

Textile Fibers Analysis

Image Analysis Report # 490

Sample Description

One sample of textile showing crossing fibers was submitted for analysis.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can distinguish the fibers and measure their diameter.



Figure 1: Part of the original image (0.63 microns/pixel).

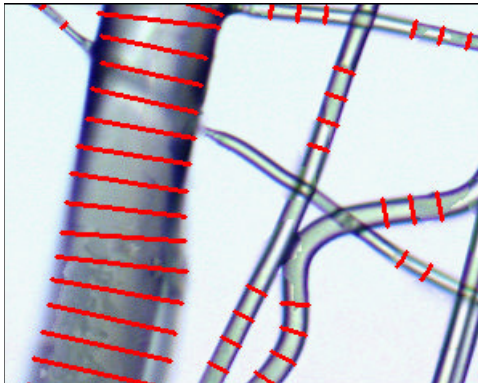


Figure 2: Outline of fibers as measured in red bitplane.

Procedure

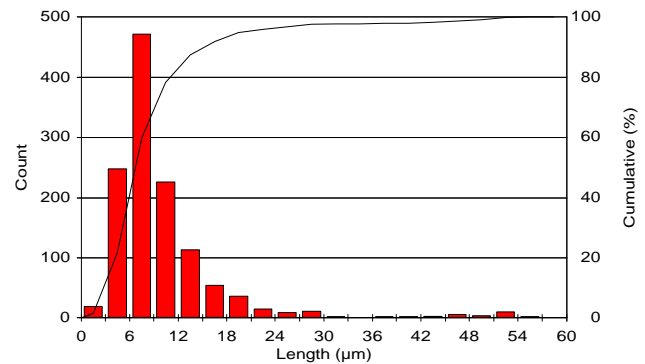
Three Gray Thresholds are combined to obtain a final binarization of the fibers. Two of them are performed after the application of a gray filter (Top Hat on White and Top Hat on Black) to highlight thin parts of the image. The third one is applied on the original image.

A Pause Edit let the possibility to fill in some undetected inner parts of the fibers. The red bitplane is cleaned before finding the fiber's skeleton. Crossing parts are separated by binary tools and grow back to the fibers size. Largest fibers can be reconnected to make the next step more reliable. The Line per Object binary tool

transforms the broken features into measuring lines being parallel to the currently processed part.

Results

Length measurement is performed on each measuring line. Automated statistics and graph are generated and cumulated for the 6 analyzed fields. Final results can be printed directly from Clemex Vision. Raw data are linked to their respective objects for validation purpose. Raw data can also be exported in Excel format.



Minimum: 1.98 microns
Maximum: 55.85 microns
Mean: 10.05 microns
Std Dev.: 7.50 microns

Figure 3: Fibers' diameter distribution and corresponding statistics.

Equipment

Image Analysis System:	Clemex Vision PE
Microscope:	Leica DM LM
Objective/Magnification:	20x / 200x
Illumination:	Transmitted Light
Calibration:	0.6338028 microns/pixel
Camera:	Sony DXC 950P
Motorized Stage:	Marzhauser EK32IM 75x50mm
Stage Controller:	Clemex ST-2000

Discussion

This analysis present two main difficulties: correctly binarize the fibers and separate them into segments. The first difficulty was overcome by capturing the image with multilayer grab and using gray filters to enhance thin parts of the gray image.

The second problem was overcome by selecting fields with few fibers and by combining several binary tools including Thin, Pruning, Triple Points, Zone, Object Transfer and several types of Boolean instructions.

It is recommended to validate the final detected fibers using the Mapping view tool. Results are reproducible.