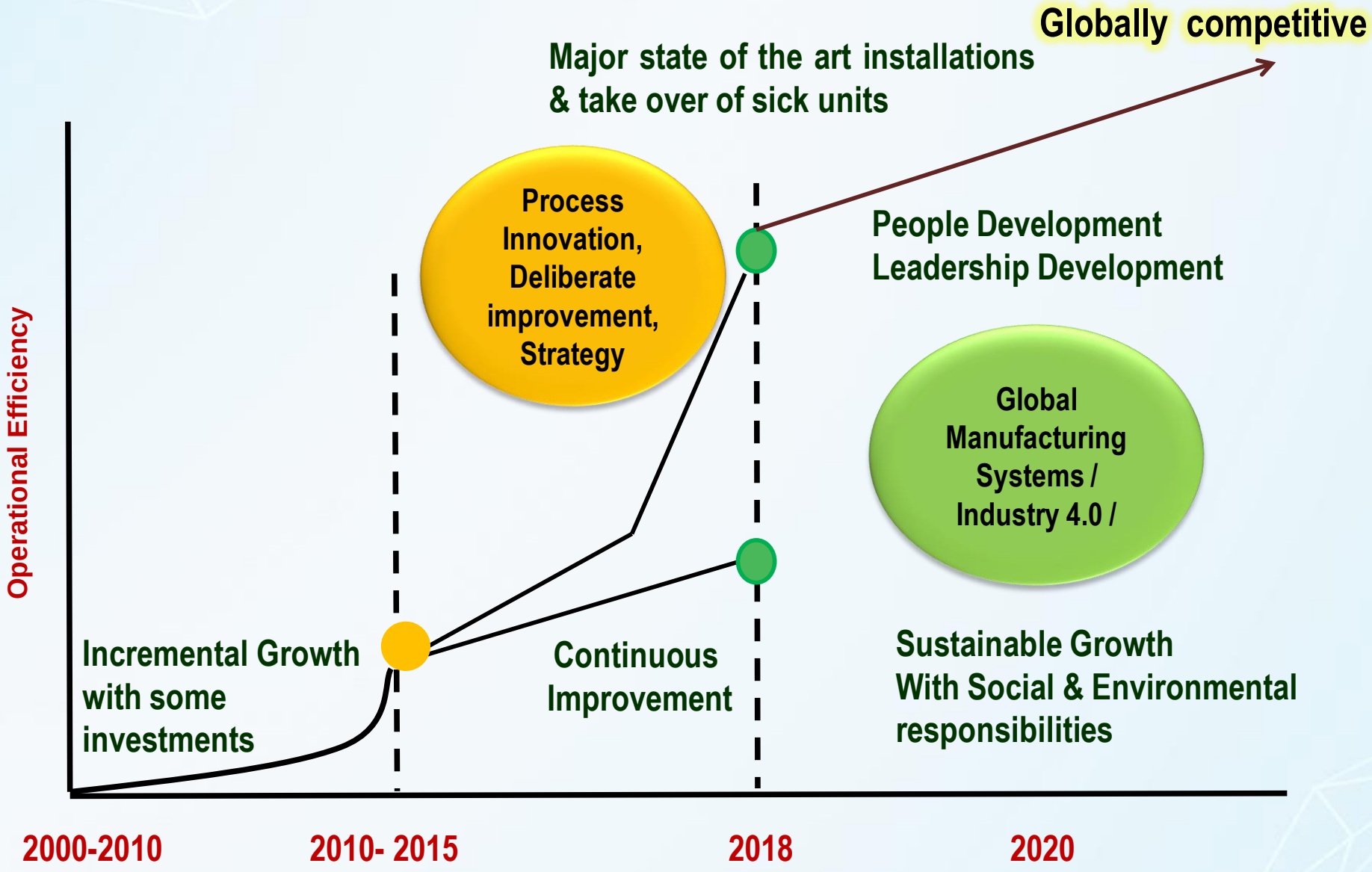
Technological Advancements in Indian Pulp & Paper

INDIAN PULP & PAPER TECHNICAL ASSOCIATION
IPPTA

Korea Technical Association of the Pulp and Paper Industry
KOREA
1967

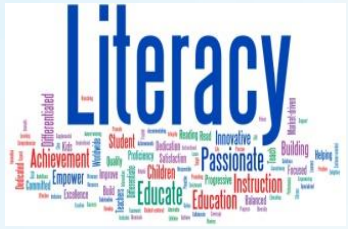
INDIAN PAPER INDUSTRY – STRATEGIC GROWTH



Tools: R-Gap, Deliberate Improvement, Bench Marking , TQM , TPM, ME

GROWTH DRIVERS FOR INDIAN PAPER INDUSTRY

Increasing Population

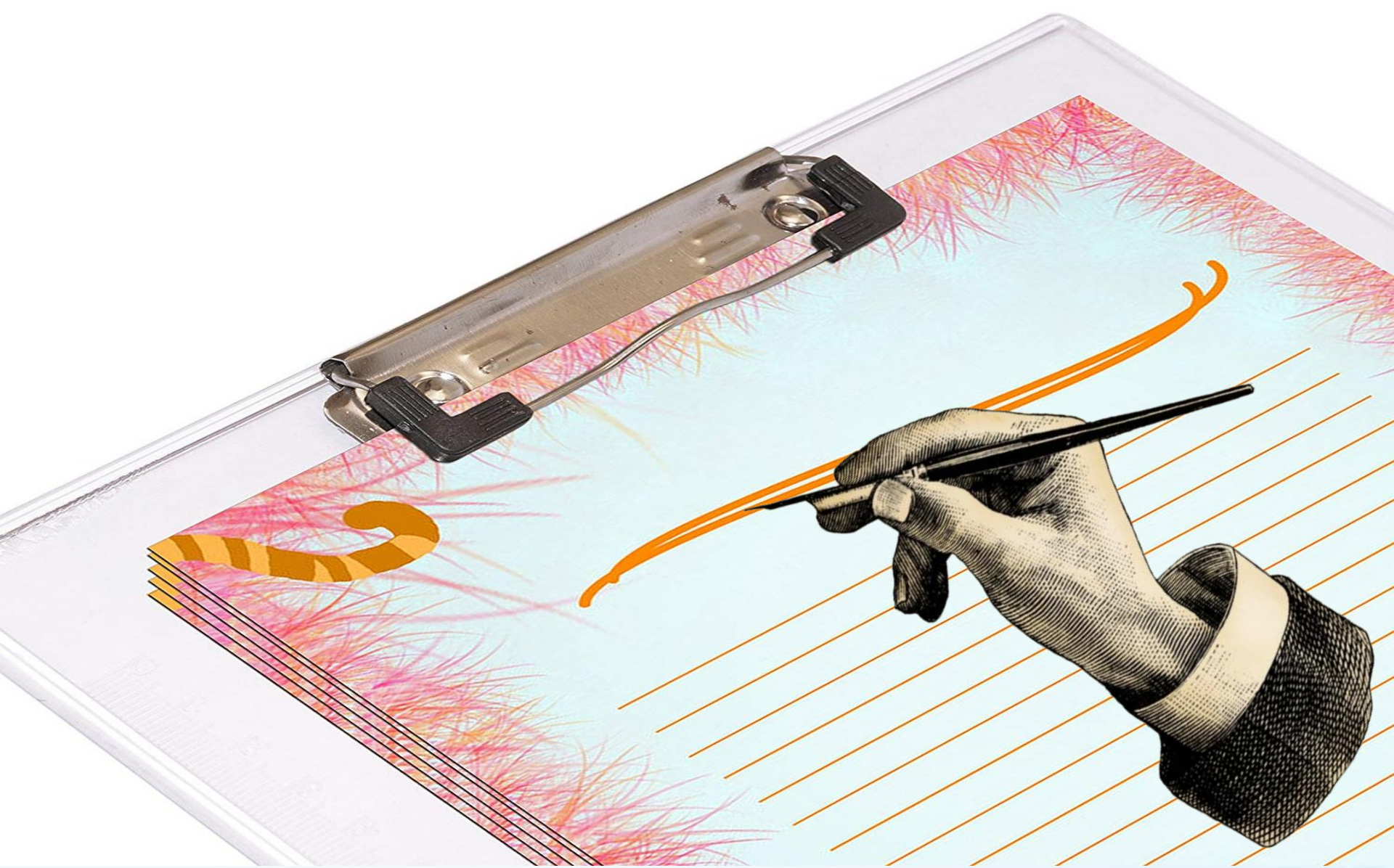


Literacy rate increase, growth in GDP

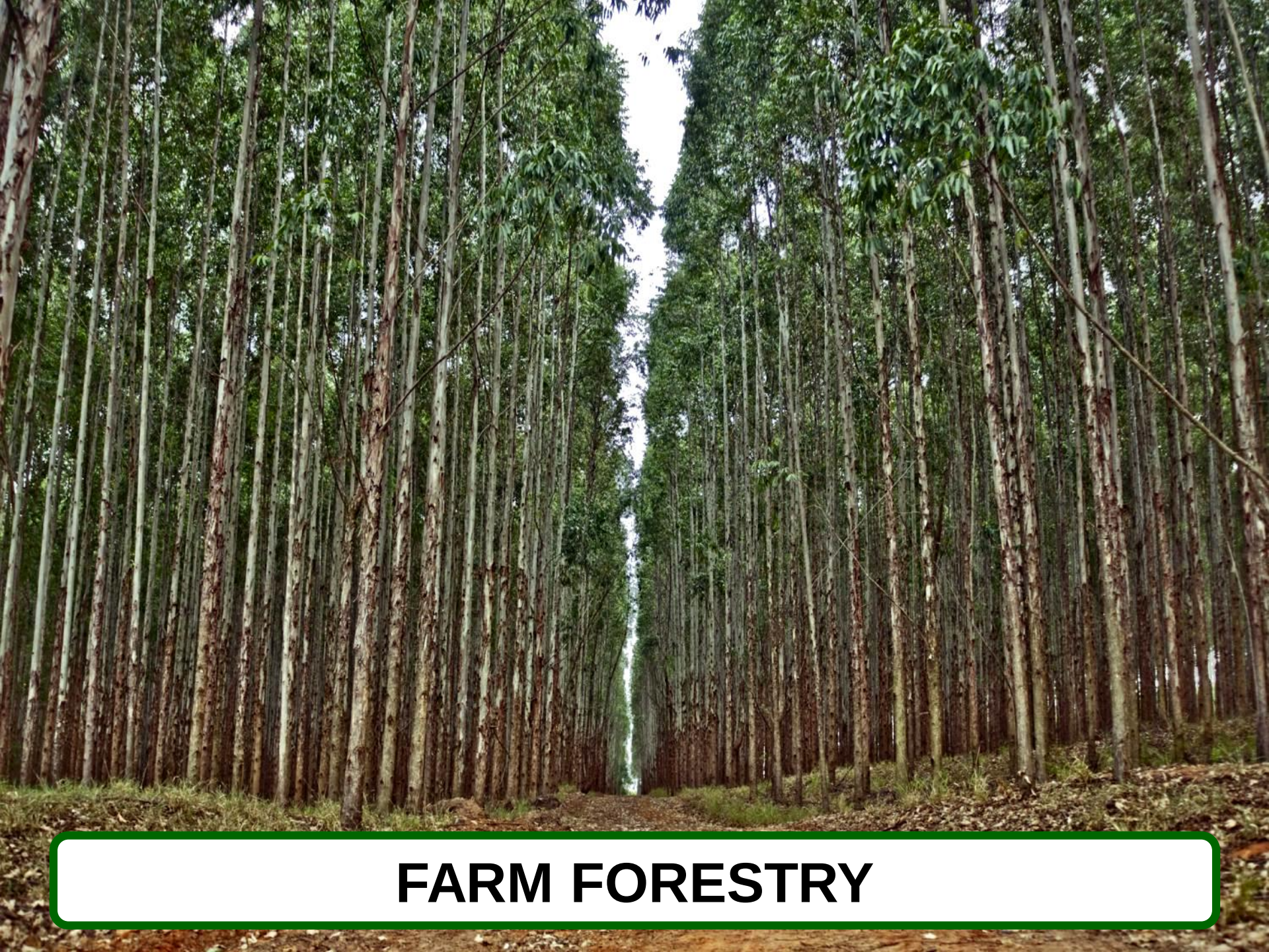
Improvement Life style of individuals

The focus of paper industry is now shifting towards more eco-friendly products and technology.

Government of India has established rules and regulations to control Degradation of Forest.



PAPER – GLOBAL & INDIA



FARM FORESTRY

FARM FORESTRY INITIATIVES

Project Objectives

- Waste land development
- Rural employment
- Environmental Protection
- Upliftment of rural economy
- Availability of raw material to industry

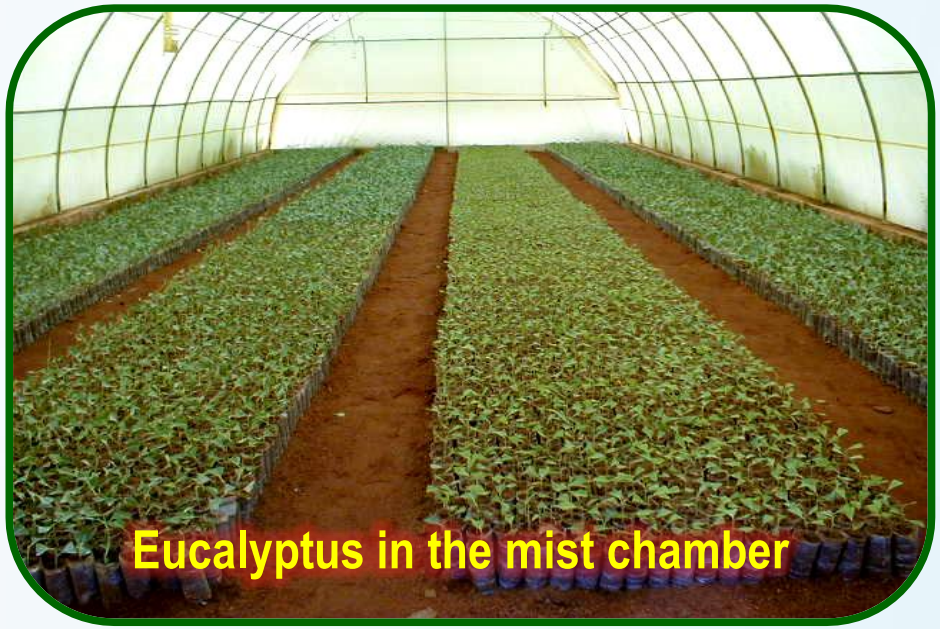
FARM FORESTRY INITIATIVES

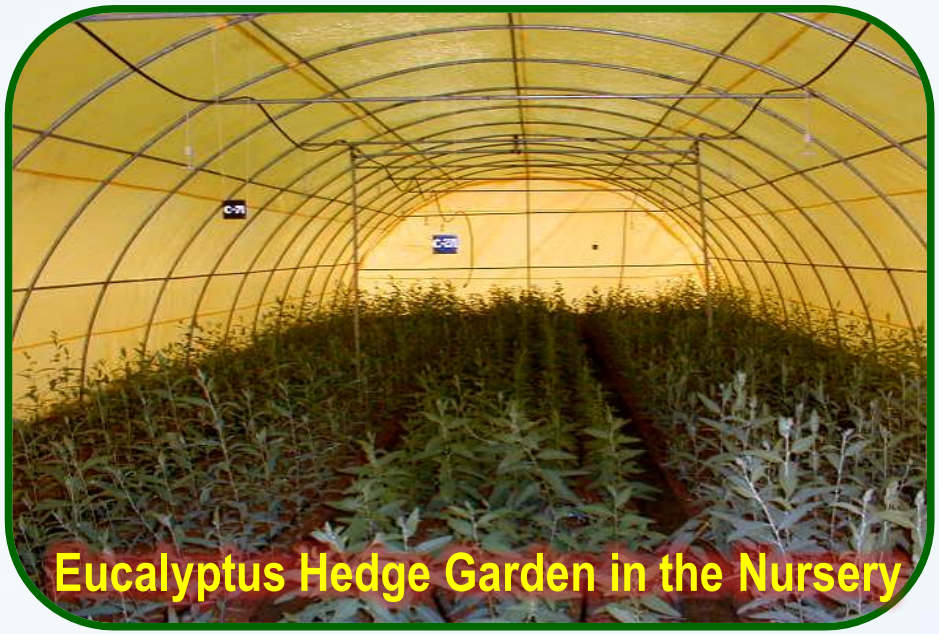
Benefits

- Alternate to waste land development project
- Environment preserved
- Trees inhale carbon di-oxide in large quantity and release oxygen.
- Global warming reduced.
- Normal climatic conditions maintained.
- Effect of Green House gases reduced.

