Intelli-Sizer ® - Size Press

Presenter:
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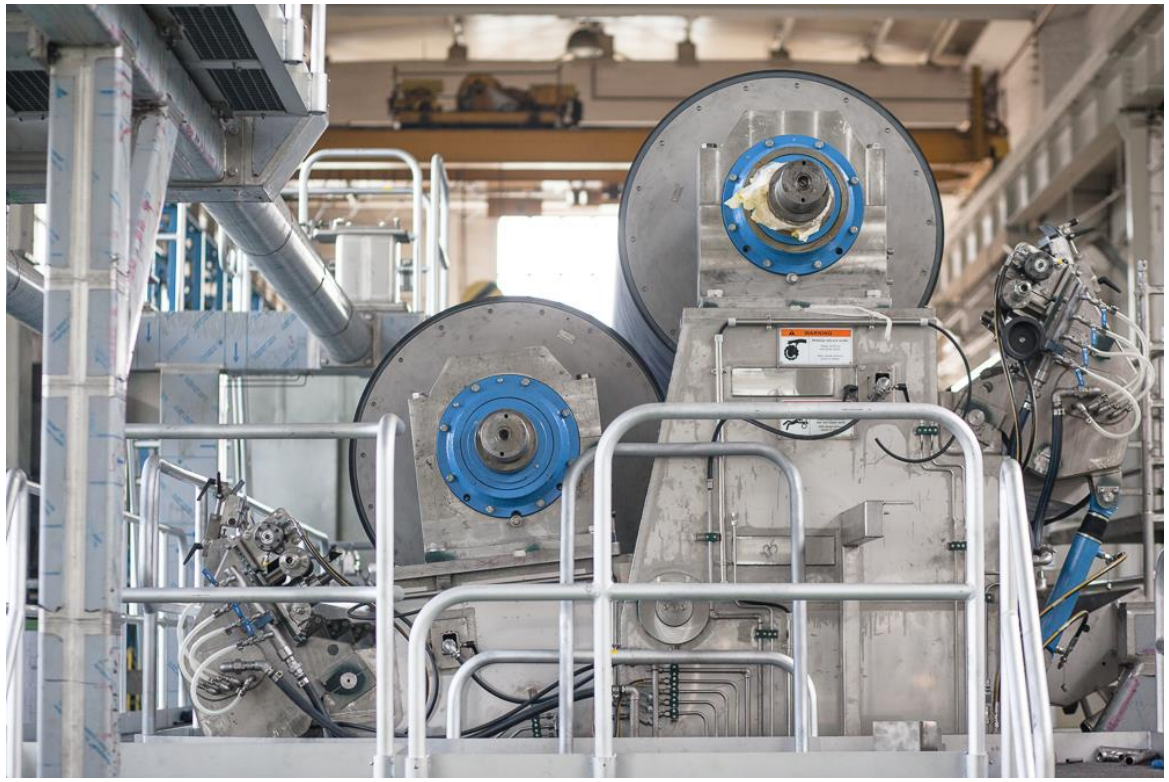
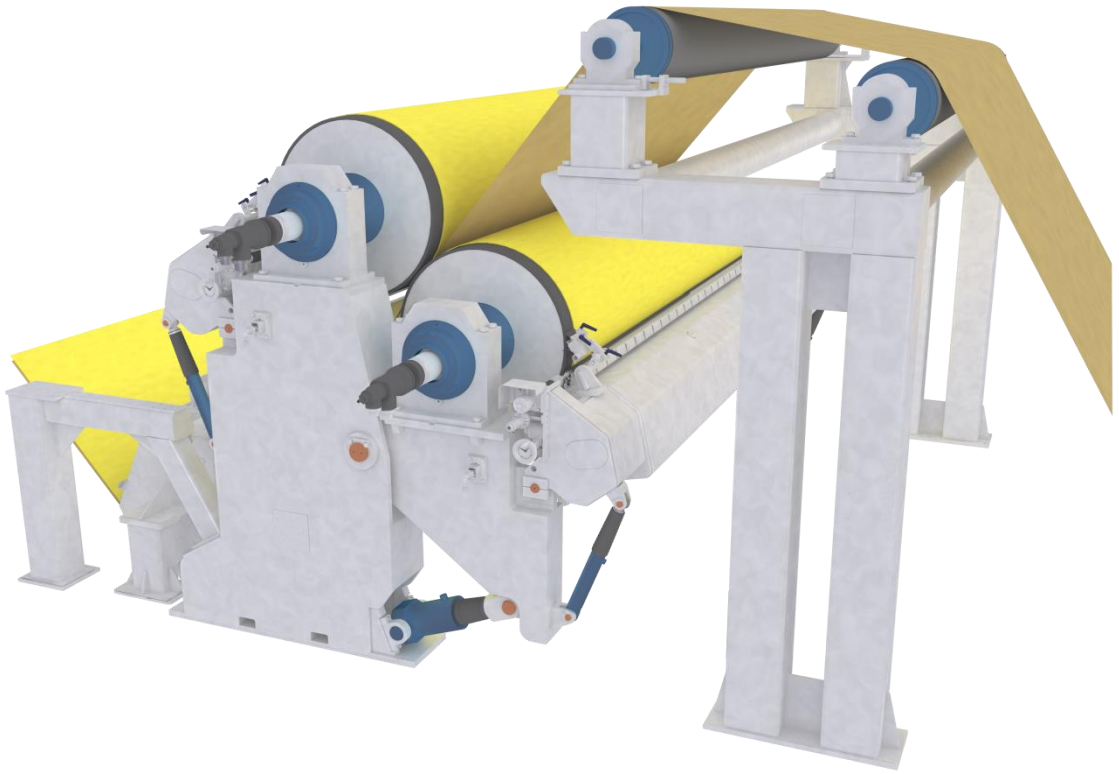


- Introduction
- Theory of operation
- Construction
- Scope of supply
- References
- Competitors
- Q&A



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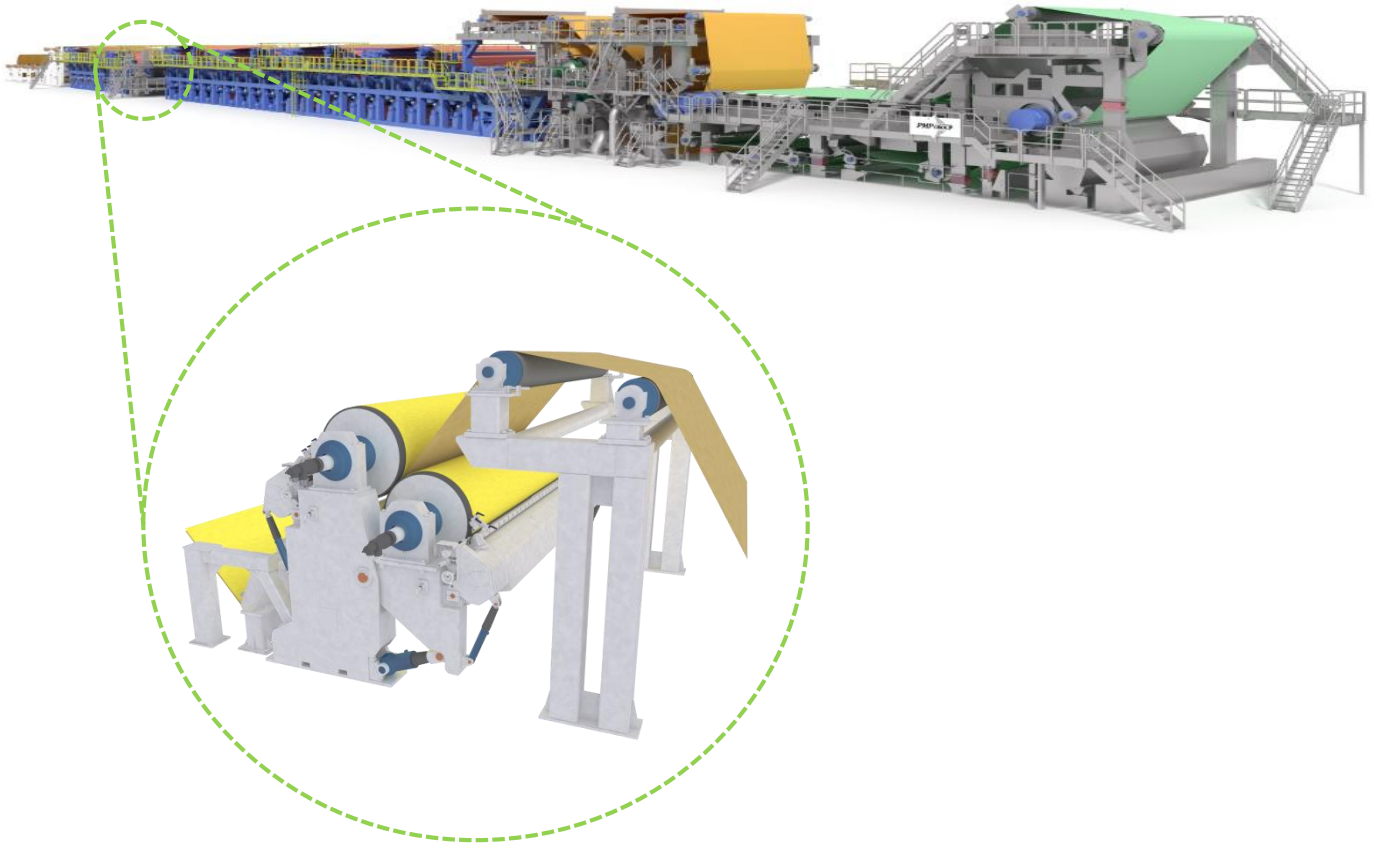


MSP launched the market in early 1980's.

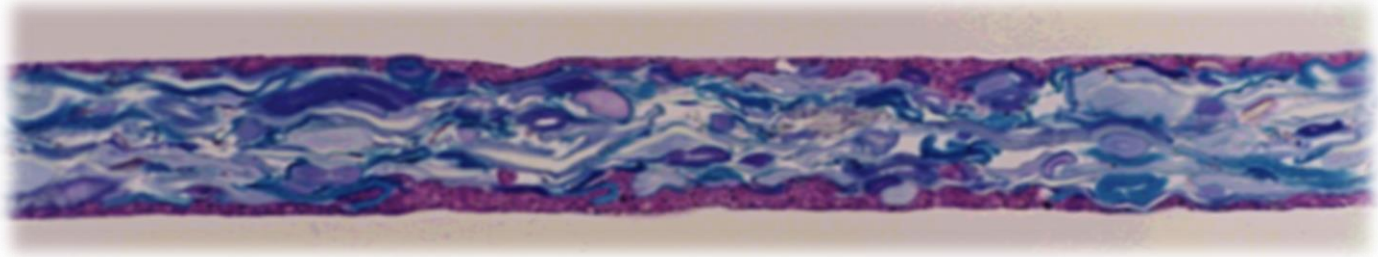
Sizing in a paper mill operation is adding materials to the surface of paper while it is still on the machine. These materials are used **to enhance the resistance of paper, to liquid penetration, to improve its strength and surface characteristics.**

Substances used in sizing include **glues, starches and waxes.**

Key Metering Size Press types:

- **Pond**
- **Film**
- **Spray**
- **Combined**

Pigment coating: a separate coating layer on top of the sheet as a printing surface



Surface sizing: Starch to be penetrated into the fiber network - no "starch coating layer" on top of the sheet targeted

