t	15,804,279	549t	8,784,000	549t	8,784,000	3. Electric power cost is based on the estimate of 450 kWh/t for bleached pulp amount.
5. Electric Power	450 kWh/t	73.72/kW	54,900 kW	4,047,228	54,900 kW	4,027,228	78,390 kW	5,778,911	78,390 kW	5,778,911	
6. Calcium Hypochloride	3.5%	2,000/kg	4.27t	8,540,000			6.097t	12,194,000			4. Consumable material cost is based on the estimate
7. Consumable Parts	4 h/t	3,101.20/h	488 h	1,513,385	488 h	1,513,385	488 h	1,513,385	488H	1,513,385	
8. Total				60,954,342		52,393,892		62,308,296		50,114,296	
9. Production Cost of Unbleached Pulp					128.8t	406.78RP/kg			183.5t	273.10RP/kg	
10. Production Cost of Bleached Pulp			122t	499.6RP			174.2t	357.48RP/kg			

9-2 Master Plan for Improvement: Straw Pulp Washing/Bleaching Section in the Unit I

9-2-1 Objective and Outline

This section is also important since it affects quality, yield and manufacturing cost of bleached straw pulp.

The major problem currently existing is that the consistency and flow rate which are most significant in washing and bleaching process, are not controlled satisfactorily because of unsatisfactory deliver conditions from batch system to continuous flow.

Also an increased effluent to outside of the system is observed; this is caused due to imperfect periodical repairs in the dewatering-washing-dust removal process, which constitute the factor to determine the quality and cost of bleached pulp.

Thickners are to replace waste water with fresh water so that bleaching chemicals may be saved and at the same time, to obtain a final stable brightness. Therefore, an easygoing repair or leaving of top wire breakage would mean the lack of consciousness in quality and cost.

In this section, stabilization of consistency and flow rate is described first, and then repairs of thickners are described so that they can be rehabilitated to the level of functioning as originally specified.

9-2-2 Proposed Measures for Stabilization of Unbleached Pulp Consistency and Flow Rate

1) The current operation is as follows:

   Workers bring unbleached straw pulp from the drainer pit, and this pulp is fed to the pulper together with measured dilution water. The overflow pulp is discharged to an old kneader pit, which is pumped pit, consequently the pulp stock is pumped up to be delivered to the vibration screen.

2) Manual operation of pulp feeding is intermittent with some breaks of workers while the dilution water is supplied continuously. Hence, it is a matter of course that the finished pulp consistency varies much, this situation necessarily causes a big viriation of washing-dust removal effect in the subsequent processes.

3) To remedy the current situation as described above, it is strongly recommeded to immediately discontinue the existing pulper overflow method and to adopt in its place, a level control method in which the pulp flow, after passing through a screen plate, is level-controlled by means of a self-priming pump.

4) It is suggested in addition to install a $15m^3$ dump chest and transfer the agitator for the $12m^3$ chest currently located in the stock preparation section, for the use in this section.

5) Also a CRC and a FRIQ should be installed to ensure stabilized consistency and flow rate for the subsequent processes and to establish a complete production control system. The CRC removed from the existing Unit I can be repaired and used. The new FRIQ must be of integrating type for unbleached pulp so that it may indicate and verify production volume and yield of such a plup. This instrument can be used for adjustment of bleaching chemical additives.

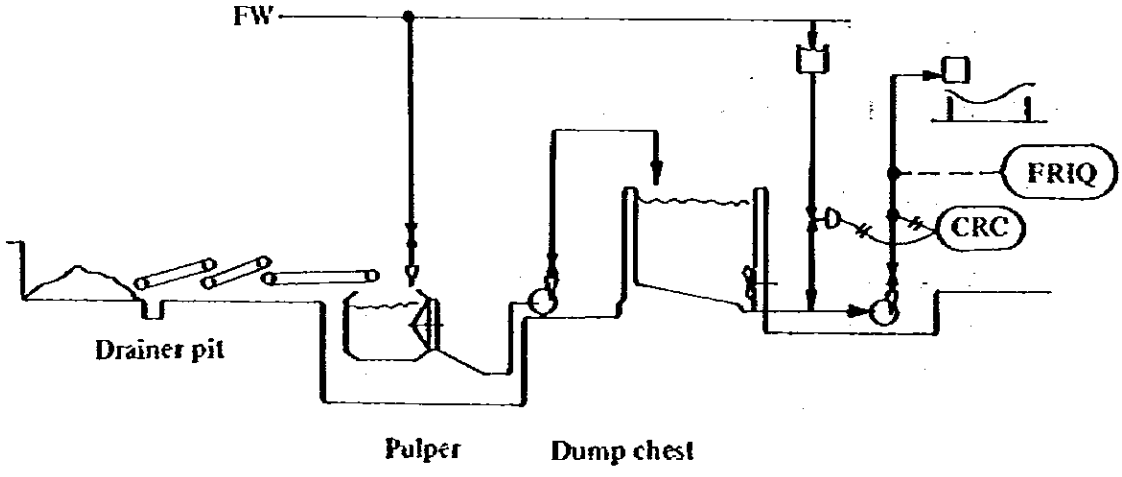


Fig. 9-2-2 Proposal for Stabilization of Pulp Consistency and Flow Rate

9-2-3 Other Proposed Measures for Improvement in Washing/Bleaching Section

1) Thickener cylinders should be repaired for prevention of effluents.

   Spare wire set for replacement

   – Specifications : SUS 316, 50-, 40- & 30-mesh

2) Screen baskets for Kowan screen, to be used for replacement upon silica trouble

   – Specifications : C type, 2.2/2.0 opening, SUS 304

3) Flow trap for centri-cleaner pump pit, to be installed for level controlling according to dilution water volume so that the variation in flow rate may be completely prevented.

9-3 Master Plan for Improvement: Stock Preparation Section of Unit I

9-3-1 Objective and Outline

Formerly, it used to be a common saying that 'paper is made by the beater'. This has now changed into a saying; 'paper is made by stock preparation'. In fact, the stock preparation section is responsible for 80% of occurrences of various troubles such as variation in paper quality, excessive dirt, etc.

1) The beater existing equipment (including edge runner) has been so obsoleted that it would require substantial investment to restore its normal function. With regard to spare parts required in the future, special orders and stock control will become necessary. This planning will also contribute to reduction in general power consumption.

2) Remodeling composed of highly suitable pulper and refining facilities is planned with a view to facilitating improvement in the total efficiency and total yield of Unit 1, in order to meet users' increasingly sophisticated quality requirements, and to reestablish sound mill operating system for cost saving.

3) By means of thorough remodelling of equipment, we anticipate expected improvements as follows:-

Total yield	: from 77 to 86%
Total efficiency	: from 68 to 76%

9-3-2 Basic Engineering Guidelines for Equipment Improvement (Table 9-3-1)

As basic guidelines for equipment engineering, the values for BANDEROL and DOORSLAG are extracted from the accompanying table 9.4.1 as representative brands since these two account for the largest number of mill production days. These data constitute our basic engineering guidelines for the stock preparation equipment.

Table 9-3-1

	Basic Data		PM 1	PM 2
1	Selected brand		BANDEROL	DOORSLAG
2	Basis weight	g/m²	60	28
3	Reel width	mm	2,100	1,900
4	Trimmed width	mm	2,040	1,760
5	Trimmed production	ADt/d	10.29	5.68
6	Production on reel	ADt/d	10.60	6.13
7	Total efficiency	%	71.98	72.04
8	Theoretical production on reel	ADt/d	14.73	8.51
9	Finishing yield	%	90.0	90.0
10	Production of finished paper	ADt/d	9.26	5.11
11	Total yield	%	90.0	90.0
12	Virgin pulp stock quantity	ADt/d	10.30	5.68
13	Quantity of finished pulp stock	BDt/d	(10 13.26	(7) 7.91
14	Paper ash content	BDt/d	(13X06) 1.03	(10X06) 0.48
15	Total quantity of pulp blended	BDt/d	12.23	7.43
16	Quantity of NBKP blended	BDt/d	(25) 3.06	(20) 1.49
17	Quantity of LBKP blended	BDt/d	(65) 7.95	(65) 4.83
18	Quantity of brokes	BDt/d	(10) 1.22	(15) 1.12
19	Quantity of clay blended	BDt/d	(13) 1.60	(10) 0.74

9-3-3 Outline of Improvement in Stock Preparation Equipment (Refer to the attached Dwg. AP 7-4)

1) A batch system is adopted. Two-line paper making machines allow independent stock preparation, except for dissolution equipment for purchased pulp.

2) We have adopted the theoretical paper production on reel of both PM1 and PM2 machines, 23,24 ADt/d, as total stock preparation capacity.
Production trimmed (i.e. production converted in terms of trimmed width, excluding the trimmings) on both machines after taking into consideration various efficiencies, represents, however, 10.29 ADt/d and 5.68 ADt/d for PM 1 and PM 2, respectively.

3) Two brands, BANDEROL and DOORSLAG, are taken for pulp stock preparation. With regard to chemicals, however, we have taken into consideration all other brands as well with a view to meeting the maximum requirement of chemical additives for stock preparation.

4) Comparatively more weight is attached to brokes/waste paper treatment system, with a view to consolidating consistency regulation and dust removal equipment for achieving stable quality of the products.

5) In order to prepare for more stabilized stock furnish and labor saving in the future, the installation of a concentrated control panel and electromagnetic valves for furnishing chemicals and brokes is planned for permitting remote control of the stock preparation work.

6) Consideration is given to permit remote control, wherever possible, with regard to areas liable to occurrences of variation in quality due to a delayed action by manual operations.

9-3-4 General Planning for Purchased Pulp Treatment Equipment

1) General Concept

(1) This equipment is intended for combined treatment of N.L BKP and self-manufactured SBKP for both PM1 and PM2.

(2) One unit of pulper is provided. After dissolution, pulp stock is sent, through damp chest to refining equipment for both PM1 and PM2.

(3) The DDR+2CR system is adopted for beating equipment. After the required freeness drop, the stock is sent to finishing chest.

2) Pulp Dissolution Equipment

(1) Pulper capacity : $10m^3$x110kw motor,
$8m^3$/5% dissolution,
$10m^3$/4% discharge.

(2) Dissolving cycle : Water supply 5 minutes + 10 minutes allowance.
: Dissolution 10 minutes
: Discharging 5 minutes

(3) Treatment capacity : On an average 10 x 4/100 x 1440/30 = 19.2 BDt/d

(4) Auxiliary facilities : Head tank for dilution water, $2m^3$x2-vessel type, automatic water storage supply system.

3) Pulp Refining Equipment

(1) The pulp stock transferred to damp chest, is pumped up, and then, switched over and transferred to both PM1 and PM2 systems by means of three-way magnetic valve. The pulp stock is then temporarily stored in refiner chest. (This switching over and transferring operation is designed to permit sequential control).

(2) The consistency of pulp stock thus stored is 4%. Set CRC (Concistency Regulating Controller) at 3.5%, actuate refiner pump, and set valve opening at that consistency control may be completed by the time for the required freeness drop is reached.

(3) Refiner capacity

		(PM 1)	(PM 2)
Treating capacity	(BDt/d)	11.01	6.32
Inlet freeness	(cc CSF)	660	650
Final freeness	(cc CSF)	200	215
Freeness drop	(cc CSF)	460	435

(4) Types of Refiners Selected

Total refiner output	(kw)	290	200
Types and numbers of refiners		1-110kw DDR 2-90kw CR	1-110kw DDR 2-45kw CR

DDR for PM1 is changed to the 'fixed gap, remote-control' type in order to cover up the momentary flow variation caused by the existing disk floating, hydraulic type. The existing conical refiners are utilized.

9-3-5 General Planning for Brokes/Waste Paper Treatment Equipment

1) General Concept

(1) IN view of the diversified brands being made by both paper making machines, as well as, a great variety in their respective blending and color furnishing, it is necessary to make this treatment system, which is intended for recycling of brokes, completely independent.

(2) In order to improve paper making efficiency and finishing yield, it is necessary to take measures to prevent the break on the machine and lowering in quality, caused by mingling of foreign matters traceable to this broke recycling system.

(3) Both wet brokes and dry brokes are made to join the broke chest, through the respective independent treatment devices, and then sent to finishing chest after the necessary consistency control.

(4) In order to maintain a fixed blending ratio to the pulp stock sent to finishing chest, the existing $2m^3$ measuring tank is utilized to achieve determined blending by the on-off operation of magnetic valve and the pulp.

(5) In the wet broke system, settling tank is utilized as damp chest, from where the wet broke is sent to the broke chest via thickner for treatment of settling tail.

(6) Dry brokes, which have, in advance, been weighed and baled in finishing room or warehouse, are fed to broke chest after being dissolved by the pulper and treated for removal of dust. The batch system is adopted here.

2) Broke Dissolution/Dust Removing Equipment for PM1

(1) Taking into consideration the fact that some brands depend entirely on brokes as the stock, we have decided to utilize the existing $8m^3$ pulper as it is, with an addition of necessary auxiliary equipment to it.

(2) Since the existing $12m^3$ broke chest can be utilized, the capacity of the broke chest permits the storage of 360 BDkg on the basis of 3% consistency.

(3) For 240 BDkg/batch treatment, it is possible to discharge pulp stock with 4% consistency by primary dilution and with 3% finishing consistency by secondary dilution.

(4) For 12 BDt/day operation depending entirely on brokes as the stock, 50 batches per day will be necessary, requiring 29-minute treatment for each batch. In this case, it is conceivable to utilize broke treatment equipment for PM2. Production planning will have to be drawn up, however, so that such utilization may be attempted only when brands made by PM2 do not require blending of brokes in large quantities.

(5) The pulper charging room shall have a hurdle-like, floating floor made of expanded metal. The room shall be designed to allow operational requirements such as unbaling before charging brokes and removing foreign matters, etc. mixed in. The floating floor also serves to remove, by gravity, heavy foreign matters coming into the room with the brokes.

(6) In order to achieve the intended purposes, this equipment will be equipped additionally with the following devices:

Head tank for dilution water	: $2m^3$ x 2-vessel type, with automatic water storage supply valves.
Separator for foreign matters made of iron	: With magnet and connected to pulper outlet.
Liquid cyclone	: To be diverted from PM3.
Prefiner	: The same as above.
Janson Screen	: For removing lightweight foreign matters.
Pumps	

3) Broke Dissolution/Dust Removing Equipment for PM2

(1) Basically, the required equipment is identical with that for PM1, but with the existing 5m³ dissolving pulper being utilized.

(2) Since the existing 12m³ broke chest can be utilized, the capacity of broke chest permits the storage of 360 BDkg/butch on the basis of 3% consistency.

(3) In case of 180 BD/butch charging, the resultant consistency will become 4.5% by primary dilution and 3% finishing consistency by secondary dilution. In this case, the 5m³ pulper will serve as a 6m³ one.

(4) In case of making brands depending entirely on brokes on PM1, a support from PM2 line may become necessary. Hence, a standardized procedure involving cleaning of the system should be established.

(5) The charging room around the pulper shall be, in a like manner as for PM1, provided with a floating floor with expanded metal.

(6) The main facilities required to achieve the intended purposes are as follows:

Head tank for dilution water : 2m³ x 2-vessel type, with automatic water storage supply valves.

Separator for foreign matters made of iron : With magnet and connected to pulper outlet.

Liquid cyclone : To be diverted from PM3.

Prefiner : The same as above.

Janson Screen : For removing lightweight foreign matters.

Pumps

9-3-6 Wet Broke Treatment Equipment

1) General Concept

(1) It will become necessary to carry out continuous treatment of wet brokes which will increase in keeping pace with the increased production setup proposed for both paper making machines, as well as, with the incorporation of suction couch roll.

(2) The current treatment method for white water and wet brokes causes white water shortage due to the loss out of the system.

(3) Simultaneously with the incorporation of suction couch roll, couch pit should re remodeled so that wet brokes may be sent with water. At the same time with this, a series of change in flow will be introduced in order to secure the required quantitiy of white water.

(4) Settling tank will be used as a damp chest for wet brokes, so that the settled wet brokes may be taken out continuously from the bottom in a fixed quantity, thereby permitting the mix ratio with dry brokes as required.

(5) Thickener and white water chest will be provided so that, as the supply source of white water, they may maintain uniform feed consistency to broke chest.

(6) Since the generated quantity of wet brokes varies according to frequencies of sheet break on the machine, use caution to grasp accurately the condition of paper production on reel so as to be able to take counteraction quickly if required.

(7) With regard to the use of white water in making cigarette paper, production planning must be drawn up with due consideration given to the impracticability of making cigarette paper on both machines at the same time.

