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Factors defining tissue DIP concept: end product demands, raw material and operational costs




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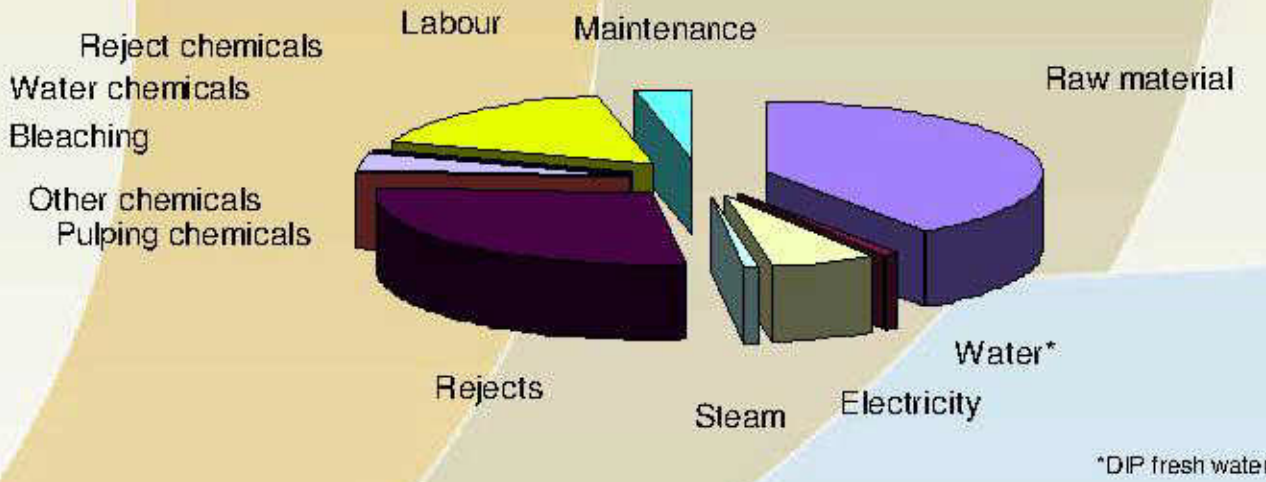
ABTCP

DIP cost analysis for tissue (example)

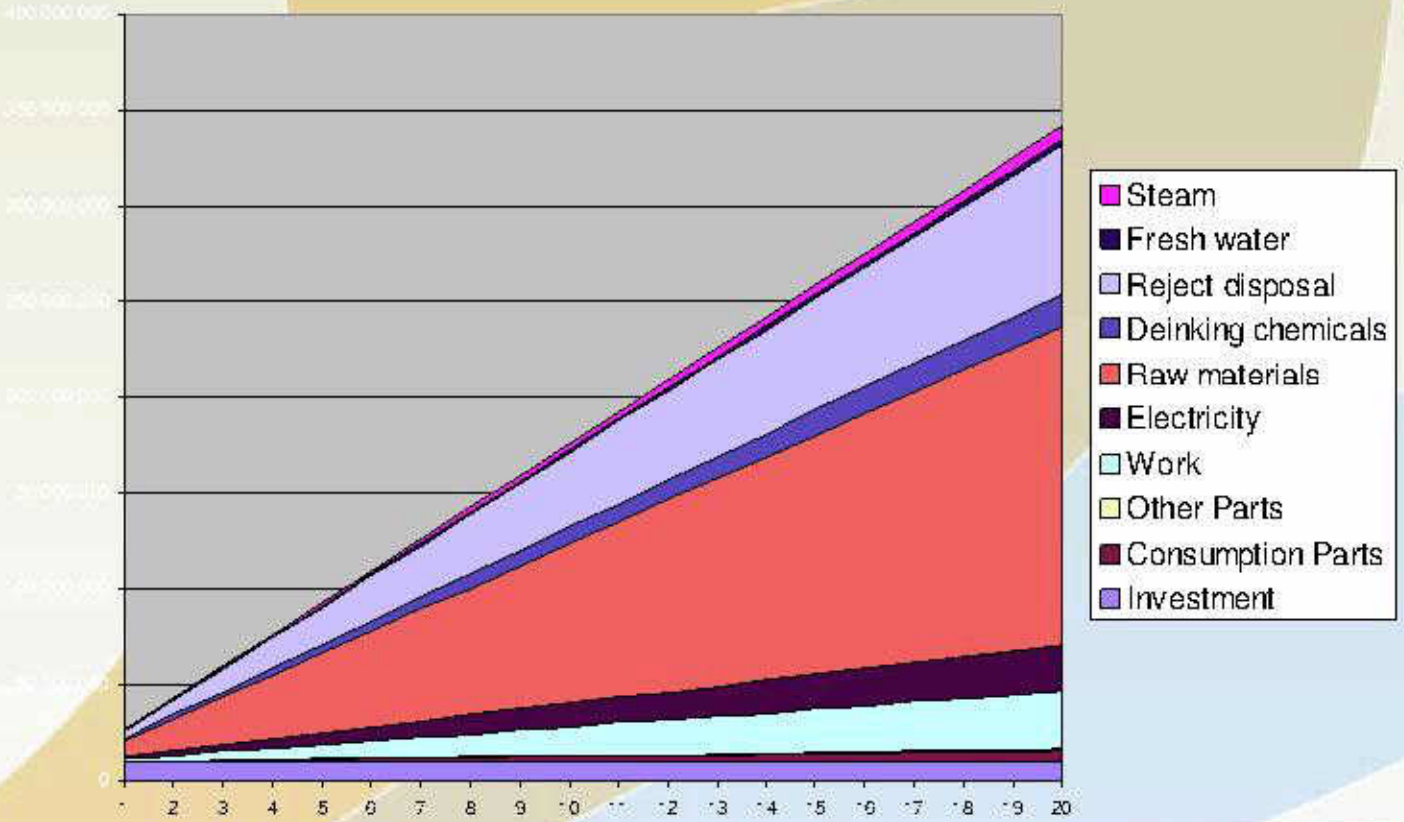
End product demands, raw material & operational costs



- **Costs variables are typically mill specific (final product, raw material, labour, electricity, water, reject treatment/disposal)**
- **By technology and concept solutions we can affect the total costs = investment + operational costs**

Life-cycle costs (example)

Total costs = Investment + Operational Costs



Dedication for life-time cost reduction! => RTD, service, performance studies

Yield as a Function of Ash Contents

$$\text{Yield (\%)} = 100 * \frac{A_{production}}{F_{production}}$$

Measurement of production.

