Optimized refining for sustainable fiber treatment, case Valmet Conical Refiner Pro

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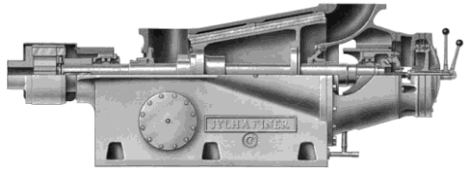
Optimized refining for sustainable fiber treatment

Agenda

1. Valmet´s low-consistency refining
2. From idea to solution
3. Case studies
4. Proven technology for MFC production
5. Summary

Valmet´s low-consistency refining solutions

Decades of experience from conical refiners and disc refiners with the industry's largest global installed base



1952
Jordan Refiners

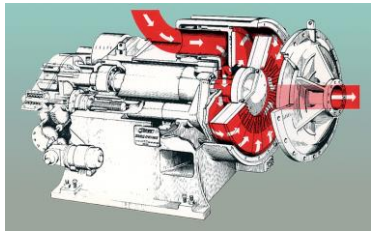
1962
Double Disc Refiners

1983
Conflo Refiners

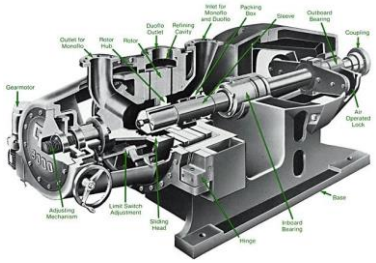
2010
Conical Pro Refiners

Valmet Refiner Family

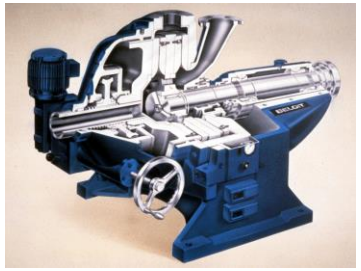
1953
DD2000



1964
DD3000



1971
DD4000



2004
DD6000

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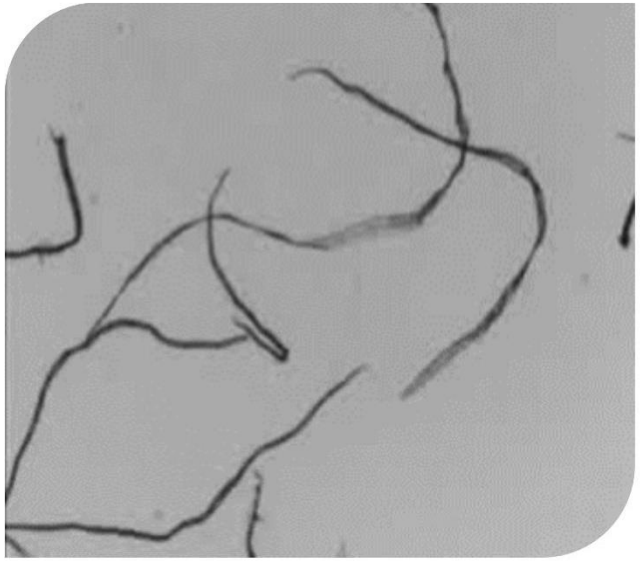
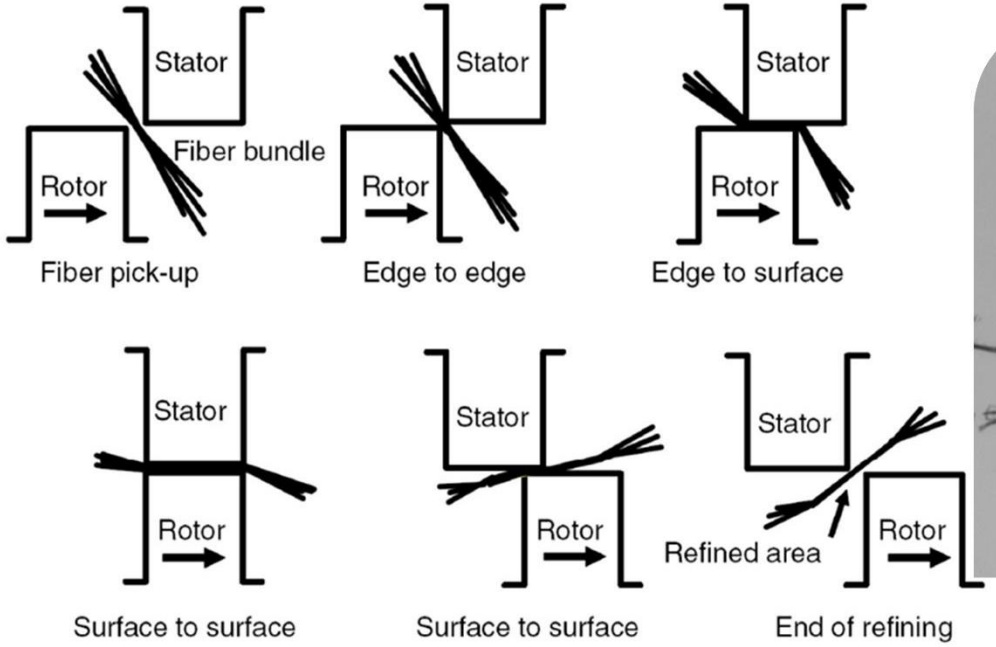
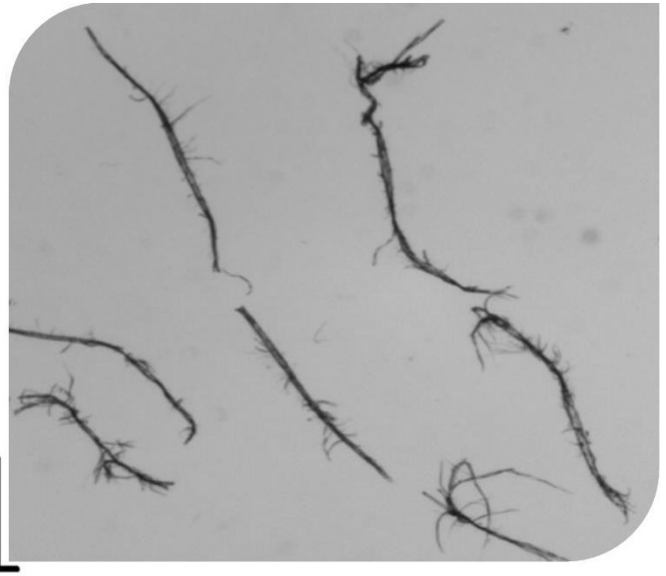
Purpose of refining