2) Wet Broke Treatment Equipment for PM1

(1) In order to permit sending the brokes with water, the pit below couch roll will be provided with a steep slope made of SUS. To complete the work involved as early as possible, the dug areas should be merely back filled with mortar.

(2) As preliminary work, a $4m^3$ pit will additionally be constructed by the existing couch pump pit. This pit will be joined to the existing pit in the main work, being provided with a self-priming pump to effect partial circulation. No agitation is provided.

(3) By incorporating a partial circulation system by means of the self-priming pump, no particular level control will be needed under normal operating condition, except for the time of breaks.

(4) The brokes sent with water to the settling tank are taken out from the bottom of the tank. thesby, the load on the thickner can be stabilized and the mix ratio of dry and wet brokes can also be made constant.

(5) White water, after being concentrated and dewatered, is used not only for batch dilution in the stock preparation section, but also is circulated for treatment of wet brokes. When any sheet break occurs, therefore, a drop in white water piping pressure may take place.

(6) Such drop of pressure causes, via pressure switch, buzzer to sound. It is necessary, then, to stop dilution in dry broke pulper until normal pressure returns. (Interlocking mechanism may also be practicable).

(7) The main facilities required for the above include:

Remodling work for couch pit and couch pump pit	: $4m^3$
New installation of self-priming pump	
New instllation of thickner and $12m^3$ white water chest,	
Pump, and pressure piping work, for white water	: To be reused from the existing ones.

3) Wet Broke Treatment Equipment for PM2

(1) Basically, the same remodeling plan as that for PM1 is applicable.

(2) Since PM2 requires, for the proposed increase in cigarette paper production, stock preparation standards substantially different from those for other brands, careful consideration should be given to its production planning.

(3) In case of alkaline paper making, neither recycled stock nor white water can be used in other general brands for blending.

(4) Accordingly, besides efficient production planning for PM2 alone, it will become necessary to consider a combination of the grades to be made on both machines in case PM1 has to make certain grades depending entirely on brokes for the stock.

(5) In the abovementioned case, a combination of DOORSLAG on PM2 and grades depending entirely on brokes on PM1, for example, may be efficient.

(6) Washing/cleaning before and after cigarette paper making, should be carried out as thoroughly as possible.

(7) Description of the necessary facilities is omitted to avoid unnecessary duplication of those for PM1.

9-3-7 Filler and Chemical Additives Preparation Equipment

1) General Concept

(1) This is an important section where, after completion of dissolution and refining, pulp stock is mixed with filler and various chemicals in prescribed ratios, necessary for making paper having quality characteristics required for the respective grades. This section involves, also, the risk of inducing loss of customers by producing paper having a quality substantially deviated from the intended one, if not treated with care.

(2) Although the existing chemicals dissolving equipment has already seen service, it can still serve our purpose. Since, in the existing beater equipment, this section depends on direct charging of the additives by hand with buckets, etc., rationalization will be needed so as to permit feeding of the measured amount in a flow system.

(3) The main additional equipment will be composed of a series of equipment based on the 'dilution → storage → feeding in a flow with measuring apparatus' to match the proposed batch system.

(4) Since the dissolving operation continues to depend, however, on the "fixed-quantity water filling - fixed-weight stock charging" mode, it is necessary to carry out "check action" accurately before and after such an operation.

(5) Final solution is measured by the measuring tanks mounted on finishing chest and operated by the on-off electromagnetic valve. Considering the need of different standard blending ratios for different grades, however, thorough examination must be made as to whether quantitative setting or consistency setting is advisable.

(6) This equipment is designed to permit eventual incorporation of sequence control on the central operating panel. Basically, however, manual control is given preference.

2) Filler/Chemical Preparation Equipment

(1) Rosin Size Equipment

The existing dissolving equipment will be utilized as it is, to let the solution flow to measuring tank by natural water head. For this, it is necessary to raise the position of the existing storage tank to provide the necessary water head.

(2) Alum Equipment

In the same way as for Paragraph (1), the solution is sent in a flow by natural water head by means of raising the level of the storage tank.

(3) Starch Epuipment

The existing dissolving storage tank will be utilized as it is, with an addition of an agitator and a liquid pump. Furthermore, circulation return piping will be newly provided.

(4) Clay Equipment

The existing dissolving tank will be utilized, but with a portable agitator to be additionally installed. Storage tank will be newly installed. Considering wear

and tear resulting from agitation, however, we recommend that a cylindrical concrete tank($10m^3$) be constructed with local hands.
Agitatior and liquid priming pump to be annexed to the equipment, will be included in the scope of supply. Its piping must also be provided with return piping permitting circulation between measuring tank.

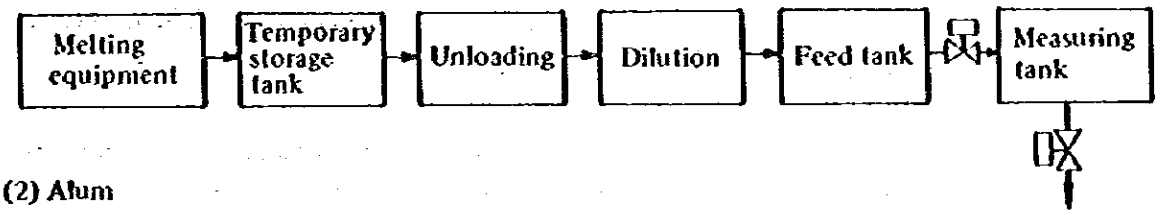
(5) Dyes Equipment

Two sets of $2m^3$ SUS-made dissolving equipment with agitatior, will be newly installed together with liquid priming pump. Blending dyes are two types, common to both PM1 and PM2. In order to enhance agitation effect, circulation return piping will be installed between measuring tanks.

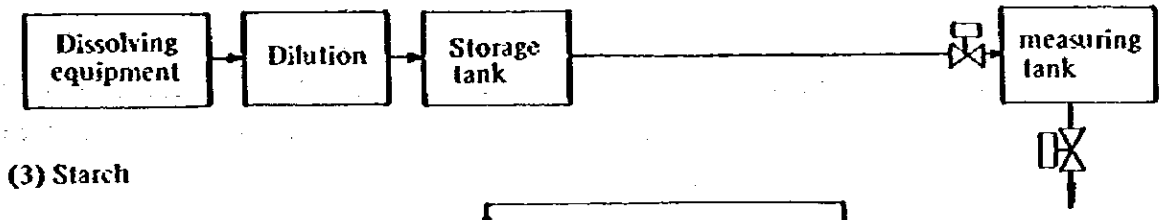
(6) A 1-ton unloading hoist will be installed.

3) Fig. 9-3-2 Schematic Flow Diagram

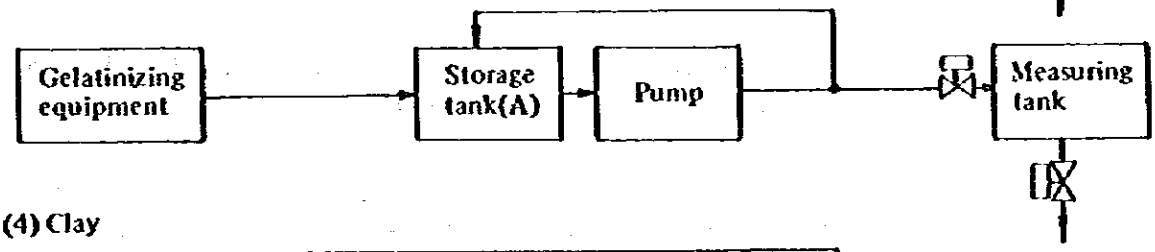
(1) Rosin Size



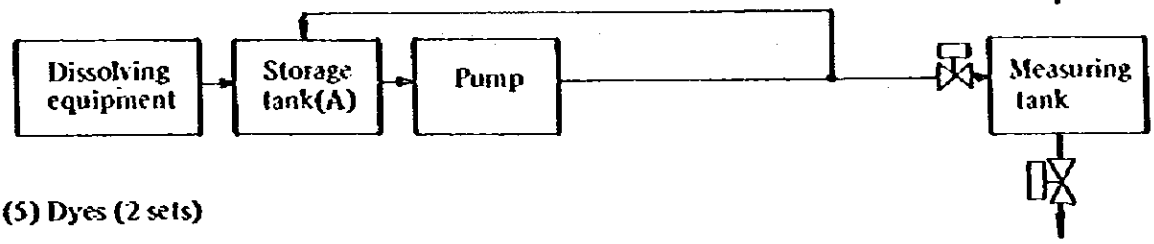
(2) Alum



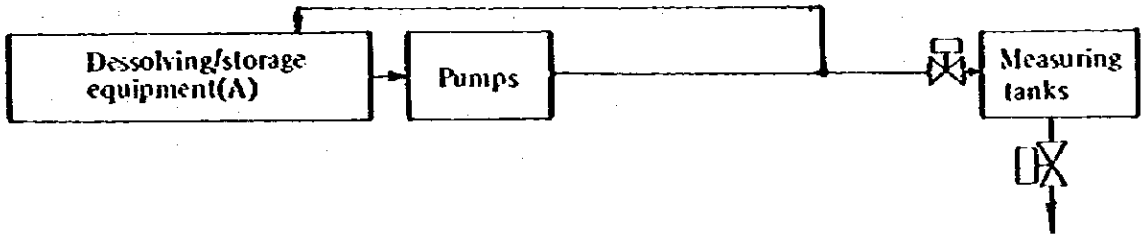
(3) Starch



(4) Clay



(5) Dyes (2 sets)



Notes) Symbol (A) in the drawing means 'with agitator'.
Return piping shall be set in upward direction.

9-3-8 Finishing Chest: Final Stock Preparation Equipment

1) General Concept

(1) The chest shall be 20m^3 capacity, the same as machine chest, with final consistency of 3.25%.

(2) Purchased pulp, after being adjusted to 3.5% in its pulper finished consistency, finished to a prescribed freeness, and then sent to the finished chest.

(3) Broke pulp, after dry brokes and wet brokes being blended adequately, shall be sent at prescribed consistency, measured by measuring tank, and then poured into finishing chest.

(4) The prescribed consistency of brokes shall be variably set at 3±0.25% in order to adjust finish consistency in finishing chest.

(5) Filler/chemicals shall be mixed, via measuring tank, after completion of blending purchased pulp and broke pulp. In order to fix size agents and dyes with pulp, a careful study will be required as to their blending sequence, retention time, etc.

2) Measuring Equipment

(1) It shall be made of SUS, with a capacity able to accommodate any blending ratios.

(2) It shall be so designed that absolute blending quantity is made variable by changing feed consistency or adjusting the setting height of level gauge at measuring tank.

(3) The feed and charging mode shall be of the 'liquid level detection → electromagnetic valve-operated charging' type, permitting remote control from the central operating panel.

(4) In order to stabilize and maintain adequate blending ratios among the respective blending chemicals, it shall be so designed that electrical equipment may be supplemented in the future to record operational data of each pump and magnetic valve, and, to allow sequential control on the basis of these data.

(5) This sequential control device is, however, not incorporated in this project as much as apprecaiable variations unknown are foreseen, depending on such parameters as retention time required for fixation of sizing agents and dyes, timing of blending, liquid temperature, consistency, etc.

(6) It is earnestly hoped, therefore, that by using various measuring meters, the "Planning → implementation → results → analysis research → replanning" cycling process will be repeated in an effort to manufacture products of the best quality with best available methods.

9-4 Master Plan for Improvement: PM1 and PM2 of Unit I

9-4-1 Objectives and Outline for Paper Making Plant as Common Description

This planning has the objectives upgrading of paper quality, improvement in various efficiencies and total yield, as well as reduction in cost of production, which can be achieved jointly with the improvements of the stock preparation equipment. With the materialization of the proposed improvements in stock preparation section, better quality of stock will become available in a stabilized manner. Hence the important task of the paper making section will be how to make paper most efficiently with such stock and then deliver it to the finishing plant.

You will find Table 9-4-2 of Planning for Improvement of Production Efficiency of PM1 and PM2 of Unit I collectively.

1) This table is concerned with improvement of production efficiency and finishing yield, the two factors being necessary for improvement of the total efficiency.

   The improved values shown here are values set on the safer side of more than 5% compared with the corresponding values obtained from the same grades made in Japan.

   It is desired that these values should be attained by all means as they are surely in the range of practicability.

2) Operating efficiencies are set at values lower than the prevailing efficiencies. This is because consideration has been given to the necessity of positive preventive measures, such as planned stoppage of machines, more vigorous washing operation, etc., which should most effectively be performed before any change is made from one grade to the other or before any lowering occurs in paper making efficiency.

3) The present value of total yield represents a value converted on a bone dry basis. On this basis, a maximum value of 90% required by Padalarang is within easy range of attainability.

In this project, it is intended to improve the present value by 10%. For some grade exceeding the 90% level a maximum of 90% is adopted.

In general, a total yield of 90% expressed in terms of bone dry corresponds to 85% on an air dry basis.

4) The operating efficiency degraded by the appreciably obsoleted driving parts, has caused slackening in paper making efficiency, as well as, a high frequency of down-time for repairs. This accounts for a primary factor in degrading total efficiency.

As corrective measures for this, the existing floor cone belt-type drive unit will be taken away from PM1 to be replaced by a sectional drive system with D.C. motors.

Furthermore, for PM2, DC motor will be incorporated to provide main power for the existing line shaft so that insufficient starting torque of the existing motor may be covered up, thus paving the way for the potentiality of an increased production.

5) As an effect of those driving system modification, it will become possible to add and to increase production of the following grades:–

PM1: Additional production of unbleached straw paper for export.
PM2: Increased production of medium grade cigarette paper.

9-4-2 Basic Design Values for Equipment Improvement (for PM1 and PM2 of Unit I)

As mentioned in Chapter 5, Table 9-4-1 on the next page shows a table of remodeling plans in which desired values for remodeling are compared and listed on the basis of various values, including sheet making efficiency, assessed on the Japanese way of calculation.

A comparative table showing the main values extracted and compared is as follows:–

			Present	Improved
1.	Total yield	(%)	76.9	86.0
2.	Total efficiency	(%)	68.10	76.0
3.	Finishing yield	(%)	86.8	90.7
4.	Net reeling efficiency	(%)	86.1	93.5
5.	Operation efficiency	(%)	90.8	89.7
6.	Operating speed	(m/min.)	48.5	65.5
7.	Theoretical net reeling production	(ADt/d)	8.87	11.66
8.	Net reeling production	(ADt/d)	6.94	9.77
9.	Production finished	(ADt/d)	6.08	8.86

Note: The abovementioned figures show arithmetic mean values of all grades in Unit I.

