

# SYSTEM ZETA: Fine-grinding technique in enclosed cycle



The demands on agitator mills do not stop at parameters like quality, function or output. Environmental compatibility and flexible expansion capability are important points.

The SYSTEM ZETA combines a multitude of advantages in a new overall design. Low energy requirement, controllable processing cycle, constant product quality and a unit construction system are future-oriented

Therefore, SYSTEM ZETA is design synergy, which simultaneously fulfills technical, economical and ecological requirements. SYSTEM ZETA, rounded out - not only in its function.

**NETZSCH**  
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# System ZETA

## General:

The primary goal for the further development of enclosed agitator mills is to raise the level of quality of finely-ground or dispersed products, to guarantee consistency and reproducibility of the quality, and to enable the control of an economic processing cycle. An **improvement** in the product characteristics can frequently, however, only be achieved at a justifiable cost under **varied operating conditions**. Two essential consequences have thus resulted for the method of operation of agitator mills, namely the **applicability of extremely small grinding media** and the **ability to handle high product flow rates**.

Smaller grinding media decisively increase the wear frequency, and thus the grinding/dispersing efficiency, with a low expenditure of energy. Higher product flow rates make the circulation, or multipassage, method of operation possible, with its positive influence on the residence-time and particle size distribution. Added to this are the advantages in the relatively simple monitoring and control of the processing cycle, which should by no means be underestimated. The circulation method also offers the possibility to check the progress of the grinding or dispersion during the entire processing cycle. The agitator mill type **LMZ** systematically combines the requirements named above in its design, while at the same time considering the many years of positive experience with conventional machine units and elements.

LMZ stands for "Lying Mill (Liegende Mühle) System Zeta", whereby "Z" stands for Circulating Flow (Zirkulationsströmung).

## Description of System:

The plant system "ZETA" consists of a **system tank**, the **agitator**

**mill Type LMZ**, with pump unit, pipelines and fixtures, as well as the electrical equipment.

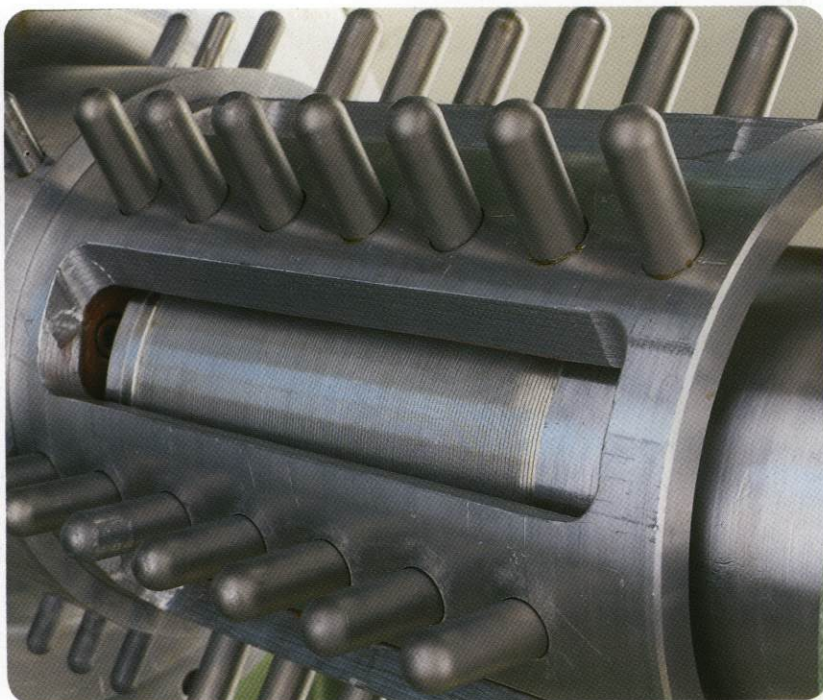
The **system tank** is equipped with an agitating device, which effects intensive circulation of the product. At the same time, the agitating elements primarily serve as scraper arms, in order to avoid deposits on the tank wall. The advantage of the coolable system tank is that the frequently very low temperature limits of the product to be processed can be met with relatively little technical effort.

The enclosed, horizontal agitator mill Type **LMZ** has a grinding chamber geometry designed for high product throughput rates.

