

Particle Shape & Properties for Powder Material

In the granulation process by the high pressure granulation method, the powder is compacted in a compact state by applying an external force in a limited space. The forces that produce stable agglomerations are bridging forces of the floccules, low viscosity liquids, surface forces and cohesion forces. The success of the agglomeration operation depends on the effective utilization and transmission of the applied external force on the one hand and the physical properties of the granular material on the other hand.

The particle shape refers to the image of a particle's outline boundary or points on the surface. The shape of the particles directly affects the other properties of the powder, such as fluidity, fillability, etc., and is directly related to the behavior of the particles during mixing, storage, transportation, sintering, and other units processing. In the project, depending on the purpose of use, people have different requirements for the shape of the particles.

For example: high-speed dry-pressing method of forming wall and floor blanks, requiring rapid filling in the mold, smooth exhaust, it is appropriate to spherical particles; Concrete aggregates require high strength and compact filling structures, so the shape of the gravel is expected to be a regular polyhedron. Conversely, the shape of the particles differs depending on the formation process, for example, a simple swinging jaw crushing machine can produce more flaky products; Powders prepared by spray drying are mostly spherical particles. Therefore, quantitative descriptions are required for various particle shapes to show differences.

On the other hand, in theoretical research and industrial practice, irregularly shaped particles are often assumed to be spherical so as to facilitate the calculation of the particle diameter, and the experimental results are also easy to reproduce. Because of this, it has become one of the main reasons for the large gap between theoretical calculations and actual conditions. Therefore, it is generally necessary to correct the particle size in the relevant theoretical formula multiplied by the coefficient representing the influence of the shape.