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Polymer Extrusion Pellets
Test Report
April 2001

Sample Identity:

Sample #	Description
Sample 1	Plastic extrusion pellets, diffuse white opaque material
Sample 2	Plastic extrusion pellets, clear material

Purpose:

This report details the particle size distribution testing and results on plastic extrusion pellet samples done in the Canty Lab on the Weatherproof Sizer. For plastic extrusion pellets, a common product anomaly occurs when 2 or more pellets are fused together. If a large concentration of these fused pellets are used in subsequent processing, undesirable product characteristics can occur. The data presented here uses the improved Canty technology to give a full particle size distribution for the plastic extrusion pellet samples. The particle size distribution provides information that can be used in implementation of a quality control system based on desired product specifications.

Setup:

The Weatherproof Sizer was used to present the particles to the imaging sensor for capture and subsequent analysis. The images shown on subsequent pages of this report present a 3.4 cm x 2.6 cm view of the particles as they freefall between the camera and an illumination screen. 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 of the images. Vector contains several imaging tools and techniques in the software that allow a full analysis of the particle images.

Calibration:

A pixel scale factor of 0.0536 mm/pixel was used for all measurements made.

Results and Discussion:

One of the benefits of the Canty system is that the data obtained can be visually verified in a test mode. The test mode gives the user the ability to look at an image and then check

measurement data to see that it is realistic. Figure 1 shows a typical test image for sample 1. Figure 2 presents the digitized image after particle thresholding has been achieved and background has been filtered out. Figures 3 and 4 present similar images for sample 2. Tables 1 and 2 list the dimensions of the particles imaged in the two samples. The tables show that most of the particles imaged have a major axis measurement of 3-5 mm. The only exception to this is particle # 4 of sample 1 that has a significantly longer major axis. This is consistent with the image presented in figure 1 that shows one particle that consists of three fused plastic pellets.

Figure 5 is a plot of percent passing by volume vs. major axis for sample 1. For this opaque material, the plot shows a significant number of particles with a large major axis size. A visual inspection of this sample indicated that there were a number of the fused pellet particles present in it. These multiple pellet particles account for much of the tail on the right of the curve given in figure 6.

Figure 7 is a plot of the percent passing by volume vs major axis for sample 1 after a hand removal of particles made up of fused pellets. The plot differs significantly from figure 5 in that the upper tail is no longer present. The steepness of the slope of the curve also indicates that the particles are narrowly distributed about the mean particle size. Figure 8 confirms this assessment.

Figures 9 and 10 present the same information for the translucent plastic extrusion pellets of sample 2. The plots indicate that some of the particles in this sample are also made up of fused pellets.

It should be noted that the Canty system can process material on a continuous basis and will consistently yield the same results for a given sample once it has been calibrated. For the samples submitted, no changes in system calibration were necessary when changing from one material to another. Assuming that the samples are representative of the product range that particle size information is required for, routine analysis of the materials should be simple and efficient.

Figure 1: Test Image of Sample 1.

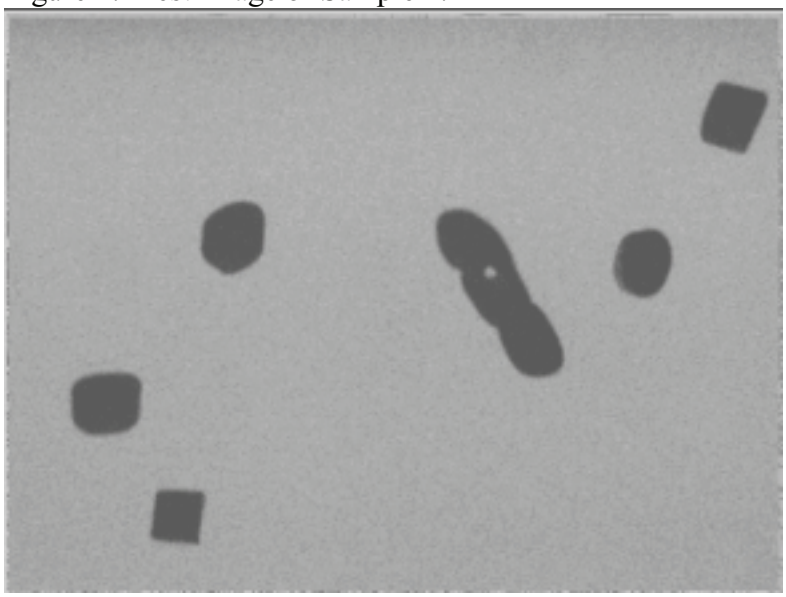


Figure 2: Digitized Test Image of Sample 1.