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Refining theories

Specific refining energy

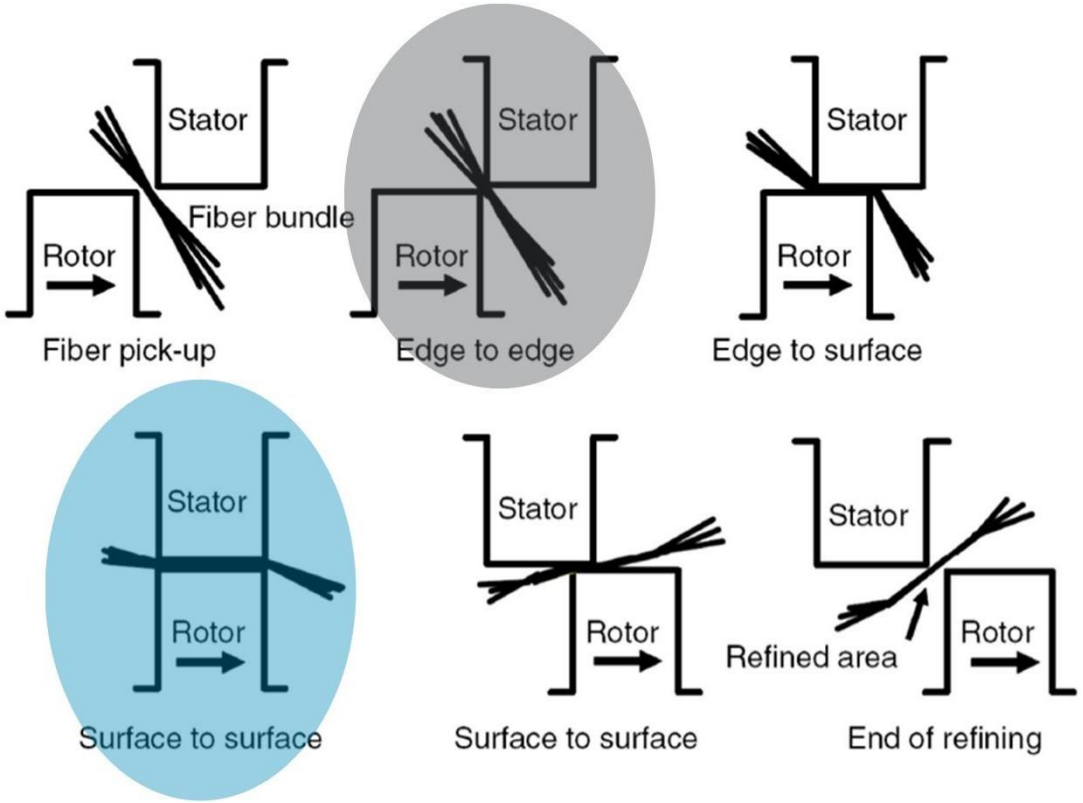
$$SRE = \frac{P_e}{m} = \frac{P_t - P_o}{F \cdot C_s}$$

Specific edge load