Coating - Target good printing quality

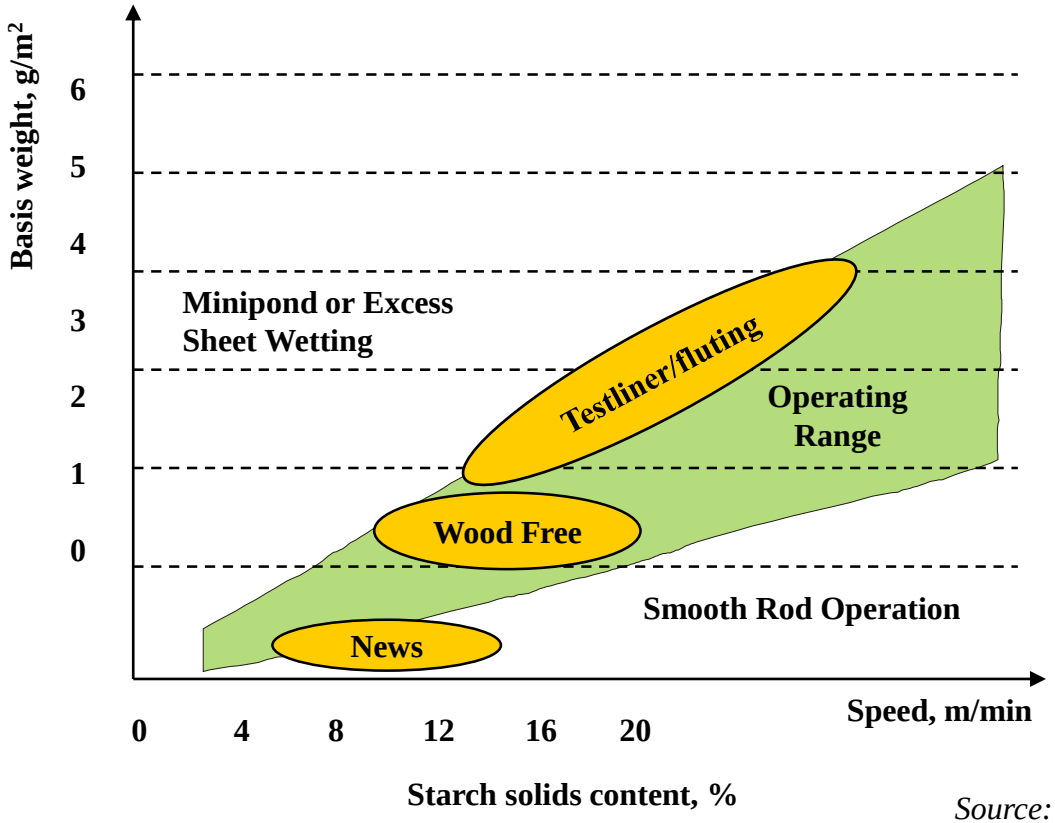
- Optical properties
  - Brightness
  - Opacity
  - Gloss
- Smoothness
- Optimized surface porosity
- Dust-free surface

Sizing - Target strength properties

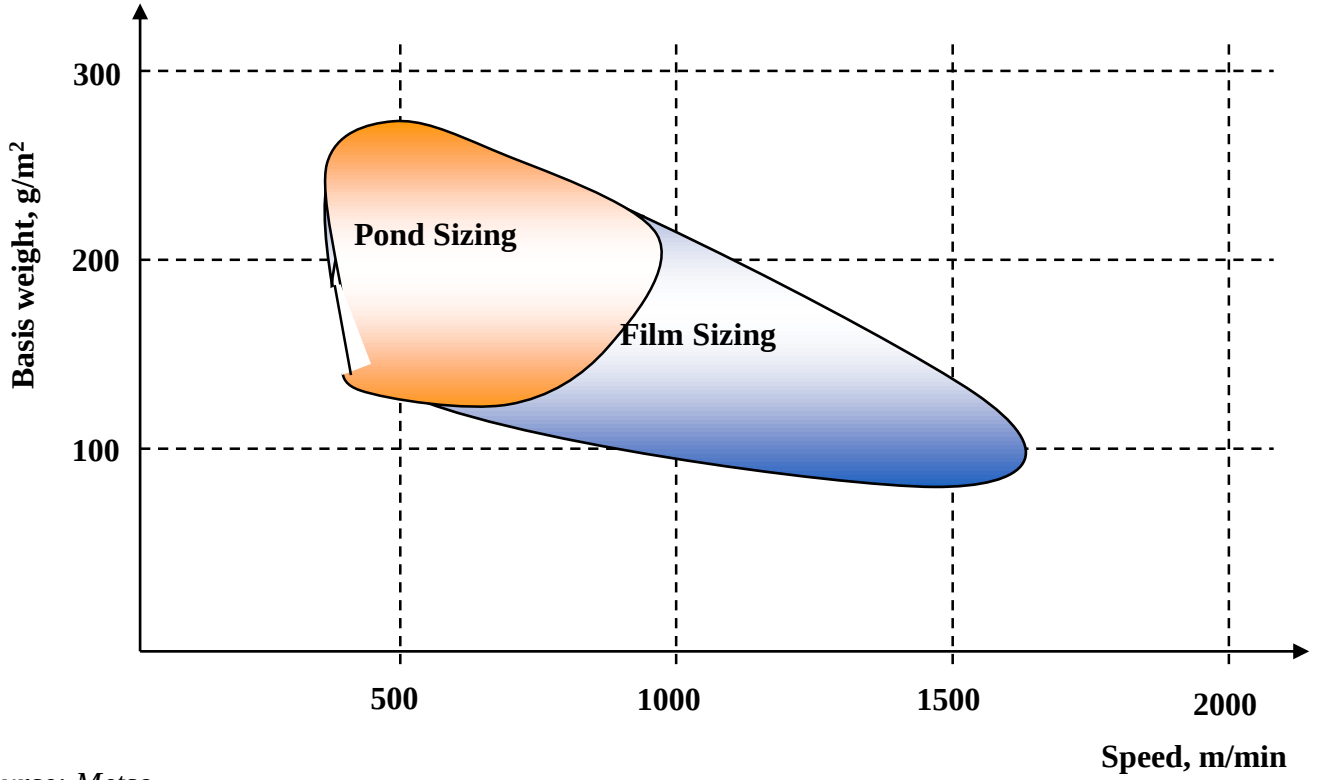
- Dust-free surface
- Less printing ink penetration
- Paper or board stiffness
- Many strength properties determined by starch z-distribution (main factor: Starch viscosity)

	Coating	Sizing/Pigmenting
Pick-up	5-10 g/m^2/side	1-3 g/m^2/side
Solids Content	50-70 %	8-16 %
Viscosity	800-1200 mPas	20-50 mPas
Rod	20-35 mm Smooth	10-25 mm Grooved
Rolls	35-50 P&J PU	10-20 P&J Rubber
Drying	Contactless	Cylinders
Sheet In-Dryness	92-97%	90-92%

- Given numbers represent most typical data seen across today paper machines.
- Shaded area shows most typical application of PMPoland Size Presses designated for packaging grades.



Source: Metso



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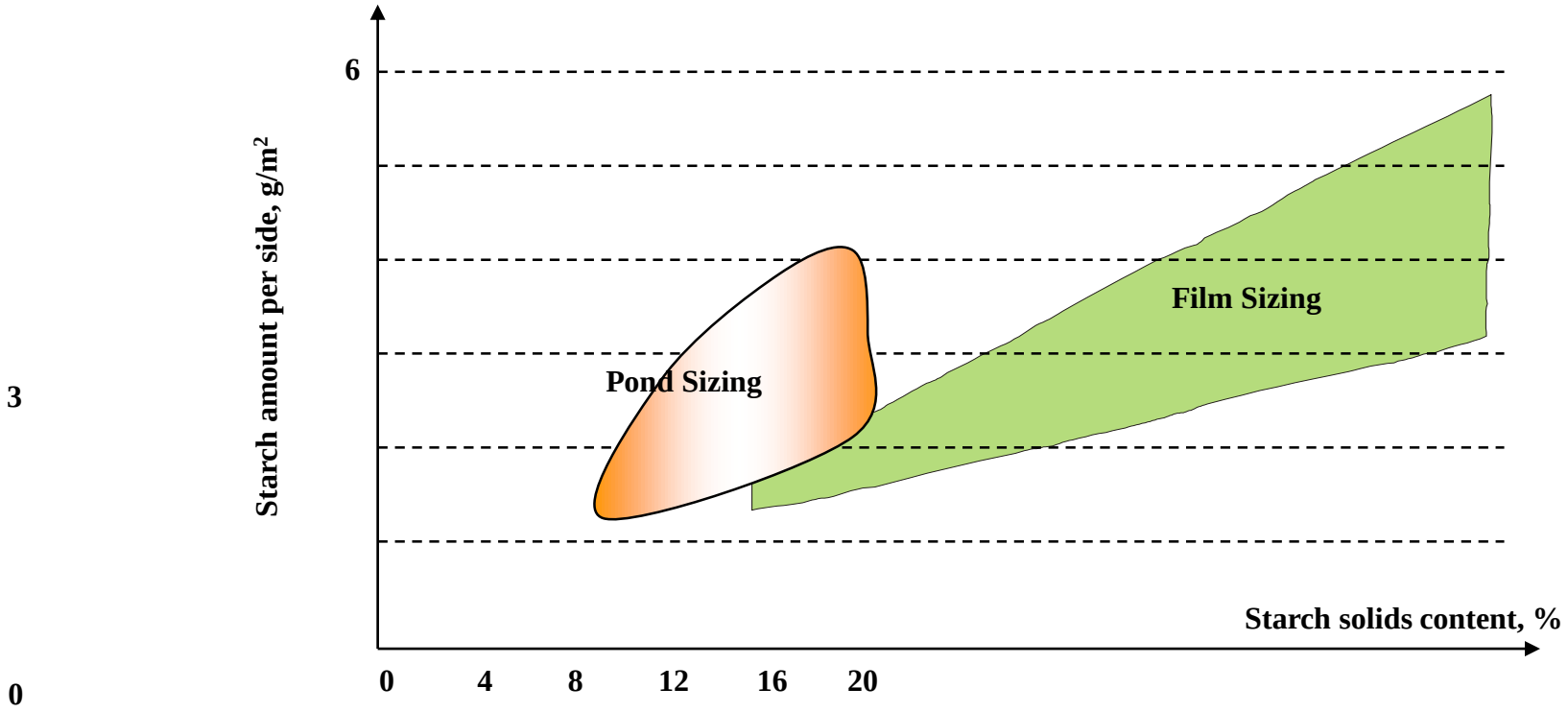

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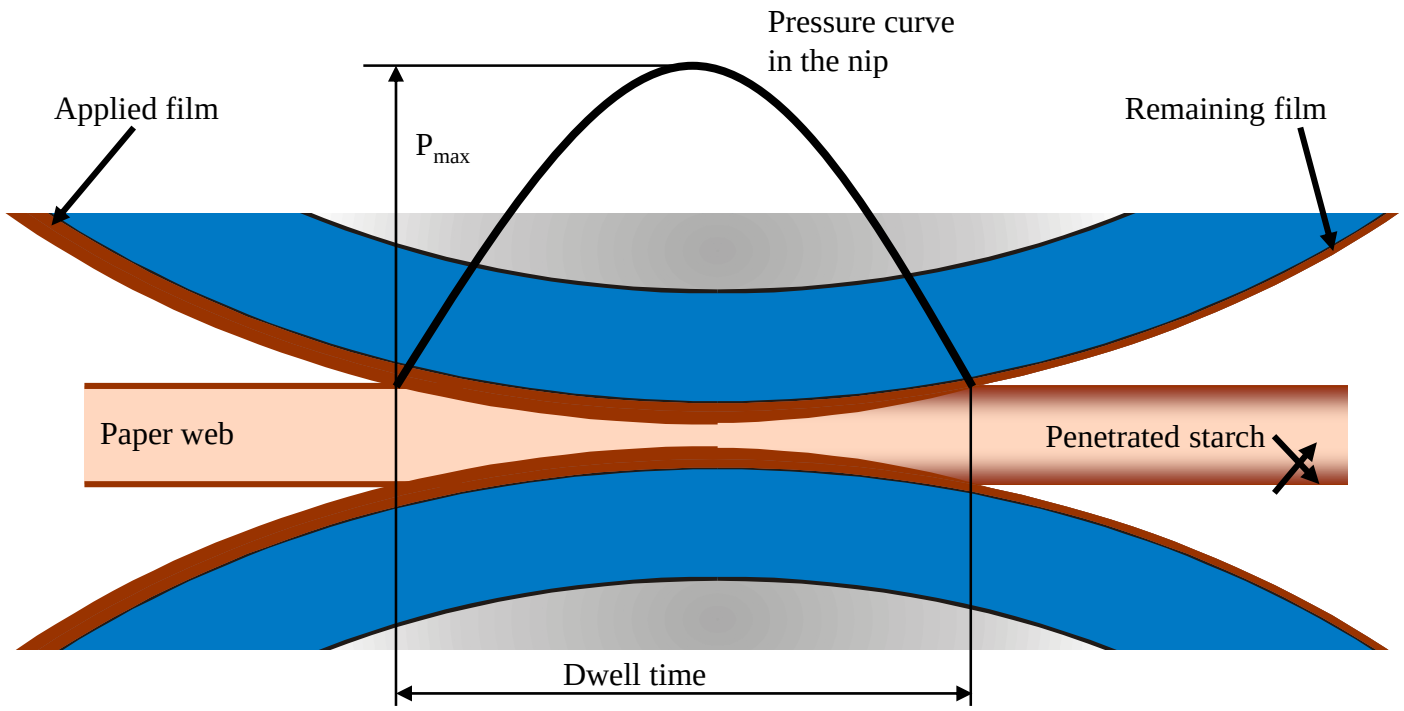
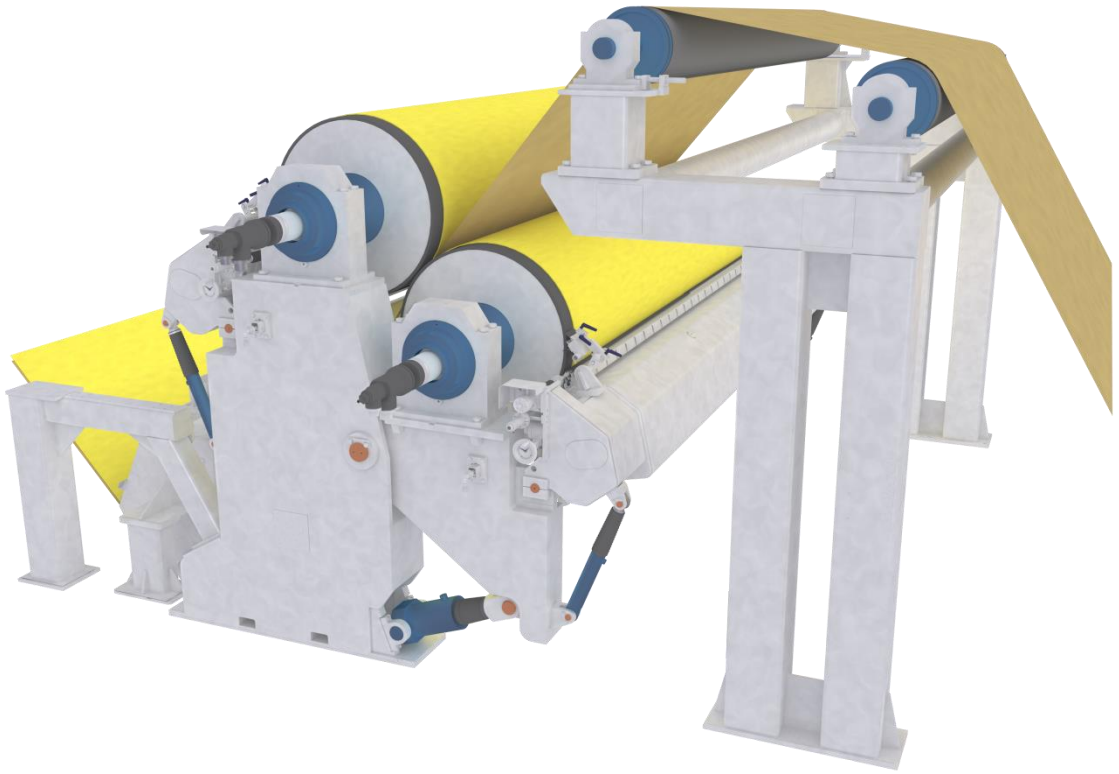