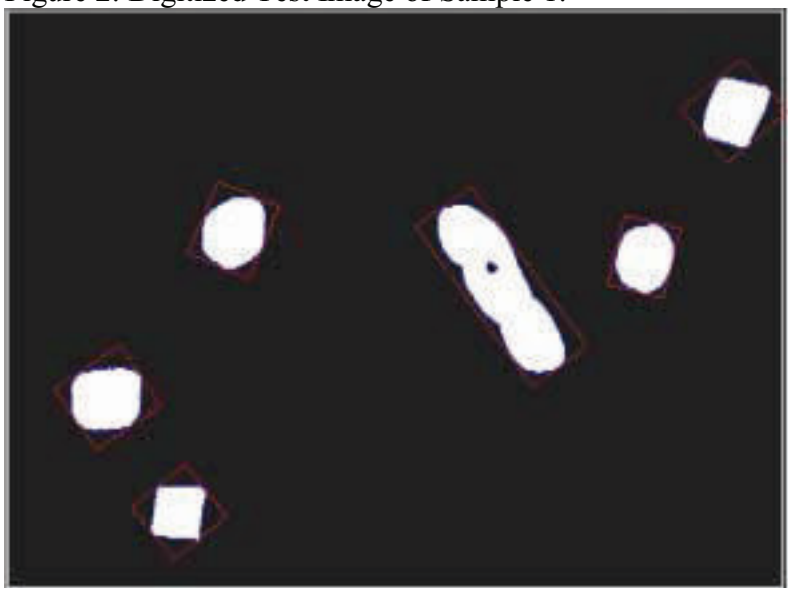


Table 1: Particle Dimensions in the Test Image of Sample 1.

Particle	Area (mm squared)	Perimeter (mm)	Major Axis (mm)	Minor Axis (mm)
1	9.008	11.534	4.082	3.605
2	9.678	11.534	4.013	3.389
3	8.376	10.731	3.682	2.949
4	25.36	25.035	10.076	3.474
5	10.187	12.270	4.098	3.743
6	6.756	10.115	3.529	3.499

Figure 3: Test Image of Sample 2.

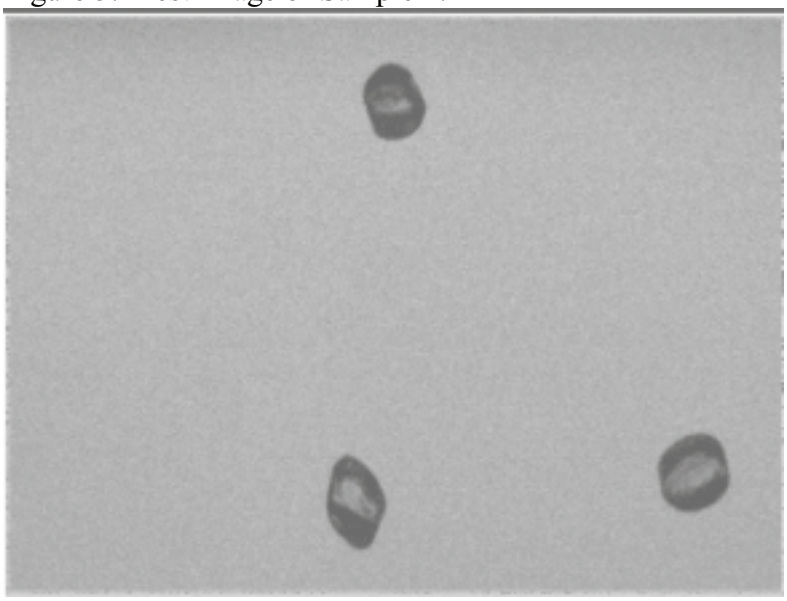


Figure 4: Digitized Test Image of Sample 2.

