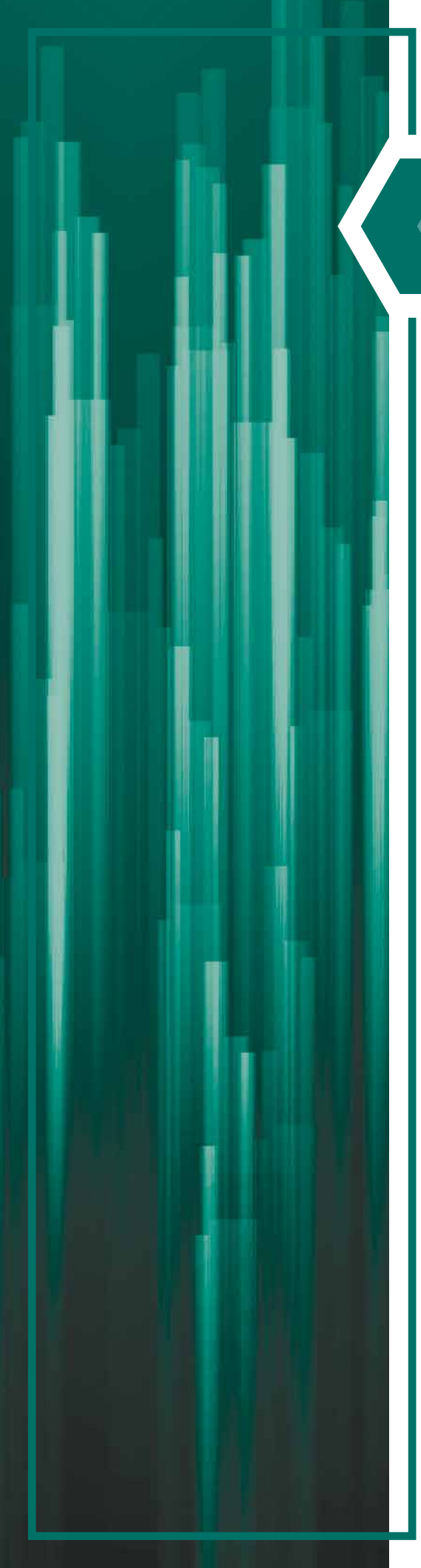
NETZSCH

Proven Excellence.

NETZSCH *PROPHI* Pre-grinding Unit

Pre-dispersion like a Pro

Business Unit
GRINDING & DISPERSING



Pre-dispersion like a Pro

Increase product capacity, save energy, shorten production time and ensure reproducibility - all this is possible with the new *ProPhi* pre-grinding unit from NETZSCH.

This new technology improves your dispersion process so that all subsequent production steps benefit. With the ProPhi you will reduce your premixing process time by up to 50% and your cleaning effort for large batches. In addition, you can process sedimentation-prone materials and fluctuating raw material qualities without jeopardizing your process reliability.

Your Benefit

- High product quality: for stable rheological product properties (no sedimentation after pre-dispersion)
- High process reliability, even with fluctuating raw material qualities
- Sustainable production
  - Reduction in energy consumption by up to 30%
  - Minimal cleaning effort for large batches
  - Reduction in investment costs and spare parts through the use of highly resistant materials
  - Smaller grinding beads can be used for fine grinding – conditional energy savings
- High productivity: reduction of the premixing process time by up to 50%

What challenges do you master with the NETZSCH ProPhi?

The NETZSCH *ProPhi* crushes difficult-to-handle coarse material with the most effective physical operating principles. Pre-dispersion of agglomerates, which is usually carried out discontinuously or continuously in intensive mixing units, can also be carried out without any problems. This re-quires prior introduction of the solids into the liquid phase. A major challenge in the continuous preparation of coarse suspensions is their tendency to sedimentation, which can be solved by a correspondingly high flow rate and a high product throughput.

When do you use the NETZSCH ProPhi in your production process?

