

# NETZSCH

Proven Excellence.



## $\Psi$ -Mix<sup>®</sup> Inline-Disperser

A Revolutionary System for Mixing and Dispersing of Solids in Liquids

CHEMICAL INDUSTRY

| a Business Field of  
NETZSCH Grinding & Dispersing



## $\Psi$ -Mix<sup>®</sup> Inline-Disperser

With the NETZSCH  $\Psi$ -Mix<sup>®</sup> Inline-Disperser you achieve optimal wetting of dusty solids in liquid components. In emission-free inline operation this disperser is suitable for both low and high viscosity suspensions. Even temperature sensitive products or products with shear thickening properties can be processed without any problems.

The  $\Psi$ -Mix<sup>®</sup> shows its real strength for processing products

- with high solid content,
- with low solid portion in large liquid batches,
- with difficult wetting solids,
- with extremely fine solids.

The NETZSCH  $\Psi$ -Mix<sup>®</sup> Inline-Disperser – the solution for your specific application!

# *Innovative Dispersion Technology*



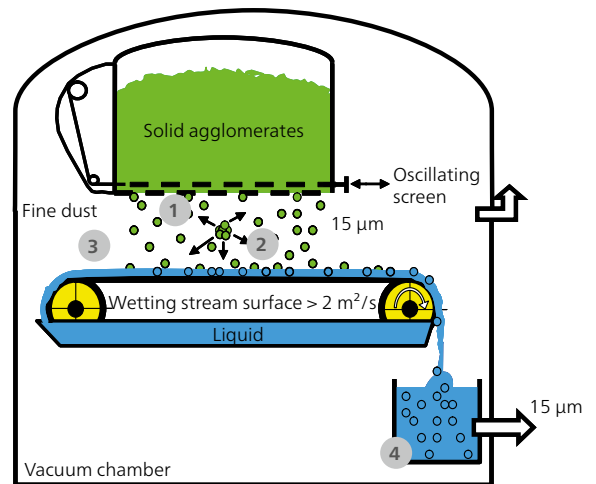
# $\Psi$ -MIX<sup>®</sup> Inline-Disperser

## The Idea

An ideal dispersion is achieved when finely dispersed powders come into contact with a large liquid surface and are wetted under vacuum and micro-cavitation.

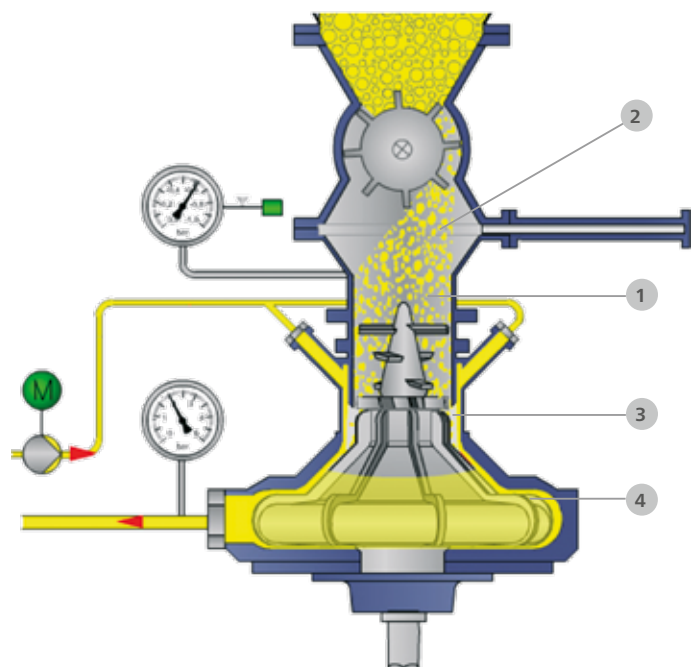
## Function Principle

Because of surface forces, dry solid particles with fineness < 10  $\mu\text{m}$  form extremely cohesive agglomerates. The interspaces are filled with air. In a dispersing process the linkage forces between the particles must be overcome and the contained air must be displaced by the binding agent solution. Ideally the primary particles are air-free coated by the binding agent and remain firmly separated from each other in suspension.



