

L&W Pulp Tester Fiber Morphology Plus

Lorentzen & Wettre Products | Pulp Measurements

L&W Pulp Tester Fiber Morphology Plus measures fibre properties such as width, length, shape factor, two classes of fines (P and S), macro fibrillation, and coarseness.

This module is based on our L&W Fiber Tester Plus in which the fibres are oriented in an image plane in the measurement cell and do not admit spread in the direction perpendicular to this plane. The tight gap is widened during the washing cycle, which takes place before and after each measurement.

Fibre width

Thinner fibres, if all other dimensions are constant, provide a better and more even formation in the sheet. The fibre width decreases when lignin is removed. For certain pulps, made from wood from a single species fibre, fibre width does not correlate with fibre length and wall thickness, but in a mix of different pulps, it may correlate. A low fibre width will give a sheet with a more even surface.

Fibre length

Fibre length is an important property of pulp, and longer fibres generally improve the strength properties up to a certain point. Limited bonding of the fibre in the network will limit the possibility for the fibre to carry a load at the ends of the fibres. With longer fibres, the bonding will be less critical. Very long fibres are more easily entangled with each other, giving the sheet poor formation.

Shape factor

Shape factor (also called form factor) is an important measure of pulp quality. Shape factor is defined as the ratio of the maximum extension length of the fibre to the true length of the fibre. A high shape factor means straight fibres and gives in most cases good mechanical properties in the sheet. It is well correlated with tensile strength and tensile stiffness. A gently treated laboratory pulp has quite straight fibres, whereas there are several process stages in a mill that are potential curlers of fibres, like presses, mixers etc.

Macro fibrillation area & perimeter

Two fibrillation indexes are calculated based on fibre area and perimeter respectively. The fibrillation indexes are calculated for different length classes. For example you can monitor if different fibre length classes are treated differently in refining or processed in other ways. Fibre bonds, which are considered to consist of hydrogen bonds, are rather weak. To increase the bonding strength the fibres are refined where the fibre surface is roughened (fibrillated) creating a larger contact area for bonding between the fibres.



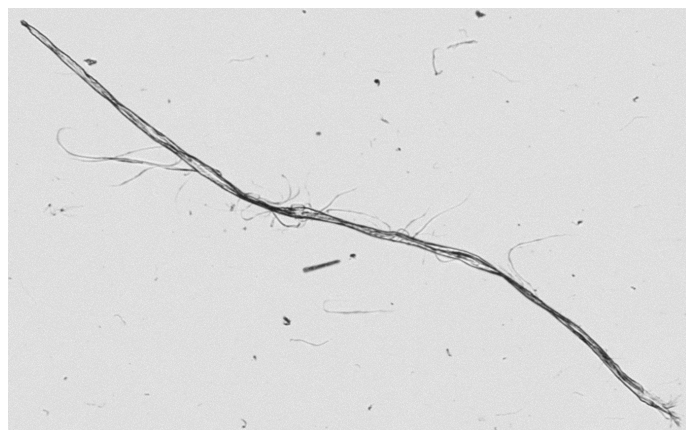
L&W Pulp Tester Fiber Morphology module is possible to pull-out from the cabinet, which simplifies for example maintenance work.

Fines

In the plus version of this module two classes of fines are regarded, P and S. Fines often have a different impact on processes and products than the fibres. 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 they improve the strength of the sheet. Both types of fines have a negative impact on the dewatering capacity on the paper machine.

Coarseness

Units of coarseness are used to express fibre wall thickness as weight per length unit. For example, low coarseness means good sheet formation while high coarseness means good drainage and high sheet bulk.



Example on a grey scale image of a single softwood fibre.

Technical specifications

L&W Pulp Tester Fiber Morphology Plus – code 966+

Results	<ul style="list-style-type: none"> – Weighted averages and difference between double measurements for length, width, macrofibril area, macrofibril perimeter and shape factor are reported. – A small difference confirms a good measurement – Number of measured fibres – Number of fibres in sample, number of fibres per gram (with coarseness) – Fibre area and volume in sample
Range	<ul style="list-style-type: none"> – Length according to ISO and Tappi standards – Width from 4 µm. Upper limit can be set from menu depending on sampling type – Resolution within measurement range is 0.1 µm for an average SW fibre – Shape factor (0) 50–100% – Alternative weights used in the statistical calculations are 1 (arithmetic), length, width, area, volume and square of length – Fines (l<0,2 mm) or l<0,1 mm depending on used standard for length (ISO or Tappi) – Coarseness weight per unit fibre length
Repeatability	Length 1.5 %, width 1 % and shape 0.5 % of average Coarseness typically better than 3 % of average
Distributions	Frequency and accumulated distributions: <ul style="list-style-type: none"> – Length 75 classes – Width in 50 classes – Shape factor in 50 classes
2D data	Length/width matrix, 15 × 20 classes
Raw data	Length, width, shape factor, macrofibril area, macrofibril perimeter
Supply	See L&W Pulp Tester Sample Preparation, code 961
Options	L&W Fiber Tester Blend, code 930 L&W Fiber Tester Vessels, minishives and kink, code 931
Dimensions	520 × 1860 × 660 mm 20.5 × 73.2 × 26.0 in
Weight	81 kg 178.6 lb

Applicable standards

Fibre length: ISO 16065-2

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