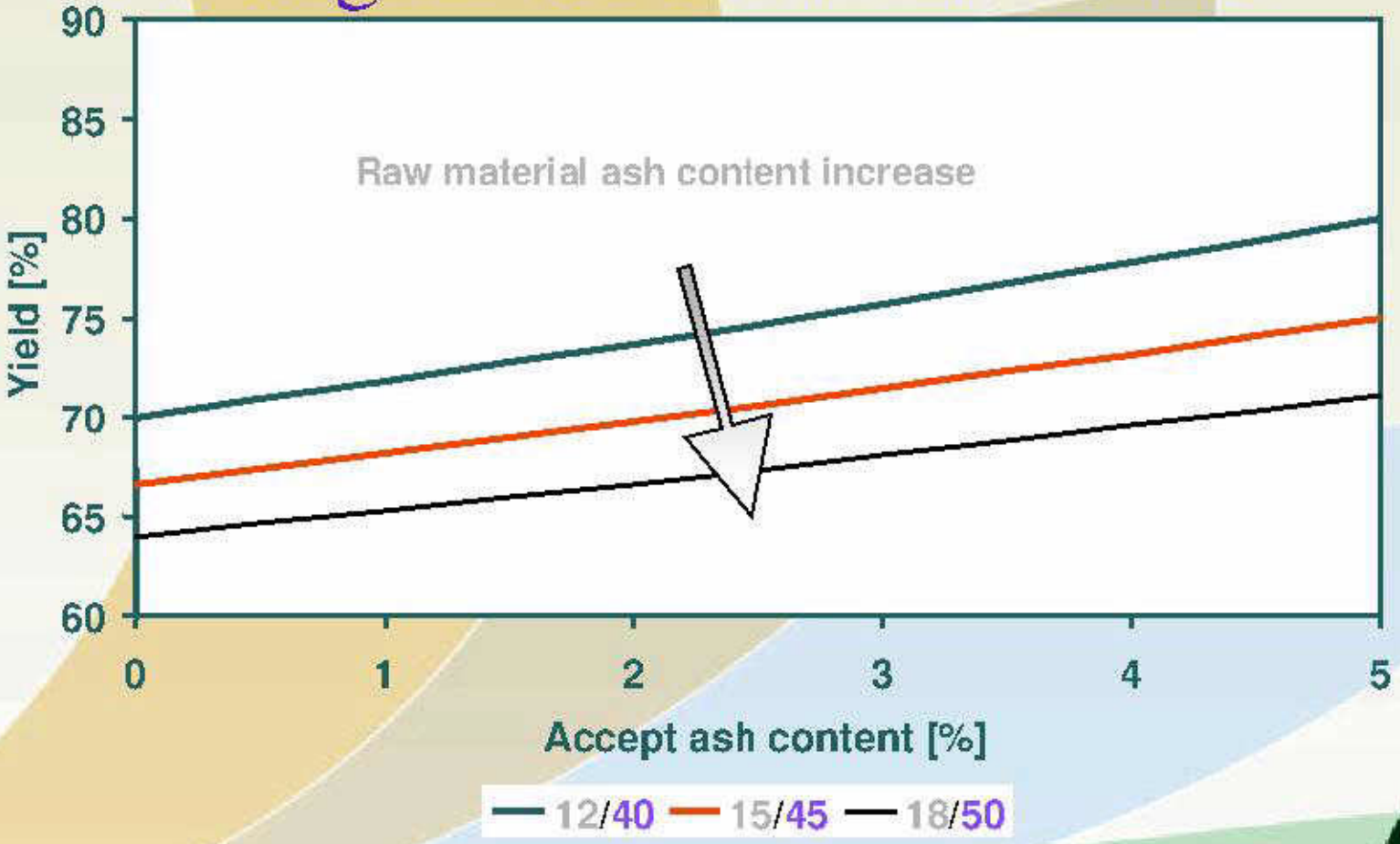
$$\text{Yield (\%)} = \frac{100*(R_{ash} - F_{ash})}{(R_{ash} - A_{ash})}$$

Measurement of ash content gives repeatable result.

For the total yield calculation, the outthrows of the pulper must take into consideration.

