CLEMEX

Mandrel Rings Impact Analysis

Sample Description

One magenta cartridge with head covered with blue tape was submitted for analysis. The part of interest was sectioned from the cartridge.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can distinguish the mandrel having beard exceeding the ring and perform count relative measurements.

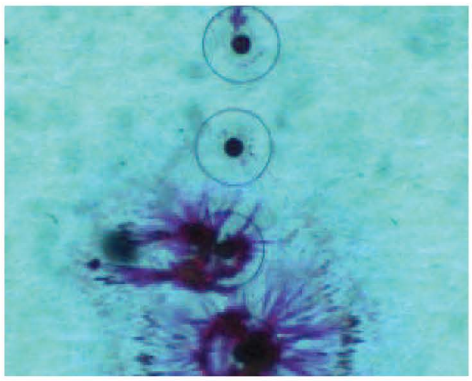


Figure 1: *Part of the original image (2.4 microns/pixel).*

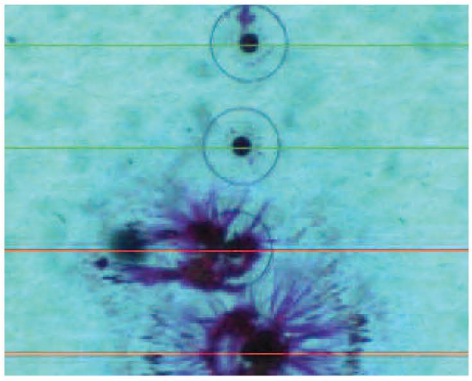


Figure 2: *Outline of fibers as measured in blue bitplane.*

Procedure

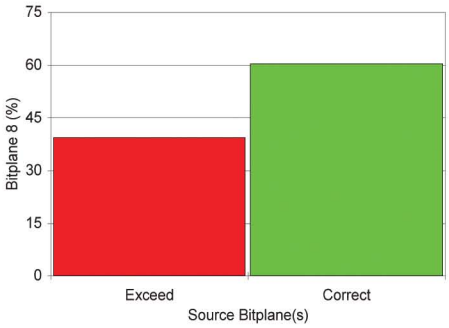
The stage pattern is defined to move accordingly to the mandrels spacing. Since 8 mandrels are visible at 100x, the stage moves 676.5 microns vertically at each field to align a binary grid with the mandrels.

A gray filter (Top Hat) is applied to highlight thin dark parts of the image. The result is binarized into yellow bitplane using a Gray Threshold and original image is bring back. Yellow bitplane is cleaned from most artifacts to isolate the detected rings. Dark middle holes are binarized to blue bitplane by Gray Thresholding and most artifacts are eliminated using binary tools.

Combining these two bitplanes with the original grid, grid lines that are overlapping correct mandrels (beards not exceeding the mandrel ring) are transferred to green bitplane.

Results

Count relative measurement of both categories is performed over the sample. Automated statistics and graph are generated and cumulated from field to field. Final results can be printed directly from Clemex Vision.



Bitplane(s)	*Bitplane Reference (%)*
Exceed	*39.58*
Correct	*60.42*

Figure 3: *Count percentage of beards exceeding the mandrel rings over the whole sample.*

Equipment

Image Analysis System:	Clemex Vision PE
Microscope:	Leica DM LM
Objective/Magnification:	10x /1500x
Illumination:	Reflected Light
Calibration:	1.2766 microns/pixel
Camera:	Sony DXC 950P
Motorized Stage:	Marzhauser EK32IM 75x50mm
Stage Controller:	Clemex ST-2000

Discussion

The main difficulty of this analysis was to find criterion to distinguish both mandrel categories (exceed / correct). The problem was finally overcome asking for the presence of a ring and a hole at the grid line height and inside a specific distance, for a mandrel to be classified as correct.

Results are reproducible.