INTERNATIONAL MEETING OF SLOVENE PAPER INDUSTRY 2018, BLED 14-15 NOV 2018

L&W Freeness and Fiber Online

Pulp & Paper solutions

ABB in Stock Preparation and Wet End

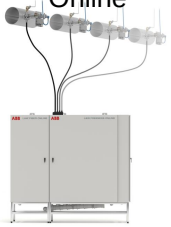
Measurement and control solutions

Advanced control solutions:
- Retention
- Filler content
- Head box consistency
- Refining

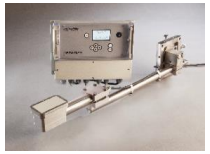
L&W Fiber Online

L&W Freeness Online

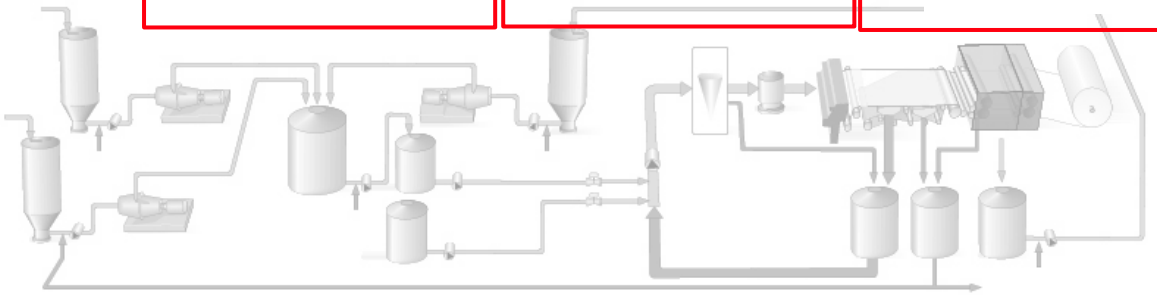
L&W Freeness and Fiber Online



L&W FSD sensor



KRT Retention measurement



L&W Fiber Tester Plus

KC/7 Microwave Consistency

Shear Force Consistency
KC/3 Blade, KC/5 Rotary

Optical Consistency
OC20/50, OC20/25, OCP03/25, OC20/70 in line

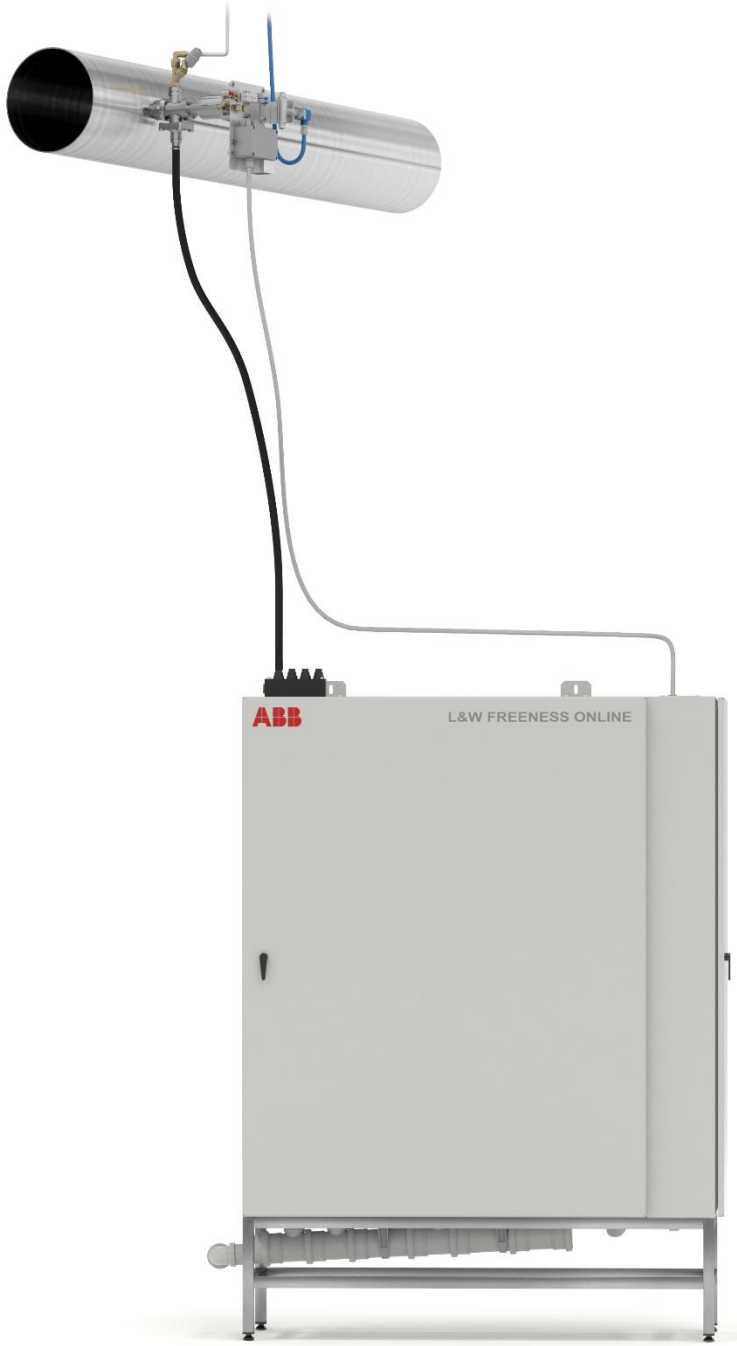
L&W Freeness Online

Benefits

L&W Freeness Online is reliable and accurate!

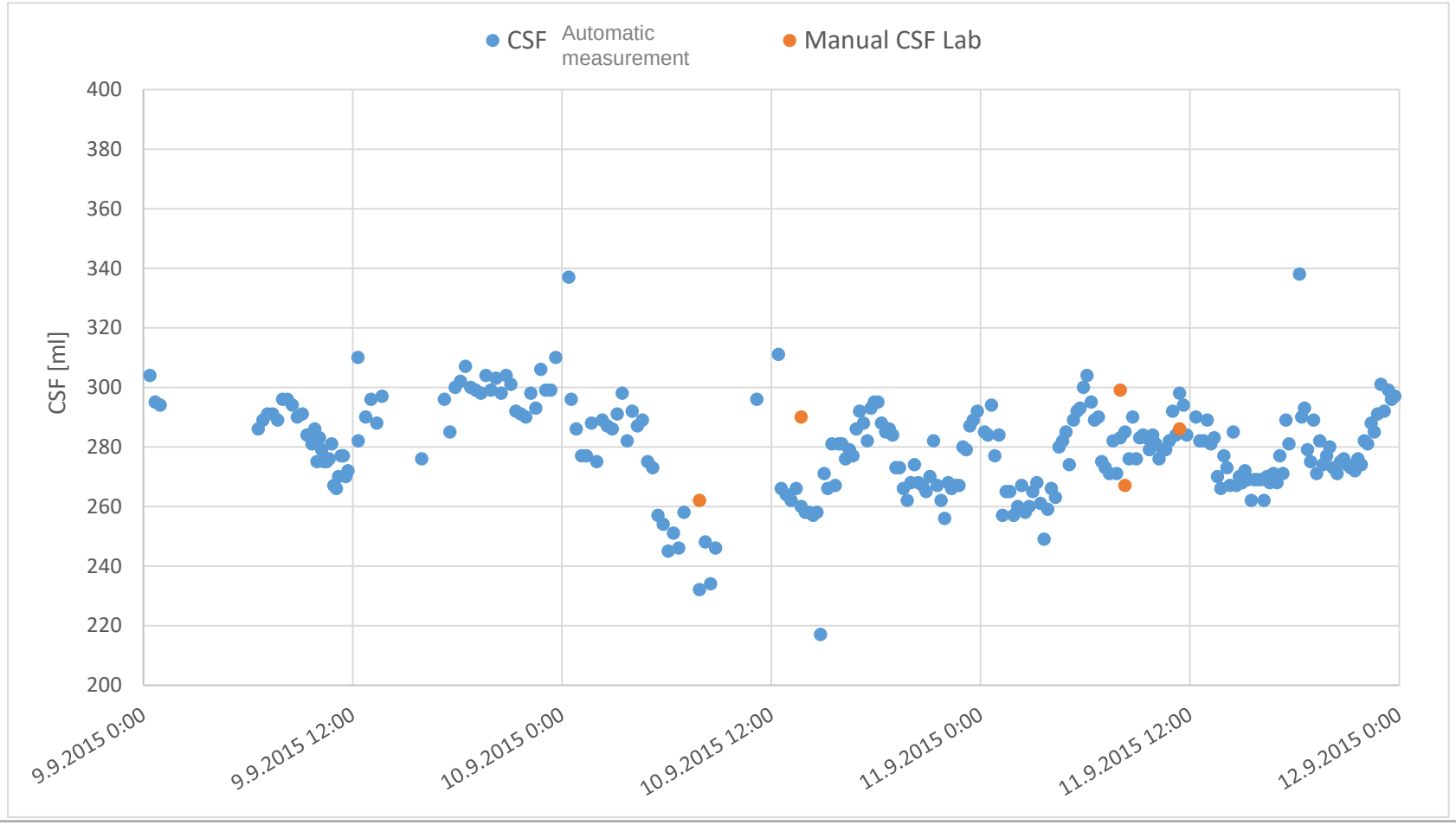
Save cost in production by monitoring and controlling CSF/SR measurements with L&W Freeness Online

