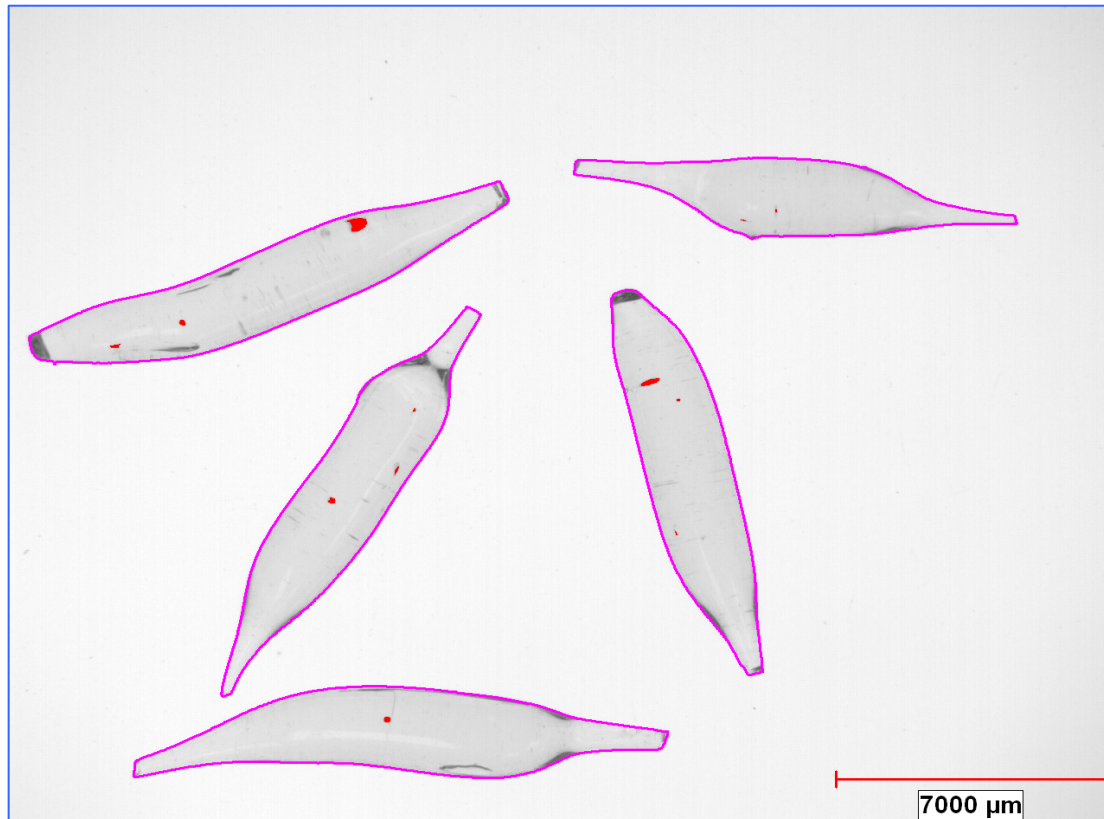


Air Bubbles in Glass Beads

Date: 2006-Jul-20, 2:14:02 PM -04'00'
Company: Clemex
Department: Lab
User Name: Clemex (signed on 2006-Jul-20 10:39:32 -04'00')
Sample ID: Bubbles in glass beads

Magnification: 9
Calibration: 22.5904 $\mu\text{m}/\text{pixel}$
Units: microns
Fields: 3

Figure 1: Typical field of view.

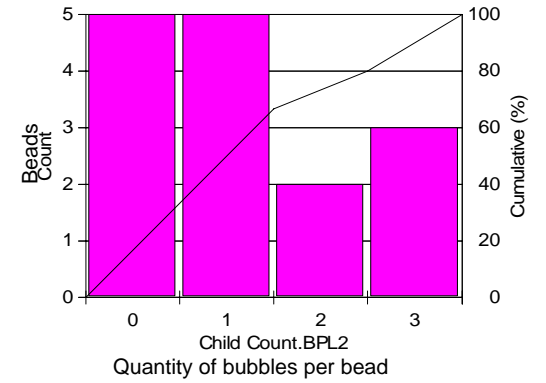
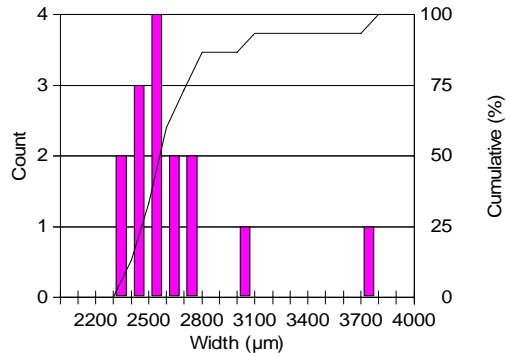
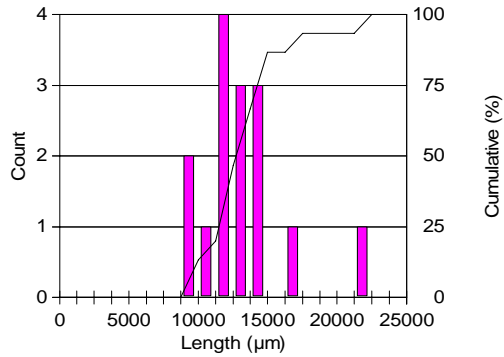


Comment:

The analysis was performed using a stereoscope Leica MZ16A with transmitted light to avoid most reflection problems. Detected features that were connected to the beads outline were eliminated. All particles having an aspect ratio over 4 and artifacts (fitting inside a 3 x 3 pixels box) were also eliminated. Each bead was measured for its Length (maximum feret) and Width (minimum feret). Each bubble was measured for its Diameter and Area. A total count of beads and bubbles was performed along with a count of bubbles per bead.