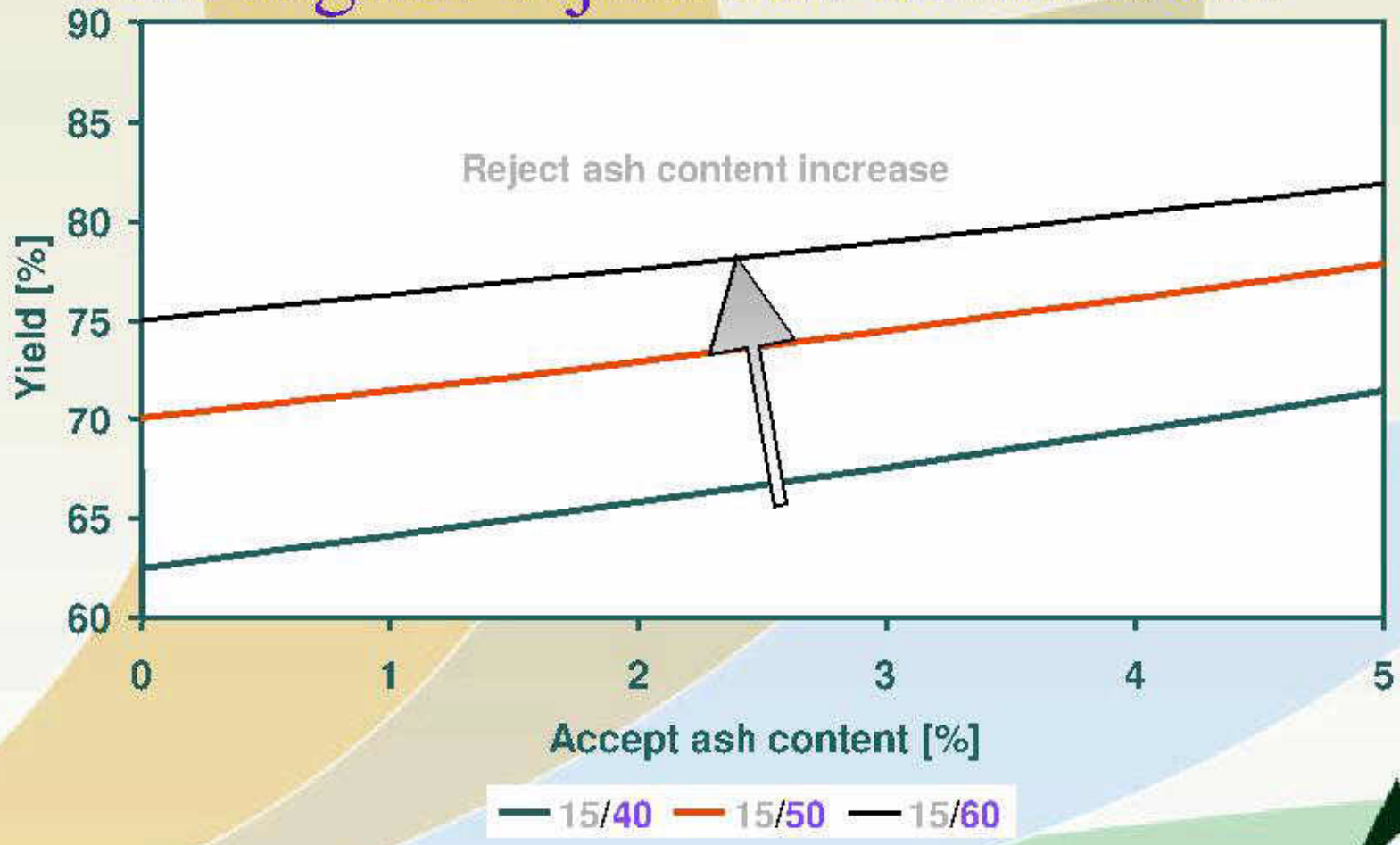
Yield and Ash Removal

The higher the ash removal the



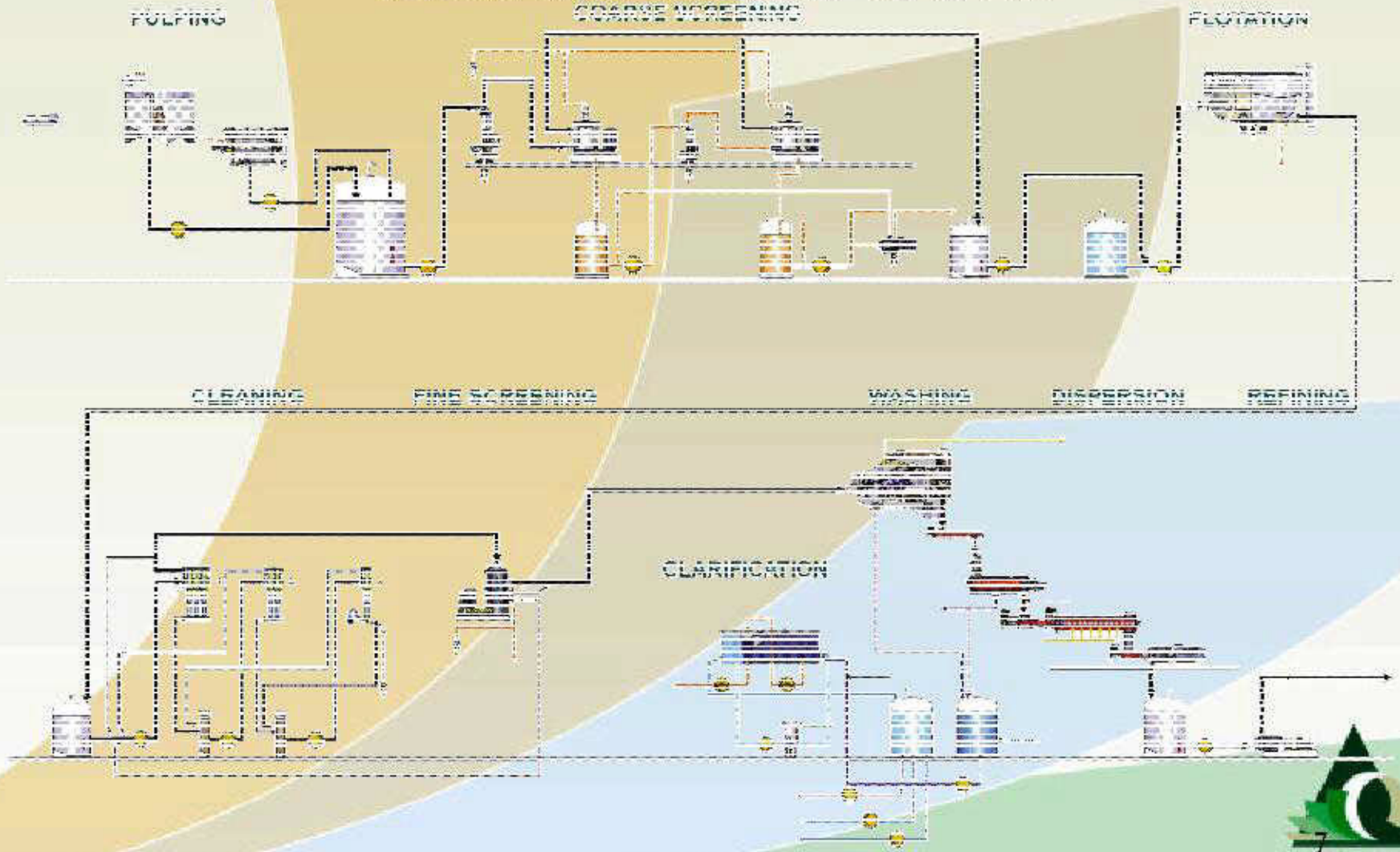
Yield Improvement

The higher reject ash content the

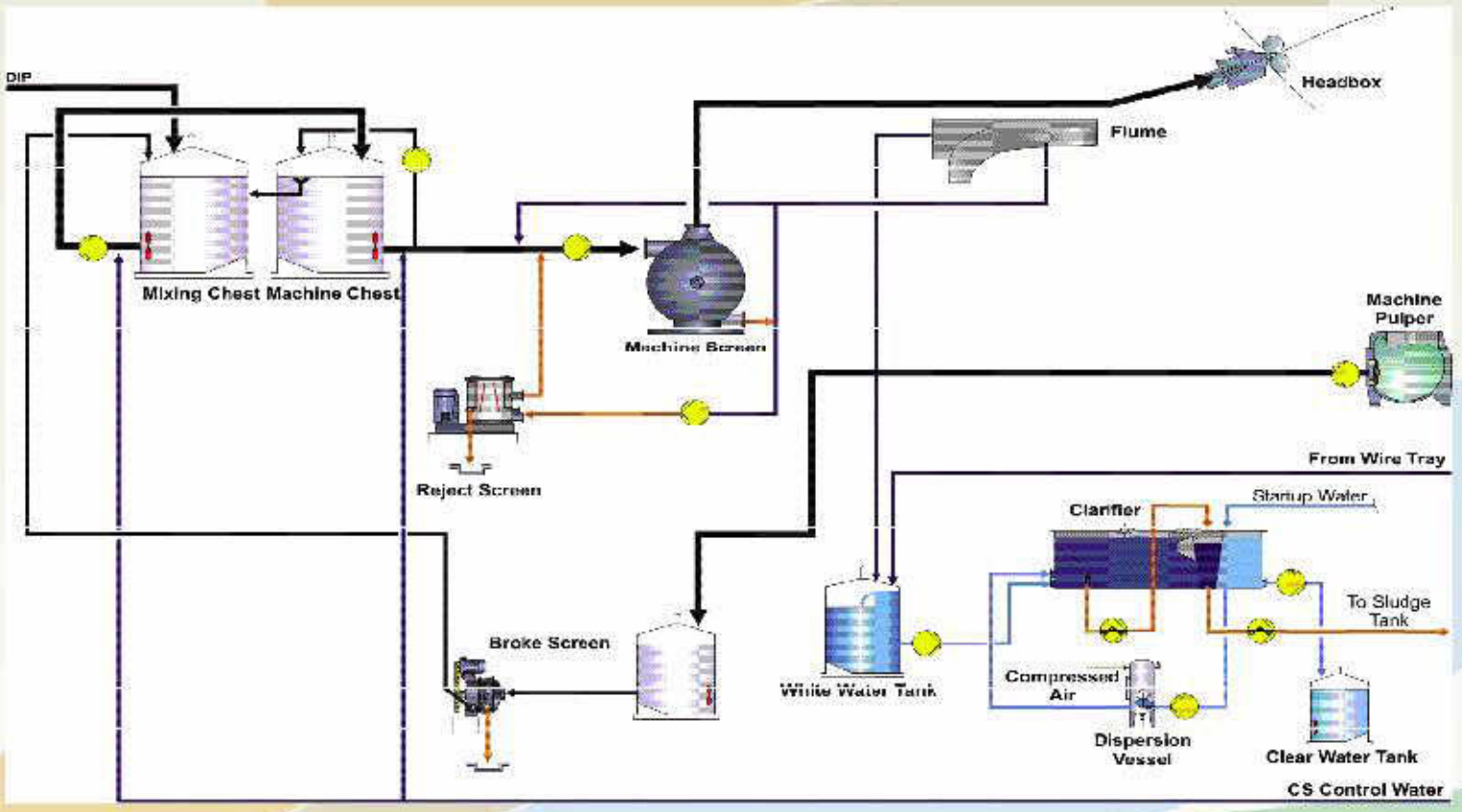


DIP line for towel & tissue

Cleanliness and Ash removal



Stock preparation flowsheet

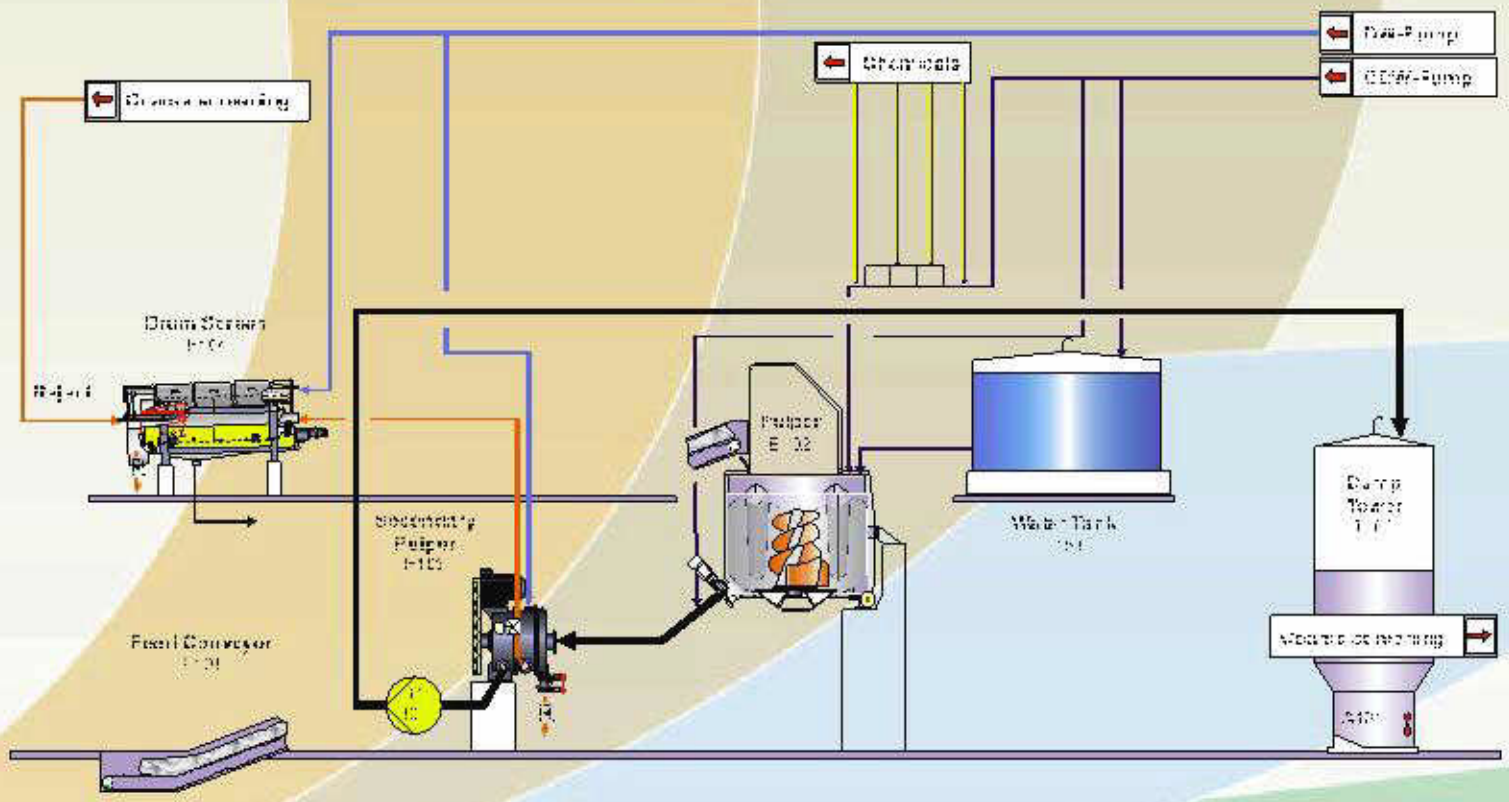


System performance

Tissue and towel production

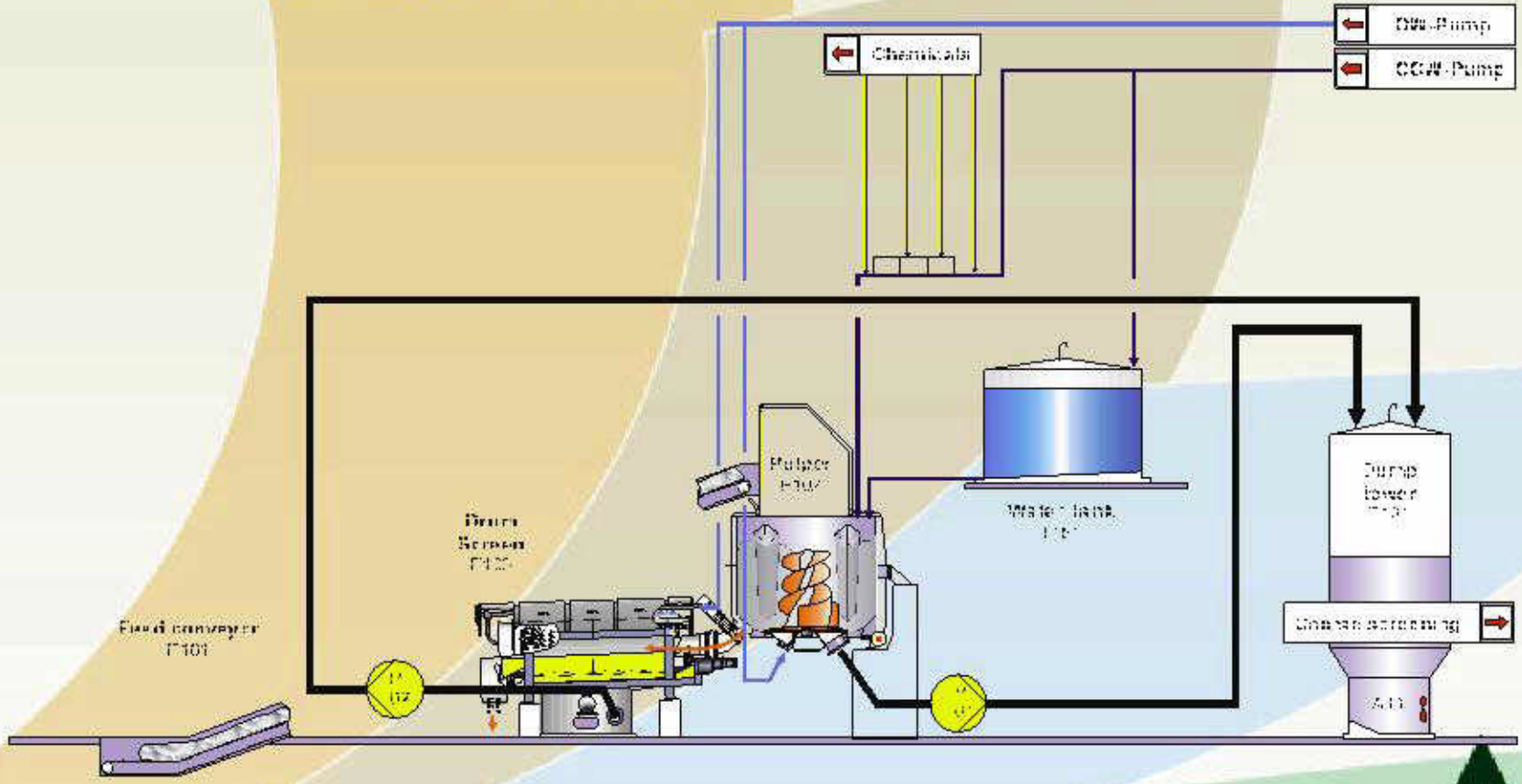
Target value	Performance	
	TOWEL	TISSUE
Brightness (ISO %)	55/60	72/82
Ash content (%)	3-7%	<3%
Yield (%)	70-75%	65-70%
Analysis	**Performance**	
	TOWEL	TISSUE
Ash content after pulper (%)	17,8	19,1
SR after pulper (ml)	35,0	25,0
Initial brightness (ISO %)	48,2	65,7
Ash content after deinking (%)	6,4	4,1
SR after deinking (ml)	51,1	28,0
Brightness after deinking (ISO %)	53,0	71,2
Final paper ash content (%)	4,8	2,7
Final paper brightness (ISO %)	55,0	73,0

