



**Your Contract Manufacturer for  
Micronisation and Milling**

# Your Family Business to Make Powder Even Finer - Since 1985.



*We see the most unusual requests as a personal challenge.*

# Manufacturing and Contract Lab Services Under cGMP

## *Our Services*

- Micronisation
- Milling
- Cryogenic Milling
- Homogenization / Blending
- Fractionated Sieving
- Process Development
- Process Validation
- Determination of Particle Size Distribution (PSD) via Laser Diffraction
- Development, Validation and Transfer of PSD Measurement Methods
- Identity Verification (FTIR)
- Cleaning Validation and Cleaning Controls (HPLC)

## *100% Commitment to Quality*

- Manufacturing Authorization
- GMP Certificate (current Good Manufacturing Practice)
- FDA Authorization (Food and Drug Administration)
- Accreditation in Japan (PMDA)
- Quality Management System (QMS)



# Micronisation

## *Particle Size Reduction*

Micronisation is the process of reducing the average diameter of a solid material's particles. Traditional techniques for micronisation focus on mechanical means, such as milling and grinding. Modern techniques make use of the properties of supercritical fluids and manipulate the principles of solubility. The term micronisation usually refers to the reduction of average particle diameters to the micrometer range, but can also describe further reduction to the nanometer scale.

Pharmaceuticals, chemical ingredients and foodstuff ingredients are the main industries in which micronisation is utilized. Particles with reduced diameters have higher dissolution rates, which increases efficacy.

## *Micronisation Under cGMP Conditions*

As one of the largest contract manufacturing organizations for micronisation, GfM handles a broad range of products: From antibiotics and chemotherapeutic agents, high potent API, steroids, cytostatics and controlled drugs to chemical and technical products as well as products in food and cosmetics industry. We use a risk based product group concept to handle all products in accordance with cGMP guidelines.

With qualified equipment and trained personnel, we accompany our customers from process development to routine production – benefitting from more than 30 years of experience.



# From Grams to Tons

## *Process Development*

Using our broad range of equipment, we accompany our customers through their product's lifecycle. Development pre-trials can be conducted on our Picoline platform and small mills starting with as few as some grams. In development phase, both processability of your product or achievement of a specific or several different particle size distributions can be shown, and the finished material be used to in the subsequent development process.

The Picoline platform and our AS 50 are also perfectly suited for very small batches.

For both clinical trials and technical batches, we cooperate with our customers to develop the micronisation process. Process parameters are set to make sure the quality of the finished material fits your need. Scale-up, DoE studies and technical as well as evaluation batches are part of our policy to ensure the final micronisation process is efficient and reproducible.



## *Process Validation*

The validity of both the PSD measurement method and the micronisation process is the basis for cGMP complying production. We perform all validation activities in close cooperation with our customers to fit regulatory and time requirements.

Pre-validation activities can include DoE studies and evaluation batches to make sure the validated process will reproducibly produce a product meeting its predetermined specifications and quality attributes.



# Spiral Jet Mills

## *Superfine and Straight Particle Size Reduction*

GfM offers its micronisation services on Aeroplex Spiral Jet Mills in different sizes: 33 AS starting with a few gram, to 50 AS and 100 AS for small volumes, up to 200 AS and 315 AS in middle and large scale production.

In spiral jet mills, compressed air or nitrogen is forced into the mill through nozzles tangent to the cylinder wall, creating a vortex. The gas leaves the mill through a tube along the axis of the cylinder. Solid particles in the mill are subjected to two competing forces:

- 1. Centrifugal force**, created by the particles traveling in circles.
- 2. Centripetal force**, created by the drag from the gas as it flows from the nozzles along the wall to the outlet in the center of the mill. The drag on small particles is less than on large ones.

Particles leaving the mill will be separated from the gas stream by cyclonic separation.



# Fluidised Bed Opposed Jet Mills

## *Micronizing to Sharp Top Limits*



For particle size distributions with sharp upper limits, AFG fluidised bed opposed jet mills are available in two sizes: 100 AFG and 200 AFG. The latter is part of a multi-milling station that also features a classifier mill, 100 ZPS.

These mills are suited for micronizing powders with a narrow particle size distribution and sharp top size limitation in the range  $< 5 \mu\text{m}$  to  $200 \mu\text{m}$ .

- Grinding nozzles arranged around the periphery of the grinding chamber
- Classifying wheel(s) arranged horizontally in the classifier top section
- Easy cleaning with hinge-back and removable classifier top section and an inspection deck in the mill housing

### **Advantages of Jet Milling**

In jet milling, the comminution is exclusively the result of interparticle collision in the gas jets. And as there are no machine components in the milling zone, neither machine wear nor product contamination occur. Jet milling is also suitable for any material hardness: from Mohs hardness 1 (talc) to Mohs hardness 10 (diamonds).



# Small-Scale Milling Equipment

## *Picoline Milling Station*

The Picoline series features two individual jet mills, specifically designed for the micronisation of very small batches starting from 1 gram. It comprises process engineering with a spiral jet mill 33 AS and a fluidised bed opposed jet mill 40 AFG.

In development phase, this design specifically allows for feasibility trials, and deciding on a milling technique with at the same time reducing any loss to the smallest amount possible.

### **Spiral Jet Mill - AS33**



### **Fluidised Bed Opposed Jet Mill 40 AFG**





# Cryogenic Mill



The Cryogenic Mill 100 UPZ is a fine impact mill, operating with liquid nitrogen that cools down the process and product. The milling technique allows for products to be milled that are very elastic and therefore hard to break. It is also suitable for heat-sensitive product, such as waxes.

