CANTY
PROCESS TECHNOLOGY

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Lab Test Report

Company:

Glass Fibre Manufacturer

P.O. # N/A

Job

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Canty Lab Contacts: Paul O'Connell (paulo@jmcanty.ie)

Sample Identity- The sample material is identified as:

Sample # A: GLASS FIBRE MANUFACTURER Samples 1-9
Labeled A, B, C or D
A: Very Good
B: Good
C: Bad
D: Very Bad
Blue: Long and Double pieces
Black: Bad Cut (Blunt Blade, Tear of Fibres, Sticking Fibres)

Purpose:

This report details the particle size distribution testing and results on samples done in the Canty Lab using the JM Canty Solid Sizer. The data presented here uses the improved Canty technology to give a full particle distribution for the samples provided.

Lab Setup:

The samples were first tested in the Solid Particle Sizer. A vibrating feed was used to move the particles from the input funnel to the end, where they fall onto the camera plate. The particle size range was fully tested in the Solid Particle Sizer. The Solid Particle Sizer was used to present the particles to the camera/imaging sensor for capture and subsequent analysis. The Canty system is vision based and self-contained including illumination components. Video signal is fed to the Canty Vector where our software performs the appropriate analysis. Vector contains several imaging tools and techniques in the software that allow a full analysis of the particle images.

Vector Image Processor

Solid Particle Sizer

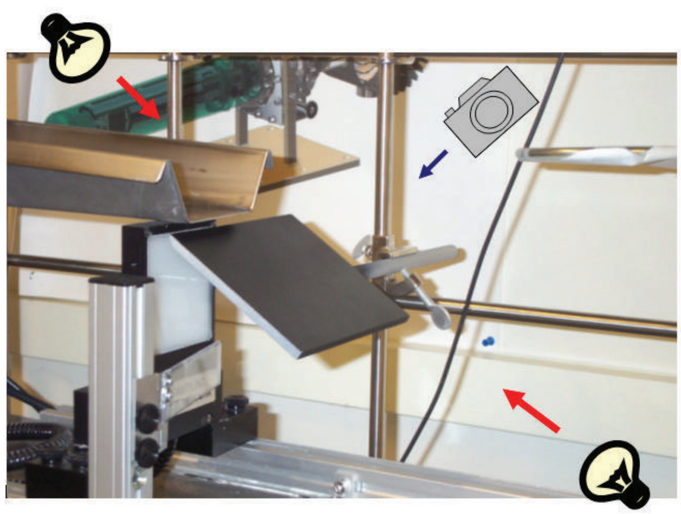


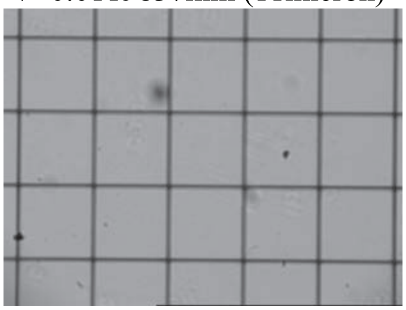
Fig 3. Internal View of Solid Sizer with ramp feed.

The Ramp feed was used to give an accurate Length of the particles on one plane. It prevents the long particles tumbling in the Z-Axis.

The orientation of the light and camera are shown above in Fig 3. The plate is polished and anodized black to give a good contast and sharp image.

Calibration:

Calibration was performed using a calibrated Scale.
Using the Calibration a value of 0.0119837mm per pixel was calculated. This gives an accuracy of +/- 0.0119837mm (11micron)



Calibration A

Results and Discussion:

Below Figure shows a Snapshot Scan of some particles from sample B. Dimensions can be seen in the table (Area, Perimeter, Major, Minor Axis and colour information)

Size for highlited particle (yellow box) is at the top of the list.

