Paper makers have limited information from infrequent manual samples to try and optimize refining. L&W Fiber Online is an image-based measurement system that provides an accurate and comprehensive assessment of fiber quality in real time. This enables mills to easily pinpoint and follow trends on furnish quality, close the control loop, and reduce variations.

Overview
Mills often have insufficient resources for true visibility into fiber quality. Compared with traditional indirect measurements, such as Schopper-Riegler (SR), the image-based measurements produced by L&W Fiber Online provide a more accurate pulp quality status in the wet end for precise optimization of fiber usage. The system allows for up to four sampling points in a single unit with a fully automated measurement cycle boasting a fast sampling rate that provides quicker, more detailed information than manual operation. As a small footprint solution with few moving parts that is both easy to use and maintain, ABB offers exceptional reliability making this one of the lower total cost of ownership options with the highest accuracy and availability.

Data is available on the unit touch screen, integrated with 800xA or via OPC for third-party DCS. The continuous, online fiber measurements provided by ABB’s system enables fast response to process variations helping to reduce production costs, eliminate over refining, and decrease energy consumption while creating a uniform pulp furnish for improved runnability of paper, board or tissue machines.

Features
- Based on ABB’s proven L&W Fiber Tester Plus
- Automatic online process sampling at up to 4 measurement points
- Measures according to ISO and TAPPI standards
- Monitors fines and fibrils, providing microfibril area and perimeter and fibril index
- Frequent data with up to 300 measurements per day enabling operators to correct control actions
- Provides evaluation of refiner plates performance
- Automatic opening and cleaning measurement cell
- Internal vacuum system to remove air bubbles
- Few moving parts
- Integration with ABB Ability™ System 800xA

Benefits
- Provides fast and accurate classification of pulp quality
- Better control and optimize the mix coming to paper machine
- Gain a more complete understanding of tensile strength than traditional measurements
- Enables closed loop control for more consistent quality
- Excellent correlation to lab measurement results
- Low maintenance requirements and cost
- Increases mill profitability by improving raw materials usage, energy costs and machine runnability
L&W Fiber Online solves the problem of detecting quality issues too late to take action by discovering variations as early in the process as in stock preparation to take corrective action sooner and meet quality specifications. This system measures fiber properties according to international standards; it is based on ABB’s well-known L&W Fiber Tester Plus, a laboratory instrument that is used by hundreds of mills and is a preferred tool by research centers and universities around the world. Fiber properties are categorized and presented as mean values and statistical distributions of width, length, shape factor, two classes of fines (P and S) and macro fibrillation. Software modules are available for vessel cells, minishives, and local deformations (kink). For mixed furnish, the optional Blend software analyzes the ratio of reference fiber species in a fiber mix, making it possible to save raw materials when switching grades or during start-up.

Measures several different fiber properties

Two-dimensional image technology and a very small measurement gap (according to ISO standards) between two glass plates ensures good alignment of fibers where the entire fiber can be seen and detected by the camera. The fibers are oriented in an image plane in the measurement cell and do not admit spread perpendicular to this plane.

Control system integration

L&W Fiber Online offers integration to 800xA with dedicated faceplates, alarm handling and trending of measurements – making immediate action by the operator easier. OPC connection to third-party DCS is also available.

Further optimize with freeness measurement

Get a complete picture of dewatering status and fiber quality in real time by adding L&W Freeness Online. ABB also offers a combination unit that provides both fiber and freeness measurements.

Example of a gray scale image of a single softwood fiber

Measured properties

Fiber width decreases when lignin is removed. Thinner fibers, if all other dimensions are constant, provide a better and more even formation in the sheet. For certain pulps made from wood from a single species, fiber width does not correlate with fiber length and wall thickness; in a mix of different pulps, it may correlate. A low fiber width will give a sheet a more even surface. The calculation principle in our unit allows for variation detection for parts of µm scale.

Fiber length is an important property of pulp, and longer fibers generally improve the strength properties up to a certain point. Limited bonding of the fiber in the network will limit the possibility for the fiber to carry a load at the ends of the fibers. With longer fibers, the bonding will be less critical. Very long fibers are more easily entangled with each other, giving the sheet poor formation. L&W Fiber Online is designed to measure true fiber length with minimum impact from the degree of deformation.

