Microtrac

Total Solutions in Particle Characterization

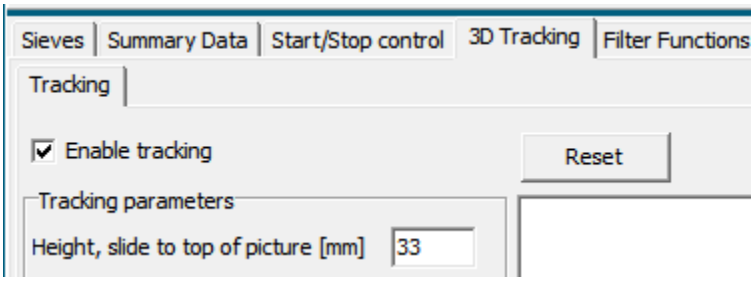
APPLICATION NOTE

Advantages of Measuring Particles in 3D verses 2D.

Application Note

SL-AN-49 Revision A

The PartAn^{3D} analyzer can be run in 3D or in 2D. In fact, Microtrac offers the only Dynamic Image Analyzers that have a 3D mode of operation, a patented feature.



When analysis is run in 2D, every captured image of particles is included in the analysis, which means that each image is an image of one randomly oriented particle. The 2D analysis is only nearly as good as 3D analysis if the particles are close to spherical in shape. When spherical in shape all reported parameters are almost as accurate in 2D as they are in 3D. When the particles are not nearly spherical in shape, it's a whole different situation.

Imagine capturing the end view of the smallest area of a 3-dimensional prism (picture a deck of cards). In 2D, the reported width would actually be the true thickness, and the reported length would actually be the true width. The thickness dimension isn't reported by any 2D analysis because the 2D parameters are all derived from only one 2-dimensional view.

In contrast, the 3D parameters are based on measurements of all 2D parameters of multiple, variously oriented 2D images of the same particle. In the current shipping version of these instruments, with the newest camera design, we can, on the average, capture, store and measure 20 differently oriented images of the same tumbling particle. We then assign the longest 2D length of all particles measured to the 3D length parameter, the longest width to the 3D width parameter and the shortest width to the 3D thickness parameter (an unmeasurable parameter in 2D analyses). This gives us a near perfect measurement of all three major dimensions of a 3-dimensional particle. In 2D analysis, the length and width measurements will be different for every different orientation of the particle, even if all the particles are exactly the same in all three different dimensions of length, width and thickness (deck of cards).

With this knowledge it's obvious that anyone interested in accurate measurements of all the morphologies of their particles would want to characterize them in all 3 dimensions. But it could be argued that if the particles are spheres, the same correct information could be obtained in less time for the same number of particles in the 2D mode. That is true. Which is why the PartAn analyzers all have a 2D mode as well. In which case the measurement is as fast as any 2D image analyzer, but with the same caveats about measurement accuracy for particles, which aren't spheres.

For more information on the PartAn visit Microtrac.com.