FARM FORESTRY INITIATIVES


Grown up Casuarina ready for Planting

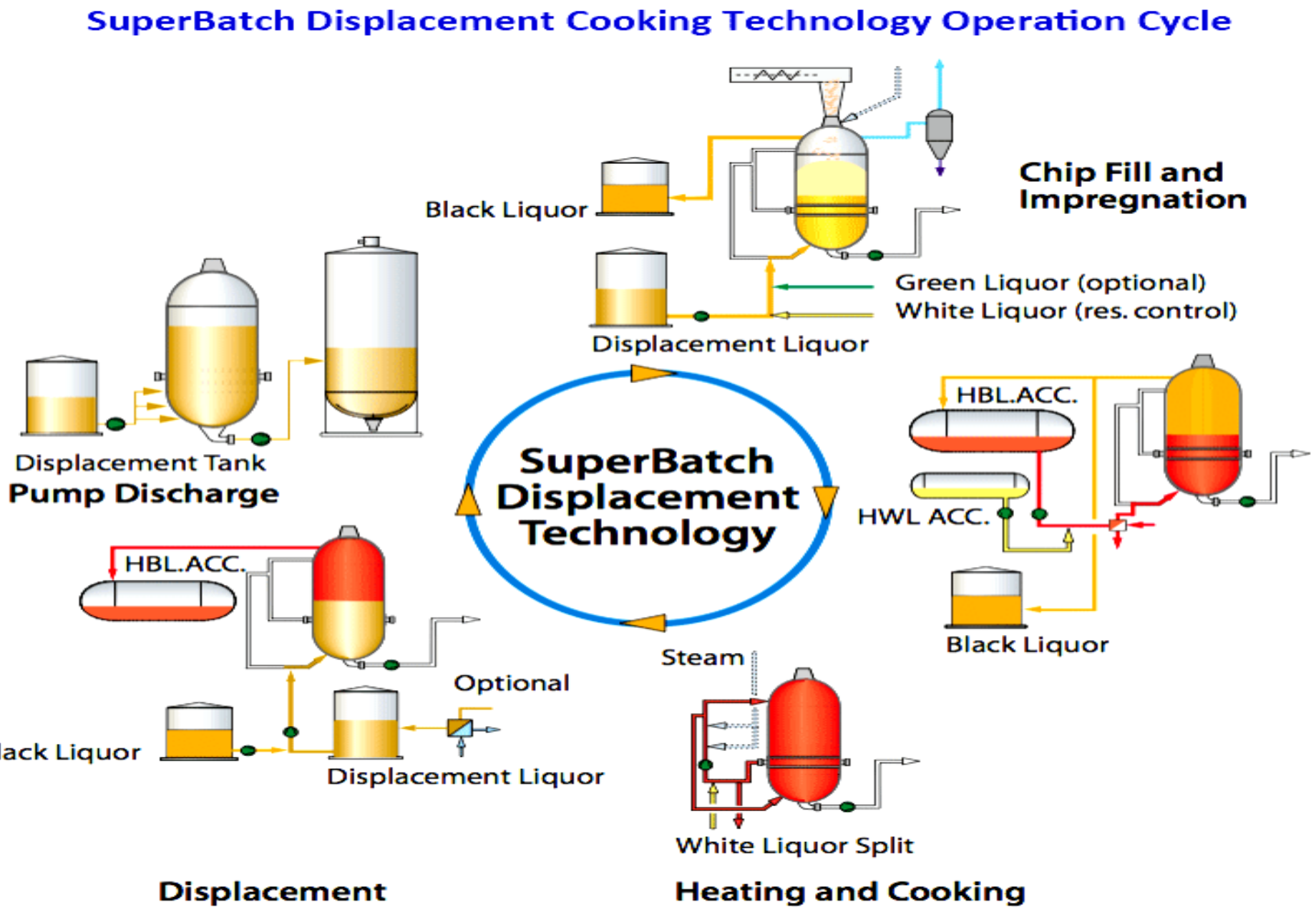

Eucalyptus in the mist chamber


Eucalyptus Hedge Garden in the Nursery

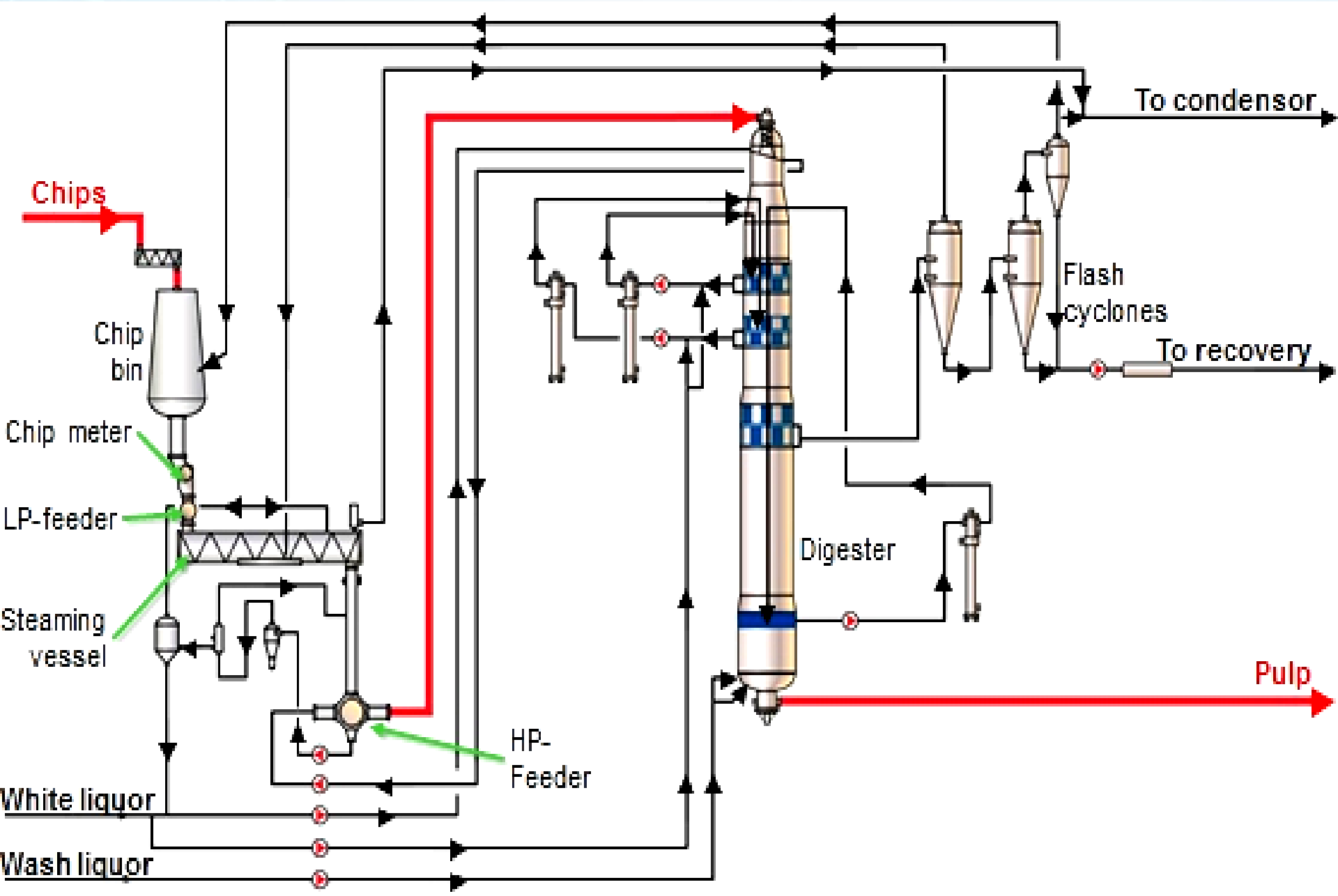

Casuarina(Junginiana) Clone at Nursery

TECHNOLOGY ADVANCEMENTS

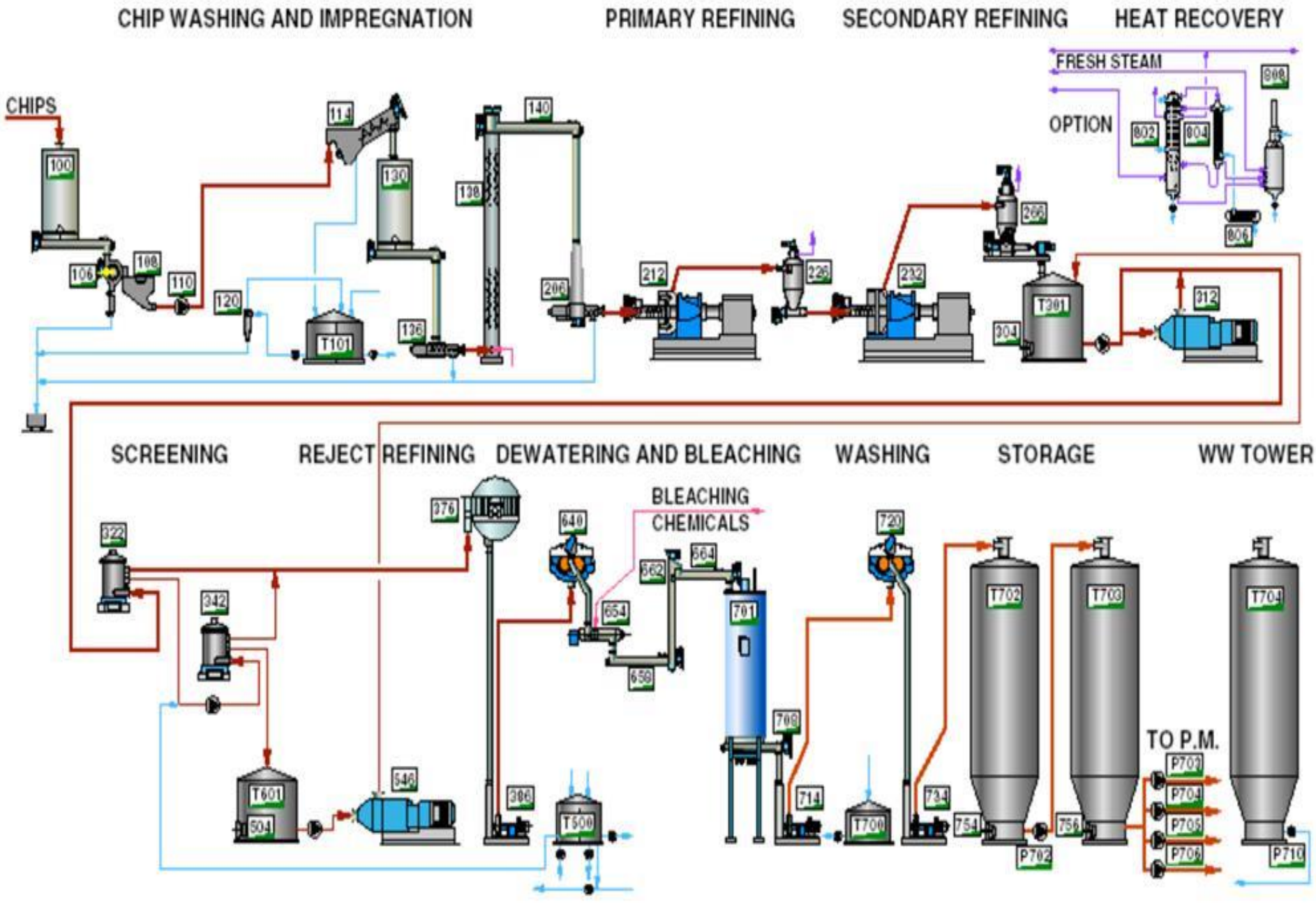
PULPING TECHNOLOGY IN INDIAN MILLS



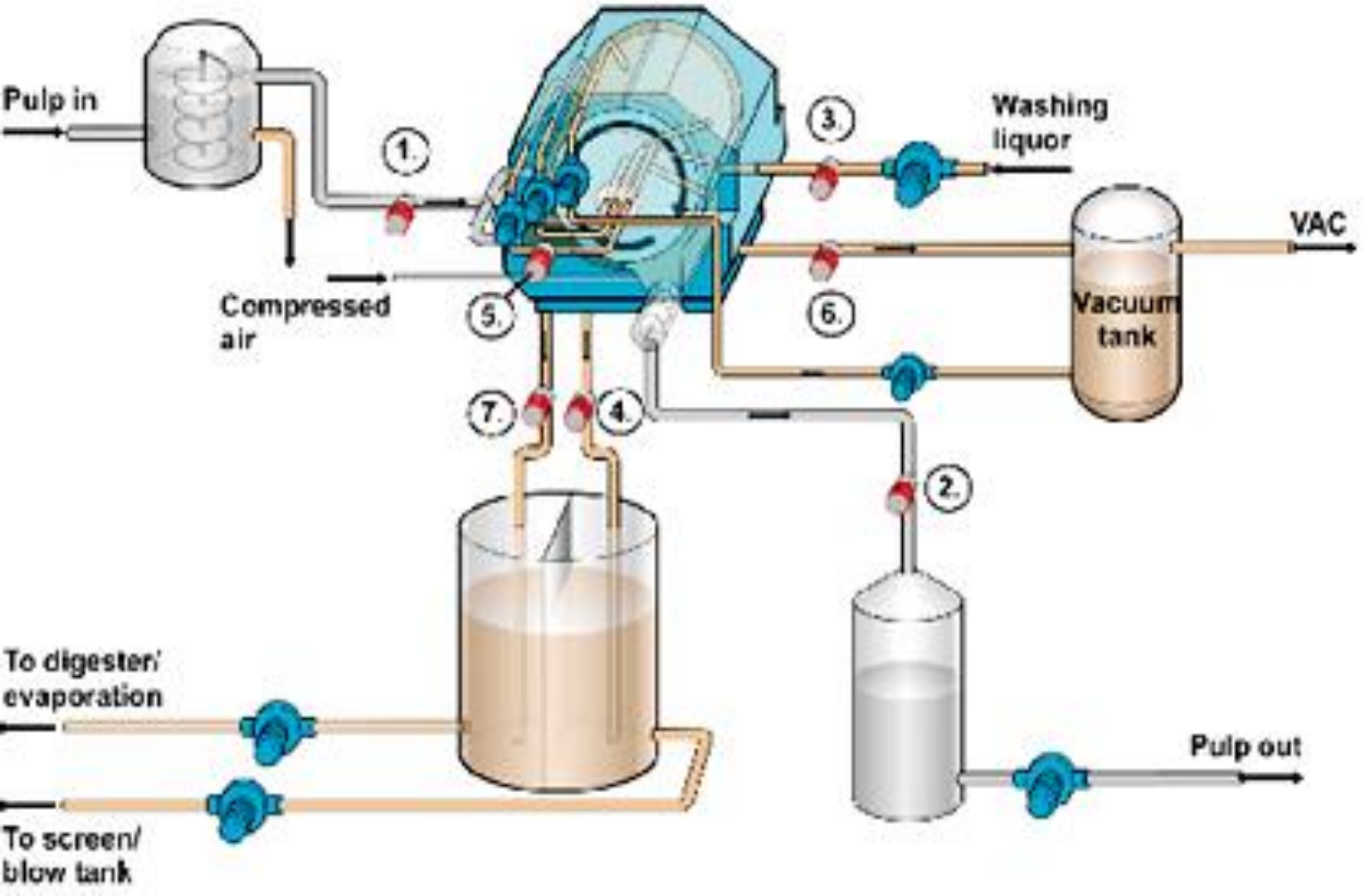
PULPING TECHNOLOGY IN INDIAN MILLS



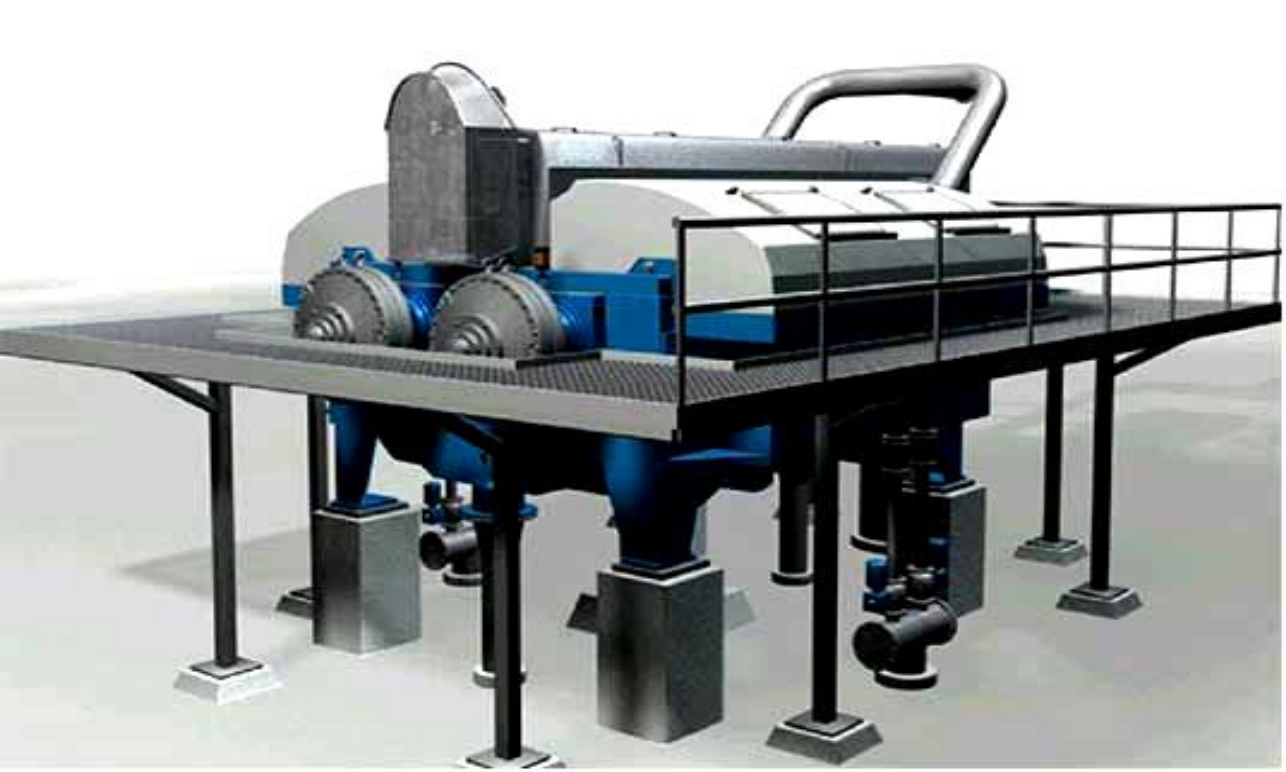
BCTMP PULP MILL

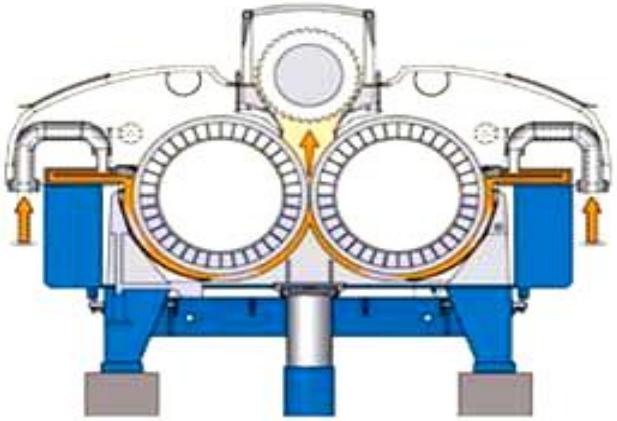


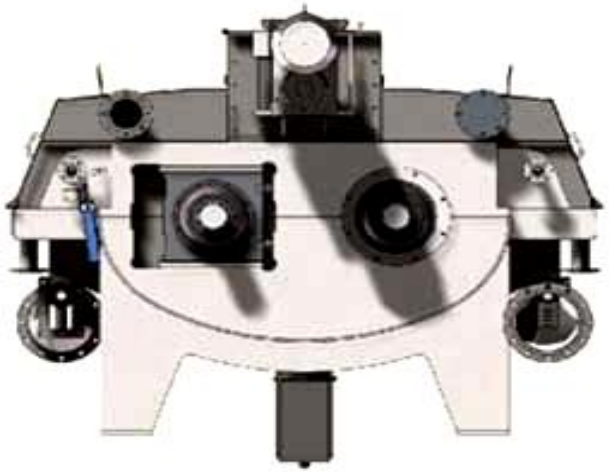