. This image presents the digitized image after particle threshold has been achieved and background has been filtered out. The attached Table lists the dimensions of the particles imaged. As can be seen on this image data for each particle is calculated. This data consists of the following:

Major Axis	Longest length of particle
Minor Axis	Narrow length of particle
Perimeter	Actual perimeter of particle
Area	Area of particle (can be used to calculate volume)

And also Colour information (not relevant as B+W camera used)

Attached Below is the "Live" Image of the above particles taken before digitizing.

Fig 4

Above image shows the particles as viewed by the camera.
The image above is from from sample 1 (D,C)

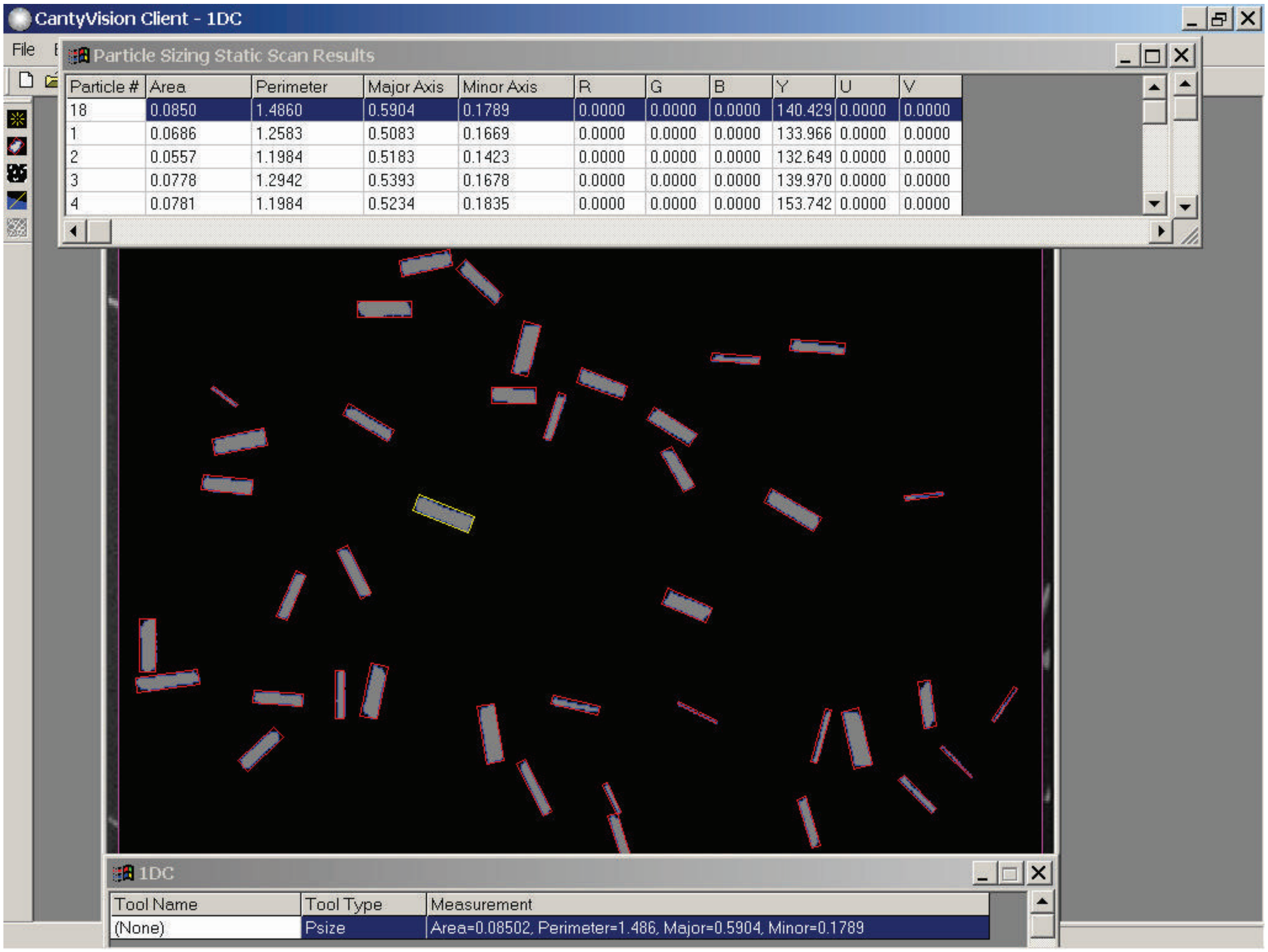


Fig 5

The above image shows the particles from Fig 4 after digitizing. The red box shows the length, width area and perimeter of each particle.
The highlited particle is shown on the yellow box.(Length 0.59mm, width 0.179mm)