- Reduce energy consumption for refiners
- Reach CSF/SR set point faster after web break and production stop
- Reduce steam demand
- Create the best possible continuous and uniform furnish for the paper or board machine



Canadian Standard Freeness

From manual to automatic measurements



From manual to automatic

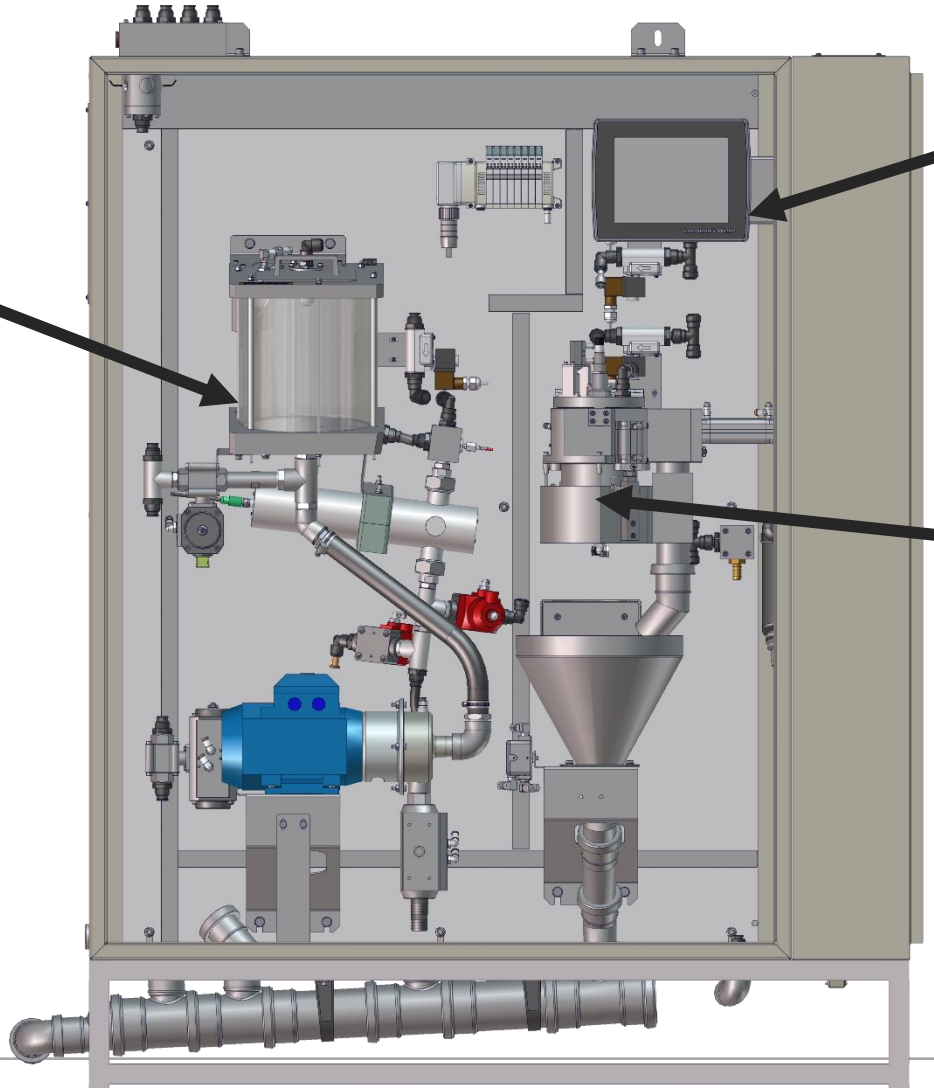
Freeness measurements

- Reducing CSF variations by 10% can reduce power consumption and create a more uniform furnish on the paper or board machine
- If manual samples are performed the opportunity may be missed
- Operators can perform other important tasks than prioritizing time for manual measurements

EXAMPLE	Time – Manual sample	Time- Freeness Online
Sampling time	1.5 hours per day (30 min per two measurements)	0.2 hours per day (4 min per sampling point)
Waiting time for result with compensation	4.5 hours per day	No waiting time
Total measurements per 24 hours	6 results (two measurement per shift, one for each fiber line)	360 results