Table 9.4.1 Improvements in Production Efficiency of Unit I/PM1 and PM2

NO.	Kinds		Basis weight (g/m²)	Trim (mm)	Operation speed (m/min)		Operation efficiency (%)		Sheet making efficiency (%)		Finishing yield (%)		Total efficiency (%)		Theoretical (ADT/D)		Reel production (ADT/D)		Production finished (ADT/D)		Total yield (%)	
					Present	Improved	Present	Improved	Present	Improved	Present	Improved	Present	Improved	Present	Improved	Present	Improved	Present	Improved	Present	Improved
-1	HVS Warna	I	80	1950	46	57	90	88	92.31	95	84.52	90	70.21	75.24	10.34	12.50	8.59	10.70	7.26	9.63	76.9	86.9
-2	HV Offset	I	60	1860	62	80	92	92	90.91	93	83.79	90	70.08	77.00	9.96	12.56	8.33	11.00	6.98	9.90	74.8	84.8
-3	HVS Putih	I	50	2050	65	85	92	92	94.19	92	81.95	90	71.01	76.18	9.59	12.55	8.31	10.62	6.81	9.56	72.4	82.4
-4	Kertas Water Mark R	III	70	1950	46	65	92	90	94.99	95	87.22	90	76.22	76.95	9.04	12.78	7.90	10.93	6.89	9.84	71.0	81.0
-5	Water Mark Warna	III	70	1950	46	65	92	90	94.99	95	87.22	90	76.22	76.95	9.04	12.78	7.90	10.93	6.89	9.84	68.4	78.4
-6	Cyclo Style	II	69	1980	65	67	92	92	79.46	94	98.61	98.61	72.09	85.28	12.79	13.18	9.35	11.41	9.22	11.25	78.2	88.2
-7	Zour Etoef	III	70	2020	46	65	90	88	82.06	95	88.15	90	65.10	75.24	9.37	13.24	6.92	11.07	6.10	9.96	72.2	82.2
-8	Mail Zegel	III	80	2080	30	50	89	87	94.85	95	82.24	90	69.40	74.39	7.19	11.93	6.07	9.90	4.99	8.91	82.3	90.0
-9	Bandrol	III	60	2040	62	73	88	86	80.16	93	89.62	90	63.22	71.98	10.93	12.87	7.71	10.29	6.91	9.26	82.2	90.0
-10	Bandrol	III	50	2040	65	85	90	88	89.71	92	89.62	90	72.36	72.86	9.55	12.48	7.71	10.10	6.91	9.09	82.2	90.0
-11	Reform	III	120	2010	32	37	88	88	90.53	97	86.10	90	68.59	76.82	11.41	12.85	8.85	10.97	7.62	9.87	82.2	90.0
-12	SPR Water Mark Ind.	III	80	2010	30	50	92	88	93.38	95	83.58	90	71.80	75.24	6.95	11.58	5.97	9.68	4.99	8.71	76.8	86.8
-13	SPR Biasa	III	80	2010	40	56	88	88	83.33	95	85.71	90	62.85	75.24	9.26	12.96	6.79	10.84	5.82	9.75	71.7	81.7
-14	Cheque Putih	III	100	1950	30	46	86	86	81.62	96	88.66	90	62.23	74.30	8.42	12.92	5.91	10.67	5.24	9.60	79.2	89.2
-15	Ijazah (STTB)	III	130	1854	24	29	80	80	81.32	97	52.40	70	34.09	54.32	8.33	10.66	5.42	7.81	2.84	5.47	57.3	67.3
-16	Post Wesel	IV	175	1940	22	26	90	90	85.19	97	90.79	90.79	69.61	79.26	10.76	12.71	8.25	11.10	7.49	10.08	83.4	90.0
-17	Kartu Post	IV	175	2050	22	25	90	90	81.20	97	90.13	90.13	65.88	78.68	11.37	12.91	8.31	11.27	7.49	10.15	83.4	90.0
-18	London Warna	IV	190	2080	20	23	90	90	91.49	97	86.45	90	71.18	78.57	11.38	13.09	9.37	11.43	8.10	10.29	79.8	89.8
-19	Door Slag Putih	V	28	1760	68	100	94	92	81.06	87	86.41	90	65.84	72.04	4.83	7.10	3.68	5.68	3.18	5.11	85.5	90.0
-20	Door Slag Warna	V	28	1760	68	100	94	92	81.06	87	86.41	90	65.84	72.04	4.83	7.10	3.68	5.68	3.18	5.11	85.5	90.0
-21	Bank Post Putih	V	44	1950	70	90	88	88	72.65	90	84.09	90	53.76	71.28	8.65	11.32	5.53	8.81	4.65	7.93	75.2	85.2
-22	Corona	V	37	1840	70	100	90	88	80.00	88	84.62	90	60.93	69.70	6.86	9.69	4.94	7.59	4.18	6.83	68.4	78.4
-23	Buku Telephone	V	37	1860	70	100	92	92	82.69	88	84.63	90	62.10	72.86	6.94	9.91	5.28	8.02	4.31	7.22	72.2	82.2
-24	Sigaret Putih	VI	26	1910	64	100	96	92	86.25	88	82.60	90	68.39	72.86	4.65	7.26	3.85	5.88	3.18	5.29	81.1	90.0
-25	Sigaret Nankin	VI	26	1910	64	100	96	92	86.25	88	82.60	90	68.39	72.86	4.65	7.26	3.85	5.88	3.18	5.29	81.1	90.0
-26	Coverture Warna	VII	60	1950	65	77	93	93	79.14	93	92.93	92.93	68.40	80.38	10.75	12.97	8.06	11.22	7.49	10.43	75.7	85.7
-27	HV Omslag	VIII	80	1950	44	58	93	93	87.71	95	97.15	97.15	79.25	85.83	9.88	13.03	8.06	11.51	7.83	11.18	77.3	87.3
-28	HV Omslag	VIII	200	2000	20	23	93	93	85.69	97	96.62	96.62	77.00	87.16	11.52	13.24	9.18	11.95	8.87	11.55	77.3	87.3
-29	HVO Biru Tua	VIII	70	2050	46	63	95	93	93.97	97	96.94	96.94	86.54	87.45	9.51	13.02	8.49	11.75	8.23	11.39	77.3	87.3
-30	Kraft Coklat	VIII	45	1800	70	90	95	93	90.30	94	97.14	97.14	83.33	84.92	8.16	10.50	7.00	9.18	6.80	8.92	77.3	87.3
-31	Water Mark	III	100	1950	30	45	86	86	81.61	96	84.84	90	59.26	74.30	8.42	12.64	5.91	10.48	4.99	9.40	76.8	86.8
	Total & Average		80.3	1951	48.45	65.48	90.81	89.68	86.13	93.48	86.80	90.66	68.10	76.00	8.87	11.66	6.94	9.77	6.08	8.86	76.9	86.0
	PM 1				39.4	51.4	90.0	89.1	86.95	95.43	87.32	90.63	68.53	77.17	9.82	12.69	7.68	10.80	6.77	9.83	76.4	85.7
	PM 2				67.4	95.0	92.7	90.9	84.4	89.4	85.71	90.71	67.20	73.76	6.87	9.51	5.38	7.74	4.61	7.04	78.1	86.6

9-5 Master Plan for Improvement: PM 1 of Unit I

9-5-1 Objectives and Outline

1) PM1 is a paper machine endowed with factors promising a bright future such as production of highly-profitable specialty paper for the Mint Bureau, unbleached straw pulp which started trial export sales recently, etc.

2) Increased profit of the plant as a whole is attainable by sales promotion supported by quality improvement of the products, as well as, by efforts to increase production through improved efficiency and increased machine speed.

3) By implementing the proposed improvement measures, attainment of the following effects is aimed at.

			Present	Improved
1.	Total yield	%	76.4	85.7
2.	Total efficiency	%	68.53	77.17
3.	Finishing yield	%	87.32	90.63
4.	Net reeling efficiency	%	86.95	95.43
5.	Operation efficiency	%	90.0	89.1
6.	Operating speed	m/min.	39.4	51.4
7.	Theoretical net reeling production	ADt/d	9.82	12.69
8.	Net reeling production	ADt/d	7.68	10.80
9.	Production finished	ADt/d	6.77	9.83

9-5-2 General Improvement Planning for Approach Flow Equipment

1) Consistency and Flow Regulation Equipment

(1) Completed stock with 3.25% consistency will be pumped up from machine chest and, after being adjusted to 3% consistency, blended and diluted with circulated white water coming from back water pit. Finally, it is adjusted to the required head box stock consistency.

(2) CRC shall be of the open type incorporating the constant head overflow type permitting to minimize variations in flow speed at the measuring zone.

(3) With a view to minimizing variations in basis weight, the constant head overflow type is also incorporated for regulating the feed of white water.

(4) Stock regulating valve shall be of the type permiting remote control so that basis weight measurement feedback may be performed rapidly from reel end.

2) Final Dust Removing Equipment

(1) Rotary screen is not adopted because of high installation cost involved.

(2) The existing "Superclone" will be utilized by relocating it to have a connection with a pressure screen with high dust removing efficiency.

(3) Pressure pump shall have the optimum specification for use with the above-mentioned cleaner and screen.

(4) For connection to head box, "double taper header manifold tubes" shall be adopted.

9-5-3 General Improvement Planning for Wet Part

1) Suction Couch Roll and Related Equipment

(1) The existing jacket couch roll is taken away to install a suction couch roll in its place.

(2) Basic specifications shall be the same as the existing couch roll for PM3 to ensure interchangeability. This will serve to reduce inventories of spare parts for supplies.

(3) As ancillary facilities, vacuum pump, separator, drain pump and paper roll will be included.

(4) Driving system shall be of the sectional drive type by single DC motor, conformably to the provisions in the section "Driving Equipment".

2) Dandy Roll and Related Equipment

(1) The required specifications shall be the same as those for PM3 to ensure interchangeability with each other, but excluding driving unit.

(2) One dandy roll with water mark will be included.

3) Wet Broke Treatment Equipment

(1) In consequence of incorporating suction couch roll, it will become necessary to cause wet brokes to be treated by water energy.

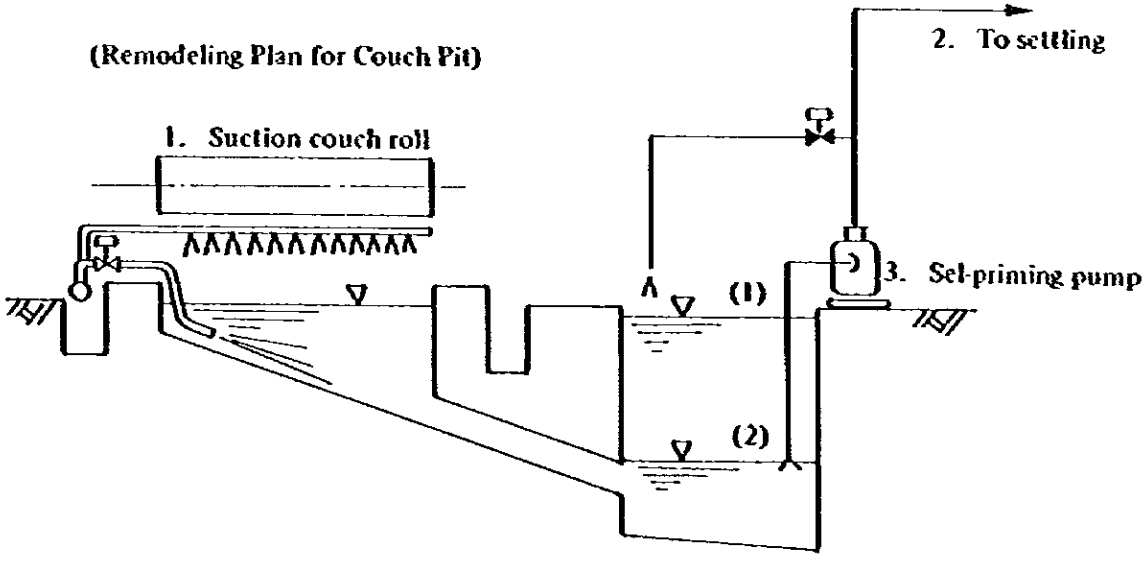
(2) Remodeling work will be required for the existing couch pump pit and couch pit. To shorten the term of work, preparatory work is to be taken into consideration as an important key.

(3) Connection will be made to white water circulation line coming from stock preparation section, including knock-off shower for break treatment, white water injection pipe for wet broke, and pressure pump for knock off fresh water.

(4) Ancillary Facilities to Wet Part

Refer to the annexed list of equipment for remodeling works.

(Remodeling Plan for Couch Pit)



Note 1. In case of a paper machine with one-storied construction in Japan:

(1) Maximum allowable level (when break occurs).

(2) Normal level (electromagnetic valve is kept open at pump delivery.)

Note 2. With a view to shortening the days required for the construction work, it is considered better to build the pit beneath the couch roll with SUS plate, instead of usual concrete work, and to embed a Hume concrete pipe for connection.

9-5-4 General Planning of Improvement for Driving Section

1) As corrective measures for lower operating efficiency due to frequent occurrences of unexpected repairs, as well as, for slackening in sheet making efficiency attributable to clutch plate slip, the existing floor cone belt driving equipment will be removed to be replaced by a new sectional drive system by DC motor.

2) Outline of the Existing Driving Equipment
(Refer to Chapter 6 "Present Technical Problems and Countermeasures")

3) Potential Capacity for Increased Production, expectable from the Existing Paper Machines

(1) Wire Part

With the wire length of 15.5m, it is possible to produce, even specialty paper, at a speed of 150m/min.

(2) Press Part and Dry Part

With the three-stage press under a nip pressure of 30 kg/cm, production up to 14.5 ADt/d is possible, on a calculation fo drying capacity, assuming press outlet moisture at 60%.

(3) Limits on Structural Strength

With the structure of dry part frame, which is almost "a museum piece", and rotating part bearing so old, two times the present maximum speed, that is, a speed of 120 m/min., is cosidered as limits.

(4) Design Speed of Driving Section

Based upon the abovementioned potential capacitiy, the design speed of the modified driving section shall be at 120 m/min.

5) Improvement Plan of Operation Speed and Production Improving Plan

(1) In Figures 9-5-1 and 9-5-2, the proposed improvement plan of operating speed and production improvement plan are shown in the graphs.

(2) The dots appearing in the drawings show actual values. The characteristic curve of operation speed (Improving target of operation speed) in Fig. 9-5-1, denotes drying limits applicable to production of specialty paper, or, in other words, limiting characteristic curve in terms of wet-web moisture at dryer inlet.

(3) These drying capacity limits are expected to be improved over the present level through the proposed incorporation of suction couch roll. In addition, it is considered that a decrease in frequency of breaks resulting from improved quality of stock will move expected actual characteristic curve upward of this improving target curve of operation speed.

(4) The figure of operation speed shown in "Improvements in Production Efficiency", has been calculated on the basis of drying capacity applicable to specialty paper, with additional 10% safety coefficient.

(5) For production, more increase in production will be possible, presupposing, however, that the formulation of the structure necessary for stock supply and sales promotion is ensured.

6) Planning layout of DC motor in modified driving section. (Refer to the attached Dwg. AP 7-5)

7) Shortening of Term of Work

The improving work for this driving equipment corresponds to the critical pass of the improving work for PM1. In case rapid completion of work is anticipated, it will depend for its success upon the proper way in which the necessary preparatory work is scheduled.

Fig. 9-5-1 Improving Plan of Operation Speed (Unit I, PM1 & PM2)

