Gray Cast Iron Measurement

Image Analysis Report # 513

Sample Description

Images of gray cast iron showing different sizes of flakes.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can measure the maximum size (length) of flakes size and find the longest one.

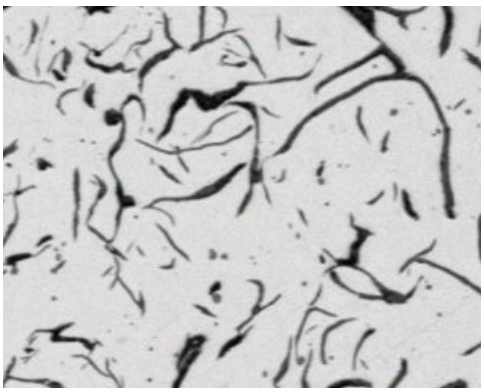


Figure 1: *Part of the original image (1.27 microns/pixel).*

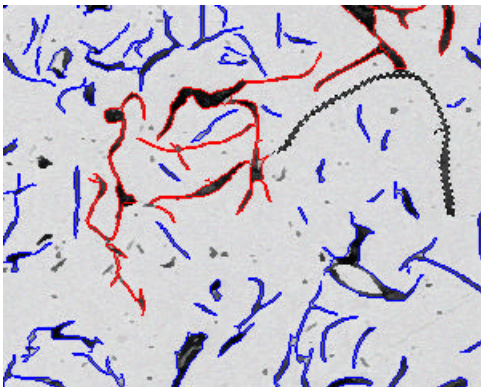


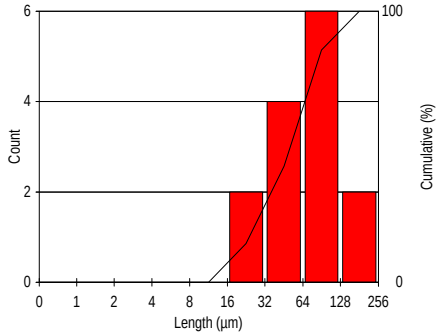
Figure 2: *Outline view of flakes as measured. Note that the longest flake was first part of a group of flakes.*

Procedure

All flakes are binarized in blue bitplane using gray thresholding. The system stops and wait for the user to identify flakes or group of flakes that possibly contain the longest flake (transferred into the red bitplane). The eraser appears allowing to separate any connected flakes from the bitplane of interest (red) prior to measurements.

Results

Length measurement is performed on each distinct feature from red bitplane. 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. The "AFS Table 1 Graphite Size" table for size class identification appears at the end of the run. After the validation, the user verifies the maximum length found for a single flake and note what is the corresponding size class accordingly to the shown table. Raw data can also be exported in Excel format allowing to build an automated macro to find the size class.



Maximum: *153.76 microns*
Size Class: *Oversize (greater than 128 microns).*

Figure 3: *Flakes' Length distribution, maximum value and corresponding size class.*

Equipment

Image Analysis System:	Clemex Vision PE or Lite
Objective/Magnification:	10x / 100x
Illumination:	Reflected Light
Calibration:	1.2693935 microns/pixel

Discussion

The main problem when analyzing gray cast iron samples is related to the fact that flakes are connected one to another. When two or more flakes are connected, they are considered as one big flake. Since the goal is to identify the longest "single" flake, big chances are that connected features are going to show up as the maximum size features. It's not possible to only eliminate these group of flakes since the longest flake may be a part of it and we need to know its specific length. Using automatic tools to separate elongated things like flakes creates over separation problems. And it's not faster to reconnected broken flakes than to isolate them from a group.

Other methods can be used to achieve the same goal of finding the longest flake length. One of these would be to use direct measurements. The user pulls a "tape" tool over the few flakes that seems the longest to him for each field of view. The longest one is identified as the maximum one and the same conversion table is used.

Of course, when no flakes are connected, the analysis is straight forward without manual edition. Results are reproducible.