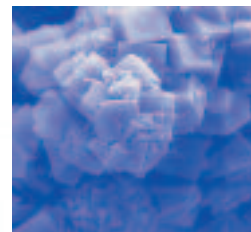


SWIRL FLUIDIZER™

From paste to
powder in one
efficient step



The SWIRL FLUIDIZER™

For drying of pastes, filter cakes and viscous liquids

When it comes to drying of pastes, filter cakes and highly viscous liquids, the Niro SWIRL FLUIDIZER™ offers a cost-effective solution for obtaining a fine, homogeneous and non-agglomerated dry product – in one compact process step.

In this respect it is superior to most conventional processes. Contact dryers, band dryers, drum dryers and tray dryers are all drying processes characterized by long processing times and the need for costly post-treatment such as milling.

Also, the SWIRL FLUIDIZER'S™ ability to handle even the most viscous liquids makes it an attractive alternative to spray drying for applications where dilution would be needed to obtain a pumpable and sprayable feed.

The SWIRL FLUIDIZER™ offers the following main process advantages:

- Ability to handle non-pumpable products
- One stage combined drying and product treatment
- Continuous operation
- Compact layout requiring a minimum of space
- Effective heat and mass transfer
- Negligible heat loss
- Maintenance-friendly design

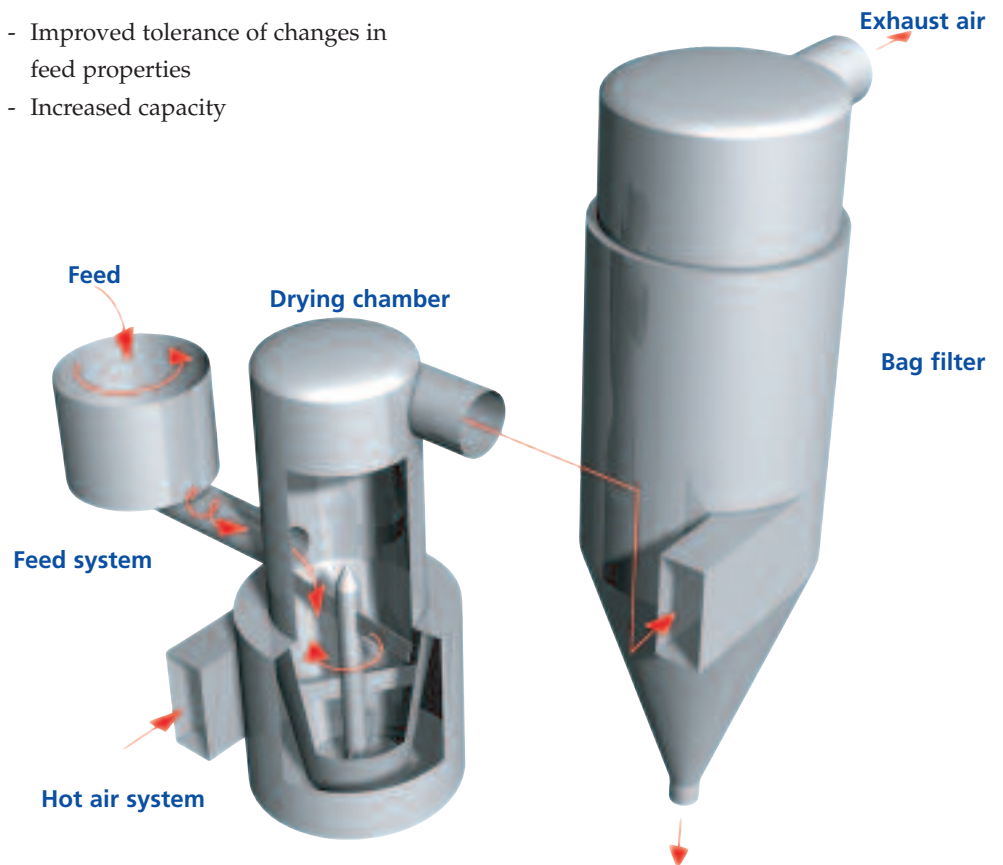
Extensive R&D work aimed at rendering the design suitable for an even larger range of applications has resulted in a “new generation” SWIRL FLUIDIZER™, mainly characterized by a conical lower portion of the drying chamber, an even more compact configuration and a number of easily implemented optional features for special applications.