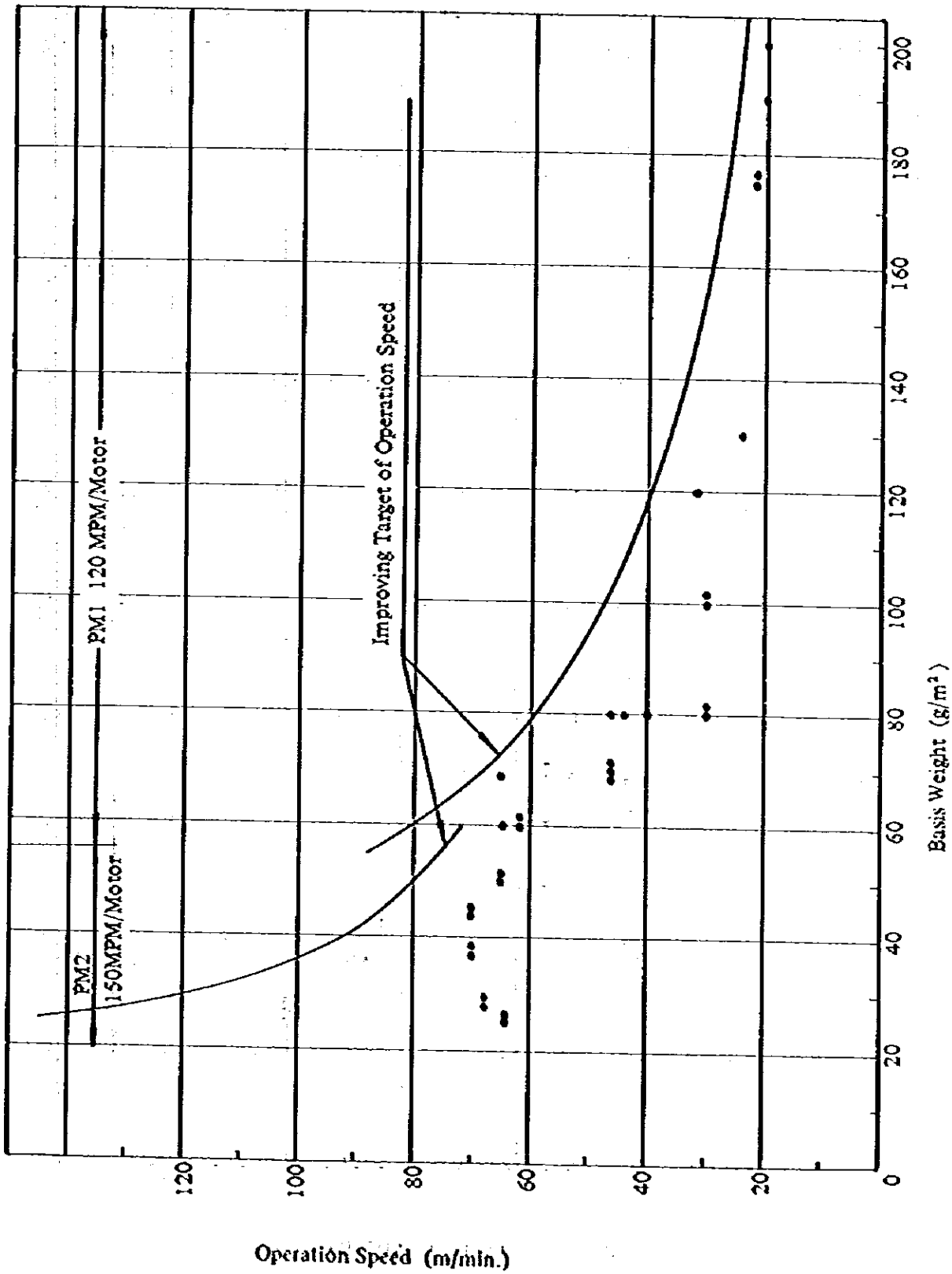
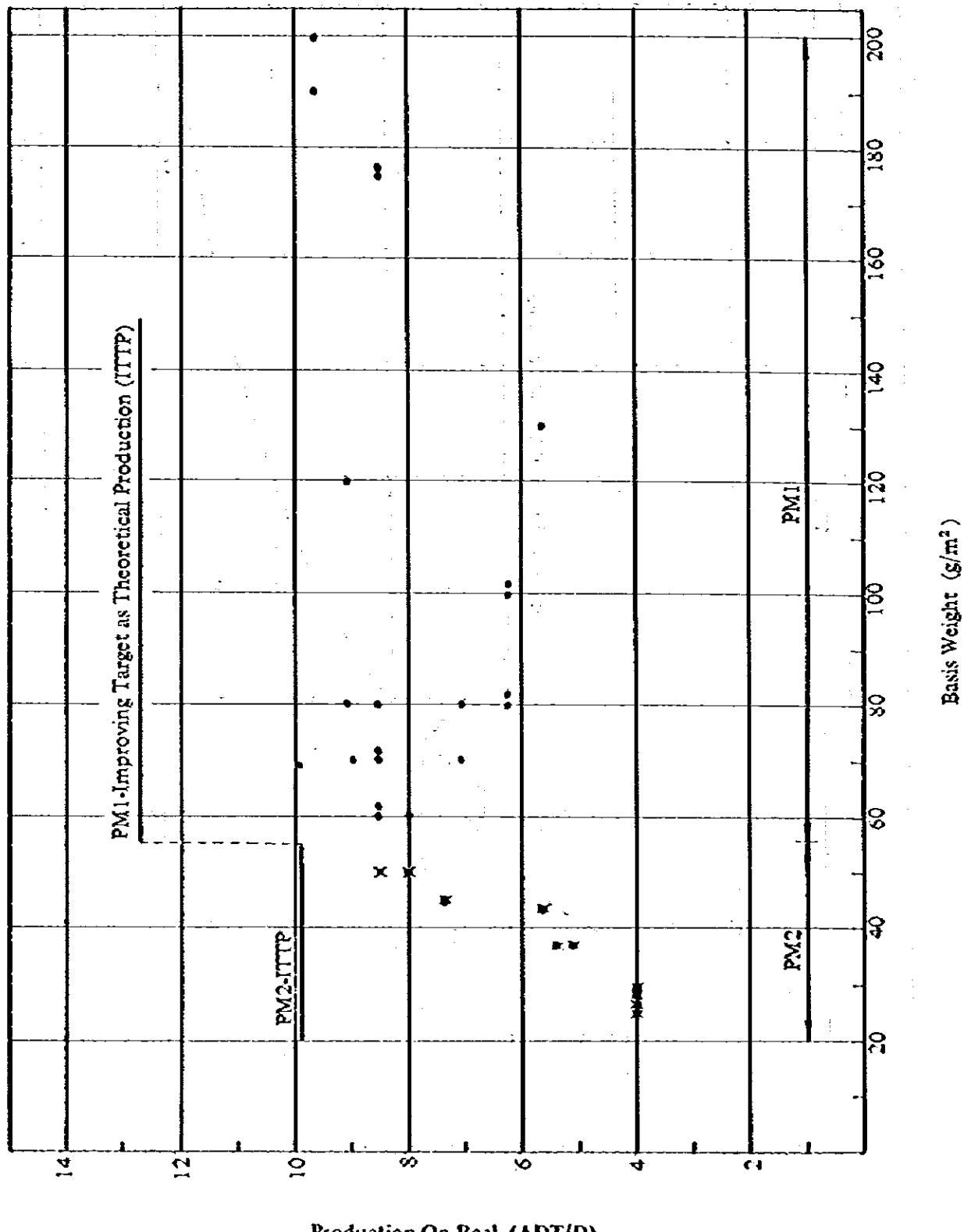


Fig. 9-5-2 Production Improving Plan vs Basis Weight (Unit I, PM1 & PM2)



9-6 Master Plan for Improvement: PM 2 of Unit I

9-6-1 Objectives and Outline

1) PM2, mainly intended for producing thin papers, suffers from extremely low operating efficiency and finishing yield, affected by inferior quality stock being furnished by the existing stock preparation section.
This pushes up cost of production disproportionately to selling prices of finished products, causing deterioration of profit.
(Refer to the table 5-6-1 under the heading of "Actual Selling Prices and Cost of Production - February, 1984", attached to Chapter 5.)

2) Accomplishment of quality improvement in stock preparation and approach sections, will be able to upgrade total efficiency and total yield, thereby reducing cost of production.

3) This planning aims at increased production of cigarette paper, etc., and better earnings by means of a series of modification works.

			Present	Improved
1.	Total yield	%	78.1	86.6
2.	Total efficiency	%	67.2	73.8
3.	Finishing yield	%	85.7	90.7
4.	Net reeling efficiency	%	84.4	89.4
5.	Operating efficiency	%	92.7	90.9
6.	Operation speed	m/min.	67.4	95.0
7.	Theoretical net reeling production	ADt/d	6.87	9.51
8.	Net reeling production	ADt/d	5.38	7.74
9.	Production finished	ADt/d	4.64	7.04

9-6-2 General Planning for Improving Approach Flow Equipment

1) Consistency and Flow Regulation Equipment
This equipment has basically the same contents as those for PM1.

2) Final Dust Removing Equipment

(1) Instead of the enclosed loop combination consisting of the existing superclone and Lamport enclosed screen, Yanson screen is to be relocated from PM1 for treating tailings for both cleaners and enclosed screens.

(2) Improvement in dust removing efficiency is to be envisaged by proper selection of Yanson screen plate, as well as, basket for the enclosed screens.

9-6-3 General Planning for Improvement of Wet Part

1) Suction Couch Roll and Related Equipment

This portion has basically the same contents as those for PM1.

2) Equipment Related to Wet Broke Treatment

Although its contents are basically the same as those for PM1, this equipment is planned for an after-modification theoretical production of below 10 ADt/d. and modification of the pit below the couch roll is excluded from the scope of the proposed work (in order to shorten the required term of construction work).
The contents of the work after the courch pump pit shall be in accordance with those for PM1.

3) Equipment Related to Wet Part

Refer to the attached "List of Equipment for Remodeling Works"

9-6-4 General Planning for Chemical Press Installation

1) The proposed modification in driving section will make it possible to increase production by speeded-up operation. Chemical press is to be newly installed with a view of transferring cigarette paper (S) in an amount corresponding to 52 days of operation from PM 3 and lowering the ratio of unprofitable grades.

2) The Proposed System:

The proposed specifications will be basically the same as those of PM3, except that the driving section is to be branched off from the pinion shaft driving the existing Group 1 dryers. The belt drive system is to be adopted.

3) Ancillary Facilities

Included are machine supply tank, screen for return channel and pump for liquids.

4) Location of Installation

(1) The proposed location of installation shall be the place between Group 1 and Group 2 of the dryers.

(2) Scaffold for inspection, among others, will be included.

9-6-5 General Planning for Improvement of Driving Section

1) As corrective measures for lower operating efficiency due to frequent occurrences of unexpected repairs, as well as, for slackening in net reeling efficiently attributable to clutch plate slip, it is planned to carry out modifications in driving section, as described below.

(1) Incorporation of DC Motor as Prime Motor. The existing motor lacks in starting torque and is obsolete. Also from the viewpoint of matching control with the suction couch roll to be newly installed, incorporation of DC motor is indispensable.

(2) Incorporation of Air Clutch System

This is necessary to improve operating efficiency and net reeling efficiency.

(3) Ancillary Facilities;

Operation control will be tightened by installing speed meters at wire and reel part, as well as, sheet break counter.

2) Outline of the Existing Driving Equipment

(Refer to "Schematic Drawing of the Existing Driving Section" in Chapter 6).

3) Potential Capacity for Increased Production of the Existing Paper Machine

(1) Wire Part 150 m/min.

(2) Press and Dry Parts: Thin paper 10 ADt/d

(3) Limits on Structural Strength: 150 m/min may be possible

4) Design Speed of Driving Section: Set at 150 m/min.

5) Improvement Plan for Operation Speed and Reel Production

Refer to Figs. 9-5-1, 9-5-2 at Item 9-5-4.

6) Planning layout of DC motor for improvement of driving section.
(Refer to the attached Dwg. AP 7-4.)

7) How to Shorten the Term of Work

(1) The work items which account for the longest portion of the term of work, are all concerned with concrete works such as foundations of prime motor, DC motor for suction couch roll, cantilever for suction couch roll, etc.

(2) It will become necessary, therefore, to study how to go ahead with preliminary works required to shorten the term of work, as well as, to use quick-setting cement, etc.

(3) One solution will be to concentrate annual planned shutdowns in certain periods. However, separated scheduling of shutdown by sections may provide another solution.

9-7 Master Plan for Improvement: Finishing Plant of Unit I

9-7-1 Objectives and Outline

1) It is necessary to see to it that any source of claim is eliminated, before delivery, by establishing quality standards compatible with economy through negotiation with individual users, as well as, by performing rigid daily delivery control at this section.

2) It is indispensably necessary to put environment in good condition by means of efficient arrangement and maintenance so that the room may be made functional and that final quality control and delivery control may be carried out under satisfactory environmental conditions as such.

3) Various counter measures shall be implemented with a view to improving finishing yield, increasing mill earnings and ensuring sales promotion, through performing more rigidly delivery and inventory control, practising selective handling of brokes, and making it daily routine to maintain close inter-communications with each operation section.

9-7-2 Slitter Rewinder Equipment for Roll Products

1) Main Specifications

(1) The desired specifications are intended for operation at a speed of 450 m/min. to finish rolls having a width of 2,250mm.

(2) Unreeling stand shall permit joint use for all the spool rolls of the existing PM1, 2 and 3.

(3) Location of Installation

It will be installed nearby the bobbin slitter in the PM3 finishing room.

9-7-3 Transporting Equipment for Roll Products and Products in sheets

1) Hoist for Slitter Rewinder

A 3-ton electric hoist will be provided for unreeling stand.

2) Forklift Truck (2.5 ton)

Intended for transporting half-finished products from Unit I to the finighing room of Unit II for finishing operation of roll products.

3) Handlifter

Intended for moving products in sheets.

9-7-4 Baling Equipment for Handling Brokes

1) Specifications: 30kg baler (maximum), movable type 300 x 300 x 500mm

2) Ancillary Facilities: 2 sets of binding device

3) Location of Installation: Finishing Room of Unit I

9-7-5 Storage for Half-Finished Products

1) Objective: As a yard for half-finished roll products as well as a temporary yard for products yet to be finished in sheet or roll.

2) Location: Indoors around the finishing equipment, presently used as a temporary yard for storing finished products.

3) Total Area: 500m²

4) Works Required: Paving the existing floor face and providing simple partition wall.

9-7-6 Road Pavement

1) Object: Maintenance of routes for transporting finished products.

2) Location: Platform for idle sidings.

3) Total Area: 500m²

9-7-7 Others

Refer to the attached "List of Equipment for Remodeling Works".

9-8 Master Plan for Improvement: PM 3 Plant of Unit II

9-8-1 Objectives and Outline

The plan has for its objectives to achieve earnings through sustainable quality improvement and reduction of cost, for cigarette paper.

1) It aims at reducing running cost of refining equipment, consolidating flax blending equipment, as well as, achieving sustainable improvement in freeness.

2) As corrective measures against variations in basis weight, it is planned to renew CRC, as well as, to consolidate and stabilize treatment of wet brokes.

3) In order to make cigarette paper mark more distinct, mark press and hidrofoil should be additionally installed.

4) Bobbin slitter should be newly installed to finish some products in bobbin.

5) All the abovementioned measures are contemplated to contribute, as overall effects, toward reducing a loss caused by overweight, as well as, increasing production of the more profitable brand "Eagle".

9-8-2 Stock Preparation -- Related Equipment

1) Readjustment of the Existing Beater

(1) The 250kg beater in the pulp plant of Unit I will be readjusted, as a measure to cope with the proposed increase in making the stock for highclass cigarette paper.

(2) Included are replacement of beating segments and re-wiring of washing drum.

2) Refining Equipment

(1) A double disc refiner will be additionally installed at the end of the existing refining equipment, "DF", with a view to stabilizing freeness, by reinforcing refining capacity and aiming at saving unit consumption ratio of power.

(2) Since stabilized freeness permits uniform dewatering rate in wet part, stabilization of basis weight is expectable by reducing possibility of uneven moisture in the direction of machine width.

(3) Proposed Specifications: 110 constant gap type DDR.

9-8-3 General Planning of Improvement for Wet Part Equipment

1) Consistency Stabilizing Equipment

(1) The existing in-line type CRC is to be transferred to the broke pulp system, and a new open type CRC is to be mounted on the existing regulating box.

(2) This plan includes works related to connection with the existing riffler.

2) Equipment for Treating Wet Brokes

(1) Vacuum thickner will be installed in order to stabilize variations in consistency resulting from changes in flow rate of wet brokes when breaks occur.

(2) For the purpose of reducing unit ratio of power consumption continuous operation of agitator for the pit under the couch roll will be redesigned to be switched over to intermittent operation upon detecting breaks.

(3) In order to prevent sedimentation of filler when agitagor stops, piping for circulation will be added.

9-8-4 General Planning of Improvement for Dry Part Equipment

1) Improvement of Drainage in Dry Part

(1) The present daily production stands, on an average, at two times the rated daily production capacity of 5 ADt/d. As a matter of course, therefore, the equipment capacity of the driving section has reached the limit.

(2) The existing group 2 of dry part represent portions where the amount of moisture evaporation becomes maximum with regard to any type of paper machine regardless of any paper grade produced. Accordingly, heat exchange between dryer cylinders and wet paper layer, will also become a maximum amount. In other words, this is the position where condensation of steam will develop at quick tempo.

(3) Whereas, normal steam pressure in drying cylinders does not reach the operating differential pressure of the existing steam trap, thus causing overload in the driving section.

(4) As corrective measures for the above, pressure on the discharge side will be made vacuum by incorporating free float type steam trap, as well as, vacuum drainage system. This will sufficiently increase relative differential pressure so that operation may become possible with low-pressure steam.

(5) As the required facilities, steam trap, vacuum pump and heat exchanger will be included.

2) Back-up Roll for Marking Press

This will be incorporated for the purpose of extending the required grinding cycle of the existing bottom rubber roll.

9-8-5 Treatment Equipment in Finishing Section for Products in Roll Form

1) Owing to rapidly increasing demand on the market for machine-rolled cigarettes, there is an observable tendency that the ratio between hand-rolled and machine-rolled cigarettes is likely to be reversed in favor of the latter in a couple of years to come.

2) Bobbin slitter will be installed in the same space housing the slitting rewinder for Unit I, thus permitting to make bobbin finish for products of PM3.

Main Specifications: 300 m/min., 27mm bobbin width.
The range of basis weight: from 20 to 26 g/m²

9-9 Basic Plan for Improving for Equipment in Test Room

9-9-1 Objective and Summary

1) The paper making industry is a process industry. The intermediate quality from the input of the raw material to the finished product via the semi-finished product on the way leads to direct and indirect causes to determine the quality of the finished product.

2) When the TQC is promoted with the quality control as a weapon, the sampling inspection of the semi-finished products in the intermediate process and prompt feedback are essential and important for the QC cycle.

3) As a daily work, it is necessary to set up quality standards for each process, to plot data continuously on the control chart by sampling periodically, and to take proper actions through early discovery of abnormalities and prompt feedback.

4) It is necessary to reinforce the minimum field testing equipment necessary for the prompt process to process examinations thus to eliminate the causes for defect as early as possible, to decrease the rate of rejects for the finished product and to restore the reliability of the customers to lead to the sales expansion.