Source: Metso

Linear load levels starch properties, applicator roll diameters and/or roll cover properties produce the desired pressure pulse and dwell time in order to optimize the penetration of starch.



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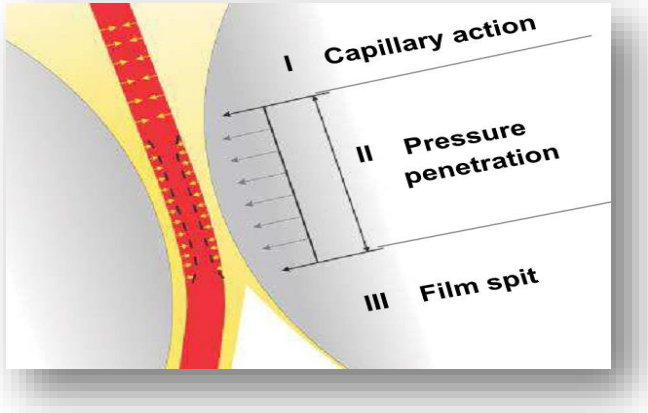
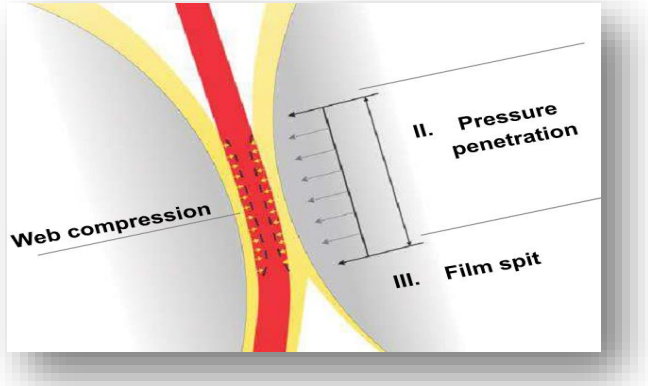
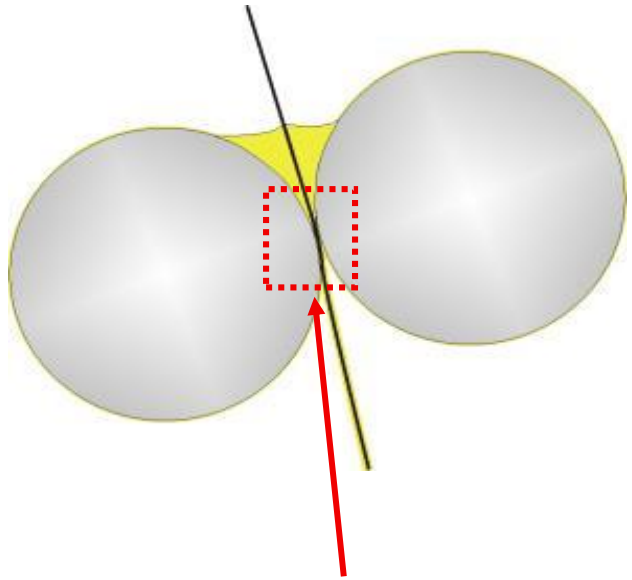
Pond nip



MSP nip

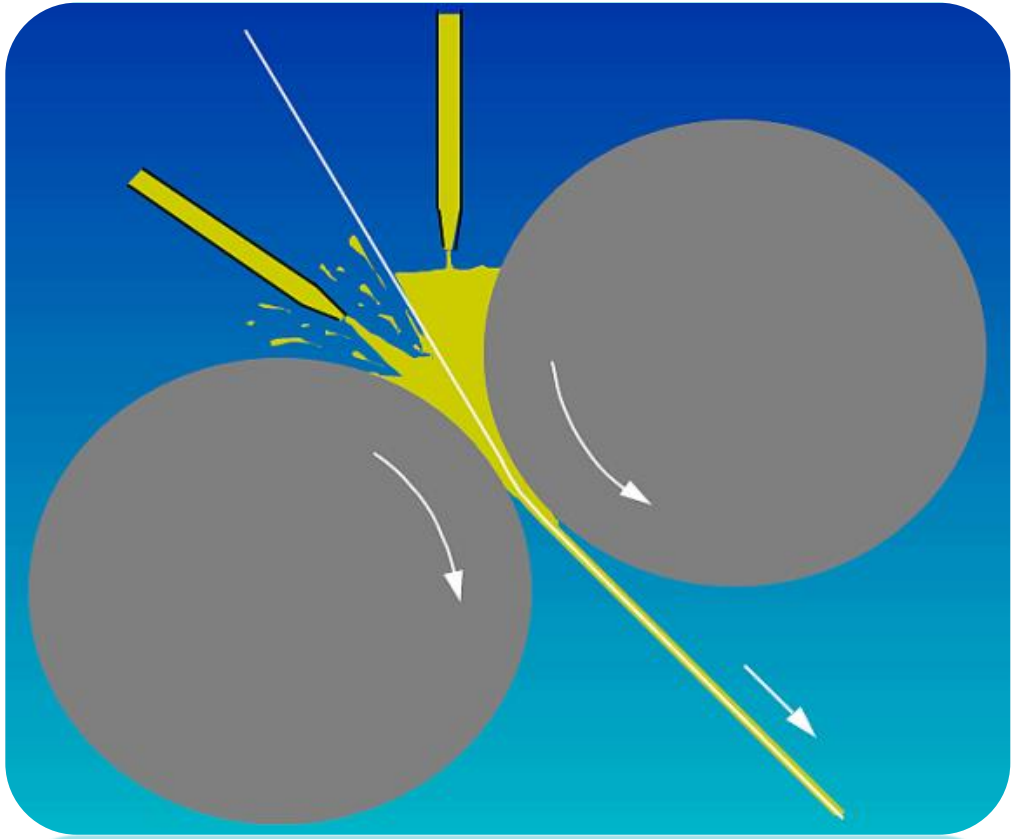




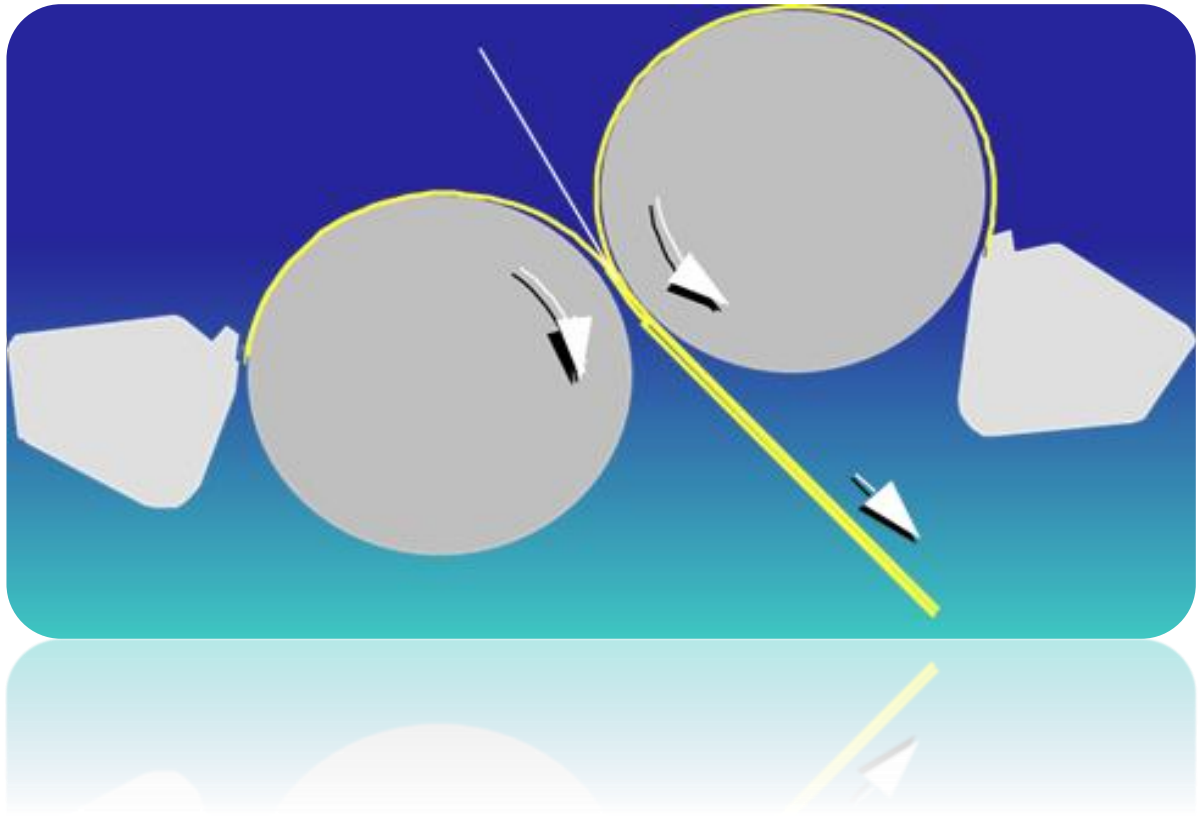
Starch transfer phenomena

There is quantitative evidence of starch penetration actually being a capillary pressure penetration phenomenon during the pressure pulse of a MSP nip. Quantitative starch penetration is found to follow closely the capillary measured, high shear viscosity of starch solutions at different solids content.

