



## HiRes FQA Software Options

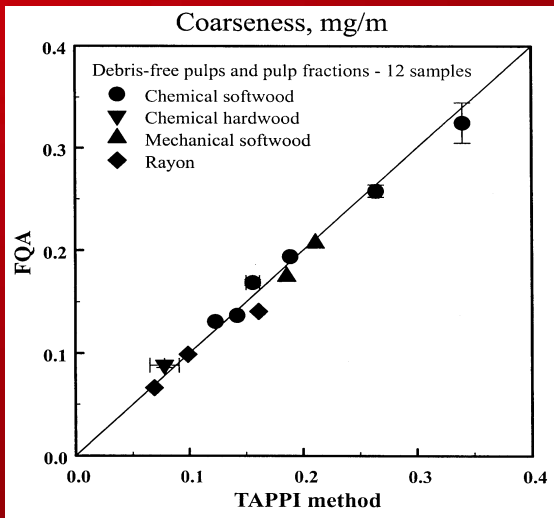
### COARSENESS AND HARDWOOD/SOFTWOOD RATIO BLENDING SOFTWARE

**Coarseness:** This option allows the HiRes FQA to accurately measure the mean fiber coarseness of a pulp sample.

The mean fiber coarseness is defined as:

$$\text{Coarseness} = (\text{OD sample mass}) / (\text{total fiber length})$$

Published results found that the FQA agreed significantly with standard microscopy.



FQA gives same results as standard microscopy (Tappi Std. T234), ref: Olson et al, Tappi J. (Oct. 1999)

Coarseness accuracy with the FQA is ensured because the entire sample is drawn from the beaker eliminating errors from poor mixing or fiber flow fractionation.

The HiRes FQA Coarseness measurement meets all the requirements and specifications of ISO Standard 23713.

**Hwd/Swd Ratio:** The software prompts the user to enter the average fiber length,  $L_w$ , and coarseness,  $C$ , of the parent species. It uses these values to estimate the fraction,  $F$ , of the softwood,  $sw$ , and hardwood,  $hw$ , in a pulp blend using the equations:

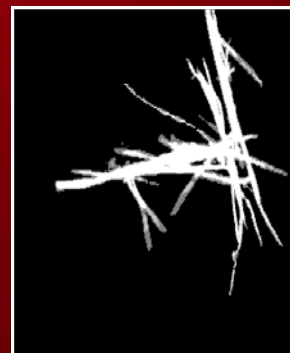
$$F_{sw} = C_{sw}(L_{wm} - L_{wh}) / [C_{sw}(L_{wm} - L_{wh}) + C_{hw}(L_{ws} - L_{wm})]$$

$$F_{hw} = 1 - F_{sw}$$

### SHIVE ANALYSIS SOFTWARE

The combined cross-sectional area of the 3 fluid layers in the FQA cytometric flow cell is 33 mm<sup>2</sup>. Consequently, large cellulose structures, such as shives, can be analyzed.

A published report (Joss et al, Appita J, 2006) found that 3 morphological parameters are required to properly describe a shive: Effective Length, Shive Area and Branch Index.



A 9 mm shive detected by the HiRes FQA

The HiRes FQA measures all 3 of these parameters.

Two shives may have the same effective length and area. By measuring the Branch index, it is possible to distinguish shives that are dense and compact from highly branched shives. Usually branched shives pose fewer problems for sheet runnability.

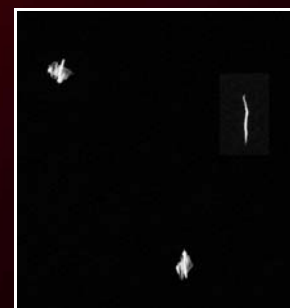
The optional Shive Analysis runs concurrent with the HiRes FQA fiber measurements. The Shive Analysis results include the means, variances and distribution histograms for: Effective Length, Shive Area, and Branch Index.

A table of Effective Length vs. Area is available. Also, shive images may be saved and displayed.

### VESSEL ELEMENT ANALYSIS SOFTWARE

The Vessel Element Analysis runs concurrent with routine HiRes FQA testing. The results include the means, variances and distribution histograms for: The Effective Length, Effective Width, L/W aspect ratio and Area.

A table of Vessel Element Length vs. Width is available. Also, Vessel Element images can be saved and displayed.



Vessel elements detected by the HiRes FQA