Agitator Bead Mill ALPHA®
The next Generation of Agitator Bead Mills
Agitator bead mills are grinding machines for ultra-fine processing of solids in liquids. Their area of application covers the particle size range from 200 µm (max. 500 µm) down to the submicron (nanometer) range. With a comminution factor down to 1 : 10 000 (200 µm — 20 nm), the application range is extensive and the variety of tasks extremely diverse. The wetting and homogenization of solids in liquids, deagglomeration and dispersion, all the way to true comminution of primary particles make the agitator bead mill a universal wet processing machine. Depending on the product properties, various types of agitator bead mills with different grinding systems are employed.

The new NETZSCH ALPHA® modular machine platform is designed such that three different grinding systems can be mounted on the same platform according to a defined drive capacity: the advanced disk grinding system, Discus, the Zeta® system with optimized grinding media separation and the new peg system, MACRO.

**At a Glance**

- NETZSCH ALPHA® 2
- NETZSCH ALPHA® Discus System 6
- NETZSCH ALPHA® Zeta® System 10
- NETZSCH ALPHA® MACRO System 14
- NETZSCH ALPHA® 16
- NETZSCH CONNECT 18
- Control Systems 19
- Application Lab 20
- Plant Engineering 21
- NETZSCH BEADS® 22
- Service 23
Fresh creative standards were also set for the new Alpha® from the very beginning and a new expression of form was used that distinctly communicates the innovative strength of NETZSCH in the design as well. In place of the cast housing, external instruments and pipework there is a clear, dynamically-curved welded construction of heavy plating which also fulfills a load-bearing function.

The ergonomic design of the machine stand was a primary consideration during the development phase. The Alpha® has a self-supporting grinding chamber, which ensures good accessibility to the grinding area during operation and maintenance. Thanks to the ergonomic mounting of the grinding chamber, changing products is quite easy, especially on the smaller models.
The new Alpha® sets the standard when it comes to flexibility and handling and, thanks to its modularity, allows customer-specific solutions: different grinding systems can be mounted on one base stand – customized for the requirements of the product you need to process.

The advantage this modular system brings you is cross-system standardization and thus the option to economically convert a machine to a new grinding system. In addition, the Alpha® is also the platform for future NETZSCH technologies, which guarantees you long-term investment security.

**Zeta® System**  
with optimized grinding media separation, mainly used for operation in the circulation or multi-pass mode

**Macro Peg System**  
facilitates the highest power input in single and multi-pass operations

**Discus Disk Grinding System**  
primarily for dispersion applications in single and multi-pass operation
Focus on Your Benefits

- Common platform for three grinding systems allows easy conversion to the respective optimal process conditions
- Long-term investment security, since the Alpha® is also the platform for future NETZSCH technologies
- Self-supporting grinding chamber for optimum accessibility to the grinding area during maintenance
- All supply lines feed into the machine from the top, which prevents obstructions at ground level
- Optimal accessibility to the parts in the machine stand that must be maintained
- Spatial separation of rotating machinery and media-carrying fittings ensures a high level of operational safety and allows safe access, even during operation
- Alpha® Cart service cart for removal of the grinding tank and addition of grinding media
- Cross-system standardization with the benefit of increased availability of spare parts and therefore faster service

The product-wetted inner tubes of the NETZSCH Alpha® grinding tank are quick and easy to replace on site. You will experience maximum flexibility when adapting to new product groups and you’ll be able to react to new product requirements by changing the grinding chamber material. In addition, the inner grinding tanks can be swiveled and turned, which maximizes their service life and reduces your spare parts costs.

Product Inlet
The tangential intake of product in the direction of rotation at the highest point reduces recirculation of the grinding media, leads to a reduction in pressure and prevents backup. It also makes it easier to empty the grinding beads for service or maintenance.

Cooling Water Supply
The optimal cooling water supply for optimal cooling of the grinding chamber and agitator shaft (depending on the type of system) make it possible to operate at the lowest processing temperatures. This means that even temperature-sensitive products can be safely processed.