- For formulations with crystalline active materials
- For formulations that are often pre-ground with so-called colloid mills and must achieve a fineness of <100 µm
- For abrasive and sedimentary products, that lead to clogging of agitator bead mills during the subsequent fine-grinding process
- For batch sizes up to 10 m^3

Machine Sizes

	***ProPhi* 4**	***ProPhi* 20**	***ProPhi* 60**
Power [kW]	7.5	30	55
Flow Rate [l/h]*	300 - 3 500	2 000 - 20 000	3 000 - 30 000
Bead Size [mm]	1,2 - 4	1,2 - 4	1,2 - 4
Bead Volume [l]*	4	20	60
Batch Size [l]*	up to 100	up to 6 000	up to 12 000

*Reference value

SELECT ACCORDING TO YOUR NEEDS

Convenient Operation

NETZSCH PLAIN - *Proven Control with Pushbuttons and digital Display*

The mill can be operated very safely using robust pushbuttons, rotary switches and selector switches. A frequency inverter allows stepless control of the agitator shaft speed.

The essential operating parameters, such as the agitator shaft speed and current power consumption of the machine, are shown on a digital switchable display.

Both the pressure at the product inlet of the mill and the product temperature are monitored and displayed by means of a contact manometer and contact thermometer.

NETZSCH BASE - *Functional Monitoring & Control*

The mill can be operated very intuitively using robust pushbuttons, rotary switches and selector switches. A frequency inverter facilitates infinitely variable control of the agitator shaft speed.

The essential operating parameters, such as the agitator shaft speed, current power consumption of the machine or the energy input are shown on a digital switchable display. In addition, the control system is equipped with a set of fault lights to clearly indicate possible critical operating conditions.

The pressure at the product inlet of the mill, as well as the product temperature, are monitored and displayed via a contact manometer and contact thermometer.

NETZSCH *Iris* - *The professional Concept for Monitoring & Control*

Based on a 12" color graphic display with multi-touch function, NETZSCH Iris facilitates monitoring and control of the process flow.

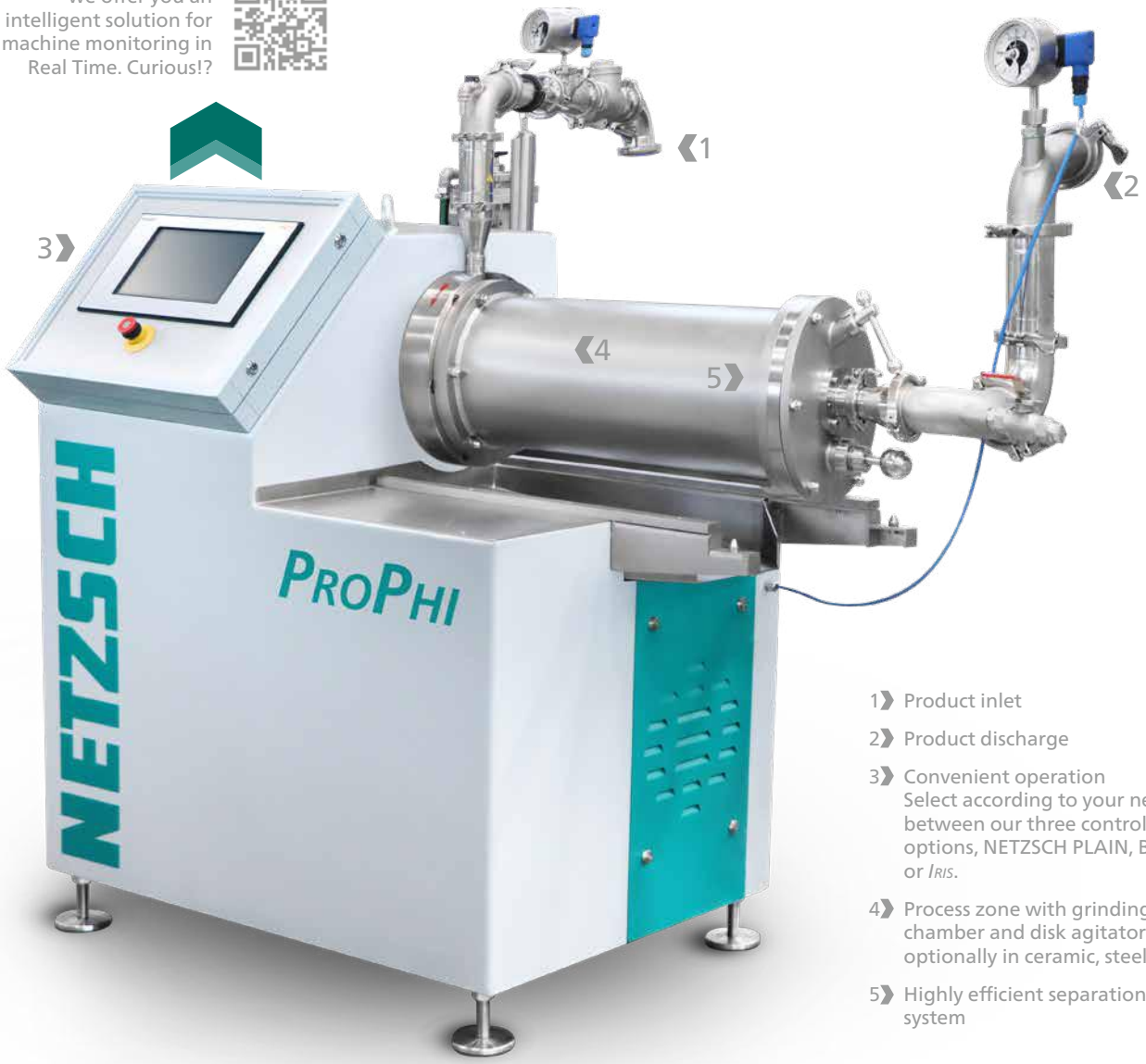
In addition to intuitive adjustment of the machine's operating parameters, other functions are available, such as batch logging and formulation management, energy consumption estimation, machine availability display, preventive and operational maintenance control, as well as historical data, combined with real production time and trend graphs.

