



OPM - Paper Manufacturing Process Manual

Prepared By	Reviewed and Approved By
	
Sanjeev Jain	C.S. Kashikar
CMR and Head (QC and R&D)	Chief Operating Officer (COO)

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INTRODUCTION:

CK Birla Group Structure and Profile :

CK Birla Group is a diversified US \$2.4 billion conglomerate that has a history of enduring relationships with renowned global companies.

With over 25,000 employees, 41 manufacturing facilities, 21 service delivery locations and numerous patents and awards, the Group's businesses are present across five continents. We operate in three industry clusters: technology and automotive, home and building, and healthcare and education.

Our companies are strengthened by shared guiding principles that include a focus on long-term value, trust-based relationships and philanthropy. Each business is transforming to build on the collective strength and synergies of the Group's size and span.

Presence operative in five continents – Asia, Europe, Africa, North and South America. Operates industry clusters –

- Technology & Automotive
- Home & Building,
- Paper and Healthcare & Education.



Technology and Automotive

- AVTEC Limited
- Birlasoft Limited
- GMMCO Limited
- National Engineering Industries Ltd. (NBC Bearing)
- Neosym



Home & Building

- HIL Limited
- Orient Cement
- Orient Electric
- Orient Paper and Industries



Healthcare and Education

- BM Birla Heart Research Centre
- The Calcutta Medical Research Institute
- BIT, Mesra
- Modern High school for Girls
- Rukmani Birla Modern High School

The future: Transformation through talent and technology

We have more than 20,000 employees and a customer base that includes some of the world's best-known companies. We also enjoy partnerships with several global leaders. Today, the Group is poised to grow through a transformation exercise that will significantly increase the size of our business, with technology and talent driving the expansion. Our vision is to create value in tune with the rapidly changing needs of customers, partners and communities in the 21st century.

Beyond business, we commit significant resources to philanthropic initiatives in scientific research, development and the preservation of India's heritage.

Our Values

- **Integrity:** Working with honesty and transparency.
- **Excellence:** Aiming for the highest quality standards in the goods and services we produce.
- **Respect:** Showing respect and humanity towards our colleagues and customers alike.
- **Responsibility:** Being sensitive and responsible towards the communities and environment that we work in.
- **Accountability:** Showing reliability in both word and deed.

Our Mission, Core Values and Principles of Management

 <p>Orient Paper & Industries Ltd</p> <p><u>MISSION STATEMENT</u></p> <p>To serve the society as a responsible corporate citizen by providing products and services to meet customer's expectations while generating adequate return for the share-Holders and creating opportunity for our human resources to achieve their reasonable aspirations.</p> <p><u>VISION STATEMENT</u></p> <p>The organizational culture is built across all levels in the organization where people are encouraged to take stretched targets, empowered to achieve them, and are supported to take calculated risks and right decisions to achieve the business objectives. OPIL Vision, Values, Beliefs and Mission truly reflect our culture. It is nurtured through regular communication, training, reward & recognition, and high level of personal commitment from senior leadership team.</p>	 <p><u>THE PRINCIPLES OF MANAGEMENT</u></p> <ol style="list-style-type: none"> 1. Our salaries are paid by satisfied customers. 2. Manage with facts and data, not opinions. 3. Prepare for future challenges and have the goal of performing better. 4. Adopt the new thinking, technology, creativity and innovation. 5. Build quality into the process from start to end. 6. Focus on Continual Improvement Plan. 7. Institute skill development on the job. 8. Set yourself as a benchmark. 9. Drive out fear. 10. Break down communication barriers amongst team members. 11. Institute program of education and self-improvement for everyone. 12. Adopt OPM mantra "One Mind, One Mission, One Team". 	 <p>Orient Paper & Industries Ltd</p> <p><u>CORE VALUES</u></p> <p><u>INTEGRITY:</u> Working with honesty & transparency.</p> <p><u>EXCELLENCE:</u> Aiming for the highest quality standards in the goods and services we produce.</p> <p><u>RESPECT:</u> Showing respect and humanity towards our colleagues & customers alike.</p> <p><u>RESPONSIBILITY:</u> Being sensitive and responsible towards the communities and environment that we work in.</p> <p><u>ACCOUNTABILITY:</u> Showing reliability in both word & deed.</p>
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Orient Paper Mills , Amlai , Prop : Orient Paper & Industries Ltd.



The Orient Paper Mill, Amlai,(Prop: Orient Paper & Industries Limited) unit of C.K. Birla Group is one of the major players in the Indian Pulp & Paper Industry. The Orient Paper & Industries Limited located on the west bank of river Sone at Village Amlai in Shahdol District in Madhya Pradesh was established in the year 1965. The unit is continuously improving its environmental / energy performance and striving to be best in the industry. The Orient Paper & Industries Limited is producing writing, printing, industrial and specialty papers.

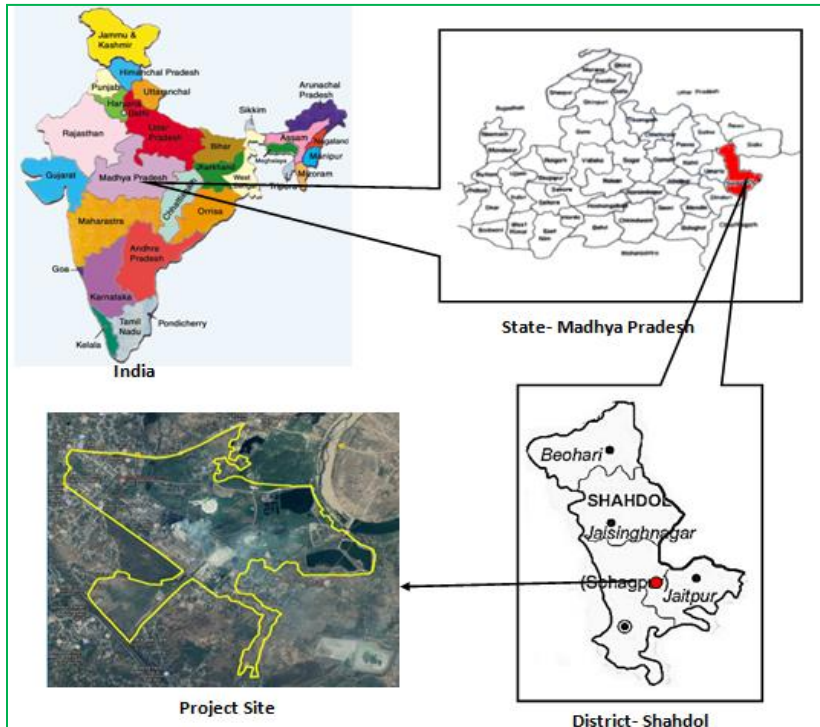
Orient Paper Mills is India's largest manufacturer and exporter of tissue paper having alliances with UAE, Philippines, Srilanka, Nepal, Ethiopia, Kenya, South Africa, Qatar, Australia, Mauritius, Portugal ,USA and many more with a strong presence in note book and writing and printing paper segment.

The Company believes that good Corporate Governance is essential for achieving long term corporate goals and enhancing stakeholders' value. The company's business objective and that of its management and employees is to manufacture and market the Company's products in such a way so as to create value that can be sustained on a long term basis for all its stakeholders, including shareholders, employees, customers, government and the lenders. In addition to compliance with the regulatory requirements the company endeavours to ensure the highest standards of ethical conduct throughout the organization.

Orient Paper Mills believes that resources must be dynamically matched with a strong commitment to excellence in products and processes though a team of dedicated people, while ensuring a clean environment for our planet, the earth. All to server the customer better today and tomorrow. Across the country and beyond its borders, graced with service from the heart which says, "You mean the world to us".

OPM is certified company of Integrated Management System under various Quality, Environment, Safety, Energy Management systems, Forest Stewardship certificates as likes ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 , ISO 50001:2011and FSC - COC & CW.

For more details please visit: www.orientpaperindia.com



Orient Paper Mills is committed to developing its business towards ecological, social and economic sustainability. Community development of the marginalized sections have been identified as focus areas. Orient Paper Mills offers vocational training and programs on micro financing for the unemployed. The company works extensively with the communities on a broad range of issues, including health, education, women empowerment, and strengthening of the village Panchayat system through training of members on issues relating to governance, development and fund management.

Profile of Orient Paper Mills – Amlai :

Our Organizational structure and Governance system, including links with the parent organization and running two businesses as below :

- **Paper Unit:**
Manufacturing of Note Book, Writing & Printing and Tissue Papers
- **Caustic Soda Unit :**
Caustic (Flakes & Lye), Liquid Chlorine, Hydrochloric Acid, Calcium Hypochlorite and Sodium Hypochlorite

Paper Unit:

Over the years, with the process of rebuilding, expansion diversification and maintaining excellent industrial relations and sustainable development, the Unit is poised to achieve increased output, greater efficiencies in input consumption and rendering a better and prompt service to the Customers.

The Company possess total 1469 Acres of the entire facility, 633 Acres of the land was developed under greenbelt and plantation.43% of the facility covered under plantation.

The company has its principle Office at Kolkata.

The paper mill is based on Hardwoods and Bamboo as fibrous raw materials. The following fibrous raw materials are used.

- **Hardwood**
- **Bamboo**

Description of equipment:

The Unit have a modern Pulp Mill with distributed control system using bleaching sequence as C_D-E_{OP}-H-D bleaching and produces the pulp with 88 +/-1 °PV brightness.

Main Machine

Beloit 225 TPD fourdrinier paper machine of 6.20meter deckle having designed speed of 610 MPM comprising Centricleaner, screens, design fourdrinier, 3-group press section and dryer section with 44 dryers cylinders, one set of calendars and one set of Kuster Calendar with heated roll, incorporating moisture, basis weight, caliper control, Ash monitoring and control system along with winder and simplex cutters.

Stock Preparation:

Triple Disc Refiners (TDR): 600HP (02 Nos.)

Double Disc Refiner(DDR): 600 HP (01 No.)

Tissue Machine # 01:

Toschi Machine with suction roll former, capacity 30 TPD (MG), deckle 2.75 meter, maximum machine speed as 575 MPM with re-winder. Complete with pulpers & stock preparation system.

Tissue Machine # 02 :

Toscotech make Soft tissue machine, capacity 59 TPD (MG), deckle 2.75 Meter, Maximum speed 1200 MPM with crescent-former, & complete with stock preparation and winder. Machine is fully DCS controlled. Paper grammage range as 14 gsm – 42 gsm .

Tissue Machine # 03 :

Valmet make Soft tissue machine, capacity 65 TPD (MG) at average grammage as 15 gsm, deckle 2.75 Meter, Maximum speed 1800 MPM capable of manufacturing very fine quality of soft Tissue, Napkin, Toilet paper, Facial Grade in grammage range from 12.5 – 19 gsm.

The Unit is making superior quality of specialty tissue papers and writing & printing papers and have a USP of manufacturing High Bulk papers for “Note Book “segment.

Existing production facilities:

Paper	:	100000 TPA
Pulp	:	90000 TPA
Evaporators	:	6-Effect MEE Street - 115 M³/hr
Recovery boiler	:	480 BLDS TPD
Steam generation from RB	:	54 tph
Lime kiln	:	120 TPD
Power generation (CPP)	:	55 MW
Two TGs (Siemens make)	:	30 MW & 25 MW
Coal fired boilers – stoker type	:	2 nos., 90 TPH each
AFBC boiler	;	150 TPH supplied by M/s Thermax.

Departments:

The departments of the plants are categorized as below:

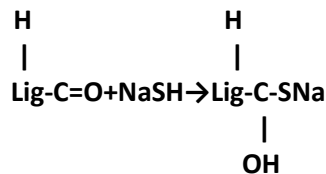
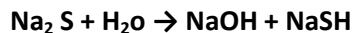
- ✓ **Administrative Department :**
 - Human Resource
 - Finance and Accounts
 - Purchase and Stores
 - Raw Material Procurement & Development

- Information Technology
- Sales and Dispatch
- ✓ **Process Department:**
 - Pulp Mill
 - Soda Recovery
 - Machine House - Main Machine, Tissue Machine # 01, 02 & 03
 - Converting and Finishing House
 - Power House
 - Effluent Treatment Plant
- ✓ **Engineering Department:**
 - Civil Engineering
 - Mechanical Engineering
 - Electrical Engineering
 - Instrumentation Engineering
- ✓ **Research and Development and Quality Assurance System (QAS)**
- ✓ **Fire and Safety**
- ✓ **Occupational Health and Safety Centre**

PULP MILL OPERATIONS

The pulp mill mainly involved the process for conversion of wood into wood pulp, which consists of almost pure cellulose fibers, the main component of paper. The Kraft process entails treatment of wood chips with a hot mixture of water, sodium hydroxide (NaOH), and sodium sulfide (Na₂ S), known as white liquor that breaks the bonds that link lignin, hemicellulose, and cellulose.

Cooking involves use of white liquor, a mixture of NaOH and Na₂ S. NaOH degrades lignin and Na₂ S fastens cooking reactions and degrades cellulose degradation caused by caustic.



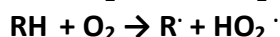
Screening of the pulp after pulping is a process whereby the pulp is separated from large shives, knots, dirt and other debris. The accept is the pulp. The material separated from the pulp is called reject.

The brown stock from the blowing goes to the washing stages where the used cooking liquors are separated from the cellulose fibers. Pulp washers use counter current flow between the stages such that the pulp moves in the opposite direction to the flow of washing waters.

Oxygen delignification:

Oxygen delignification involves free radical reactions, and therefore its selectivity is limited. This can lead to significant reduction in pulp viscosity and intrinsic fiber strength, depending upon the final kappa

number of the pulp. At higher temperatures, oxygen has a strong tendency to react with organic substances, and radical chain reactions are initiated which liberate superoxide anion radicals ($O_2^{\cdot -}$) and hydroperoxy radicals (HOO^{\cdot}).



Chipper House:



No's of Chipper	Kw/ Diameter	Capacity
03 (Drum)	400 / 1200	20 TPH (Each)

Chips Screens: There are Six (6) Chip screens each with capacity as 15 tph

Chipping operation:

Debarked mixed hardwoods & bamboo logs are converted into chips in 3 drum chippers having capacity of 20 tph each. Belt conveyors carry chips from chippers to screens.

Screening of chips:

The chips are screened in vibrating screens where oversize chips (+ 50 mm) are removed. Acceptable chips (-50 mm +3 mm) are carried by belt conveyors to silos for storing. Oversized chips are converted into acceptable quality of chips in re-chipper. The undersize chips i.e. fines and dust are collected and sent to Boiler house.

Raw Material Storage:

Bamboo and Mix hardwoods are received through rail and road transport and are unloaded in storage yard. Bamboo and wood stacks have been provided at separate space as per fire protection rules

Digester House:

150 M³ TATA-KMW Vertical Stationary Digesters with all type of auxiliary equipment.

Blow Tank :

One blow tank of 350 M³ capacity.

Wash Plant:

Twin Roll presses from Metso / Valmet for high consistency operation.

Chips Charging to Digester:



Over view of Chips Silo

Chips from silos are taken by pneumatic means to the digester (7nos) having capacity of 150 m³ each.

Chips Digestion:

After loading of digester optimum amount of white liquor (around 15% alkali as Na₂O) is charged and the contents are heated by indirect/direct steaming to achieve 165/170°C. Normally the cooking cycle is 6-7 hours to produce bleachable grade of pulp.

The cooked material is blown to a blow tank and heat of vapours is recovered in blow heat recovery system. The blown mass is diluted with black liquor and is taken to knotters for removal of uncooked knots. The knots are put back into the digester along with chips and digested with white liquor. The pulp slurry containing alkali, lignin, cellulose and some amount of hemi-cellulose are then taken to washer.

Digester House – 7 nos. Digesters



Washing and Screening of Pulp:

The blown pulp is screened through vibrating knotter and state-of-art combi screen with three Stage Hot Stock Screening by M/s Andritz. The washing of pulp is carried out by five stage of brown stock washing with one vacuum filter and four numbers state-of-art twin roll presses incorporation with ODL stage after 3rd stage washing and 2 stage Post ODL washing.