DD WASHER IN PULP MILL



WASHING AND BLEACHING IN INDIAN MILLS





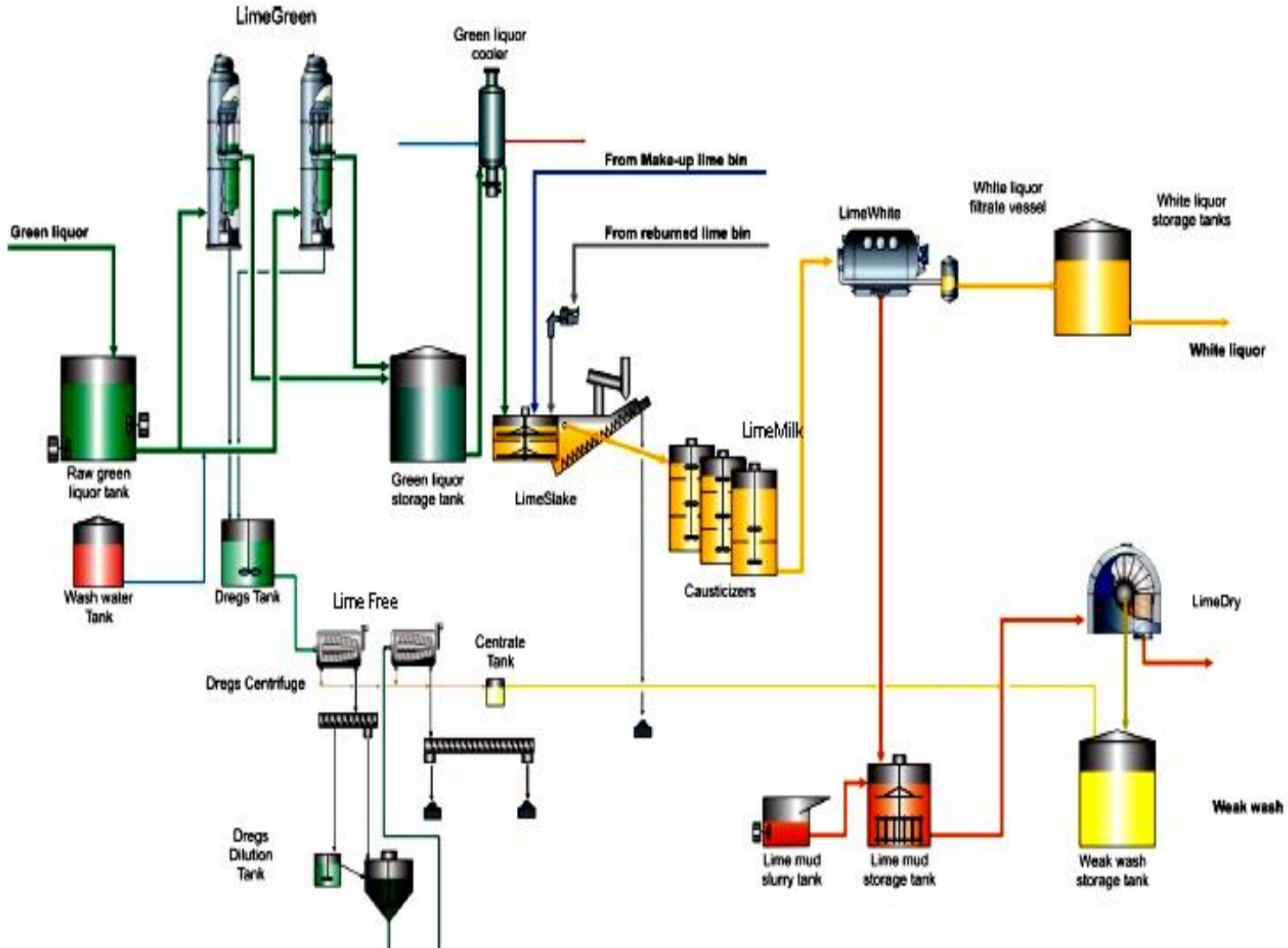


FALLING FILM EVAPORATOR – 7 EFFECT

Recovery Boiler producing 65 KSC pressure and 460 ºC SH steam production satisfies 50% energy need of the Mill

MODERN RECAUTICIZING

With X filter, GL Cooler, CD filter, Centrifuge for dregs handling and two stage lime mud filter



OZONE BLEACHING IN ONE OF THE INDIAN MILL

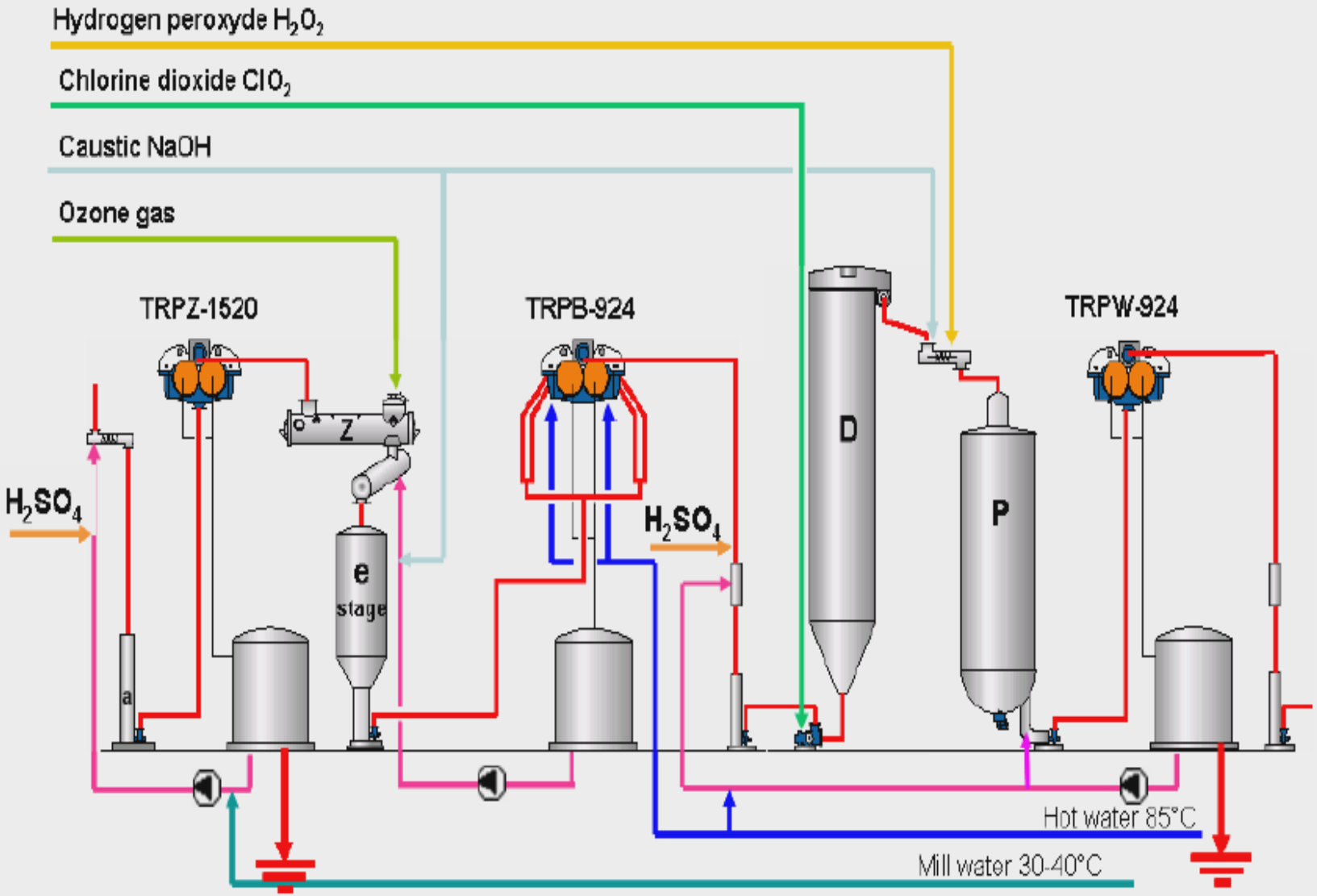
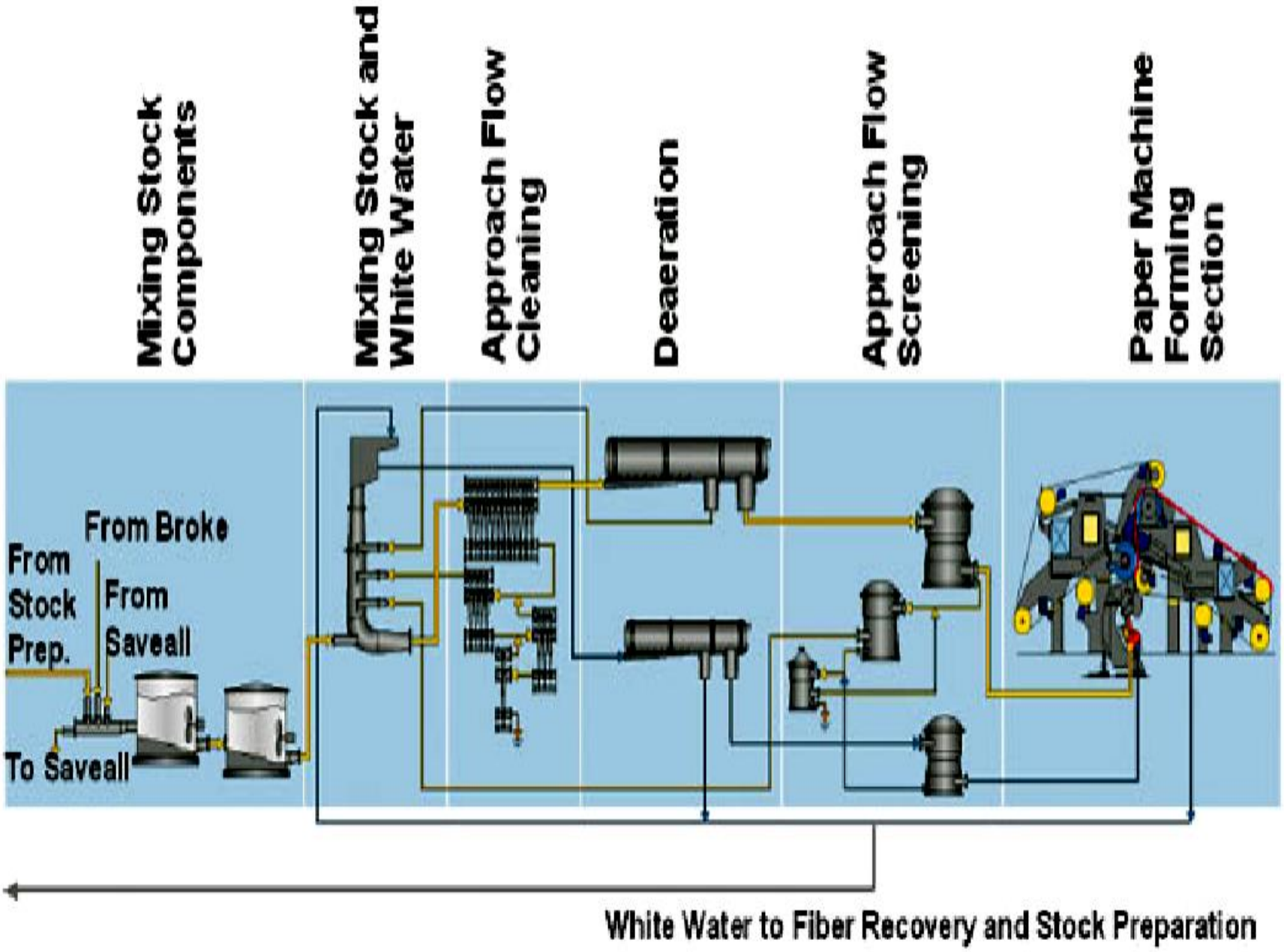
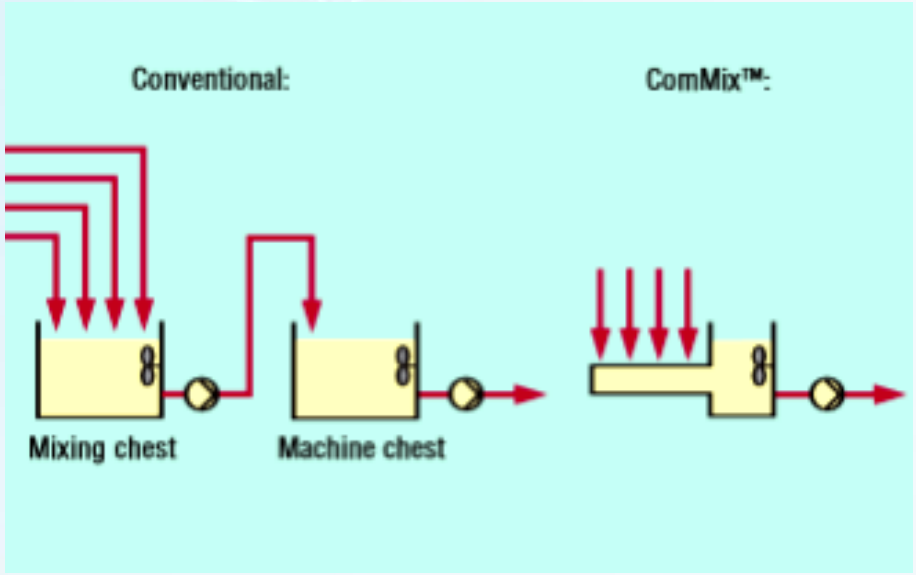