Supply Connections
For optimum connection of the Alpha® to existing pipe systems, all supply lines feed into the machine from the top. This also avoids hoses and pipes, and thus obstructions, on the floor and the mill is easily accessible with industrial trucks from all sides.
The NETZSCH Alpha® Discus system is the quantum leap in disk grinding technology. The further optimized Discus disk agitator combined with the NETZSCH DCC® separation system guarantees you extremely high throughput rates with significantly narrower dwell time distributions and therefore more intensive grinding with uniform impact intensity. The power input of the mill increases considerably, with a simultaneous increase in energy efficiency. The Discus grinding system activates and optimizes the movement of the grinding beads between the disks, which leads to a higher power input and a grinding efficiency with low specific energy consumption. Thus, you profit from a significant reduction in production costs, since the specific energy consumption decreases with increasing productivity.

NETZSCH Alpha® Discus System Brings you:

- Extremely high throughput rates
- Significantly narrower dwell time distribution
- More intensive grinding with uniform impact intensity
- The highest power input
- Low specific energy consumption

Complete Series

<table>
<thead>
<tr>
<th>Alpha® Discus System Models</th>
<th>Grinding chamber volume [l]</th>
<th>Batch size [l]</th>
<th>Drive [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LabStar</td>
<td>0.75</td>
<td>1.5 - 5</td>
<td>2.2 - 3</td>
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<tr>
<td>4</td>
<td>3.6</td>
<td>10 - 100</td>
<td>5.5 - 7.5</td>
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<td>20/30</td>
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<td>200</td>
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<td>560</td>
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<tr>
<td>1000</td>
<td>1000</td>
<td>-</td>
<td>315 - 355</td>
</tr>
</tbody>
</table>
Design and Principle

- Continuous agitator bead mills with horizontal disk agitator
- With the Discus grinding system, the movement of the grinding media between the disks is activated and optimized. This leads to a high power input and a grinding efficiency with low specific energy consumption
- The product flows axially from the inlet through the grinding chamber and is stressed by the shearing, pressure and impact action of the grinding beads and thus ground or finely dispersed
- A highly effective centrifugal separation system allows the product to flow out, while the grinding beads are retained in the mill

Optimal Cooling

Because temperature limits often restrict an elevated power input during processing, NETZSCH has improved the cooling capacity of the agitator bead mill. The grinding tank with an inner tube made of NETZSCH CErAM C, combined with an optimized cooling water supply line facilitates maximum heat transfer between the product and the cooling water. This means increased production performance with optimal cooling and guarantees greater production reliability with respect to quality and adherence to the permissible temperature limits.

Cool Plus Package

- Optimized cooling water supply for maximum heat transfer
- Grinding chamber with inner tube of NETZSCH CErAM C
- Greater thermal conductivity compared to steel
- High degree of hardness and wear resistance
The Further Optimized Model DCC® Pre-Classifying Separation System

The highly-efficient, dynamic centrifugal separation system makes it possible to use grinding media of various densities, matched to the task at hand. In addition, grinding beads as small as 0.2 mm in diameter can be used with this system. The separation system ensures that even with high viscosities the mill can be operated far below the critical point of grinding media compression. This means you maintain extremely stable operational performance, shutdowns due to overpressure and excessive temperature are prevented and grinding media wear is minimized. The classifying rotor considerably increases the service life of the separator screens and reduces maintenance and downtime.

Function of the DCC® pre-classifying separation system in a horizontal disk mill with 0.2 mm glass grinding beads with a water flow rate of 600 l/h

Focus on Your Benefits

- Use of extremely small grinding media even with high-viscosity products and high throughput rates
- Reduced screen wear due to the positioning of a pre-classifying disk
Material Options for any Product

In order to meet the requirements of the widest range of products and to guarantee product compatibility, we offer a variety of grinding chamber materials.

Matching the grinding chamber material to the product properties facilitates low-wear operation of the mill.

The use of a low-contamination grinding chamber design leads to an enormous expansion of the possible product applications for the machine.

Selection of Grinding Chamber Materials
- Highly wear-resistant special steel
- Stainless steel
- NETZSCH-CerAM Z
- NETZSCH-CerAM N
- NETZSCH-CerAM C
- NElast
- Special materials upon request

Focus on Your Benefits
- A suitable grinding chamber material or material combination is available to you for any product requirement
- Conversion of the machine to a different material is possible
- Minimum wear costs

Application Possibilities Abound
- Printing ink
- Coatings
- Pigment
- Textile dyes
- Magnetic coatings
- Paper coatings
- Fillers
- Pesticides
- Ores
- Minerals
- Technical and consumer ceramics
- Ceramic masses and glazes
- Cosmetics
- Foods
- Biotechnology: cell disruption
Suitable for every viscosity and almost any product, with this technology you will achieve the highest product qualities and fine-nesses into the nanometer range using a wide variety of grinding media from 0.1 mm to 3 mm in diameter. The closed horizontal agitator bead mill is designed for the highest product throughput rates and has a peg grinding system with extremely high grinding intensity.