Comprehensive modeling and testing as well as experience from many industrial scale installations have led to this new, flexible design, which offers the following process advantages:

- Improved tolerance of changes in feed properties
- Increased capacity

- Ability to handle very high drying temperatures
- Capability to dry very heat-sensitive products

Now the SWIRL FLUIDIZER™ is available in a wide range of sizes from small standardized pilot scale units to very large industrial installations.



Process Concept



Drying Chamber

The heart of the process is the Drying Chamber where the feed disintegration and evaporation take place. The chamber consists of cylindrical upper and conical lower parts. For most applications the feed is introduced into the middle of the chamber. The hot drying gas is fed into the chamber through the air disperser, which surrounds the lower conical portion of the drying chamber. The air disperser generates a tangential air flow which enters the drying chamber from the bottom. There is an intense, swirling internal flow pattern of product and drying air within the chamber, insuring uniform drying and disintegration. The swirling flow is assisted by the rotary disintegrator, a series of rotating blades that impact the product, reducing it to ever smaller particles; increasing the surface area in this manner increases the evaporation rate.

The arrangement of the lower part of the drying chamber and the air disperser is also ideal for effective cooling of hot internal surfaces, optionally allowing for drying of even very heat sensitive products. The dried product particles and the spent drying gas exit the drying chamber through the outlet at the top of the chamber.

Feed tank

The cylindrical feed tank is equipped with a slowly rotating agitator, driven from the bottom, which ensures a steady feed supply to the bottom-mounted, speed-controlled dosing screw. The screw transfers feed to the drying chamber at a continuous and controllable rate.

Hot air system

Hot drying air is supplied to the air disperser at a controllable rate in order to ensure optimum thermal efficiency of the drying process.

Any available energy source can be effectively utilized.

Powder recovery and exhaust air cleaning system

A bag filter is typically selected for dried product collection and cleaning of the spent drying air.



Process Configurations

Selecting a configuration of a Niro SWIRL FLUIDIZER™ for the substantial variety of applications is actually quite easy. All plants are composed of standardized modules that are configured with product-specific options. For instance, there could be a cooling system for heat-sensitive products, special features for particle size control or the fundamental choice of an open system versus a closed system.

Open cycle system

In the open system atmospheric air is used for drying. This system can be applied even in cases where the product to be dried poses a potential dust explosion hazard, as the plant can be provided with pressure release or suppression systems.

Closed cycle system

In the closed cycle system the oxygen content of the gaseous drying medium is either kept below a certain level or eliminated by operating the plant in an inert mode using nitrogen as drying gas. Suppression of the oxygen content is often used where the product poses a severe dust explosion hazard, whereas the inert nitrogen atmosphere is essential when drying products containing a flammable solvent.

Process applications

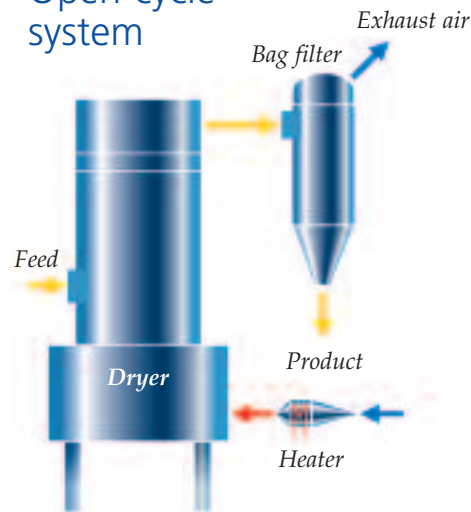
Recognized for its flexibility, the SWIRL FLUIDIZER™ has been used for a wide range of applications in the chemical industry, including:

- Agrochemicals – herbicides and fungicides
- Ceramics – silica, bentonite, kaolin
- Dyestuffs/pigments – iron oxides, titanium dioxides, phthalocyanines, zinc phosphates
- Inorganic chemicals – metal carbonates and hydroxides, calcium phosphates, zeolites
- Organic chemicals – optical brighteners, flame retardants, polymers
- Waste products – sludge, sediments

The SWIRL FLUIDIZER™ is also well suited for pharmaceutical and food industry applications. Whatever the application, Niro's comprehensive pilot plant facilities in Columbia, Maryland are available for testing, trial and production. Customers may draw on Niro's comprehensive expertise in drying and the experience we've gained in supplying over 10,000 units worldwide since the company's founding in 1933.



Open cycle system



Closed cycle system