Source: Metso

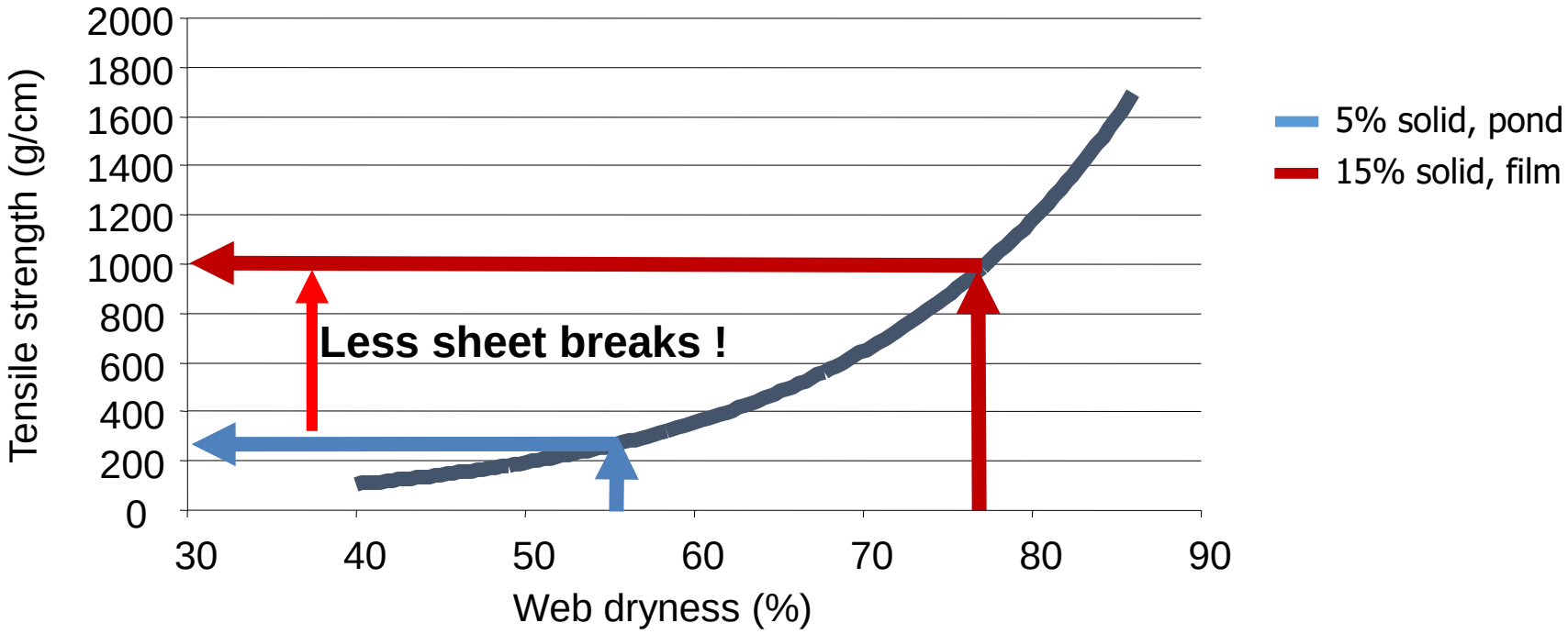


- Highest starch pick up => high strength at high basis weights
- Pond turbulence creates uneven starch pickup, distribution and severe runnability problems above 800 m/min, however machines are known running successfully at 1000-1100 m/min
- Poor runnability on low basis weights & low wet tensile furnishes
- Excessive wetting of sheet creates breaks
- No possibility to adjust starch pickup other that starch solids
- Pickup varies w/moisture level and profile
- High liquid pickup and low starch solids requires lot of after-drying capacity



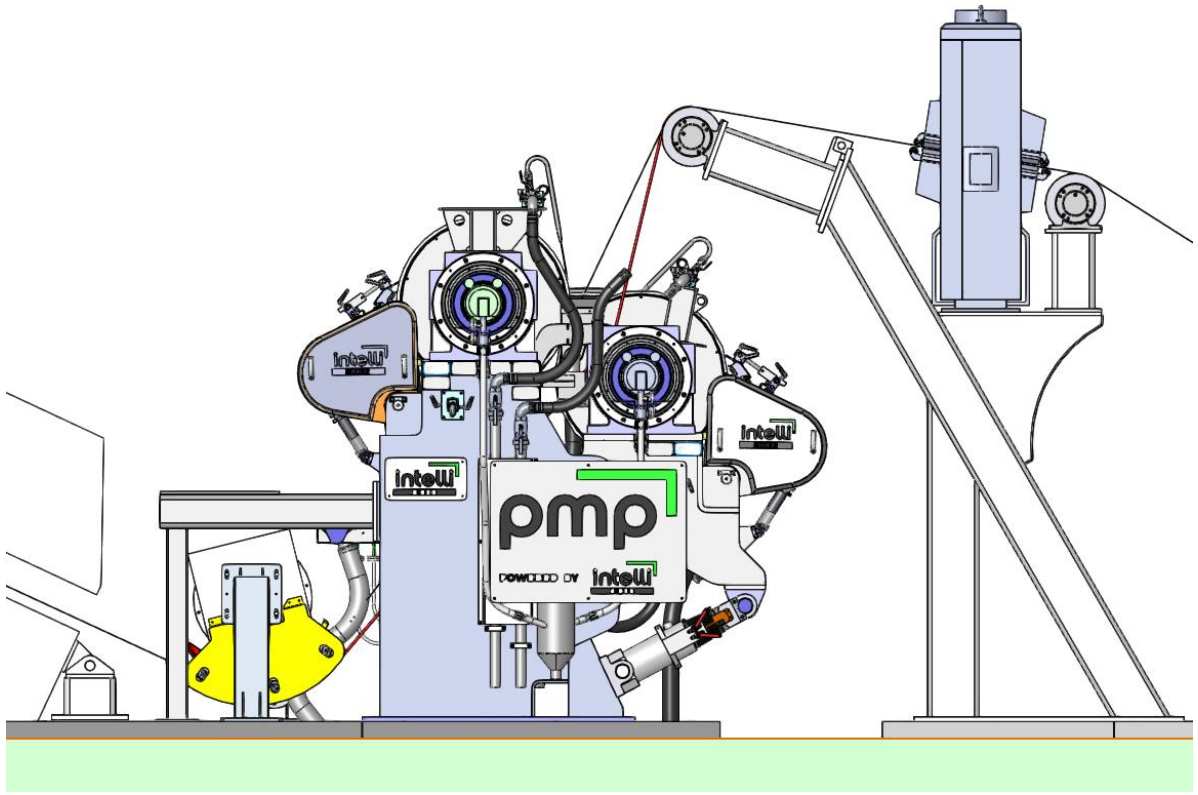
- No size puddle
- Clean operation/high efficiency
- ~85% reduce in breaks
- One or both sides operation
- Sizing/pigmenting, coating operations
- Low number of sheet breaks
- Increased wet web strength
- Easy to apply low coat weights or size amounts
- Reduction in after MSP drying load
- Stable, streak-free sizing layer controlled by film thickness
- Improved moisture profile
- Max. coat weight limited by film splitting - typically 10 g/m²/side
- Max. size amount limited by mini pond - maximum wet film 30-35 g/m²/side

Example with copy paper



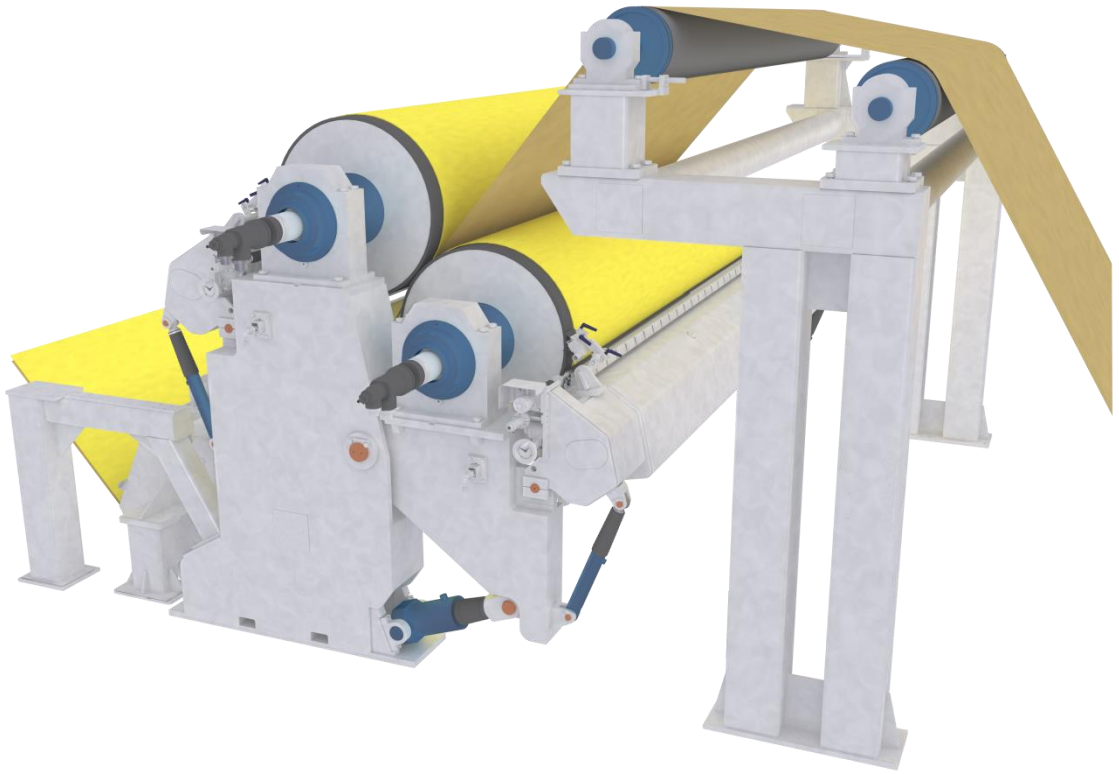
Assumptions: 74 g/m2 base (bone dry), surface sizing 3 g/m2 starch, web weting 27 g/m2 (10%) or 12 g/m2 (20%)

Source: Brecht, W., Erfurt, H., Wet-Web Strength of Mechanical and Chemical Pulps of Different Form Composition, TAPPI, 42(12), 959 (1959).



- Solids content and pick-up can be controlled independently and separately on both sides
- Good CD profiles
- Does not limit machine speed
- Ability to adjust wet pick-up enables good runnability even with low basis weight grades
- Ability to perform pigmenting coating
- More layout possibilities
- Less web breaks
- Shorter after-dryer section

Pond vs. Film	
Burst strength	**Film slightly better**
SCTgeo	**No difference**
Scott Bond	**Pond better**
CMT	**No difference**