An integrated error management system provides guidance and assistance for problem solving.

CUSTOMIZED TO YOUR NEEDS

Individual Configuration

With NETZSCH *Notify*, we offer you an intelligent solution for machine monitoring in Real Time. Curious!?



1 Product inlet

2 Product discharge

3 Convenient operation
Select according to your needs between our three control options, NETZSCH PLAIN, BASE or *Iris*.

4 Process zone with grinding chamber and disk agitator optionally in ceramic, steel or PU

5 Highly efficient separation system

EXAMPLES OF DIFFERENT APPLICATIONS

Industrial use of the ProPhi

Agrochemicals

GRINDING OF GRANULATED SULFUR

Sulfur is used in agricultural chemistry, among other things as a fungicide against fungal decay in viticulture and tomato cultivation. As a component in fertilizers, it helps in the formation of amino acids and enzymes and thus accelerates plant growth. Particle size plays a decisive role in the absorption of sulfur via the leaf structure.

Initial Situation:

- Crystalline sulfur particles 5 mm - 10 mm
- Coarse suspension tends toward sedimentation
- Clogging of agitator bead mills

Improved production process with the *ProPhi*:

- Three-stage production process with *MaxShear*, *ProPhi* 20 and *Alpha® Discus* 4
- End fineness achieved after pre-dispersion d_{95} = 55.5 µm with 4.0 mm grinding beads
- Fine dispersion with *Alpha® Discus* 4 and 1.0 mm grinding beads; end fineness d_{95} = 14.4 µm
- Reduction of the total energy consumption by up to 30%
- Reduction of the premix time by 50%

Flexo Printing Inks

EFFICIENT PRODUCTION WITH LOW

One of the most important process parame
is the grinding bead size. The smaller the be
such as color intensity, transparency and gl
grinding beads increase the production cap

Initial Situation:

- Particle size after pre-dispers
- Fine grinding with a pin mill
  beads
- Production capacity of 75 kg
- Specific energy requirement

Improved production process with

- Two-stage pre-dispersion pro
  ProPhi pre-grinding unit
- Use of 2.5 mm - 2.8 mm Ø gr
- Flow rate of 7.5 m^3/h - 10.0
- Ultra-fine grinding with *Alpha*
  bead size 0.3 mm Ø
- Increase in the capacity facto
- Reduction in the total energy

VER ENERGY REQUIREMENTS

ters in the fine grinding of printing inks
eads, the better the coloristic properties
loss. In addition, in most cases, smaller
pacity or save pigments.

ion with a dissolver is d_{95} > 100 µm
using 1.2 mm - 1.4 mm Ø grinding

ink/h
for the production line 165 kWh/t

the *ProPhi*:
ocess with *Epsilon* inline disperser and

rinding beads for pre-dispersion
m^3/h
A® *Neos* agitator bead mill; grinding

or by 3.2
y consumption of more than 50%

Minerals / Ceramic Applications

GRINDING OF ALUMINA

Both natural minerals and the products created through calcination processes usually have very coarse particles. For further processing in aqueous slurries, these must first be pre-ground in a laborious process. Due to their high density, the pre-ground materials settle very easily in pipelines. The suspension only becomes stable below a certain particle size.