Oxygen – Delignification System



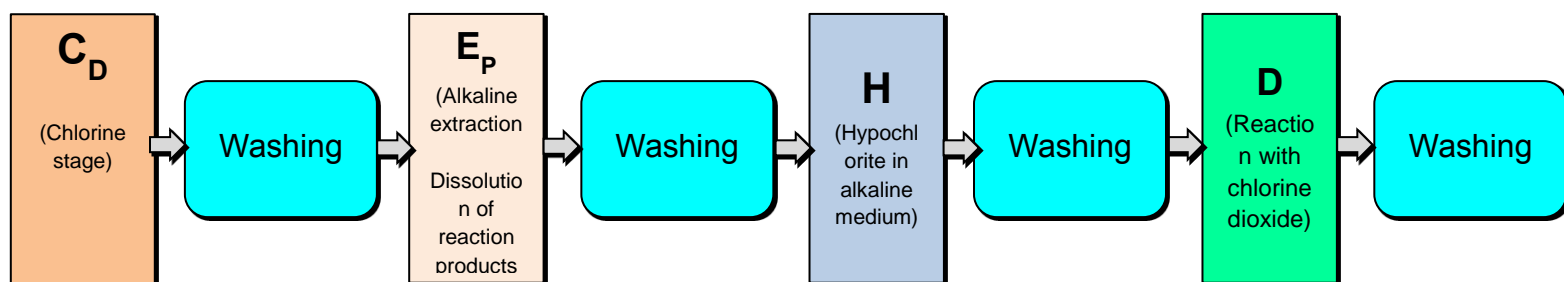
Twin Roll press for efficient pulp washing

Bleaching of Pulp:

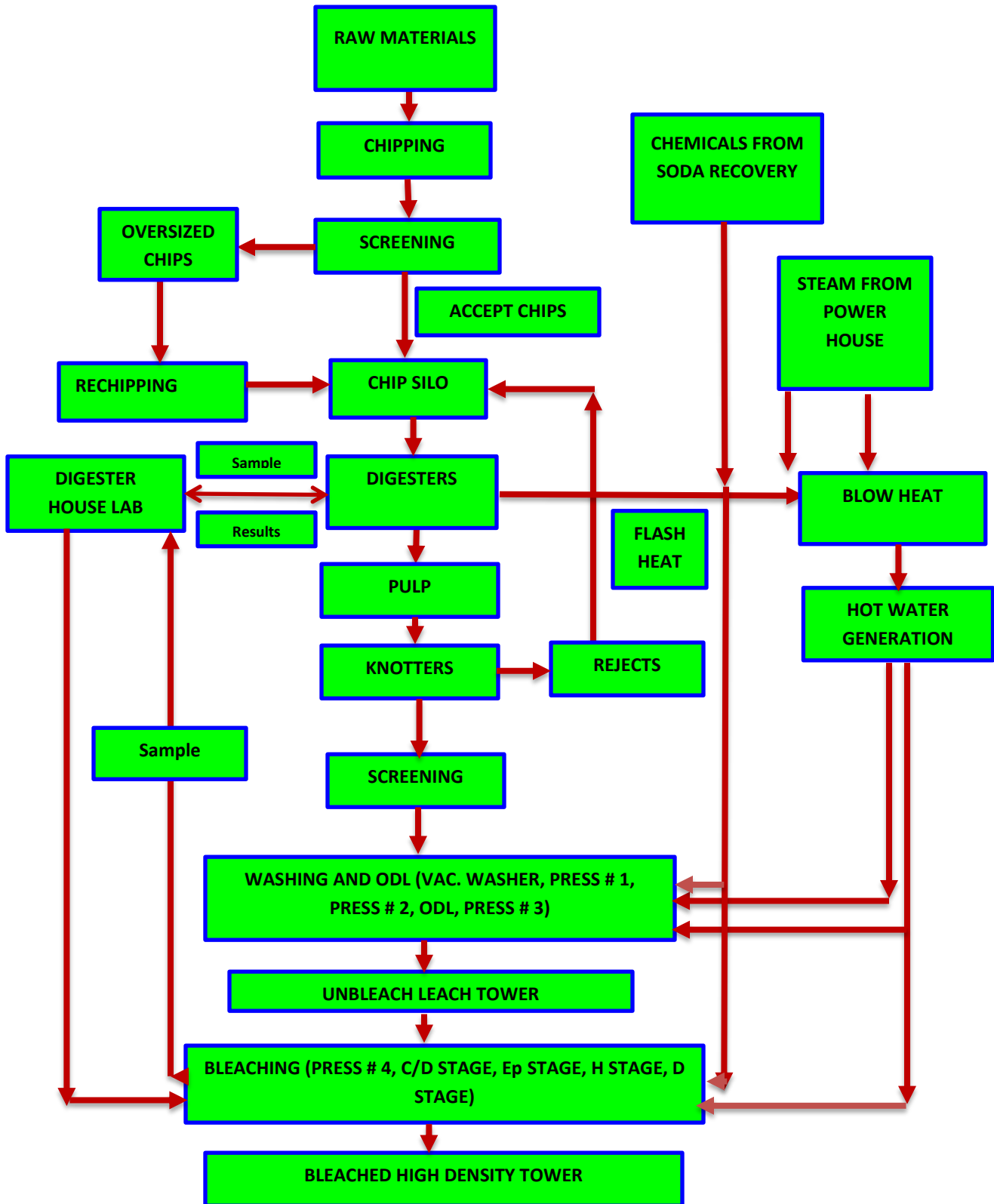



The washed pulp has brownish colour and bleached in the sequence of CD-EOp-H-D in four stages. The pulp brightness is maintained around $88 \pm 1^\circ\text{PV}$. The bleached pulp is stored in Bleached High Density Tower.

Present Bleaching sequence is CD-EOp-H-D with conventional drums.



PULP MILL: PROCESS FLOW DIAGRAM



	PAPER MANUFACTURING PROCESS MANUAL		PAPER DIVISION	
	DEPARTMENT: PULP MILL PROCESS		Doc No	SOP/Pulp Mill
	MASTER LIST OF SOP		Page No	1 of 1

S. No.	SOP No.	Title of SOP	Rev No	No of Pages
1	SOP/Pulp Mill/01	Startup of chipper , screening and storage operation	00	1
2	SOP/Pulp Mill/02	Startup of Digester House operation Washing, ODL System and Screening operation	00	2
3	SOP/Pulp Mill/03	Startup of Washing, ODL System and Screening operation Oxygen Generation (MVS Engineering)	00	2

1	PURPOSE:	SOP for Startup of chipper , screening and storage operation
2	SCOPE OF APPLICATION:	Pulp Mill
3	PROCEDURE:	
Task/Activity		Responsibility
<p>CHIPPING:</p> <p>1. The chippers used for chipping in Orient Paper Mills, are drum chippers. These chippers are used for both Bamboo and wood chipping. The ratio of Bamboo to wood depends upon the type of paper to be manufactured. Generally, the ratio of about 25:75 (Bamboo: Wood) is maintained.</p> <p>2. The bamboo or wood to be chipped is transported to chipper by means of conveyor belts where Static Grabbers installed at all three chippers or labor is required for unloading these raw materials from trucks or tractors onto the conveyor. Water is sprayed on the raw materials. The water used on conveyors for spray is the second grade water i.e., the filtered effluent from Pulp mills and Paper machines. After transporting the raw materials to the chippers, this water is drained through the side walls into a common collector and is passed to grit collector.</p> <p>3. Hence, all drum chipper No. 1, 2 & 3 are used for chipping of raw material then the chips are carried to a screen by means of conveyor belts.</p> <p>4. The oversize chips are again cut through re chipper and dust being collected in trolleys through conveyor belts and sending to power house. Then accepted chips are transported to silo through conveyor belts.</p> <p>5. After chipping the chips are conveyed to chip screen. There are 6 open gyratory types of screens, having 2 decks for classifying oversize, normal size and under size chips.</p> <p>6. The chips from chipper go to jack ladder and conveyors to chip screen. This jack ladder conveyor distributes the chips uniformly into screen headers. The star feeder present in this screen header distributes the chips uniformly onto the screen compartment.</p> <p>7. The oversize chips collected from first deck are conveyed to re-chipper. The accepts collected from second deck are send to Silo for storage/ The undersize particles or dust is collected in a dust bin and used for firing as fuel in boiler house.</p> <p>RECHIPPING:</p> <p>In the Orient Paper Mills, the re-chippers employed are of drum type. After screens re-chippers are provided so as to convert oversized chips into acceptable size.</p> <p>CHIP SILO:-</p> <p>There are 2 silos having storage of 60MT each. Wood chips are conveyed to the silo through belt conveyors. Chips Silo Capacity is 120 tons. Both silos are of vertical cylindrical type with conical bottom terminating over circular rotating table feeders. The knots that are rejected from knotters are also mixed with wood chips and stored in chip silo.</p>		<p>HOD/ SECTIONAL HEAD/ SHIFT INCHARGE/ OPERATOR</p>

1	PURPOSE:	SOP for Startup of Digester , Washing, ODL and Screening operations
2	SCOPE OF APPLICATION:	Pulp Mill
3	PROCEDURE:	

Task/Activity	Responsibility
<p>COOKING:</p> <ul style="list-style-type: none"> Pulping is the process by which wood is reduced to a fibrous mass either mechanically, thermally, chemically or by combinations of these treatments. In OPM conventional Kraft cooking is carried out. Kraft pulping is a full chemical pulping method where NaOH & Na₂S are used as cooking chemicals for delignification of wood. The pulp mill of OPM is provided with 7 vertical stationary digesters, each of capacity 150 m³, with a pre-heater and liquor circulation pump. There is provision for both indirect and direct steaming. The cooking cycle is of about 6 ½ -7.0 hours. <p>DIGESTER HOUSE: The various operations carried out during cooking in digester house are as below:</p> <p>DIGESTER CHARGING:</p> <ul style="list-style-type: none"> The chips are conveyed from silo through weight meter conveyor and then blown to the digesters by means of blowers through movable chip chute. Next stage is to charge the cooking liquor into the digester. Before feeding white liquor is analyzed for Active Alkali. Required cooking liquor is calculated on the basis of wood. Near 40 tons of chips on A.D. basis, a total volume of 90 m³ of liquor containing about 70 m³ of white liquor and 20 m³ of black liquor are charged. To prevent back deposition of lignin and to maintain a driving force a slight excess of cooking chemical is added. <p>STEAMING:</p> <ul style="list-style-type: none"> In OPM, indirect steaming is done. And in special cases direct steaming is done. The liquor is pumped to pre-heater, which heats the liquor to required temperature, and hence indirect heating of liquor is done. Steaming is done in 2 stages. In first stage 2 hours indirect steaming is done maintaining temperature of about 135⁰C and pressure of 2.5 kg/cm². At this point retention of one hour is given. After one hour indirect steaming is again started and pressure and temperature is elevated to 6.5 kg/cm² and 160⁰C. <p>RETENTION:</p> <ul style="list-style-type: none"> A retention time of about 1 hour is provided at cooking temperature and pressure for the completion of chemical reaction of cooking liquor with wood chips. <p>RELIEVING:</p> <ul style="list-style-type: none"> If the pressure created exceeds then the digester relief valve is released so that all the pressure and volatile components are released during the relieving period. Hence periodic relieving of digester is necessary to relieve the excess pressure created. <p>BLOWING:-</p> <ul style="list-style-type: none"> After cooking is completed and the pulp is sampled out knowing the Kappa. No., pulp is blown to the blow tank tangentially. When the pulp is blown defibrillation take place. The fibers get separated and the steam is released from the cooked pulp. Blowing is done with Kappa. No. 20-21. If the Kappa. No. is more, and then again cooking is continued for another 15-20 minutes. The blow tank is agitated so that no lump formation takes place. Black liquor is used to dilute the pulp in the blow tank. 	<p>HOD & SECTIONAL HEAD & SHIFT SUPERVISOR & OPERATOR</p>

Task/Activity	Responsibility
WASHING, SCREENING AND ODL SYSTEM– <ul style="list-style-type: none"> The objective of washing of pulp is to remove the maximum amount of black liquor dissolved solids from the pulp while using as little wash water as possible. In OPM there is one rotary vacuum drum filter and 3 presses in series. Before washing in OPM 4 stage Hot stock screening is available. In which three screens and one sand cleaner and 6 Knotters are present. First the pulp passes through the 12 mm hole size knotters the accepted pulp is send to hot stock screening and rejects knots are conveyed to silo through belt conveyors. The accepted pulp from hot stock screening goes for washing and rejects from hot stock screening (Sand cleaner) thrown out of the system. The washing acts on the counter current way. In between 2nd and 3rd press there is ODL system. The ODL system consists of two reactors having different retention time. In ODL system, the pulp is treated with oxygen in alkaline medium at elevated temperature. At the inlet of the 1st reactor oxygen is mixed along with caustic soda solution. In between the two reactors, steam is introduced into the pulp stream. The pulp coming out of the press # 3 is finally gathered in unbleached pulp storage tank which is called unbleached tower. 	HOD & SECTIONAL HEAD & SHIFT SUPERVISOR & OPERATOR

1	PURPOSE:	Startup of Pulp Bleaching operation, Oxygen Generation (MVS Engineering)
2	SCOPE OF APPLICATION:	BLEACH PLANT, PULP MILL
3	PROCEDURE:	

Task/Activity	Responsibility
<p><u>BLEACHING OF PULP</u> FINAL WASHING STAGE:- The final washing of the pulp coming from the bleach tower is done in press # 4 which is a side entry press.</p> <p><u>C/D STAGE:-</u> It is the first stage in multistage bleaching where lignin is removed in the form of chlorolignin. Fragmentation of lignin takes place by Chlorine and Chlorine Dioxide.</p> <p>The unbleached pulp from press # 4 at 32% Cy is pumped to a stand pipe. In this stand pipe dilution of pulp to 8-10% Cy is done using C/D stage filtrate. The pulp is then mixed with Chlorine and Chlorine Dioxide at a pH of 1.5 -2 in a C/D mixture. This pulp is passed through up flow C/D tower of 105 m³ capacity. 1 hour retention time is given for the completion of reaction. Then the pulp is washed on C/D washer with clarified water. The filtrate is collected in bottom seal tank and used for vat dilution and also for dilution of pulp before entering the C/D stage. The rest of the filtrate drained off.</p> <p><u>Eop STAGE:-</u> The pulp from C/D washer is mixed with NaOH and H₂O₂ solution in a caustic mixture with the help of L.P. steam of 49 psi pressure. This pulp is then fed to down flow Eop tower of capacity 126 m³ where retention of 1 hour is given. The bleached pulp is then washed on alkali washer with clarified water and the filtrate is used for dilution of pulp before entering Eop stage and also for vat dilution.</p> <p>After washing Sulphamic Acid at the rate of 0.1% is mixed with the pulp in the re-pulping screw conveyor to maintain the strength of pulp.</p> <p><u>HYPOCHLORITE STAGE:-</u> The pulp from Eop stage is taken to hypo mixture where hypo at pH 10 –10.5 is added and temperature is maintained at 40–45⁰C. Then the pulp is washed on Hypo washer with ClO₂ Filtrate/ fresh hot water at 70⁰C. The filtrate is used for dilution of pulp before entering H-stage and also for vat dilution. The brightness of pulp at exit of this stage is maintained at 82±1.5%.</p> <p><u>CHLORINE DIOXIDE STAGE:</u> The pulp from hypo stage washer is fed to steam mixture and then to T-mixture where ClO₂ solution of 5.8 gpl is added. Then the pulp is passed through on up-flow J – Tube and then through down flow ClO₂ tower where 3 hours retention time is given. Then the pulp is washed on ClO₂-washer with clarified water. After D-stage the pulp is having a brightness of 87.5 ± 1%. After D-stage the bleached pulp is conveyed to a bleached high density tower of capacity 1000 m³ where it is stored at 12-14% Cy.</p> <p><u>Oxygen Generation</u> Reference- oxygen generation plant operating manual (MVS Engineering)</p>	<p>HOD & SECTIONAL HEAD & SHIFT INCHARGE & OPERATOR</p>

SODA RECOVERY OPERATIONS



Soda Recovery:

Black liquor from pulp washing having about 15% solids is concentrated in multiple effects rising film solids evaporator. Counter current heating is done with the help of steam. After evaporators the liquor concentration is around 50-52%. Finally, the black liquor is concentrated up to 65% over a cascade evaporator and after mixing with sodium sulphate thick black liquor is burnt in the Recovery Furnace.

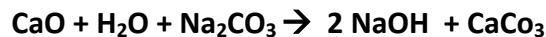
High-pressure steam is obtained as a by-product from Recovery Boilers. Sodium sulphate added as make up chemical reacts with carbon and around 90% of Na_2SO_4 is converted into sodium sulphide as per following reaction.



The smelt moves downward through the fuel beds and is discharged from the bottom of furnace as molten stream, which consists of Na_2CO_3 and Na_2S . The smelt is dissolved in weak liquor and is known as green liquor.

Causticizing of green liquor:

Green liquor is clarified in a clarifier to remove impurities picked up in smelt operation. Lime is added to green liquor. The process of converting sodium carbonate to sodium hydroxide is referred as causticizing. The reaction is as follows:



Causticizing reaction normally goes for about 85 to 90% completion. Considerable alkali remains with mud (CaCO_3) and recovered by counter current washing on mud washers. Finally, lime sludge goes to the filters and after washing the sludge leaves the filters at around 55% solids. The sludge is collected in ponds / low lying areas. White liquor thus generated is again used at digesters for cooking of chips

Recovery Cycle of Pulping Liquors:

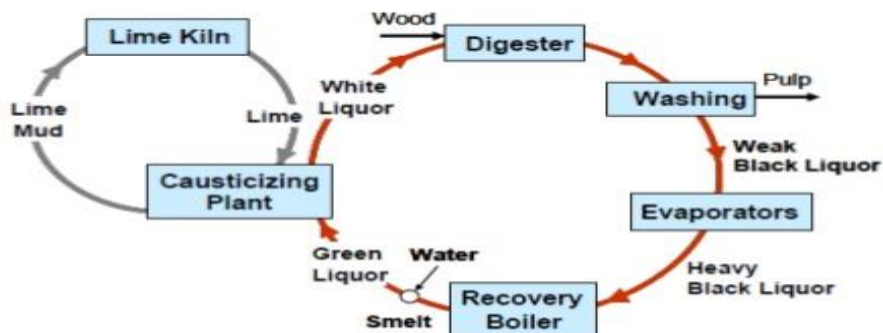


Fig: Recovery Cycle of Pulping Liquors

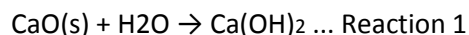
Rotary Lime Kiln Operations:

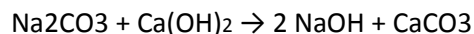


Rotary kiln in OPM is being used to convert lime mud into lime for reuse in the causticizing plant for our Kraft recovery process. It produces quicklime through the calcination of lime mud and limestone (calcium carbonate). The lime mud fed into rotator lime kiln, where it is dried and heated counter currently by combustion gases from an oil or gas burner at other end of the kiln. The production of good quality of re-burned lime is the most basis requirement in lime kiln operation. Lime kiln contain three zone preheating zone, calcination zone and decomposition zone. Calcination of lime mud is a highly endothermic reaction. The reaction only begins when the temperature is above the dissociation temperature of the carbonates in the limestone. This typically is between 780°C and 1340°C. In decomposition zone calcium carbonate is decomposes into calcium oxide and carbon dioxide. The resulting calcium oxide is reused in causticizing process.

