

Laser Size Diffraction for 316 Powder

Carpenter Additive has developed techniques to control the blending and packaging of the materials it supplies. As a means of validating this process a batch of 316 Stainless Steel powder was sampled and its Particle Size Distribution measured using Laser Size Diffraction. The technique for taking powder samples is described in Carpenter Additive's Technical Bulletin as: 'Powder Sampling Procedure'.

Process

A total of 5 samples were taken from a single container of Carpenter Additive's 316 powder in accordance with the 'Powder Sampling Procedure'. A further sample was taken from the same location in 8 different containers from the same batch and the Particle Size Distribution measured.

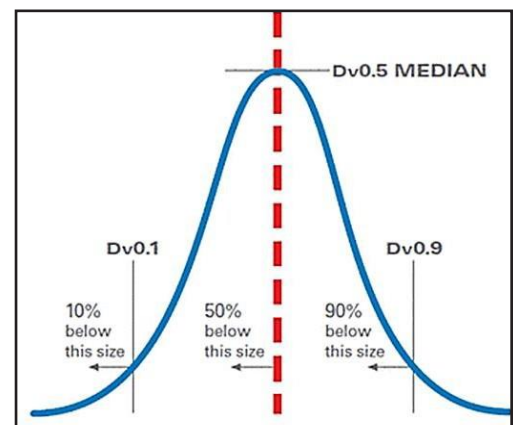
Results

In the chart below the first 5 data points represent the samples taken from the first container. The 8 subsequent points (6-13) represent the samples taken from 8 additional containers. As can be seen from the chart, the distribution through a single container and across all 9 containers is consistent with very little variation.

Conclusion

The consistent Particle Size Distribution across the single container and all 9 containers shows a consistent quality of powder. This will ensure repeatable behavior, such as flow of the powder in the additive manufacturing machine. This is important to give good coverage of powder on the build platform that will result in a consistently dense final product.

A material that does not flow correctly could leave voids in the build envelope resulting in voids in the final product. The optimum Particle Size Distribution does change from machine to machine. It is very important when purchasing a powder to specify the machine type that the powder will be processed on.



Additional Information

What is meant by D10, D50, D90? The chart above shows a typical Particle Size Distribution.

D50 = The D50 or the median, has been defined above as the diameter where half of the population lies below this value.

D90 = 90 percent of the distribution lies below the D90.

D10 = 10 percent of the distribution lies below the D10.

