

## Image Analysis Report # 924

### Toner Particles Size and Shape

#### Sample description

Loose toner powder sampled from different areas of a commercial printer.

#### General analysis request

Detect particles and measure their size and sphericity

#### Equipment used

- 1) A Leica DM6000M Microscope was used.
- 2) Motorized stage was a 215x100 mm, 1 mm pitch, achieving 0.5 mic/step and connected to a Clemex ST-3000 USB motorized stage controller
- 3) Camera used was a 1.4 Mp CCD, Color
- 4) Software used was a Clemex Vision PE with Microscope control, and Report Generator options.

Magnification used: 500X

Calibration Factor: 0.160 micron/pixel

#### Analysis procedure

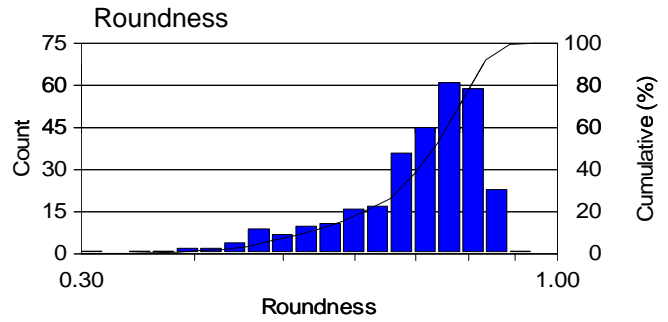
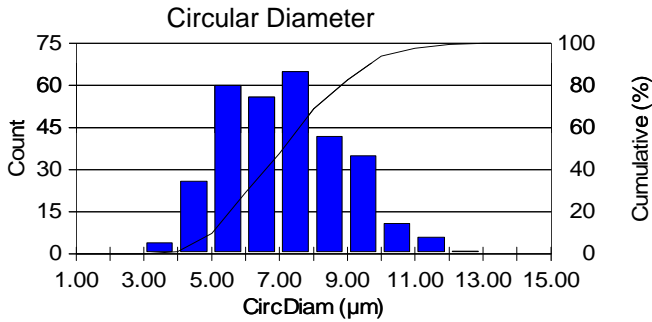
##### Steps

1. Since the depth of field at 500X is pretty narrow, images were captured using the multi-layer grab feature to create images where everything is in focus.
2. The software detects particles on the slide based on differences in saturation level.
3. Any particle smaller than 3 microns is automatically rejected as too small to be of interest.
4. Agglomerations were detected and excluded from the measurements.
5. Particles are measured for their equivalent diameter and their sphericity. Graphs and statistics are generated automatically on the fly as the analysis progresses.
6. The motorized stage moves the sample to a different field of view and the analysis is repeated until the surface of interest is scanned.

#### Results

Toner is detectable and measurable by image analysis. In the same collected, the average diameter of the particles was 7.2 um. None of the toner particles was a perfect sphere, rather the roundness varied between 0.31 and 0.91, for an average of 0.70.

## Graphs and Statistics

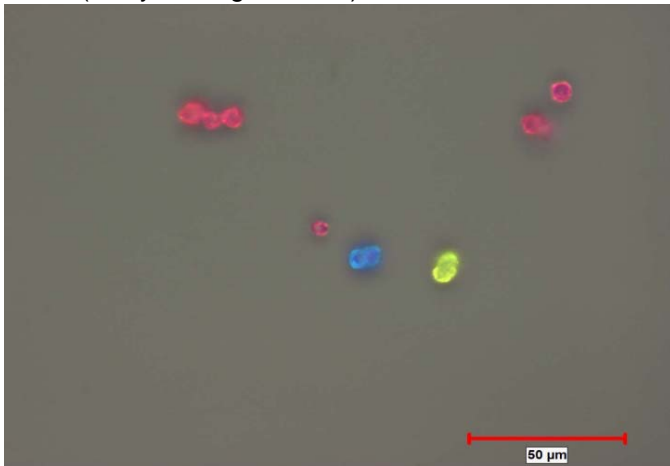


Minimum:	3.90	µm
Maximum:	12.40	µm
Mean:	7.20	µm
Std Dev.:	1.75	µm
Sum:	2203.37	µm
Count:	306	
Under 1.00:	0	
Over 15.00:	0	
Accepted:	100.00	%
Field Count:	400	
Field Area:	36705.89	µm <sup>2</sup>
Total Area:	14682357.10	µm <sup>2</sup>
D10:	5.04	µm
D50:	7.06	µm
D90:	9.52	µm

Minimum:	0.31	
Maximum:	0.91	
Mean:	0.70	
Std Dev.:	0.12	
Count:	306	
Field Count:	400	
Field Area:	36705.89	µm <sup>2</sup>
Total Area:	14682357.10	µm <sup>2</sup>
D10:	0.52	
D50:	0.73	
D90:	0.83	

## Sample Images

500X (analysis magnification)



200X (zoomed out view)