Working principle:

In the causticizing plant, calcium oxide (CaO) is used to causticize sodium carbonate (Na₂CO₃) in the green liquor to produce sodium hydroxide (NaOH).





The causticizing reaction precipitates calcium carbonate (CaCO_3) which is separated from the liquor, washed to remove the residual liquor and dewatered on a pre-coat filter to a solids content of 65% or higher. The resulting lime mud is fed into a rotary kiln where it is dried and heated counter-currently by combustion gases from an oil or gas burner at the other end of the kiln. As the mud temperature reaches about 800°C (1470°F) in the calcination zone of the kiln, CaCO_3 decomposes into CaO and CO_2 (Reaction 3). The resulting CaO or re-burned lime is reused in the causticizing.



Details of Rotary Lime Kiln supplied by M/s F L Smidth & Co Denmark:

S.No.	Particulars	UOM	Parameters
1	Operating Capacity	TPD	120
2	Length	meter	70
3	Diameter	meter	3.0
4	Speed	rpm	1.3

6-Effect Evaporator street



Evaporation is process used to concentrate a solution by removing solvent (mainly water) in a purified form by the application of heat

Black liquor evaporation is an essential part of the chemical recovery process as it significantly concentrates the dry solid matter in black liquor so that the liquor can be effectively combusted in recover boiler.

Basically, the black liquor is heated until it reaches the boiling point so that the water contained in the black liquor will gradually evaporate and turn into steam (Vapour) and separated from the black liquor.

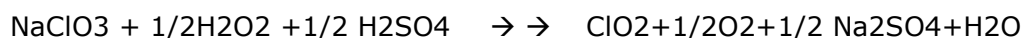
Multiple Effect Evaporator (MEE), is an apparatus for efficiently using the heat from the steam to evaporate water. In a multiple effect evaporator, water is boiled in a sequence of vessels, each held at a lower pressure than the last. Because the boiling temperature of water decreases as pressure decreases, the vapour boiled off in one vessel can be used to heat the next and only the first vessel requires an external source of heat. Black liquor of 15% solid can be easily converted into black liquor of 70% solids through the MEE.

Chlorine Dioxide Plant:



CIO₂ is being used as a bleaching agent for Pulp bleaching process to get the bleached pulp. OPM had done an innovation of conversion of CIO₂ solution from R-2 process to Eco- friendly & cost effective HP-A process:

This CIO₂ plant was originally designed to produce chlorine dioxide by the R-2 process, where sodium chlorate is converted to chlorine dioxide using Sodium Chloride in a strong solution of Sulphuric acid. This process was later converted to HP-A process, where the use of sodium chloride is totally stopped and H₂O₂ is used as reducing agent, which reduces sodium chlorate in presence of strong acid medium of Sulphuric acid. Advantage of this process is that CIO₂ solution is being produced without Chlorine. its reaction Efficiency is 94% to maintain the reaction efficiency it is necessary to maintain 4.5 Mole of Sulphuric acid in the out let of the primary reactor. Excess of this amount will lead to formation of sodium bi-sulphate due to which CIO₂ decomposition may happen. Hence it is necessary to maintain NaClO₃ solution flow, H₂O₂ flow and Sulphuric acid flow in proper ratio.



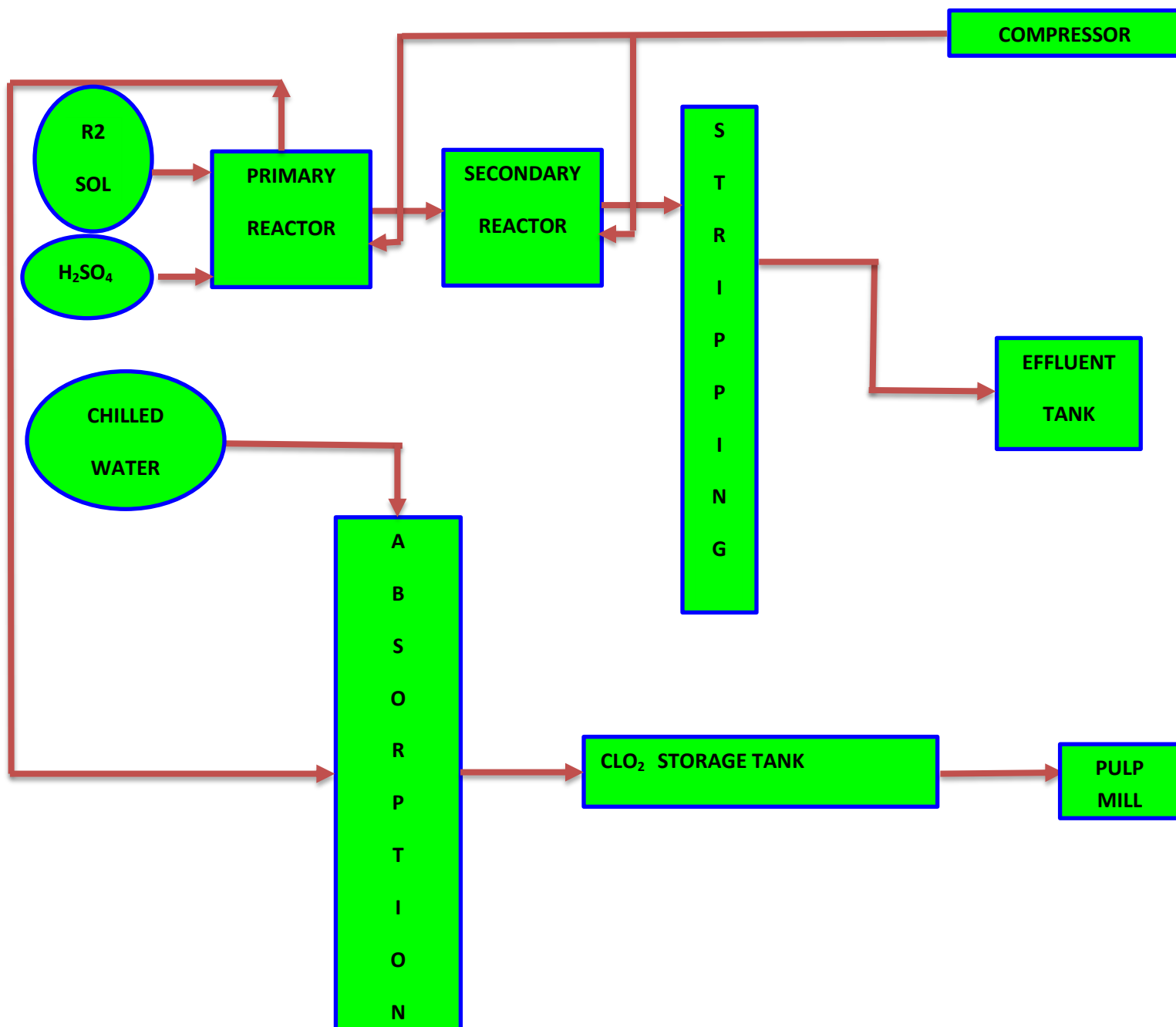
A slight amount of NaClO₃ (nearly 1 gpl) should present in the solution at the out let of the stripper, so that efficiency can be maximized. Chlorate solution, Sulphuric acid and Hydrogen Peroxide are fed to Primary Reactor through dip tubes and flow is controlled by control valves up to desired rate of production. Air is introduced at the bottom of the reactors through a diffuser plate. Air quantity is controlled by control valve to maintain desired concentration of CIO₂ gas to avoid the decomposition of CIO₂ gas.


The solution overflows from the Primary Reactor to Secondary Reactor, where again air is introduced through the bottom of the Secondary Reactor and its quantity is controlled by control valve to complete the reaction.

The overflow from Secondary Reactor goes to the Stripper (Tertiary Reactor) where traces of ClO_2 gas is removed completely by air, which is introduced from the bottom with manual valve. The product gas consisting of ClO_2 , Oxygen and Air enter in ClO_2 absorption tower. ClO_2 gas is absorbed in chilled water (at 7°C) its solution containing 7 gpl of ClO_2 , which is collected in ClO_2 storage tank and same pumped to Pulp mill. After the absorption column Oxygen gas remains in the gas phase which is released in Atmosphere.

Residual solution from the Tertiary Reactor contains 320 gpl of sodium sulphate, 440 gpl of Sulphuric acid. The same solution is pumped to pulp mill for maintaining PH in D-Stage.

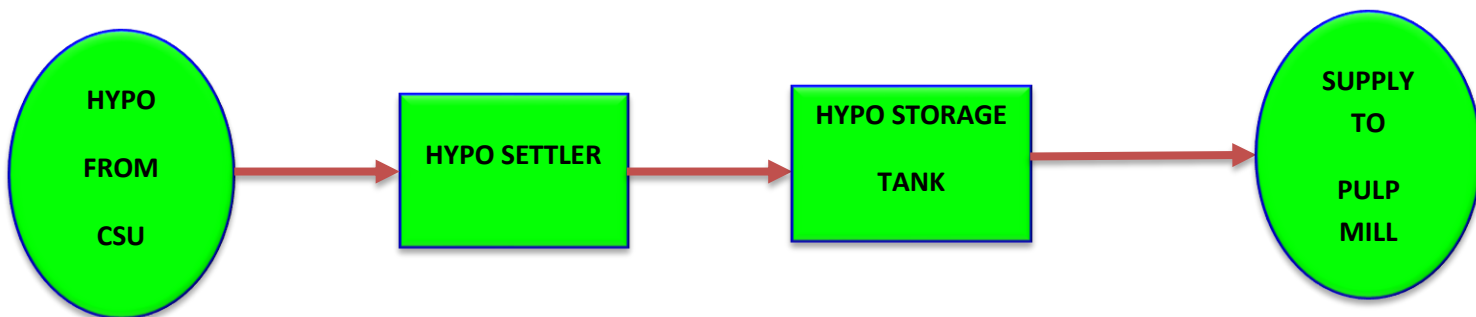
BLOCK DIAGRAM FOR CHLORINE DIOXIDE PREPERATION BY R-2 PROCESS



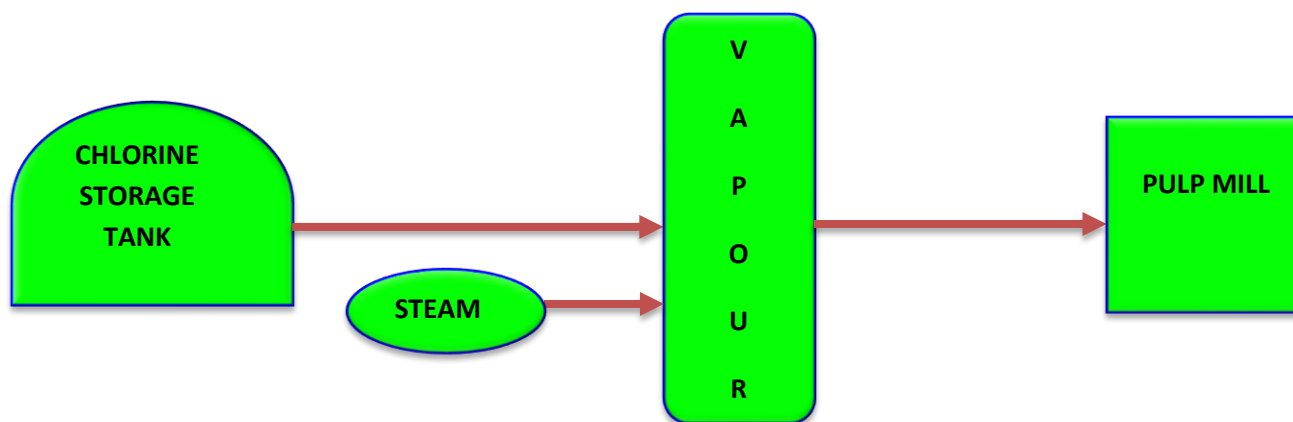
		PAPER MAKING PROCESS MANUAL	PAPER UNIT	
		SODA RECOVERY PLANT	Doc No	SOP/ SRP
		MASTER LIST OF SOP	Page No	1 of 1
S. No	SOP No.	Title of SOP	Rev No	No of Pages
1	SOP/SRP/ClO ₂ /01	Chlorine Dioxide Operation Procedure	0	1
2	SOP/SRP/HCl /02	Hypo/ Chlorine Preparation and Handling	0	1
3	SOP/SRP/CP/03	Causticizer Plant Operation procedure	0	1
3	SOP/SRP/EP/04	Evaporator – Operation Procedure	0	1
4	SOP/SRP/RB/05	Recovery Boiler / Furnace Operation Procedure	0	1
5	SOP/SRP/CP/06	Causticizer Plant Operation procedure	0	1

1	PURPOSE:	Operations of Chlorine Dioxide Plant
2	SCOPE OF APPLICATION:	Chlorine Dioxide Generation Plant
3	PROCEDURE:	
Task		Responsibility
Operation of Chlorine Dioxide Plant <ol style="list-style-type: none"> 1. Ensure interlocking of MOL, Vent fan and compressors. 2. Start vacuum building with ejector system. 3. After achieving normal vacuum, start chilling plant 4. Check R2 solution strength. 5. After achieving required temperature of water start chilled water pump and control as per requirement. 6. Start vents fan MOL pump and compressor. Start feed of acid and R2 solution in primary reactor 7. Check ClO_2 generation strength. 8. Check acid and chlorate strength of primary reactor outlet 9. When sufficient level of ClO_2 achieved, inform consumer department To consume as per their requirement. 10. Periodic checking of ClO_2, acid and chlorate strength. 11. At the start of preparation of R2 solution, check the strength of Sodium Chlorate and sodium chloride solution. 12. Check the strength of Sulphuric acid 13. Maintain the strength of Chlorate up to 300(+/-) 10, and Sodium Chloride up to 200(+/-) 10. 14. After Preparation of R2 solution check its strength, then check the strength of acid. 15. After Reaction is complete check the concentration of product, acid %, strength. 16. If the generation of Chlorine dioxide is high stop the production. 		Operator/Assistant Operator