FLOWSHEET
PULPER WITH SECONDARY PULPER



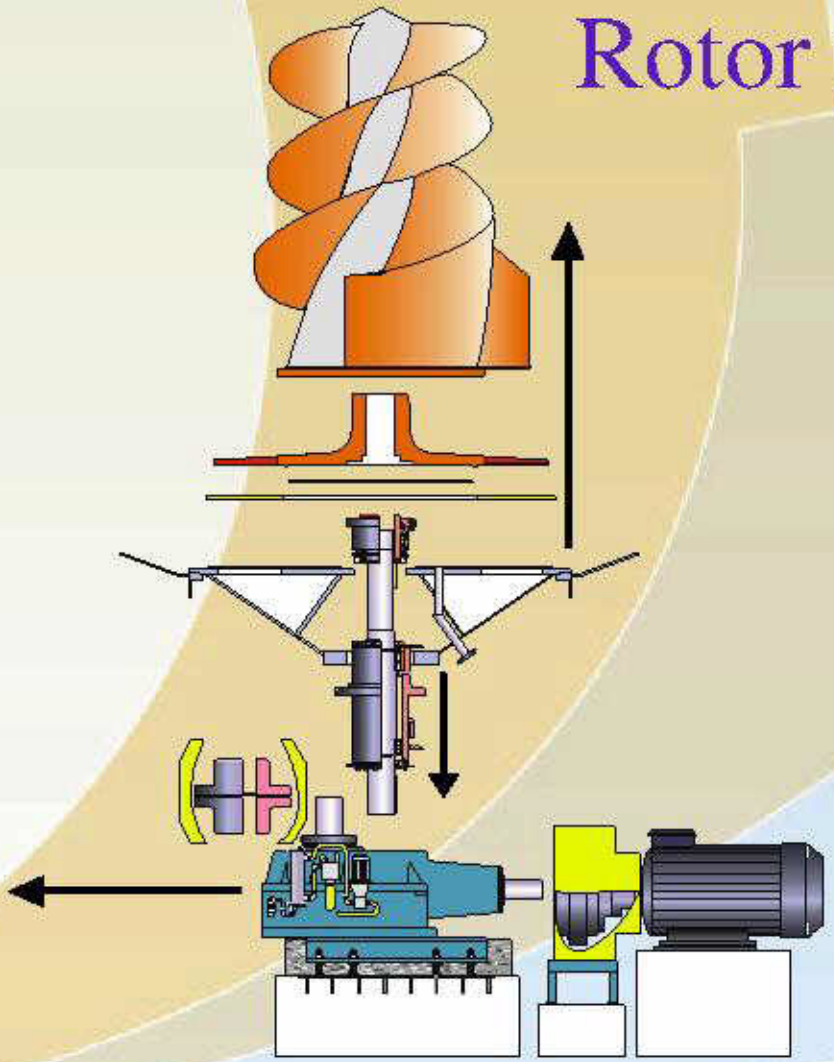
FLOWSHEET

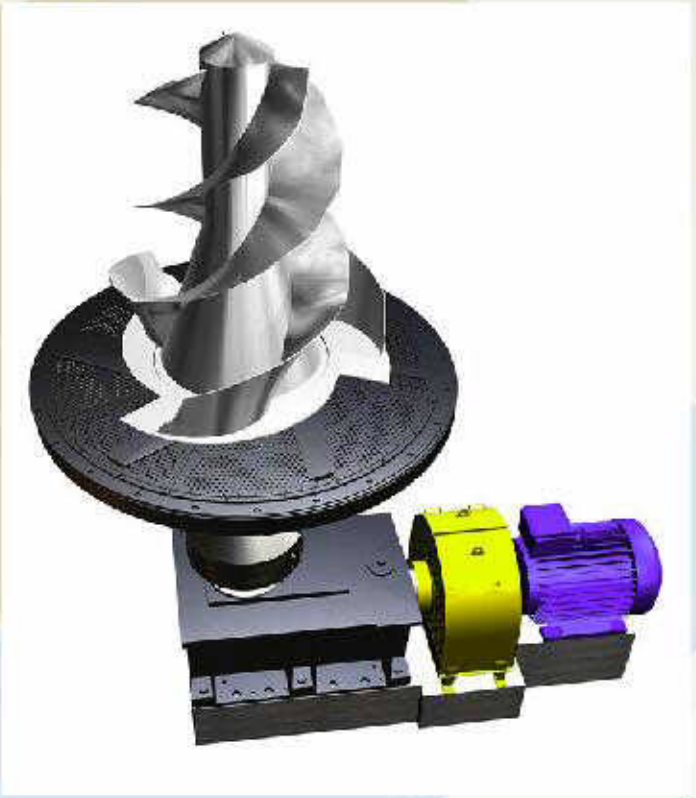
PULPER WITH SCREEN PLATE



OptiSlush VH Pulper

Rotor unit





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HC BatchPulping

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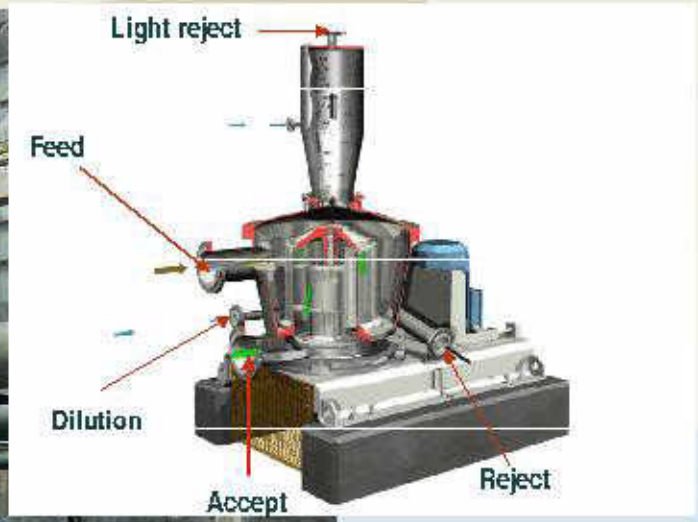
OptiSlush VH Pulper

Advantages

- Clean pulp for further processing
  - Efficient contaminant detachment from fibers
  - Excellent ink particle separation
- High pulp yield
  - Efficient movement of pulp
  - The special rotor design with three helical spirals ensures complete pulp movement thoughout the vat.
  - Excellent defiberizing
- Efficient and Simple rejects removal
  - Helical Rotor with extraction plate and direct discharge to drum screen

OptiScreen CS coarse screens

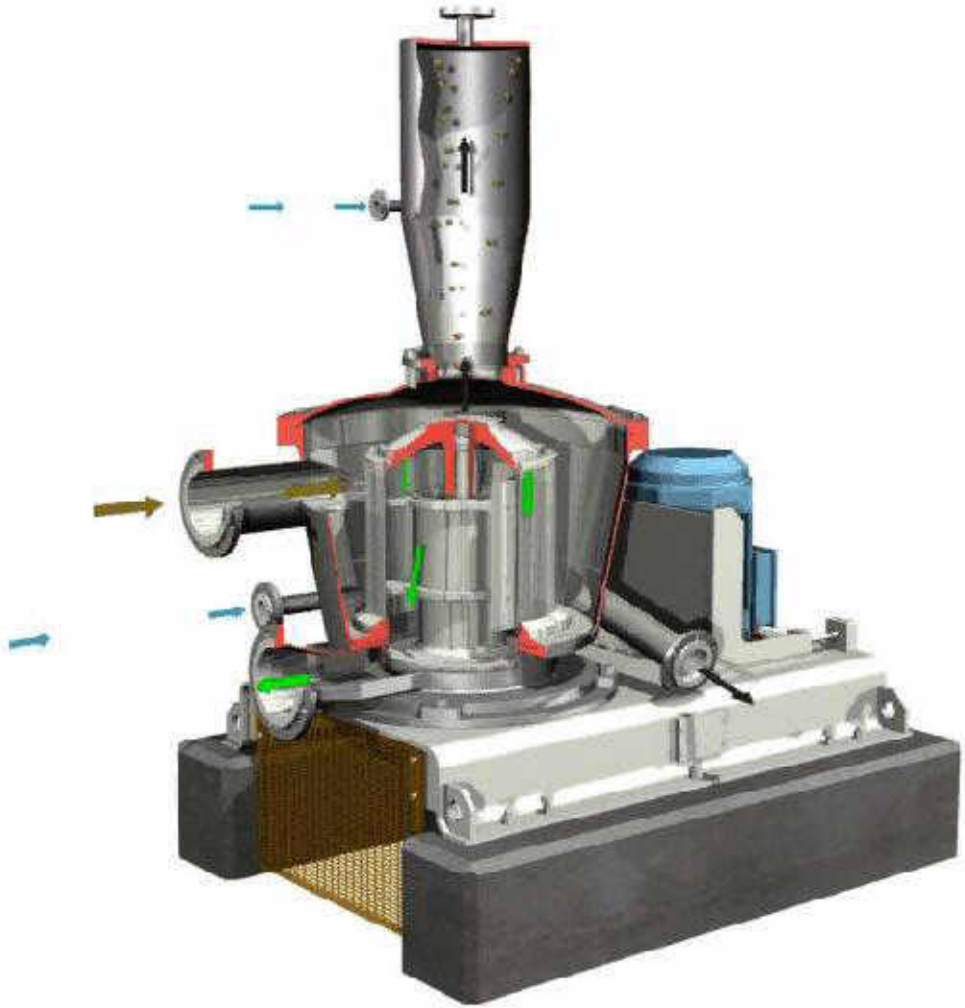


High capacity
Low energy
Low wearing

The purpose of DIP coarse screening

Coarse screening tasks

Target	Coarse screening
Remove	plastic, adhesives, staples, paper clips, sand, glas bigger than screen basket hole width
Maximize	pulp quality and constant runnability
Minimize	fiber loss, breakdown of impurities, energy consumption
Protect	pre and fine screening systems and other process stages against damages