L&W Freeness Online

Overview



Sample handling and dilution to 0.3% or 0.2 % consistency according to standards

Touch screen for easy set up and maintenance

Freeness module with screen plate according to standard

Operational principle

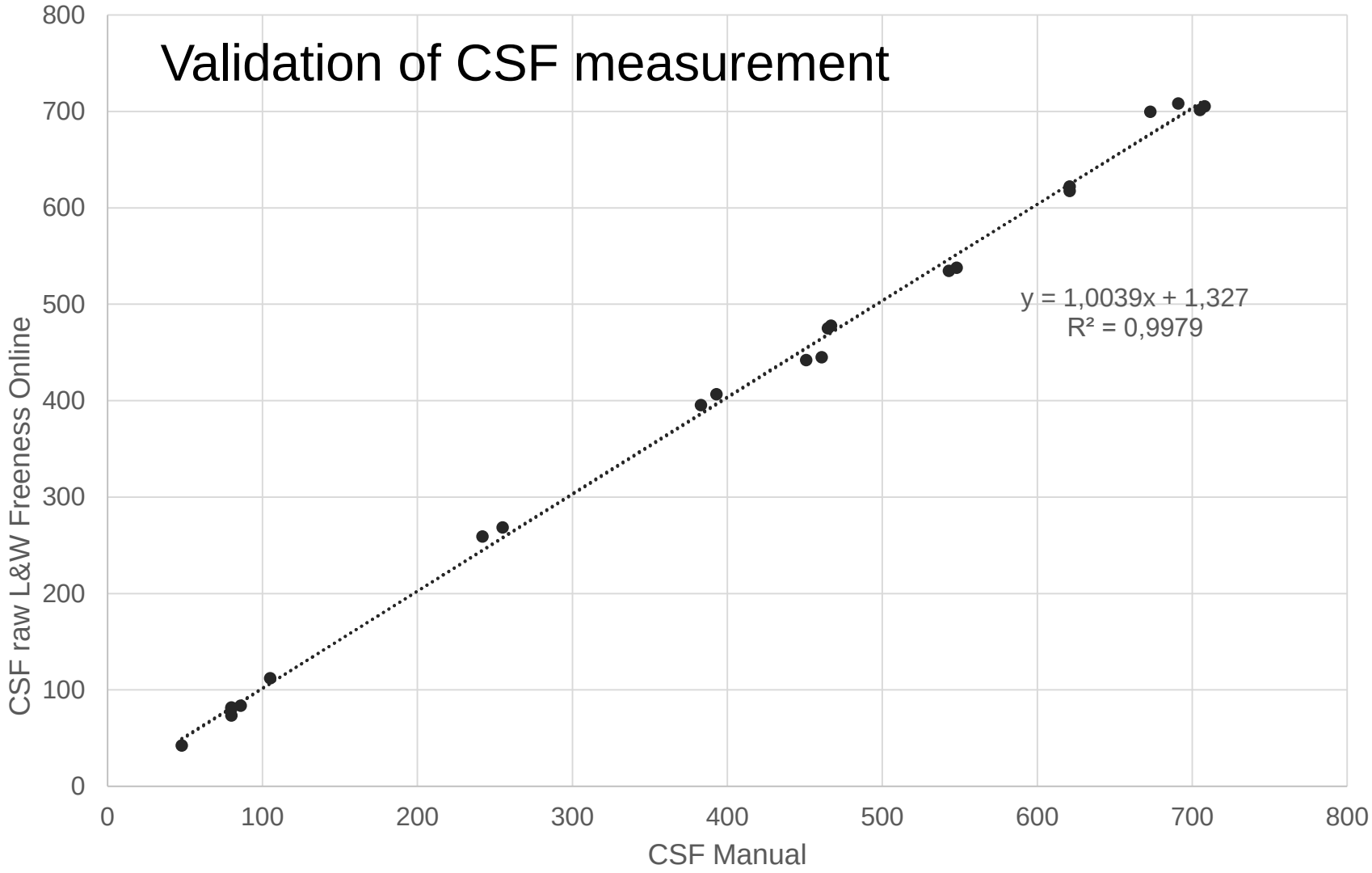
Description

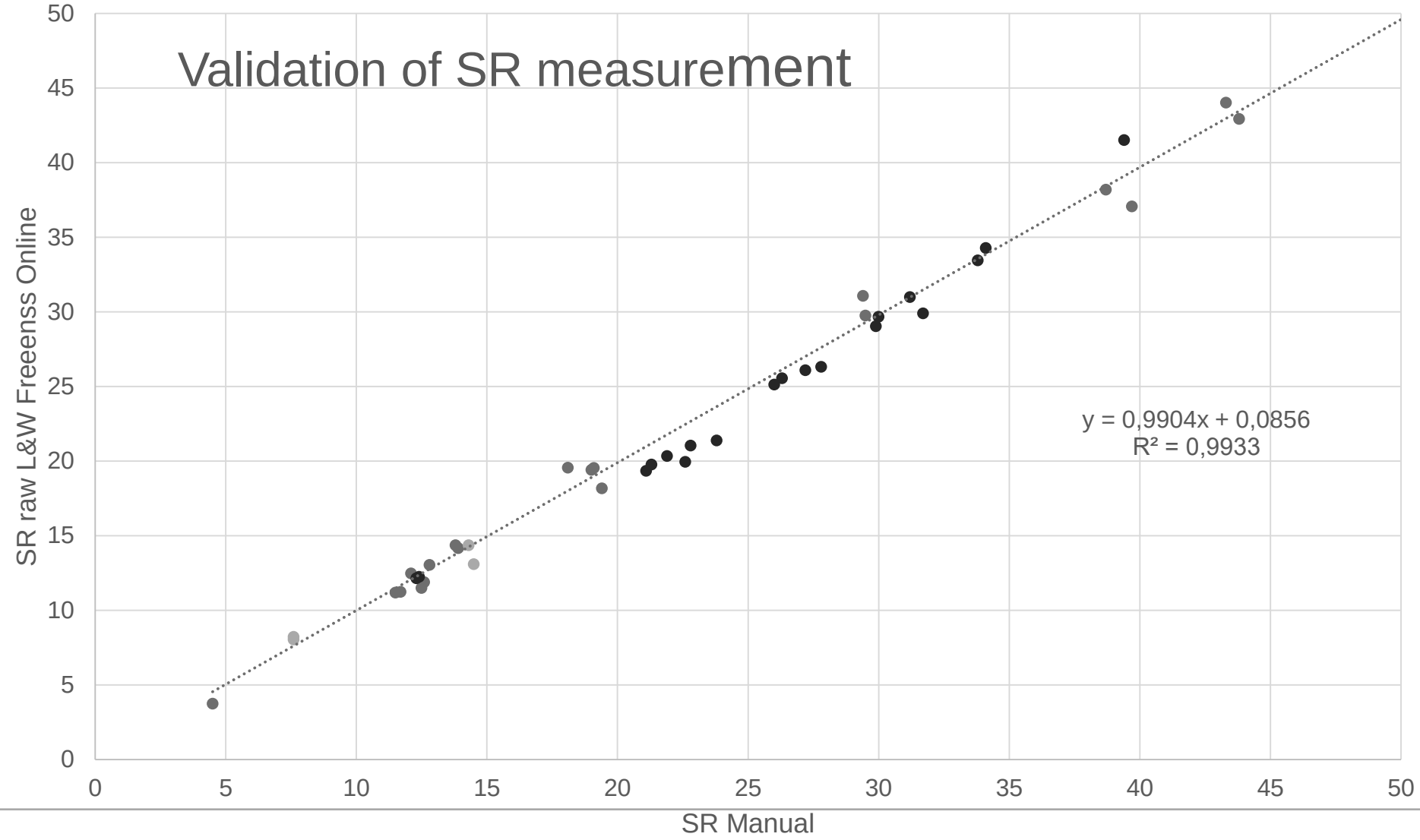
The sample is pushed to the to the sample handling tank, where the sample is diluted to approximately 0.3% for CSF and 0.2% for SR. To reduce analyzing time, the next sample is pushed forward and awaits in its pipe until the sample before it is finished.

The first sample is then transported to the freeness module, where a pulp pad is created over the screen as it dewaters. The dewatering range is measured with ultrasonic sensor. The second sample is then moved to the sample handling tank.

Mathematical operations are made to calculate the corresponding CSF or SR value. The result is compensated with the correct consistency from the optical sensor and the temperature is measured and compensated for as well, according to standards.

The pulp pad is cleaned out from the freeness module by air and water to create turbulence, it is then flushed to drainage. The second sample is transported to the freeness module for measurement.


Validation of CSF measurement
CSF raw L&W Freeness Online
CSF Manual
y = 1,0039x + 1,327
R² = 0,9979
0
100
200
300
400
500
600
700
800


Validation of SR measurement
SR raw L&W Freeenss Online
SR Manual
y = 0,9904x + 0,0856
R² = 0,9933
0
5
10
15
20
25
30
35
40
45
50

Freeness

CSF measurement principle

Related to TAPPI (T-227) and ISO standards (ISO 5267)

- Diluted to 0.3% consistency
- Screen plate identical to standard
- 1 liter sample is analyzed
- Compensation for consistency and temperature
- Double measurements from same sample
- Water measurement between samples

Cleaning with water, air, detergent and ultra sonic cleaning (optional)

