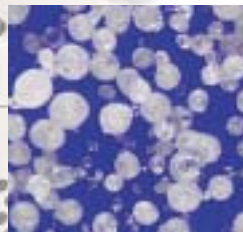
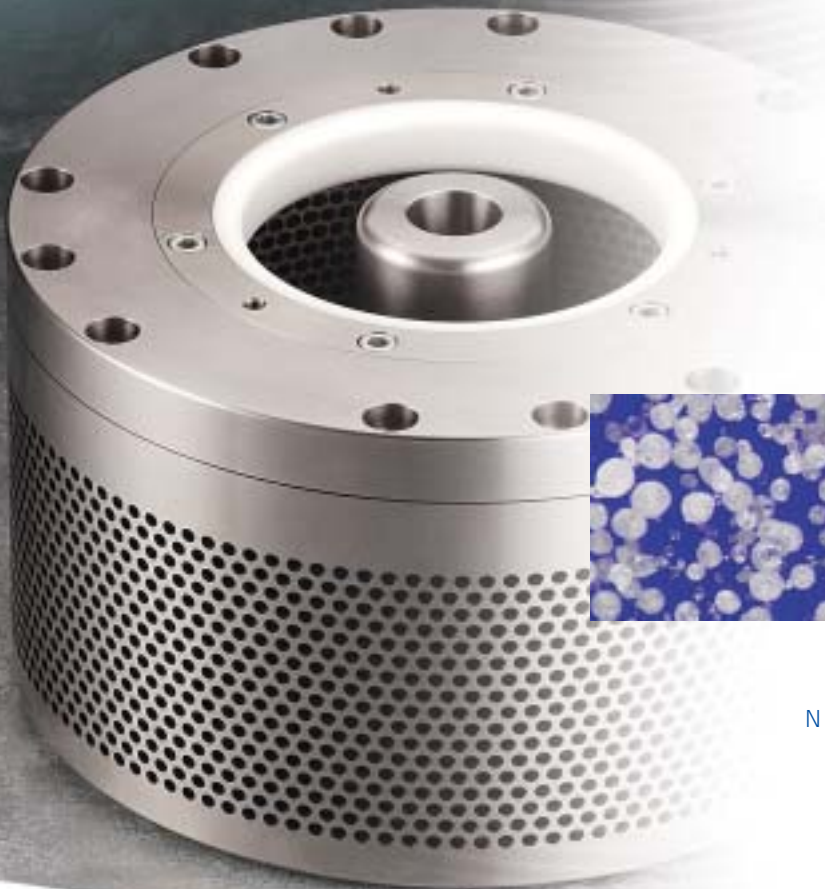
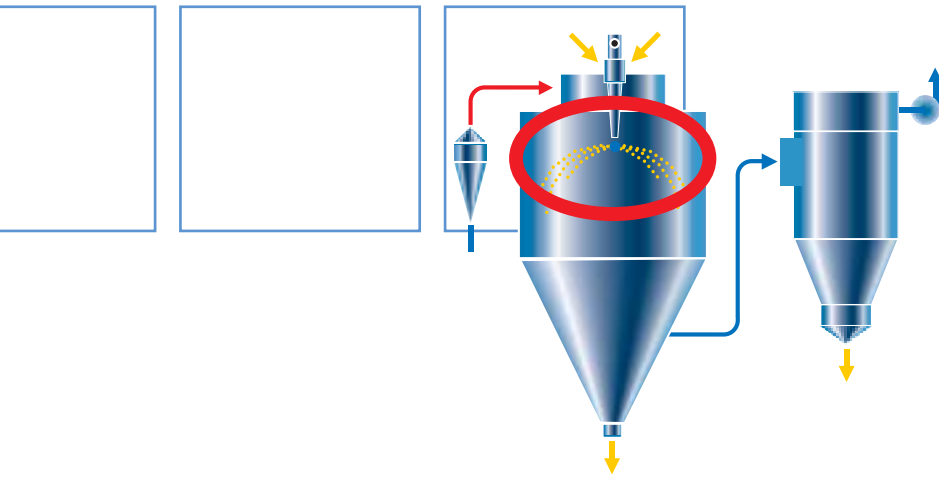