$$SEL = \frac{P_e}{L_s} = \frac{P_t - P_o}{CEL \cdot n}$$

Specific surface load

$$SSL = \frac{SEL}{IL}$$



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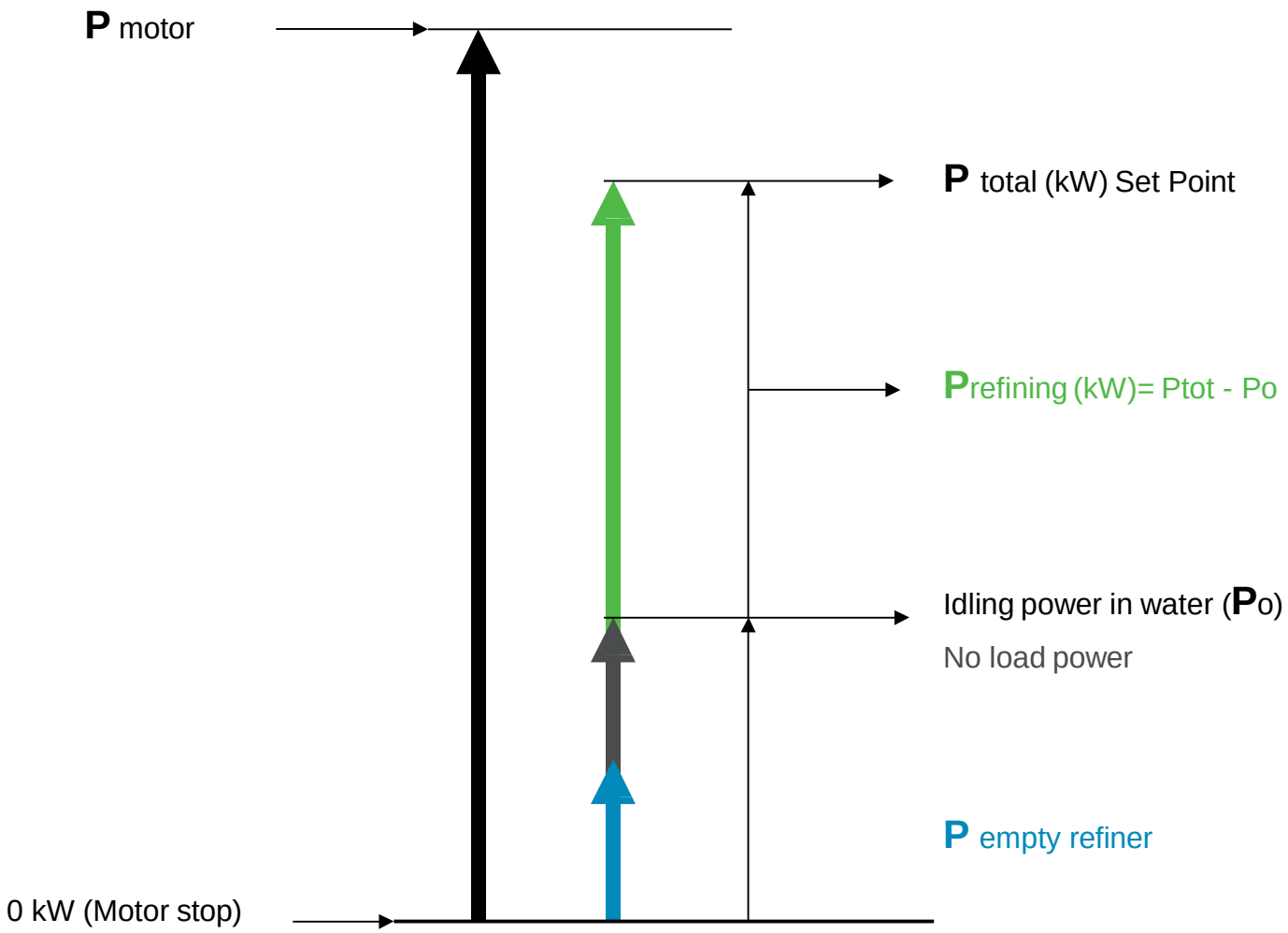
Refining power