9-9-2 Testing Equipment to be Supplied

See the attached equipment list required for renovation work.

9-10 Basic Plan for Improving for Maintenance and Utility Sections

9-10-1 Objective and Summary

The objective is to improve the equipment functions in auxiliary sections and to increase the factory profitability as a part of the efforts to increase the efficiency and yield and to decrease the cost.

1) To reduce the steam cost, one of the main reasons for the abnormally high manufacturing costs of self-made straw pulp and all the grades of paper produced.

2) One of the causes for the high manufacturing cost of the self-made straw pulp is the high rate of fiber loss in the effluent, and for this reason the yield of the bleached straw pulp is very low at 25%. Therefore, the yield of bleached pulp should be increased by taking measures to minimize the fiber loss and at the same time by recovering the pulp settled in the pond with the use of simple effluent treating equipment.

3) The elevated water tank is time-worn and is not used now because of leakage. For this reason the water pressure fluctuates greatly in the intermediate process and this is a main cause for the quality fluctuation throughout the equipment where a constant amount dilution is required.

The water tank is to be totally replaced.

4) As a part of measures to cope with the increasing demand for roll products and to increase the production of Unit 1, the product warehouse should be expanded and the roads in the premises should be improved and connected with one another in a more effective way.

9-10-2 Basic Plan for Improving Steam Generating Equipment

1) Objective and Summary: out of 4 boilers in the existing boiler plant, 3 boilers are old flue boiler and smoke tube boiler which have been used since the establishment of the factory and therefore, the thermal efficiency is low and the pressure resistance is decreased due to super-annuation of the body and for this reason the maximum working pressure must be set low.

The remaining one boiler was installed at the time of PM3 expansion in 1975 having a good thermal efficiency and it can be used in the future.

In order to withstand the peak load of the pulp cooking division and to reduce the steam cost from the present 21,670 RP/t to 16,000 RP/t, a package boiler is to be installed.

2) Boiler Specifications

(1) Type: outdoor oil-fuelled package type water tube boiler

(2) Capacity:

14 kg/cm² x 14 t/h steam x 1.1 t/h fuel oil/9,800 kcal/kg

(3) Supply Scope

Boilder: Package boiler/14 kg/cm² x 15.4 t/h – 1 set
Water treating equipment: Water softener/280 m³/cycle
Instruments & control panel:
Water supply and oil supply integrating meters, pressure gauge, thermometer, steam flowmeter

(4) Out of supply scope:

Chimney, soft water tank, raw water tank, oil tank etc. are out of the supply scope, insofar as the existing facilities can be used.

9-10-3 Basic Plan for Improving Repair Equipment

1) Objective and Summanry

(1) For the old production equipment, the maintenance cost is rather low, about 3% of the annual sales. (Fiscal 1983)

(2) The daily maintenance activity mainly consists of needful repairs of a passive nature and there is a lack of improvement effort through a progressive mind to seek the solution for problems.

(3) In order to establish a preventive maintenance system and to decrease the frequency of accidents arising suddenly it is necessary to heighten the morale of employees to go forward for improvement programs.

(4) As a preparatory stage for the preventive maintenance system, it is necessary to standardize, simplify and unify the parts and also to replenish the machine tools required for that purpose.

2) Knife Grinder

(1) Since the frequency of grinding certain parts which get worn quickly such as blades for sheet cutter and doctor blades for hard rool is increasing, a knife grinder should be installed at the workshop for processing such blades by themselves.

(2) Main specification:

2500mm grinding length x 300mm width

3) Milling Machine

(1) This equipment should be installed anew to enhance the will of employees for self-improvement and to promote the standardization, simplification and unification of old equipment.

(2) Main specification:

Horizontal type 1500 x 300mm bed type with end mill equipment

9-10-4 Basic Plan for Improving Electric Equipment Instrumentation and Maintenance Equipment

1) Objective and Summary

(1) Apparatuses and measuring instruments for daily inspection are lacking and the preventive maintenance by inspection during operation is imperfect and the positive control is almost impossible.

(2) Ordinary measuring instruments are not properly owned or maintained, and those instruments in hand are not periodically calibrated.

(3) Despite the fact that there are many old transformers and motors, the measures to cope with any sudden accidents are not taken.

(4) In order to establish the preventive maintenance system, which is assigned to the auxiliary sections, necessary apparatuses and measuring instruments and minimum necessary spares for maintenance should be provided, thus reducing the cases of sudden repairs.

2) Equipment to be Provided

(1) 630 KVA transformer for Unit 1: 3 units to be renewed

(2) AC and DC spare motors, one each

(3) Measuring instruments & gauges for control:

See the attached equipment list needed for renovation

9-10-5 Basic Plan for Improving Water Equipment

1) Objective and Summary

(1) The water quality is good because the fountain in the mountaneous area is used as a water source but the effective water volume tends to decrease year by year and the present effective water volume is halved to 100 ℓ/sec.

(2) The consciousness to save water in the premises is lacking and there are many spots where water is wasted due to leakage or valve seat missing, and because much water is discharged into a drainage ditch and wasted, the apparent water usage rate becomes high.

(3) Because the elevated water tank is time-worn and not used, the pressure flucturation in the dilution piping is big. For this reason the fluctuation in quality starts at the pulp section, adversely affecting the quality obtained at the next section of paper making.

(4) As the countermeasures, it is necessary to renew the elevated water tank and to reduce the fluctuation of the water pressure and at the same time to repair the piping to save the water and increase the use of the white water by recirculation.

2) Equipment to be covered by renovation plan

(1) Elevated water tank:

Capacity: $10m^3$, material: FRP
Accessories: one set of piping and connecting seats

(2) Related equipment:

Overhauling of frame for elevated water tank
Replacement and repairs of existing piping valves

(3) White water circulating equipment:

Refer to "Improvement of Unit I Stock Preparation Section"

9-10-6 Basic Plan for Improving Effluent Treating Equipment

1) Objective and Summary

(1) The progress rate of industrialization in Indonesia is still low and the control values to improve the environment are fixed by law but the controlling force is not so tight as in the developed countries because the employment stabilization and expansion must also be taken into consideration.

(2) Under the present circumstances, the valuable pulp fiber is just drained wastefully and the increased loss of fibers is the biggest cause for the high manufacturing cost.

(3) See Table 6-14-2 "Comparison between Paper Pulp Industry Effluent Analysis and WPRD Requirements" attached to the section of unbleached pulp recovery of pulp section for self-use.

(4) As the measures to reduce the environmental polution by decreasing the above effluent load and at the same time to increase the total yield by recovering the wasted fibers an effluent settling pond and flowing equipment should be installed.

2) Simple Type of Effluent Settling Pond

(1) Building place:

Reclaiming the land along the Unit 1 drainage ditch, the area of 5m (width) x 100m (length) x 3m (depth) reaching to the gate is used.

(2) Structure:

As per Fig. 9-10-1. Since 2-tank switching type is used, the total capacity for one section is 750m^3.

(3) Retention time:

The total amount of effluent for Unit 1 can be decreased from the present 5,500m^3/d to 4,500m^3/d by increased use of the white water circulated. (200 x 10 + 120 x 20)

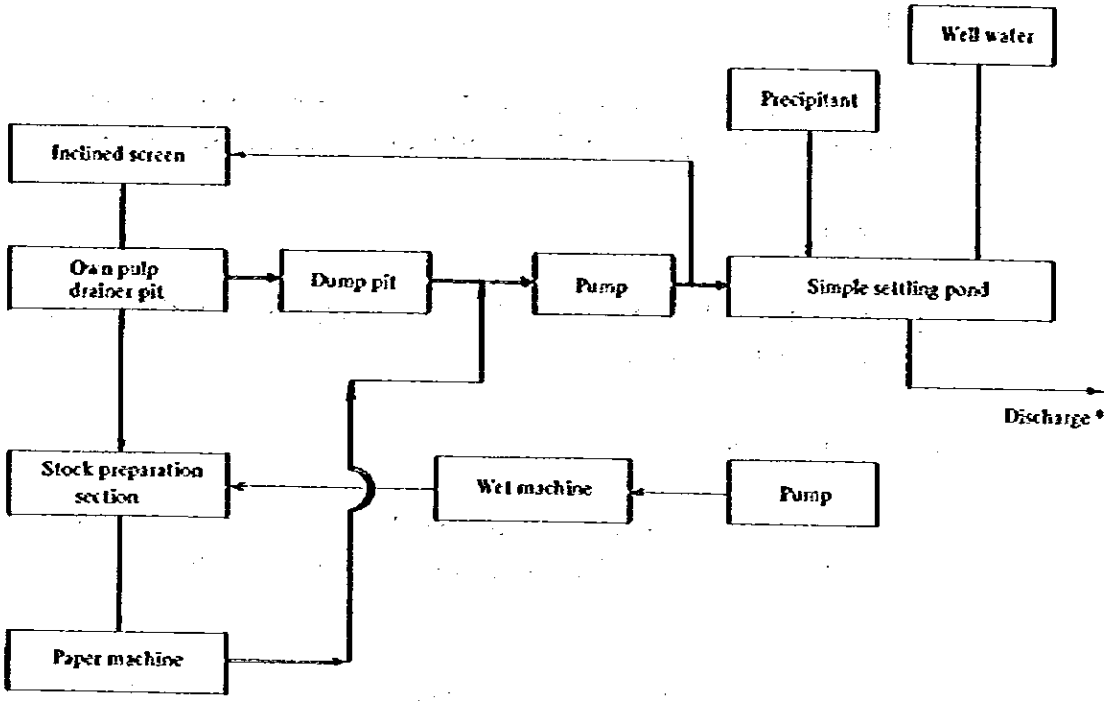
Therefore, at the total average a retention effect of about 4 hours is available, but it may also be necessary to use coagulant and precipitant. (In case of Japan, it is about 3 – 4 hours with simple settling type.)

(4) Pre-Treating Equipment to Recover Own Pulp

By installing an inclined screen in the drainer pit room for unbleached pulp and a 2m^3 dump pit in the existing drainage ditch, the pulp should be recovered with circulation by a sand pump.

(5) Fibers recovered from simple settling pond

The fibers settled down is sent to the existing wet machine by the sand pump and wet-lapped and then blended with the PM1 broke pulper in the stock preparation room, provided that it can only be used for the paper made from brokes only.



* Target (value specified by WPRD) 500 ppm

(6) When the target effluent load is 500ppm, value specified by WPRD (Water Problems Research Directorate):

Own bleached pulp: $500 \times 10^{-3} \times 200 = 100$ kg/ton
Paper making section $500 \times 10^{-3} \times 120 = 60$ kg/ton

That is, about 0.1% can be expected as the effluent consistency. But if the precipitant is not used, the SS portion of the effluent load decreases by only about 50%. In such a case, it is also expected that the BOD will not come within the limit of the specified value. In order to contain SS and BOD within these specified values, it is necessary to have a full-scale effluent treating equipment.

(7) The objective of this project is to recover the fiber loss to increase the total yield, and therefore, such an extensive investment in the effluent treating equipment will not be made under this project.

(8) The full-scale effluent treating equipment should be installed at the time of the next project of PM4 installation.

In such a case, the effluent (treated) from the simple settling pond should be treated again in combination with the new equipment.

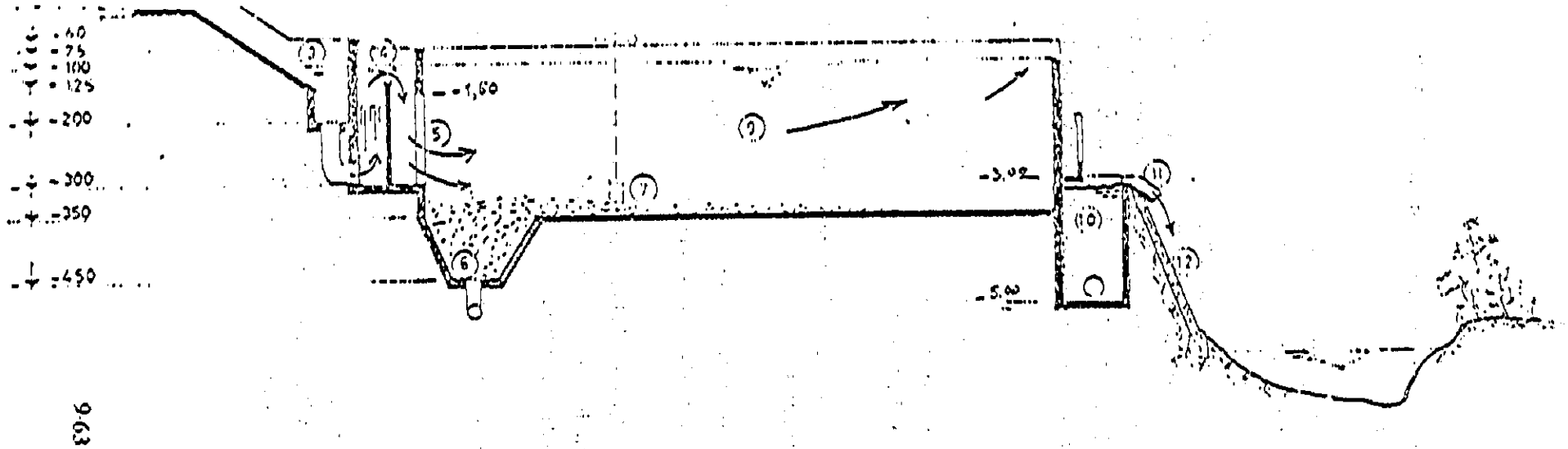
(9) It may be necessary to consider the combined use of well water as a measure to reduce the effluent load in case the effluent control value is enforced legally prior to the new installation of PM4.

9-10-7 Basic Plan for Improving Product Control Facilities

1) Objective and Summary

(1) To improve the shipment control through proper level inventory by building anew a product storage with a space large enough to hold the normal stock amount and also to improve the function of the existing Unit I finishing room.

Fig. 9-10-1 Recommendable Effluent Pond for Pulp & Paper Industries in Indonesia



Kelerangan:

1. BAK PELARUT SODA
2. SARINGAN (GRATING)
3. BAK PEMBAGI
4. BAK PENYALUR
5. DINDING PENYALUR/PENAHAN ARUS
6. PENAMPUNG SERAT/FINES
7. POMPA SUBMERSIBLE
8. PIPA PENGEMBALIAN SERAT/FINES
9. BAK PENGENDAP
10. BAK PENAMPUNG AIR BERSIH
11. SALURAN PELIMPAH AIR BERSIH
12. DINDING TURAP
13. PIPA PENGEMBALIAN AIR BERSIH

(2) As a relative work, a close connection between Unit I and Unit II factories should be achieved by burying the idle siding and making a road, thus making it possible to rationally use the equipment within the premises including mutual entry of the handling and carring devices.

2) Product storage

(1) Total area:

500m² (1.5 month stock of Unit I at 2 t/m²)

(2) Structure:

Simple slate construction, making the effective use of the rails removed from the siding.

(3) Place:

A place on the siding where it is convenient for truck loading.

3) Earth Filling and Road Making Work

The work covers the total area of about 1,000m² and the function within the premises will be improved.

4) Forklift Truck

One 2.5 t gasoline type should be purchases locally.

Chapter10.

EDUCATION AND TRAINING PROGRAM

Chapter 10 EDUCATION AND TRAINING PROGRAM

10-1 Objective and Outline

1) This renovation plan is considerably limited to a minimum improvement of equipment (i.e. the hardware aspect), with a view to achieving a maximum of effect with a minimum of capital investment.

   In order to achieve the maximum of effect with the minimum of capital investment, it generally becomes necessary to support such policy for the leveling up of technology management.

2) Management technology (i.e. the software aspect) requires a large amount of expenditure and a huge consumption of time for its general leveling up because it shall cover diversified aspects of mill operation, not only for paper companies, but also for all industries in the world.

   PPM, having continued excellent mill management through long years since established, does not stand in need of so much education and training for the moment.

3) Viewed from another angle, however, it is a well-known fact that modern management technology has in many cases, succeeded in overcoming even inferiority in the aspect of facilities.

   The paper companies, as a process industry, is required to have unique operation and management structure.

   Specifically, it is necessary to increase earnings through stimulating overall effects both in the software and hardware aspects, by carrying out education and training at overseas with regard to not only operating management of production lines, but also other management technology on which mill management should be based, such as quality control, process control, marketing control, etc..