Initial Situation:

- Pre-grinding in very large drum mills
- High energy requirement
- Strong sedimentation formation and rigid / slow production flow
- Tendency to clog

Improved production process with the *ProPhi*:

- Two-stage dispersion process with *Epsilon* / Ψ-*Mix*® inline disperser and *ProPhi* pre-grinding unit
- High flow rate of 15 m^3/h, solids content at 65%
- High addition rate of solids
- Easy embedding in automated production line
- Iron-free grinding due to ceramic and PU coating of the process zone
- Stable production process with end fineness d_{50} = 3.5 µm
- Specific energy 0.05 kWh/kg
- Production capacity 200 kg/h

Features of the NETZSCH PROPHI

Cooling

- NETZSCH *CERAM* grinding chamber and NETZSCH-*COOL*+ design for maximum cooling efficiency

Separation System

- Highly efficient ICC separation system:
  - For a high flow rate
  - For dynamic separation of grinding beads

Material of Construction (MOC)

- Adapted to the product requirements

High Flow Rate

- Circulation grinding with highest flow at lowest pressure (process ~ 1.2 bar - 1.5 bar)
  - Prevents sedimentation in the pipelines
  - Provides for the necessary batch turnover with low specific energy input to the product

Independent Pump

- The right choice of pumps for every product
- Pump power adjustment independent of rotor speed

Best Process Design

- Highly efficient *NEXWING* disk grinding system
- High energy density

Grinding Beads

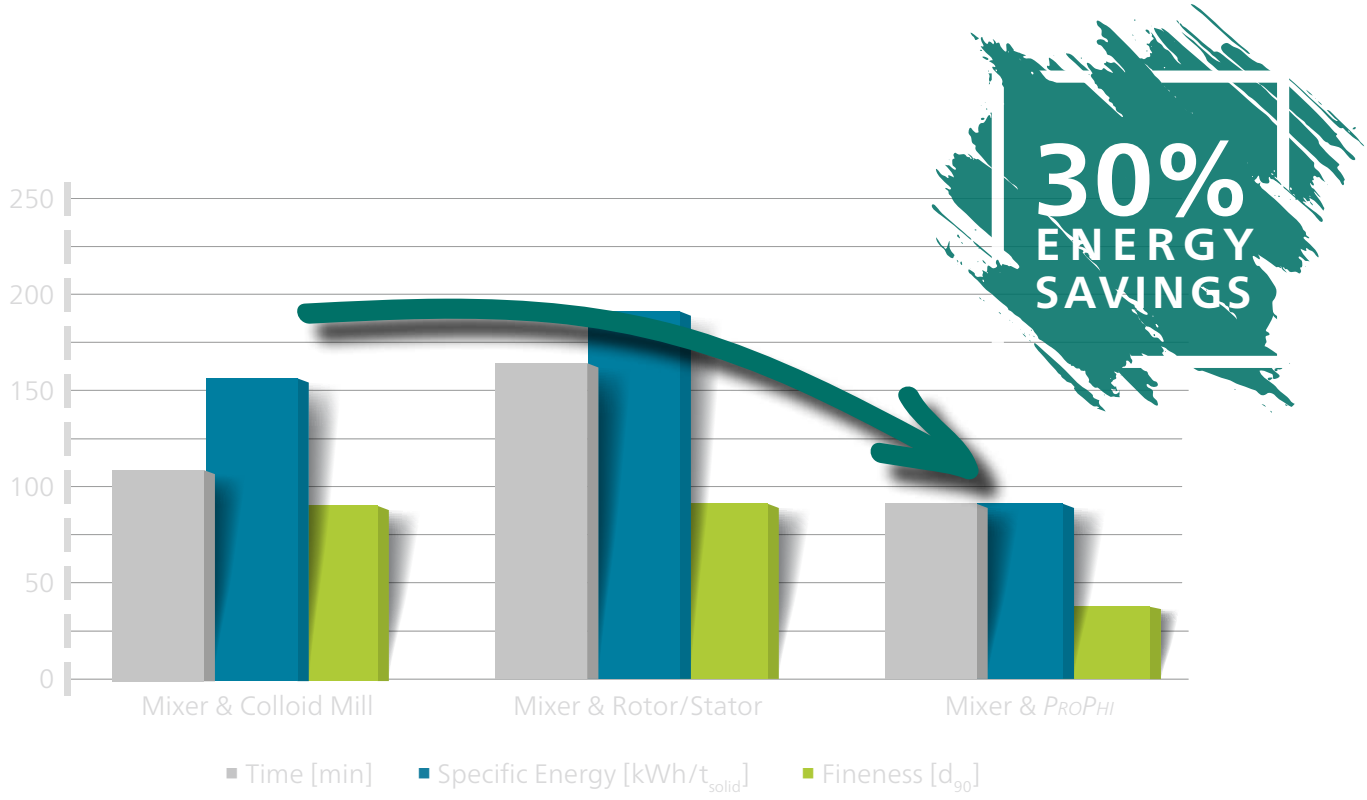
- Grinding beads from 2 mm - 4 mm diameter
- Variable grinding media fill level, adjustable to the product specifications