$$P_0 = k * n^{2.8} * d^{4.5}$$

- k constant
- n speed
- d diameter



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Unique flow to refining zone → more fibers are treated

Theory proven by reference cases

Case linerboard, Asia

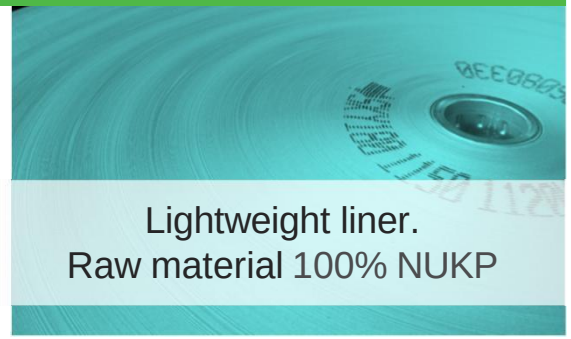
Original Refining System

Equipment

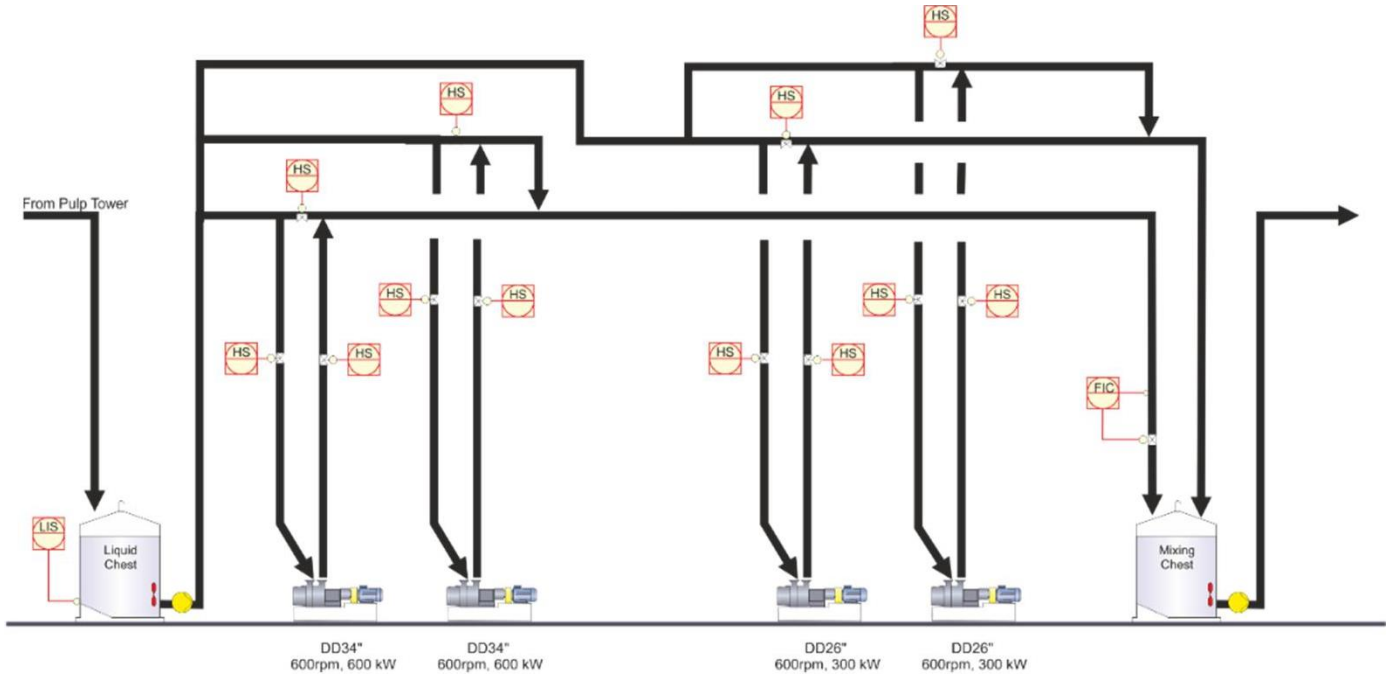
- 2 pcs of 34” competitor’s DDR
- 2 pcs of 26” competitor’s DDR