Schopper-Riegler

SR measurement principle

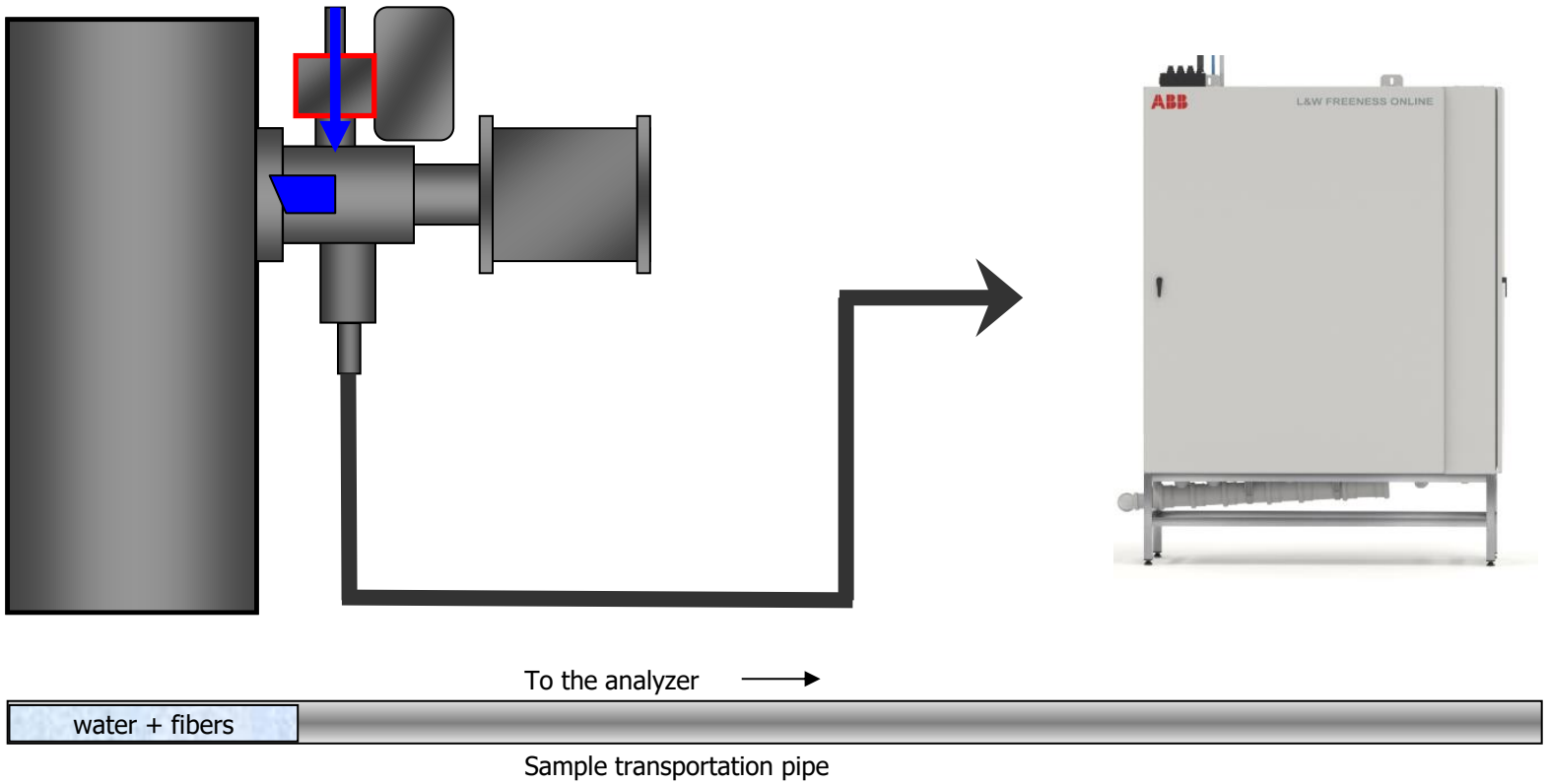
Related to and ISO standards (ISO 5267)

- Diluted to 0.2% consistency
- 1 liter sample is analyzed
- Compensation for consistency and temperature
- Double measurements from same sample
- Water measurement between samples

Cleaning with water, air, detergent and ultra sonic cleaning (optional)

Sampling reliability

Function of samplers



Simple and robust process connection

•Well proven and well known samplers sold in 1000s

•Pneumatically driven piston goes into the process

- Robust design
- Sharp cutting edge
- Material SS 316L, titanium available on request

L&W Freeness Online
Specification

Specification	
Maintenance interval	Easy cleaning once per month
Consistency	Maximum 8%
Output	4-20 mA or OPC (option)
Measurement range	According to standard (ISO 5267-2 or TAPPI T277)
Distance between sampling point and unit	Maximum 100 meter (328 ft)
Dimensions cabinet	1250 × 1750 × 500 mm (49.2 × 69.9 × 19.7 in)
Dimensions sampler	400 × 340 × 310 mm (15.7 × 13.4 × 12.2 in)
Utilities	Power 100-240 V Filtered water 25 µ or better (pressure requirement 3-8 bars) Average water consumption 2.43 L/min (82.2 fl oz US/min) for L&W Freeness Online with 2 samplers Instrument air according to ISO 8573-1 with air class 2-4-3, pressure 0.4–0.7 MPa (58–102 psi)
Options	Ultrasonic cleaning, Schopper-Riegler, OPC, water and air filter for incoming utilities, detergent pumps, additional samplers
Recommended number of sampling points	2-4 (possible to add more)

Refiner Bump Test

Evaluation of L&W Freeness Online

To show that L&W Freeness Online follows the refiner energy a bump test of refining energy at a customer site was made

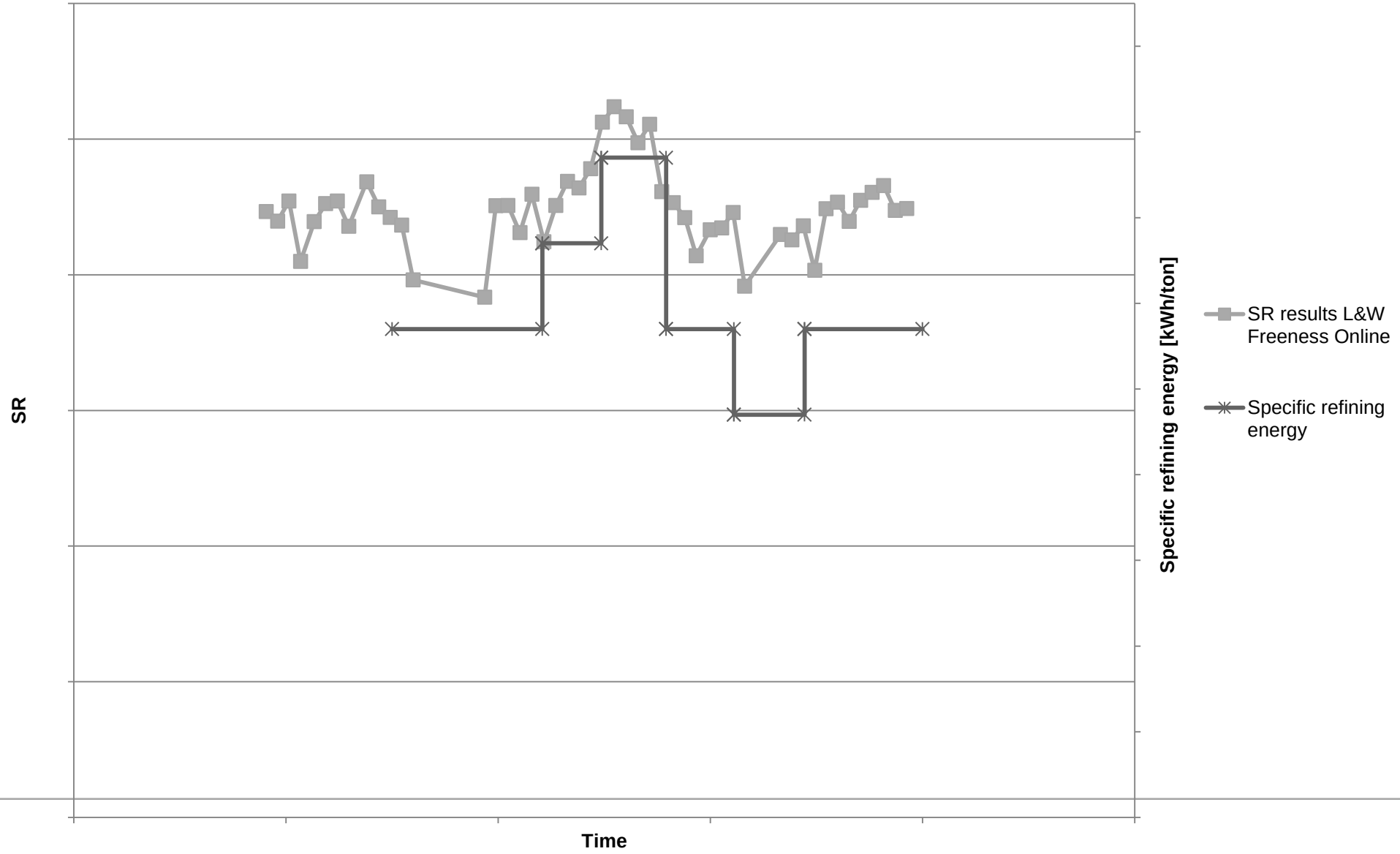
- Specific refining energy changed gradually from to a higher specific energy per ton and back again
- Next slide shows the result of the bump test

The incoming pulp comes from reject from different parts of the pulp and paper mill. The pulp varies over time and the operators cannot control what type of reject that is used

- Large variation in incoming SR

Conclusion: L&W Freeness Online follows the refiner energy well. At low specific refining energy the variation in SR comes mainly from incoming pulp and is not effect by the refiners to a large extent.