BLOCK DIAGRAM FOR HYPO PREPERATION



BLOCK DIAGRAM FOR CHLORINE VAPOURIZATION SYSTEM

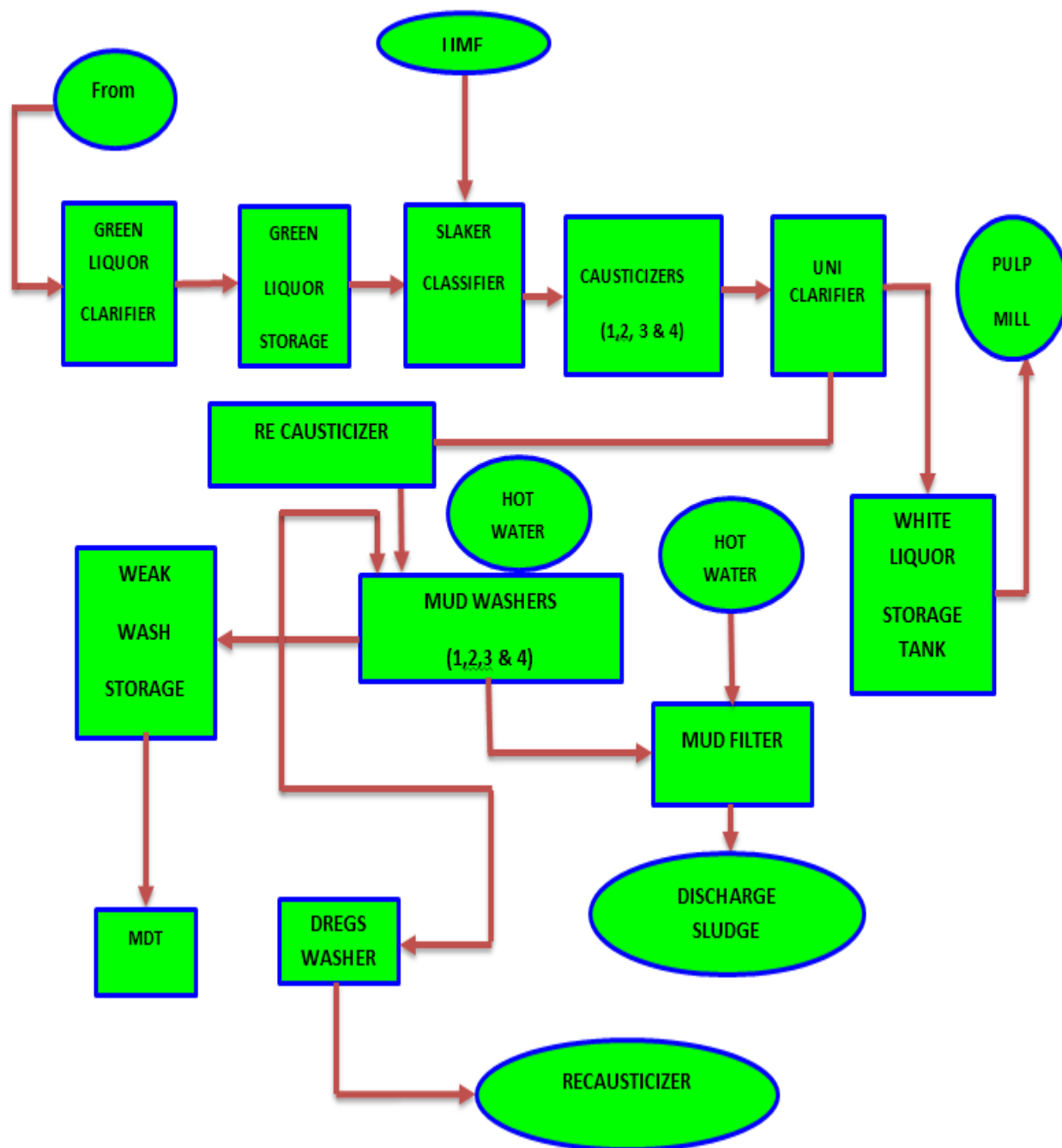


1	PURPOSE:	Operation of hypo preparation & chlorine vaporization plant
2	SCOPE OF APPLICATION:	Chlorine Gas Manufacturing Plant
3	PROCEDURE:	
Task		Responsibility
<ul style="list-style-type: none"> Heat the vaporizer with steam Open Chlorine tank outlet valve, common valves, open expansion outlet valve, vapor inlet valve and control valves above 10% to maintain 2 kg / cm² pressure and ensure the system is leak proof. Increase Cl₂ gas pressure up to normal range (5 Kg) with opening the control valve and inform consumer department to consume Cl₂-gas as per their requirement In any emergency, stop tank main valve and allow chlorine gas to neutralizing system and bring down the pressure of chlorine to zero. Attend the emergency situation as per on site emergency plan. For Hypo Preparation- <ul style="list-style-type: none"> Prepare Milk of Lime Solution (MOL) by adding lime and water at (5-8 °TW) Allow MOL to the Reactor (Flow 15-25m³/hr) Open Chlorine gas to the Reactor Check The strength of Hypo Store Hypo Solution in storage Tank. 		Supervisor/Operator

1	PURPOSE:	Operation Of a Causticizing Plant
2	SCOPE OF APPLICATION:	Soda Recovery Process
3	PROCEDURE:	

Task/Activity	Responsibility
<ol style="list-style-type: none"> 1. Start lime feeding system and fill up the lime bins. 2. Start slacker classifier, sump pump, causticizer agitators, causticizer sump pump. 3. When Green Liquor Comes as per requirement in Green Liquor storage tank, start Green Liquor pump and open steam to Green Liquor heater for heating. 4. Check Green Liquor Strength. 5. Start lime table feeder to slacker. 6. Check causticizing efficiency of lime liquor and adjust lime feed as per requirement 7. Open hot water for trammel screen and classifier grits washing. 8. When overflow from White Liquor unclarifier starts to White liquor storage tank, check White liquor strength 9. When the required amount and strength of comes, White liquor inform consumer dep't (Digester House) to consume as per their requirement. 10. Periodic checking of White liquor, Lime Liquor, Green Liquor, Weak wash, underflow of clarifiers and over flow of clarifiers and record in log book to maintain the quality.. 11. When the required slurry level comes in slurry tank, start mud dewatering system along with vacuum pump, water recovery pump, Hot water system and Filtrate Pump. 12. Start lime stone feeding system and fill up the bunker. 13. The moisture of Filter cake comes normal and discharge of cake amount stabilized. 14. Ensure all the interlocks of RLK are in operating condition and updated. 15. Start Oil heating circulation to attain normal temp. 16. Start Oil firing in RLK with small oil nozzles and adjust the draught through ID Fan 17. Allow slow heating of RLK for about 24 hours 18. Start Product lime conveying system 19. When the required temp. at RLK feed end comes, stop oil firing and put big oil burners nozzles and again start oil firing and stabilize the flame. 20. Start lime sludge and make up lime stone feeding to RLK and adjust the ratio. 21. Check the parameters of the initial. Intermediate and final products as per the testing schedule in the plant in each shift 22. Check the parameters i.e. TTA, TAA CE%, Su%, Twice in the shift 23. In case of any abnormality or deviation in the results inform the shift in charge 24. Maintain all the testing data in data log book 	<p style="text-align: center;">Shift Incharge/ Supervisor/Operator</p>

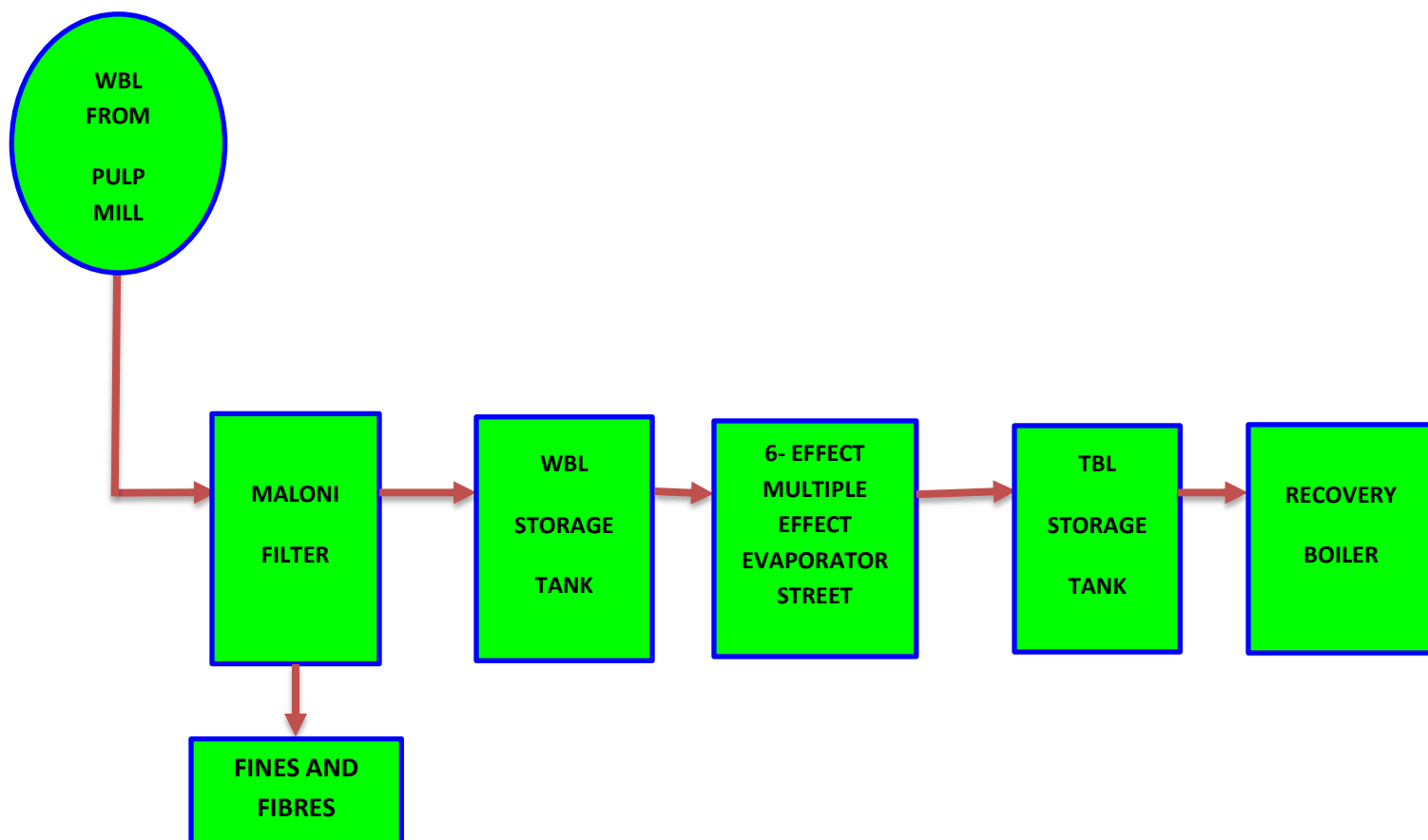
BLOCK DIAGRAM FOR CAUSTICIZING PLANT



1	PURPOSE:	OPERATION OF EVAPORATOR
2	SCOPE OF APPLICATION:	Black Liquor to Evaporators
3	PROCEDURE:	

Task	Responsibility
<ul style="list-style-type: none"> Start Maloney filter and open steam nozzles Inform Pulp mill to start black liquor supply and adjust supply as per requirement. Open steam to black liquor tanks steam coils to increase temperature of WBL. After checking physically, if found to be alright initiate start up activity. Close all air vents. Start water passing to evaporator bodies and ensure there is no leakage Start vacuum building and ensure normal vacuum (600 mm water column) Open steam and increase the steam flow to pre heat up the evaporator bodies. Stop steam and water flow to evaporator and open black liquor to evaporator. When the black liquor passes through evaporator, slowly increase steam flow to evaporator. Start steam condensate & combined condensate pump. Increase steam and black liquor flow slowly as per plant condition (Do not allow sudden increase of steam pressure.) Check concentration time to time. When required concentration comes, allow its condensate to drain. When required concentration achieved take black liquor into thick black liquor storage tank Connect steam condensate to power house when conductivity comes normal. Connect combined condensate to Causticizer when it is clear and of normal conductivity and inform Shift in Charge Periodic checking of concentration, steam flow, B/L Flow and pressure and record in log book. Periodic checking to inlet and outlet concentration of WBL. 	Shift incharge/Operator

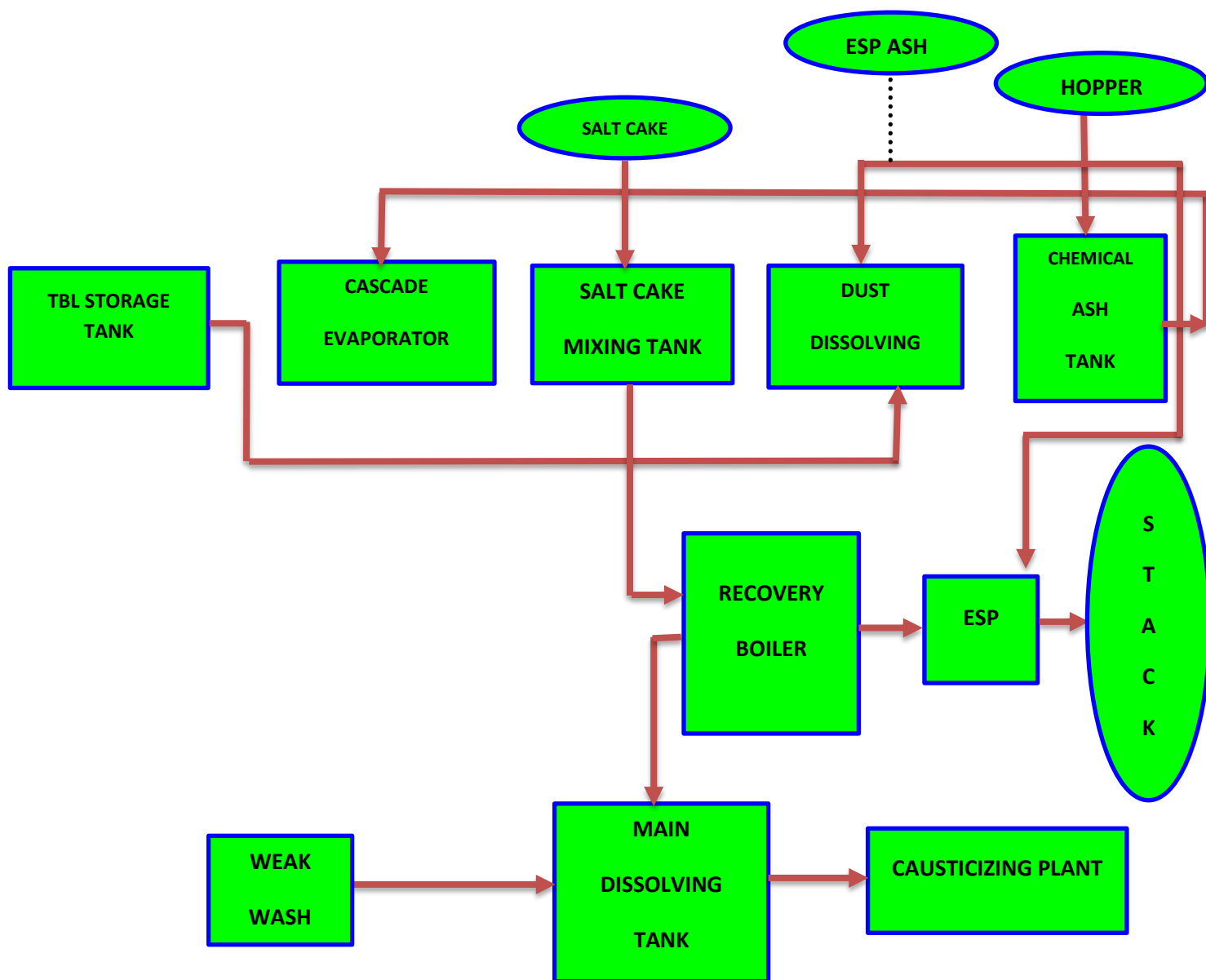
BLOCK DIAGRAM FOR MULTIPLE EFFECT EVAPORATOR STREET



1	PURPOSE:	OPERATION OF RECOVERY BOILER/ FURNACE
2	SCOPE OF APPLICATION:	Soda Recovery Process
3	PROCEDURE:	

Task/Activity	Responsibility
<ol style="list-style-type: none"> After checking plant physically and if found to be ok, initiate start up activity. Open Drum vent valve and super heater vent valve & drain valve. After flushing closed the drain valve. Fill up the boiler with feed water up to desired drum level. Ensure all the man holes , access doors of boiler are boxed up Ensure all the man holes , access doors of boiler are boxed up Fill up the cascade with B/L and smelt dissolving tank with weak wash. Check the interlocking of cascade, ID FD, PA fan. After ensuring interlocking start the cascade ID fan, FD fan and PA fan charge air heater. Start oil heating and circulation. When the oil temp. reached as per requirement, start oil firing and adjust air. Then, increase oil burners one by one after every 1 hr or as per requirement. When the pressure of boilers comes more than 3.5 Kg/ cm², close both vent valves one by one. As the pressure starts normal increasing tendency, start B/L heating and circulation to attain the required temp. At about 20 kg / cm² presser inform power house to start recovery 850 Psi header line and about 30 kg / cm² inform Power House to open main header valve. At about 40 Kg.cm² pressure, open the steam stop valve When required steam pressure of boiler is achieved to main header pressure and required temp., start B/L firing and close super heater drain valve. Start all the ESP equipment before taking flue gas in ESP. When the temp. of ESP Chamber, comes to required level, charge ESP field by electrical department. Before charging of ESP, Assure that they should not more than two burners 	<p>Shift in Charge/ Operators</p>

BLOCK DIAGRAM FOR RECOVERY BOILER



Paper MACHINE FOR WRITING & PRINTING PAPERS



View of Paper Machine



Triple Disc Refiner (TDR)

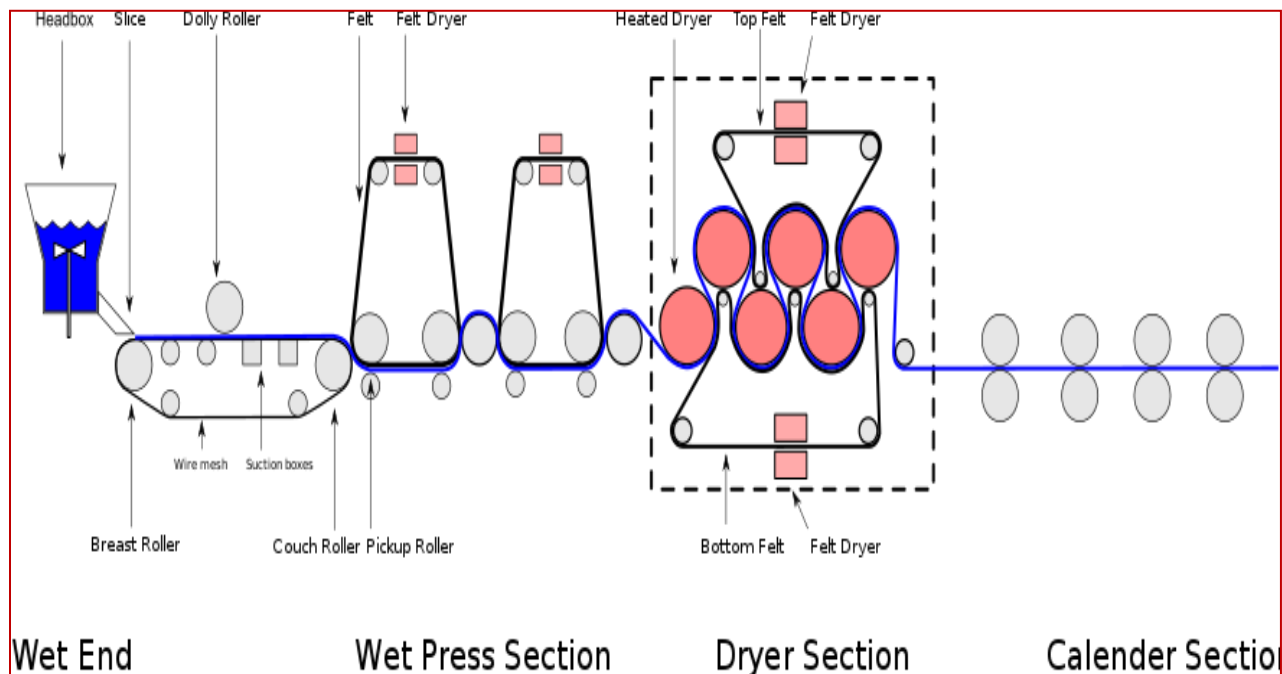
Paper Machine for Writing & Printing papers:

Including Stock Chests and mechanical additive system. Beloit 225 TPD fourdrinier paper machine of 6.20 meter deckle having designed speed of 610 MPM comprising Centricleaner, screens, design fourdrinier, 3-group press section and dryer section with 44 dryers cylinders, one set of calendars and one set of Kuster Calendar with heated roll, incorporating moisture, basis weight, caliper control, Ash monitoring and control system along with winder and simplex cutters.