From abstract model to practical conversion - dry fine dust is diving into a fast flowing thin layer.

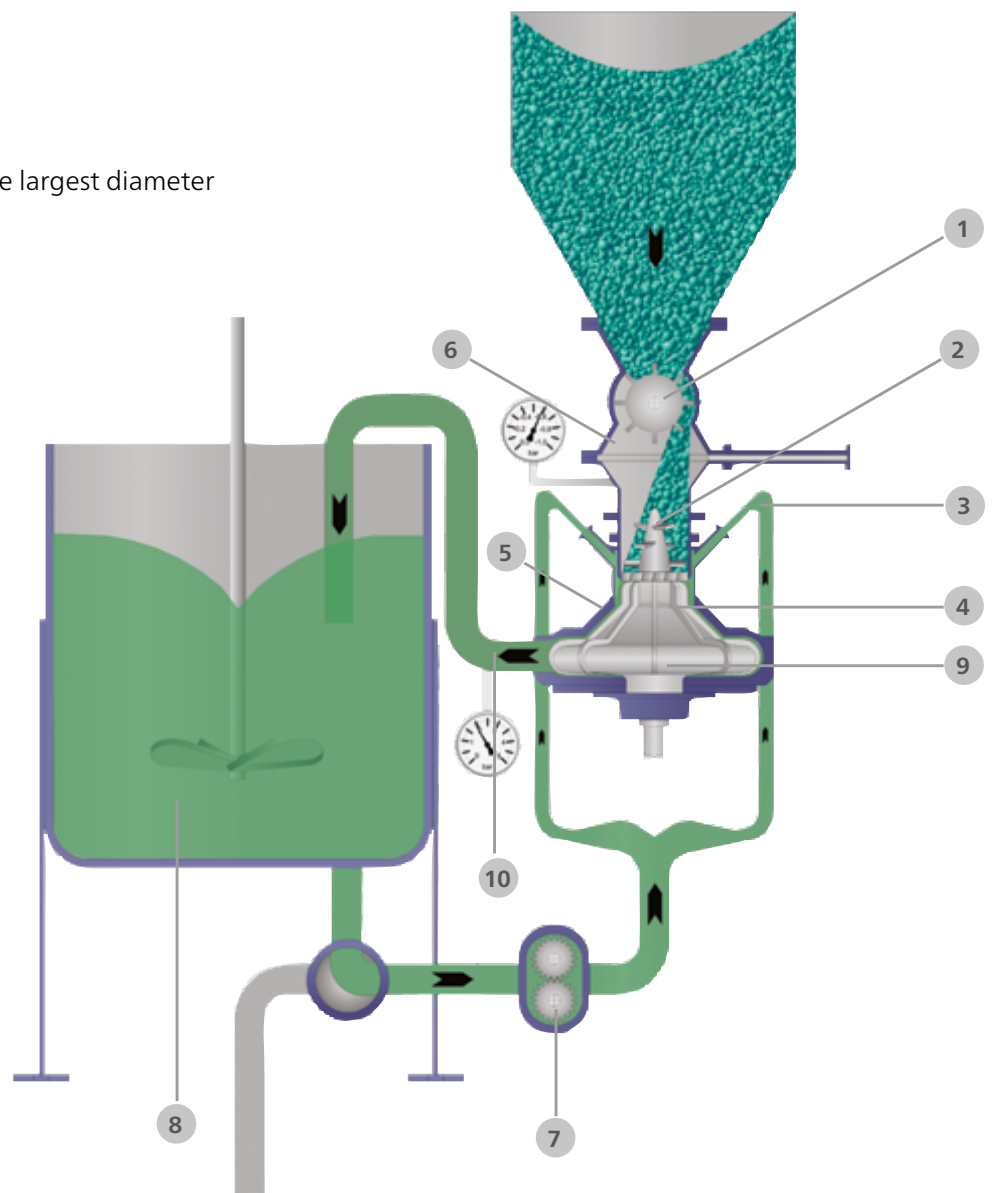
- 1 Dry agglomerates are atomized and released in vacuum
- 2 The capillary air is removed from the dry agglomerates by means of a vacuum
- 3 Dry dispersed particles are diving into a liquid layer to wet out and are micro-cavitated
- 4 The liquid is hydraulically pressed into the capillary paths (atmospheric and process pressure)