Furnish

- 100% NUKP
- Consistency 3.5–3.7%
- Refining degree 650 CSF → 420-440 CSF



Lightweight liner.
Raw material 100% NUKP



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Case linerboard, Asia

New Refining System

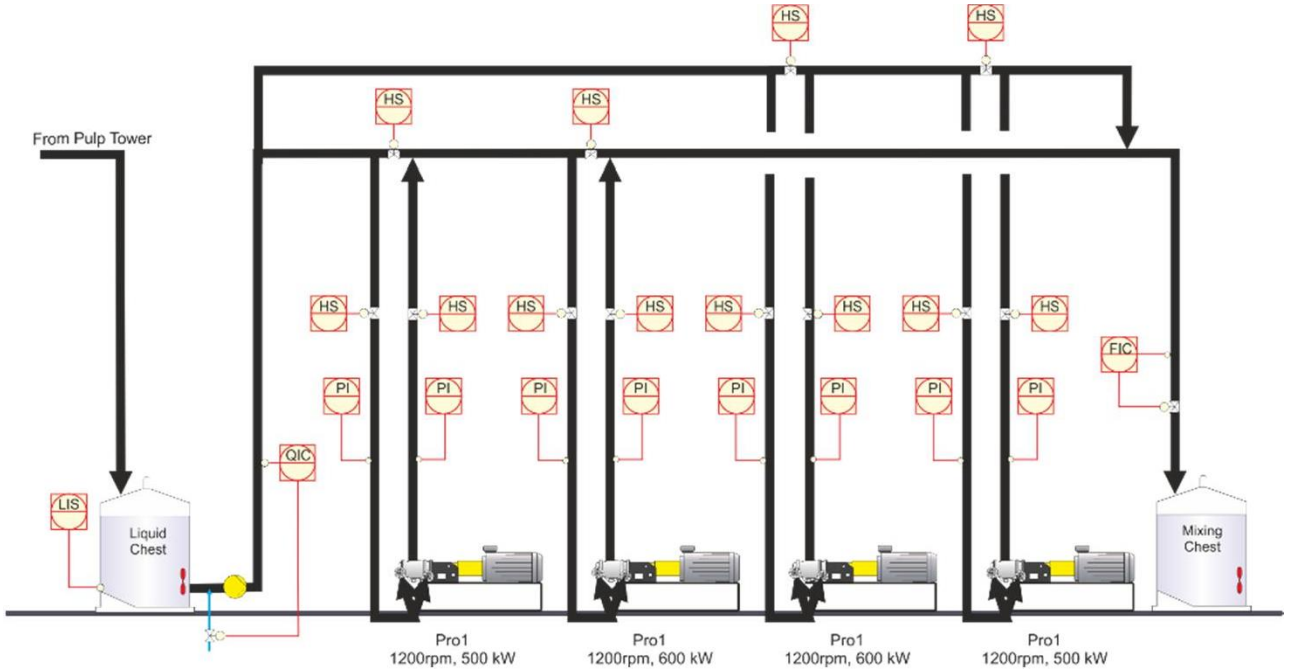
Equipment

- 4 x Valmet Conical Refiner - Pro1 refiners replaced the four competitor's DDR refiners

Results

- Significant energy savings
- Old system 100 TPD: 1764 kW → GRE 423 kWh/t
- New system 120 TPD: 1400 kW → GRE 280 kWh/t

34% less gross energy required



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Case linerboard, Asia

CO_2 emission reduction in LC refining

Valmet Conical Refiner – Pro 1 refiners replaced the four competitor's DDR refiners

Competitor's refiner	
Case Description	LC refining for linerboard, Asia
Customer benefits	Tensile strength Low fines generation
CO_2 emission per ton	**~ 322 kgCO_2/ton**

Valmet Conical Refiner - Pro	
Case description	LC refining for linerboard, Asia
Customer benefits	Lower refining energy Tensile strength Low fines generation
CO_2 emission per ton	**~ 213 kgCO_2/ton** 34% CO2-savings

Best case scenario

Energy

SOURCE Electricity **-143**kWh/ton

CO_2 **- 109** kg/ton

100 BDTPD (before) and 120 BDTPD (after) , 350 d/a , linerboard

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Case uncoated woodfree, Asia