10-2 Contents of Education and Training

10-2-1 Paper Making Technology and General Management

1) Training by Jobsites and Items of Training

Unit I

Pulp Plant	(control on operation, process quality and personnel)	1 person
Stock Preparation Plant	(control on operation, quality and personnel)	1 person
PM1 and 2 Plants	(control on operation, quality and personnel)	2 persons
Finishing Plant	(control on operation, quality and delivery)	1 person

Unit II

Stock Preparation Plant	(control on operation, quality and personnel)	1 person
PM3 Plant	(control on operation, quality and personnel)	1 person
Finishing Plant	(control on operation, quality, personnel and delivery)	1 person
Equipment Maintenance	(control on operation, process and personnel system of improving proposals)	2 persons
Accounting, Business, Testing and Technical Engineering	(QC, TQC; system of improving proposals)	4 persons
	Total	14 persons

2) Contents of Training

(1) QC:

Training shall be intended for all employees through a 6-week special Governmental course.

(2) Operating Control:

Training shall be provided with particular emphasis placed on daily "plan-do-check-action" principle.

(3) Process Control:

Training shall aim at "revolution in consciousness" in the sense that equipment of each plant should be controlled by its own operators, not depending entirely upon services of the equipment maintenance control section.

(4) Personnel Control:

Training should also cover such fields as not generally included in personnel control, such QC circle, equipment improving system at jobsites, etc.

3) Overseas Training:

The Period and Method of Trainees despatched

(1) The required period is estimated for net sixty (60) days at overseas.

(2) Method of Trainees despatched

Twelve trainees, excluding one group consisting of two testing- and technical engineering, from the total fourteen trainees, shall be dispatched separately in two or three groups.

4) Method of Training

(1) All trainees shall take special training with foreign language before dispatch to overseas.

(2) Immediately after arrival at the country, they shall receive training in QC through a 6-week Special Governmental course.

(3) After that, they shall be sent to several paper mills in the country for 18-day on-the-job training.

Detailed contents and method of such training shall be reviewed in the working stage, and established for efficient operation.

10-2-2 Total Quality Control

1) Although it is possible to take this training in the Special Governmental course, additional training is planned in the course of on-the-job-training with regard to methods of application in the field.

2) Application study of various QC techniques shall also be established in the course of on-the-job-training.

10-2-3 Small Group Activity (Field Circle)

(1) In contrast to the ordinary "top down" system in which orders are flowed from TOP to BOTTOM, the "bottom up" system is adopted in this small group activity where such flow is reversed, with the bottom taking the initiative.

(2) This activity will find application in such a way, for example, that a small group solves, at the jobsite, problems with the system of improvement proposals concerning machinery and equipment being operated, and then reports such proposals to TOP management.

(3) Application may also be found as a means of sharpening a problem mind, and such frame of mind shall be firmly established in the course of on-the-job-training.

10-2-4 System of Improvement Proposal

(1) It is necessary to establish an improvement proposing system by individual or group so that each and every one of the employees is trained in consciousness in improvement with regard to the company's facilities.

(2) It is also good policy to what human desire by, for example, grading those proposals which are put to practical use, and awarding a prize accordingly.

(3) This system is also possible to be established in the course of on-the-job-training.

10-3 Supervision for Operation and Equipment Control

1) In addition to special training at overseas, it is necessary to give practical guidance at the jobsite after implementation of the modification works.

It is suggested that the entire stage of operations from trial operation to quality assurance be divided into two portions, and that in-plant guidance be given in each portion for four months in total.

2) Contents of Supervision

(1) General operating control on improved facilities.

(2) How to formulate a structure conductive to increase in production, and how to solve problems involved.

(3) How to improve quality, how to make market research, how to promote sales of products.

(4) How to reduce production cost.

3) Supervisors to be despatched

(1)	Instructor for pulp and stock preparation plant	(1x2x2)	4MM
(2)	Instructor for sheet making and finishing plant	(1x2x2)	4MM
(3)	Instructor for electricity and instrumentation	(1x1x1)	1MM
(4)	Instructors for market research and sales promotion	(2x1x1)	2MM
(5)	Instructor for general coordination	(1x0.5x2)	1MM
			12MM

[(MM) = Man-Month]

Chapter 11.

OBJECTIVES OF INVESTMENT AND EXPECTING EFFECT OF IMPROVEMENT

Chapter 11.

OBJECTIVES OF INVESTMENT AND EXPECTING EFFECT OF IMPROVEMENT

1) Equipment investment required for the attainment of renovation purposes shall be implemented.

The outline of main facilities, amounts of investment involved, and expected improvement effect are described on the lists to follow in the form of schedules classified by plants or sections.

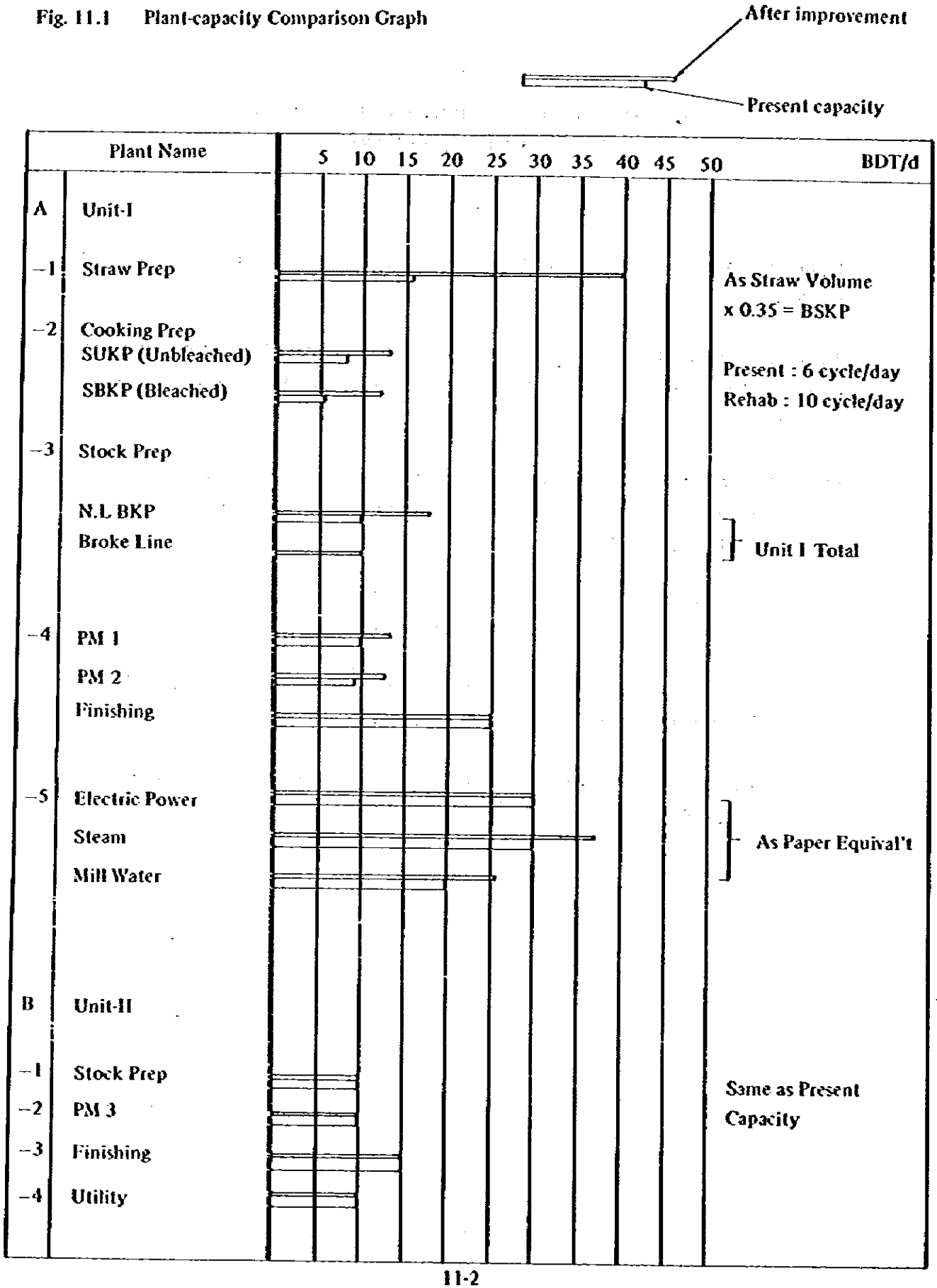
(1) In the schedule, only main facilities are picked up with their designations. For particulars or each unit of equipment, refer to Chapter 12 dealing with implementation of renovation plan.

(2) With regard to amounts of investment involved, the individual plant breakdown and the breakdown classified by construction works, are shown in Chapter 12.

(3) Expecting effect is not discussed in this chapter because it is utilized as a basis of calculation for financial assessment in Chapter 13.

2) Balance of plant capacities, before and after improvement works, are shown in Fig. 11-1 so that improvement effect may be graphically compared.

Fig. 11.1 Plant-capacity Comparison Graph



UNIT – I, Pulp Plant

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
A	Pulp Plant				476,956	
–1	Straw Preparation	Straw Cutter	1	3 ADt/h		
		Belt Conveyor	4	3 ADt/h		
		Conveyor Scale	1	3 ADt/h		
–2	Cooking Section	Digestor Overhaul	5	Quick Hutch		
		Drainer Overhaul	5			
–3	Pulping	SUKP Dump Chest	(1)	20m³		
		CRC	(1)			
		FRC	1			
–4	Washing Screening Cleaning and Bleaching	Others for Overhaul	1			

–1 Objective and Summary

The equipment is so old that it is almost impossible to supply a proper cooking pressure and the cooking yield has decreased greatly from 40%, the figure of 10 years ago, to 28%.

Since the straw cutter cannot be used and the straws as received are pneumatically sent to the digester, as much as 3% of the pulps or straws is not cooked and the costs of the chemicals and steam required for recooking are the main cause for the high cost.

The objective is to eliminate the main causes for the high production cost with Unit I of main brands by recovering the cooking capacity of 10 years ago and making measures such as repair of the drainer pit and reduction of wasting fibrous materials into effluent.

–2 Expected Effect of Modification

2.1 Measures to increase the cooking yield and to reduce wasting fibrous material

Unbleased 26 → 37%

Bleached 25 → 35%

2.2 Measures to shorten the cooking cycle and to increase production

5.42 → 10.5 BDT/d

2.3 Measure to improve steam unit ratio

6.0 → 4.5 t/t

2.4 Effect of improving steam unit cost (by boiler renewal)

21,670 → 16,000 Rp/T

2.5 Measure to improve chemical unit ratio

NaOH/straw 7.0 → 6.8%/t

–3 Remarks

Presently SBKP (straw pulp) cost at 499 Rp/kg which is almost same as LBKP 542.25 Rp/kg.

As a result of the above measures, 345.00 Rp/kg can be expected by the calculation shown in a separate sheet, and 1/2 KBKP equivalent of the LBKP blended brand can be replaced by this SBKP.

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
B	Stock Prep				814,783	
–1	N. LBKP Line	Hydra Pulper & Conveyor	1	10m³ x 110 kW		
		Chest with Agitator	4	20m³		
		CRC & Head Tank	2	Inline type		
		Double Disk Refiner	1	110 kW		
		Pulp Pump	6			
–2	Dry Broke Line	Hydra Flaker	1	45 kW		
		Liquid Cyclone	1	No. 8		
		Vibrating Screen	2	3.5ϕ Jonson		
		Measuring Tank	2	For Chemical		
		3 Way Valve	7	Incl. Maguet V		
		Piping Material	1			
–3	Wet Broke Line	Thickner	2	Vacuum Filter 6.6 kW		
		White Water Chest	(1)	12m³		
–4	General Use	Operation Panel	2	Semi Sequence		
–5	Pulp Storage	Warehouse	(1)	500m²		
–6	Pulp Transport	Fork Lift Truck	(1)	2.5 t		
–7	General Use	Others	(1)			

–1 Objective and Summary

"Paper can be made at Stock Preparation" still remains effectively. The obsolete equipment is the main factor for decreasing total yield due to increasing of the waste fibrous material into effluent water, and it becomes source of deteriorating product quality and fluctuation of basis weight.

This is one of the most important areas to reduce the cost, to increase the profitability of the plant, and to achieve stable sales expansion through the stabilization of the quality, increasing sheet making efficiency and increasing finishing yield, and therefore, it is the area where biggest effect of investment can be expected.

–2 Expected Effect of Modification

2.1 Stabilization of stock consistency
- Reduction in weight loss 10 → 5%
- Reduction and stabilization of moisture fluctuation
- Reduction and stabilization of blending fluctuation

2.2 Stabilization of freeness
- Reduction and stabilization freeness fluctuation
- Reduction and stabilization color variation
- Stabilized quality and expectation of sales promotion

2.3 Improving dust removing efficiency
- Increasing and stabilization of sheet making efficiency
- Increasing and stabilization of finishing yield
- Improving and stabilization of quality and expectation of sales promotion

2.4 Stabilization of mixing ratio of pulp stock and chemical agent
- Improving and stabilization of quality and expectation of sales promotion
- Setting up of standard quality, quality control systems and realization of cost down
- Reliance recovery leading to sales promotion

2.5 Expected values
- Total yield increase 77 → 86%
- Total efficiency increase 68 → 76%

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
C	Chemical Prep				113,913	
-1	Dissolving Stage	Dissolving Agitator	5	Portable type 4 Stational type 1		
-2	Storage Stage	Clay Storage Tank Dyes Storage Tank	(1) 2	10 m³ Concrete 2m³ SUS364		
-3	Distribution	Discharge Pump	5	Anti Chemical		
-4	Others	Piping Material	1			

-1 Objective and Summary

Auxiliary improvements for the stock preparation to be completed.

This investment is a start line for the fixed amount mixture because the mixing variation will directly influence the quality variation of the final product.

-2 Expected Effect of Modification

2.1 Stabilization of chemical consistency

Possibility of standard setting and cost reduction

2.2 Stabilization of mixing ratio

Possibility of standard setting and cost reduction
Reliance recovery through stabilized product quality and sales promotion

2.3 Reduction of quality variation through sequential control together with the stock prep.

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
D	PM1				825,217	
–1	Approach Equipment	CRC with Head Tank	1	Open type		
		Regulating/Mixing Box	1	SUS304		
		Pressure Screen	1	1.6 dia. 7.5 kW		
		Vibrating Screen	1	2.0 dia. 3.7 kW		
		Head Box Connection	1	Manifold Taper Header		
		Stock Pump	4			
–2	Wire Part	Table Roll	22	80 dia. x 2,550 ℓ		
		Dandy Roll Assembly	1	Stand + Mark Roll		
		Suction Box	4	200 Width SUS		
		Beam & Shower	1	For Suction Couch		
		Suction Couch Roll	1	560 dia. x 2,490 ℓ		
		Vacuum Pump Unit	1	500 mm HG x 46 M³/min		
		Couch Pit	(1)	Modification		
		Shaking Machine	1	Vibro Flyte 3.7 kW		
–3	Wet Broke	Piping Work	(1)	For W.W. recovery		
–4	Dry Part	Reinforcement Work	(1)	For Speed up		
–5	Driving Part	Sectional DC Drive	8	85.2 kW Total		
		Cooling Unit	1			
		Speed Meter	1	Digital type		
		Sheet Break Counter	1	Integrater		
		Sheet Break Sensor	2	Photo cell		
		Operation Panel	8			

–1 Objective and Summary

Though old, it is a profit making machine which produces special paper succeeding the history as the paper making plant under the direct control of the Mint Bureau.

Owing to the straw pulp mixture and the mild pressurized dewatering equipment, it can produce bulky high-class paper, but being directly affected by the varying low quality pulp stock coming from poor system of Stock prep., it is no more able to meet the requirement for highly efficient processability and printability.

Also, the draw fluctuation from part to part due to the wear in the drive part and operation stoppage due to slipping considerably decrease the total efficiency.

The improvement targets should include the minimum investment to increase the sheet making efficiency and finishing yield and to improve the profitability of the entire plant and also the unit improvement which will be made possible by improving the quality and efficiency.

–2 Expected Effect of Modification

This effect overlaps the improvement effect of the stock prep. section.

2.1 Increasing total efficiency

Total average for UNIT I 68 → 76%

2.2 Increasing total yield

Total average for UNIT I 77 → 86%

2.3 Increasing selling price due to quality improved

3% of total sales for PM 1

2.4 Increasing mixture of straw pulp due to equipment stabilized and sheet breaks decreased

Equivalent to 1/2 of LBKP

2.5 Increasing speed and increasing production capacity through drive modification

Total average for PM 1 40 → 60 m/min.