## The Machine Construction

- 1 Solid feeding via rotary valve
- 2 Solid disintegrator connected to the rotor
- 3 Tangential entry of the liquid into the acceleration chamber
- 4 Wetting of the solid in cyclone with laminar flow
- 5 Cone-shaped compression zone with cooled housing – the cavitation area
- 6 Solid feeding tunnel with safety slide valve
- 7 Wetting stream pump
- 8 Batch tank with agitator
- 9 Agitator as liquid ring pump
- 10 Outlet of the suspension at the largest diameter

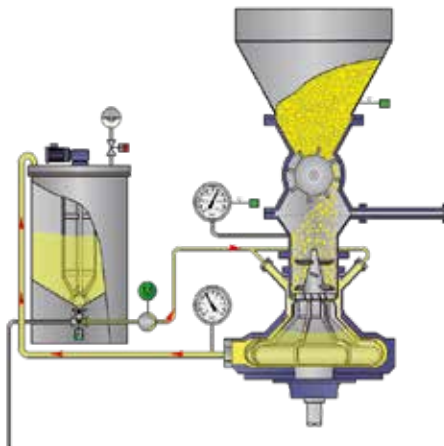
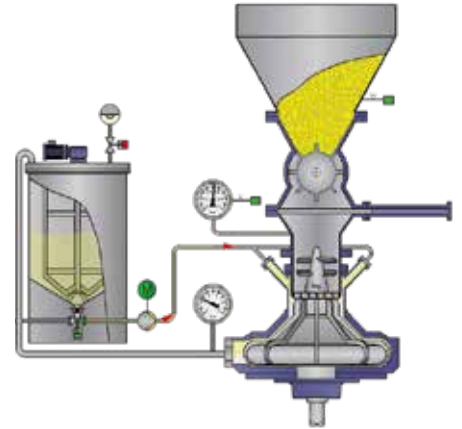


# Description of the $\Psi$ -Mix<sup>®</sup> Process

## Starting Sequence

The liquid is prepared in the batch tank. Solids are pre-weight and supplied in the feeding tank above the rotary valve. Alternatively, solids feeding can take place by supply from, for example, a silo or directly from Big-Bags, container or bags.

After starting the pump and rotor, the liquid is fed to the  $\Psi$ -Mix<sup>®</sup>. A suction vacuum is formed above the rotor while the liquid flows directly back to the batch tank. The liquid circulates between batch tank and machine.

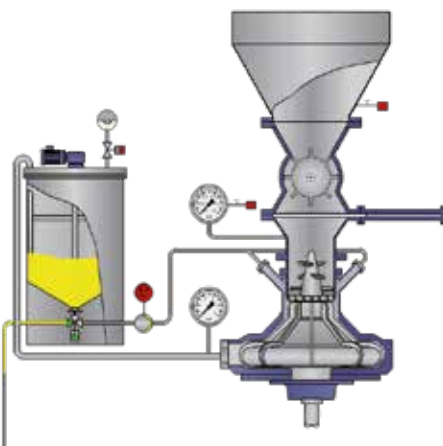
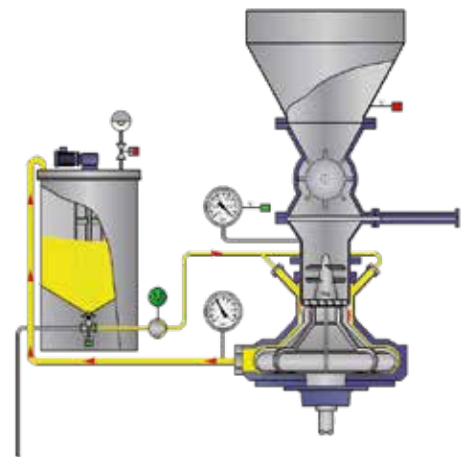


## Dosing Sequence

The solid feeding can be started after vacuum is established. The dosing rate is controlled by the viscosity rise. In case of overdosing the viscosity rises and the preset limit value of the main drive automatically controls the dosing rate. The pressure at the outlet is dependent on the pressure drop of the return line and can be in the range of 0.5 bar to 3 bar.