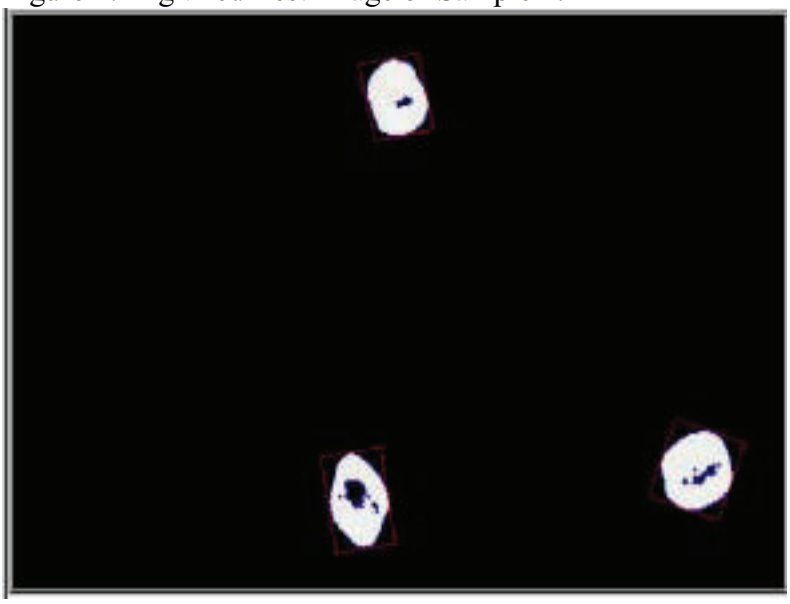


Table 2: Particle Dimensions in the Test Image of Sample 2.

Particle	Area (mm squared)	Perimeter (mm)	Major Axis (mm)	Minor Axis (mm)
1	9.327	13.443	4.029	3.100
2	11.344	18.940	4.294	3.829
3	9.678	19.366	5.000	3.075

Figure 5: Percent Passing vs Major Axis Sample 1.