# NARROWSPAN™ Atomization

Powder  
Production with  
Narrow PSD



NIRO POWDER TECHNOLOGY



# A New Principle...

## *Niro NARROWSPAN<sup>TM</sup> (NS) Atomization*

### **Powder Particles of Uniform Size**

Many types of spray dried products would benefit from being coarse with a particle size distribution as close as possible to a uniform-sized distribution, i.e. where all particles would be spheres with identical diameters. Such products would have the advantage of being dust-free (no fines) and of containing no large particles (difficult to dry and to re-dissolve).

### **Conventional Atomization Methods**

Conventional atomization methods create droplets with a wide size

distribution, which in turn form the basis of the normal powder. These methods include rotary atomization, pressure nozzle and two fluid nozzle atomization. A common factor in these methods is the inherent randomness in the creation of the single droplet, resulting in a great variation of powder particle sizes – far from the mentioned “uniform” condition. Obvious advantages of uniform powders would be reduced dust problems and easier plant design, where the absence of large droplets requiring longer drying times would allow for reduced plant dimensions.

### **Approaches to Uniform Size Distribution**

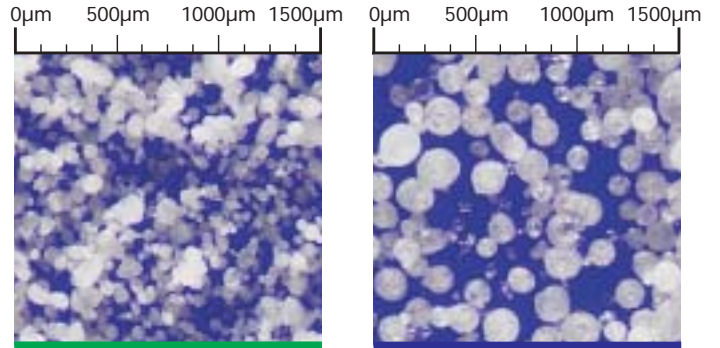
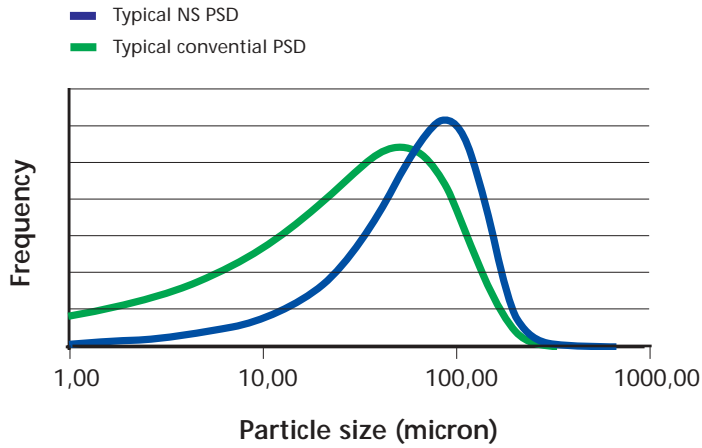
One approach to making uniform-sized powders is the NS atomization principle used by the Niro “W” type atomizers. The narrower particle size distribution obtained with these atomizers shows improved powder properties, including flowability, non-dustiness, and wettability, previously possible only in plants of considerably larger dimensions.

### **A Profitable Replacement**

A spray drying plant concept with the NS atomization technique may replace the nozzle tower concept for future plants. The advantages to this are: Significantly reduced building height, increased drying capacity, particle size change, flexibility, and a simplified feed system. A dryer adopting the NS technique will be able to accept an operation producing powder with increased average particle sizes, due to the reduced occurrence of larger droplets.