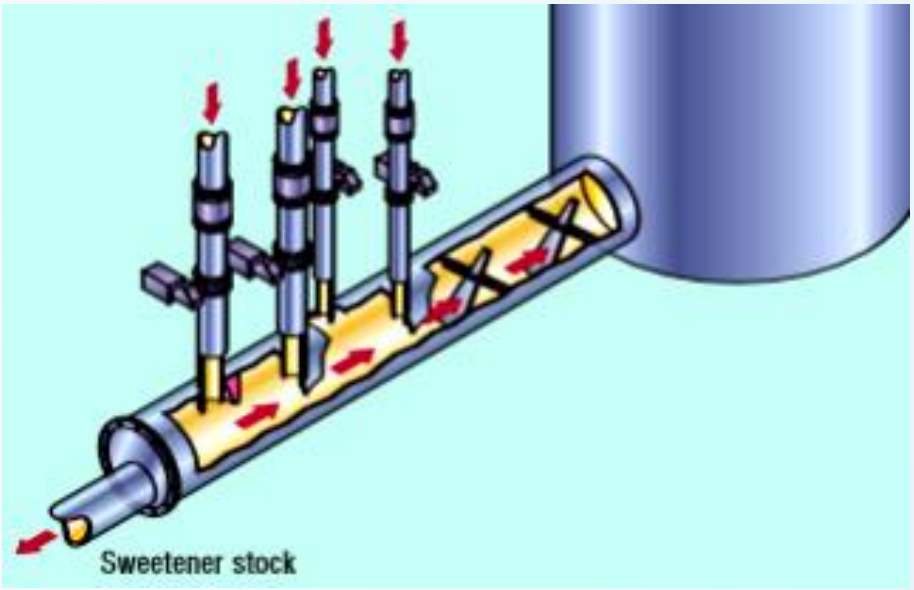
Figure 12: Line 2 at ITC *Bhadrachalam [24]*

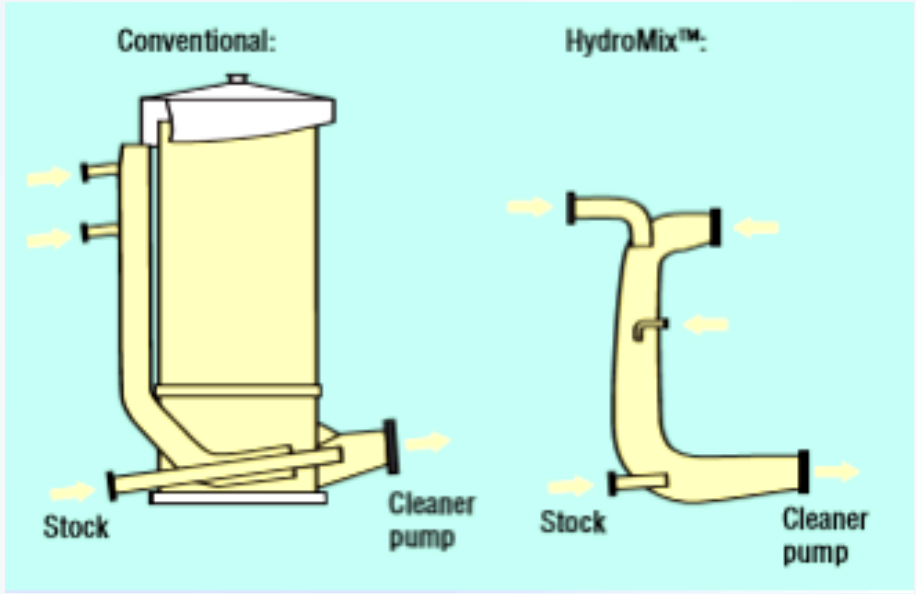
APPROACH FLOW SYSTEM IN HIGH SPEED MACHINE