# Manufacturing



*We take quality personally.*

## ***Monitoring and Cleaning Controls***

We ensure long-term compliance with all relevant regulations along the entire production chain. This includes microbiological and cleaning controls like surface contact tests, measurements of airborne germs, controls of the process air, trend analyses, HPLC analysis, TOC and many more.

On request, our experienced staff can also conduct product-related cleaning validation procedures for you.

## ***Blending and Homogenization***

We can produce homogeneous blends according to your specifications both before and after the micronisation process. Modern container blenders and free tumble blenders are available for respective batch sizes and volumes.

## ***Fractionated Sieving***

We use specific sieving processes to fractionate your product into the grain sizes you specify. Modern technology allows sieving of even very fine material: Modern ultrasonic sieves can classify your product to very small particle sizes. In addition, we offer protective screening of your products before further processing in our plant.

## Particle Size Analysis

### Malvern Mastersizer 2000 and 3000

GfM conducts particle size distribution (PSD) measurements via laser diffraction on Malvern Mastersizer 2000 and 3000, both with dry dispersion and wet dispersion. For micronisation services as well as contract lab services, we perform PSD method transfer, development and validation in our in-house laboratory.

### Air Jet Sieving

Alternatively, we determine the particle size distribution of your products for all standard sieve sizes with our Hosokawa Alpine air jet sieve, with FDA-compliant software.

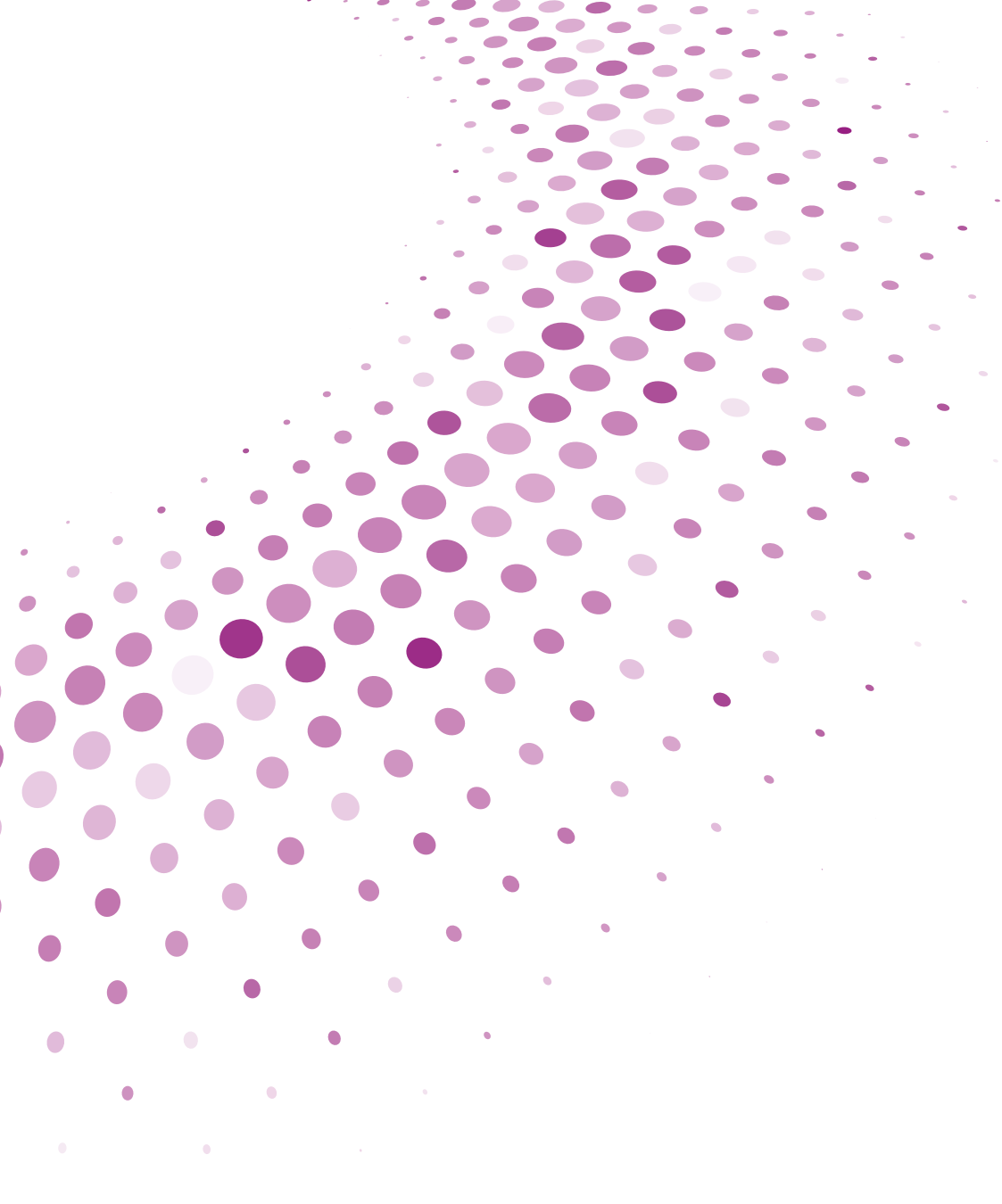
### Microscopic Analysis

For determining particle size distribution and characterization of crystals, we also offer the possibility of microscopic image analysis.

### Sieve Analysis

In addition to air jet sieving, we offer sieve analysis with vibrating sieves. With this method, we determine the particle size distribution of your product in one step with different mesh sizes.





**Get in touch with us – we look forward to hearing from you soon!**

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