## Dispersing Sequence

When the solid feeding is completed the suspension can be reworked for a specifically determined period of time depending on the characteristics of the product. Under micro-cavitation and thanks to the deaeration function of the  $\Psi$ -Mix<sup>®</sup> the product suspension achieves the required quality parameters.



## Emptying Sequence

Subsequently the suspension can be pumped via the  $\Psi$ -Mix<sup>®</sup> into a storage tank or you can switch to another process tank to start a new formulation. Although less than 2 liters of suspension remain in the machine (depending on the length of the pipe) after the machine has been put into standstill it is possible to use the CIP cleaning before you change the product.

# Your Advantages

## Energy saving

Compared with conventional single or multi shaft mixers the energy demand of the  $\Psi$ -MIX® system for dispersing products is reduced up to 30%.

## Product quality

The effective wetting of the solids improves the product quality and can dramatically increase the productivity of a subsequent grinding process. The energy-saving and gentle processing of the products leads to better product qualities.

## Scale-up

The *MICRO*  $\Psi$ -MIX® is specially designed for product tests and for the production of small batches. The control system saves scale-up parameters for the production machine, guaranteeing a high degree of safety and flexibility.

## User-friendly

To make frequent product changes without great expenditure, special attention was applied to the human-engineered design of the swiveling construction.

### Facts

- Fast wetting of powder in liquids
- High quality homogeneous pre-dispersion
- Totally enclosed and emission free dispersion
- Dosing of the solids via rotary valve
- Feeding from Big-Bag, bags or container
- Suitable for explosion-proof areas
- Pressure shock resistant partition to atmosphere
- Optional quick cleaning unit
- Thin-film deaeration function
- Reworking by micro-cavitation

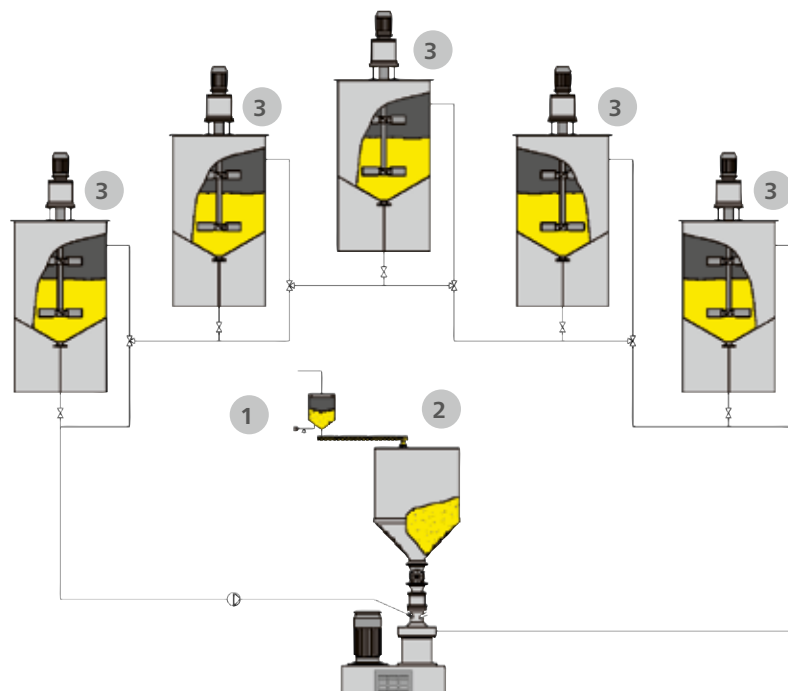


# Plant Engineering / Plant Concepts

Publication Gravure Ink Plant

## Star plant

The star plant design concept is the ideal solution for mixing processes of products that either require a re-reaction time such as a binding agent or require re-adjustment and quality control. The stationary solid dosing system (1) together with the  $\Psi\text{-Mix}^{\circ}$  (2) form the central dispersing unit. The  $\Psi\text{-Mix}^{\circ}$  is connected via a ring line with several, separately adjustable process tanks (3). During the mixing process, the completed batches can re-react or be reworked in the other agitating tanks. As soon as this process is completed the tanks are emptied, cleaned and filled with new liquid.