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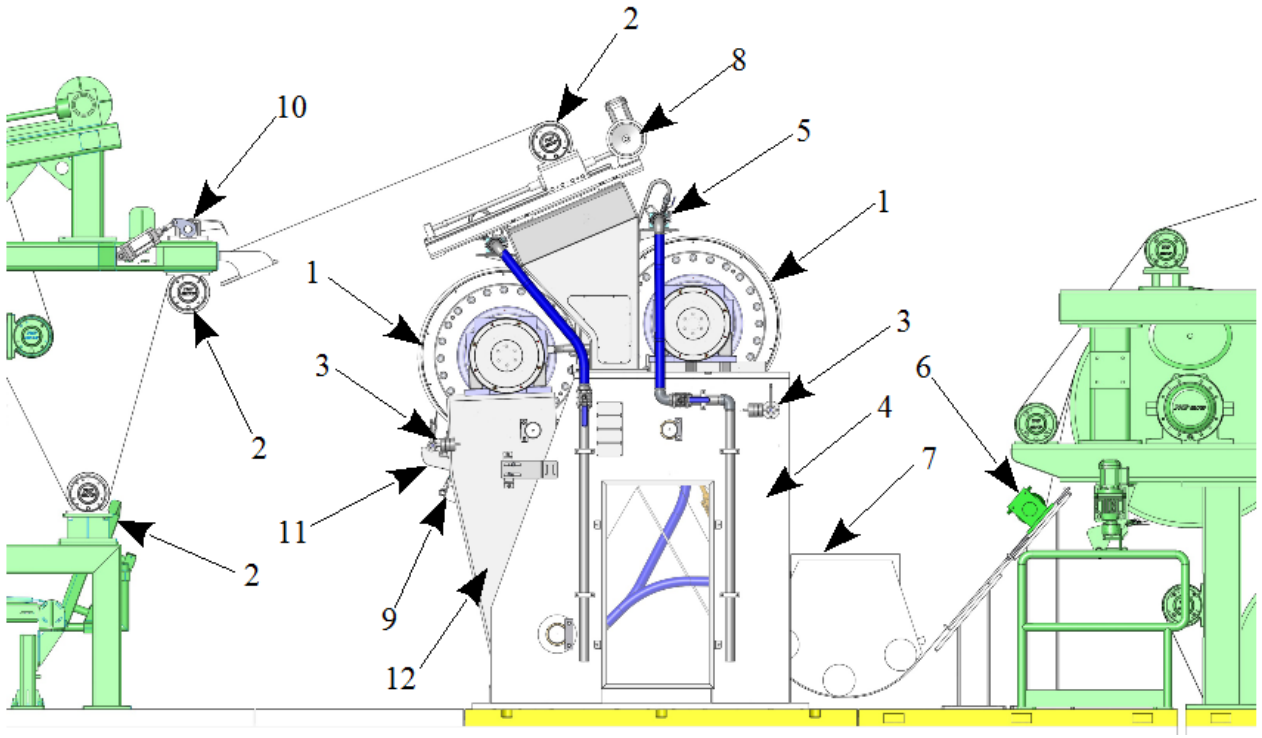
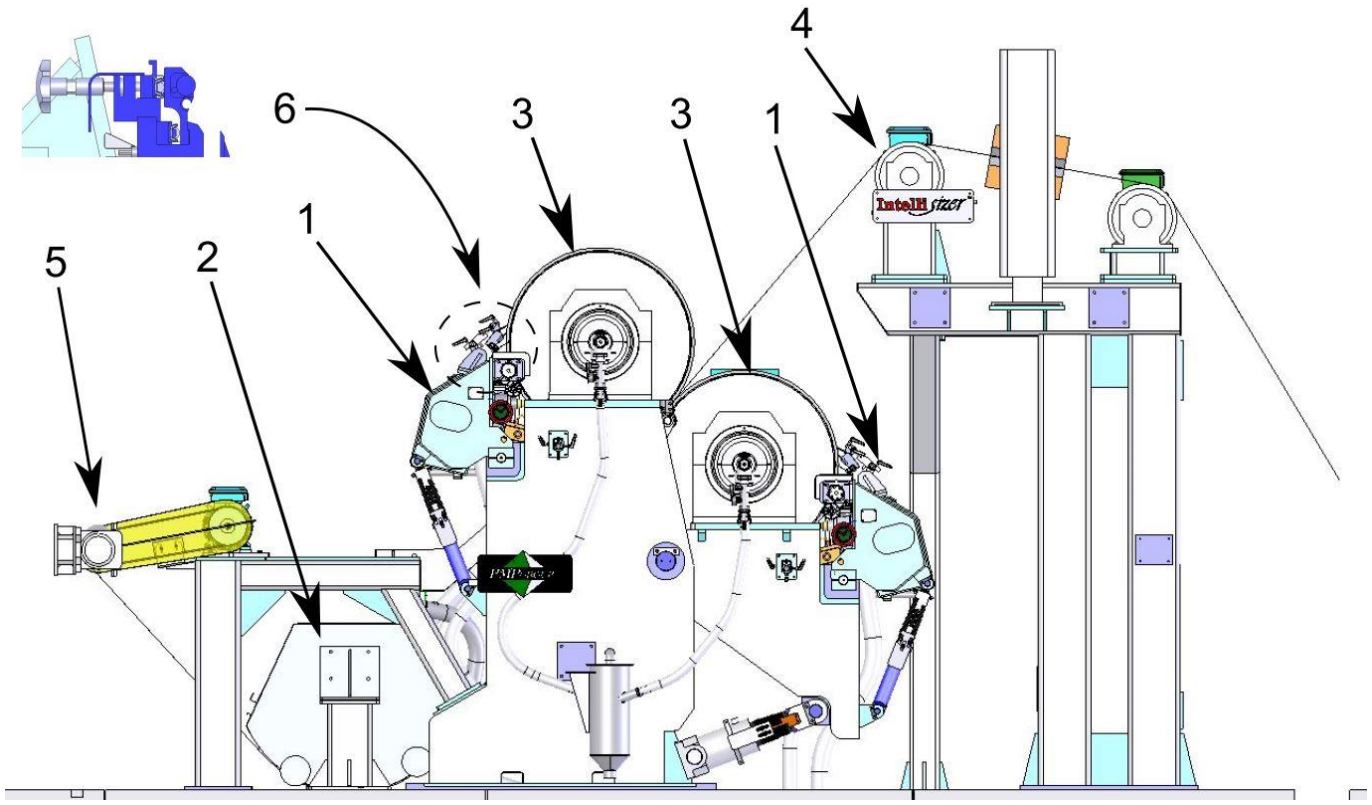
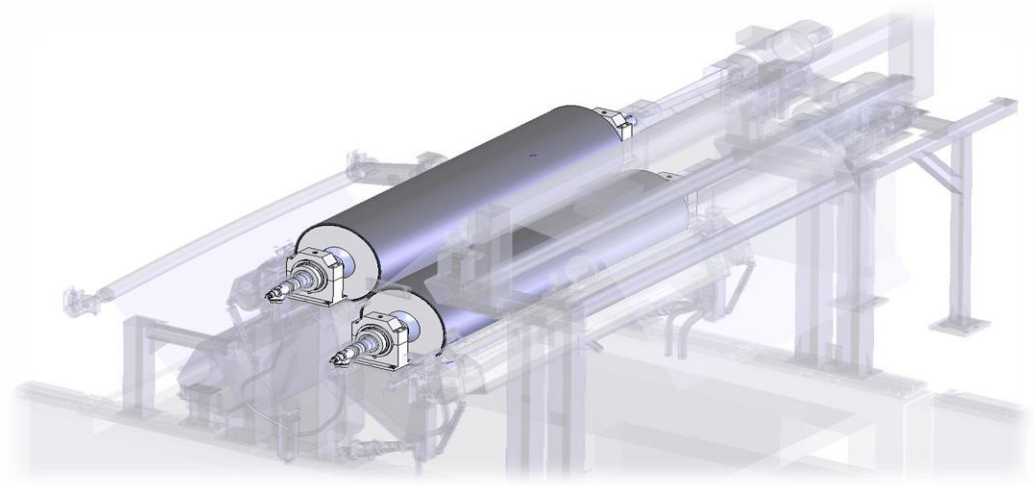


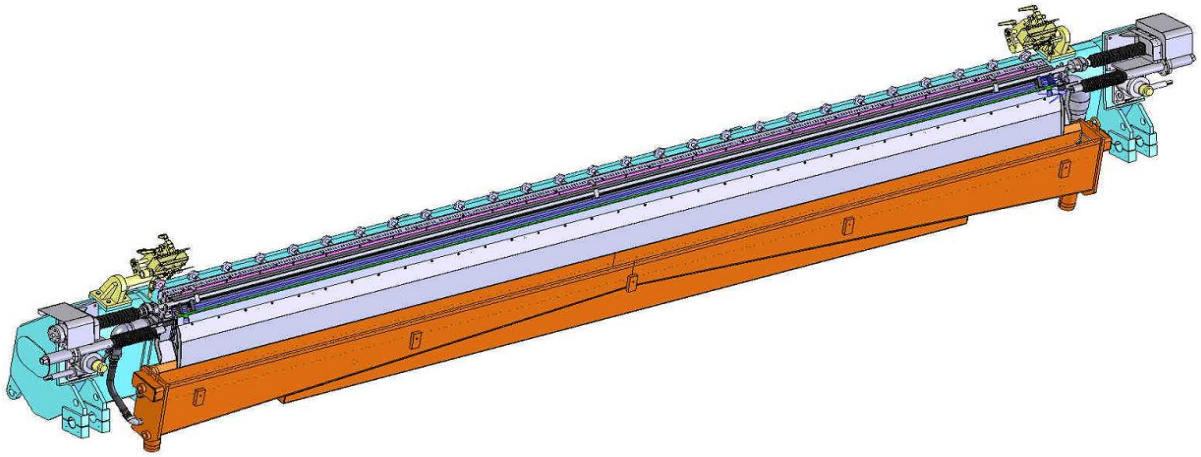
Item	Component
1	Applicator roll
2	Paper roll
3	Edge Wipes
4	Framework
5	Application system
6	Spreader roll
7	Air turn device
8	Paper roll positioner
9	Showers
10	Web breaker
11	Saveall
12	Bottom applicator roll arms



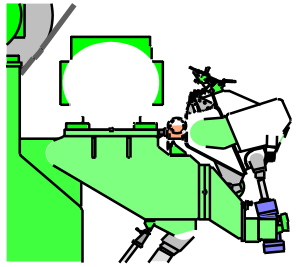
Item	Component
1	Metering head
2	Airturn device
3	Applicator roll
4	Paper roll
5	Spreader roll
6	Application system



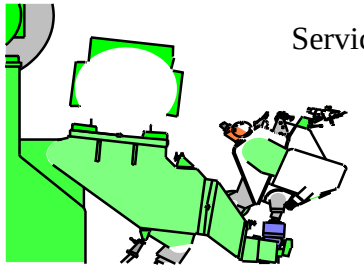
- The rolls are covered
- Rolls are cast iron castings grades 450/EN-GJS-600 & EN-GJL-300
- The size and the crown of the rolls depend on:
  - width of the machine
  - linear load used
- Water circulating inside the rolls provide stable and uniform temperature
- Grease/oil lube bearings



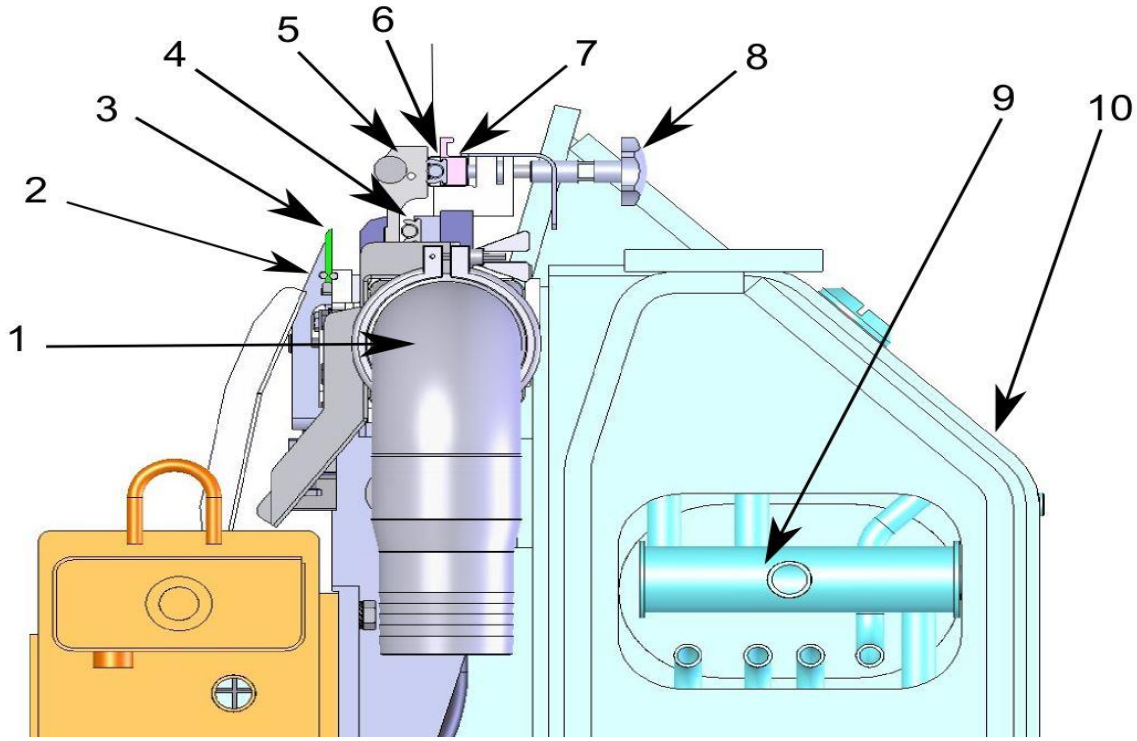
- A fabrication used to carry the sizing solution to an applicator roll.
- Serves as a mounting point for a metering equipment (element)



