Cell Sizing in Extruded Foam

Image Analysis Report # 534

Sample Description

4 pieces of extruded foam were submitted for analysis. Two smaller pieces were cut from the 1/2" thick sample and were used as example for the current analysis.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can distinguish the cells and perform shape, size and oriented size measurements.

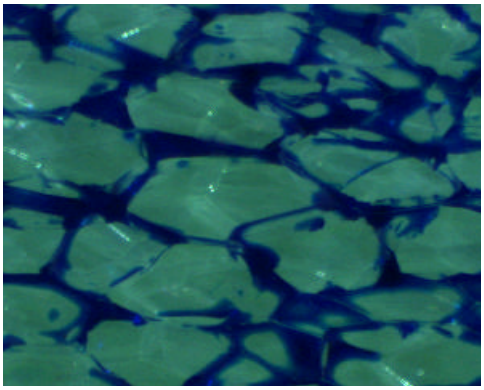


Figure 1: *Part of the original image of side A (25x, 5.08 µm/pixel).*

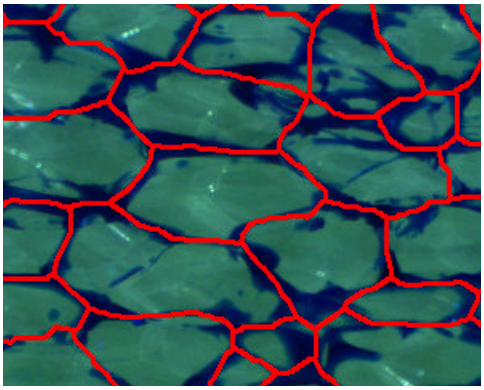


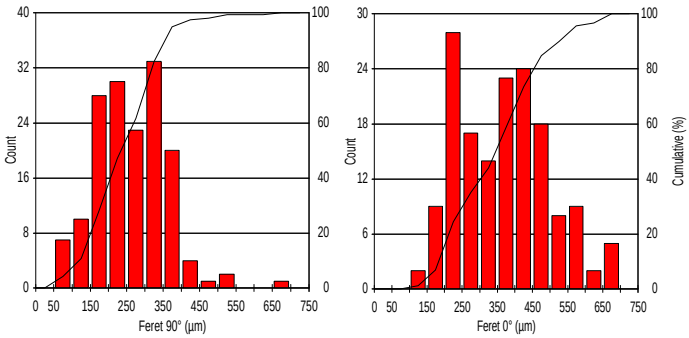
Figure 2: *Outline of cells as measured in red bitplane.*

Procedure

Gray filters were applied on original image to eliminate partial holes inside the walls. Walls were binarized into red bitplane using Gray Threshold. Binary tools were applied on the red bitplane to convert walls to cells and to perform automatic separation of connected features. Small artifacts were eliminated prior to measurements.

Results

Area, Length, Feret Average, Feret 0°, Feret 45°, Feret 90°, Feret 135°, Circular Diameter, Aspect Ratio and Orientation measurements are performed on each feature. Anisotropy is calculated for each field. Automated statistics and graph are generated and would be cumulated if analyzing several images (sample). 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.



Feret size at	***90 degree***	***and***	***0 degree***
Minimum:	*50.86 µm*		*106.60 µm*
Maximum:	*661.22 µm*		*685.28 µm*
Mean:	*263.08 µm*		*368.61 µm*
Std Dev.:	*95.31 µm*		*128.48 µm*

Figure 3: *Cells feret distribution at 90 and 0 degree with the corresponding statistics (side A).*

Equipment

Image Analysis System:	Clemex Vision PE
Microscope:	Leica DM LM
Objective/Magnification:	2.5x / 25x (5x/50x side B)
Illumination:	Polarized Light
Calibration:	5.08 *µm*/pixel (2.6 *µm/p side B)*
Camera:	Sony DXC 950P
Motorized Stage:	Marzhauser EK32IM 75x50mm
Stage Controller:	Clemex ST-2000

Discussion

The main difficulty of this analysis was to obtain images suitable for image analysis (see the walls). The problem was overcome using polarized light with samples previously stamped in blue ink.

The current analysis is completely automated. However, a Pause Edit could be added to allow manual separation of cells or drawing of missing wall if more control is desired.

We recommend validating the final detected fibers using the Mapping view tool.

Results are reproducible.