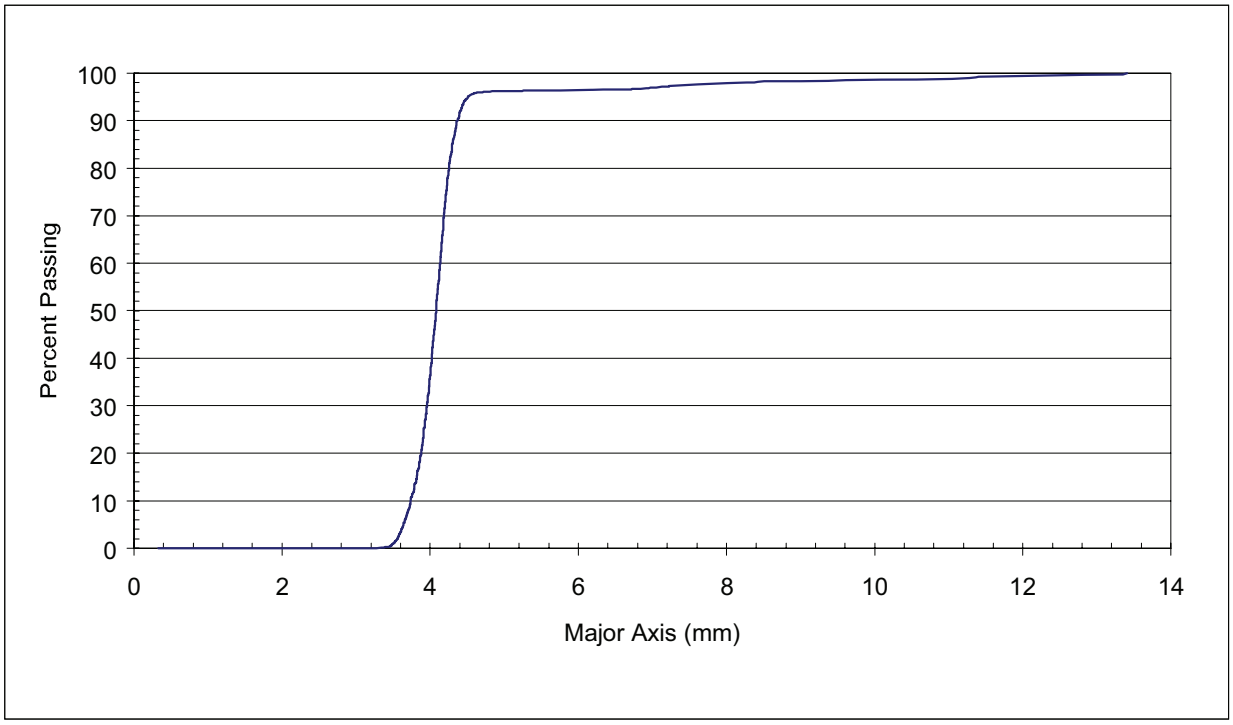


Figure 6: Pseudo-Bin Plot (Volume of particles at a given size) Sample 1.

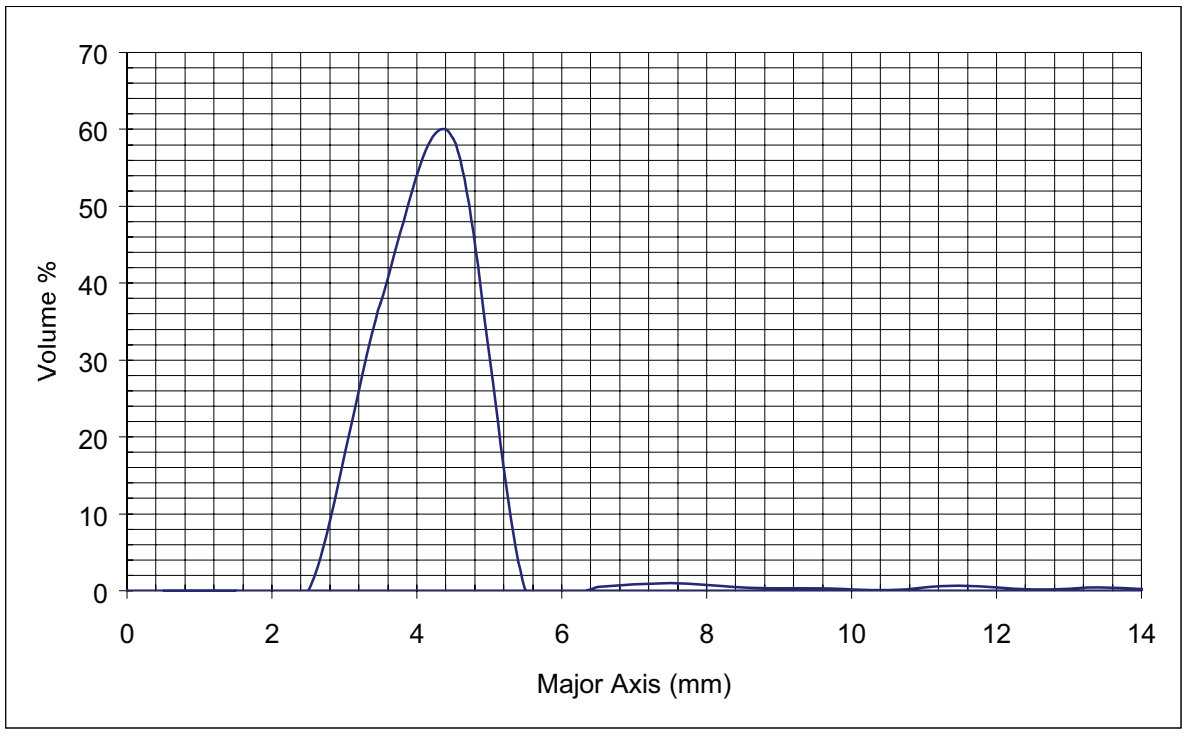


Figure 7: Percent Passing vs Major Axis Sample 1 after removal of fused pellets.