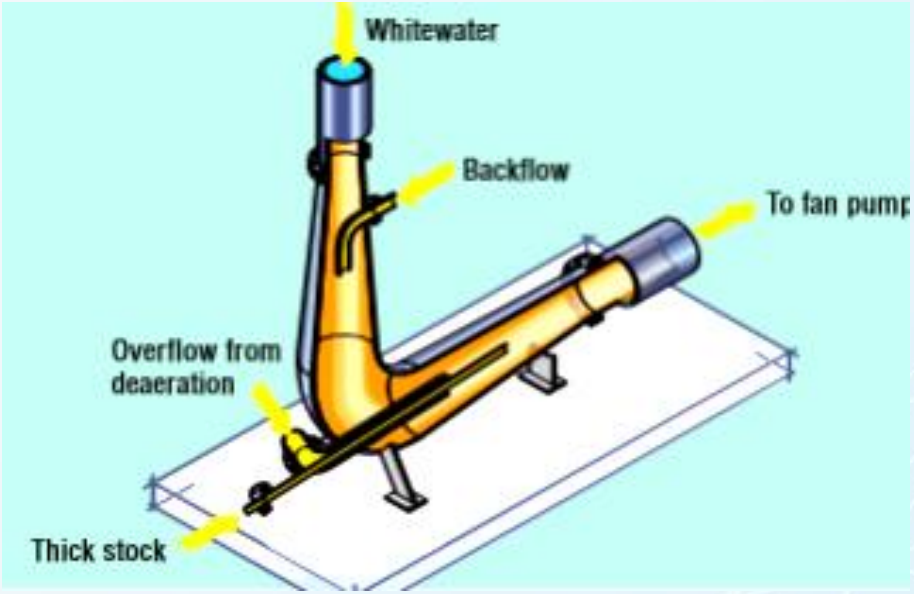


REBUILDING IN APPROACH FLOW SYSTEM







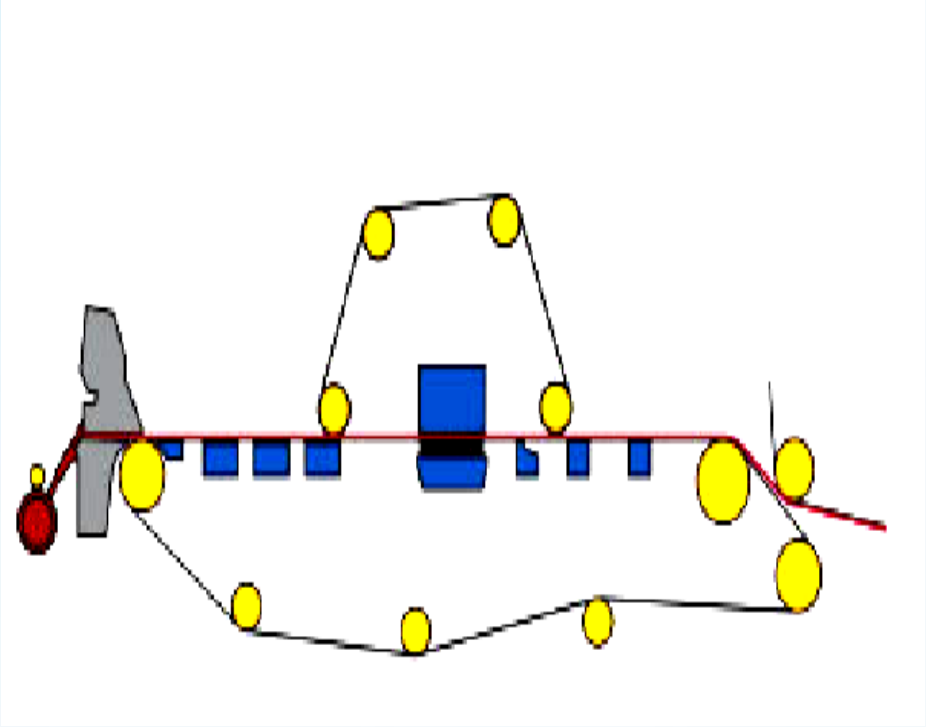


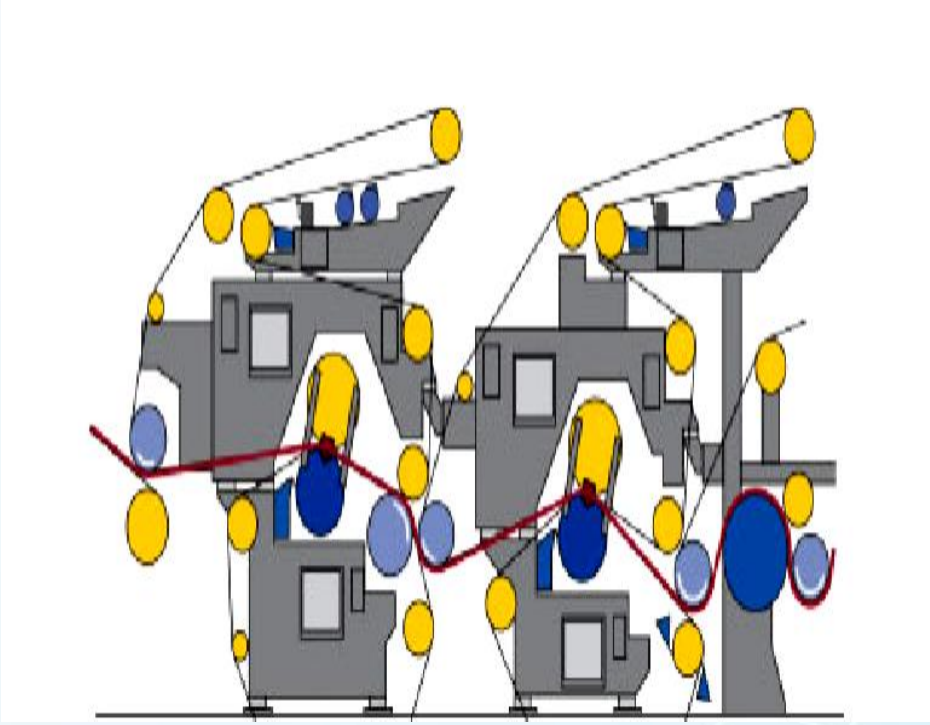
FULLY AUTOMATED PAPER MACHINE

State of the Art Paper Machine with fully automated conversion Facility

BI-NIP FOR HIGH SPEED PAPER MACHINES

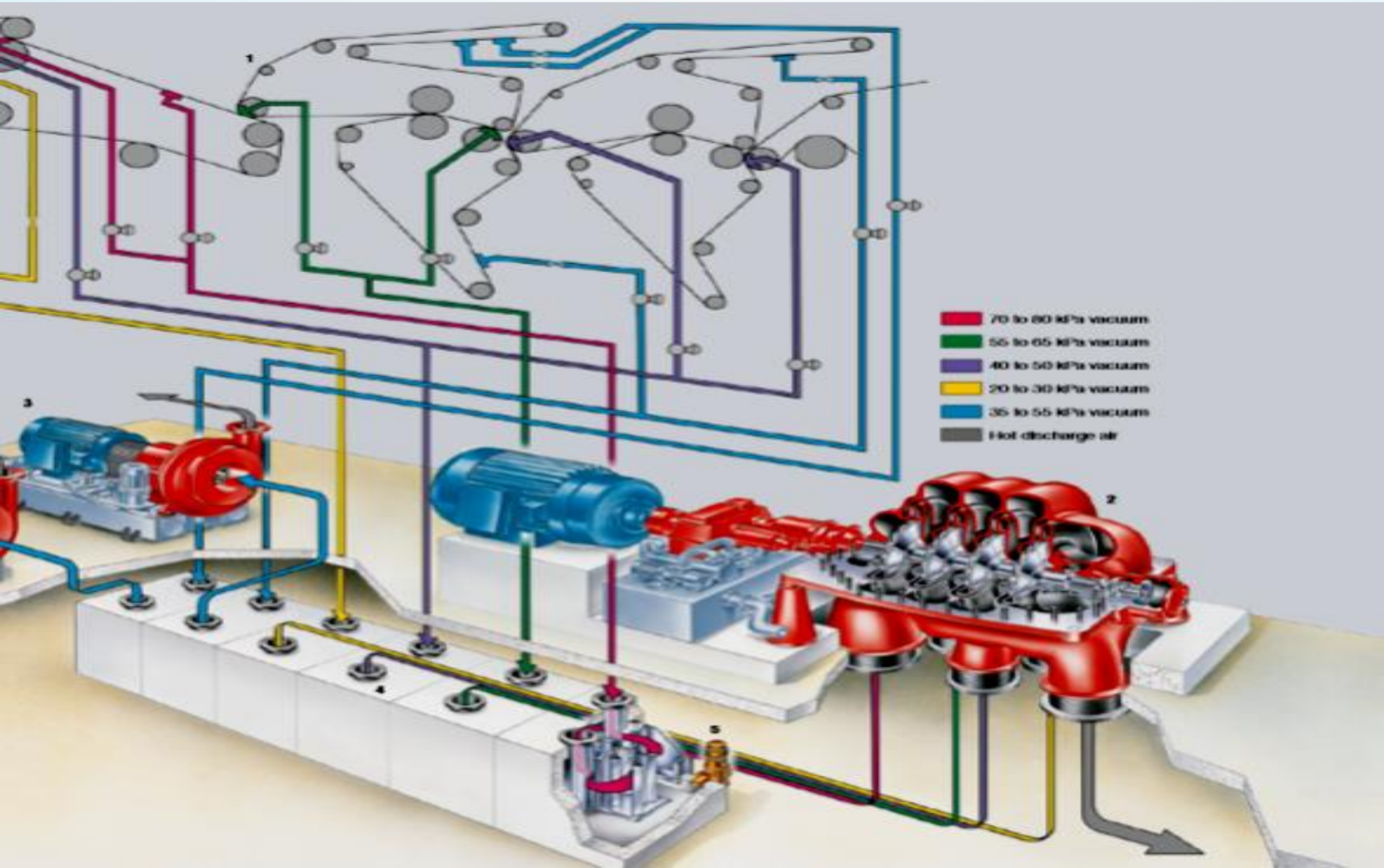
Fourdrinier Twin wire former





TURBO COMPRESSOR

Turbo Compressor replacing inefficient vacuum pumps



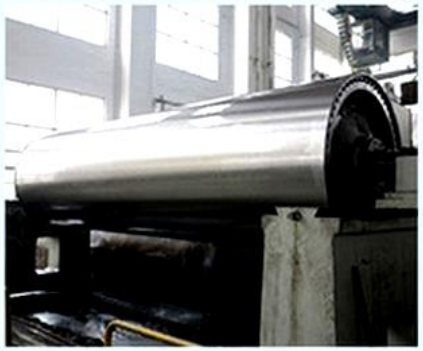
DRYING CYLINDER WITH SPOILING BARS

1500Dia. Dryer Cylinder

1800 Dia. Dryer Cyliner

Turbulence Spoiling Bar

Hydraulic PressureTest



Finish Grinding

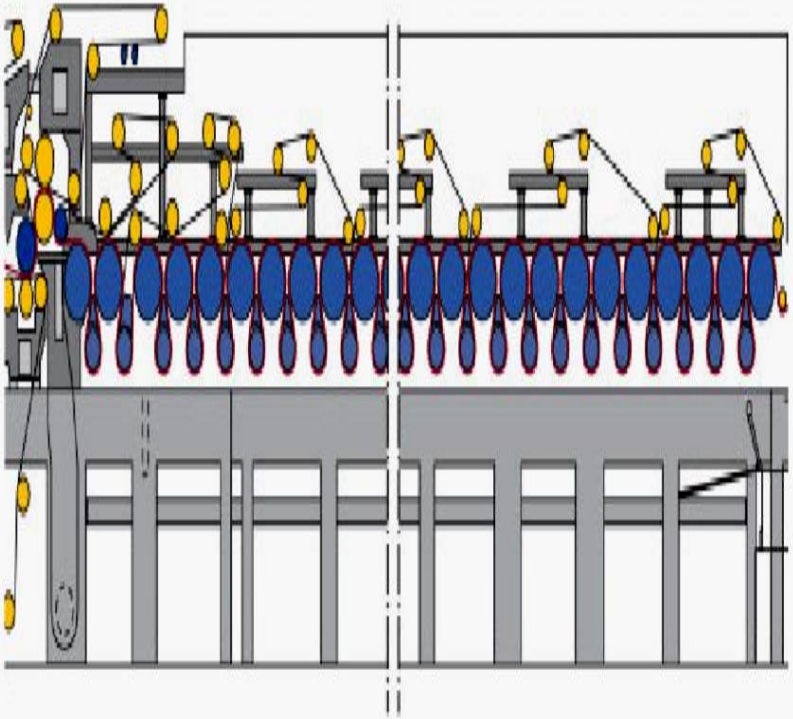
Dynamic Balance Test

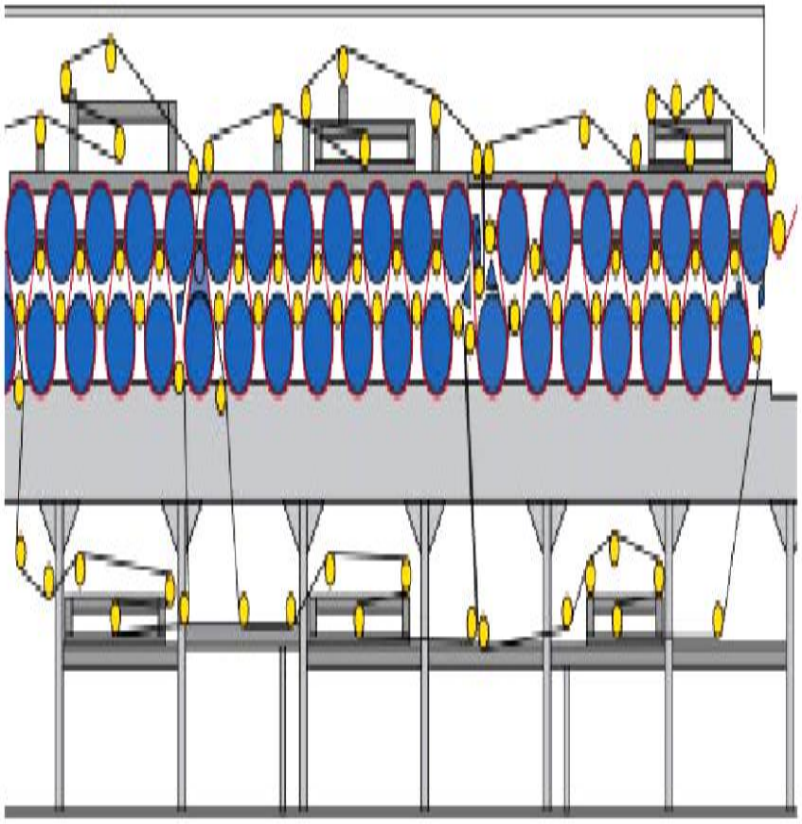
1800 Dia. Dryer in the

3000 Dia. Yankee cylinder

3660 Dia. Yankee Cylinder

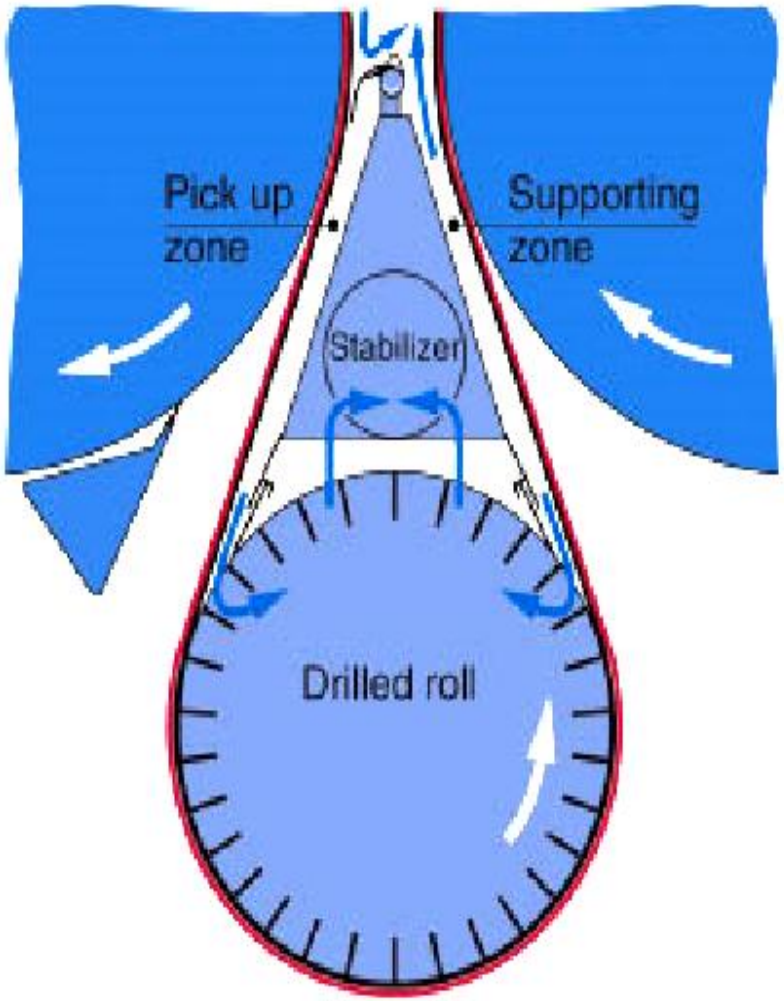
UNIRUN AND CURL CONTROL LOOP DRYER SYSTEM

