

# Introduction

Spray drying is a technique preferred by a growing number of pharmaceutical companies to produce better drugs. This ultra-fast and gentle drying technology offers unique possibilities for designing particle characteristics. You can see examples on the following pages.

Poroshat Filter is the first designer and manufacturer of spray dryers in Iran, which has been able to take another step towards its goal by using its engineering power and technical knowledge in manufacturing equipment for various industries in the country.



**PHARMACEUTICAL INDUSTRY  
HIGH-TECH MADE BY PEOPLE FOR PEOPLE**

# The right process for your product

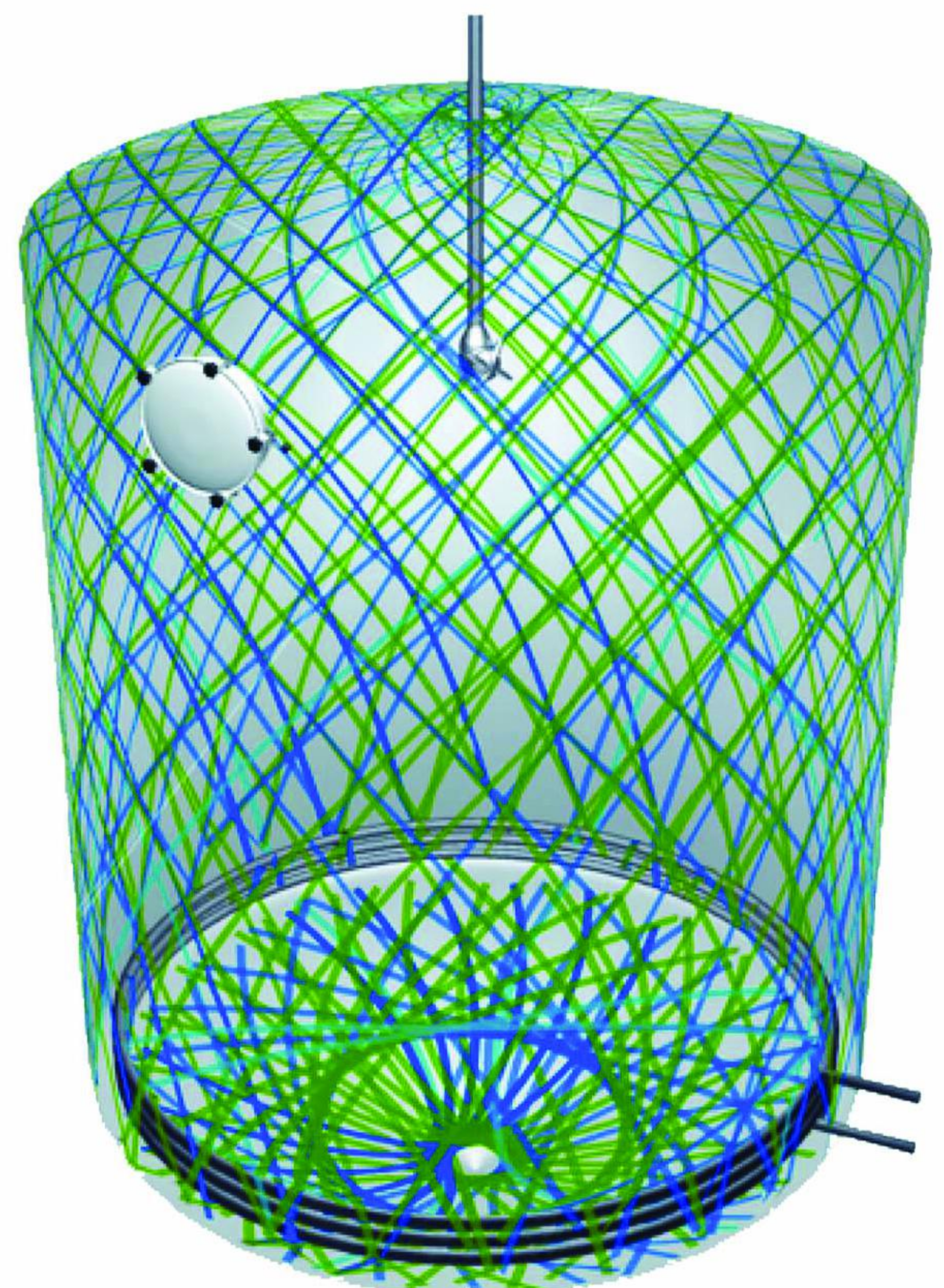
## Spray dryer versus other dryer

Spray drying is considered to be a simpler and faster process, involving the conversion of a liquid formulation into a dry powder in one single step. The solution is atomised into fine droplets, which are quickly dried straight after in a large chamber using warm gas. The resulting dry particles are then collected with a cyclone.