### **Documented Benefits**

Extensive pilot and production scale spray drying operations have documented many of the inherent benefits of the NS atomization technique. Based on these experiences, we can predict and prove potential improvements to the properties of specific products.



*Conventionally atomized spray dried skim milk*

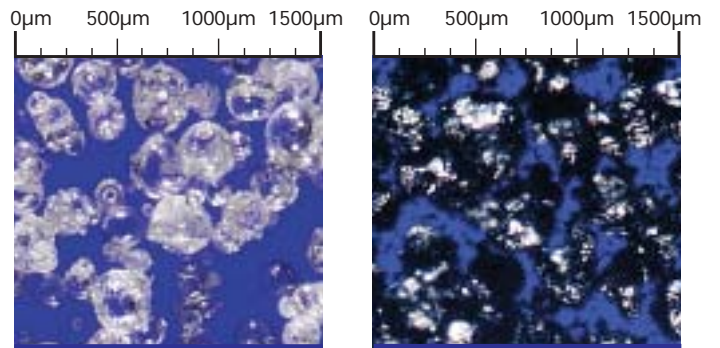
*Niro NS type atomized spray dried skim milk*

Particle size + distribution (PSD) shown as mass frequency distributions. Comparison between a Niro NS atomization and a conventional rotary atomization.

Testing the NS technique on skim milk has revealed pronounced improvements in powder wettability and the expected reduction in product dustiness.

**Multiple Test Results**

Atomization	With conventional atomizer wheel	With NS technique
Rosin-Rammler exponent	1,2-1,9	1,5-2,9
"Span" (D90-D10)/D50	2,5-1,5	2,0-1,0



*Niro NS type atomized zinc fertilizer product, d50 = 170 micron, span = 1,6*

*Niro NS type atomized dyestuff, d50 = 140 micron, span = 1,7*

The Rosin Rammler exponent expresses the "steepness" of the particle size distribution curve. High values mean a narrower particle size distribution.

"Span" is simple expression of the particle size distribution. A low number indicates a narrow distribution and an ideal "uniform size" would result in a span of zero.





**Atomizer sizes  
accomodated to  
the “Walzel”  
atomization principle\* .**

Capacities in tons per hour feed

<i>For new plants</i>	<i>F15DW-</i>	<i>0,3 -1</i>
	<i>F100W-</i>	<i>0,5 -3</i>
<i>For plant rebuilds</i>	<i>F15W-</i>	<i>0,3 -1</i>
	<i>F35W-</i>	<i>0,5 -2</i>
	<i>F100W-</i>	<i>0,5 -3</i>
<i>For tests at customer site</i>	<i>F15W-</i>	<i>0,3 -1</i>
	<i>F35W-</i>	<i>0,5 - 2</i>
<i>For tests at Niro A/S Station</i>	<i>F15W-</i>	<i>0,1 - 0,3</i>

\*

Professor Dr. Techn. P. Walzel, University of Dortmund, has after intensive research proposed a basic atomizer wheel design, where the feed is distributed into a multitude of streams, each being atomized from its own atomizer wheel channel. This has made it possible to move “rotary atomization” towards more uniform droplet size distribution.

Niro A/S has implemented these ideas into a novel rotary atomization design (patented), suitable for obtaining these particle distribution characteristics under industrial drying conditions.

# At a Glance

Based on the new NS atomization principle, the F15W and F100W rotary atomizers from Niro offer you a wide range of advantages:

- More narrow particle size distribution (PSD)
- Improved product flowability
- Improved product wettability
- Increased average particle size
- Suitable for new plants
- Can replace nozzle tower concepts
- Suitable for improving existing rotary atomizer plants



*Patented*

# NARROWSPAN™ Atomization

Powder Production  
with Narrow PSD

*Niro is a world leader in industrial drying, with spray drying, freeze drying, and fluid bed processing as core technologies. The Niro companies are part of the Process Engineering Division of the GEA Group.*



Process Engineering  
Division

A company of mg technologies group

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