A **rotor/slotted-pipe system** of large dimension is employed as grinding media/product separator in order to allow the highest possible product throughput rates, even with the smallest slot widths, without excessive pres-

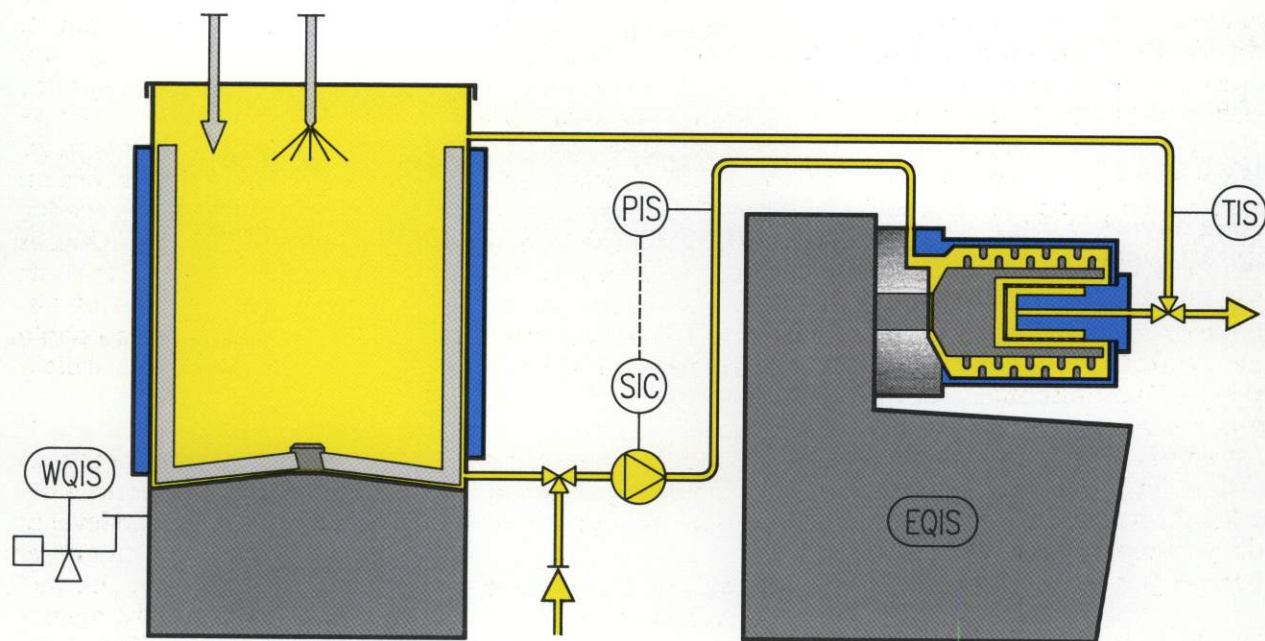
sure differences. Along the essential section of its length and on the periphery, the rotor is provided with numerous slots designed for efficient conveyance. Thus, the grinding media entering the interior of the rotor are transported back to the outer grinding chamber. Since the slot area forms only a small part of the rotor surface, the rotor itself, with the fixed agitator peg arrangement, functions as a grinding- and dispersion-intensive agitator shaft. Through the arrangement of slotted pipe diameter and slot width, dependence on the size of the grinding media, the discharge system operates with the lowest possible wear and over wide ranges of viscosity without appreciable grinding media deposits or blockage.

The design of the electrical equipment for the system is determined by the desired level of automation. Perhaps the greatest advantage lies in the fact that, with relatively low measurement and control effort, a stable and thus exactly reproducible production process can be achieved. For most applications, neither costly product flow



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### Operating Sequence of the System:

The operational cycle of the system "ZETA" (see Fig.) occurs essentially in 4 processing steps:

#### a) Filling the System

The mixing tank with predispered product is connected to the pipeline on the suction side of the pump unit, the stop valve opened and the pump started. The prepared product thus flows through the running agitator mill and into the system tank until the preset or desired volume has been reached.

#### b) Circulation Operation

The valve to the mixing tank is closed and has been reset to the circulation function. The product is thus pumped from the

system tank through the agitator mill and back in circulation. Through the batch volume and the specific energy required, the determined kilowatt-hours can be specified or calculated. After the input energy has been expended, circulation operation is ended and if required, quality control can be carried out.

#### c) Transfer of Product

The grinding/dispersion process is ended, the valve in the circulation line is reset to the transfer function and the system emptied. In standard cases, transfer of the product is via the agitator mill. For transfer lines with high pressure differences however, the valve can be positioned before the agitator mill to avoid unnecessary pressure impingement in the grinding chamber or the installation of an additional transfer pump.

#### d) Cleaning the System

When the production process has terminated, cleaning liquid is sprayed into the system tank and pumped through the agitator mill. After the liquid has run through the grinding chamber the valve is reset to the circulation function, so that an intensive cleaning process with as little liquid as possible can be carried out. After the washing liquid has been pumped out, or the product fed for processing to the end viscosity, the operating system is ready for a new batch.

The system "ZETA", however, also offers the advantage that liquid components can be added to the system tank during or at the end of the production cycle, e.g. in order to improve the dispersion process, to undertake required modifications or to adjust the end formulation.

## Sizes

Machine size	LMZ 2	LMZ 4	LMZ 10	LMZ 25	LMZ 60
Grinding chamber volume	1,6 l	4 l	10 l	25 l	62 l
Batch size	ca. 10 l	ca. 100 l	ca. 500 l	ca. 2000 l	> 2000 l
Drive power of the agitator mill	4 kW	13,5 - 15 kW	17,5 - 22 kW	36 - 45 kW	70 - 90 kW

Subject to technical change.

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