<table>
<thead>
<tr>
<th>System Models</th>
<th>Grinding chamber volume [l]</th>
<th>Batch size [l]</th>
<th>Drive [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINI/MICRO SERIE</td>
<td>0.08 - 0.16</td>
<td>0.15 - 0.5</td>
<td>0.94</td>
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<tr>
<td>LabStar</td>
<td>0.6</td>
<td>1 - 5</td>
<td>3</td>
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<tr>
<td>2</td>
<td>1.6</td>
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<td>150</td>
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<td>&gt; 4000</td>
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<tr>
<td>400</td>
<td>400</td>
<td>&gt; 8000</td>
<td>315 - 500</td>
</tr>
</tbody>
</table>
Easy and Reliable Operation

The Zeta® grinding system is, in every respect, a user friendly, low-maintenance and very reliable grinding system. Starting with the structural design of the agitator mill, there is already a number of advantages: the horizontal orientation guarantees a homogeneous fill of the grinding media in the grinding tank. The start-up performance of the mill with product is therefore unproblematic and very high flow rates can be set without pressure build-up. The product outlet is located directly on the bottom of the grinding tank and is therefore easily accessible.

During operation, the product flows horizontally through the agitator mill from the inlet on the bearing side and exits via the slotted pipe at the bottom of the tank. The forced conveyance of the product through the grind-intensive grinding media fill guarantees a uniform load inside the mill, while the dynamic separation system reliably retains the grinding media in the grinding zone. This enables extremely high throughput rates without pressure build-up in the grinding chamber and creates ideal conditions for circulation or multi-pass operation. For precise temperature control, the agitator mill is equipped with an optimized cooling system. A coolable agitator shaft is also available as an option.

Focus on Your Benefits

- Peg grinding system with the highest grinding intensity
- Finenesses into the nanometer range
- Narrowest particle size distribution
- Greatest cost efficiency
- Exact reproducibility
- Effective centrifugal separation system
- Use of extremely small grinding beads from 0.1 mm diameter
- Logical design for the highest throughput rates
- Ideal for circulation/multi-pass operation
- Optimal energy input with effective cooling
- Ideal temperature control
The NETZSCH Zeta® grinding system has a wide range of applications and is equally suited both for processing very low-viscosity products and grinding products with a high solids concentration and correspondingly high viscosity, and everything in between. The product-wetted components are available in various materials. Depending on the application, materials such as NELast, ceramic, abrasion-resistant special steels and stainless steel are available.

Steel Version
Optionally available in highly wear-resistant special steel or in stainless steel.

Ceramic Version
For iron-free grinding of abrasive, contamination-sensitive, solvent-based products. Material options for the product-wetted grinding chamber components are NETZSCH-CerAM Z, NETZSCH-CerAM N or NETZSCH-CerAM C.

NELast Version
All product-wetted components are NELast-coated for iron-free processing of contamination-sensitive, predominantly water-based products.

Focus on Your Benefits
- Universally applicable for every product
- Scale-up possible from laboratory to production machine
- Reliable use of a wide variety of grinding media from 0.1 mm to 3 mm
- You achieve the best product qualities with maximum output and optimal energy efficiency
- Additional product-optimized grinding chamber configurations available upon request
From the Laboratory to Production

The Zeta® grinding system is available to you for the Labstar laboratory mill with a grinding chamber volume of 0.6 l all the way up to a production machine with a grinding chamber volume of 400 l.

Full scale-up of results achieved at laboratory scale is possible.