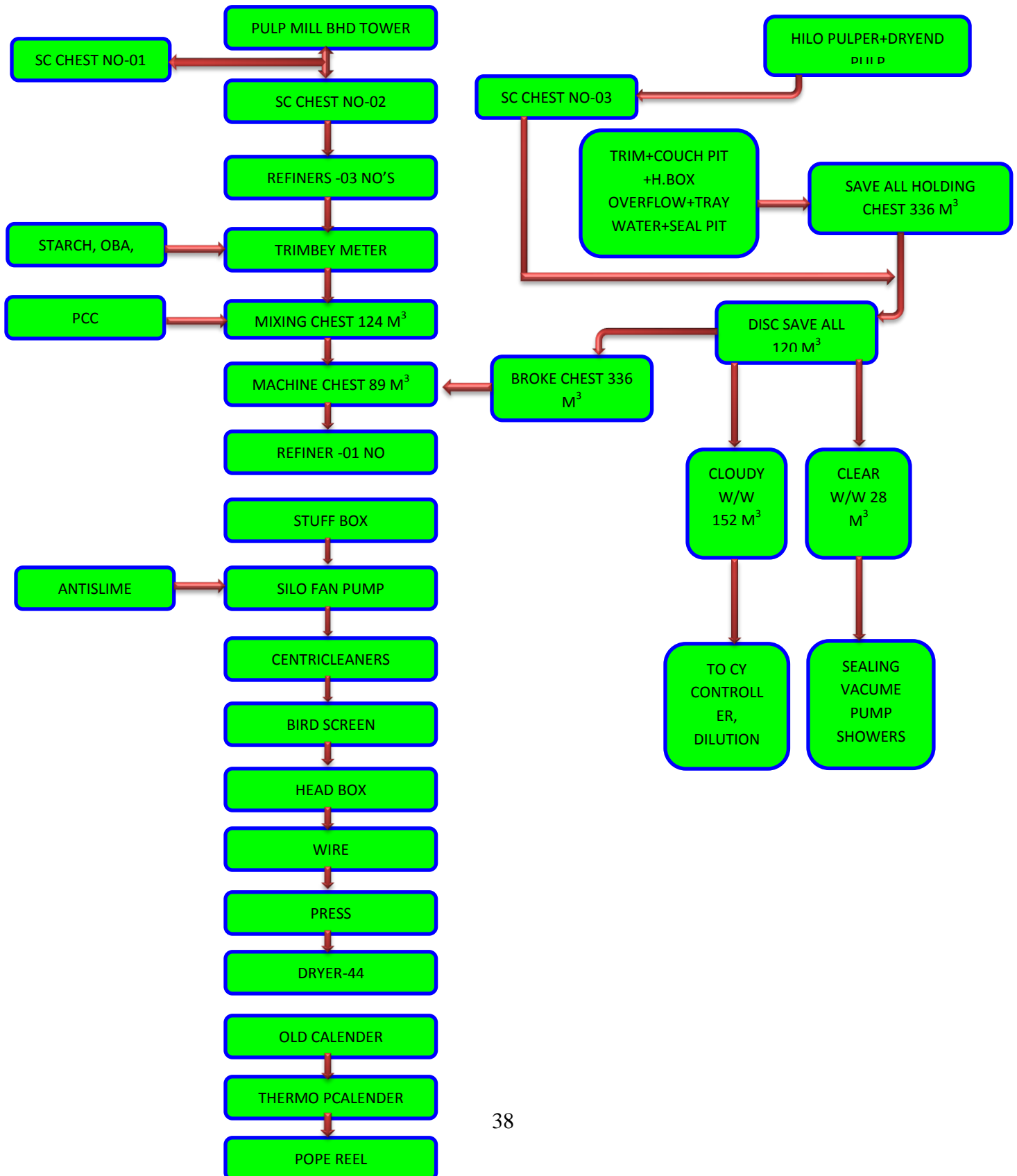
Particulars	UOM	Main Machine
Machine deckle	meter	5.5
Machine speed	mpm	550
GSM of Paper	g/m ²	54-90


Paper making procedure:

There are four main sections on this paper machine. The forming section makes the pulp into the basis of for sheets along the wire. The press section, which removes much of the remaining water via a system of nips formed by rolls pressing against each other aided by press felts that support the sheet and absorb the pressed water. The dryer section of the paper machine, as its name suggests, dries the paper by way of a series of internally steam-heated cylinders that evaporate the moisture. Calenders are used to make the paper surface extra smooth and glossy. In practice calendar rolls are normally placed vertically in a stack.



MAIN MACHINE: PROCESS FLOW DIAGRAM



	PAPER MANUFACTURING PROCESS MANUAL		PAPER DIVISION	
	DEPARTMENT: PAPER SECTION		Doc No	SOP/PMC
	MASTER LIST OF SOP		Page No	1 of 1

S. No	SOP No.	Title of SOP	Rev No	No of Pages
1	SOP/PMC/01	STARTUP OF STOCK PREPARATION PLANT	00	01
2	SOP/PMC/02	STARTUP OF REFINERS AND VACCUM PUMPS, STEAM & CONDENSATE VALVES	00	01
3	SOP/PMC/03	OPERATION OF PULPER	00	01
4	SOP/PMC/04	STARTUP OF APPROACH FLOW SYSTEM, WIRE AND PRESS PART	00	01
5	SOP/PMC/05	STARTUP OF DRYER PART , CALENDER SECTION AND POPE REEL	00	01
6	SOP/PMC/06	STARTUP OF REWINDER , UNLOADING OF REELS FROM REWINDER, SETTING & CHANGING THE KNIVES TO REQUIRED SIZE	00	01

1	PURPOSE	Startup of Stock Preparation Plant
2	SCOPE OF APPLICATION	Stock Preparation Plant
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<ol style="list-style-type: none"> 1. Take the clearance from all the engineering departments & utility 2. Check all the system from process side. 3. Closed the entire pumps and chests drain valve. 4. Open all the sealing water of the agitator and pump as per requirement then starts the all agitator of the chest. 5. Start DISC Filter(Save all/fiber recovery system) 6. Start pulp drawing from the pulp mill B.H.D tower. 7. Starts required refiners in system & proper load given. 8. Maintain consistency as per requirement. 9. Keep ready the required chemical additive for the proper mixing with the pulp in mixing/blending chest. <p>HANDLING OF CHEMICALS,DYES & COLOURS</p> <ol style="list-style-type: none"> 1. No person shall be allowed to handle acidic, alkali and slurry without proper PPE's such as shoes, hand gloves, and goggles, dust mask etc. 2. No person shall be allowed to prepare and store chemical solution without PPE's as above. 3. Check the quality of PPE periodically by inspection and replace the damaged immediately <p>PCC SOLUTION PREPARATION.</p> <ol style="list-style-type: none"> 1. Ensure the healthiness of communication facility 2. No person shall be allowed to operate without proper PPE's such as gum boots, goggle. 3. Start exhaust fan before PCC handling. 4. Check the quality of PPE periodically by inspection and replace the damaged immediately. 5. Ensure the healthiness of communication facility. 	<p>Shift In-charge/Stock Operator</p>

1	PURPOSE:	OPERATION OF PULPER
2	SCOPE OF APPLICATION:	STOCK PREPARATION and PAPER MACHINE
3	PROCEDURE:	

Task/Activity	Responsibility
<ol style="list-style-type: none"> No person shall be allowed to operate Pulper without proper PPE's such as shoes etc. Only Pulper operator is allowed to operate the Pulper. If any fault is found, shift incharge is to be informed. Rectification of fault and inform service dept. Check the quality of PPE periodically by inspection and ensure replacement of the damaged immediately. Ensure the healthiness of communication facility. 	Shift Incharge/ Operator/

1	PURPOSE	Startup of Approach Flow system, Wire part and Press
2	SCOPE OF APPLICATION	Paper Machine wet end part
3	PROCEDURE	

TASK /ACTIVITY	RESPONSIBILITY
<p>Startup of Approach Flow system</p> <ol style="list-style-type: none"> 1. Check all the pumps delivery, suction valve and sealing water. 2. Fill up silo with fresh water/ back water. 3. Starts Centricleaner screens and vibrating screen. 4. Take wire, press& all dryer section should be in run mode. 5. Start vacuum pump & fan pump. 6. Start 2nd and 3rd cycle and feed pump one by one and check the inlet/outlet pressure. 7. Start machine chest pump. <p>Wire Part startup operation</p> <ol style="list-style-type: none"> 1. Check all the rolls and wire and clean thoroughly 2. Start all the lubrication shower, breast roll shower, trim, and check the nozzle of the all the showers. 3. Check the wire guide unit. 4. Check the dandy roll up position and both side pin should be inserting. 5. Start wire wetting with water hose pipe. 6. Start wire in inching mode. 7. Start wire in wash-up mode. 8. Start wire in running from the clutch. 9. Start wire high pressure shower pump. 10. Check the wire over run position. 11. Start main vacuum pump with the help of Engineering Department <p>Press Part Startup</p> <ol style="list-style-type: none"> 1. Start all the lubrication shower of the felt 2. Check the nozzle of the all the showers. 3. Check the felt guide unit. 4. Start felt wetting from the water hose pipe. 5. Check all UHLE box inlet valve. 6. Remove the 2nd press suction roll holding pin. 7. Start press part in inching mode in open position for five six rounds. 8. Give the press in crawl mode till stock came on the wire. 9. Check the Granite roll doctor blade loading position. 10. Check the felts over run position. 11. Take press part in load mode before lower the pick roll. <p>Start press in running form the clutch</p>	<p>Shift Incharge/Machine Tender/ Wire boy</p>

1	PURPOSE	Startup of Dryer Part, Calendar Section and Pope Reel
2	SCOPE OF APPLICATION	Paper Machine dry end part
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Dryer Part Startup</p> <ol style="list-style-type: none"> 1. Open the entire steam line drain valve and steam trap. 2. Check steam and condensate separator system. 3. Start all the condensate pumps and vacuum receiver pump. 4. Steam valve opened for heating dryers. 5. Check all the screen rolls of the dryer part. 6. Load all the doctor blades. 7. Check the dryer screens guide unit. 8. Start dryer's part in inching mode. 9. Starts all the pocket ventilation system and hood exhaust fans. 10. Check the dryer's rope and rope pulley. 11. Give the dryers part in running mode before stock came on the wire. 12. Check the dryer's screens over run position. 13. Check the condensate removal and D.P. 	<p align="center">Shift Incharge/Back Tender/Assistant Back Tender</p>
<p>Calendar Section and Pope Reel</p> <ol style="list-style-type: none"> 1. Start Paper Machine turbine with help of Mech. After taking clearance from the utility. 2. Start the oil lubrication system by mechanical department. 3. Check all the rolls of the calendar part and clean the rolls with kerosene. 4. Load all the doctor blades. 5. Load all the calendar rolls. 6. Take the calendar part in running mode by clutch. 7. Check the pope reel rope and rope pulley. 8. Load all the doctor blades. 9. Give the pope reel part in running mode by clutch. 	

1	PURPOSE	Startup of Rewinder, unloading reels , changing of knives
2	SCOPE OF APPLICATION	Rewinder Section
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Startup of Rewinder</p> <ol style="list-style-type: none"> 1. Check the availability of air pressure.. 2. Check the all the slitter motor and knife setting. 3. Take the cutting size form the Paper machine shift in charge. 4. Check the jumbo roll gsm and deckle of the roll. 5. Check the proper functioning of emergency interlocking system of machine. 6. Start feeding paper in the winder circuit, putting the core pipe in between the both drum roll and insert the core chuck form both side. 7. Ensure that person feed in paper tail has withdrawn; then Start/speedup rewinder slowly and increase the speed of the rewinder. 8. Start the trim blower for sucking the trim from both ends. 9. Check the proper knife cutting and both side trim. 10. Stop the winder after making set diameter (95-100 cm) 11. Eject the set and recheck all the reels size and cutting of the knife. 12. Assistant operator should mention the following description on the reel side such as lot number, reel number, reel size, date of manufacturing. 13. Again start rewinder for next set. 14. Give the feedback of the parent roll and reel quality to the shift incharge. <p>Unloading reels</p> <ol style="list-style-type: none"> 1. No person shall be allowed to operate without proper PPE's such as shoes. 2. To ensure the reel diameter as per specifications. 3. To ensure person responsible for unloading the reels are properly trained. Ensure no person is present in front of reel unloaded <p>Changing of knives</p> <ol style="list-style-type: none"> 1. Only rewinder operator and mechanical technician allowed for knife changing job. 2. Ensure the bottom slitter motor is in off position. 3. Ensure the effectiveness of communication facility. 	<p>Shift Incharge/3rd hand rewinder operator/4th hand rewinder operator</p>

OPM - Onsite PCC Plant

OPM always believe in innovation and ready to accept new challenges, there by an eco-friendly product was introduced which is a mile stone for a traditional industry like paper and the lost market was recaptured with appreciation. Installed the Precipitated calcium carbonate (PCC) generation plant of annual capacity 7000 MT by trapping CO₂ from AFBC Boiler stack. This lead to an all-around improvement and innovation in business operation by adopting a strategic integration of technology , operation & economy.



View of OPM - Onsite PCC Plant

OPM has had a strong presence in the 'NOTEBOOK – RULEBOOK market. Nearly 45,000 to 50,000MT of the said variety is marketed by the mill in a year and has a USP of 'High Bulk variety. The key property was being maintained by higher percentage of bamboo as the raw material and minimum of loading material like talcum powder.