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Flotation

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ρ_{as} = Density in aeration sector

ρ_{ss} = Density in separation sector

Δp = Pressure difference between aeration and separation sector

High ash removal
Low fiber losses
Low energy
Small layout

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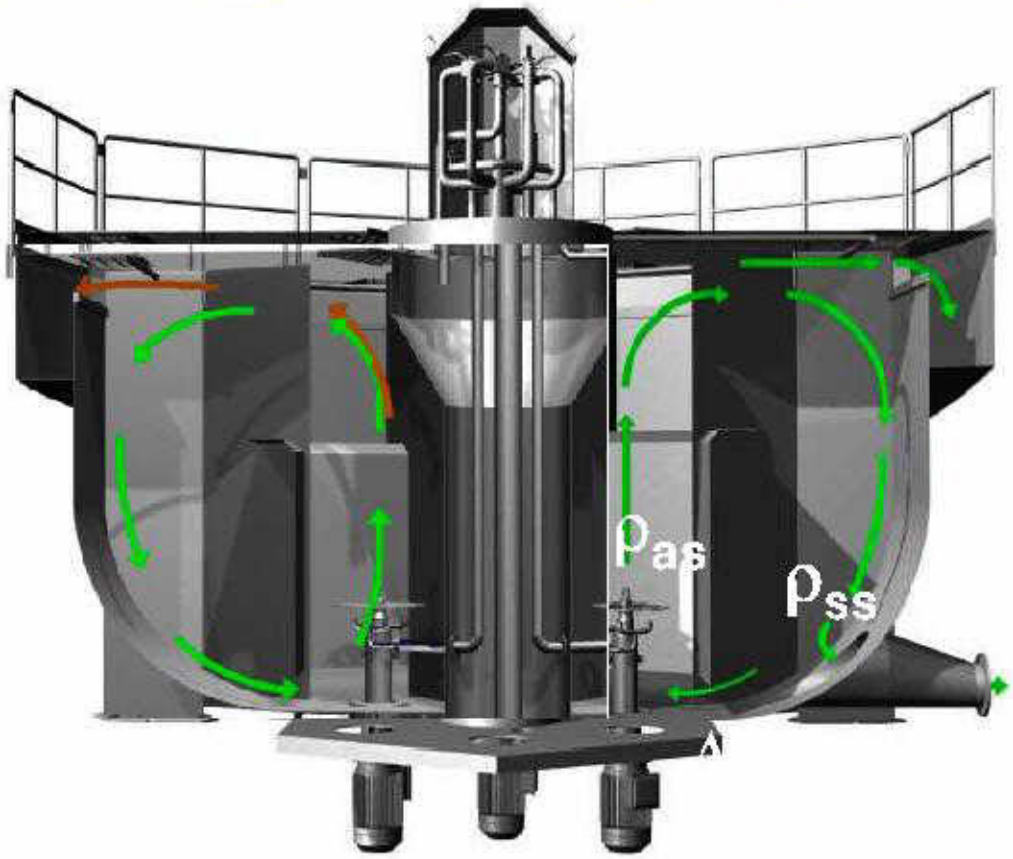
Flotation

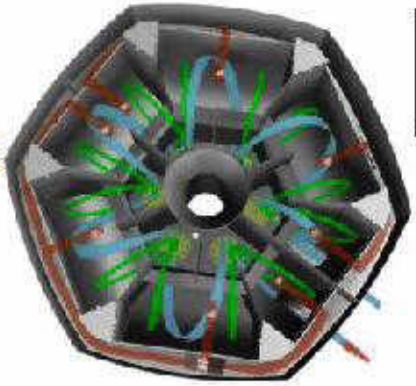
Selective tool to remove ash

Yield and quality depends on

- Retention time
- Feed consistency
- Control of reject overflow
  - flotation cell technology
  - foam retention time
- Ash share and fiber in reject
- Foaming
  - pulp ash content
  - chemistry
  - the amount of air
- Bubble size distribution (air feed flow vs. rotor speed, rotor type);

Operation Principle - Basic Physics





ρ_{as} = Density in aeration sector

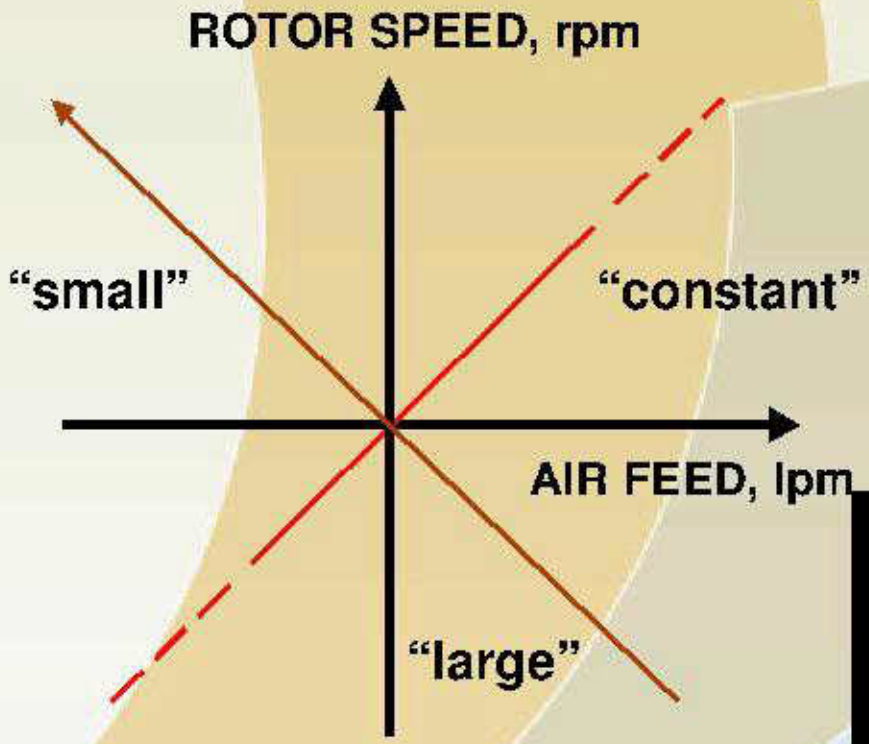
ρ_{ss} = Density in separation sector

Δp = Pressure difference between aeration and separation sector

The circulation of stock is based on the difference in the stock's specific gravity between the aeration and separation sectors.