Extensive Range of Applications

- Printing inks: e.g. flexo, gravure (chip grade)
- Inkjet ink
- Ceramic inkjet
- Coatings
- Dyes, color pastes (textiles, plastics)
- Pigment preparations, pigment manufacturing
- Phthalo-blue conversion
- Fillers
- Pesticides
- High-tech products: e.g. color filters, polishing agents for electronic components
- Cosmetics
- Thermal paper coatings
- Magnetic coatings
  ... and many more
The MACRO grinding system represents the logical advancement of the John System annular chamber mill with the centrifugal force separation device. The new peg system is designed for high power input in single and multi-pass operation. The grinding system has an intensive cooling system for the grinding chamber and agitator shaft, making the ALPHA® MACRO System the ideal machine for moderate to high viscosity products, such as UV systems, at low processing temperatures.
Wide Range of Models

<table>
<thead>
<tr>
<th><strong>ALPHA® MACRO System Models</strong></th>
<th><strong>Grinding chamber volume [l]</strong></th>
<th><strong>Batch size [l]</strong></th>
<th><strong>Drive [kW]</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3</td>
<td>10 - 100</td>
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</tr>
<tr>
<td>400</td>
<td>375</td>
<td>355 - 400</td>
<td></td>
</tr>
</tbody>
</table>

Applications

- UV systems
- Offset
- Screen printing inks
- High-viscosity additives for printing inks
- Pigment
- Magnetic coatings
Accessibility

The clear, straightforward design with integrated hoses and pipes results in simplified operation, prevents contamination and, at the same time, means considerably less effort is required for cleaning. The spatial separation of rotating machinery and media-conveying fittings for cooling water, compressed air or mechanical seal buffer fluid ensures a high level of operational safety and allows safe access, even during operation.

Operational Safety

For increased operational safety, the mechanical seal operating fluid is monitored continuously. These data can be documented and used for predictive maintenance to ensure high availability of the machine.
**ALPHA® Cart** Service Cart

For maintenance and service as well as changing the grinding media, grinding beads must be collected and moved. It is also sometimes necessary for different grinding systems to be moved from or to the machine. With the flexible, multifunctional **ALPHA® Cart** you have a tool that can be used for all of the different grinding systems to greatly simplify these tasks.

The integrated service tray holds the entire bead charge and prevents loss of grinding media during maintenance. The grinding tank and tank bottom can be removed without additional lifting equipment. Another advantage is that one service cart can be used for multiple machines.

**Handling & Operation**
- Additional information available under www.netzsch.com/alpha
Linking the NETZSCH ALPHA® to NETZSCH-COnnect enables the acquisition and storage of various process data from your machine. With the data-bank-based, web-browser-controllable tool, process data are continuously recorded, pre-processed and encrypted in XML files on a central server via a VPN network. With the appropriate access authorization, you and your product specialists can view, analyze and export the data from any network-capable PC. This provides you with indications of relevant changes in your production process, allowing you to draw conclusions about effects on the production quality. Through the evaluation of process data over an extended period of time, you can better plan the optimization of your production processes, maintenance and service work and get details on production and shutdowns as well as their possible causes.
The Choice is Yours

Whether the basic version, integration into higher-level process control systems or data acquisition hardware and software: a wide range of control options are available for the \textit{Alpha}® agitator bead mill – talk with our experts.

\textbf{NETZSCH BASE}

With the capability for efficient process control through recording of the energy input, the basic version, NETZSCH BASE, offers more than just the necessary safety functions. The automatic screen cleaning sequence facilitates trouble-free processing of the most difficult products.

- Power measurement and display for the agitator motor
- Fault light set indicates values exceeding or falling short of limits
- kWh meter to record energy input (kWh), preset value for process shutdown and display toggling to current power input (kW)
- Infinitely adjustable agitator and pump speed via frequency converter
- Automatic screen cleaning sequence

\textbf{NETZSCH GRAPH}

Automatic operation is made possible with the NETZSCH GRAPH control system. Operation, input and calculation parameters are shown on the display. Automatic start allows reliable run-up of the machine to the preset operating parameters.

- Display of operation, input and calculation parameters (mill rotational and peripheral speed; gross and net mill output; pump speed; product pressure; product throughput – with optional flow meter, otherwise calculated from pump speed; product temperature and more …)
- Presetting of nominal and limiting values for automatic operation

\textbf{NETZSCH GRAPH Plus}

With NETZSCH GRAPH \textit{Plus}, various control strategies are available. The measured values are graphically assigned to the measurement points on the display. In automatic mode, process parameters can be acquired from the process databank with formulation management for a maximum of 98 product data sets. This allows you to process any formulation automatically according to individual parameters.