Result of Refiner Bump Test



Comparison to specific refining energy

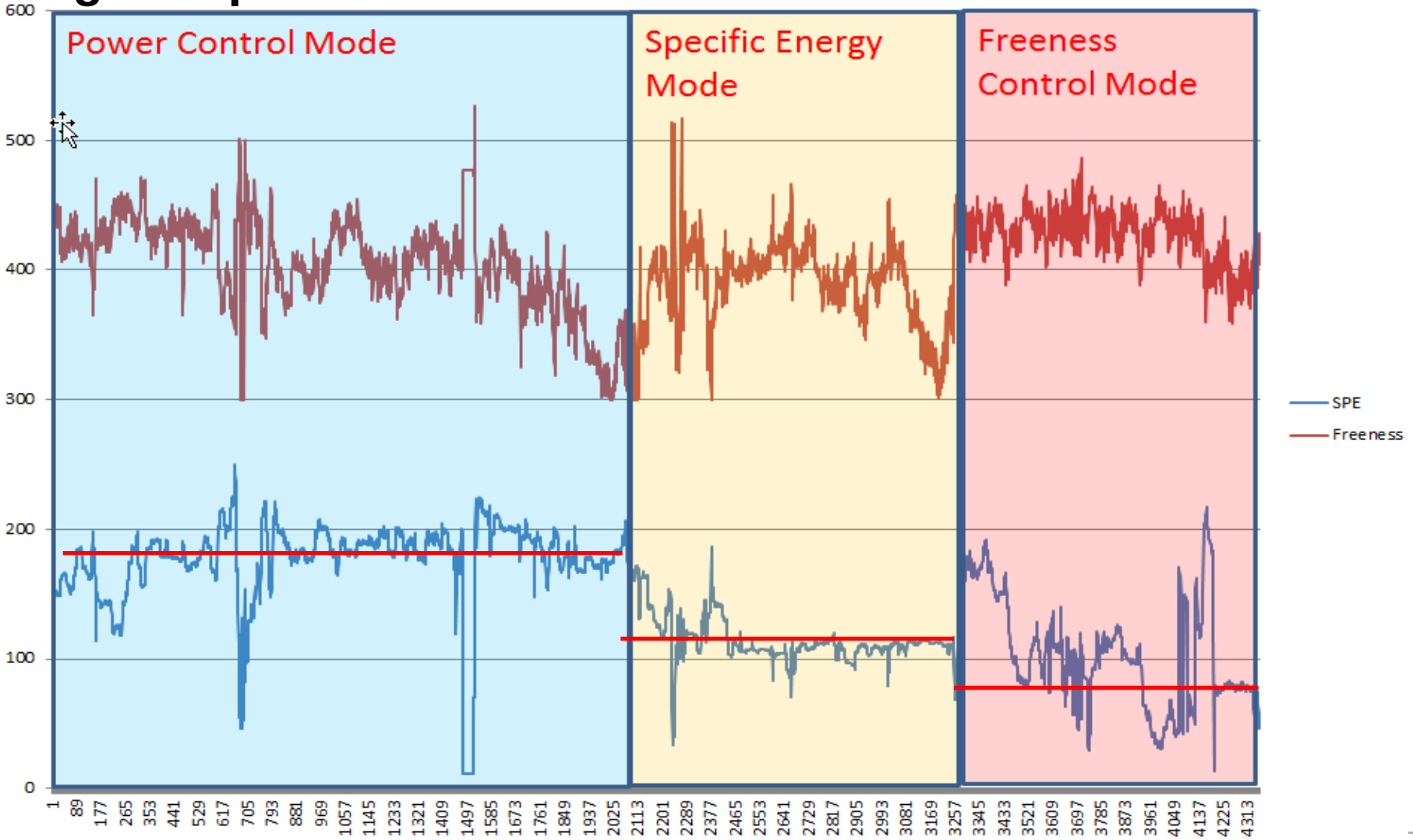
Evaluation of L&W Freeness Online

A comparison is made of the result of L&W Freeness Online and specific refining energy at a paper mill that produces printing and writing paper

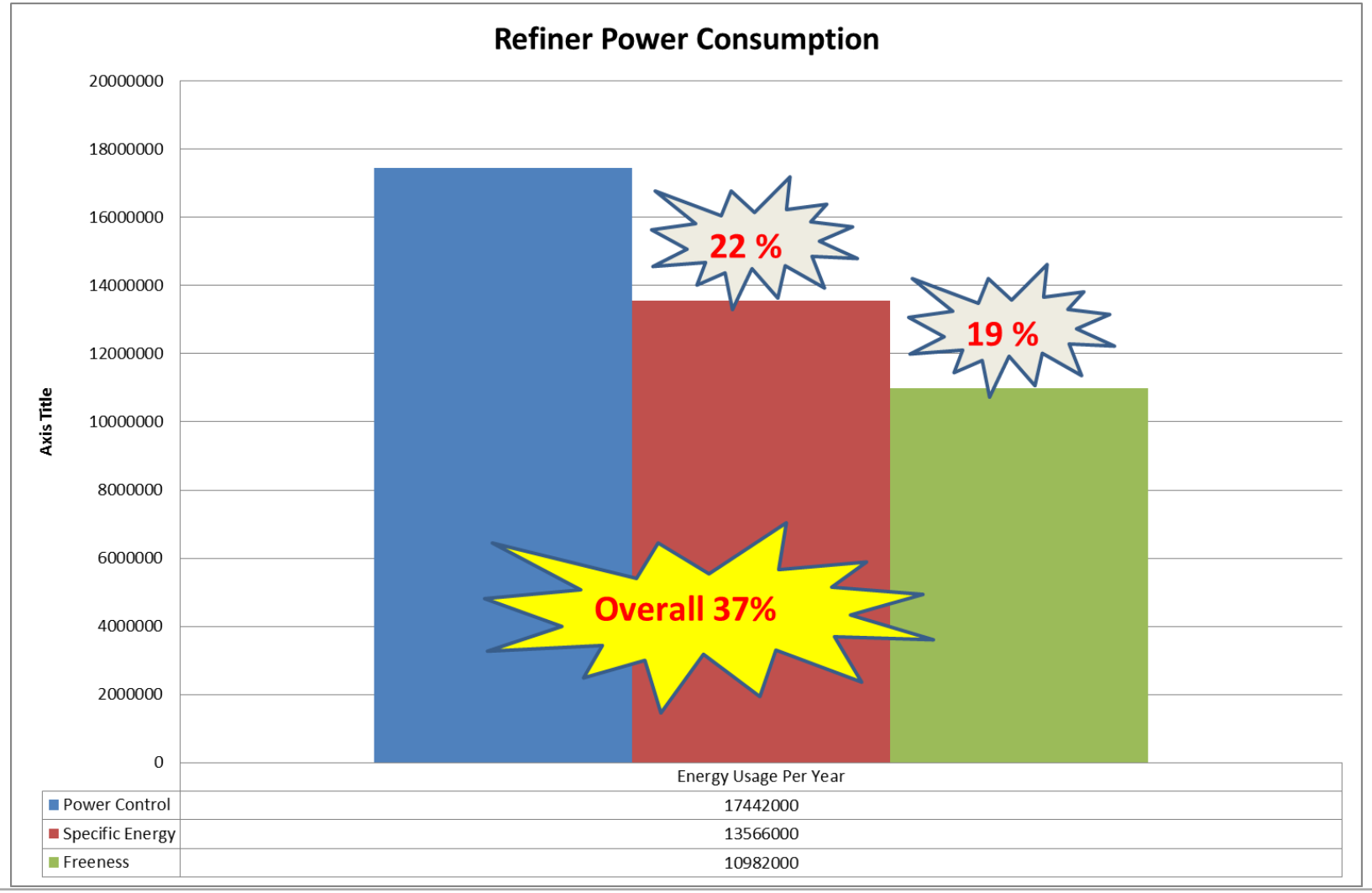
- See next slide for results

Conclusion: L&W Freeness Online follows the specific refining energy very well. The customer is especially happy that our measurement detects when the refiner plates are parted (dip in SR and refining energy values) which correlates well with their process when changes of incoming pulp occur.

Energy Saving Comparison



Energy Saving Comparison



L&W Freeness Online

Summary

Reduce production costs by monitoring and controlling CSF/SR measurements with L&W Freeness Online

- Well proven samplers
- Accurate CSF/SR measurement
- Robust with few moving parts
- Easy to use and simple to maintain

Use results from L&W Freeness Online for implementing a control strategy to reduce costs even further

L&W Freeness Online is reliable and accurate!

Know your fibers

Achieve the properties you want in your product

L&W Fiber Online

An image-based online system for monitoring fiber properties that affect key properties in paper and board.