Flotation

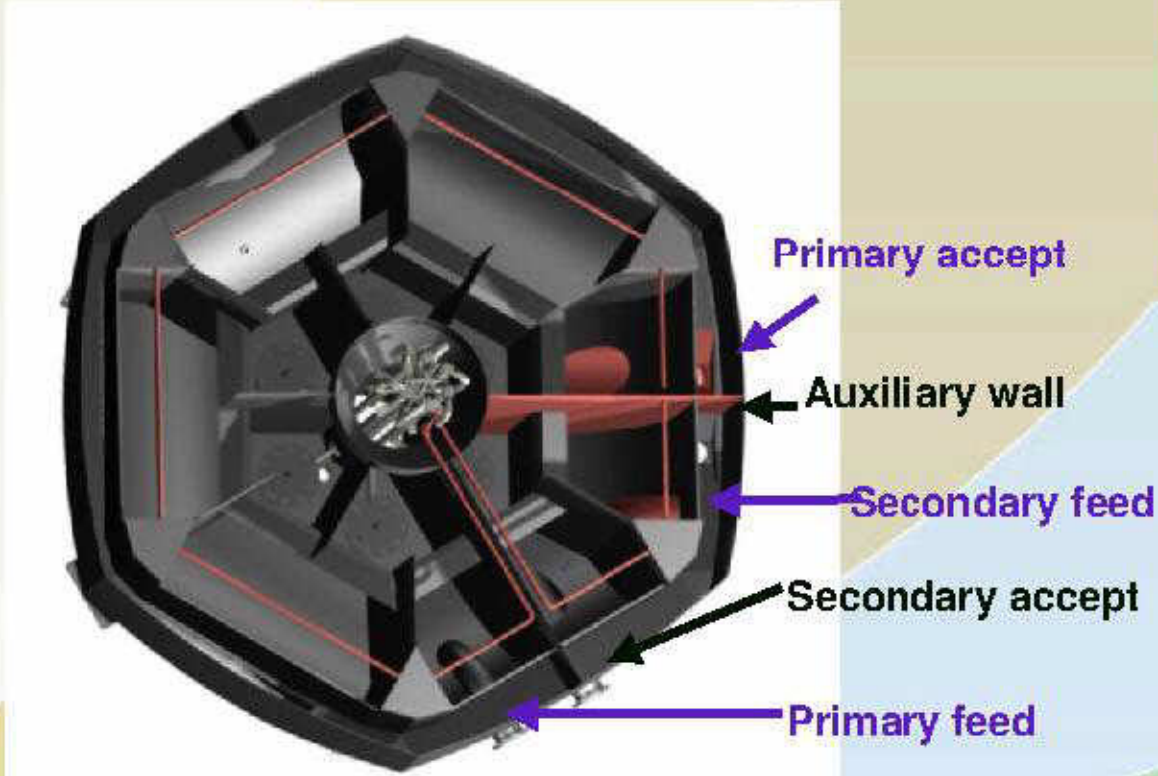
Aeration Adjustment



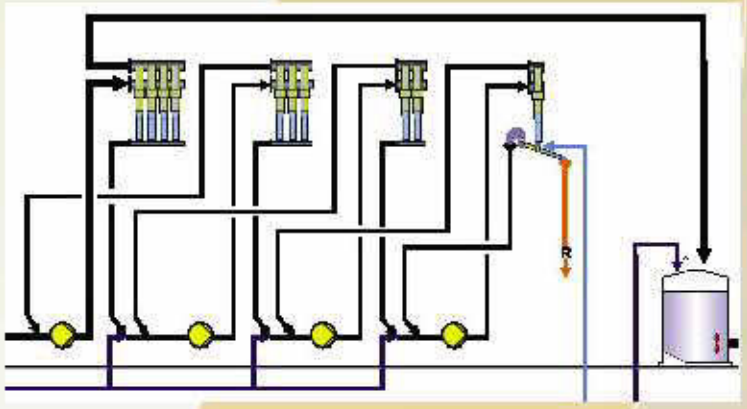
- Bubble size can be controlled by rotor speed and air feed
- Bubble size is also affected by chemistry and consistency