UNIT – I. PM2

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
E	PM2				638,696	
–1	Approach Equipment	CRC with Head Tank	1	Open type		
		Regulating / Mixing Box	1	SUS 304		
		Pressure Screen	(1)	PS400 Overhaul		
		Vibrating Screen	(1)	Relocation from PM 1		
		Stock Pump	4			
		Wire Roll	1			
–2	Wire Part	Suction Box	4	200 Width SUS		
		Suction Couch Roll	1	560 dia. x 2,490 ℓ		
		Beam & Shower	1	For Suction Couch		
		Vacuum Pump Unit	1	500mmHg x 46 m³/mm		
		Couch Pit	(1)	Modification		
		Shaking Machine	1	Vibro flyte 3.7 kW		
–3	Dryer Part	Chemical Press	1	3 roll type		
		Screen & Sump Tank	1	SUS304		
–4	Driving Part	DC Drive for Couch	1	37 kW DCM		
		Line Shaft DC Drive	1	45 kW DCM		
		Belt Drive for Chem. Press	1	Cone pulley		
		Remote Belt Shifter	8	Remote operating		
		Air Clutch	8	Remote operating		
		Operation Panel	8	Wall Mounted type		
–5	Others	Piping Material	1			

–1 Objective and Summary

Though old, it has robust construction and it is possible to increase the speed to about 150 m/min., but due to insufficient power for operation start and wear of the drive part, the operating efficiency is low.

Like PM 1, it is directly affected by the low quality pulp stock coming from the poor system of stock prep., and obriging to decrease sheet making efficiency due to foreign matter, and decreasing finishing yield due to grit and dust, are main causes of lower level of profitability for the plant.

Furthermore, the quality varies widely and the weight loss is squeezing the revenue and if present situation where the product far off from the needs of the users are produced and supplied is continued, it is clear that the customers will turn their backs, thus making the business unprofitable.

As a measure to solve the above problems, a chemical press should be installed to improve and stabilize the quality through the modification of the wet part of the paper machine and stock prep., together, to make it possible to increase the production of the cigarette paper, a profitable item.

In addition, the objective includes a partial shift of production of the high class cigarette paper from PM 3, thus contributing the profitability of the entire plant.

–2 Expected Effect of Modification

2.1 Increasing total efficiency and increasing total yield

Same as for PM 1

2.2 Increasing selling price through quality improved

3% of the total sales for PM 2

2.3 Increasing mixture of straw pulp through stabilized equipment and decreasing sheet break

Equivalent to 1/2 of LBKP

2.4 Increasing speed and production capacity through modification of drive part

Total average for PM 2 60 → 80 m/min.

UNIT – 1, Finishing

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
F	Finishing Plant				279,304	
–1	Sheet Finish	Spool Roll	10	212 dia. x 2,650 ℓ		
–2	Roll Finish	Slitter Rewinder	1	2,200W x 1,500 dia. 450 m/min 15 kW DC drive		
–3	Handling	Electric Hoist Fork Lift Truck Hand Lifter	1 (1) 2	3 ton x 12 m lift 2.5 ton Gasoline		
–4	Handling	Road & Floor Pavement	(1)	500 m²		
–5	Storage	Product Warehouse	(1)	100 m² Existing Modification		
–6	Dry Broke	Broke Press Baler	1			

–1 Objective and Summary

The finishing room has historical stone flooring and the swallows flying over contaminate the products.

Many of the semi scrapped finishing equipment are still remained and stock products and half-finished products are piled up around these idle equipment, and even the horizontal movement of the products is almost impossible.

For the horizontal movement of the products, hand carrier are used, but due to the roughness of the joints of the stone flooring, the carrying products are falled often down and other products get damaged.

In order to produce the roll product which is increasing in demand, the paper is rewound by the super calender and taken up by the bobbin slitter of almost scrap quality and the roll product is far from acceptable.

As the measures to improve the above situation:

1.1 To build a new warehouse and move the packaged products to the warehouse, to pave the room floor, to conduct housekeeping, and to secure the transportation route for the half-finished goods.

1.2 To make an organic connection between the new plant and old plant which are now separated by the siding and to pave the road by burying the siding so that the transportation equipment and finishing equipment can be commonly used.

1.3 In order to produce the roll product which is now becoming popular, part of the PM 3 finishing room should be used for finishing the roll product and a slitter winder should be installed.

1.4 In order to prevent contamination of the recirculated broke paper and to improve the mixture control, a baling machine should be installed.

–2 Expected Effect of Modification

2.1 Reliance recovery and increasing selling price through the improved quality of the finished product

1% of total sales for Unit 1

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
G	PM 3 Line				470,870	
--1	Stock Prep	Overhaul of Existing Beater	2	For Flax treatment		
		Double Disk Refiner	1	110 kW for Cutting		
--2	Approach Equipment	Thickner for Wet Broke	1	Vacuum Filter 66 kW		
		CRC with Head Tank	1	Open type		
		Sensing Box Modification	1			
--3	Wet Part	Hydro Foil	5	Single blade type		
		Photo Cell	3	For Short break		
		Magnet Solenoid Valve	1	"		
		On-Off Controller	1	For Shut break		
--4	Dry Part	Mark Press Backup Roll	2	High top covered		
		Vacuum Drainage System	1	For light loading		
		Steam Trap	1	"		
--5	Finishing	Bobbin Slitter	1	1,200 width		
		Electric Hoist	1	2.5 ton		

--1 Objective and Summary

One of the profitable departments which started commercial operation in 1975 as the sole cigarette paper manufacturing plant in the country and now produces and supplies 3,000 tons, 25% of the total demand of 12,000 tons. There is no problem in particular with the equipment, but it is necessary to establish the supply capability for the machine-wound cigarette paper which is getting popular, to improve and stabilize the quality to compete with the imported French product and especially to improve on the weight loss due to pin hole measure which reaches as high as 8%.

As a quality to compete with the French product, bulky quality with less pin holes is required, and therefore, the first and minimum requirement is the use of the French Calcium Carbonate which is bulky and has low density. The effect of the increased mixture of the Flax pulp now under research and development is secondary and not much can be expected from it. The effect of the increased mixture of the Flax pulp seems to be the improvement of softness, sheet formation and strength of the paper. It is of course necessary to continue the research and development toward the higher quality of cigarette paper by this raw fibrous material in the future.

In order to realize the production of a product equivalent in quality to the imported rival product until the PM 4 is installed, the research and development efforts throughout the country are required.

As the above improvement measures and for the future, some units of equipment should be newly installed or extended.

--2 Expected Effect of Modification

2.1 Increasing production and revenue of the profitable brand "Eagle" by transferring part of the production of the low profit brand "Silver Bird" to PM 2

52-day reduction for Silver Bird and 52-day increase for Eagle

2.2 Increasing revenue through increasing sales of machine-wound cigarette paper and increasing tariff if possible

Tariff 30% → 60%

2.3 Cost reduction by decreasing the weight loss

8% → 4%

UNIT – I & II, Laboratory

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
II	Laboratory				22,435	–1 Objective and Summary The production control in the process industry mainly consists of the control on delivery and receipt of quantity and quality between sections on the jobsite. The quality control is to judge the intermediate quality of the half-finished products which are continuously flowing and is one of the most important controls which is equivalent to the checking work within the QC cycle. In order to improve and stabilize the product quality, this judging work must be completed as quickly as possible and the speedy feedback must be provided. The daily work in a laboratory includes the checking work within the QC cycle and the laboratory is obliged to provide the quickest possible feedback to the field which demands quick actions. In order to promote the TQC by using the quality control as a weapon, the laboratory must have the authority and responsibility as a quality consultant. As the above measures, minimum necessary testing equipment should be added. –2 Expected Effect 2.1 Reduction of claims, returning goods and discounts through quality control improved. 2.2 Execution of delivery control by preparing individual product quality data by lot through quality control prior to delivery. Possibility of reliance recovery and sales promotion.
–1	Tester	Porosity Meter	1	For Cigarette		
		Thickness Tester	1			
		Size Tester	1			
		Stiffness Tester	1			
–2	Analyzer	Centrifugi Extractor	1	For Freeness		
		Niagara Beater	1			
–3	Others	Infra Red Oven	1			
		Thermometer	1			
		Electric Oven	(1)	By local preparation		

Objective and Expected Effect of Investment by Plant for Renovation Project

No.	Details of Main Equipment and Installation Place				Investment Amount (Rp x 1,000)	Objective and Expected Effect of Modification
	Place	Name of Equipment	Q'ty	Main Specifications		
1	Maintenance and Utility				839,957	
–1	Steam Supply	Package Boiler	1	14 kg/cm² x 14 t/h		
		Water Treatment Unit	1			
		Steam Flow Meter	1			
–2	Work Shop	Knife Grinder	1	For Unit I & II		
		Milling Machine	1	With end mill set		
–3	Instrument	Manometer	1	1m height		
		Pressure Gauge	5	0.5 kg/cm²		
		Vacuum Gauge	20	200 mmHg		
–4	Electric	Transformer	3	630 kVA		
		Portable Recorder	1			
		Module Checker	1			
		kWH Meter	5			
		Synchro Scope Recorder	1			
		Power Factor Meter	1			
		Others	1			
–5	Process Water	Water Head Tank	1	10 m³ FRP		
		Others	(1)			
–6	Effluent Water	Effluent Pump	(1)	500 m³		
		Slurry Pump	2	For Fibre Recovery		
		Others	(1)			
–7	Product Storage	Warehouse	(1)	500 m²		
		Fork Lift Truck	(1)	2.5 ton Gasoline		
		Rail Road Reclamation	(1)	1,000 m³		
		Road Pavement	(1)	1,000 m²		

–1 Objective and Summary

One of the main causes for the high production cost of the own pulp and all the brands in the mill is due to the high steam unit cost. All the existing boilers, except the package boiler which was installed when PM 3 was installed, are low-efficiency boilers wasting expensive fuel. Also, the straw pulp, 60% of the production of the own straw pulp line, is discharged as waste fibrous material into the effluent ditch. By recovering this, the yield can be improved and the cost can be reduced and also the environment can be improved by reducing the effluent load.

Also, the head tank of the water system is not used now because of severe leakage, and for this reason, the pressure fluctuates largely and the paper quality varies, and this equipment should be renewed.

Since the new construction of the product warehouse is a foundation for increasing the production capacity of the Unit I and also the minimum requirement for improving the function of the existing finishing room, it should be realized by all means.

–2 Expected Effect of Modification

2.1 Reducing steam unit cost

21,670 Rp/t → 16,000 Rp/t

2.2 Reduction of waste fibrous material and increasing production of unbleached straw pulp

2% of total unbleached straw pulp (yield 38% → 40%)

2.3 Possibility of stock production, increasing operating efficiency and stabilized quality by securing the product storing space

2.4 Saving subcontract cost and promote the process improvement by the introduction of machining equipment for work shop.

2.5 Establishment of preventive maintenance system and reduction of sudden stoppage of production through the introduction of instruments for controlling → Improving operating efficiency

Chapter 12.

IMPLEMENTATION OF RENOVATION PLAN

Chapter 12. IMPLEMENTATION OF RENOVATION PLAN

The objective of this project is to achieve implementation of an overall and centralized renovation of Padalarang Paper Mill.

To achieve this purpose, the whole renovation plan has been classified into short-term, middle-term and long-term plans.

1) Short Term Plan:

This phase shall cover the term of implementation for such as the items pointed out by us at site during the survey period of this project, those improvements described in our final report as to be carried out by PPM own effort and pre-repairs or supplies required for the locally-procured equipment, etc.

2) Middle-Term Plan:

Renovation works, which are the mainstay of this renovation plan, shall be carried out as main works of the fourth five-year plan (from 1984 to 1988).

Commencement of work shall be in fiscal 1985 with the expected period of completion extending to 2 years and 2 months.

This plan shall include the engineering concerning the modification works, education and training at overseas, operating supervision at mill site, among others.

3) Long-Term Plan

Although, judged from trends of the domestic market in Indonesia, foreign currency situation, among others, PM4 expansion project should be commenced as early as possible, its implementation is impossible within the fourth five-year plan because of restricted fund procurement, and so forth.
It is recommended, therefore, that this phase is to be commenced from the 2nd year of the fifth five-year plan (from 1989 to 1993).

12-1 Implementation Structure

12-1-1 Establishment of Project Team

1) Necessity of Term of Work to be shortened

(1) This project is to be carried out by shutdown of the paper machines now in operation.

The required shutdown period shall be respectively as follows: –

PM1	30 days
PM2	21 days
PM3	0 day

(2) Presently, operating earnings (operating profit to cover fixed cost) of the respective paper machines are approximately as follows:–

PM1	7,000,000 Rp/day
PM2	40,000 Rp/day
PM3	5,000,000 Rp/day

(3) As mentioned in the above (1) and (2), a big loss will result from the required shutdown; hence how to shorten the required term of work holds an important key to success.

2) Organization of Project Team

(1) It is necessary to organize a project team to be selected from the existing PPM organization, with a view to formulating the required control system.

(2) In order to shorten the required term of work, it will become important how to carry forward "works to be performed before the proposed shutdown of paper machines", or, in other words, "preparation works".

(3) It is desirable to establish a control system prior to commence the project, to take care of among others local procurement or purchased goods to be controlled, or, inspection of domestic order-made facilities.

12-1-2 Construction Progress Control to be Tightened

1) Thorough preparation will be required, by checking on progress chart of construction works by CPM (Critical Pass Method), with regard to arrival of goods, the number of workers, arrangement of heavy duty handling equipment, etc.

2) It might as well be said that preparatory works such as passage ways for haulage to the sites concerned, temporary yard for removals, power source for work, water, etc., are the root of the way of progress control for the construction work.

12-1-3 Supervisory control to be strengthened

1) It is desirable that the whole progress of works shall be supervised until completion by a combination of the mill project team and local contractors.

2) Since, however, perfection is required as to judgment of the progress of works, instructions as to arrangement of preparatory plan, etc. it will be planned to invite supervisor(s) and advisor(s) from overseas.

12-2 Construction management to be made

1) Scheduling on production and shutdown.

From the necessity of shortening the required term of work, it is the most important key to success how to reduce actual shutdown days, for example, by such means as shifting scheduled annual shutdown days, to be concentrated within the proposed term of work.

2) Control on Design and Engineering

Simultaneously with commencement of the project, engineering work beginning with interfaced sketching at site, will be made. At this stage, overall control is required as to, among others, how to make engineering progress so as to enable local preparatory works to progress efficiently.

3) Control on Tenders, Evaluation and Orders

This project consists mainly of rehabilitation works. It may safely be said, therefore, that most of the requirements are concerned with spare parts in relation to the facilities operated.

In making actual investment, however, distinction must be made between portions required for simple replacement with similar facilities and for overall evaluation against special facilities, such as improvement in efficiency, cost reduction, etc.

4) Construction Progress Control

We have already dealt with this subject in 12.1.

Further control is, however, necessary, while giving due consideration to final functioning of the entire system, including, among others, preparation of any drawing revision concerning any portion where field interfacial dimension is not in conformity with the planned drawing.

5) Trial Operation and Operating Control

It is important to inspect and verify prior to commence the idling check of every driving equipment. Occurrences of damage to equipment through omission of this precaution may not only result in waste of spare parts, but also develop in a problem of delay involving the construction schedule entirely.

Also with regard to operating control, planned and staged speedup will become indispensably necessary.

6) Control on Education and Training Plan

As described in Chapter 10.

7) Control on Renovation Plan Funds

8) Materials Control

It is necessary to secure materials, those required before and after trial operation to start with, and then operation materials compatible with the proposed structure for the production increase. Any delay will meet with an investment effect reduction by half.

9) Personnel Management

Personnel management shall cover not only operators under contract work system related to the proposed works, and supervisor(s) from overseas, but also the mill's employees during plant shutdown.

10) Safety and Disaster Prevention Management

Accident prevention measures during the term of work are an important requirement. The project team is required to put everything it has got into maintenance of a proper management system.

12-3 Stages of Execution of Constructon Works

1) Renovation programming is shown in Fig. 12-3-1.

2) Scheduled plant shudown days for the proposed works are as follows: –

PM 1	30 days
PM 2	21 days
PM 3	0 days

12-4 Total Investment Amount

1) Total Investment Funds : Rp 7,982,608,000–

Breakdown
(Foreign currency portion) : Rp 5,026,087,000–
(Local currency portion) : Rp 2,956,521,000–

Table 12-4-1 shows its breakdown.

For further details, refer to Chapter 13 "Final Evaluvation".