It allows paper makers to control quality and optimize cost in stock preparation by monitoring fiber properties online :

- Control refining to the actual effect on fiber properties
- Reduce refining energy and dryer section steam consumption
- Optimize the mix of long fibers, short fibers, recycled fibers and chemicals to achieve quality targets
- Reach quality targets faster after grade changes and production stops
- Reduce pulp variations and create a continuous and uniform furnish for the paper or board machine

Fiber Morphology

L&W Fiber Online measurements

What is measured and what does it relates to:

Fiber length & width – sheet strength (tear), formation

Fines S & P – dewatering, strength

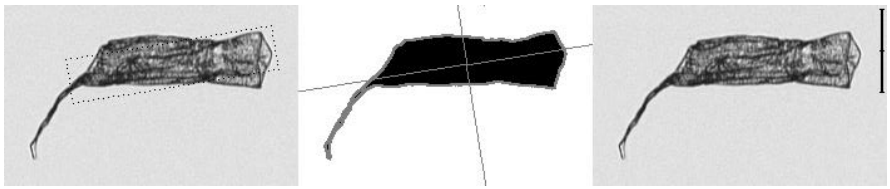
Kink – cellulose degradation, viscosity, strength

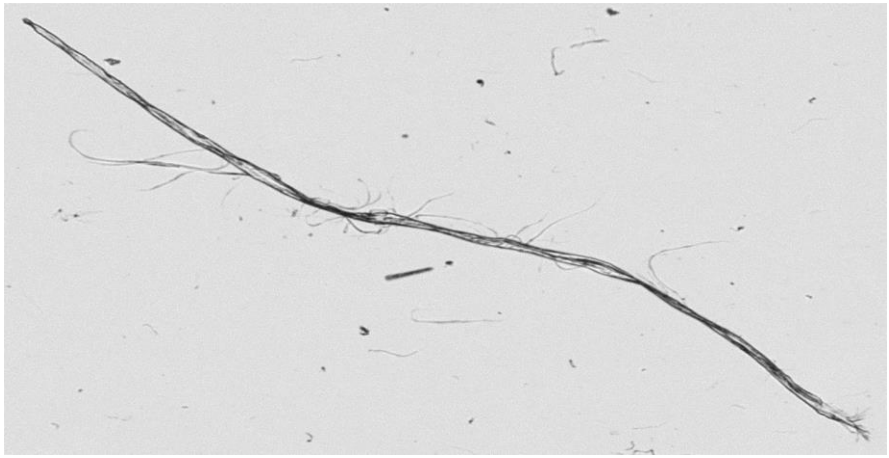
Shape factor – tensile stiffness, stretch, refining

Vessel cells – printability, linting

Shives – web breaks, linting, printability

Fibril area/perimeter – strength





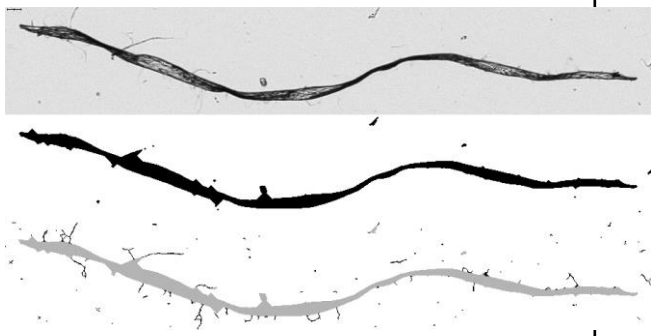
Fibril index good indication of refining effect

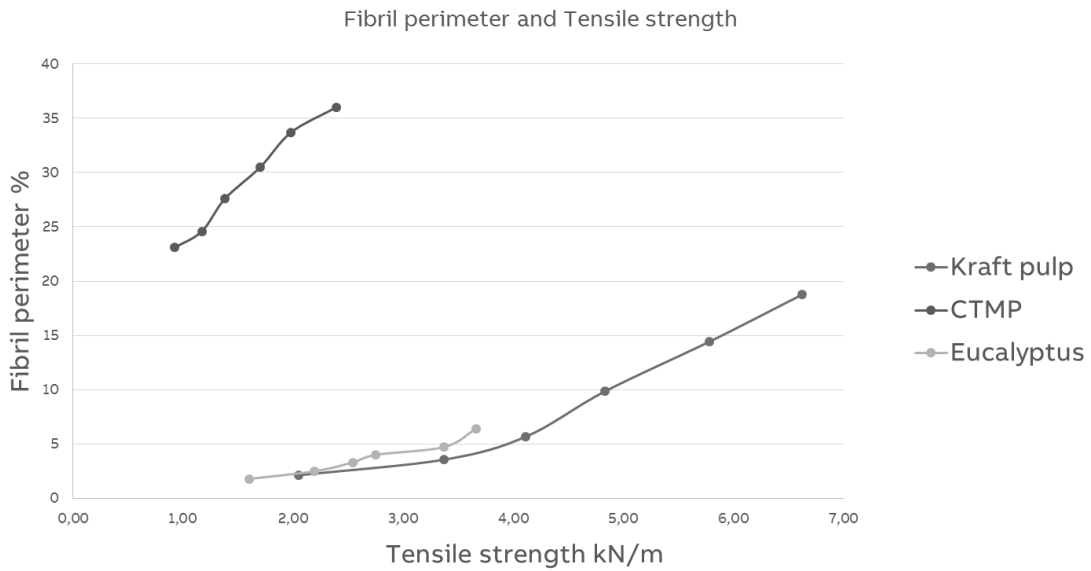
L&W Fiber Online measurements

Fibrils on the fiber surface

Calculation of fibril index based on area and perimeter of fibrils in relation to total fiber

Better linearization and stronger correlation to paper strength properties than SR and CSF

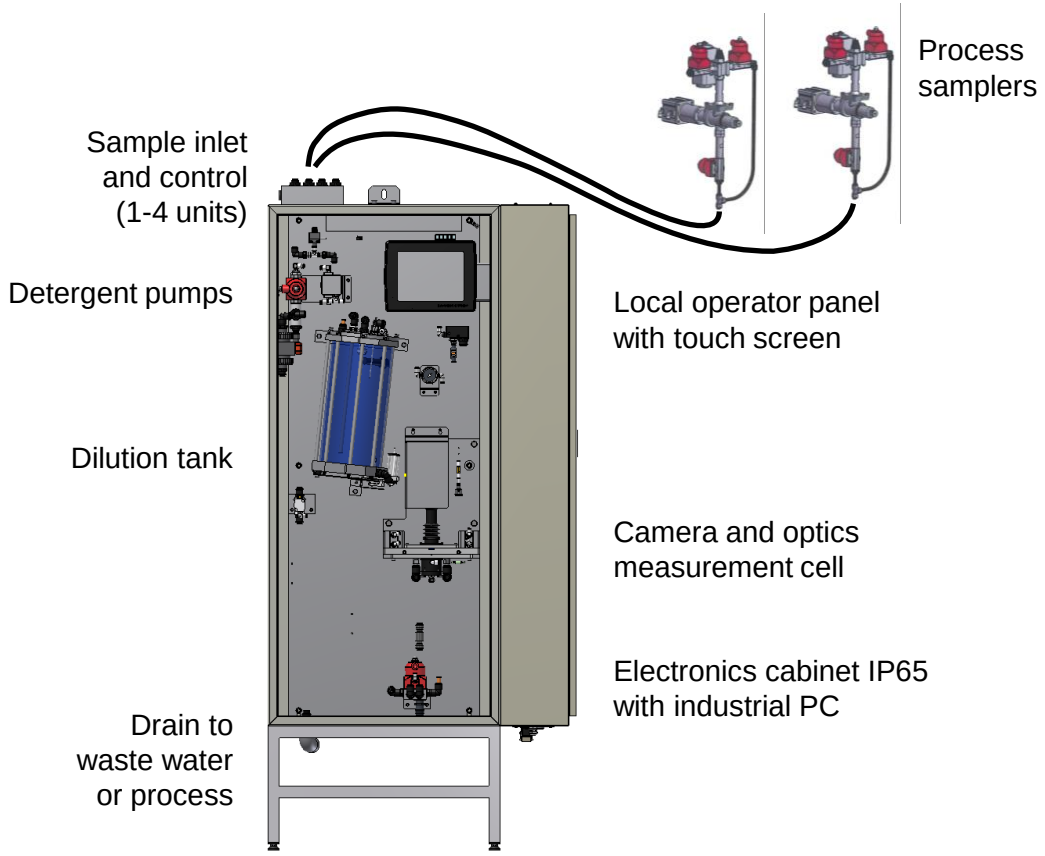




Lab precision in process environment

Product overview

- Collects the samples in sequence
- Sample measurement time 3-4 min
- Sampling sequence controlled to program or manual
- Calibrated in factory