SAVE ENERGY

Highly Efficient Process Engineering

Pre-grinding in an agitator bead mill is many times more efficient and effective than pre-dispersion with a high-speed dissolver, a rotor/stator system or a colloid mill. The result is a reduction in particle size by a factor of 10 - 15 with the same expenditure of time and with comparable energy input.

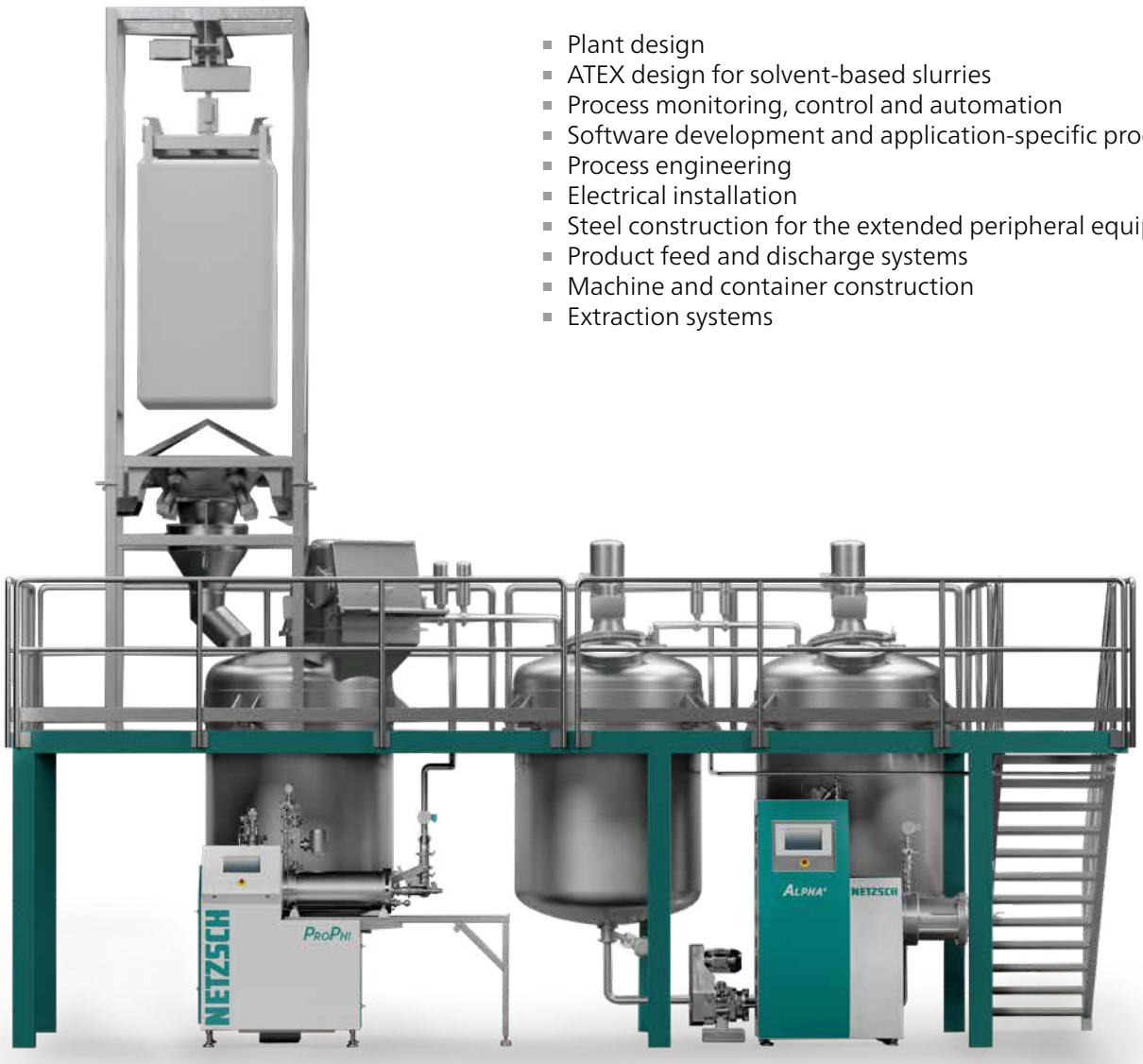
With the new revolutionary *ProPhi* pre-grinding unit, extremely high suspension throughputs can be realized for product circulation so that it can be used in a by-pass mode of operation for solids input and suspension.