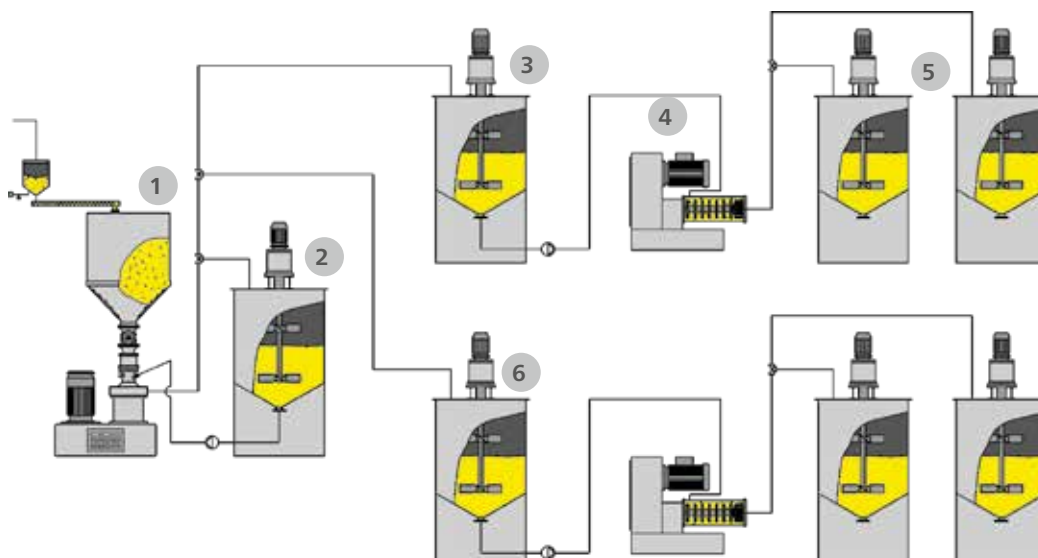


The  $\Psi$ -Mix® Inline-Disperser is the predestinated machine for the integration in automated plants and for processing large batches especially in emission-critical or explosion-proof fields.

Heatset/Coldset Plant

## Multiple Line

The „multiple line“ plant concept shown here with an enlarged double-line, describes the ideal solution for large product quantities such as newspaper printing inks. Here, the  $\Psi$ -Mix® (1) is used in connection with a batch tank (2) and a solid feeding system as dispersing unit. After finishing the dispersion processes which are operated in circulation, the product is alternately fed into one of two storage tanks (3) in the process line. This process line is switched alternatively. The product is then ground via two in-line arranged agitator bead mills, type *DISCUS* (4) and stored in a process tank (5). Meanwhile, another dispersing batch is processed. After completion, the product is fed to the storage tank (6) of the second production line. With this system, it is possible to run both lines continuously in three shifts.



# Applications

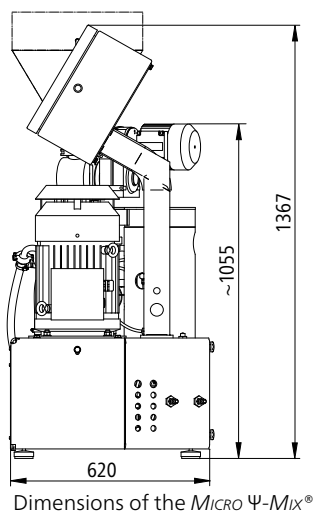
Both temperature sensitive products as well as low to high viscosity - barely pumpable - suspensions of the entire field of application for dispersing technology can be processed.

- Resin dispersions, architectural paints, industrial paints, filler pastes, pigment dispersions, automotive paints, UV paints, fire protection paints, marine coatings, gel coats
- Gravure printing inks, heat set inks, rotational printing inks, coldset inks, sheet fed offset, flexo printing inks, screen printing inks, inkjet inks, extender
- Food and beverages
- Pharmaceutical and cosmetically products
- Pastes of fumed silica, aluminum oxide pastes, plastisol based suspensions, foam-free water suspensions, cast resins, ...