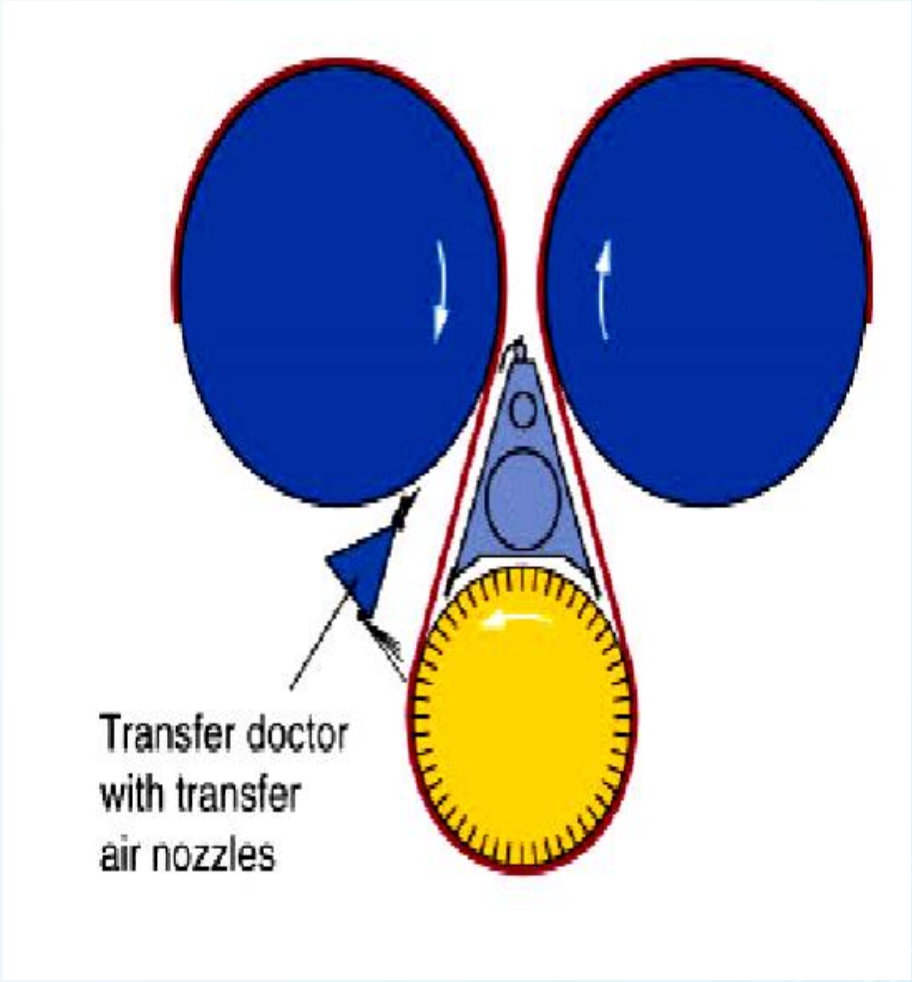




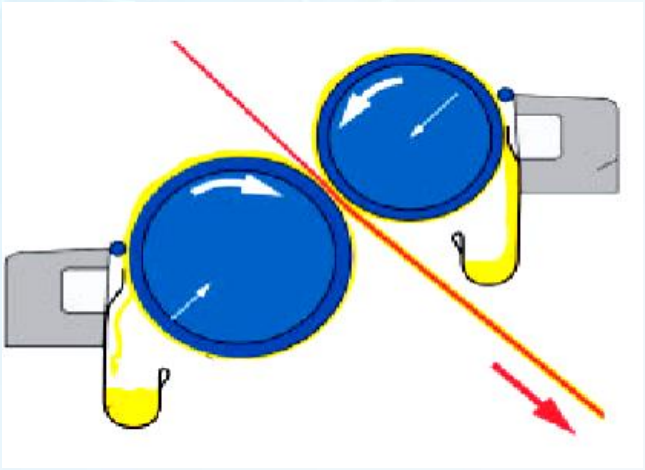
STABILIZER ROLL

Stabilizing elements for web guiding in single – tier dryer section

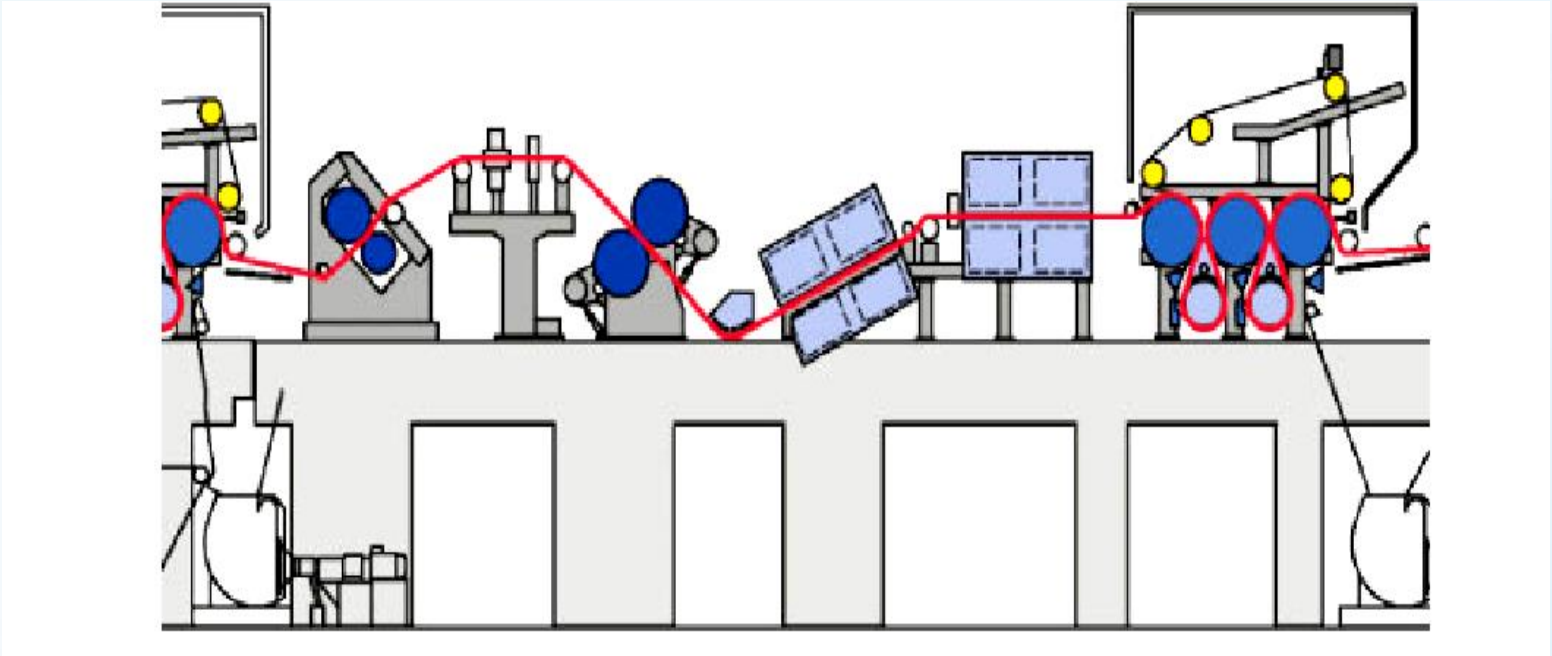




SPEED SIZER WITH MCB DRYER AND CB TURN



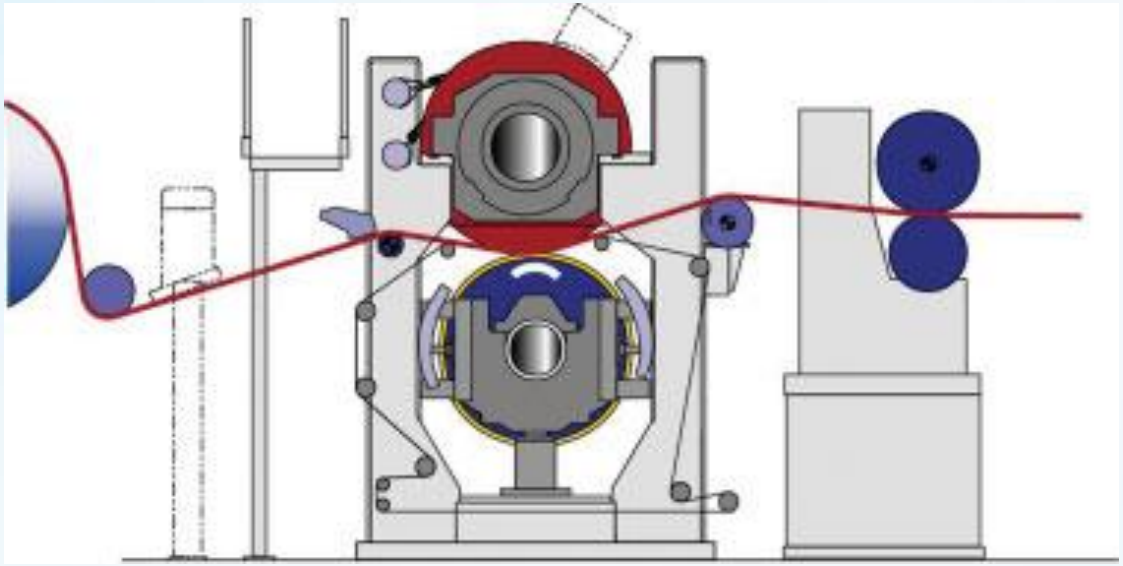
Film press



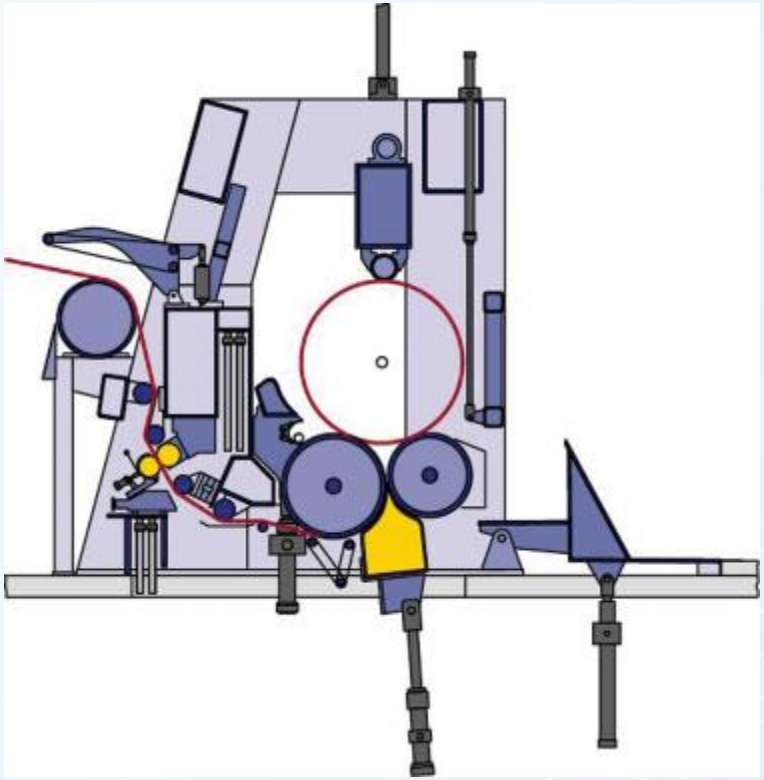
Online film press of modern LWC machine

CALENDER AND HIGH SPEED WINDER

The extended nip calendar is based upon the well-established shoe-press technology.