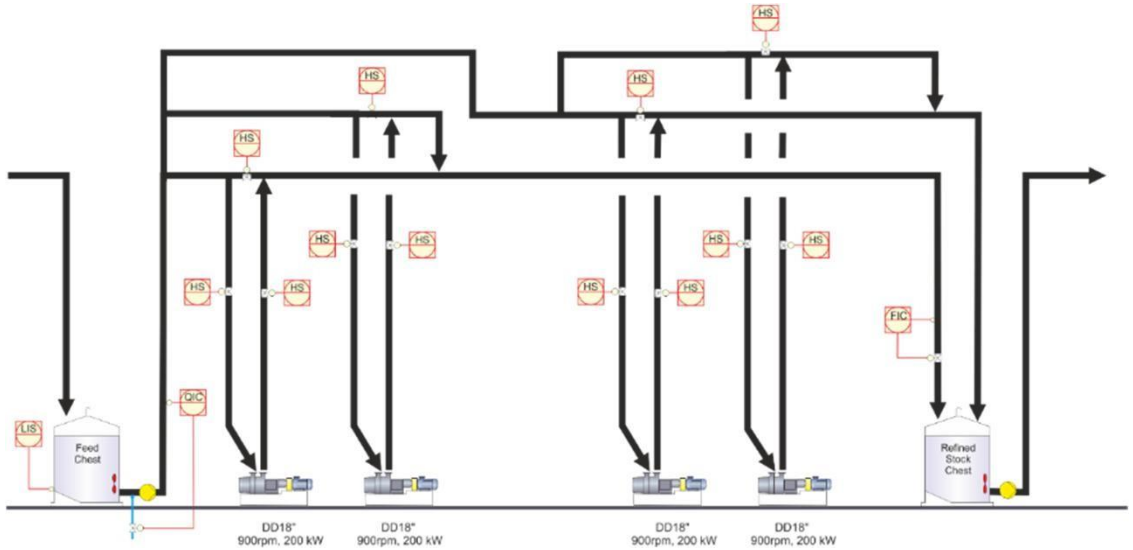
Original Refining System

Equipment

- 4 x of 18” competitor’s DDR

Furnish

- 40% Indonesian Mixed
  + 30% Moorim Mixed
  + 30% Mixed HW
- Consistency 4.5%
- Refining degree 650 CSF → 470 CSF



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Case uncoated woodfree, Asia

New Refining System

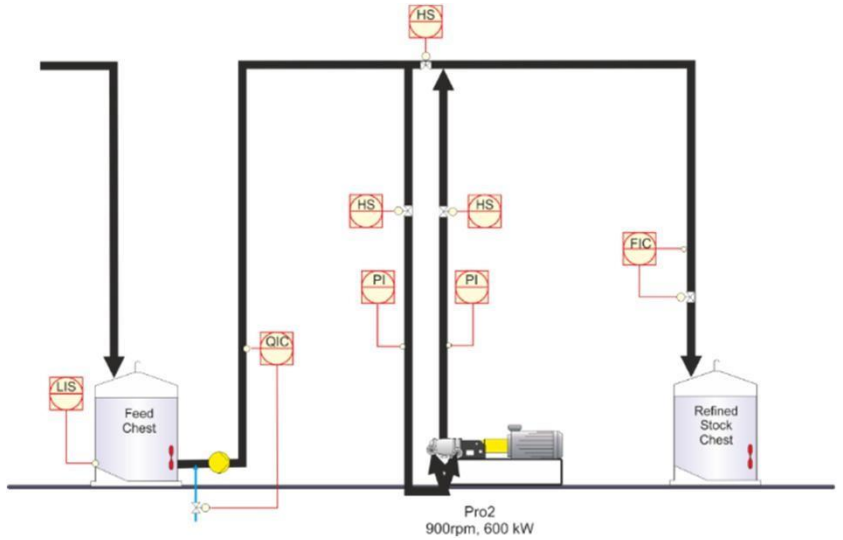
Equipment

- Valmet Conical Refiner – Pro 2 refiner replaced the four competitor's DDR refiners

Results

- Significant energy savings
- Old system 145 TPD: 720 kW → GRE 119 kWh/t
- New system 145 TPD: 440 kW → GRE 73 kWh/t

39% less gross energy required



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Case uncoated woodfree, Asia

Reducing CO_2 emissions in LC refining

Valmet Conical Refiner – Pro 2 refiner replaced the four competitor's DDR refiners

Competitor's refiner	
Case Description	LC refining for uncoated woodfree, Asia
Customer benefits	Tensile strength Low fines generation
CO_2 emission per ton	**~ 91 kgCO_2/ton**

Valmet Conical Refiner - Pro	
Case description	LC refining for uncoated woodfree, Asia
Customer benefits	Lower refining energy Tensile strength Low fines generation
CO_2 emission per ton	**~ 56 kgCO_2/ton** 34% CO_2-savings

Best case scenario

Energy

SOURCE Electricity **-46**kWh/ton

CO_2 **- 35** kg/ton

145 BDTPD, 350 d/a , uncoated woodfree

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Proven technology for Micro-Fibrillated Cellulose (MFC) production

Valmet Conical refiner Pro
Becoming the industry standard in producing MFC

On-specification MFC quality = correct type and amount of fines

Determined by fillings gap → utmost important to have accurate gap control

- Proven technology for MFC production
- Specific filling for MFC production available
- Equal fiber distribution to refining area through proactive two-ended feeding