Plant Engineering

Whether you need a complete turnkey solution or just advice on a certain aspect of plant construction - we have the necessary know-how. For more than 100 years, NETZSCH has been designing and building systems using the latest production machines and manufacturing techniques. We implement projects for companies all over the world. Talk to our experts. At NETZSCH you get everything from a single source:

- Plant design
- ATEX design for solvent-based slurries
- Process monitoring, control and automation
- Software development and application-specific programming
- Process engineering
- Electrical installation
- Steel construction for the extended peripheral equipment
- Product feed and discharge systems
- Machine and container construction
- Extraction systems



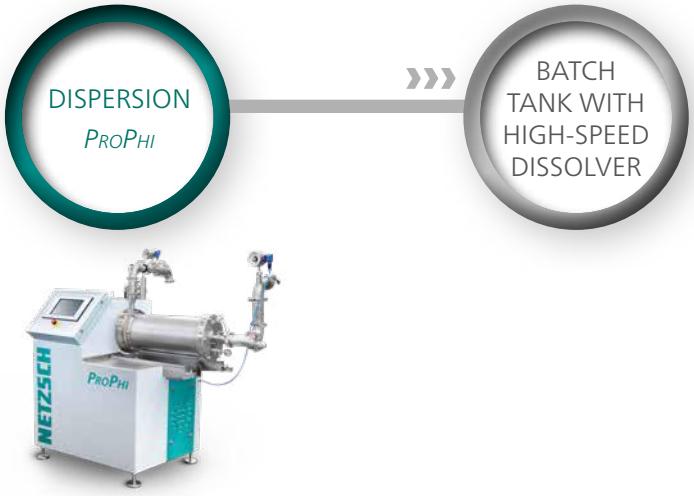
USE THE *ProPhi* ACCORDING TO YOUR NEEDS

Flexible in the Production Process

At NETZSCH, you can select a suitable pre-dispersion system for your needs from our wide range of products. Whether dissolver, rotor/stator system, inline dispersion system or pre-mill, you will find the right machine for every task.

Visit one of our worldwide laboratories and test your product with our machines. Our experienced engineers and laboratory staff advise and assist you with the machine and process design. You will go home with the best test results!

Process Concept for Finenesses < 2 mm



Process Concept for Finenesses > 2 mm

The owner-managed NETZSCH Group is a leading global technology company specializing in mechanical, plant and instrument engineering.

Under the management of Erich NETZSCH B.V. & Co. Holding KG, the company consists of the three business units Analyzing & Testing, Grinding & Dispersing and Pumps & Systems, which are geared towards specific industries and products. A worldwide sales and service network has guaranteed customer proximity and competent service 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 Broyage | France
NETZSCH España | 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

customer portal

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G&D · PROPHI · EN · 12/24 · Technical specifications are subject to change.