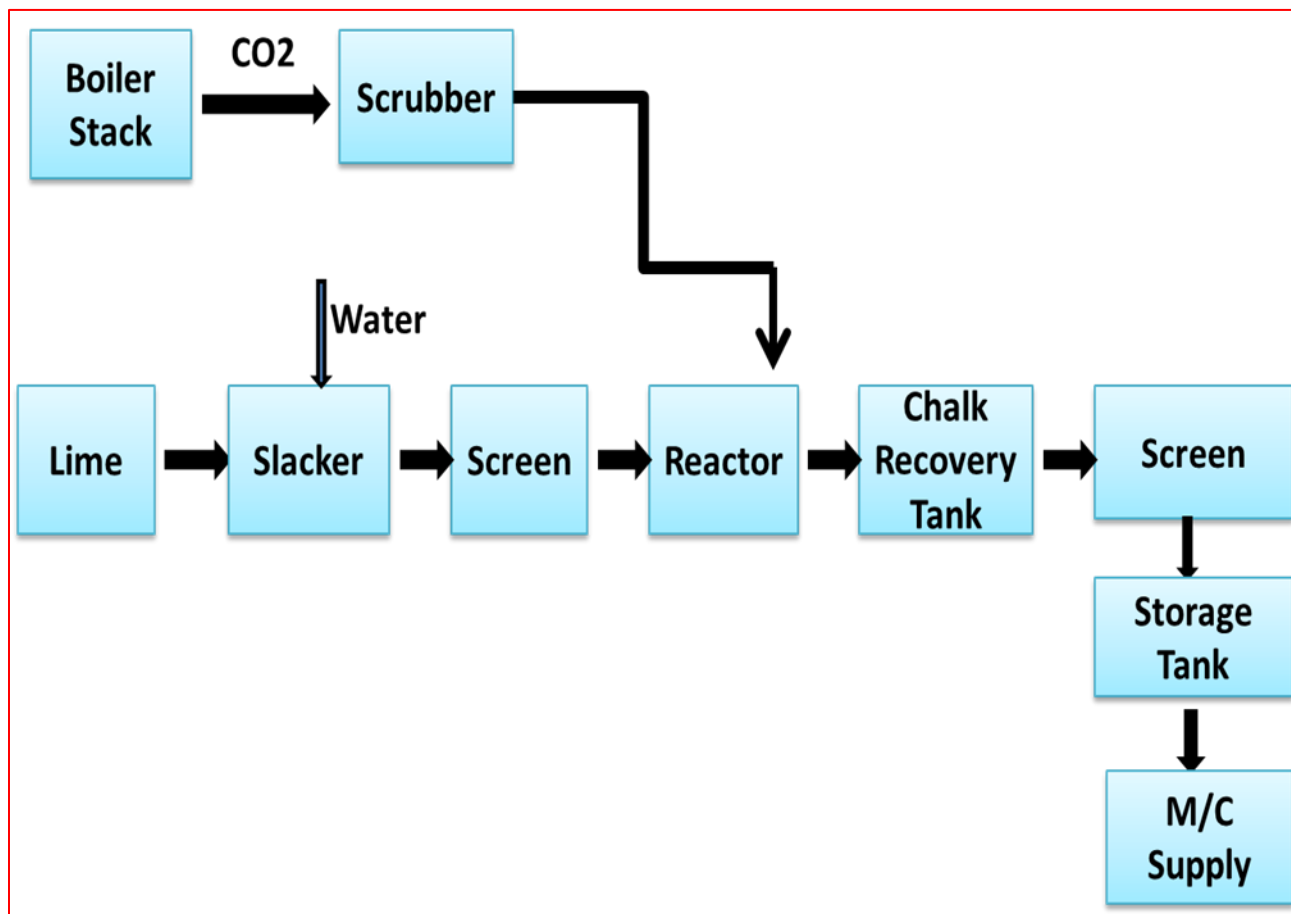
This became a challenge for the organization to maintain cost effectiveness as well as key properties like bulk and brightness. Moreover, due to use of talcum powder there was fugitive emission in the plant which was objected by pollution authorities and employees.

Further the challenge became formidable as the product started loosing market due to high cost and poor appeal.

At this juncture a new filler was introduced in the manufacturing of the product in slurry form which improved the product quality by leaps and bounds .

- A) Improved brightness & appeal
- B) Introduced more filler 12% which led to less consumption of fibers raw material like.
- C) Maintain maximum bulk.
- D) Maintain good strength properties.
- E) Achieve maximum satisfaction from customers & dealer fraternity
- F) Reduce fugitive pollution in the plant which improved employee morale.
- G) It is a part of Clean Development Mechanism Project.

Flow diagram of PCC Plant



Details of Tissue machines # 1 & 2

Particulars	UOM	Tissue M/c #1	Tissue M/c #2
Machine deckle	meter	2.75	2.75
Machine speed	mpm	600	1200
GSM of Paper	g/m ²	12.5 - 28	14.0 – 42.0

TISSUE MACHINE # 01

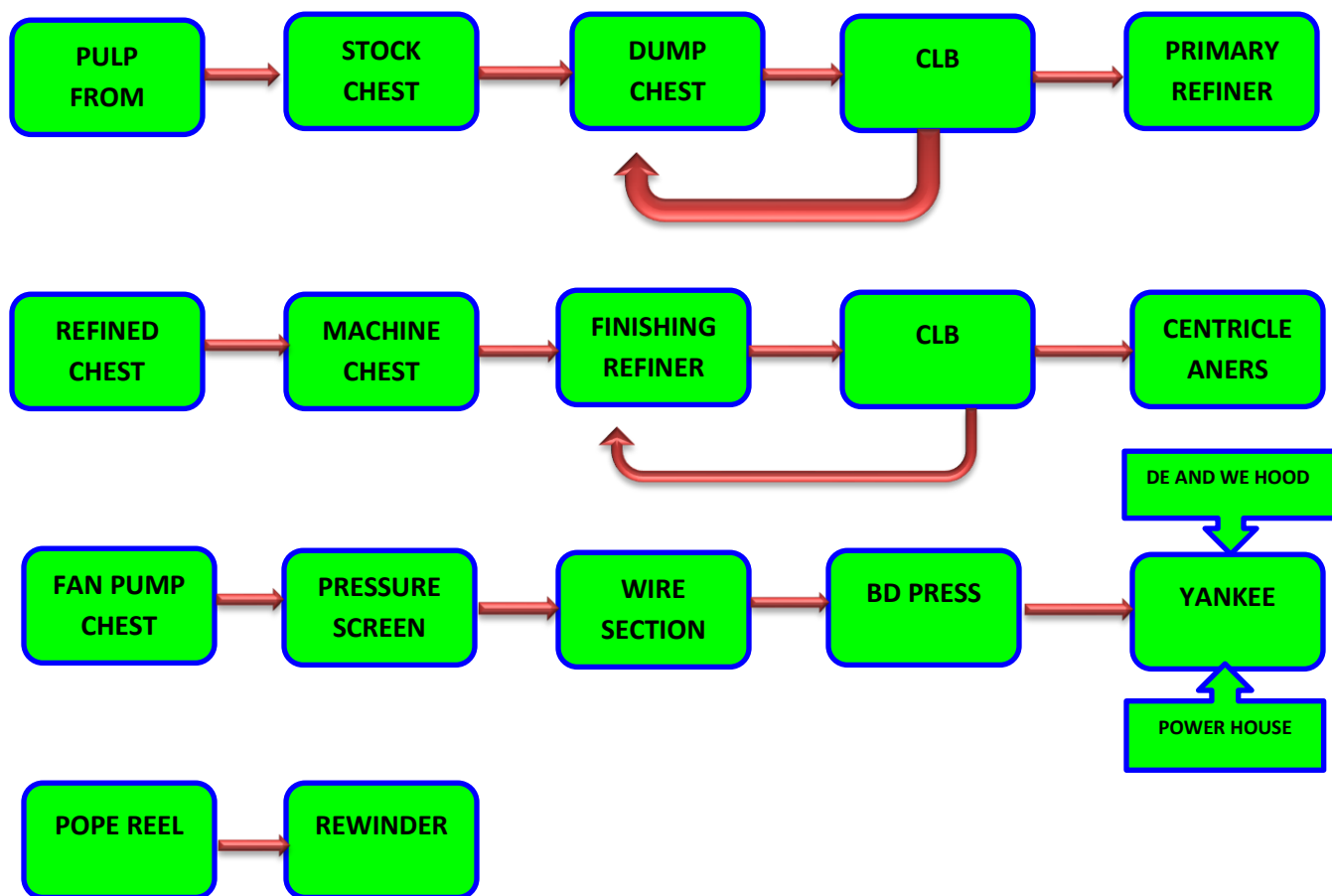


Tissue Machine #1:

This machine is M/s Toscotec Italy make, Suction roll former with inclined wire tissue machine having a capacity of 47 TPD , deckle 2.75 meter Maximum speed 550 MPM with rewinder. This machine rewinder is having the facility to produce three ply paper. Machine is producing the paper in the GSM range of 12.5 to 24 gsm .

Main product of this machine is Napkin ,Toilet and Facial grade paper

TISSUE MACHINE #1 : PROCESS FLOW DIAGRAM

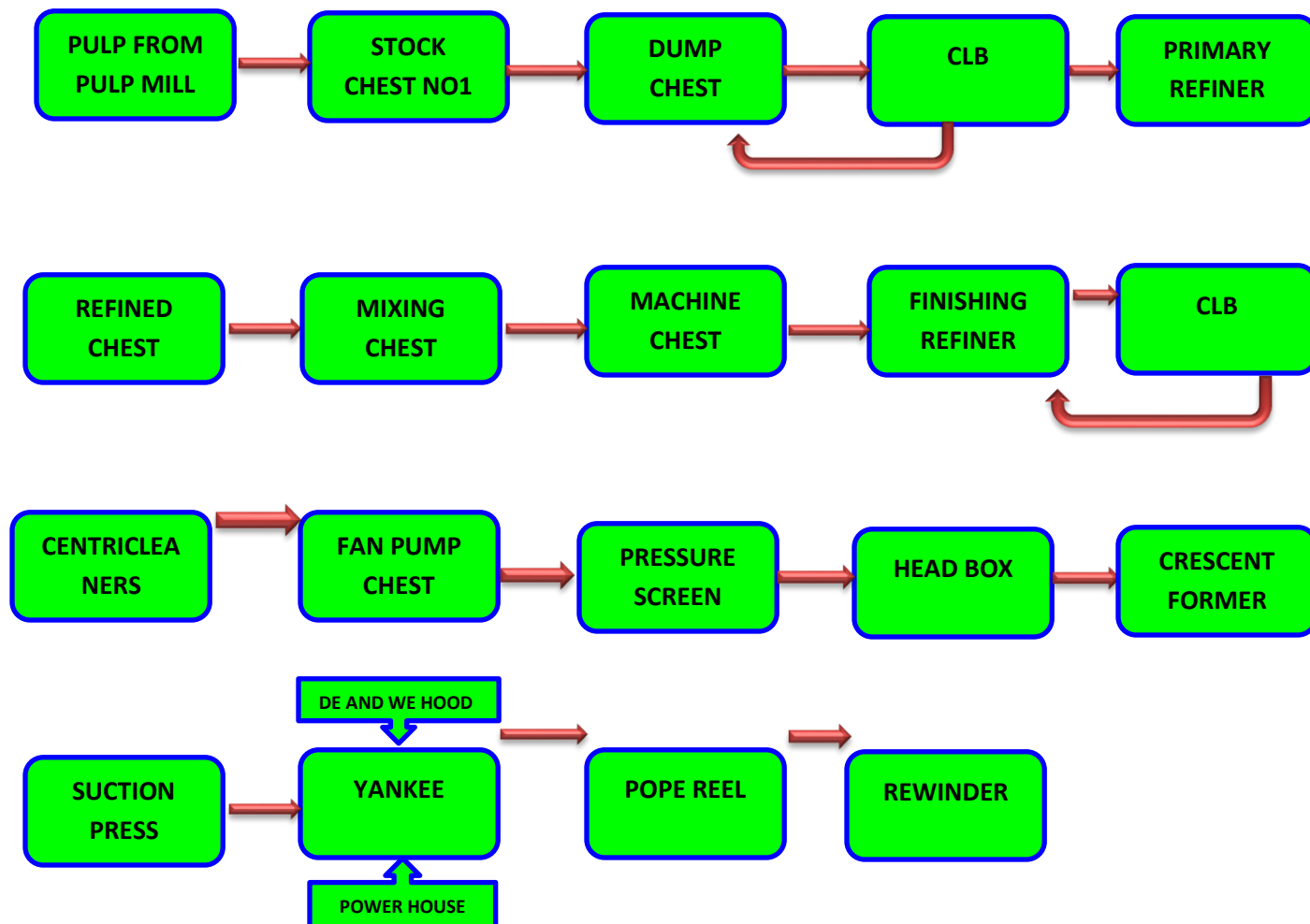



TISSUE MACHINE # 02**Tissue Machine #2:**

This machine is Toscotec Italy make with crescent former tissue machine having a capacity of 59 TPD, deckle 2.75 m. Maximum speed 1200 MPM with two rewinder. Machine is producing the paper in the GSM range of 14.0 to 42 gsm.

Main product of this machine is Napkin, Towel- Maxi Roll, Interfold, HRT, Kitchen Towel, C-Fold, M&N Fold grade paper.

TISSUE MACHINE #2 : PROCESS FLOW DIAGRAM



	PAPER MANUFACTURING PROCESS MANUAL		PAPER DIVISION	
	TISSUE -1&2		DOC No	SOP/ TIS1&2
	MASTER LIST OF SOP		Page No	

S.No	DOC No.	Title of SOP	Rev No	No of Pages
1	SOP/TIS/01	Startup of stock preparation plant- handling of Chemicals, Refiner, Krofta, Vacuum pump and Compressor	00	1
2	SOP/TIS/02	Pulper operation	00	1
3	SOP/TIS/03	Startup of approach flow, Yankee hood heating	00	1
4	SOP/TIS/04	Startup of wire and press section, Startup of Yankee, Startup of Pope reel	00	1
5	SOP/TIS/05	Paper feeding from Yankee to pope reel, Changing of Yankee , Cleaning Yankee spray nozzles	00	1
6	SOP/TIS/06	Startup of Rewinder	00	1

1	PURPOSE	Startup of Stock Preparation Plant
2	SCOPE OF APPLICATION	Stock Preparation Plant
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<ul style="list-style-type: none"> Take the clearance from all the engineering departments & utility. Start air compressor. Check all the system from process side. Closed the entire pumps and chests drain valve. Check all interlocks in DCS Start water system in auto start sequence or manually. Open all the sealing water of the agitator and pump as per requirement then Start the all agitator of the chest. Start krofta, and dilution pumps. Start pulp drawing from Stock chest-1. And fill up the thickened (dump) stock chest. Starts required refiners in system. And fill up refined, mixing and machine chests. Maintained consistency as per requirement. Keep ready the entire chemical additive for the mixing chest in the pulp to machine <p>Chemical Handling.</p> <ul style="list-style-type: none"> No person shall be allowed to handle acidic, alkali and slurry without proper PPE's such as shoes, helmet, dust mask, goggles etc. No person shall be allowed to prepare and storage caustic solution without PPE's as above. Check the quality of PPE periodically by inspection and replace the damaged immediately. Ensure proper dilution of chemicals as per requirement. Check all the drain and control valve. Ensure no leakage and spirit of chemicals during handling & preparation. Ensure proper safety and housekeeping. 	<p>Shift In charge/Stock Operator/Assistant operator</p>

TASK/ACTIVITY	RESPONSIBILITY
<p><u>Vacuum pump and compressor</u></p> <ul style="list-style-type: none"> • Inform Electrical/Mechanical department in case of high noise coming from bearing shaft, motor joints, gear box etc. • Specific noise monitoring to be done. • Start the equipment's and checks all the process parameter. • Air and oil filter of Compressor to check periodically. <p><u>Refiner:</u></p> <ul style="list-style-type: none"> • Ensure refiners are unloaded condition before startup of refiner. • Ensure refiner should be flushed and sealing water to open. • Ensure all operating valves should be in proper position <p>Krofta</p> <ul style="list-style-type: none"> • Open the all drain valves of krofta before cleaning • Clean the krofta properly with water hose and chemicals. • Clean the krofta strainers and check thoroughly. • Close all drain valve of krofta. • Start the krofta water feed pump. • Start the air dissolving tube pump and maintain the pressure 5 to 6 kg/ cm² • Open the air in Air Dissolving Tank and start chemical dosing pump at the rate of 0.3 to 1.2 kg /hour (as per process requirements). 	<p>Shift In-charge/Machine Tender/Assistant</p>

1	PURPOSE	Broke and pulp slushing (Pulp Operation)
2	SCOPE OF APPLICATION	Tissue-1&2 wet end part
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<ul style="list-style-type: none"> Only operator/ assistant. Operators are allowed to operate the pulper. Check the interlocks and air pressure availability Cheek the valves and close the drain after cleaning. Start the back water pump for dilution and fill the pulper from 40 to 50% Start the pulper agitator and back water for pulp (broke) dilution. Feed the broke or pulp for slushing and slushed the pulp in consistency of 3 to 5.5 % for half an hour. Transfer the slushed pulp in proper chest. Mix the slushed pulp in mixing chest with proper ratio as per process requirement) Ensure proper safe work and housekeeping. 	<p>Shift In-charge/Machine Tender / Assistant operator</p>

1	PURPOSE	Heating of Yankee, Startup of approach flow system
2	SCOPE OF APPLICATION	Tissue-1&2
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Heating of Yankee</p> <ul style="list-style-type: none"> Only machine tender/ assistant operator are allowed to operate the steam & condensate valve with proper PPE's and tools. Check the interlocks and air pressure availability Check the Steam line traps and steam header / separator tanks drain, before charging the steam from power house. Close the all drain v/v after charging the steam and increase the steam pressure from 0.5 to 20 kg / cm² gradually Ensure leakage in valve plugged properly. Take the steam to Yankee and hood for paper drying as per process requirement. Ensure work with proper safety. <p>Startup of Approach Flow system</p> <ul style="list-style-type: none"> Start air compressor. Check all the system from process side. Closed all the pumps and chests and silo drain valve. Fill up wire pit 1 with fresh water/ back water. Check all the pumps delivery, suction valve and sealing water. Check all interlocks in DCS. Put auto start sequence in on mode. Start centricleaners Start pressure screens, dilution fan pump and after ensuring Wire part in running position. Start mc chest pump along with finishing refiner and maintain basis weight v/v opening according paper gsm. <p>Yankee Hood Heating (Drying)</p> <ul style="list-style-type: none"> Start auto hood heating sequence. Check interlocks in DCS. Start Yankee dry and wet hood fans. Start hood exhaust fan. Maintain hood temp at 170° to 200°C as per process requirement (Auto/Manually) Close the hood after taking paper at Yankee. Ensure periodically fluff cleaning. 	<p>Shift In-charge/Machine Tender/ Assistant Operator</p>