The image above is from from sample 1 (D,C)

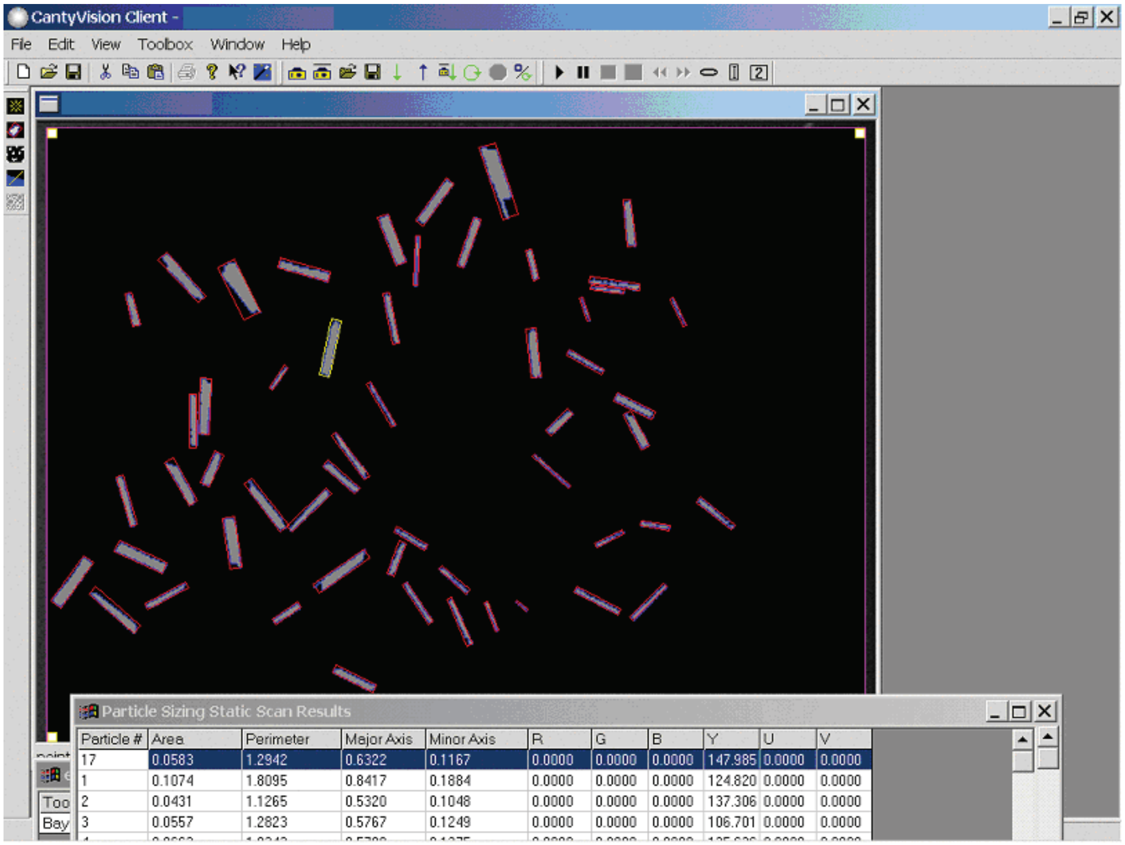


Fig 6

The above image shows the particles from Fig 6 after digitizing. The red box shows the length, width area and perimeter of each particle.
The highlited particle is shown on the yellow box.(Length 0.63mm, width 0.117mm)

