



PARTICLE SIZING OF POWDER COATINGS

Powder coatings are alternatives to paints that are comprised of a resin and a pigment. The powder is sprayed on the part and attracted by the electrostatic charge applied to the part. The item is then heated in an oven to cure the resin and form a solid layer. Particle size is important to provide the optimum surface finish and minimize process waste.

Summary

Powder coatings are alternatives to paints that are comprised of a resin and a pigment. The powder is sprayed on the part and attracted by the electrostatic charge applied to the part. The item is then heated in an oven to cure the resin and form a solid layer of resin and pigment. The end result is a finish that is tough and more resistant to damage.

In addition to performance advantages, powder coatings are becoming more popular because of environmental reasons. Compared to paints, powder coatings have a low Volatile Organic Compound (VOC) content. This is particularly important in environmentally strict countries such as the U. S. and Europe. They are becoming more popular in other countries as environmental controls are enacted.

Applications

Powder coatings are used in a wide variety of industries from automotive parts to furniture to industrial tools. Powder coating is generally more chip resistant than paint or other surface finishes.

Recent advances have increased the applications available for powder coating as manufacturers have learned how to make products that give a high-gloss finish, a matte finish, or special finishes and colors such as textured or wrinkle-finish, metallics, pearlescent, and sparkle finishes.

These special finishes are often provided by mixtures of other components in the standard powder mix.

Importance of particle size

Particle size distribution of the powder is critical to both the final product performance and the application properties.

As with other pigments, the size of the largest pigment particles affects the surface finish. Larger particles will protrude above the surface, leaving a rough texture. This can also affect the performance while in the oven by preventing an even resin surface. Because powder coatings are applied with spray guns, similar to paint, large particles can clog the spray nozzle orifice.



Horiba LA-930 Particle Size Analyzer with PowderJet Dry Feeder



Because it is a dry powder, the size of the powder particle is important to the spray performance. The average size and distribution of sizes is important to get good coverage of the part, as well as the total amount of fine particles. Fine particles in the powder don't have enough mass to be attracted to the target by the electrostatic charge and get blown away. This wasted material is lost efficiency, so the full distribution of particle sizes is important to maintain optimum performance of the powder coating process.

Measuring Particle Size

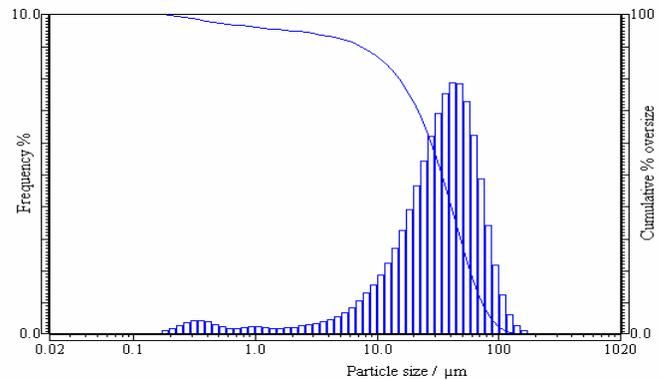
The range of different applications and materials produce a wide distribution

of particle sizes, from sub-micron to almost a millimeter. Measurement and classification of the entire size distribution is important.

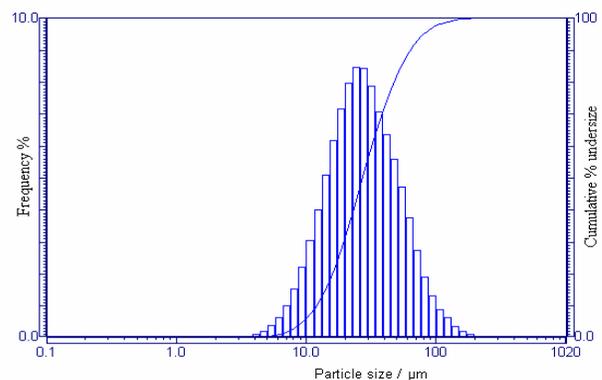
Samples can be measured as a fluid dispersion or as a dry powder, depending on the application and size range. The finest particles may be more difficult to disperse with a dry system, but the speed of dry analysis may make it more attractive. Horiba's LA-930 can be used in either mode, depending on the accessories fitted.

Two examples of a particle size analysis of powder coatings are shown below:

*Hybrid powder coating
Median: 33.987 μ m
Sample preparation: Dispersed in water with a small amount (usually 0.1%) surfactant. Ultrasonic dispersion may be required for some of the finer grades.*



*Thermoset powder coating
Median: 26.892 μ m
Sample preparation: Measured with the PowderJet dry feeder, with low pressure dispersion.*



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