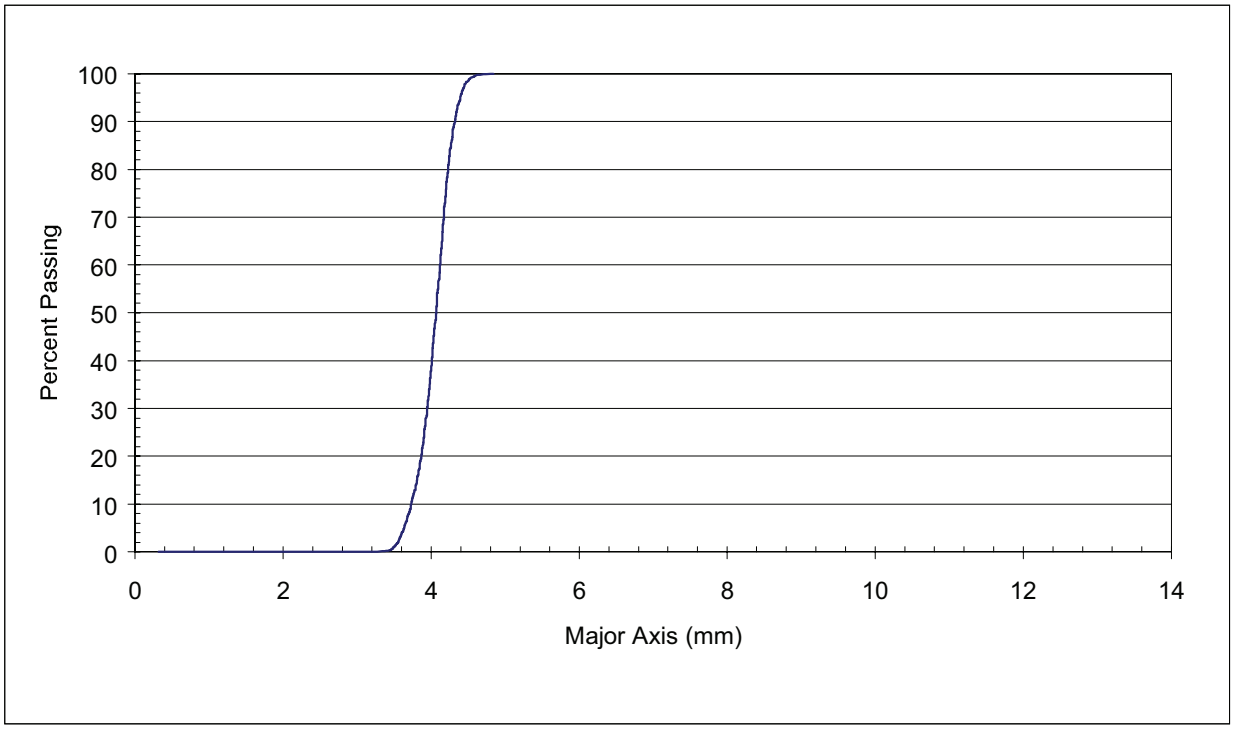


Figure 8: Pseudo-Bin Plot (Volume of particles at a given size) Sample 1 fused pellets removed.