The image above is from from sample 5 (A,B)

Figure 3 Data from Sample

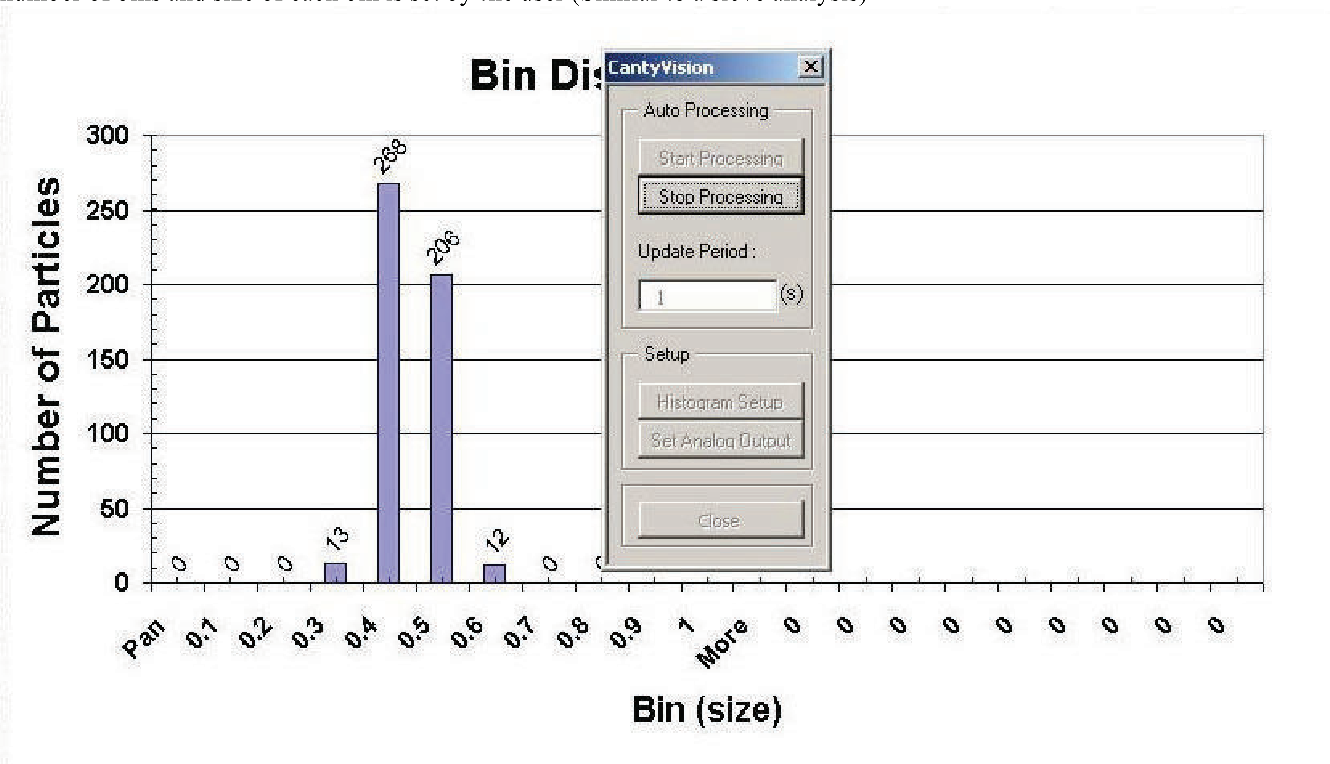
Particle Sizing Static Scan Results

Particle #	Area	Perimeter	Major Axis	Minor Axis	R	G	B	Y	U	V
43	0.0138	0.6951	0.3229	0.0720	0.0000	0.0000	0.0000	87.9167	0.0000	0.0000
44	0.0333	0.9587	0.4951	0.0899	0.0000	0.0000	0.0000	142.543	0.0000	0.0000
45	0.0158	1.0066	0.4593	0.0616	0.0000	0.0000	0.0000	103.818	0.0000	0.0000
46	0.0342	1.0546	0.4913	0.0959	0.0000	0.0000	0.0000	163.445	0.0000	0.0000
47	0.0333	1.0785	0.4861	0.0996	0.0000	0.0000	0.0000	142.465	0.0000	0.0000
48	0.0718	1.2343	0.5273	0.1678	0.0000	0.0000	0.0000	184.276	0.0000	0.0000
49	0.1301	1.4860	0.5491	0.2963	0.0000	0.0000	0.0000	207.532	0.0000	0.0000
50	0.0669	1.2343	0.5304	0.1678	0.0000	0.0000	0.0000	162.802	0.0000	0.0000
51	0.0692	1.1744	0.5033	0.1558	0.0000	0.0000	0.0000	155.589	0.0000	0.0000
52	0.0454	1.1384	0.5306	0.1180	0.0000	0.0000	0.0000	126.791	0.0000	0.0000
53	0.0569	1.2103	0.5031	0.1447	0.0000	0.0000	0.0000	165.055	0.0000	0.0000
54	0.0253	1.1025	0.4885	0.0818	0.0000	0.0000	0.0000	122.011	0.0000	0.0000
55	0.0431	1.0186	0.4955	0.1102	0.0000	0.0000	0.0000	147.820	0.0000	0.0000
56	0.0419	1.0306	0.5003	0.1121	0.0000	0.0000	0.0000	168.404	0.0000	0.0000
57	0.0167	0.9347	0.4677	0.0710	0.0000	0.0000	0.0000	101.965	0.0000	0.0000