Operating position

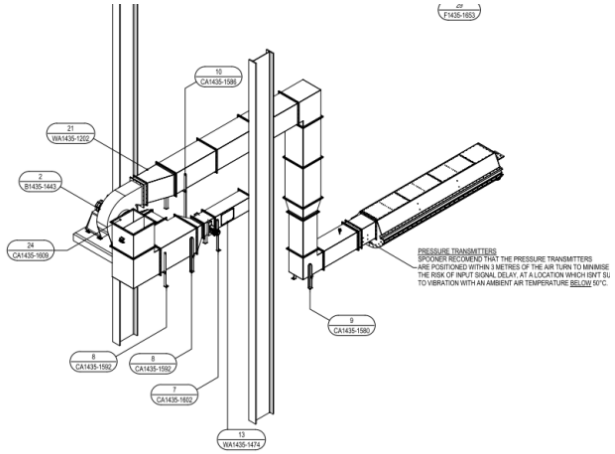


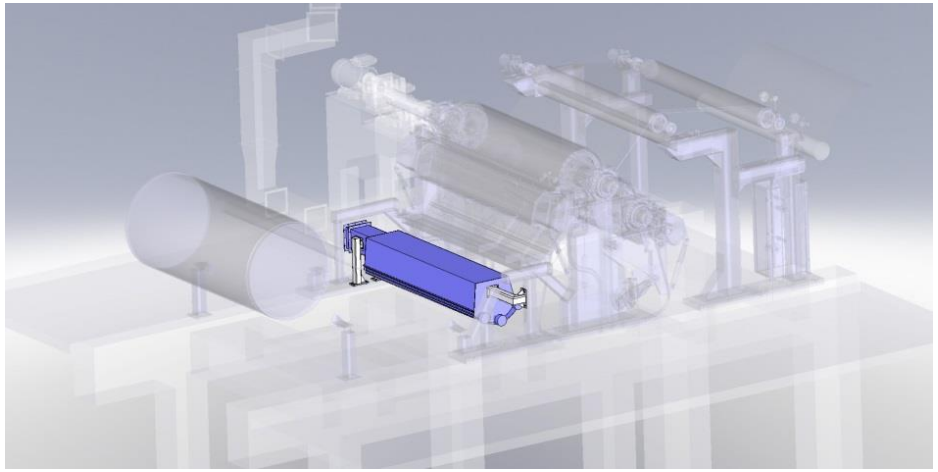
Service position



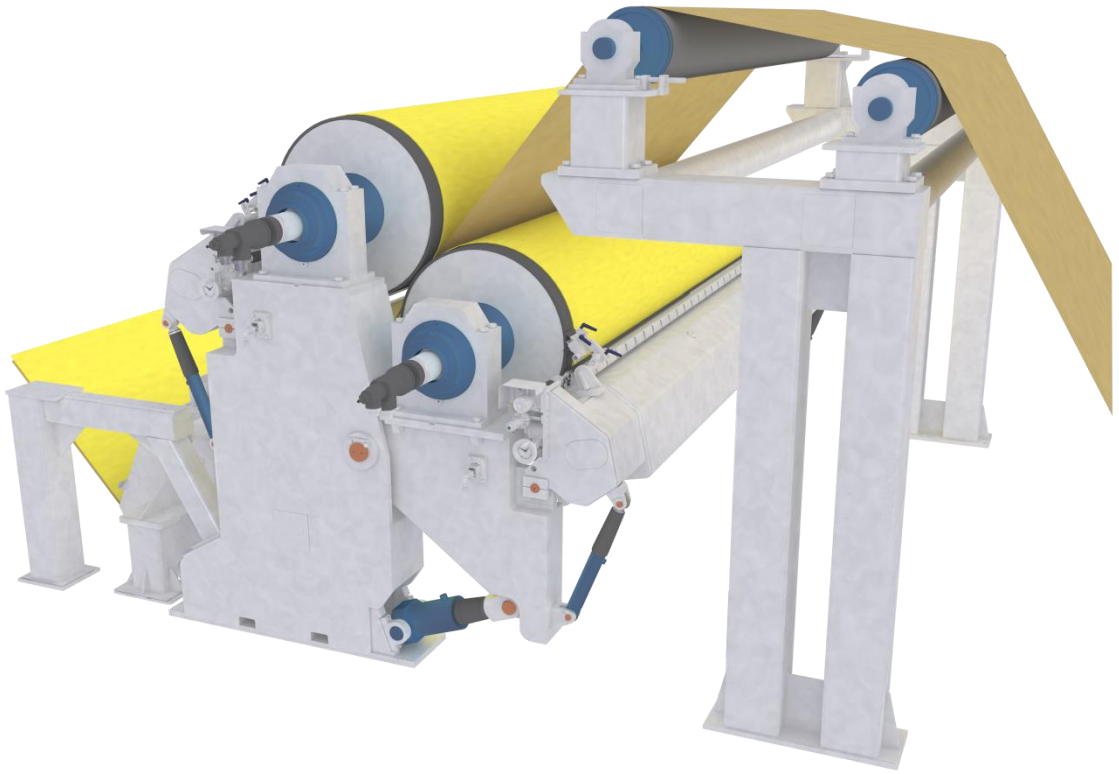
Profile tube is important to a successful application operation. It applies pressure to the metering rod controlling the film thickness on the applicator roll.

Item	Component
1	Distribution Pipe
2	Front Wall
3	Baffle Blade
4	Unclamp Tube
5	Rod and Holder
6	Profile Tube
7	Flexible Plate
8	Adjusting Screws
9	Heating System
10	Beam





- The air turn unit is designed to change the direction of the product web through a pre-set angle; this is done without direct contact with the product web
- Air is drawn into the system through the disposable filter cells by the supply fan
- A manual damper is provided to set the level of hot air required by the system.
- A pneumatic controlled damper then automatically adjusts the level of cold air required to maintain a constant temperature



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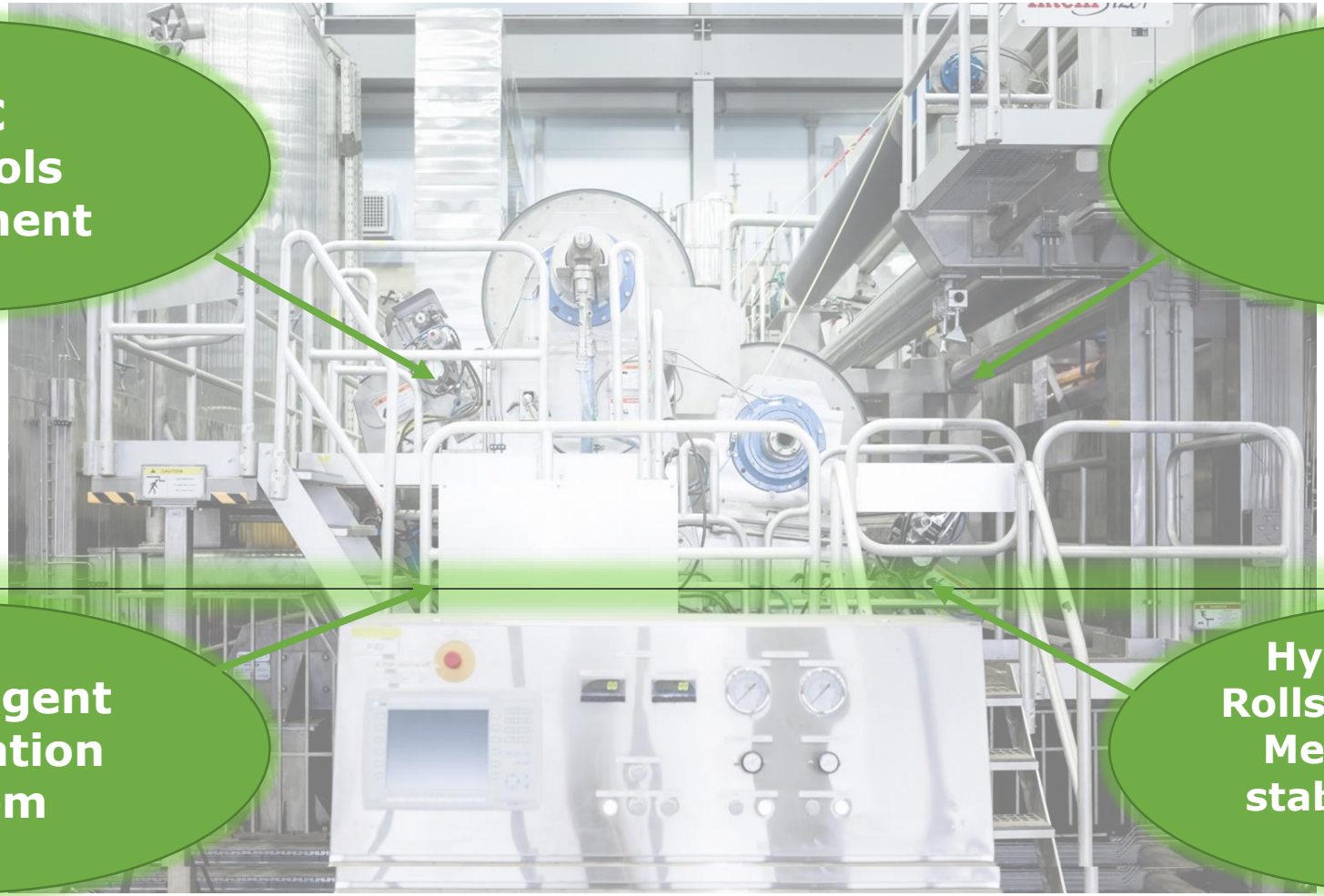
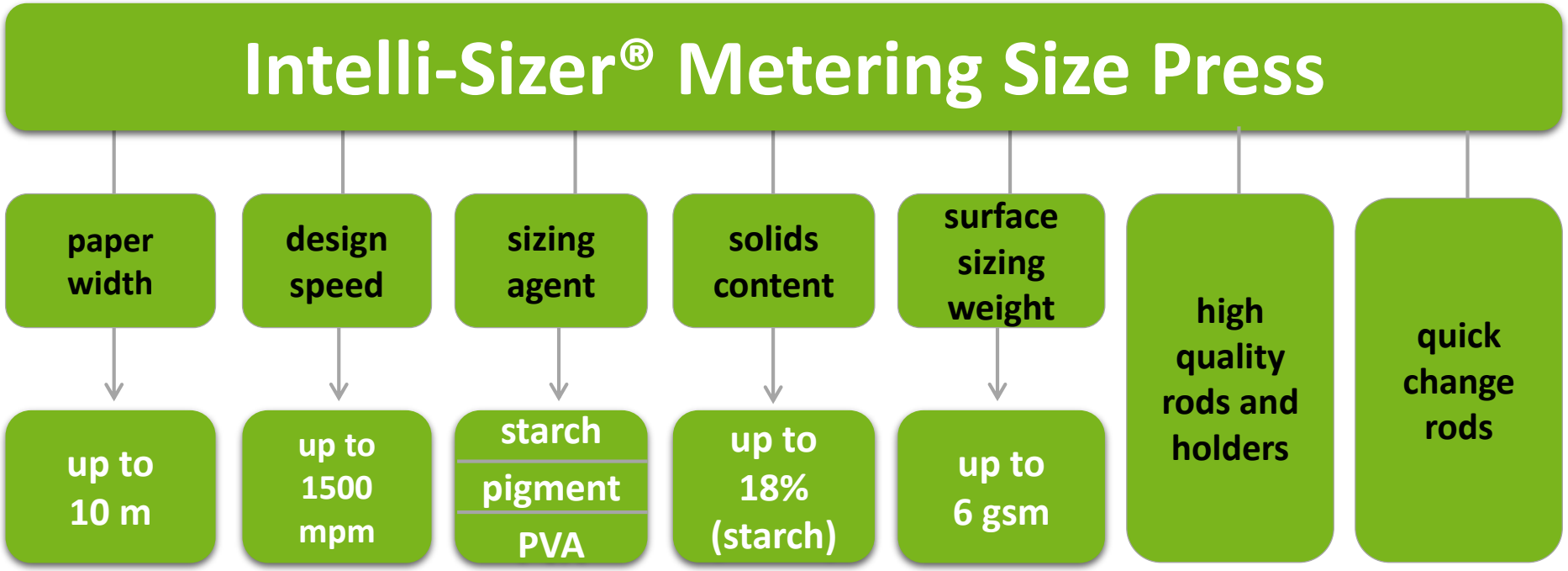