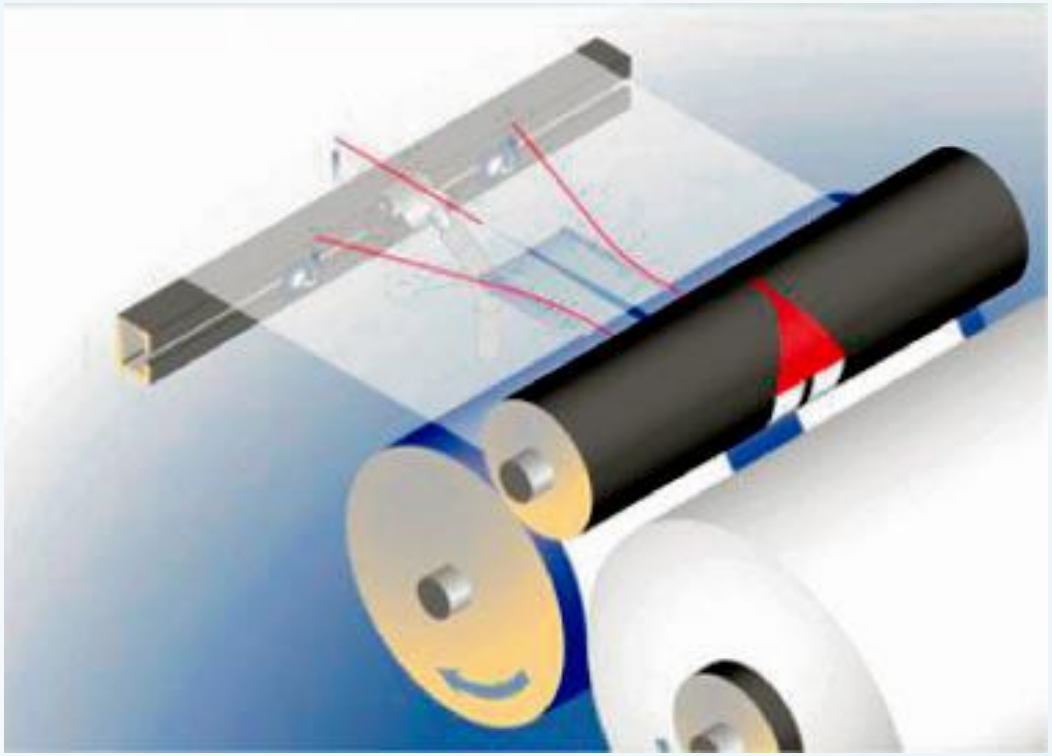


Two-drum winder with air relief



AIR TURN GOOSE NECK ASSEMBLY

Turn-up system with high-pressure water jet and cutting form sheet



CUSHION STOPPER LINES IN WINDER

Segmented cushion stop lines

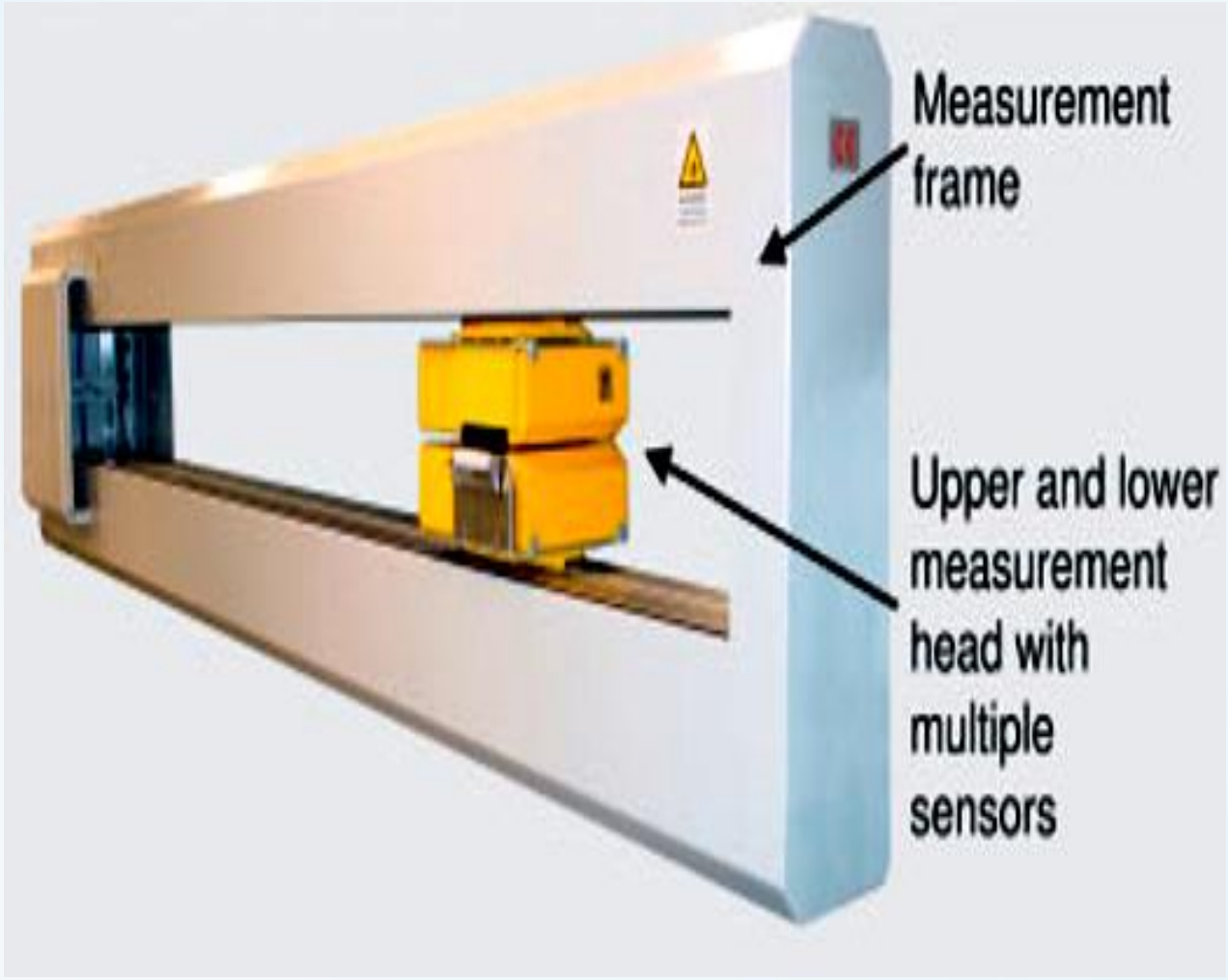
CAROUSEL CONVEYOR FOR REEL TRANSPORT

Belt Conveyor

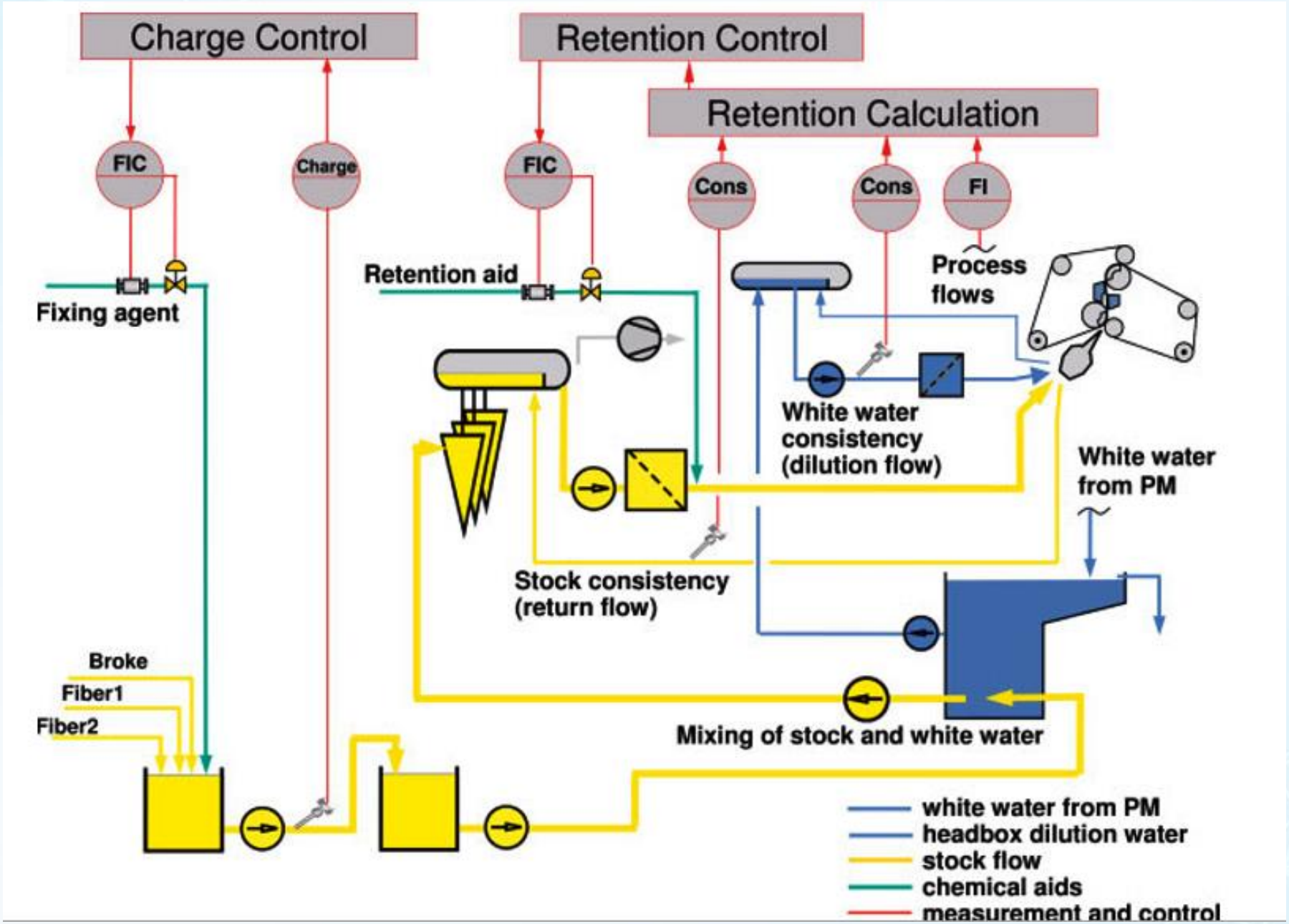
Carousel Conveyor

QUALITY CONTROL SYSTEMS

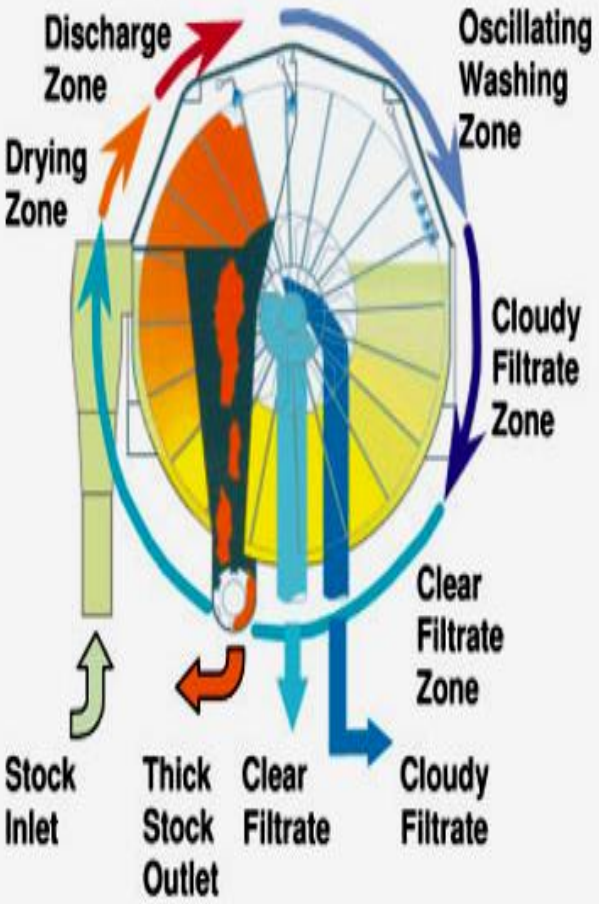
Quality Measurement Scanner

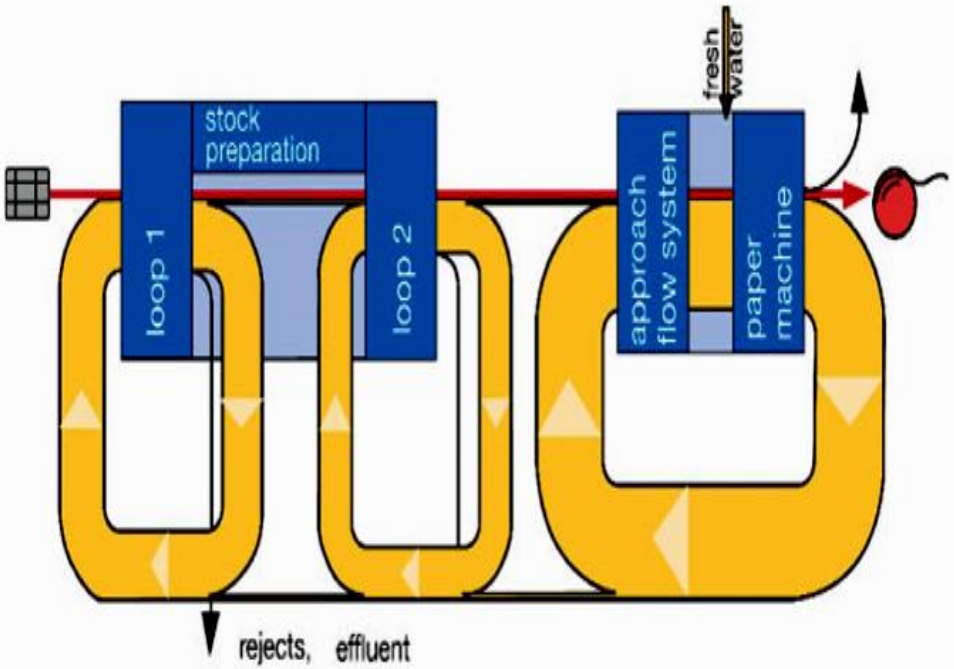


BASIS WEIGHT CONTROL SYSTEM ONLINE



BAGLESS SAVEALL AND WHITE WATER SYSTEM

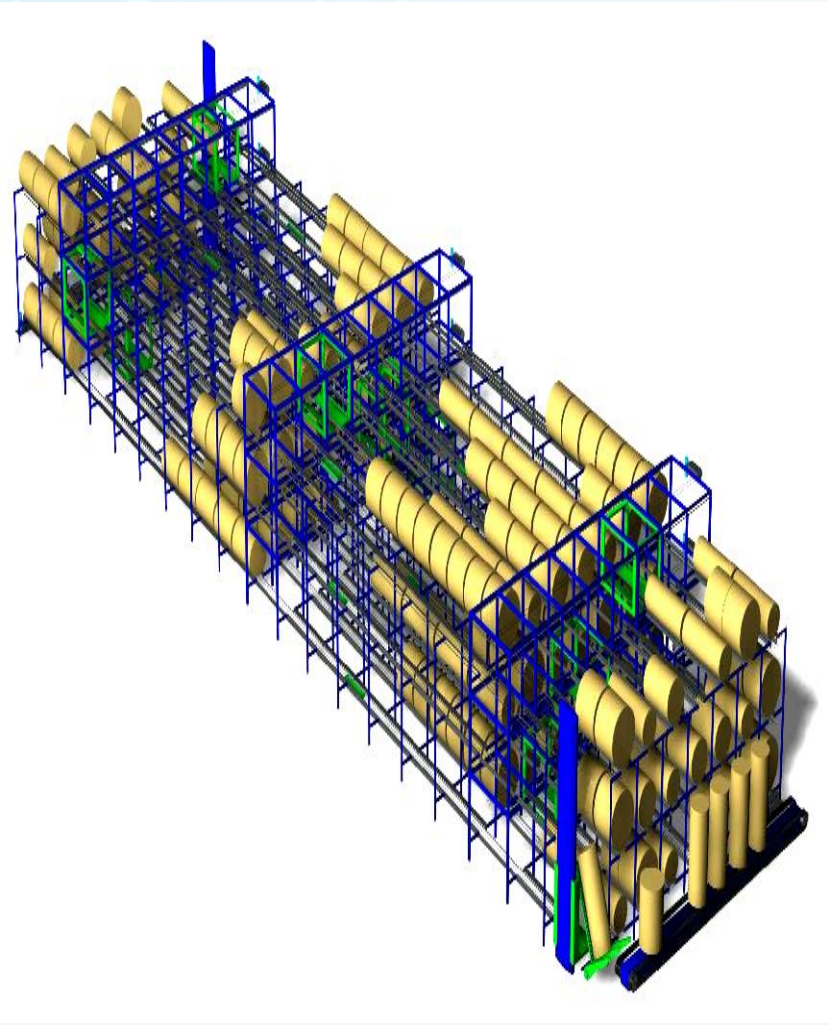




AUTOMATIC PALLET CHANGING FOR CUTTER

Bielomatik Cut pack (Capacity – 200 tpd)

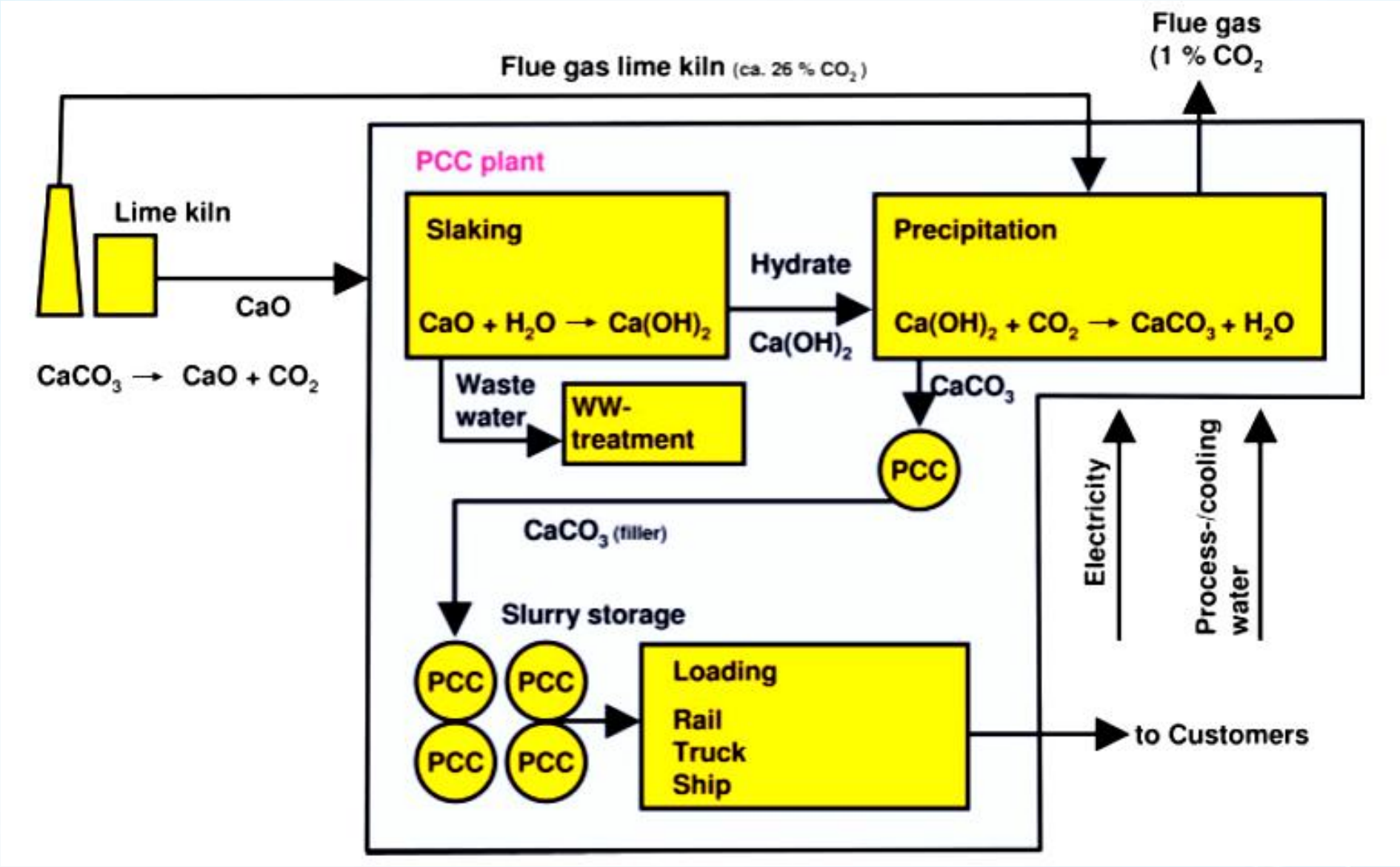
AUTOMATIC STORAGE AND RETRIEVAL SYSTEM



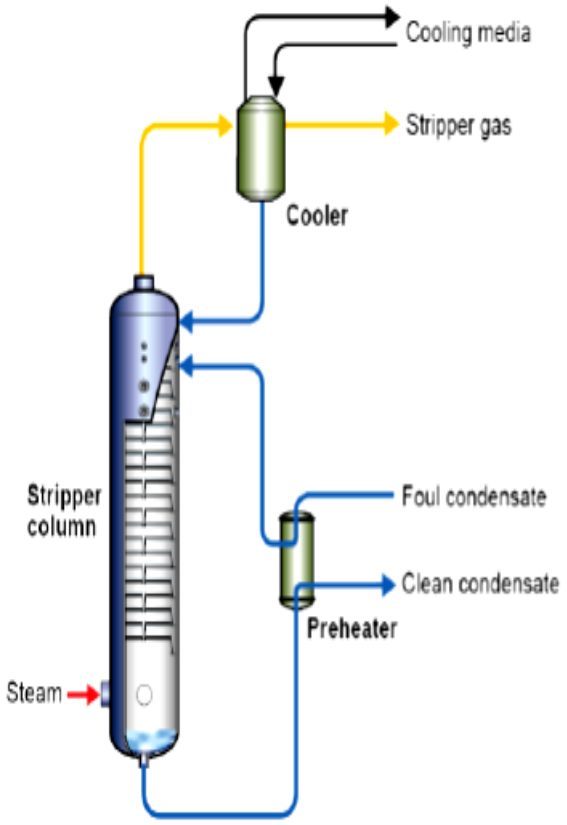
Automatic storage & Retrieval System (2000 t capacity)

INSITU PCC PLANT

Flow sheet for the production of precipitated calcium carbonate

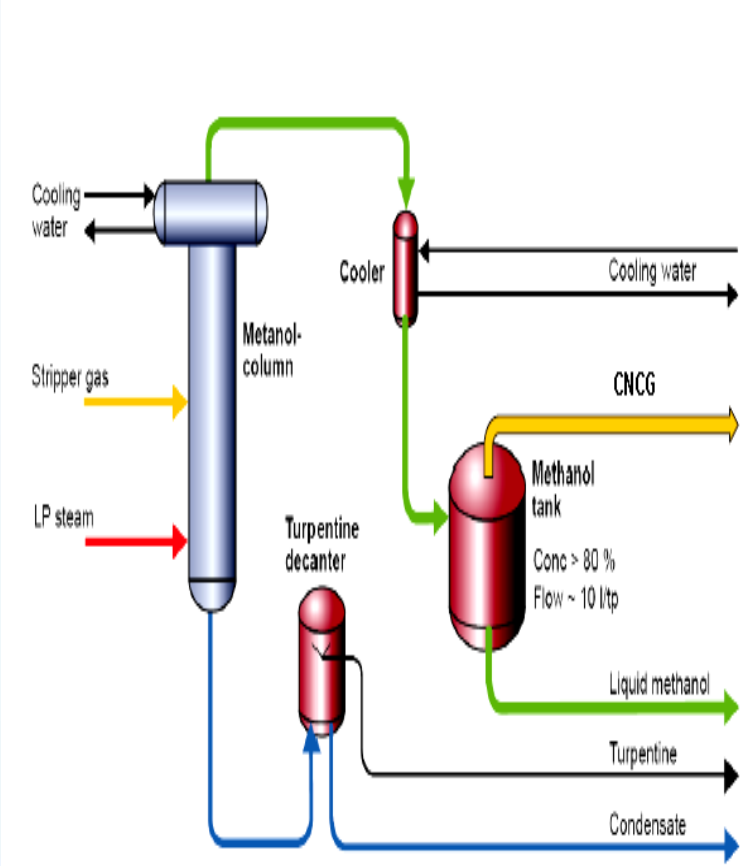


FOUL CONDENSDATE AND METHANOL STRIPPING

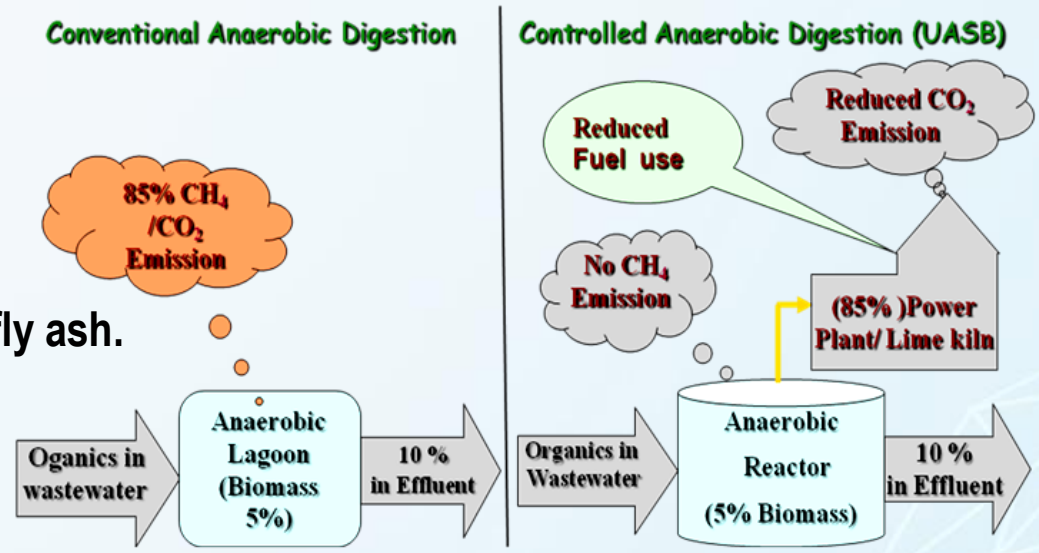


Efficiency
90 - 95% Methanol
>99% TRS

Steam/condensate
Ratio = 0.2 ton/ton



WORLDS LARGEST BAGASSE PULP MILL



- By product cement from Lime sludge and fly ash.
- Bagasse wash water to anaerobic digester replacing 70% furnace oil requirement for Lime Kiln.

TECHNOLOGY FOR TERTIARY TREATMENT : MBBR, DAF

Development of demonstration plot in ETP area with vegetables and Rice

CIRCULAR ECONOMY

CIRCULAR ECONOMY (INDUSTRIAL ECOLOGY)

Paper - Sugar Complex

CIRCULAR ECONOMY (INDUSTRIAL ECOLOGY)













Wet pith (Raw Material) for Board manufacture
Dry pith (Bio fuel) for Boiler



Methane gas (Fuel) for Boiler / Kiln



Green Power for Mill







SUSTAINABILITY THROUGH CIRCULAR ECONOMY

Social

Over **1240 acres** of dry land got irrigation facility.

Rural upliftment and job creation for nearby marginal farmers.