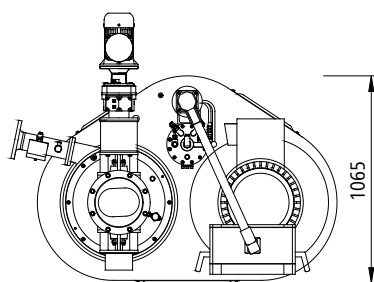
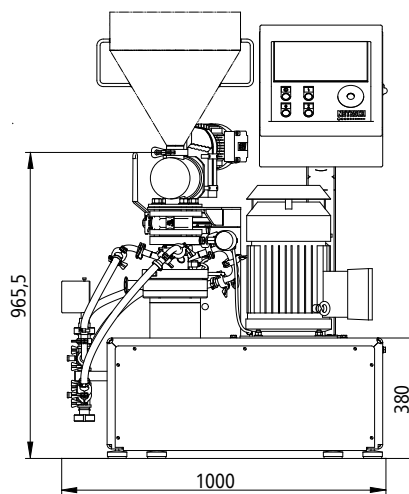


# Technical Data

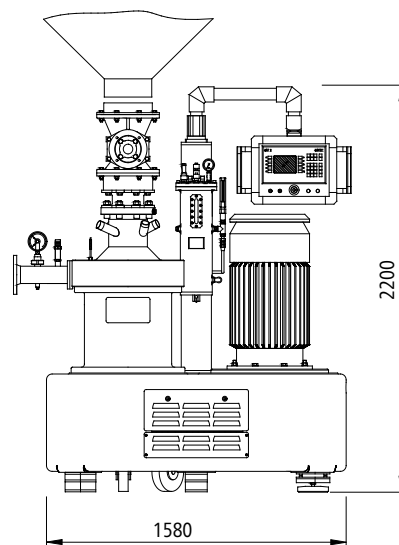
Technical data	<i>MICRO</i> $\Psi$ -Mix®	$\Psi$ -Mix®	<i>MEGA</i> $\Psi$ -Mix®
Solid throughput [m³/h]	0,3	up 5	35
Suspension flow [m³/h]	1 - 2	20 - 30	120 - 200
Drive power [kW]	5	45 - 75	110 - 200
Speed range [min⁻¹]	1,000 - 3,000	500 - 1,800	250 - 1,000
Feeding pressure [bar]	< 3,0	< 3,5	< 3,5
Batch quantity [l]	15 - 300	300 - 15,000	5,000 - 100,000




Dimensions of the *MICRO*  $\Psi$ -Mix®



Dimensions of the  $\Psi$ -Mix®





The NETZSCH Group is an owner-managed, international technology company with headquarters in Germany. The Business Units Analyzing & Testing, Grinding & Dispersing and Pumps & Systems represent customized solutions at the highest level. More than 3,800 employees in 36 countries and a worldwide sales and service network ensure customer proximity and competent service.

Our performance standards are high. We promise our customers Proven Excellence – exceptional performance in everything we do, proven time and again since 1873.

## Proven Excellence. ■

### Business Unit Grinding & Dispersing – The World's Leading Grinding Technology

NETZSCH-Feinmahltechnik | Germany  
NETZSCH Trockenmahltechnik | Germany  
NETZSCH Vakumix | Germany  
NETZSCH Lohnmahltechnik | Germany  
NETZSCH Mastermix | Great Britain  
NETZSCH FRÈRES | France  
NETZSCH España | Spain  
ECUTEC | Spain

NETZSCH Machinery and Instruments | China  
NETZSCH India Grinding & Dispersing | India  
NETZSCH Tula | Russia  
NETZSCH Makine Sanayi ve Ticaret | Turkey  
NETZSCH Korea | Korea  
NETZSCH Premier Technologies | USA  
NETZSCH Equipamentos de Moagem | Brazil

NETZSCH-Feinmahltechnik GmbH  
Sedanstraße 70  
95100 Selb  
Germany  
Phone: +49 9287 797 0  
Fax: +49 9287 797 149  
info.nft@netzsch.com

**NETZSCH®**

[www.netzsch.com](http://www.netzsch.com)