58	0.0698	1.2703	0.5473	0.1750	0.0000	0.0000	0.0000	136.510	0.0000	0.0000
59	0.0233	0.9946	0.4780	0.0713	0.0000	0.0000	0.0000	132.308	0.0000	0.0000
60	0.0603	1.1984	0.4987	0.1489	0.0000	0.0000	0.0000	167.514	0.0000	0.0000
61	0.0638	1.2583	0.5128	0.1605	0.0000	0.0000	0.0000	173.261	0.0000	0.0000
62	0.0006	0.0479	0.0240	0.0240	0.0000	0.0000	0.0000	85.0000	0.0000	0.0000
63	0.0075	0.5992	0.2881	0.0498	0.0000	0.0000	0.0000	95.8846	0.0000	0.0000
64	0.0333	1.0186	0.4913	0.0894	0.0000	0.0000	0.0000	127.051	0.0000	0.0000
65	0.0790	2.0372	0.9196	0.1305	0.0000	0.0000	0.0000	155.625	0.0000	0.0000
66	0.0485	1.1025	0.5133	0.1202	0.0000	0.0000	0.0000	161.798	0.0000	0.0000
67	0.0520	1.9294	0.8573	0.1240	0.0000	0.0000	0.0000	130.889	0.0000	0.0000
68	0.0557	1.1265	0.5119	0.1313	0.0000	0.0000	0.0000	168.793	0.0000	0.0000
69	0.0330	1.0306	0.4674	0.0959	0.0000	0.0000	0.0000	146.156	0.0000	0.0000
70	0.0615	1.9294	0.9140	0.1521	0.0000	0.0000	0.0000	133.350	0.0000	0.0000
71	0.0201	0.8029	0.4079	0.0758	0.0000	0.0000	0.0000	104.128	0.0000	0.0000
72	0.0626	1.1864	0.5212	0.1517	0.0000	0.0000	0.0000	157.738	0.0000	0.0000
73	0.0477	1.2223	0.5418	0.1253	0.0000	0.0000	0.0000	132.241	0.0000	0.0000
74	0.0462	0.9946	0.4941	0.1254	0.0000	0.0000	0.0000	157.478	0.0000	0.0000