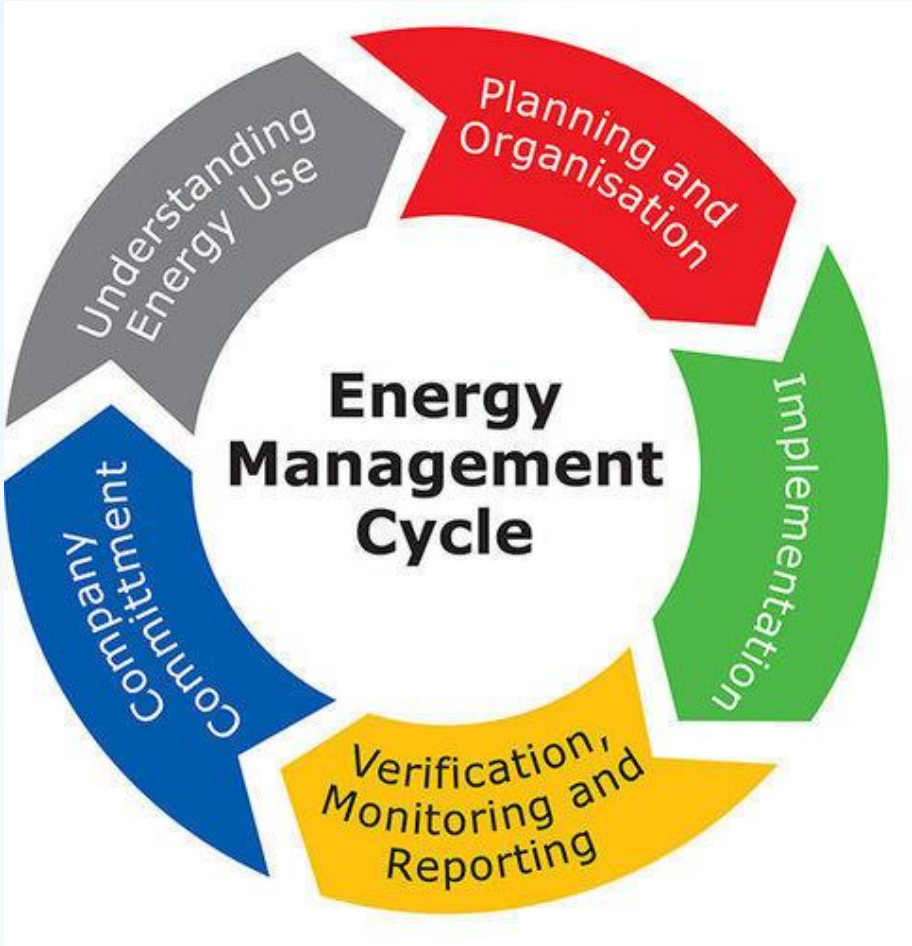
Environmental

Co2 sequestrated through **Photosynthesis and Phytolith route** (825 tons of C02 eq sequestrated annually)

Generation of biomass for replacing fossil fuel **(pith, black liquor, Methane gas)**

Economical

Sustainable **raw material Sourcing for Sugar and Paper Mill**


Energy Management Cycle
Planning and Organisation
Implementation
Verification, Monitoring and Reporting
Company Commitment
Understanding Energy Use

ENERGY

ENERGY

- The Perform Achieve Trade (PAT) is an innovative, market-based trading scheme announced by the Indian Government in 2008 under its National Mission on Enhanced Energy Efficiency (NMEEE) in National Action Plan on Climate Change (NAPCC).
- It aims to improve energy efficiency in industries by trading in Energy Efficiency Certificates. The 2010 amendment to the Energy Conservation Act (ECA) provides a legal mandate to PAT.
- Participation in the scheme is mandatory for Designated Consumers under the ECA. It is being administered by the BEE that sets mandatory, specific targets for energy consumption for larger, energy-intensive facilities.
- The PAT Scheme is being implemented in three phases- the first phase runs from 2012-2015 covering 478 facilities from eight energy-intensive sectors, namely Aluminium, Cement, Chor-alkali, Fertilizer, Iron and steel, Pulp and paper, Textiles and Thermal power plants. This accounts for roughly 60% of India's total primary energy consumption .

ENERGY

Particulars	UOM	Value
No. of plants in the sector	Nos	31
Baseline Energy Consumption in PAT cycle – 1	Million TOE	2.09
Energy reduction target for the sector	Million TOE	0.119
Energy Savings achieved in PAT cycle – 1	Million TOE	0.289
Energy Saving achieved in excess of target	Million TOE	0.170
Reduction in GHG emissions in PAT cycle – 1	Million TCO2	1.24
Cumulative energy savings with PAT impact till 2030 over BAU[13]	Million TCO2	7.81

GLOBAL BENCHMARKING

Industry Group	Particulars	UOM	Global Avg	India Avg	Industry Benchmark
Wood based Mills	Sp. Electrical Energy Consumption	kWh / t of Paper	1000 – 1100	1400 – 1500	1200
	Sp. Steam Consumption	T of steam / t of Paper	7.0 – 9.0	12 – 13	9
Agro based Mills	Sp. Electrical Energy Consumption	kWh / t of Paper	-	1200 – 1400	1000
	Sp. Steam Consumption	T of steam / t of Paper	-	12 – 14	10
RCF based Mills producing unbleached grades	Sp. Electrical Energy Consumption	kWh / t of Paper	500	450 – 550	400
	Sp. Steam Consumption	T of steam / t of Paper	2.5	4 – 5	3.5
RCF based Mills producing bleached grades	Sp. Electrical Energy Consumption	kWh / t of Paper	600 - 650	680 – 800	570
	Sp. Steam Consumption	T of steam / t of Paper	4 – 4.5	6 – 7	5

STEAM & POWER CONSUMPTION IN INDIA MILLS

Section wise Energy Consumption Trend (Wood based)

Section	Power Consumption (kWh / t of Paper)	Steam consumption (T of steam / T of paper)
Pulp mill	300 – 325	1.2 – 2.5
Recovery Section	250 – 300	3.0 – 3.5
Stock Preparation & Paper Machine	350 – 450	2.5 – 4.0
Effluent Treatment Plant	75 – 100	-
Power generation Plant	150 – 200	-
Total	1126 – 1300	3.7 – 6.5*

* Without considering steam consumption in Recovery section

STEAM & POWER CONSUMPTION IN INDIA MILLS

Section wise Energy Consumption Trend (Agro based)

Section	Power Consumption (kWh / t of Paper)	Steam consumption (T of steam / T of paper)
Pulp mill	300 – 325	1.2 – 2.5
Recovery Section	75 – 100	1.0 – 1.7
Stock Preparation & Paper Machine	350 – 450	2.5 – 3.5
Effluent Treatment Plant	75 – 90	-
Power generation Plant	125 – 200	-
Total	925 – 1165	3.7 – 6.0*

* Without considering steam consumption in Recovery section

PAT ACHIEVEMENT

Energy Savings

0.289 Million TOE

Coal Savings

0.67 Million Tons

CO2 equivalent

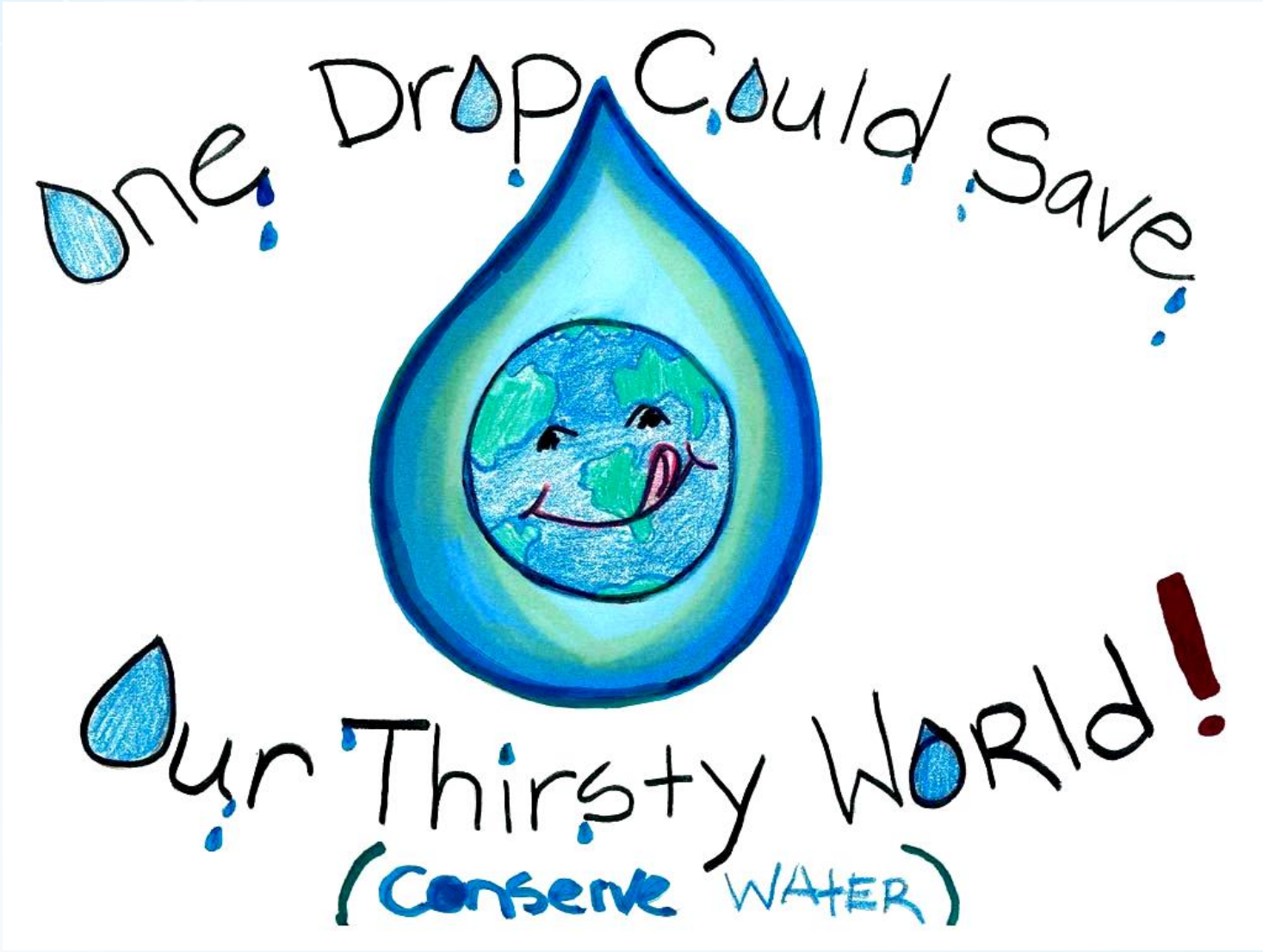
1.24 Million Tons

Savings

Rs. 3 Billion

Investment

Rs. 18.84 Billion



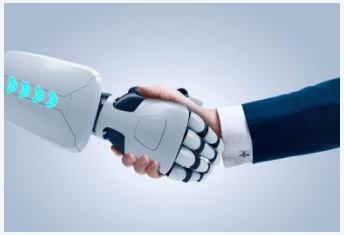
WATER CONSERVATION

WATER CHARTER VISION OF GOVT OF INDIA

Charter vision

Upgradation of status of Pulp & Paper industries

Process Operations



Technology

Reduction in fresh water consumption &

waste water discharge

Environmental performance &

Compliance with environmental norms

WATER CHARTER VISION OF GOVT OF INDIA

Charter focus

Reduction in fresh water consumption & waste water discharge

* Process Up gradation
* Reuse / Recycle of back water / treated effluent

Environmental Compliance

* At source
* ETP upgradation
* Addition of tertiary treatment

Zero discharge of Black Liquor

WATER CHARTER VISION OF GOVT OF INDIA

Mill Category	Fresh water consumption m3 / t of paper	Waste water discharge m3 / t of paper
Wood bleached	50	40
Wood unbleached	25	20
Agro Bleached	50	40
Agro Kraft	25	20
RCF bleached	15	10
RCF Kraft	10	6
Specialty paper	50	40

NEW WATER CHARTER NORMS BY GOVT OF INDIA

Parameters	UOM	Existing Norms	Charter Norms	% Reduction
Effluent volume	m^3 / t of Paper	100 (LPM) 150 (Agro) 50 (RCF)	40 & 20 (Wood – Bleached & Kraft) 40 & 20 (Agro – Bleached & Kraft) 10 & 6 (RCF – Bleached & Kraft)	60 – 80 73 – 86 80 – 88
pH		6.5 – 8.5 (LPM) 5.5 – 9.0 (Agro)	6.5 – 8.5	-
SS	mg / l	50 (LPM) 100 (Agro)	30 30	40 70
TDS	mg / l	2100	1800 (Chemical Pulp Mills) 1600 (RCF)	14 – 24
COD	mg / l	350 (LPM) Not defined (Agro & RCF)	200 (Wood & Agro) 150 (RCF)	43

NEW WATER CHARTER NORMS BY GOVT OF INDIA

Parameters	UOM	Existing Norms	Charter Norms	% Reduction
BOD	mg / l	30 100 (Onland)	20	33
AOX	mg / l	1 kg / t of paper = 5 mg / l (LPM) 2 kg / t of paper = 11 mg / l (Agro)	8	27
Colour	PCU	Not defined	250 (Wood & Agro) 150 (RCF)	-
SAR		26	10 (Wood & Agro) 8 (RCF)	62 – 69

WAYS ADOPTED TO ACHIEVE NORMS

Environmental Sustainability
Through Process
Upgradation

Environmental Sustainability
Through Fresh Water
Conservation

Environmental Sustainability
Through ETP Upgradation

WAYS ADOPTED TO ACHIEVE NORMS

Environmental Sustainability through Process Upgradation

- * Availabilty of wet washing system for fibrous raw materials
- Improved pulp washer for agro based mills
- # Oxygen delignification + Conventional or ECF bleaching
- * Chemical Recovery Plant (Individual or Common)
- High consistency pulper for waste paper based mills

* Both Kraft and writing and printing agro based mills

Agro based writing and printing mills

WAYS ADOPTED TO ACHIEVE NORMS

Environmental Sustainability through Fresh water conservation

- Availabilty of calibrated flow meter at bore well and distribution pipe lines
- Availability of fresh water reservoir
- Online continuous environmental monitoring system
- Paper machine nozzles of specified diameter (< 0.75 mm)
- Installation of fiber recovery unit like Krofta / Sedi cell / Poly disc filter etc
- Increased reuse and recycle of back water / treated effluent

WAYS ADOPTED TO ACHIEVE NORMS

Environmental Sustainability through ETP upgradation

- Adequacy assessment of existing ETP
- Provision of equalisation tank
- Upgradation / Modification of primary clarifier to achieves SS level of <200 mg / l at clarifier outlet
- Adequate aeration through diffused / surface aerators
- Maintenance of MLSS level 2500 – 3000 mg / l
- Provision of Tertiary treatment system – Physico – Chemical options / or dual media / multi grade filter, Pressure sand filter, activated carbon

ACHIEVEMENTS OF WATER CHARTER

S. No	Parameters	Reduction %
1	Black Liquor Discharge	100
2	Reduction in fresh water consumption	60 – 75
3	Reduction in effluent generation	60 – 75
4	Reduction in loads in terms of TSS, BOD, COD	40 – 70
5	Reduction in colour waster water discharge	80 – 90

CORPORATE SOCIAL RESPONSIBILITY

CORPORATE SOCIAL RESPONSIBILITY

- Water supply projects
- School uniform distributions
- Subsidized notebook distributions
- Cattle vaccination program
- Distributions of medicines
- Medical facilities such as mobile health care units
- Drinking water arrangements
- Drinking water arrangements for cattle
- Organizing social awareness programmes

CORPORATE SOCIAL RESPONSIBILITY

Education - Sponsoring every year nearby Village students to pursue course on **Diploma in Pulp and Paper technology at SIT Trichy**

Health - Free medical Camps for nearby Villagers regularly.

CORPORATE SOCIAL RESPONSIBILITY

Our priority was to take care of drinking water for the community...
Our Social responsibility

About 6000 m3/day of potable water is supplied to Colony residents and nearby villages through a network of 350 water taps

GROUND WATER RECHARGING POTENTIAL


Kadachanallur


Ramadas Nagar


Iyunthupanai


Chinnanangur Lake - 2

TECHNICAL ORGANIZATIONS

Technical Organizations working for making Paper industry globally competitive in India

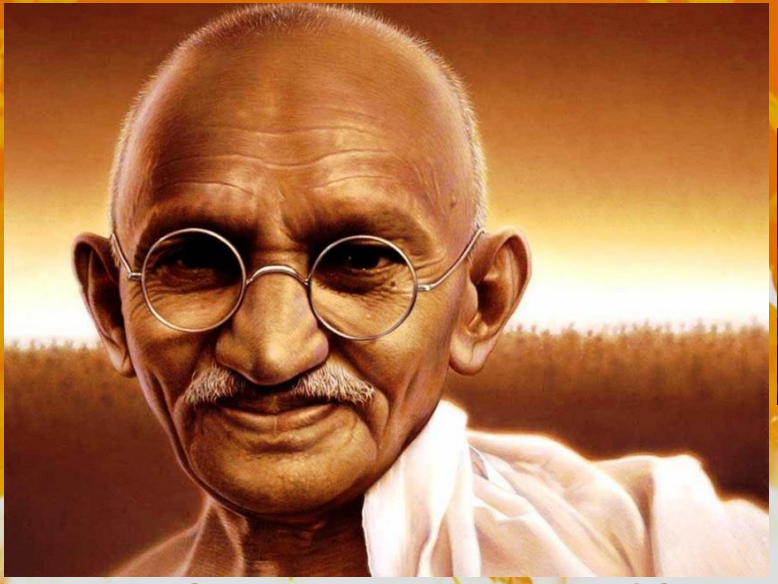
Central Pulp & Paper Research Institute

Indian Paper Manufactures Association

Indian Pulp & Paper Technical Association

Indian Agro & Recycled Paper Mills Association

Confederation of Indian Industry



Be the change you wish to see in the world.

Mahatma Gandhi

Thank You