- Fast and accurate gap control down to 1 µm level by servo motor
- Explicit fillings gap determination and online filling gap calibration by Touch Point Control (TPC) system

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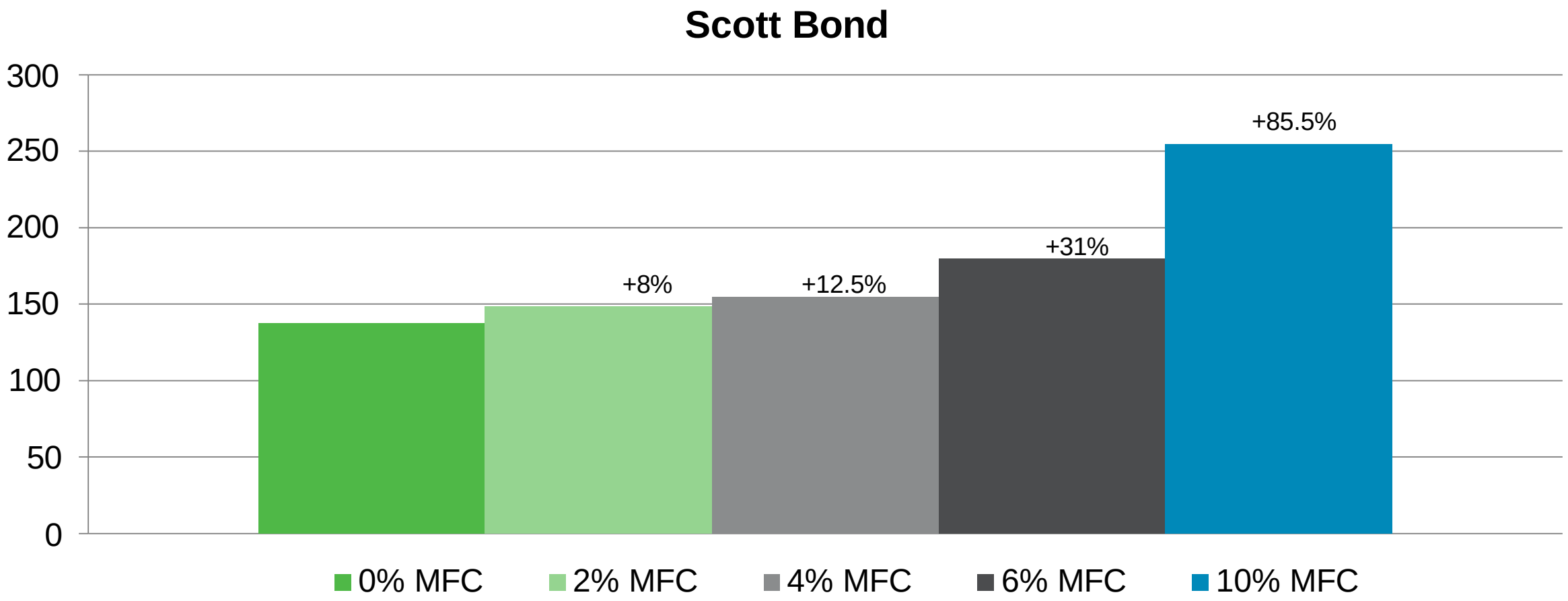
Source: Valmet internal

MFC Paper Results

Example of Internal Application - Specialty Electrical Paper 62 g/m^2



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Source: Valmet internal

Summary

Optimized refining for sustainable fiber treatment

Summary

Ideal solution for low energy consumption and sustainability in your paper production

Reduced energy consumption due to **lowest no load**

Accurate gap control and online calibration

More fiber receiving **proper refining**

Reducing CO_2 emissions

Valmet Conical Refiner Pro in MFC production

- Proven technology for MFC production
- Equal fiber distribution to refining area through proactive two-ended feeding
- Specific filling for MFC production available

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FORWARD