|              | Heat sensitive | Drying Time | scalable | Pressure    | Particle size control | flammable solvents | Cost        |
|--------------|----------------|-------------|----------|-------------|-----------------------|--------------------|-------------|
| Spray dryer  | ✓              | second      | ✓        | atmospheric | ✓                     | ✓                  | Expensive   |
| Freeze dryer | ✗              | hour        | ✗        | vacuum      | ✗                     | ✓                  | Expensive   |
| Rotary dryer | ✗              | minute      | ✗        | atmospheric | ✗                     | ✗                  | inexpensive |
| Flash dryer  | ✗              | second      | ✓        | vacuum      | ✗                     | ✗                  | Affordable  |

## Self-cleaning system for Spray dryer

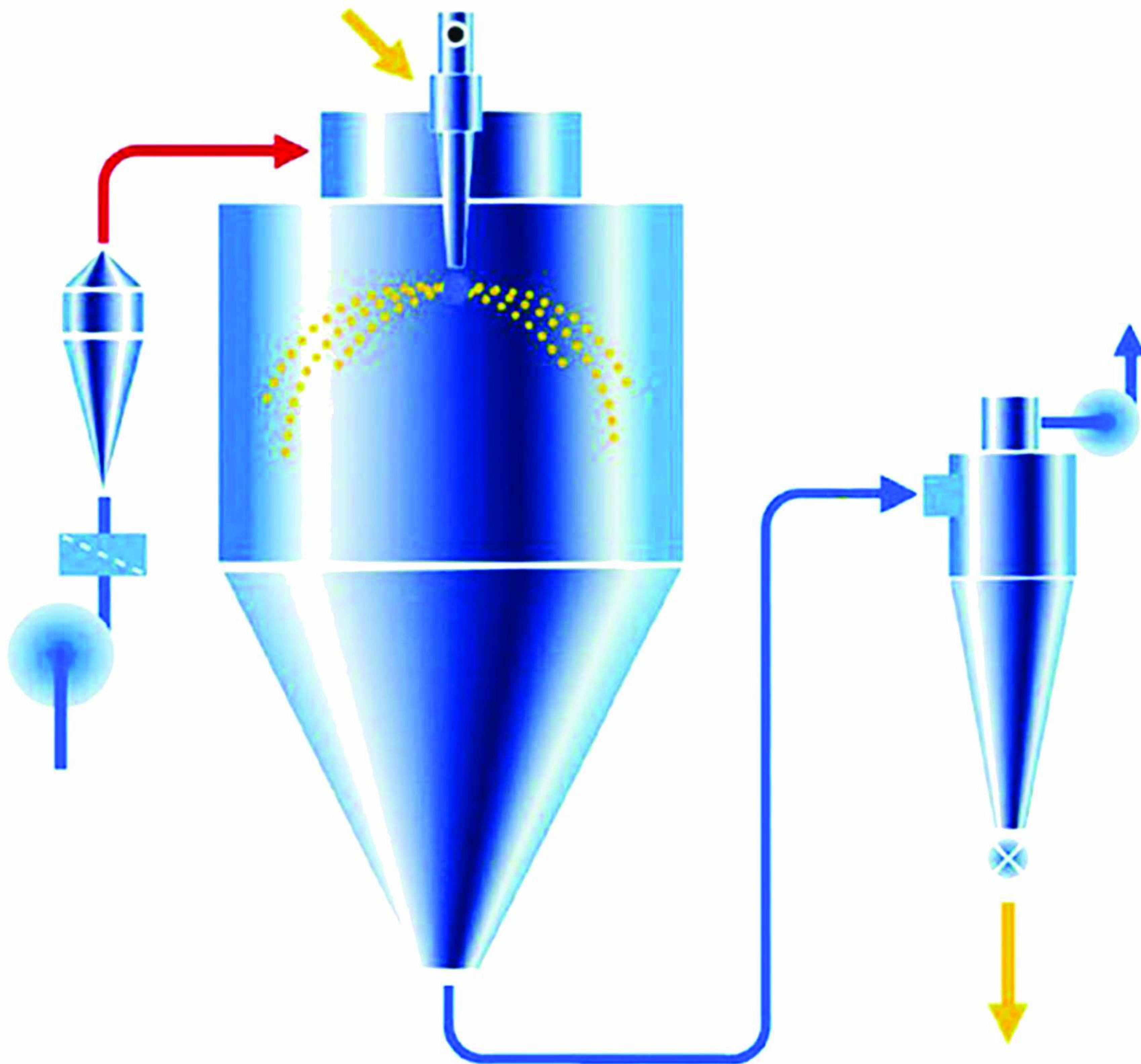
Rotary jet heads are specifically engineered to use the pressure and flow available to create high impact cleaning jets. Automated and fluid-driven, these devices maximize mechanical force, which reduces the amount of time, temperature and cleaning solution needed to effectively clean.