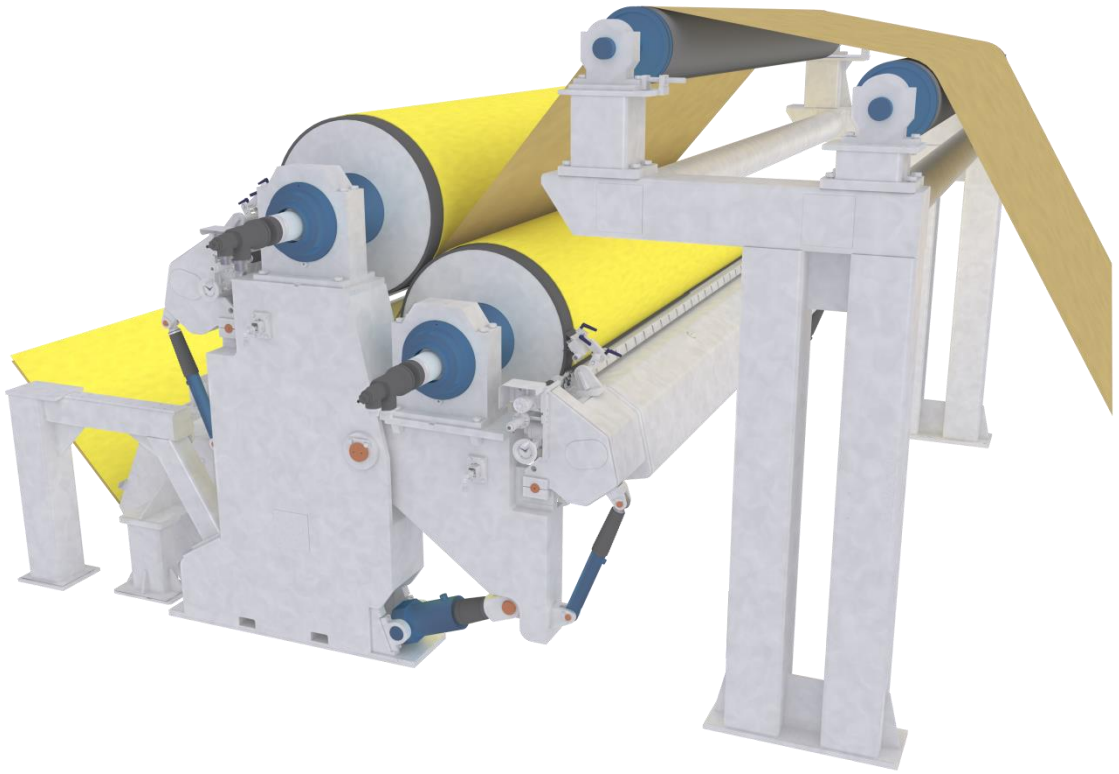
PLC
Controls
Equipment

DRIVES

Sizing agent
Preparation
system

Hydraulic unit
Rolls stab. system
Metering head
stab. system *if
applied





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2014

Customer: Smurfit Kappa

Location: United Kingdom, Europe

Scope of supply: PM transfer & rebuild (including new Intelli-Nip® Shoe Press), Supply, refurbishment, erection and commissioning services

Project goals: Production profile modification (based on relocated machine), reduction of investment costs, combining new technological elements with refurbished parts

Machine main data:

- Grades: Fluting, Testliner
- Reel trim: 5070 mm
- Max operating speed: 1200 mpm
- Basis weight: 80-120 gsm
- Capacity: 310 000 t/a

2014

Sizer main data:

- Starch Weight Range: 3.5 – 7 g/m2 (total)
- Starch Solids: 12-16%
- Starch temperature: 80°C (conventionally 60°C)
- Design Nip: 80 kN/m
- Operating Nip: 60 kN/m

2014

2017

Customer: Smurfit Cartón y Papel de México, S.A. de C.V. Molino Los Reyes

Location: Mexico, North America

Scope of supply: Hydraulic Headbox Intelli-Jet V® with CP, wire modification, dewatering elements, press rebuild (Intelli Tri-Nip™), a new dryer and pre-dryer section rebuild, size-press rebuild, tail threading upgrade, reel rebuild (relocated), mechanical drives

Project goals: Increasing capacity by 100 000 t/a, product portfolio widening (fluting/liner)

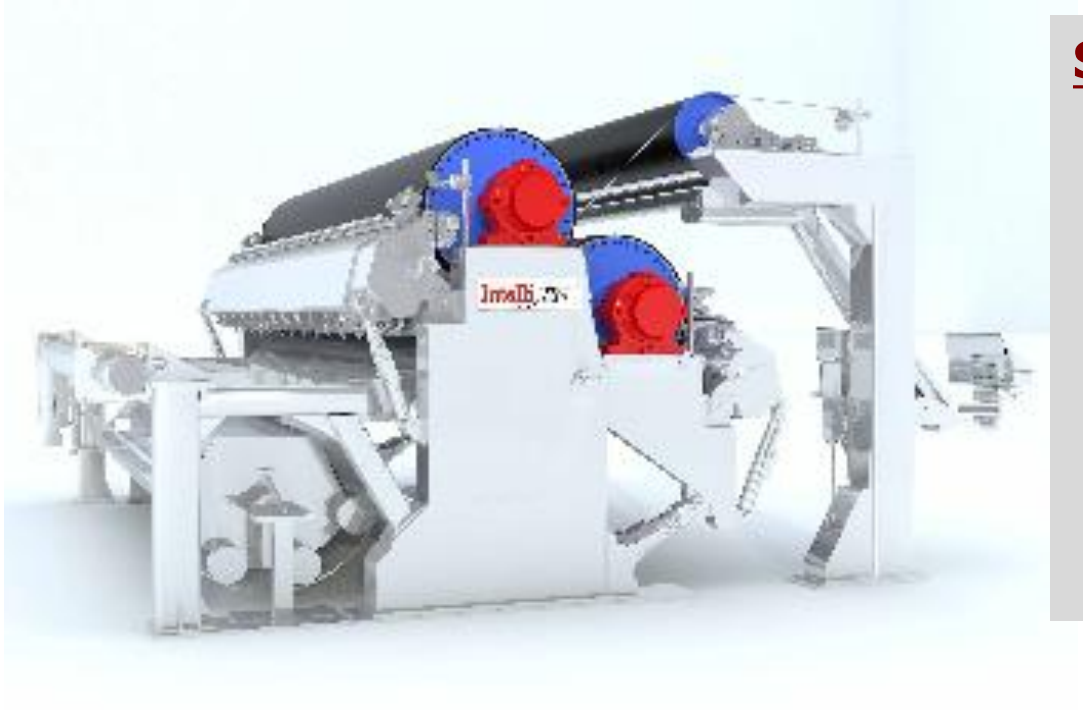
Status: Optimization

PHOENIX CONCEPT™

Machine main data:

- Grades: Liner and Corrugating Medium
- Reel trim: 2410 mm
- Max operating speed: 800 mpm
- Basis weight: 100-240 gsm
- Capacity: 350 000 t/a

2017



Sizer main data:

- Rolls OD: 1100 mm
- Starch Weight Range: 5 – 8 g/m²
- Starch Solids: 12%
- Starch temperature: 55-65°C (conventionally 60°C)
- Design Nip: 60 kN/m

2017

2018

Customer: Smurfit Cartón y Papel de México, S.A. de C.V. Molino Los Reyes

Location: China

Scope of supply: New Hydraulic Intelli-Jet V® Headbox, Intelli-Shaker®, key components for Intelli-Top® Former and Intelli-Sizer® Bifunctional Size Press.

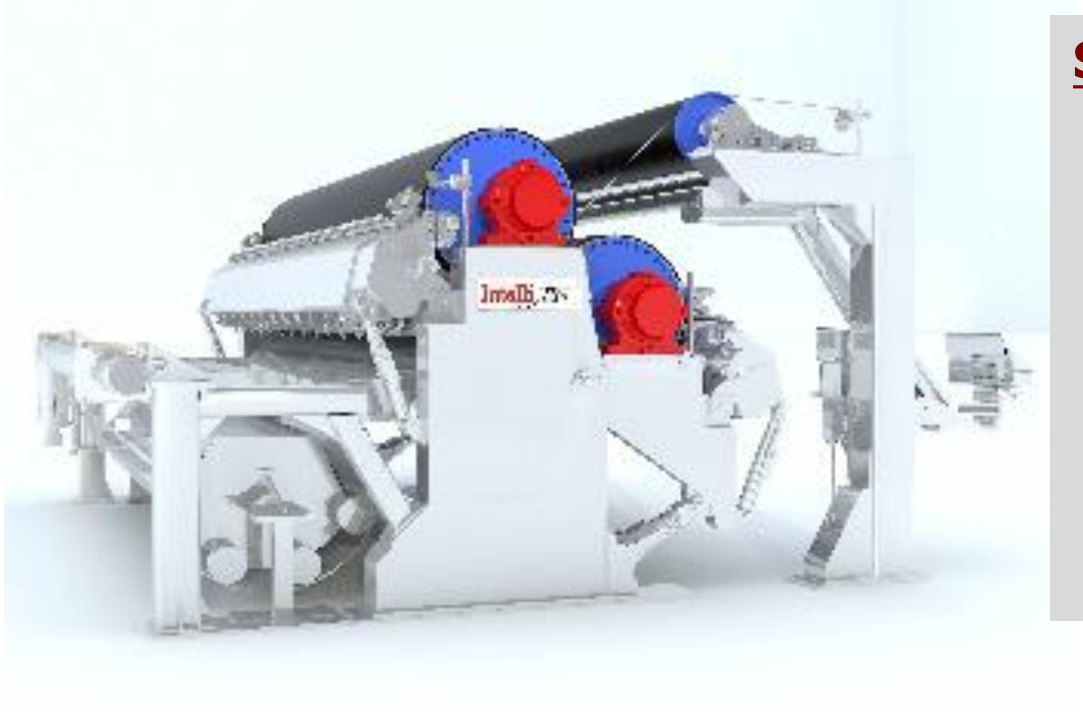
Project goals: The Project is to design, supply, construct and commission a new headbox with CP system for PM#8 glassine papers on the Purchaser's site at Yiwu Huachuan paper mill.

PHOENIX CONCEPT™

Machine main data:

- Grades: Glassine paper
- Reel trim: 3460 mm
- Max operating speed: 700 mpm
- Basis weight: 30-80 gsm

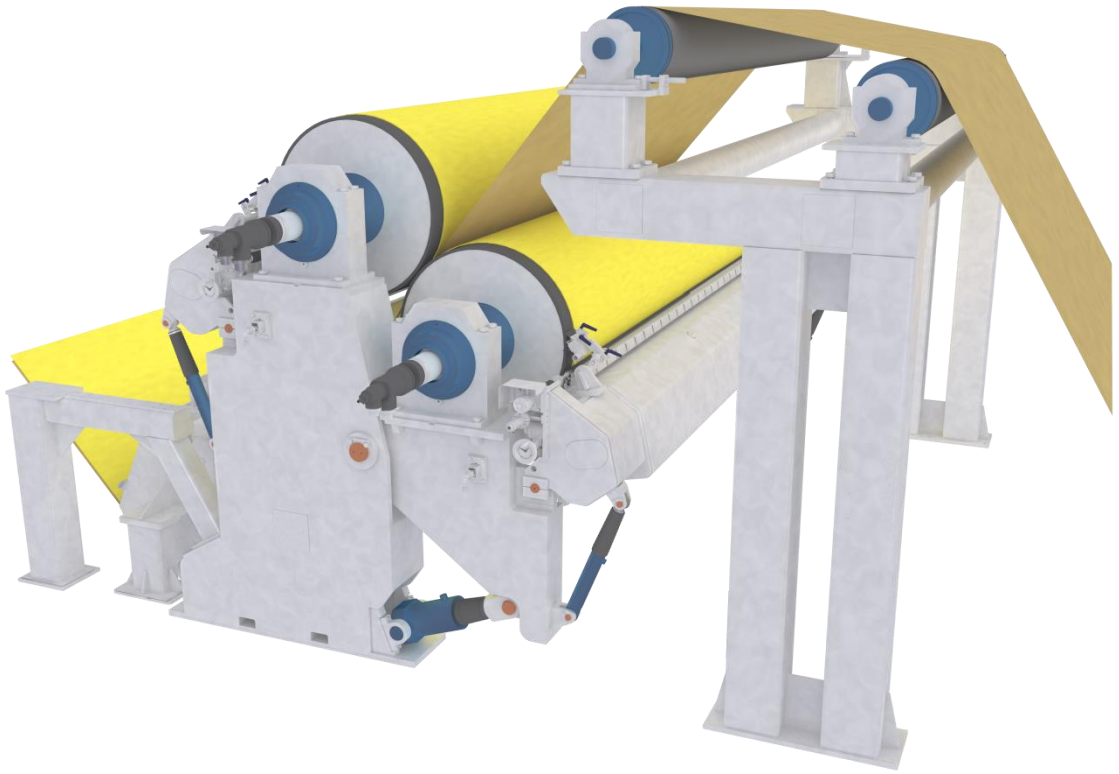
2018



Sizer main data:

- Rolls OD: 1020 mm
- PVA Weight Range: 6 g/m^2
- Starch Solids: 4-12%
- Design Nip: 50 kN/m