1	PURPOSE	Startup of Wire and press part
2	SCOPE OF APPLICATION	Tissue-1&2
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Startup of Wire and press part</p> <ul style="list-style-type: none"> Start air compressor. Start DC cooling motor. Start lubrication unit. Start all the lubrication shower and cleaning showers. Check the wire and press part guide unit. Start wire/press wetting with the water hose pipe. Start wire/press in jogging mode, for cleaning and checking thoroughly Start wire/press in crawl mode. Load all rolls doctor blades and start oscillation. Start wire/press in running at 200 m/min Start high pressure showers oscillation. Start wire/press HP shower pump. Put vacuum pump Auto start sequence in on mode. Check the wire/press over run position. Speed up to 350 m/min and load the press. Speed up to required machine speed <p>Startup of Yankee</p> <ul style="list-style-type: none"> Start air compressor. Check and open all manual steam valves. Start DC cooling and lubrication unit. Ensure inlet steam header pressure is 18 kg/cm² and temp is 220°C. Check interlock in DCS. Start Yankee in crawl mode. Open Yankee heating/warming valve and start Yankee in auto warming sequence to get Yankee temp 105°C.(Warming 1st phase) Start thermo compressor and close manual warming valve to get Yankee temp 127°C.(Warming 2nd phase) Start Yankee in run mode. Load Yankee cleaning and creping doctor blade. Speed up to 350 mpm and load the press. <p>Startup of Pope Reel</p> <ul style="list-style-type: none"> Check the all interlocks in DCS. Start air compressor. Start DC cooling motor. Start pope reel hydraulic unit. Load pope reel doctor blade. Start pope reel in crawl mode. Start pope reel in run mode. Start primary arm spool starter unit for taking empty spool at pope reel. 	<p>Shift Incharge/Machine Tender/Assistant</p>

1	PURPOSE	Paper feeding from Yankee to pope reel, Yankee Cleaning, boom shower spray nozzles & filter cleaning
2	SCOPE OF APPLICATION	Tissue-1&2
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Paper feeding from Yankee to pope reel</p> <ul style="list-style-type: none"> No person shall be allowed, without proper PPE's such as shoes, helmet, ear plug, dust mask etc. Startup the pope reel after getting clearance from all engineering dept. Only Machine tender and assistant is allowed for paper feeding job. <p>Yankee cleaning</p> <ul style="list-style-type: none"> Only Machine tender and assistant is allowed to change doctor blades. Inform regarding fault if any, conveyed to shift engineer/services department. Check the quality of PPE periodically by inspection and replace the damaged immediately. <p>Yankee boom shower spray nozzles & filter. cleaning</p> <ul style="list-style-type: none"> Stop coating chemical dosing pump To open filter and cleaned. To open shower nozzles and cleaned properly. Flush the shower properly. Fit back filter and nozzles. Start the coating chemical dosing pump and Set right the process parameter. 	<p>Shift Incharge/Machine Tender/ Assistant</p>

1	PURPOSE	Rewinder operation
2	SCOPE OF APPLICATION	Tissue-1&2
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<ul style="list-style-type: none"> Start rewinder DC cooling duct motor. Start air compressor. Start winder hydraulic unit and check the pressure. Check the interlocks and all safety measures. Check the all the slitter and knife setting. Take the cutting size arrangement form the machine shift in charge. Keep ready cutting core pipe as per size requirement. Check the jumbo roll number, gsm and deckle of the roll. Start feeding paper in the winder circuit in crawl mode and put the core pipe in between the both drum roll and insert the core chuck form both side with safety. Load the unloader unit. Start/speedup rewinder slowly and increase the speed of the rewinder. Start the trim blower for sucking the trim from both ends. Check the proper knife cutting, reel quality and both side trim. Enter required reel diameter set point in winder control system. Eject the set and recheck all the reel size and cutting of the knife. Write the gsm, reel size and lot number on each reel face in local market order only or as per instruction. Again start rewinder for next set. Ensure periodically fluff cleaning. Only Rewinder operator is allowed to setting the knives job. Check the knife holders in safe mode. Check the quality of PPE periodically by inspection and ensure to replace the damaged immediately. 	<p>Shift In-charge/rewinder operator /Assistant operator</p>

Tissue Machine #3:

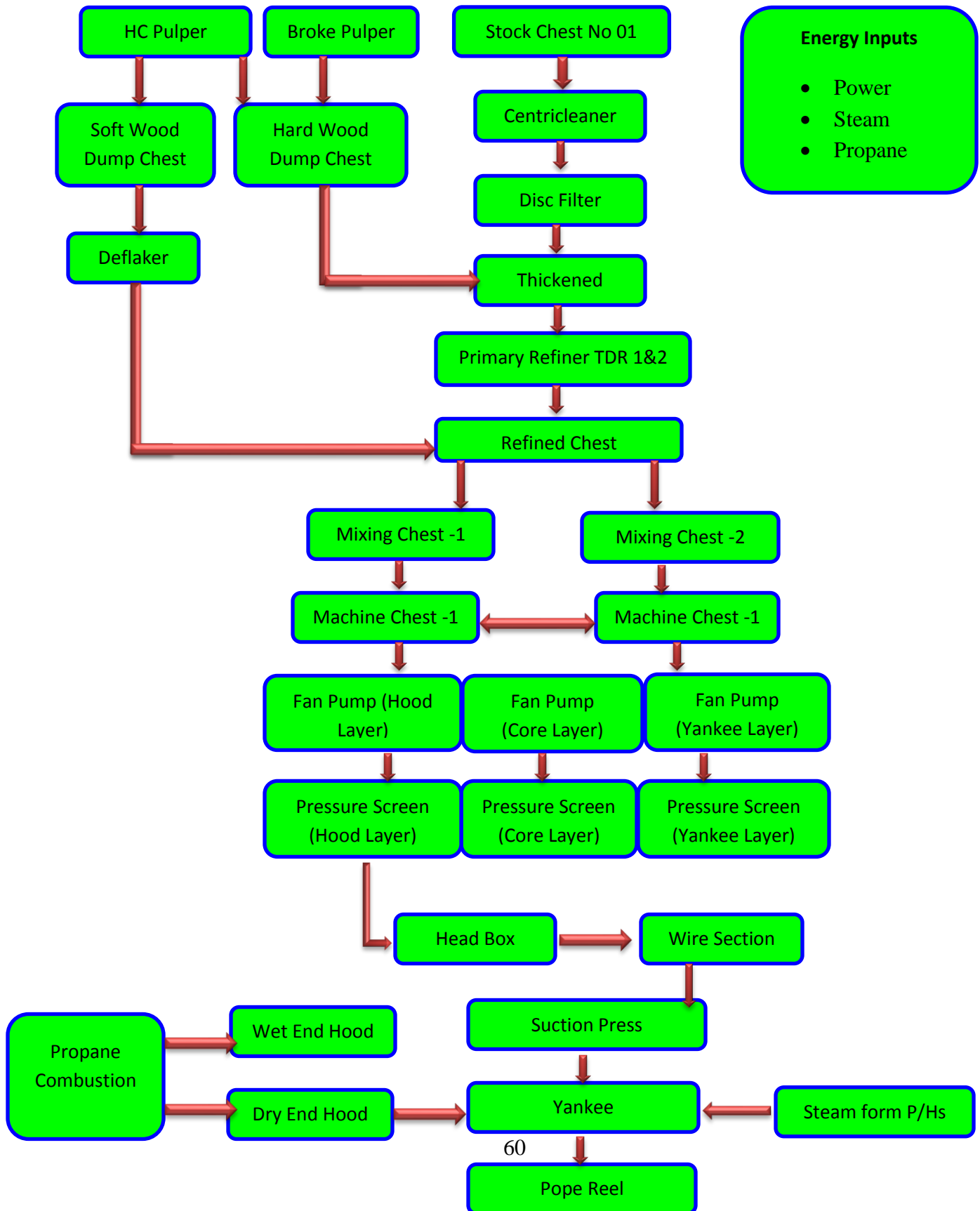
This is Valmet machine and commissioned in year 2017. Machine is with crescent former having a capacity of 90 TPD , deckle 2.70 meter Maximum speed 1800 MPM with two rewinder. Machine is producing the paper in the grammage range of 12.5 to 19 gsm .


Main product of this machine is Facial & Toilet grade paper.

Particulars	UOM	Tissue M/c #3
Machine deckle	meter	2.75
Machine speed	mpm	1800
GSM of Paper	g/m ²	12.5-19



TISSUE MACHINE #3 : PROCESS FLOW DIAGRAM



	PAPER MANUFACTURING PROCESS MANUAL		PAPER DIVISION	
	TISSUE -03		Doc No	SOP/ TIS 03
	MASTER LIST OF SOP		Page No	1 of 1

Sr. No	SOP No.	Title of SOP	Rev No	No of Pages
1	SOP/TIS 03/01	Startup of stock preparation plant- Refiner, Vacuum pump and Compressor ,Krofta	00	1
2	SOP/TIS 03/02	Pulper operation	00	1
3	SOP/TIS 03/03	Startup of approach flow, Yankee hood heating , combustion of propane gas.	00	1
4	SOP/TIS 03/04	Startup of wire and press section, Yankee, Pope reel	00	1
5	SOP/TIS 03/05	Paper feeding from Yankee to pope reel, Changing of Yankee doctor blade ,Cleaning Yankee spray nozzles	00	1
6	SOP/TIS 03/06	Startup of Rewinder , Setting the knives of required size	00	1

1	PURPOSE	Startup of Stock Preparation Plant
2	SCOPE OF APPLICATION	Stock Preparation Plant
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<ul style="list-style-type: none"> Take the clearance from all the engineering departments & utility. Start air compressor. Check all the system from process side. Closed the entire pumps and chests drain valve. Check all interlocks in DCS Start water auto start sequence. Open all the sealing water of the agitator and pump as per requirement then start all agitator of the chest. Start DISC Filter, dilution pump and all Centricleaner. Start pulp drawing from Stock chest-1. And fill up the thickened stock chest. Start required refiners in system and fill up refined, mixing and machine chests. Maintain consistency as per requirement. Keep ready the required chemical additive for the pulp to mix properly in mixing chest. <p><u>Vacuum pump and compressor</u></p> <ul style="list-style-type: none"> Inform Electrical/Mechanical department in case of high noise coming from bearing shaft, motor joints, gear box etc. Specific noise monitoring to be done. Start the equipment's and checks all the process parameter. Air and oil filter of Compressor to check periodically. <p><u>Refiner:</u></p> <ul style="list-style-type: none"> Ensure refiners are unloaded condition before startup of refiner. Ensure refiner should be flushed and sealing water to open. Ensure all operating valves should be in proper position <p><u>Krofta Operation</u></p> <ul style="list-style-type: none"> Open the all drain valves of krofta before cleaning Clean the krofta properly with water hose and chemicals. Clean the krofta strainers and check thoroughly. Close all drain valve of krofta. Start the krofta water feed pump. Start the air dissolving tube pump and maintain pressure 5 to 6 kg/cm² Open the air in Air Dissolving Tank and start chemical dosing pump at the rate of 0.3 to 1.2 kg/hour (as per process requirements). 	<p>Shift In charge/Stock Operator/Assistant operator</p>

1	PURPOSE:	OPERATION OF PULPER
2	SCOPE OF APPLICATION:	STOCK PREPARATION
3	PROCEDURE:	

Task/Activity	Responsibility
<ul style="list-style-type: none"> Only operator/ Assistant operators are allowed to operate the pulper. Check the interlocks and air pressure availability Check the valves and close the drain after cleaning. Start the back water pump for dilution and fill the pulper from 40 to 50% Start the pulper agitator and back water for pulp (broke) dilution. Feed the broke or pulp for slushing and slushed the pulp in consistency of 3 to 5.5 % for half an hour. Transfer the slushed pulp in proper chest. Mix the slushed pulp in mixing chest with proper ratio(as per process requirement) Ensure proper safe work and housekeeping. 	<p>Shift In-charge/ Operator/ Safety Officer</p>

1	PURPOSE	Startup of Approach Flow system, Yankee Hood Heating, Hood heating by combustion of propane gas
2	SCOPE OF APPLICATION	Tissue 3 wet end part
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Startup of Approach Flow</p> <ol style="list-style-type: none"> 1. Start air compressor. 2. Check all the system from process side. 3. Close all the pumps and chests drain valve. 4. Fill up wire pit 1 with fresh water/ back water. 5. Check all the pumps delivery, suction valve and sealing water. 6. Check all interlocks in DCS. 7. Put auto start sequence in on mode. 8. Start pressure screens, dilution fan pump and all three fan pumps after ensuring Wire part in running position. <p>Yankee Hood Heating</p> <ol style="list-style-type: none"> 9. Take clearance from Propane gas station. 10. Start auto hood heating sequence. 11. Check interlocks in DCS. 12. Check and open manual valve of propane gas at machine end. 13. Open propane gas supply valve from propane gas station and maintain gas pressure at 1.5 kg/cm². 14. Start propane gas burners for combustion. 15. Maintain hood temp at 210°C. 16. Close the hood after taking paper at Yankee. <p>Hood heating by combustion of propane gas</p> <ol style="list-style-type: none"> 17. Only machine operator / assistant is allowed to open the propane gas valve 18. Maintain inlet pressure 1.5 kg/cm² by adjusting control valves from propane gas station operator 19. Maintain good housekeeping to avoid fire hazard 20. 	<p>Shift Incharge/Machine Tender /Assistant Operator</p>

1	PURPOSE	Startup of Wire and Press section, Yankee, Pope reel
2	SCOPE OF APPLICATION	Tissue 3
3	PROCEDURE	

TASK/ACTIVITY	RESPONSIBILITY
<p>Startup of Wire and Press Section</p> <ol style="list-style-type: none"> 1. Start DC cooling motor. 2. Start lubrication unit. 3. Start all the lubrication shower and cleaning showers. 4. Check the wire and press part guide unit. 5. Start wire/press wetting with the water hose pipe. 6. Start wire/press in jogging mode, for cleaning and checking thoroughly 7. Start wire/press in crawl mode. 8. Load all rolls doctor blades and start oscillation. 9. Start wire/press in running at speed of 200 mpm 10. Start high pressure showers oscillation. 11. Start wire/press HP shower pump. 12. Put vacuum pump auto start sequence in on mode. 13. Check the wire/press over run position. 14. Speed up to 350 mpm and load the press. <p>Startup of Yankee</p> <ol style="list-style-type: none"> 1. Check and open all manual steam valves. 2. Start DC cooling and lubrication unit. 3. Insure inlet steam header pressure is 18 kg/cm² and temp is 220°C. 4. Check interlock in DCS. 5. Start Yankee in crawl mode. 6. Open Yankee heating/warming valve and start Yankee auto warming sequence to get Yankee temp 105°C.(Warming 1st phase) 7. Start thermo-compressor and close manual warming valve to get Yankee temp 127°C.(Warming 2nd phase) 8. Start Yankee in run mode. 9. Load Yankee cleaning and creping doctor blade. <p>Speed up to 350 mpm and load the press.</p> <p>Startup of Pope Reel</p> <ol style="list-style-type: none"> 1. Take the clearance from all the engineering departments. 2. Check the interlocks in DCS. 3. Start air compressor. 4. Start DC cooling motor. 5. Start pope reel hydraulic unit. 6. Load pope reel doctor blade. 7. Start pope reel in crawl mode. 8. Start pope reel in run mode. <p>Start primary arm spool starter unit for taking empty spool at pope reel.</p>	<p>Shift Incharge/Machine Tender/Assistant</p>

1	PURPOSE:	FEEDING OF PAPER FROM YANKEE TO POPE REEL
2	SCOPE OF APPLICATION:	TISSUE-3
3	PROCEDURE:	

Task/Activity	Responsibility
FEEDING PAPER FROM YANKEE TO POPE REEL <ul style="list-style-type: none"> No person shall be allowed to operate without proper PPE's such as shoes, helmet, dust mask etc. Only m/c tender and assistant is allowed for paper feeding. 	Manager/ Shift Incharge/ Operator

CHANGING YANKEE DOCTOR BLADES

- No person shall be allowed to operate without proper PPE's such as shoes, asbestos hand gloves, dust mask etc.
- Only m/c tender and assistant is allowed to change doctor blades.
- If any fault is found, shift incharge, supervisor to be informed.
- Information regarding fault if any, conveyed to shift engineer/services department.

CLEANING YANKEE SPRAY NOZZLES

- Only operator/ assistant operators are allowed to operate the pulper.
- Check the interlocks and air pressure availability
- Check the valves and close the drain after cleaning.
- Start the back water pump for dilution and fill the pulper from 40 to 50%
- Start the pulper agitator and back water for pulp (broke) dilution.
- Feed the broke or pulp for slushing and slushed the pulp in consistency of 3 to 5.5 % for half an hour.
- Transfer the slushed pulp in proper chest.
- Mix the slushed pulp in mixing chest with proper ratio(as per process requirement)
- Ensure proper safe work and housekeeping.