Shape factor is an important measure of pulp quality and is defined as the ratio of the maximum extension length of the fiber to the true length of the fiber. A high shape factor, or form factor, means straight fibers and enables good mechanical properties in the sheet. It is well correlated with tensile strength and tensile stiffness. A gently treated laboratory pulp has quite straight fibers, whereas there are several process stages in a mill that are potential curlers of fibers, like presses, mixers etc. L&W Fiber Online calculates how straight the fiber is; a variation in shape factor between 81–85% for a bleached chemical softwood pulp affects tensile index by 15 Nm/g. A 1% change in shape factor significantly impacts Tensile Index.

Macro fibrillation area and perimeter are calculated based on area and perimeter respectively. The fibrillation indexes are calculated for different length classes, thus the user can monitor if different fiber length classes are behaving differently in refining or processed in other ways. Fiber bonds, which are considered to consist of hydrogen bonds, are rather weak. To increase the bonding strength, the fibers are refined where the fiber surface is roughened (fibrillated) creating a larger contact area for bonding between the fibers.

Fines are regarded in two classes; P and S. A coarse fines class (P) and a fines class (S) are reported. Fines often have a different impact on processes and products than the fibers. Before treatment (i.e. beating), only P fines are present and ray cells are included in this classification. P fines have poor bonding properties. S fines are created during beating and may improve sheet strength. Fines have a negative effect on dewatering and pressing.

Impurities, such as kink, vessel cells, minishives, flocs and dirt, can be analyzed via optional software. There are recommended settings for vessel cells and shives, and other types of objects can be specified.

Blend analyzes the ratio of reference fiber species in a fiber mix and is available as an add-on. The references are stored permanently in the database.
Technical specifications – L&W Fiber Online, code 950

Inclusive  
L&W Fiber Online, touch screen and electronics

Technical details  
Monitoring of fibers during measurement. Sample amount typically 0.1 g dry weight pulp, not critical

Measurement results  
- Weighted averages for length, width, fibril area, fibril perimeter, shape factor and two classes of fines (S and P) are reported.  
- Number of measured fibers  
- Number of fibers in sample  
- Optional measurements: blend, vessel and kink

Measurement range  
- Length according to ISO and Tappi standards (Tappi: 0.1–7.5mm, ISO: 0.2–7.5mm)  
- Width from 4μm.  
- Resolution within measurement range is 0.1 μm for an average SW fiber  
- Shape factor (0) 50–100%  
- Fines l < 0.2 mm or l < 0.1 mm depending on used standard for length

Measurement frequency  
5–7 minutes/sample

Repeatability  
Length 1.5 %, width 1 % and shape 0.5 % of average

Sample types  
- Separate sample types can be declared for different sampling points or by different users. Measurement time: Tappi/ISO

Installation requirements

Power  
240 W, 100–240V

Instrument air  
Air supply should follow standard ISO 8573-1, Air-class 2-4-3

Air pressure  
0.4–0.7 MPa (58–102 psi)

Sampler connections  
Air: Ø 6 mm (1/4 in) water resistant polyurethane ether (PU) or polyamide (PA)  
Water: Ø 10 mm (3/8 in) water resistant polyurethane ether (PU) or polyamide (PA)

Sample transportation  
Ø 10 mm (3/8 in) water resistant polyurethane ether (PU) or polyamide (PA)

Enclosure class  
Safety and water protection IP65

Water

Consumption  
approx. 150 l/h (10–15 samples á 10l)

Pressure  
0.5–0.8 MPa (5–8 bars)

Temperature  
> 15°C

Filtration  
Filtered to 10μ or better with sufficient flow rate

Connections

Data outputs  
4–20 mA  
OPC UA (OPC UA to DA Gateway is optional)  
XML (on-request)

Sampling

Recommended no. of sampling points  
1–4 samplers

Pulp consistency in pipe  
1–8%

Distance between sampling point and cabinet  
max. 100 m

Process pressure  
Minimum process pressure:  
0.5–1 bar at 1–3% consistency  
1.5 bar at 3–5% consistency  
2–2.5 bar at 5–8% consistency

Dimensions  
820 x 1650 x 500 mm  
(32.2 x 64.9 x 19.7 in)

Net weight  
138 kg  
(304 lb)

Applicable standards  
ISO 16065-2:2007

L&W Fiber Online illustrated with example of connected samplers
Learn more
For decades, as leading supplier of fiber testers and freeness laboratory measurements, we have the
knowledge, products and experience to help our customers achieve their measurement objectives.
Please contact us to learn more about how our products can help optimize your production.

Inside L&W Fiber Online

The information provided in this data sheet contains descriptions or characterizations of performance which may change as a result of further development of the products. Availability and technical specifications are subject to change without notice.

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