# Understanding spraydryer capacity

## How to characterize the size of a spray dryer

The size of a spray dryer is best described by the flow rate of process gas that the plant is intended to handle. The gas disperser in the top of the drying chamber is designed at this flow rate to supply a uniform and efficient mix of hot gas and the feed droplets produced by the atomizing device (e.g. Rotary atomizer). Similarly, the cyclone design functions to efficiently separate particles. The gas flow also determines the filter area required in the bag filter and the diameter of the ducts.



# The right process for your product

With the most advanced portfolio of drying technologies and the world's best engineering minds focused on supporting your success, Poroshat helps you to make the most of new opportunities across a full spectrum of products.

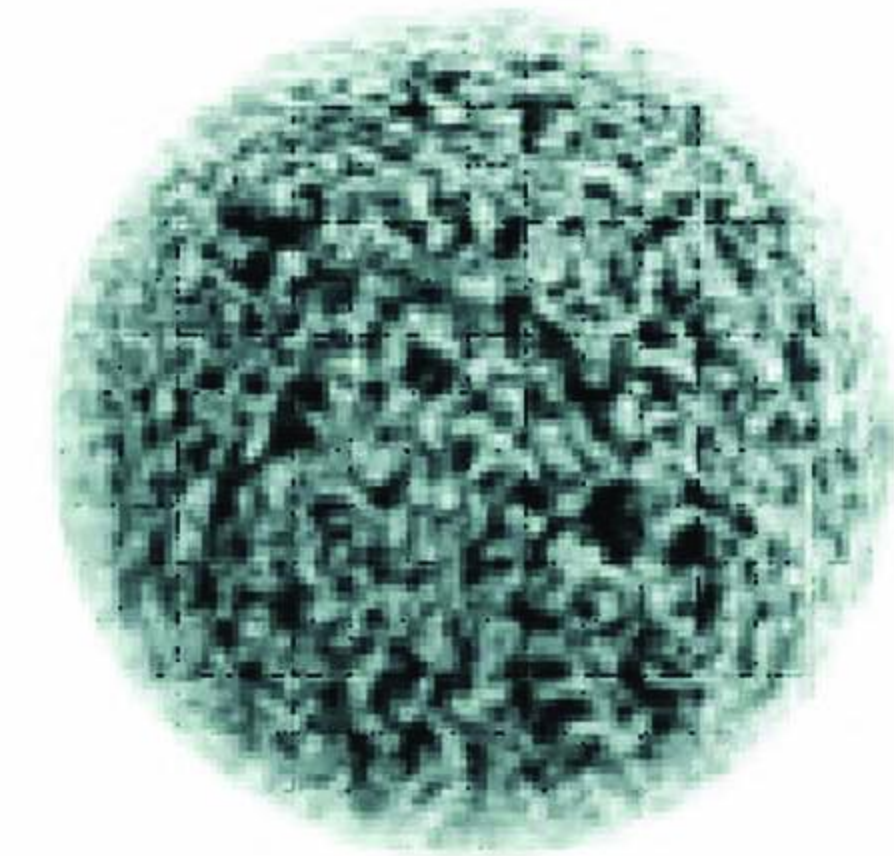
## Ceramics

- Titanates
- Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Fe<sub>x</sub>O<sub>y</sub>
- Kaolin
- Silicium oxide/nitride
- Zinc oxide
- Zirconium oxide/silicate



## Nano materials

- Inorganic nano material
- Organic nano material
- Pharmaceuticals



## Dyestuff & pigments

- Dyestuff intermediates
- Related fillers
- Barium sulphate
- Cadmium carbonate
- Calcium carbonate
- Ceramic colorants
- Iron oxide (black, red, yellow)
- Kaolin



## Organic chemicals

- Organic acids
- Plant materials
- Chloramines
- Gluconates
- Hydrazines
- Phthalates



## Agrochemicals

- Potash
- Phosphate rock
- Monoammonium phosphate
- Diammonium phosphate
- Calcium chloride
- Ammonium nitrate
- Ammonium sulphate
- Urea



# Spray dryer components

Rotary Atomizer units can handle any pumpable feed material, solution or slurry, covering a wide range of feed characteristics in terms of solids content, density, and viscosity. Process material can be fed to the atomizer by a low-pressure positive displacement pump, or even by gravity flow from a head tank. The atomizer converts the feed into a spray or atomized cloud of fine droplets, typically 30-50 microns in size, suitable for spray drying.

- Inorganic solution
- Pharmaceutical materials
- Tungsten carbide
- Catalyst carriers
- Silicas
- Kaolin & clay products

***It is possible to use different wheels for different feed properties, which can control the properties of products***



Spray Dryer is also enhanced with an innovative gas disperser to ensure optimum contact between the heated drying gas and atomized spray cloud, thereby improving dryer performance and efficiency. Available features include remotely adjustable process gas velocity and swirl vane angle.

In this system, by changing the angle of the air distribution vans, the speed, flow and duration of hot air contact with the feed can be controlled and the quality and efficiency of the spray dryer can be improved.