2018



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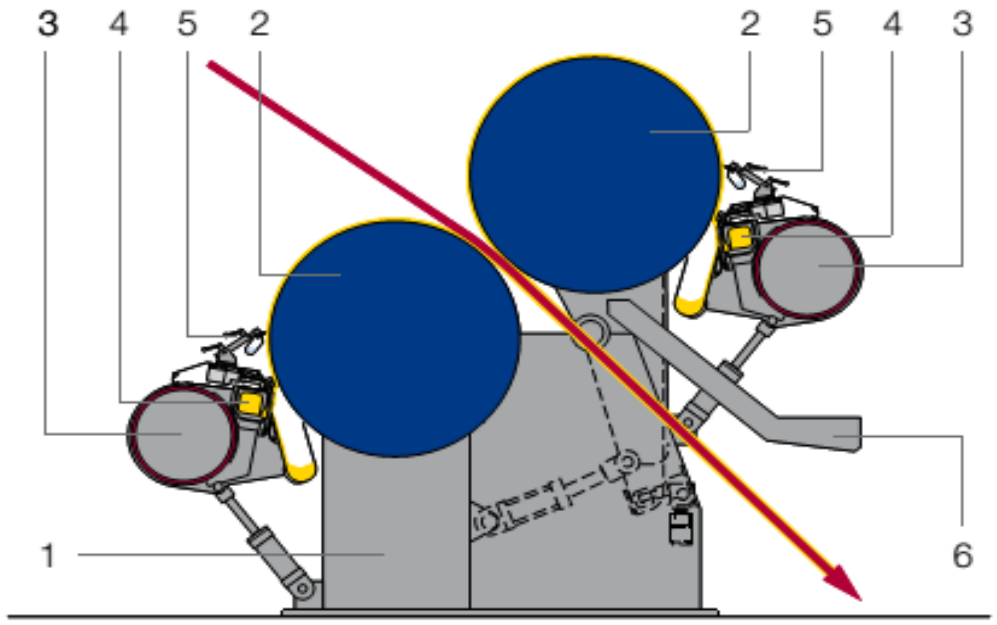
1 Upright & lever 2 Applicator roll 3 Supporting beam
4 Applicator unit 5 Edge doctor 6 Save-all pan

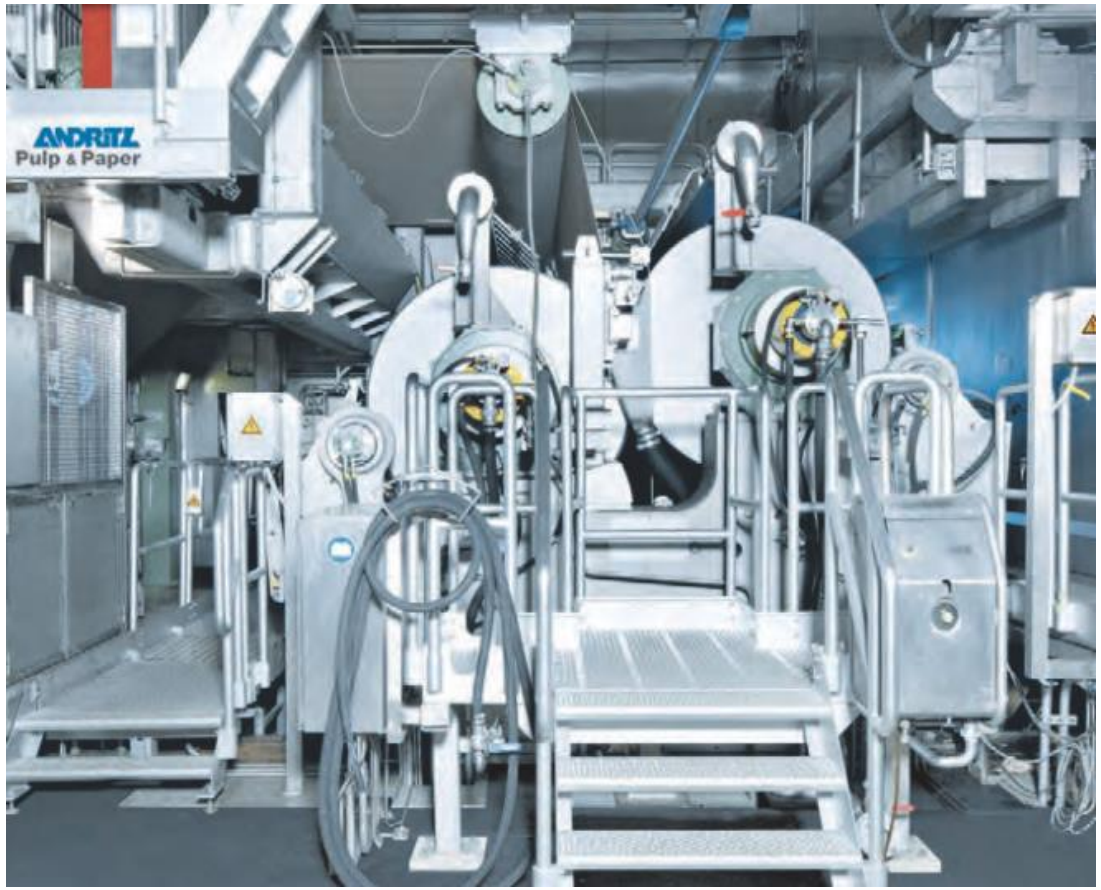


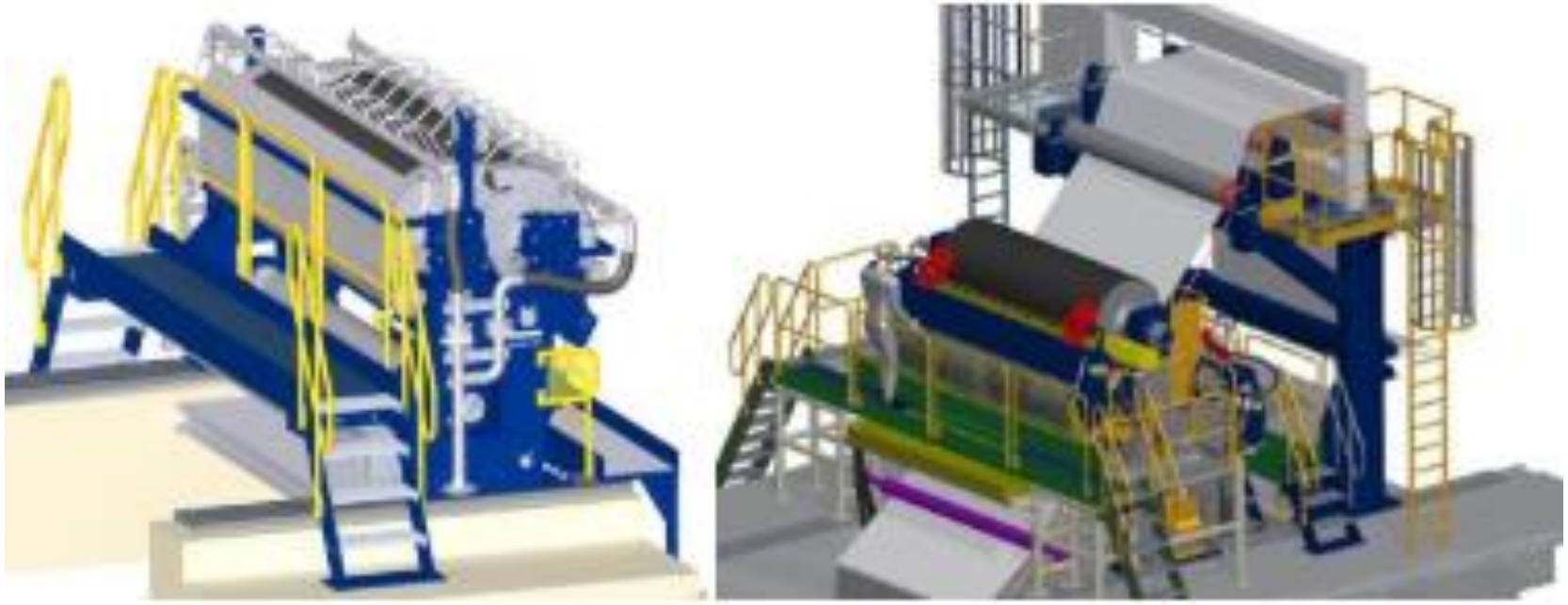
Source: Voith

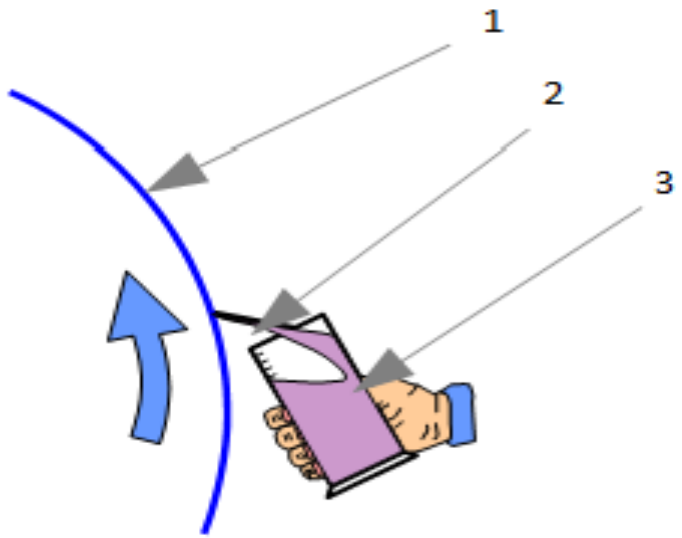
- Over 270 units in operation
- Uniform CD application profiles
- Process stability
- Easy maintenance & repair
- Quick and easy cleaning
- Good runability

Valmet's sizers feature smart construction leading to:

- Proven and safe solutions
- Excellent reliability
- Less maintenance and unexpected shutdowns
- Clear scope of delivery
- Flexible solution for auxiliary/optional choices
- Enables upgrades easily
- Fast delivery time including shorter installation and start-up time
- Pre-tested and industrial units to site (core sizer, machine circulation skids, automation cabinets, tail threading)

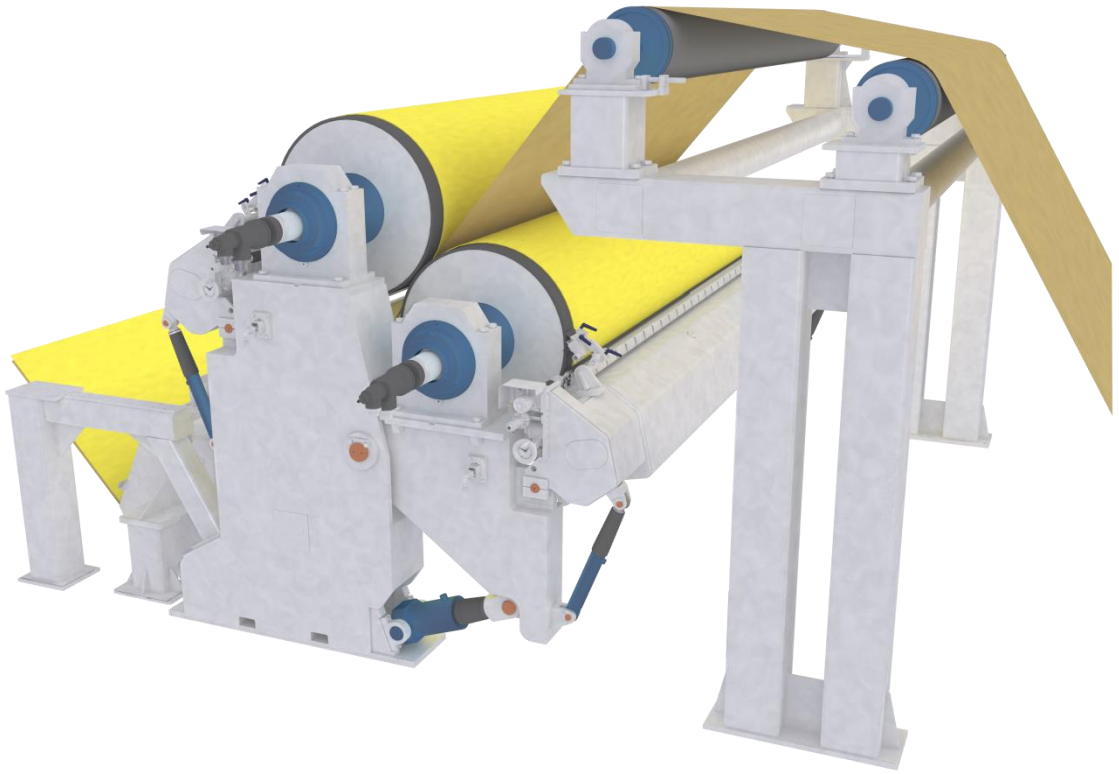






Check the amount of fluid on the rolls surface using the measuring scraper.
1- Applicator rolls, 2- Scraper, 3- Measuring beaker.

- Equal cross machine fludi volume on the roll surface



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