2) Table 12-4-2 shows "Breakdown List of Budgets for Investment by Respective Plants and Sections" to be referred to the ("Breakdown List by Individual Plants")

3) Table 12-4-3 shows "Investment Budget Breakdown into Machinery and Equipment, and the Respective Works" to be referred to the ("Breakdown List for the Portion of Machinery and Equipment")

12-5 Year-By-Year Investment Funds

For particulars, refer to Chapter 13 "Financial Evaluation".

12-6 Renovation Plan Equipment Schedule

Appendix 6 carries equipment schedule to be supplied under the renovation program.

Fig. 12-3-1 Renovation Programming for PPM

No.	Descriptions	Fiscal Years 1st Year	2nd	3rd	4th	5th	6th	7th	8th	9th	10th Year	Remarks
A	Renovation Engineering											
-1	Field Sketch											
-2	Designing & Drawing											6 M before Evaluation
-3	Tender Spec											
-4	Tender Evaluation											
-5	Manufacturing											7 M for MFG
-6	Inspection & Report											
-7	Shipping											
B	Construction Works											
-1	Civil & Building Work											Drawing should be supplied by Supplier
-2	Local Manufacturing											Ditto
-3	Dismounting Work											
-4	Chest & M/C Foundation											
-5	Installation Work											PM 1 : 1 M, PM 2 : 0.75 M, PM 3 : 0.25 M
-6	Piping Work											
-7	Electric & Instrument											
-8	No Load Adjustment											
-9	Water Test Run											
-10	Trial Operation											
C	Operational Startup											
-1	Operation Supervision											
-2	Commercial Operation											
-3	Warranty Test											Mechanical Warranty only
D	Training at Overseas											
E	Cigarette Machine Expansion											
-1	Study of Local Flax Pulp											
-2	Study of High Grade Cigaret											
3	Expansion of Flax Pulp Plan & PM 4						Installation	Commercial Operation				

Table 12-4-1 Budgetary Price List of Renovation Project

Unit: 1,000 Rupiah

No.	Description	Foreign currency	Local currency	Total amount
A	Equipment Cost			
–1	FOB Price	3,402,652	–	3,402,652
–	CIF Charge (6%)	170,130	34,026	204,156
	CIF Price	3,572,782		3,606,808
–3	Imp't Tax & Duties (12.5%)	–	450,852	450,852
–4	Inland Transpor'n & Insurance (5%)	–	180,339	180,339
–5	Other Charges	–	–	0
	Import Price	3,572,782	665,217	4,237,999
B	Engineering Fee			
–1	Field Sketch			
	Engineering Cost (5MM)	44,808	–	44,808
	Daily All'ce & Air Fare	15,348	–	15,348
–2	Design/Drawing Work (25MM)	217,391	–	217,391
–3	Tender Evaluation (8MM)	69,565	–	69,565
–4	Inspection/Report (2MM)	17,391	–	17,391
–5	Documentation (Manual, Report Etc.)	39,131	–	39,131
	Engineering Total	403,630	–	403,630
C	Construction Works			
–1	Local Equipment (Import Limitation Items)	–	151,304	151,304
–2	Civil & Build'g Works (Incl., Foundation)	–	548,044	548,044

No.	Descriptions	Foreign Currency	Local Currency	Total Amount
-3	Installation Work (Incl., Piping, Electric & Instrumentation)	-	380,130	380,130
-4	Field Supervision (Installation Supervi'n) & Startup Commission) (14.5 MM)	161,413	-	161,413
	Construction Total	161,413	1,079,478	1,240,891
D	Operation Supervision			
-1	Engineering Cost (12 MM)	111,948	-	111,948
-2	Daily Allow'ce & Air Fare	27,131	-	27,131
	Ope., Supervision Total	139,079	-	139,079
E	Training Fee			
-1	Expenses for Trainee (28MM)	87,652	-	87,652
-2	Expenses for Trainee (4MM) (Incl., AOTS charge)	123,618	-	123,618
	Training Total	211,270	-	211,270
F	Overhead	178,639	33,261	211,900
G	Contingency	359,274	69,870	429,144
	Total Budget	5,026,087	1,847,826	6,873,913
H	Initial Working Capital	-	1,108,695	1,108,695
	Grand Total	5,026,087	2,956,521	7,982,608

Table 12-4-2 Breakdown of Investment by Respective Plants and Sections

As FOB Price : Unit: 1,000 Rupiah

No.	Descriptions	Foreign Currency	Local Currency	Total Amount
1	Unit I. Pulp Plant	410,870	66,087	476,956
2	Unit I. Stock Prep	625,218	189,565	814,783
3	Unit I. Chemical Prep	43,043	70,870	113,913
4	Unit I. PM 1	697,826	127,391	825,217
5	Unit I. PM 2	531,304	107,391	638,696
6	Unit I. Finishing	200,609	78,696	279,304
7	Unit II. All Facilities	427,390	43,478	470,868
8	Laboratory	18,087	4,348	22,435
9	Utility and Adminis'n	448,305	391,652	839,957
	Total	3,402,652	1,079,477	4,482,129
10	Portion of Equipment and Material	3,402,652	151,304	3,553,956
11	Civil, Build'g & Constru'n	0	928,173	0

Table 12-4-3 Breakdown List for the Portion of Machinery and Equipment

As FOB Price: Unit: 1,000 Rupiah

No.	Descriptions	Foreign Currency	Local Currency	Total Amount
1	Machinery and Equipment	3,402,652	151,304	3,553,956
2	Civil & Build'g Works	–	548,043	548,043
3	Installation Work	–	143,696	143,696
4	Piping Work	–	112,304	112,304
5	Electric & Instrument'n Works	–	124,130	124,130
	Total as FOB Price	3,402,652	1,079,477	4,482,129

Chapter 13.

FINANCIAL EVALUATION

Chapter 13. FINANCIAL EVALUATION

13-1 Basic Policy

It is difficult to determine the effectiveness of new investments themeselves at the time of carrying out renovations on the existing mill as the effectiveness of the past investments on the existing facilities and the new investments interwinds.

Therefore, the following evaluation was carried out as concerns the renovation plan.

1) In the case the renovation plan is not carried out on the existing mill;

   A study was carried out on the profit and loss statement for the existing mill.

2) The profit and loss statements (annual) were sought in the case the renovation plan is carried out on the existing mill and a comparison was made with the profit and loss statement in the case of not carrying out the renovation plan.

3) In order to determine the effectiveness of the renovation plan, the internal rate of return (the I.R.R.O.I.) and payout period for the invested capital has been sought by considering the difference in the profit and loss in the case the renovation plan is carried out.

4) In order to determine the financial situation for the mill as a whole in the case of carrying out the renovation plan, a study was made on the profit and loss for the existing mill and renovation plan as a whole.

5) For this financial analysis, out of the data received from the mill, the actual figures for 1983 and the planned figures for 1984 were used as the basic figures.

   The starting year of the evaluation has been set at 1985 while the fiscal year shall be the fiscal accounting year of the mill (January – December).

6) All the prices used for the evaluation have been fixed at the 1983 actual prices or the 1984 planned prices.

That is, rises in commodity prices, as well as rises in personnel costs, have not been taken into account.

7) There is the tendency to regard the renovation plan as being only an improvement of the facilities.

However, we wish to stress that the renovation plan has another phase just as important as an improvement of the facilities, namely, strengthening of the management and employee educational training.

8) The currency used in this Chapter is Rp and the conversion rate will be as follows:

US$1 = Rp1,000
US$1 = ¥230

13-2 Production and Sales Plan

13-2-1 Conditions

(1) The production volume and sales volume have been taken as equal with no increase or decrease in the inventory volume.

(2) The annual operation days are set unchanged in principle.

(3) The number of days of operation was calculated by production items and the total of these was taken as the total number of days of operation for the year.

(4) For the daily production volume by grades in the case the renovation plan is carried out, the anticipated increase in the daily production through speed up and the anticipated increase in daily production through various efficiency improvements have been added to the daily production by grades in the case the renovation plan is not carried out.

(5) The annual production and sales volume by grades, as concerns the existing grades, shall in principle be the same in the case of carrying out the renovation plan as in the case of not carrying out the renovation plan.

(6) In the case of carrying out the renovation plan, the increased production through an increase in daily production will be appropriated to increase sales of the grades, salable and profitable, and also to the saleable new items to be developed.

(7) As concerns those items having extremely low profitability, the number of days required for production has been reduced and the time saved is planned for production of items which can be sold with a good profit, as well as new items with sales possibilities.

13-2-2 Production and sales plan

The production and sales plan in the case the renovation is carried out and when not carried out is shown in Table 13-2-1.

13-3 Daily Output by Grades

13-3-1 Method for deciding the daily production by item.

The daily output of a certain grade is decided by the theoretical daily production and the total efficiency.

Further to say, the total efficiency is decided by the operation efficiency, the sheet making efficiency, and the finishing yield. This relationship will be shown by the following formula:

Theoretical daily net production = Basis weight x machine speed x Trimmed width x 1,440

Daily production = theoretical daily net production x total efficiency.

Total efficiency = Operating efficiency x sheet making efficiency x finishing yield

Operating efficiency = (1,440 Min $-T_1$ Min) ÷ 1,440 Min

T1: The time; The paper making machine is stopped due to unexpected mechanical breakdown, etc.

Sheet making efficiency = (1,440 Min − T2 Min) ÷ 1,440 Min

T2: The time; No product is being produced due to paper break, etc. despite the machine is operating.

Finishing yield = Net production finished that can be sold ÷ Actual net production on reel

13-3-2 The total efficiency, operating efficiency, sheet making efficiency, and finishing yeild in the case of not carrying out the renovation plan:

The total efficiency and the other efficiency factors in the case of not carrying out the renovation plan have been set up with consideration paid to the figures for 1983 and the plans for 1984, as well as the actual data obtained during our stay at the mill to conduct a survey.

13-3-3 The total efficiency, the operating efficiency, the sheet making efficiency, and the finishing yield in the case of carrying out the renovation plan:

For determining the said various factors, the average figures prevailing in Japan have been taken into consideration and the figures were set somewhat lower than the Japanese ones.

It is of course only natural but this cannot be automatically attained simply by improving the facilities but can be attained finally through the strengthening of operational and managerial controls.

13-3-4 Daily net production, total efficiency, operating efficiency, sheet making efficiency, and finishing yield;

The daily net production, total efficiency, operating efficiency, sheet making

efficiency and finishing yield in the case the renovation plan is carried out and in the case the renovation plan is not carried out are shown in Table 13-3-1.

13-4 Annual Operating Profits by Production grades

13-4-1 Outline of the operating profits

(1) We have introduced the concept of operating profit for determining advantageous products and disadvantageous products, as well as for calculating increases in profit in the case of increased production, and for calculating increases in profit in the case the production cost is lowered through improvements in the various yields and efficiency, and for calculating increases in profit in the case of producing new brands.

(2) By per kg operating profit is meant the figure after the total variable cost required for producing 1 kg is deducted from the sales price per kg.

Operating profit per kg = Product sales price per kg – variable cost per kg.

Production cost per kg = Variable cost per kg + fixed cost per kg

That is, the operating profit per kg for a certain product is the gross profit at the time 1 kg of a certain product is produced and sold in the case that the fixed costs are not considered.

(3) Operating profit per daily operation is meant the operating profit in the case of sales for one day.

Operating profit per day = Operating profit per kg x daily production

Operating profit per day = (Product sales price per kg – variable cost per kg) x daily production

(4) Therefore, by comparing the daily operating profit of a certain product and the fixed costs per day (in principle, this is fixed with no relationship to the

kind of product) it will be possible to determine whether a certain product has profitability when viewed from the total cost.

Operating profit per day > Fixed costs per day = There is a profit

Operating profit per day < Fixed costs per day = There is no profit

13-4-2 Factors that influence the variable cost per kg of paper.

As the factors that influence the variable cost per kg we have considered the following for producing and selling 1 kg of the paper.

Pulp cost (Unit price x quantity)

Filler clay and chemicals (Unit price x quantity)
Steam, electricity (Unit price x quantity)

Sales expenses (Unit price x quantity)
Total yield

13-4-3 Production cost of straw own pulp

The per kg production cost of straw own pulp was calculated on the basis of variable cost. The following factors have been considered as concerns the factors influencing the variable cost.

The raw-material cost, the daily production, the pulp yield, the bleached pulp yield, and chemical cost in the case of carrying out the renovation plan and in the case of not carrying out the renovation plan are shown in Table 13-4-1.

The effectiveness of the cost reductions in the production of straw own pulp has been reflected in the unit price of pulp used in the case the operating profit is calculated.

13-4-4 Steam cost after renovation of the boiler.

At present PPM has three boilers of old type and one new boiler.

The renovation plan incorporates the installation of a new boiler and the scrapping of three old boilers.

Through this, the steam cost will be reduced as follows, as mentioned in Chapter 5.

Steam cost (in the case the renovation plan is carried out) ..... Rp 16,000/t

Steam cost (in the case the renovation plan is not carried out) ..... Rp 21,670/t

The effectiveness through the lowering of the steam cost has been reflected in the unit cost of the steam used in the case the operating profit is calculated.

13-4-5 Operating profit by grades produced.

The per kg operating profits by grades produced in the case the renovation plan is carried out and in the case the renovation plan is not carried out are shown in Table 13-4-2.

13-4-6 Annual operating profit

The annual operating profit in the case the renovation plan is carried out and in the case the renovation plan is not carried out has been calculated by combining the production and sales plan of Table 13-2-1 with the daily operating profit by grades produced in Table 13-4-2.

The difference in the case the renovation is carried out and in the case renovation is not carried out is:

Rp. 1,431,727,000.

These figures represent the increase in the profit arising through the improvements made to each factor mentioned in 13-3-2 through the carrying out of the renovation plan considering that there will be no change in the fixed costs.

These figures include the portion of an increased operating profit owing to a certain recovery in the sales prices. The effect of the price recovery is stated in the next paragraph.

13-5 Other Items Contributing to Increased or Decreased Profits

13-5-1 Profit accruing from price recovery

As mentioned in Chapter 3, due to the fact that the product quality is not uniform in the present situation and is inferior when compared to that of other companies, the sales price is lower by 5% in the case of PPM than the other companies in terms of equivalent grades.

In the case the renovation plan is carried out, as explained in detail in Chapter 6 the product quality will not only become stabilized but the product will also be improved to th point where there is little difference from that of similar products of other companies and thus the sales price can be restored. It is assessed that the price restoration will at least be about 3% in the case of PPM

13-5-2 Loss due to reduced production during the period of construction work

(1) In the case the renovation plan is carried out, the production line will be stopped temporarily for the improvement project and the production will be temporarily suspended, or slowed down. Therefore, the production volume will decrease and there will be a loss in income. This is referred to as loss due to reduced production.

In this plan, such a loss will be held down as far as possible with consideration paid to the following conditions.

a. The stoppage will be carried out during the season of stagnant demand.

b. Production of grades with poor profitability will be reduced.

c. Profitable grades and regular brands(products that are supplied on a regular basis to certain customers) will be produced in volume prior to the stoppage taking into consideration the volume that cannot be produced due to the temporary stoppage, and these will be stored.

d. The assistance of engineers with long experience in such improvement projects as this should be considered from foreign paper companies or consulting companies and the stoppage period should be shortened as much as possible.

(2) Number of days for shutdown required for main costruction work

PM 1	30 days
PM 2	21 days
PM 3	nil

13-6 Other matters to be taken into consideration in the process of calculating year-to-year operating profit

13-6-1 The loss due to reduced production:

On the basis of the number of days for shutdown stated in paragraph 13.5.2, the loss due to reduced production is calculated as follows:

Unit: Rp 1,000

	PPM
– 1st year	Rp 113,287

13-6-2 Achieving operation ratio

	PPM
1st year	85%
2nd year	100%
3rd year	100%

13-6-3 Total amount of increased operating profit

Unit: Rp 1,000

	PPM
At present	Rp 3,512,774
After renovation (normal year)	Rp 4,994,511
Increment	Rp 1,431,737

13-7 Fixed Costs

13-7-1 Basic conditions

1) The fixed costs in the case of not carrying out the renovation plan, i.e. the present fixed costs, are all based on the actual data for 1983 and on the planned data for 1984.

2) In order to make lower the production cost for certain products and to strengthen the market competitive power, the improvement of labor productivity is important. In particular, this is indispensable in the case of PPM which have a low labor productivity. However, in this plan, in order to attain the mission of PPM, i.e. to stabilize employment and to contribute to the development of the local area, the total personnel cost has been fixed, rather than to introduce an idea to rationalize the labor force.