Air Bubbles in Glass Beads

Glass Bead Measurements:

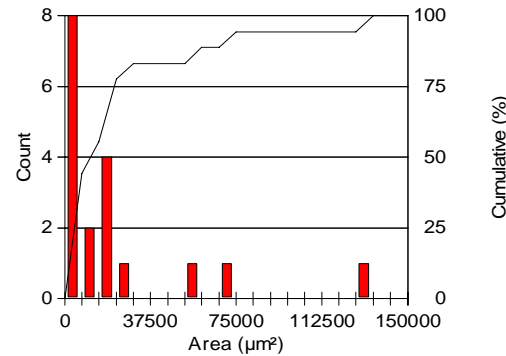
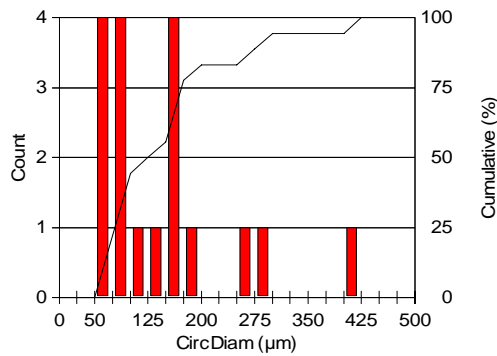


Min: 8810.24
 Max: 21446.72
 Mean: 13130.46
 Std Dev: 3026.80
 Count: 15

Min: 2371.99
 Max: 3735.88
 Mean: 2654.93
 Std Dev: 347.46
 Count: 15

Min: 0
 Max: 3
 Mean: 1.2
 Std Dev: 1.15
 Count: 15

Air Bubble Measurements:



Min: 67.44
 Max: 413.39
 Mean: 148.54
 Std Dev: 94.74
 Count: 18

Min: 3572.27
 Max: 134215.33
 Mean: 23985.25
 Std Dev: 33227.61
 Count: 18

Image Analysis Steps

Figure 1: Original image at 9x



Figure 2: Defects as first detected including part of the beads outline.



Image Analysis Steps

Figure 3: Artifacts were eliminated and remaining features were considered as bubble and filled.

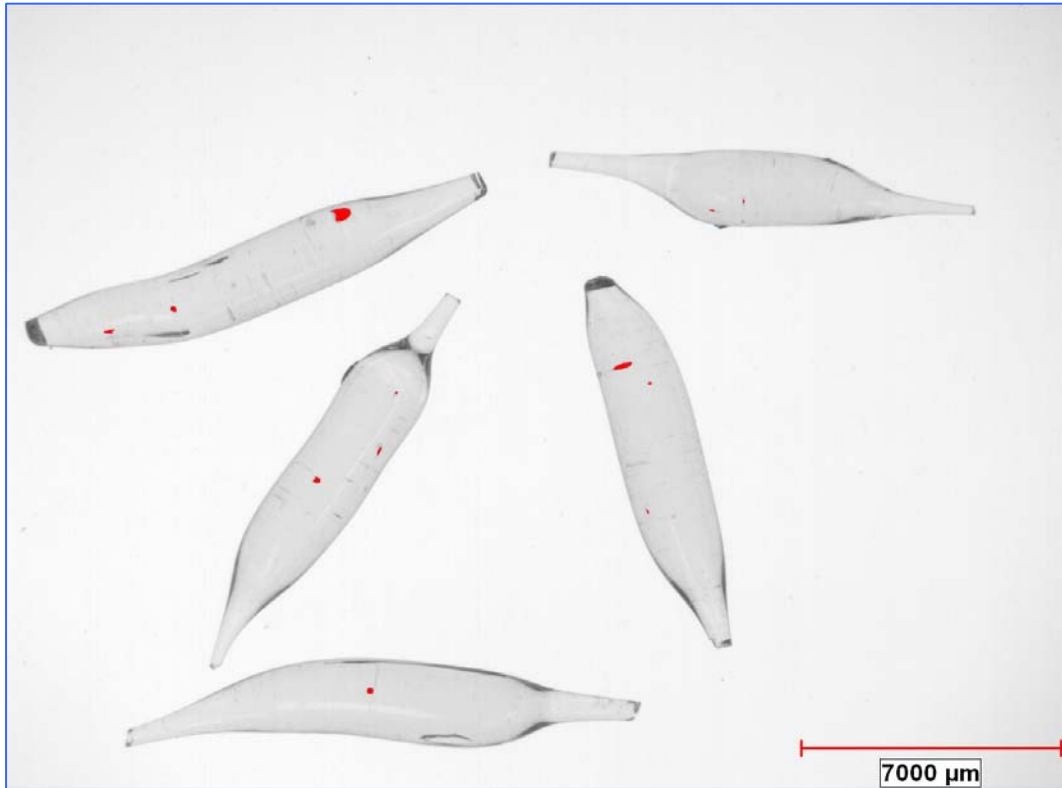


Figure 4: Glass beads (in outline view) and air bubbles, as measured.