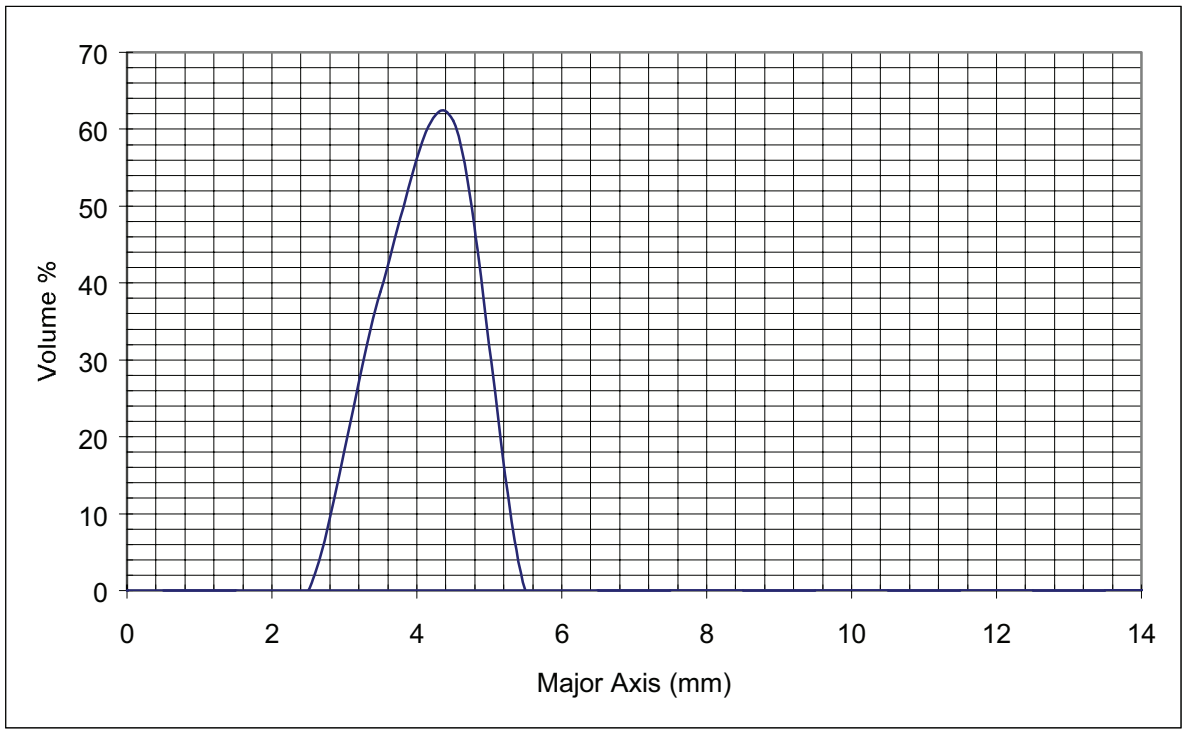


Figure 9: Percent Passing vs Major Axis Sample 2.

