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MATERIAL FLOW
EQUIPMENT

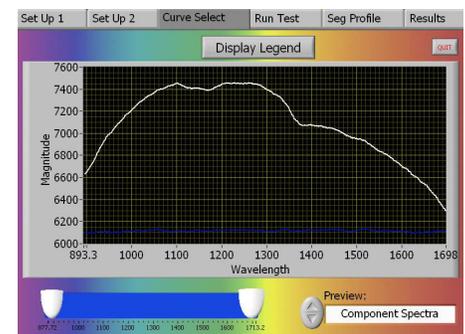# Using the SPECTester to Quantify Density (Porosity) of a Mixture

The SPECTester is designed to evaluate and quantify the segregation potential of both individual components, and the entire mixture in a product containing up to six unique components. However, the machine's capability extends to analyzing the density/porosity of any material, regardless of the number of ingredients in the mix. Essentially, when reviewing the pile formed in the test hopper, the SPECTester measures the amount of material present compared to the void space between any/all particles in the pile. In other words – comparing the presence of material to air in the pile, we can determine the density/porosity of the material at specific points in the process. Steps to determine the density (porosity) of a mixture using the SPECTester:
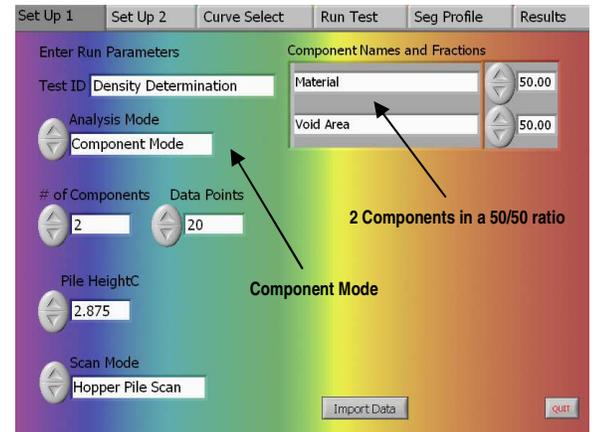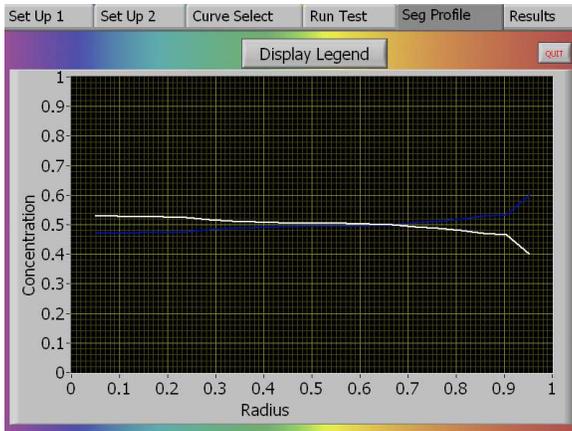

- Using only two component trays, leave the bottom (second) tray empty and fill the top tray with the material mixture.
- Fill the tester hopper in normal fashion, with ~2L of the material to by analyzed.
- On the touch-screen, begin the SPECTester program.
- When the SetUp1 screen appears, enter the name of the Test to be run.
- Select "Component Mode" to acquire density.
- Enter "2" as the number of components.
- And the number of data points to be collected by the SPECTester. We recommend 15 to 20 data points for most materials.
- Referring to the pile height gauge, enter the height of the left side of the material pile.
- Enter the names and percentage of concentration for the two components. The names are arbitrary, to the User preference. However, the percentage concentration of the two components (material and air) should be defined as a 50/50 mixture, or 50% each.
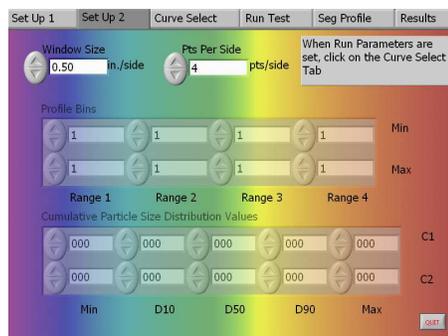
- On the SetUp2 screen, select the standard 0.5 inch window with 4- or 5-sided matrix.
- The CurveSelect screen shows the void (air) spectra as a flat blue line and the material spectra as a white curved line.
- On the RunTest screen, check all your entered data for accuracy and then click "Get Data". Data collection and analysis will take several seconds to a few minutes.

Technical Questions may be directed to Kerry Johanson, Material Flow Equipment   +1-352-303-9123

Using the SPECTester to Quantify Density (Porosity) of a Mixture

The segregation profile represents the density/porosity of the mixture at the various locations in the pile, which simulates the process. If density remained constant through the material run, then both the blue and white line would be perfectly horizontal, overlapping one another. Where the white line appears above the 0.5 line, material density is greater. Where the white line appears below the 0.5 line, material density is less and the packaged material may be underweight. Please note that if the process has typical funnel flow hoppers that cause the sides of the bin to empty last, then the material at the very end of the production run is likely to be somewhat out-of-spec, as indicated by the large dip in the density profile.

The number of primary interest on the Results screen is the Material Segregation Intensity number. For the example shown (which corresponds to the segregation profile graph above), the overall density of product through the process is good.

To properly evaluate a material's density using the SPECTester, it is necessary to consider both the Segregation Profile graph as well as the Segregation Intensity Number. Together, these data provide the information necessary to describe the density (or porosity) segregation of a sample mixture.