OptiBright MC Flotation

Two Stages in One Unit



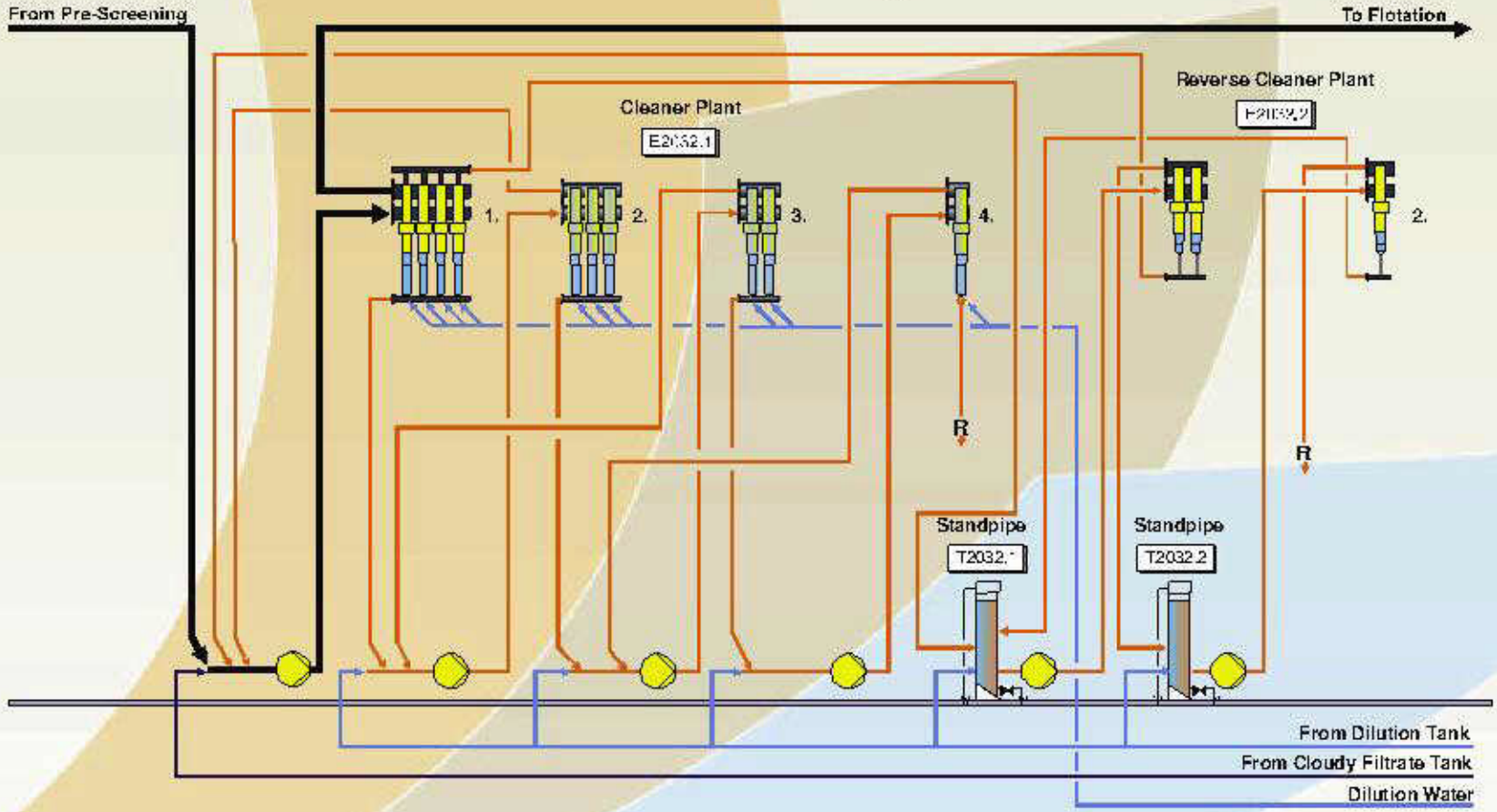
Centrifugal Cleaning

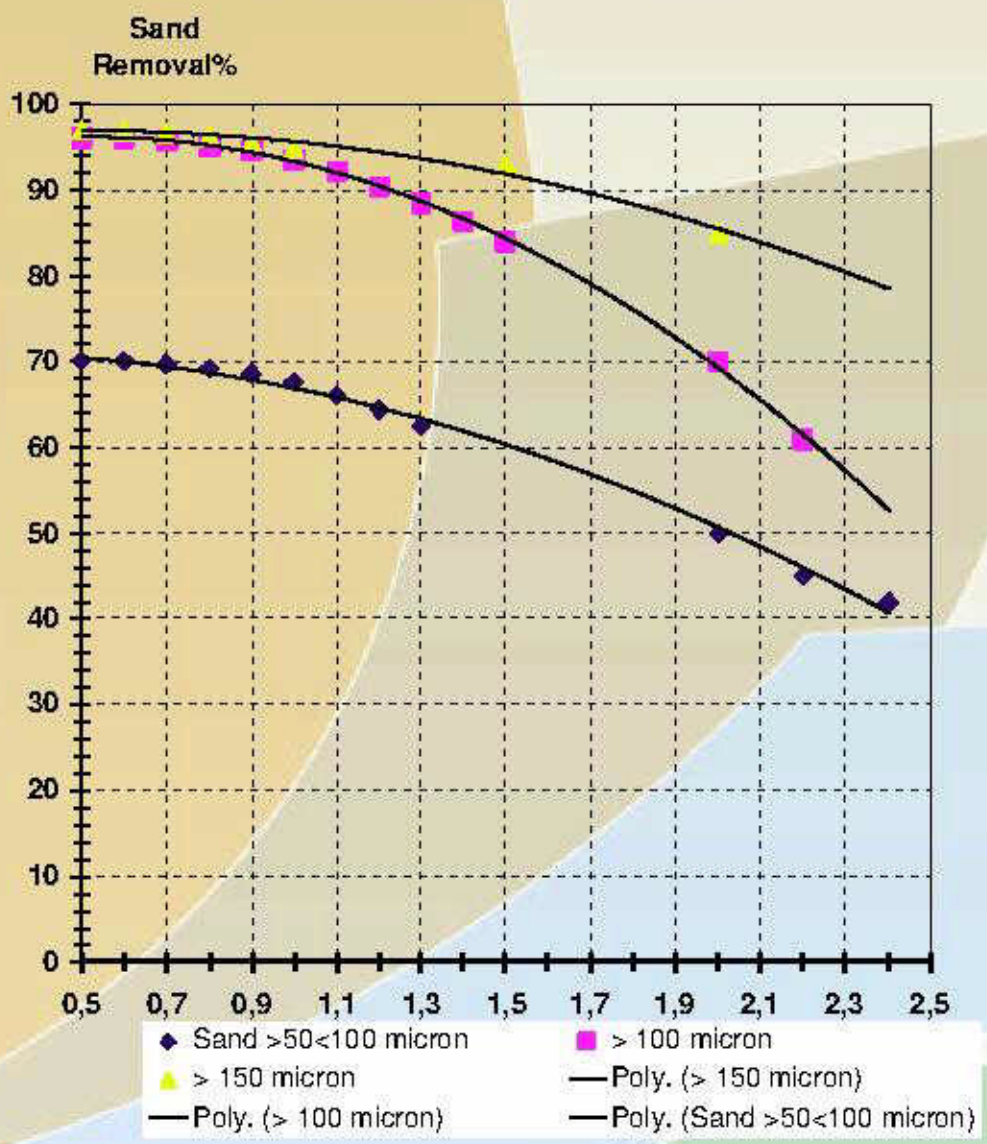


Objectives:

- Spec and Sand Removal Higher Consistencies
- Protection to the Fine Screens against wear

Cleaning


From Pre-Screening
To Flotation
Cleaner Plant
E2032.1
Reverse Cleaner Plant
1.
2.
3.
4.
2.
R
R
Standpipe
T2032.1
Standpipe
T2032.2
From Dilution Tank
From Cloudy Filtrate Tank
Dilution Water


Clp 700 CRC at 150 kPa (21 psi) PD
Sand Removal%
100
90
80
70
60
50
40
30
20
10
0
0,5
0,7
0,9
1,1
1,3
1,5
1,7
1,9
2,1
2,3
2,5
Sand >50<100 micron
> 100 micron
> 150 micron
Poly. (> 150 micron)
Poly. (> 100 micron)
Poly. (Sand >50<100 micron)

Multi-stage OptiScreen FS

Low total investment
Low total energy
Small layout

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Pre and fine screening

Typical challenges in the screening systems

Problem	Consequence	Cost
Low separation of stickies	Lower overall sticky removal	Poor paper machine runnability
Low separation of dirt	Dirt specks on sheet	End product attractiveness and price
Low separation of heavy reject	Screen basket wear	Short screen basket life-time
High fiber loss	More raw material needed	Cost of fiber, reject treatment cost
Poor runnability	Disturbancies in production	Lost production
Frequent mechanical failures	Increased need for maintenance	Maintenance cost, lost production

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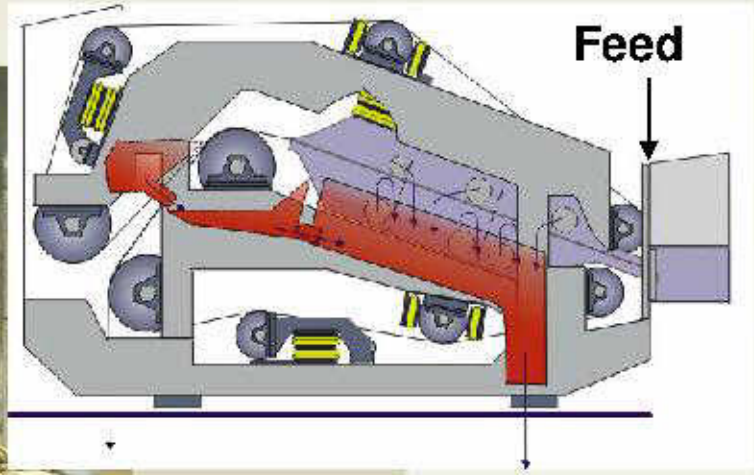
Multi-Stage Fine Screen

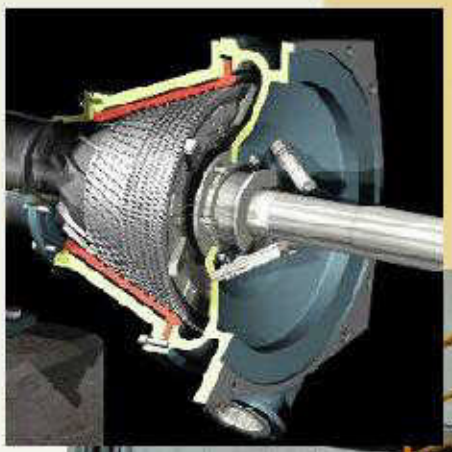
- Low or Medium Consistency Operation
- Low installation costs
- Eliminates intermediate tanks, pumps, controls, pipes, etc

OptiThick GapWasher



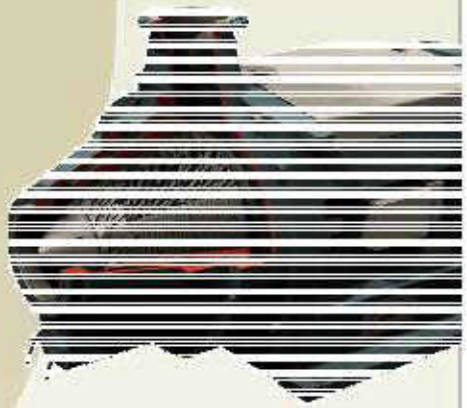
- High capacity
- Controlled washing/yield
- Low fiber losses
- Compact layout

OptiFiner Dispersion



Efficient heating & bleaching (HI)
Compact heating (CT)
Strength improvement

OptiFiner RF Refiner



Optimum refining result
Low total energy
Small layout

OptiDaf Microflotation

Compact layout
Uniform water quality

Summary

End product demands, raw material & operational costs

- Innovative unit process technologies
  - Efficient screening => runnability of washer and PM
  - Adjustable flotation
  - Controllable washing combined with DAF=> high ash and microsticky removal
  - Conical disperger => high dirt reduction and development of strength properties
- High production rate (even 86 tpd)
- Low water consumption (6-7 m3/t)
- Excellent process performances
  - Yield > 65%
  - Ash reduction >80%
  - SRE > 96%
- Concept life-time cost efficiency

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