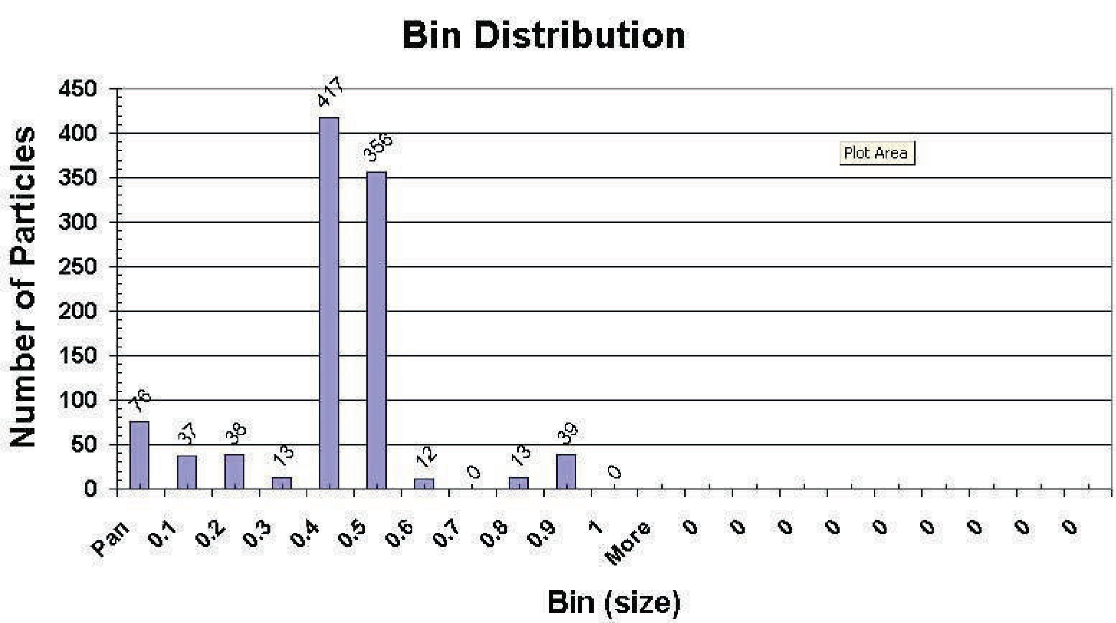
The data presented in figure 3 represents the information taken by the VECTOR NT. This file will contain data for 500 particles and a graph is automatically generated.

There are 2 possible graphs. Bin Graph, which has all parameters set by customer, and a Percent passing graph, which is automatic (only choice of Major and Minor Axis)

Below are 2 bin graphs for comparison between 2 samples. The sample size is preset by the user (1000 particles) and the number of bins and size of each bin is set by the user (Similar to a sieve analysis)



Graph 1: Sample 5AB Major Axis image.
Data for all graphs was calculated using the Length (major Axis)



Graph 2: Sample 1DC Bin graph along Major Axis

The CantyVision system will model the particles of a sample in a consistent manner once it is calibrated for that sample. This will yield reproducible results so that efficient judgments can be made about the quality of a given raw material or product based on particle size.

As can be seen from the above graph, the long particles can be easily noticed by seeing a peak in the oversize bin.

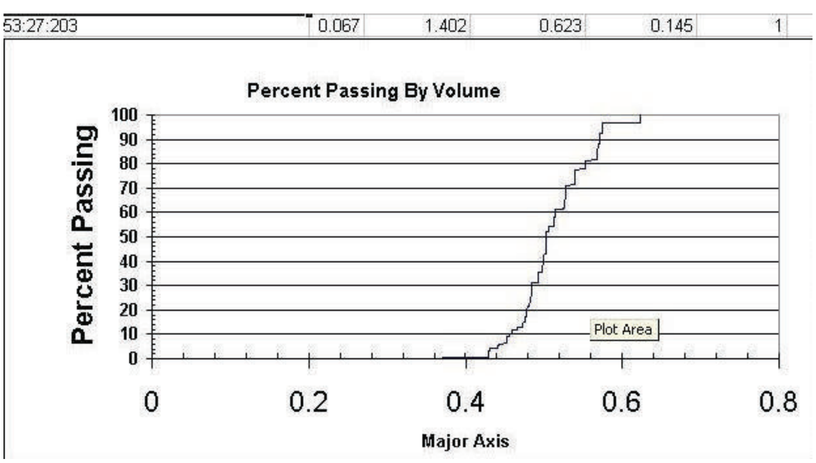
Conclusions:

The Canty system will provide a consistent measurement of particle size and reproducible results on the products cited in this report. It provides a full particle size distribution for the samples provided. The system should be usable both as an analytical tool for QC/QA and as an in-stream analyzer and in this role can provide measurement results in a matter of minutes on a continual basis. The Bin graph clearly shows a count of the number of particles of a certain size. A preset number can be set and an alarm can sound if a number or these particles pass. For example, if a large number of 1mm long particles pass, an alarm could notify there is a problem with the cutting process.

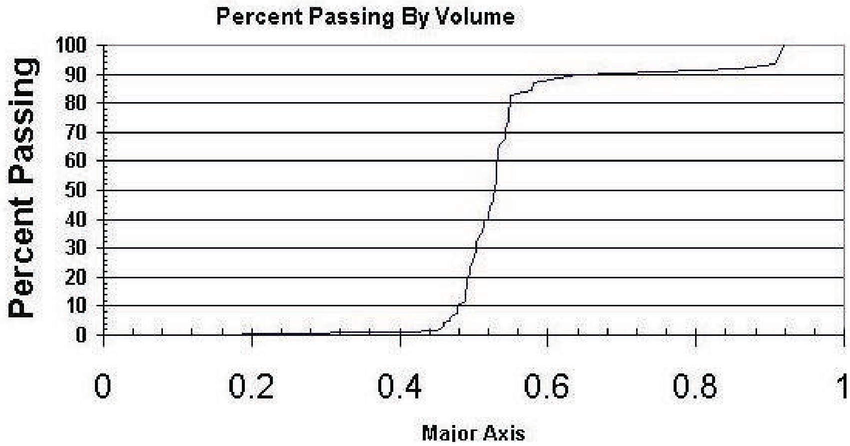
Supplemental data attached below also shows similar conclusive data for the Width measurement.

Supplemental Data.

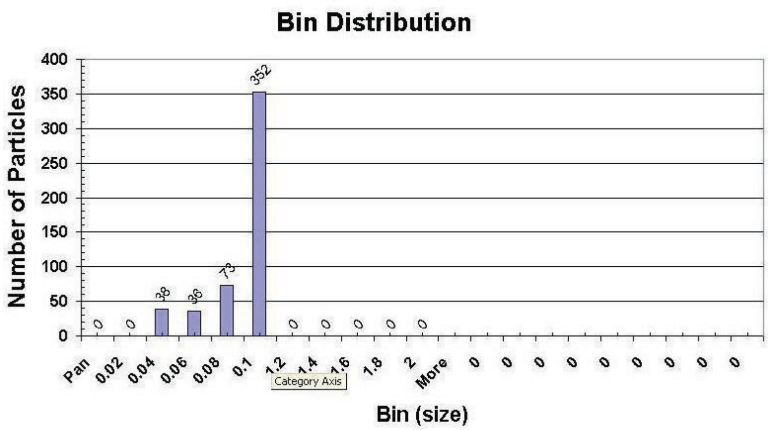
Attached below are Bin Graphs for the minor Axis of each particle.
Also attached is some percent passing by volume graphs. These show the data calculated assuming a volume calculated using the Major, Minor, Perimeter and Area. The graph is then plotted by Major and Minot axis. The graphs automatically update after 1000 particles. From these graphs a D50% particle size can be noted.



Supplemental Graph 1: Percent passing of Sample 5AB by major axis



Supplemental Graph 2: Percent passing of Sample 1DC by major axis



Supplemental Graph 3: Sample 5AB minor Axis Bin Graph