High Performance image analysis module

Product Overview

Measurement principle

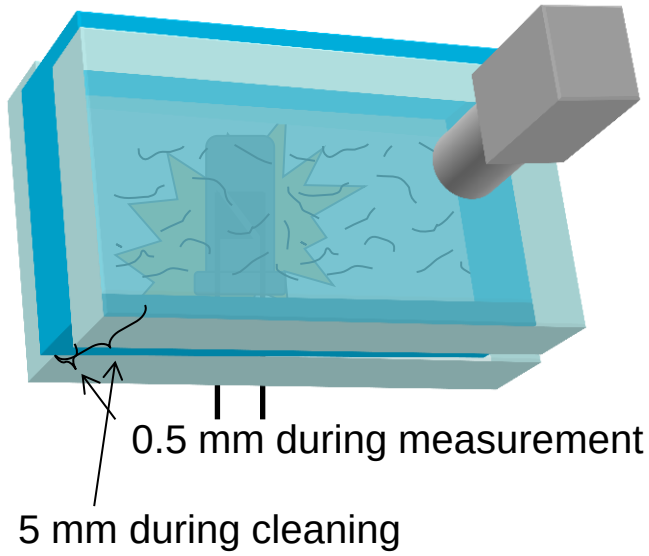
Typical sample volume 0.1 mg dry substance contains 3 000 – 20 000 fibers

High performance camera with USB3 vision interface

Standard measurement gap (ISO)

Gap opens for cleaning between measurements to avoid plugging

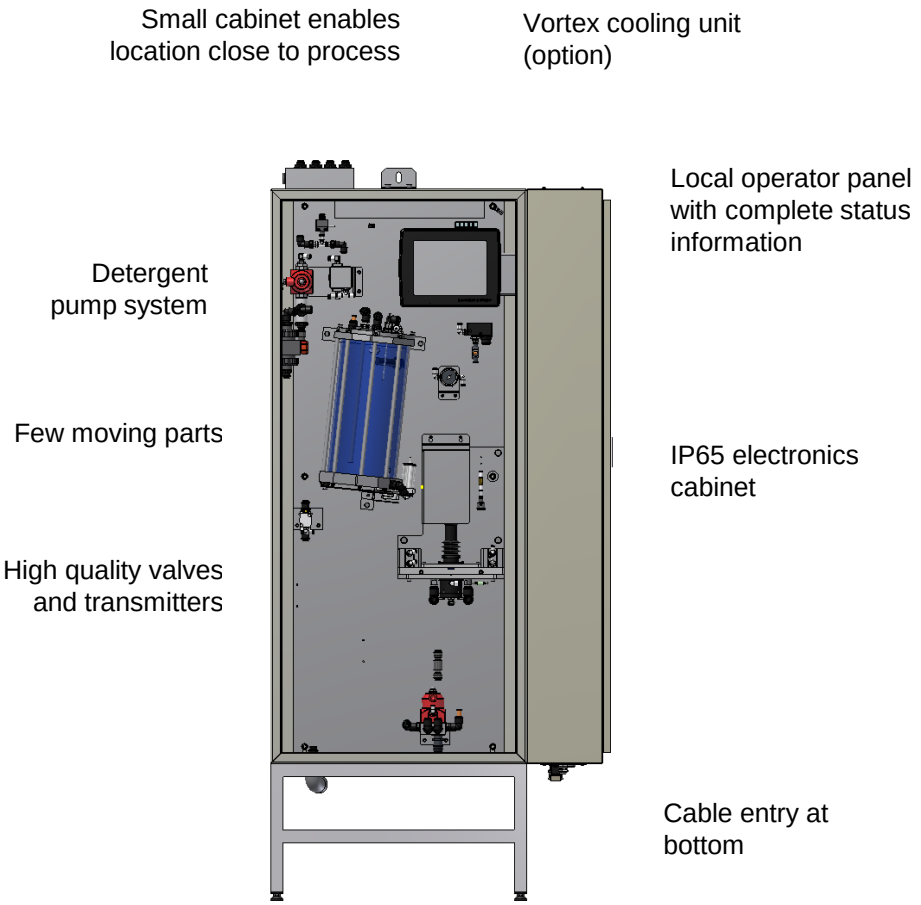
Proven software for signal processing and image analyses



Designed for reliability in process environment

Product Overview

- Designed to minimize need for maintenance and calibration
- Pre-calibrated in factory
- Flange (NS 40) and samplers can be pre-installed during process shutdown
- Extensive built-in diagnostics and alarm handling for intuitive support and maintenance
- Optimized spare part package
- Less sample volume generates less dirt build-up and maintenance

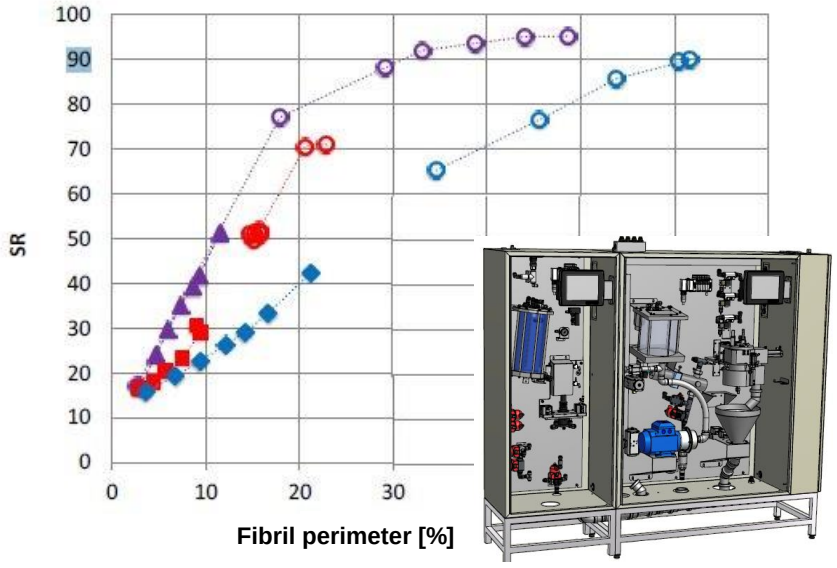


Extended information over traditional methods

L&W Fiber Online measurements

Freeness (CSF and SR) are standardized methods with long history, but Fiber Morphology is a superior measurement:

- Better linearization
- Independent of process conditions: latency, temperature, pH etc.
- Direct measurement, no calibration
- Less sample volume generates less dirt build up and maintenance



