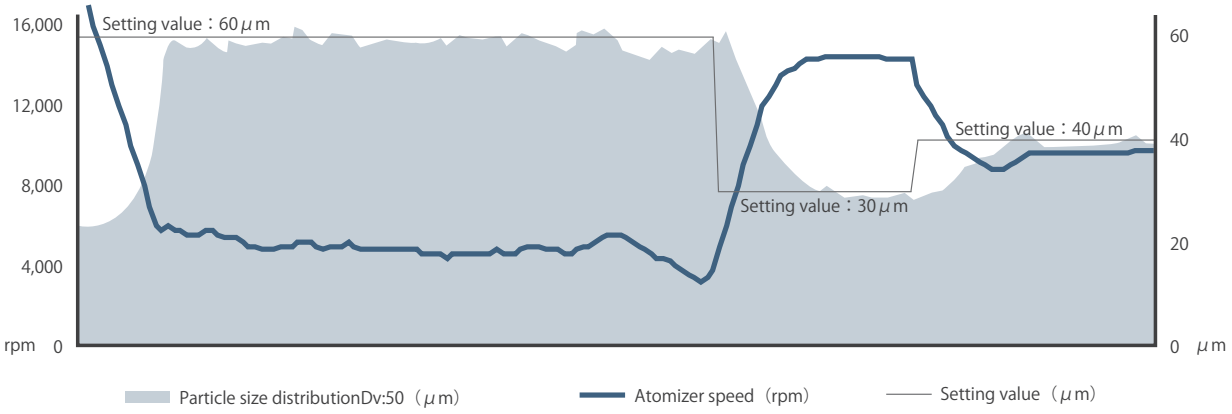
Spray drying new technologies

Auto-PSD-Control System

Controlling by “Rotating Speed”?
Wait! Control the “Particle Size Distribution” directly.

The significance of measuring in real time.

By measuring particle size distribution in real time, you can see various changes in the process. Even if raw materials, recipes and operating conditions are already fixed, the quality of the spray dried powder changes constantly during the process. This means that the fixed atomizer rotating speed may not achieve a stable particle size distribution. With our new technology, you can control not only the rotating speed but also the particle size distribution.



Example of Dv:50 particle size distribution automatic tracking

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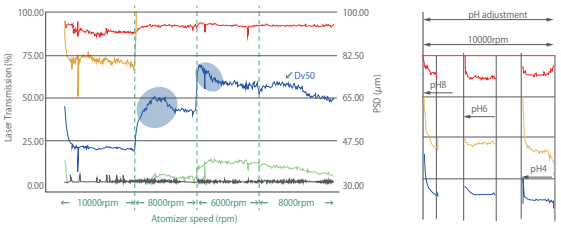
Understand the real process

“Insitec” is a Malvern’s real time particle size distribution measurement system. The system can monitor flowing particles in real time with high accuracy in the process.



Recognize and control automatically

The spray dried powder is composed of various sized granules. Therefore, the size of granules is referred as “ distribution”. Spray drying process is one of the most ideal processes that can create granules with a sharp particle size distribution. However, conditions of feeding liquid material, process gas and inlet/outlet temperatures are not precisely consistent in the process. Therefore, It is important to stabilize the final dried product by measuring and controlling particle size distribution at the manufacturing process in real time.

Coanda Effect Disc

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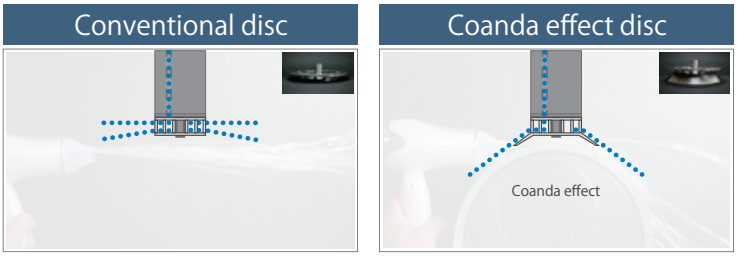
Innovative disc shape dramatically improves your yield rate.

In centrifugal atomization, the liquid material is fed and the droplets are atomized toward horizontal direction by centrifugal force. In general, it is necessary to design a drying chamber bigger in order to prevent adhesions of undried material droplets on the inner wall. To solve this issue, we developed a brand new type of disc shapes named Coanda Effect Disc (the coanda effect is the tendency of a fluid to keep attaching to a convex surface). With this phenomenon, sprayed droplets go downwards and can be taken more fall-down time inside the chamber. This allows to enhance the drying efficiency and reduce the material adhesion loss compared to the process operation by conventional disc, and can even design a drying chamber size smaller without sacrificing the production yield rate.



Case 1. Al_2O_3 50wt% slurry

Conventional disc 66.2% → New disc 83.7%

128 % UP

Case 2. Dextrin 30wt% aqueous solution

conventional disc 69.4% → New disc 86.7%

148 % UP

Swirl Flow Classifier

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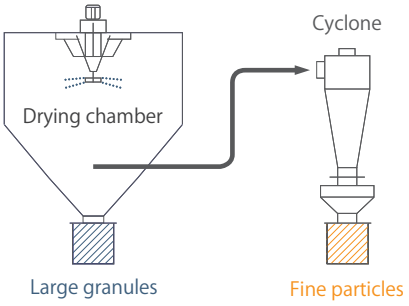
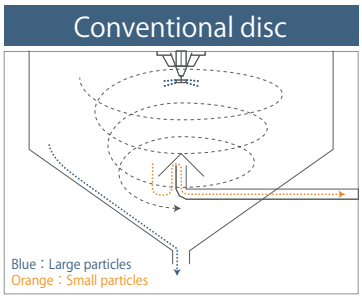
High yields from the drying chamber.

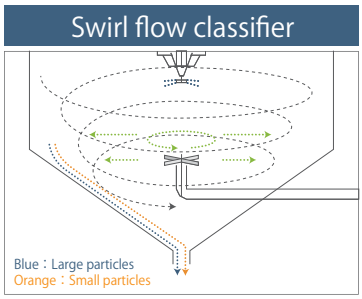
By dual collection method which is generally used for inorganic materials such as fine ceramics, granulated powder which has a large particle size and is excellent in fluidity is collected from the drying chamber, and fines are collected from the cyclone. Granules collected by the cyclone may be broken in to fines due to the friction impact on the inner cyclone wall, and therefore are often returned to raw materials. To increase the collection yield from the drying chamber we developed the swirl flow classifier at the inlet of the cyclone. By attaching the classifier, it is possible to improve the collection efficiency from the drying chamber.



Dual collection method

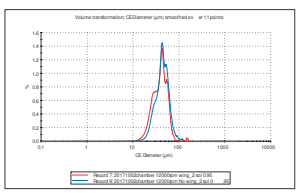


Fine particles flow into the cyclone duct.

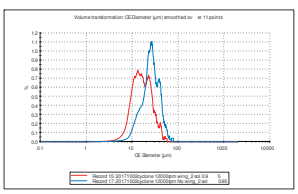


The fine powder is moved outward by the swirling flow.

Al_2O_3 50wt% slurry	Yield rate from the drying chamber	Yield rate from the cyclone
A:With swirl flow classifier	77.7%	13.0%
B: Without swirl flow classifier	60.8%	26.6%



Collection from the drying chamber (Dv50)
A : 39.7μm B : 42.9μm



Collection from the cyclone (Dv50)
A : 15.7μm B : 25.2μm

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