TASK/ACTIVITY	RESPONSIBILITY
<p>STARTUP OF REWINDER</p> <ul style="list-style-type: none"> • Take the clearance from all the engineering departments. • Start rewinder DC cooling duct motor. • Start air compressor. • Start winder hydraulic unit. • Check the interlocks. • Check the all the slitter and knife setting. • Take the cutting size form the machine shift in charge. • Keep ready cutting core pipe as per size requirement. • Check the jumbo roll gsm and deckle of the roll. • Start feeding paper in the winder circuit and putting the core pipe in between the both drum roll and insert the core chuck form both side. • Start/speedup rewinder slowly and increase the speed of the rewinder. • Start the trim blower for sucking the trim from both ends. • Check the proper knife cutting and both side trim. • Enter required reel dia. set point in winder control system. • Eject the set and recheck all the reels size and cutting of the knife. • Write the gsm, reel size and lot number on the each reel face in local market order. • Again start rewinder for next set. • Give the feedback of the parent roll and reel quality to the shift incharge <p>SETTING THE KNIVES TO REQUIRED SIZE</p> <ul style="list-style-type: none"> • No person shall be allowed to operate without proper PPE's such as shoes, dust mask etc. • Only winder operator / assistant is allowed to change and setting the knives. • Check the quality of PPE periodically by inspection and replace the damaged immediately 	<p>Shift Incharge/Back Tender/Assistant back Tender</p>

REWINDER'S



Main Machine



Tissue #01




Tissue #02



Tissue #03

Finishing House



	PAPER MAKING PROCESS MANUAL		PAPER DIVISION	
	DEPARTMENT: FH PLANT		Doc No	SOP/ FH
	MASTER LIST OF SOP		Page No	1 of 1

Sr. No	SOP No.	Title of SOP	Rev No	No of Pages
01	SOP/FH/01	OPERATION OF SHEET CUTTER AND SHEET FINISHING.	00	1
02	SOP/FH/02	PROCESS OF REEL PACKING, REEL WEIGHMENT	00	1
03	SOP/FH/03	OPERATION OF ELEVATOR (LOWERATOR).	00	1
04	SOP/FH/T/01	PROCESS OF REEL PACKING IN TISSUE PLANT	00	1

1	PURPOSE:	Run Cutter in safe way
2	SCOPE OF APPLICATON:	CUTTER SECTION
3	PROCEDURE:	

Task/Activity	Responsibility
<p>OPERATION OF SHEET CUTTER</p> <ul style="list-style-type: none"> • Before starting the machine check around the machine for any abnormality i.e. opens the guard, loose connection etc. • Check emergency switch is in active position. • Give clearance to all before starting the machine. • Take precaution before loading & unloading reels by load lifter. • Passage to be cleared around the machine. • Machine tools to be kept in tool box. • Empty core to be placed in core pipe area. • Keep place neat & clean for safety purpose. <p>SHEET FINISHING</p> <ul style="list-style-type: none"> • All information to be taken from sheet cutter log book by Shift-Incharge such as quality, size, gsm approximate quantity of paper – Checker will make summary report of paper to be finished lying in the floor. • Shift-Incharge will cross check both the sheet cutter report & summary report with the marketing programme. • Summary report is made for final label printing after checking standard ream weight by the checker. • Checkers check the reams before packing & make order ream's label for final packing. • After pasting the label on the reams checkers check randomly before sending to the godown. If there is any defect found it is kept for further reprocess. 	<p>Asst. Manager & Shift Incharge</p>

1	PURPOSE:	Systematic way and defect free reel packing
2	SCOPE OF APPLICATION:	FINISHING HOUSE - REEL PACKING SECTION
3	PROCEDURE:	

Task/Activity	Responsibility
<p>SOP FOR REEL PACKING & DELIVERY</p> <ul style="list-style-type: none"> Reels passed by Quality Control Laboratory for direct packing are to be kept size wise in reel packing area. Check size of the reel randomly lying for packing. Reels to be wrapped with wrapper before machine packing. Kraft paper wrapped reels to be carried out on packing machine. Corrugated discs of suitable diameter are to be kept on adjacent sides of reels then reel core plugs to be inserted on both sides. Reel to be wrapped with stretch film by the machine as per norms. Stretch wrapped reel to be carried out for weighment. After reel weighment, reel sticker label to be pasted with the all details. Weighed reels to be noted on register with the details. Weighed reels to be delivered to godown. Reel weighed register to be handed over to concerned department supervisor for SAP posting <p>SOP FOR REEL WEIGHMENT</p> <ul style="list-style-type: none"> Check the weighing machine with standard weight before weighment of the reels. If any variation observed correct it by scale calibration with concerned person. Ensure '0' value on display on the scale before weighing the reels. Keep the reel on the center of weighing machine to obtain the correct value. <p>Write the display value on the reel before delivered to godown</p>	<p>Shift incharge</p>

1	PURPOSE:	OPERATION OF ELEVATOR
2	SCOPE OF APPLICATION:	FINISHING HOUSE
3	PROCEDURE:	

Task/Activity	Responsibility
<ul style="list-style-type: none"> Elevator to be run by only authorized person. Before lowering the materials check the capacity of elevator. Before start check all the materials inside the elevator. All guards to be closed before start the elevator. Check emergency switch is in active position. Check proper lighting is there in the elevator. Proper up & down marking on the switch in the elevator If abnormalities found to be informed to concern shift Incharge. 	Shift incharge

1	PURPOSE:	DEFECT FREE REEL PACKING IN SYSTEMATIC WAY
2	SCOPE OF APPLICATION:	TISSUE PLANT FINISHING HOUSE
3	PROCEDURE:	

Task/Activity	Responsibility
<ul style="list-style-type: none"> Reels passed by Quality Control Laboratory for direct packing are to be kept size wise in reel packing area Check size of the reel randomly lying for packing. Reels to be packed with needful packing materials. As per order reels to be packed by manually or by packing machine. After packing the reels, identification details to be displayed on the reel by reel label. Reels are recorded in reel register with weight & delivered to godown. Reels delivered to godown are checked with rewinder generation for cross checking. 	Shift Incharge

Research and Development and Quality Assurance System (QAS)

Research and Development:

R & D team in Orient Paper Mills, Amlai is one of the strongest wing and plays an important role in giving an edge over the competitors. Some believe in miracles, but good results are more often the outcome of Innovation & creativity. Breakthroughs that revolutionize an industry do not happen overnight and cannot be realized within a year like "Rome was not built in day". Someone needs to initiate/ kick-off this process. Creating an effective and productive Research team requires constant thinking, planning & focus on Continual Improvement Plans.

Orient Paper Mills, Amlai - Research and Development Lab is first lab which is NABL Accredited lab in India for waste water testing.

Orient Paper Mills, Amlai- Research and Development Lab is recognised from Department of Scientific and Industrial Research (DSIR) Government of India- Ministry of Science and Technology Delhi.

R & D team constitute in Orient Paper Mills, Amlai with following features:

1. Balanced teams.
2. Clearly defined goals and roles.
3. Regular and open discussions.
4. Good communication skills.
5. Openness to change.
6. Prior successful collaborations & readiness.
7. Technological readiness for remote teamwork.
8. Trained experienced leadership.
9. Adequate administrative resources and services.
10. Effective brainstorming strategies.
11. Working on cost reduction initiatives.
12. 100% Results deliverance.

Quality Assurance System (QAS):

Quality Assurance Department of Orient Paper Mills, functions as an aspect of quality management focused on providing confidence that quality requirements will be fulfilled. The confidence provided by the department is twofold- internally to management and externally to customers. Quality assurance department essentially contributes to a host of benefits- including reduced cost, increased efficiencies and ultimately greatly enhanced customer satisfaction.

Working principle is based on providing solutions and tools needed to effectively manage quality assurance objectives at every point in the supply chain- from initial evaluation to final product. The QAS team monitors all the systems and sub-system in the production cycle for error or defects so that the finished products are consistently of the highest quality. The department keeps keen focus on maintaining customer trust by instilling confidence that all regulations and standards are met across the board.

Customer visit at their sites for an strong interaction to understand their requirement and accordingly ensure the final product (Tissue paper, writing & Printing paper) as per the customer requirements.



RESEARCH & DEVELOPMENT



QUALITY ASSURANCE SYSTEM (QAS)

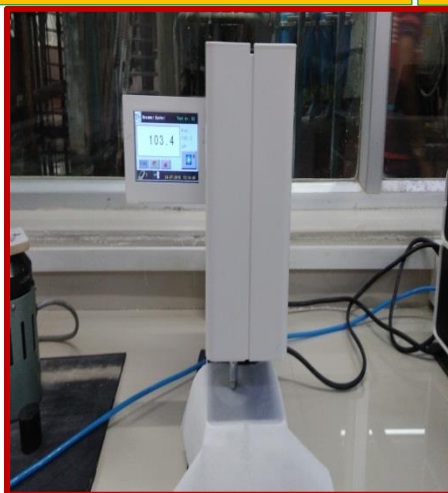


Sophisticated Imported lab equipment

Tensile tester (TMI USA)



Thickness tester (TMI USA)



Brookfield Viscometer (USA)



Konica Minolta Brightness Tester (Japan)



Digester for Pulping Study



QAS department has its own designed system of sampling and testing procedures based on ISO and Tappi right from incoming raw materials, pulp mill samples to finished product.

Sample	Sampling Source	Test Parameters	Test Reference
RAW MATERIAL			
Fibrous Raw Material	Yard	Moisture Content	--
Non-Fibrous	Store	Parameters	IS,TAPPI,
INTERMEDIATE PROCESS TESTING			
2nd Press Pulp	Pulp Mill	Brightness (%), Consistency (%), Alkali Loss Kappa Number	ISO-2470-2 T-240-OM-02 CLTPP03 T-236-OM99
3rd Press Pulp	Pulp Mill	Consistency (%), Alkali Loss	T-240-OM-02 CLTPP03
4th Press Pulp	Pulp Mill	Brightness (%), Consistency (%), Alkali Loss, Kappa Number, Viscosity	ISO-2470-2 T-240-OM-02 CLTPP03 T-236-OM-99 T-203-OM-99
CD, Eop Pulp	Pulp Mill	Brightness (%)	ISO-2470-2
Hypo Pulp	Pulp Mill	Brightness (%)	ISO-2470-2
ClO ₂ Pulp	Pulp Mill	Brightness (%),	ISO-2470-2
		Viscosity	T-203-OM-99
Mill Water	C.Lab	pH, Conductivity, Total Hardness, Calcium Hardness, M. Alkali, Silica content, Turbidity	IS-3025
White Liquor	Pulp Mill , Soda Recovery	TTA, TAA, NaOH, Na ₂ S, Sulphidity (%), Causticity (%), Efficiency (%)	T-624-CM-00
Black Liquor	Pulp Mill , Soda Recovery	Residual Active Alkali, Twaddle, Suspended solid	T-625-TS-64
Caustic , Hypo	Pulp Mill	Strength (gpl), Suspended solid	T-624-CM-00

FINISHED PRODUCT			
Writing & Printing Paper	Machine parent roll	GSM	T-410-OM-2
		Caliper Bulk Breaking Length Tear Factor Burst Factor Ash Smoothness Wax Pick	T-411-OM-97 T-411-OM-97 T-404-CM-92 T-414-OM-98 T-403-OM-02 T-413-OM-02 SCAN-P-84-02 T-459-OM-02
Tissue Paper	Machine parent roll	GSM	T-410-OM-2
		Caliper Bulk Breaking Length Wet Strength Water Klemn	T-411-OM-97 T-411-OM-97 T-404-CM-92 T-456-OM-03
Finish House	Cutter, Finishing	GSM,	T-410-OM-2
		Shade, Size, Sheet Count, sheet finishing, ream weight	--

Captive Power Plant

Captive power plant of 55 MW state of art Cogeneration plant was installed in year 2012 with AFBC Coal fired boiler, of pressure 88 bar & capacity as 150 tph steam generation with Two (2) Siemens make Turbo-generators with capacity as 25 MW and 30 MW respectively supplied by M/s Thermax



Effluent Treatment Plant

The company has taken utmost care to mitigate the impact of Industrial & Domestic effluent by installation of an advanced Effluent Treatment Plant (ETP) having a capacity of 20500 m³ /day and consisting Primary, Secondary and Tertiary treatment process, so as to get the treated effluent quality reusable in the HRTS land application, Ash quenching, wood washing, gardening & plantation purpose. Thus the entire treated effluent is reused which result in **“Zero Liquid discharge”** to river Sone. It is worth mentioning here that treatment of effluent is not only statutory requirement but it is an important objective of our Environmental Policy.

- ✓ **ETP up-gradation by installation of equalization tank with state of art of diffused aeration system.**
- ✓ **Installation of new aeration tank with fine air bubbles diffusers**
- ✓ **Installation of On-line stack, Ambient and Effluent monitoring system.**
- ✓ **Development of HRTS site with green belt for utilization of treated effluent and reduction of carbon foot print.**
- ✓ **Reduction in water consumption to < 50 mt/t of paper.**

Achieved Zero Discharge of Effluent into the river:

Orient Paper Mill is the first Integrated Pulp & Paper Industry which is in Ganga River Basin and has maintained zero liquid discharge (ZLD) to river. Mills has adopted a multi-pronged strategy for achieving zero discharge of treated effluent. This is a pioneering achievement, which goes beyond statutory compliance. This has been made possible by reducing the generation of wastewater at source and unique technology of High Rate Transpiration System (HRTS) installed at the mills under technical guidance from National Environmental and Engineering Research Institute, Nagpur (NEERI). OPIL possess a zero discharge scheme, by reduce, reuse, recycling of treated waste water thus it doesn't discharge any fully treated waste water in to river. Treated waste water used for land application, making the complete process environmental friendly to an extent.



HRTS



Zero Liquid Discharge



Existing primary Clarifier



Diffused Aeration Tank



Secondary Clarifier



Clarified effluent recycle to Chipper house and Power house

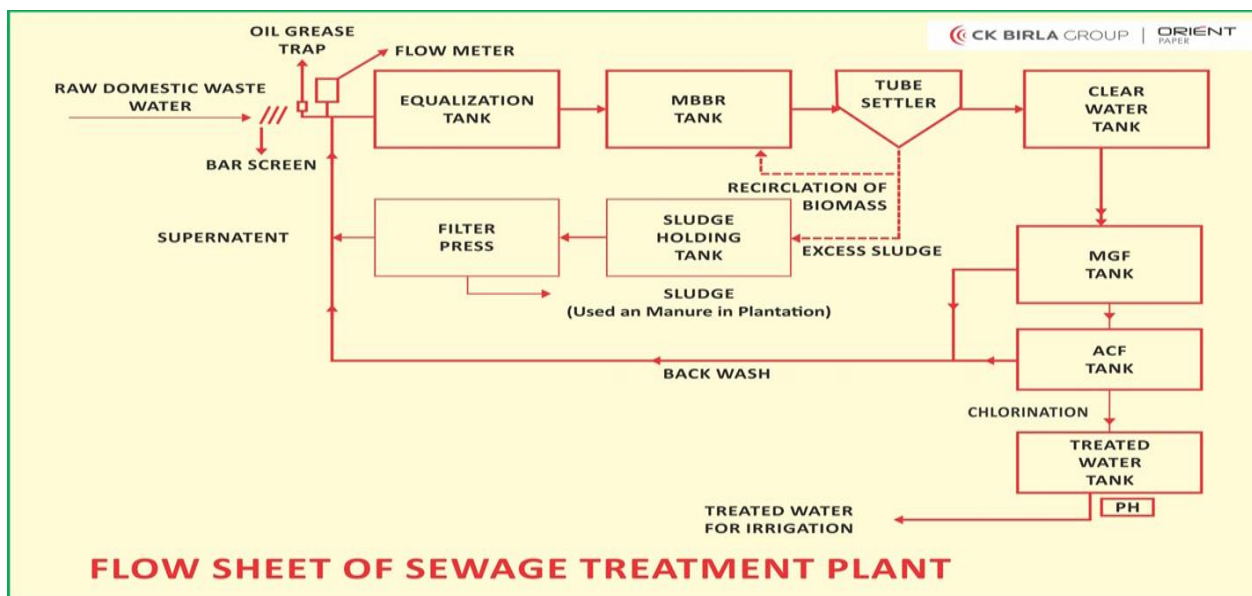
Sewage Treatment Plant (STP)

Sewage Treatment Plant of capacity 1000 m³/day consist of Equalization Tank, MBBR based Aeration tank, Tube Settler, Sludge Holding Tank, Clear Water Tank, MGF & ACF followed by final Treated water storage tank etc. STP was commissioned on 30.06.2019. Process flow diagram and name of different units with capacity and size are as given below. Treated domestic waste water is being used in plantation.

Details of Units	Cap in m ³
Bar Screen	0.4
Equalization Unit	200
MBBR Tank	270
Tube Settler	90
Clear Water Tank	56
MGF Tank	45 m ³ /hr
ACF Tank	45 m ³ /hr
Treated Water Tank	130
Sludge Holding Tank	45
Filter Press	2 m ³ /hr
Air Blower 2 Nos.	791 m ³ /hr each



OVERVIEW OF SEWAGE TREATMENT PLANT



Thanks

PS : The above Process manual is the property of Orient Paper Mills , Amlai