- Display of trend graphs for the most important process data
- Automatic operation with acquisition of nominal values from a formulation (max. 98)
- Preset values for all operational modes for a batch
- Control strategies such as power, temperature, pressure or throughput control – flow meter required
- Shutdown functions can be selected and combined:
  - Timer
  - Energy input and/or number of cycles
- For passage mode, shutdown is pressure-dependent
NETZSCH Application Lab & Excellent System Integration

Application Lab

NETZSCH applications laboratories are equipped with state-of-the-art technology and are part of our comprehensive service program.

These laboratories allow us to accurately test customer products in order to obtain the maximum grinding efficiency according to customer specifications. After testing is complete, a comprehensive test report, including a sample of the final product, is prepared and sent to the customer.

Customers are welcome to take part in the testing of their product, guaranteeing that all tests are run exactly according to their requirements. During the trials, customers will also learn more about our company, its manufacturing abilities and staffs.
From Greenfield Site to Complete Turnkey Plant – Solutions from a Single Source

The experience NETZSCH has with different applications combined with the available expertise in machine technology and plant engineering provides you with complete turnkey solutions – from the NETZSCH laboratory direct to your production facility.

NETZSCH Offers You

- Expert advice
- A vast body of experience and technical expertise, particularly in mixing, pre-dispersing, wet grinding and de-aeration for a wide range of applications in many different industries
- Utilization of the best commercially-available technology for the entire process
- A laboratory to assess the designed solution prior to implementation and to provide an appropriate performance guarantee
- Capacities that guarantee you short delivery times
- Entire production plants – we’re with you from conception to completion and production

Further Information

Additional information available under www.netzsch.com/anlagen
NETZSCH-BEADS® & Service

NETZSCH-BEADS® – Always the Right Choice!

The selection of suitable grinding media represents an excellent optimization feature in dispersing and wet-grinding processes with agitator mills. With the use of NETZSCH-BEADS® you will achieve optimal results.

- Ideally matched grinding media for NETZSCH agitator bead mills
- All of the important qualities available in the desired sizes
- Optimal combination of machine, grinding tool and application
- Process optimization and performance enhancement
- Improved energy efficiency
- Worldwide NETZSCH service from a single source

Ceramic Grinding Beads

**ZetaBeads®**  Yttrium stabilized zirconium oxide grinding beads
Applications: printing inks, dyestuffs, paints, pigment production

**ZetaBeads® Plus**  Yttrium stabilized zirconium oxide grinding beads
Applications: abrasive products, inkjet, nano products, abrasives / CMP, battery masses, ceramic products

**ZetaBeads® Nano**  Yttrium stabilized zirconium oxide grinding beads
Applications: inkjet, nano products, Abrasives / CMP

**CeraBeads**  Cerium stabilized zirconium oxide grinding beads
Applications: minerals / fillers, agricultural chemistry, paints, ceramic masses and glazes

**ZsBeads**  Zirconium silicate grinding beads
Applications: minerals / fillers

Steel Grinding Beads

**SteelBeads Q**  Chromium steel grinding beads
Applications: printing inks, soot preparations, hard ferrites

**SteelBeads Micro**  Cast steel grinding beads of tempered carbon steel
Applications: ferrites, pigment production

Glass Grinding Beads

**GlassBeads**  Glass grinding beads
Applications: agricultural chemistry, dyes, minerals / fillers
Our Global Service Expertise Gives You Peace of Mind for Your Production

Technical assistance must arrive quickly and work perfectly. That’s why we offer an extraordinary range of services, with the assurance that highly-qualified NETZSCH personnel perform these services all over the world. Our specialists provide quick and reliable assistance. We advise you in your own language, wherever you are.

The NETZSCH service network extends to all corners of the globe. As a result, we strengthen the competitive capacity of our customers, facilitate trouble-free, efficient processes and ensure maximum machine availability.

Our Range of Services Includes

- Procedural commissioning
- Inspection
- Maintenance
- Modifications
- Overhauls
- Process optimization
- Spare parts
The NETZSCH Group is a mid-sized, family-owned German company engaging in the manufacture of machinery and instrumentation with worldwide production, sales, and service branches. The three Business Units – Analyzing & Testing, Grinding & Dispersing and Pumps & Systems – provide tailored solutions for highest-level needs. Over 3,500 employees at 210 sales and production centers in 35 countries across the globe guarantee that expert service is never far from our customers.