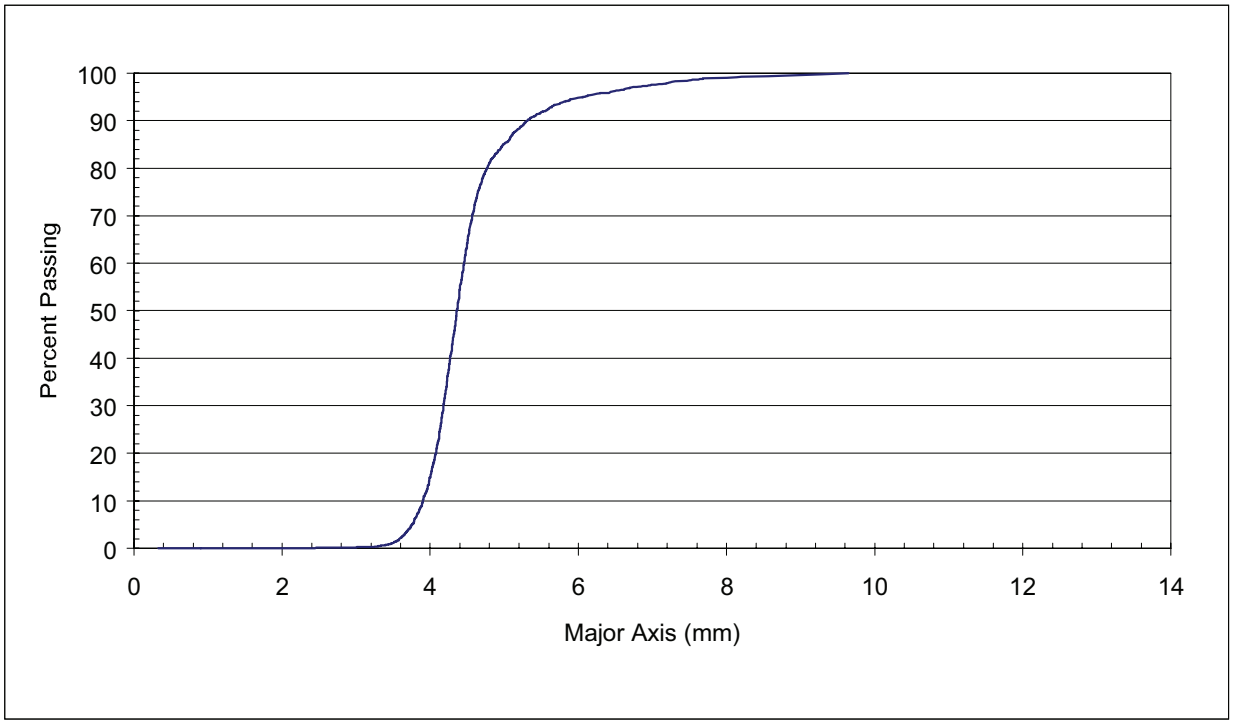
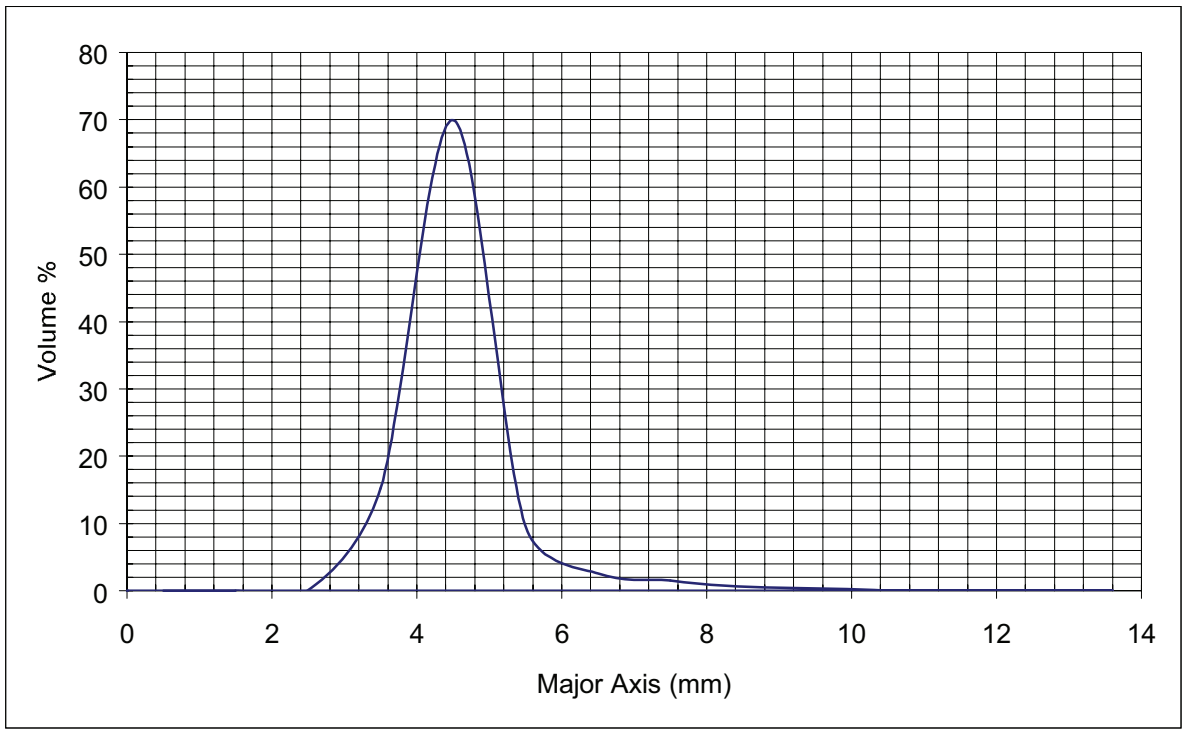


Figure 8: Pseudo-Bin Plot (Volume of particles at a given size) Sample 2.



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 information obtained can be used as an indication of the presence or absence of fused plastic extrusion pellets and should be easily incorporated into a quality control structure. The system should be usable as an analytical tool for QC/QA and can provide measurement results in a matter of minutes on a continual basis so that more efficient judgments can be made about product quality.

Further Information:

For further information on the Canty Particle Sizing System, please contact us at the address on this report or feel free to email us at sales@jmcanty.com.