L&W Fiber Online can be combined with L&W Freeness Online

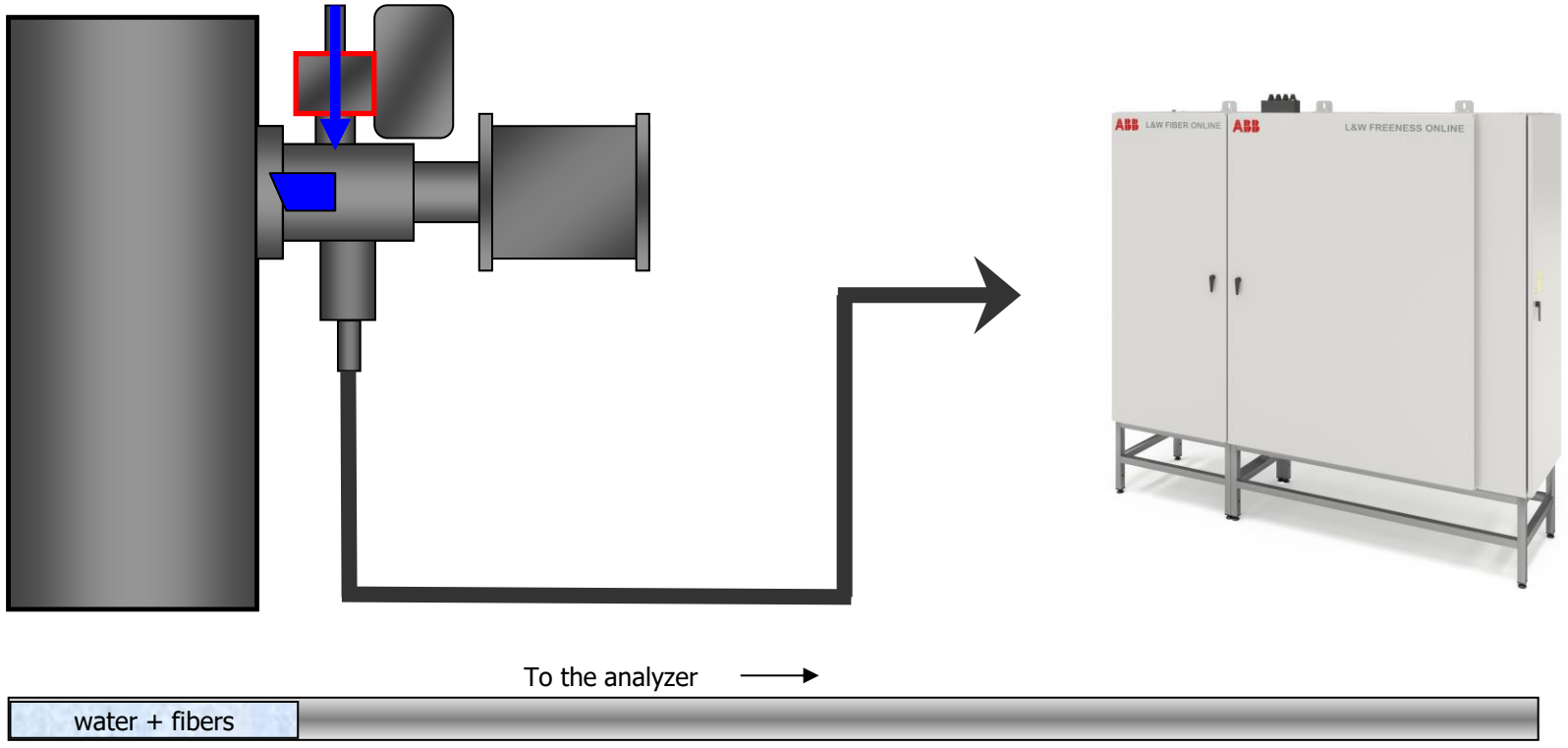
Combination L&W Freeness and Fiber Online

Measurement results:

- CSF/SR
- Fiber length
- Fiber width
- Shape factor
- Fines total
- Fines S & P
- Fibril area
- Fibril Perimeter

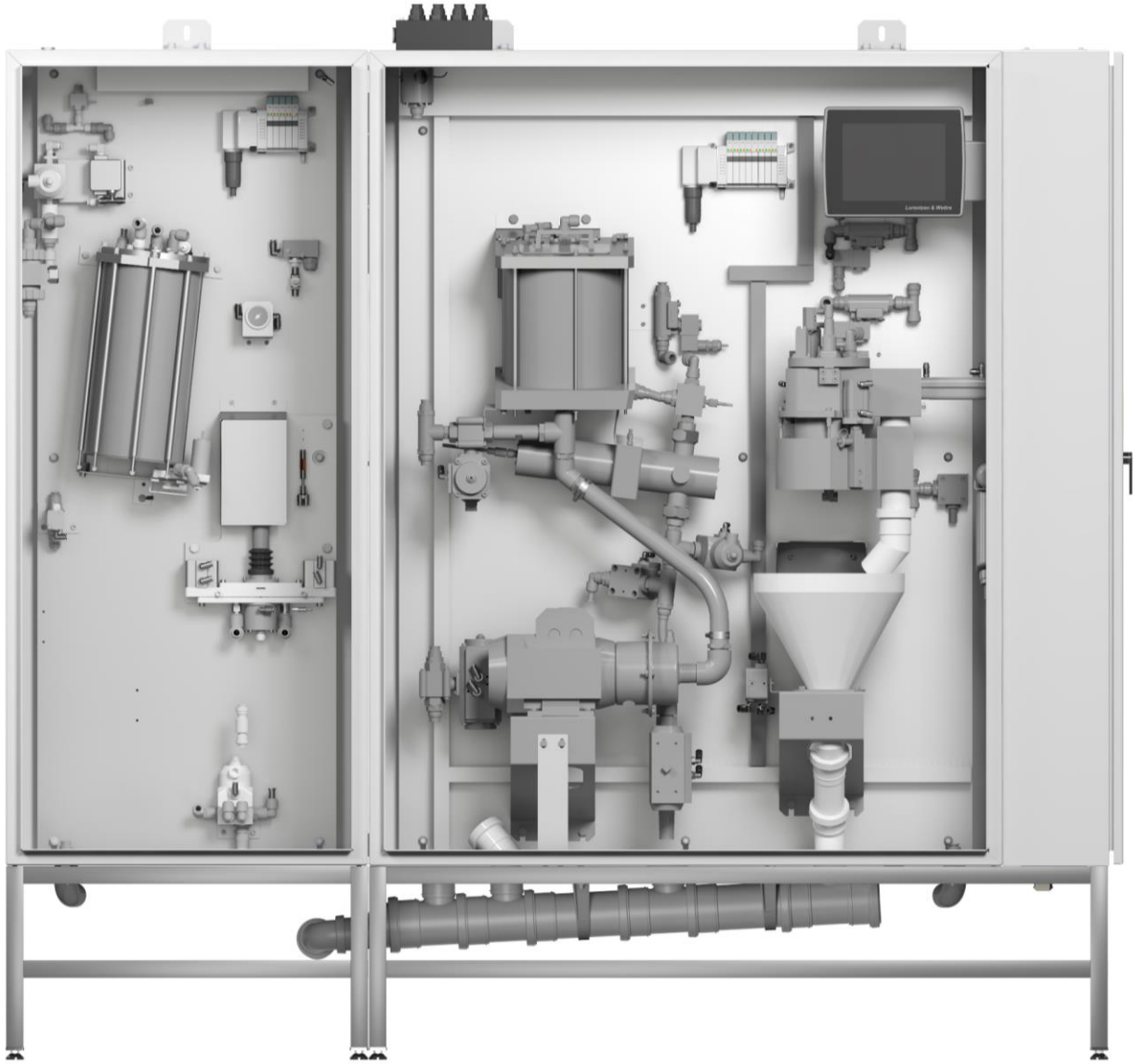
Function of samplers

Sampling reliability



Designed for the process

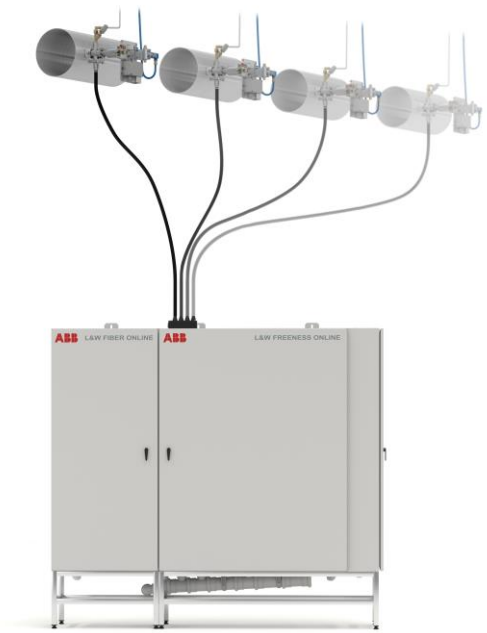
Reliability and low maintenance



Achieve uniform furnish for your paper, board or tissue machine

Know your fibers

L&W Freeness and Fiber Online



Combine the well-known freeness measurements with image-based online system for monitoring fiber properties, to achieve an holistic view of your furnish.

It enables paper makers to control quality and optimize cost in stock preparation by monitoring fiber and freeness properties online :

- Control refining to the actual effect on fiber properties
- Reduce refining energy and dryer section steam consumption
- Optimize the mix of long fibers, short fibers, recycled fibers and chemicals to achieve quality targets
- Reach quality targets faster after grade changes and production stops
- Reduce pulp variations and create a continuous and uniform furnish for the paper or board machine


ABB