

## Krauss-Maffei SZ pusher centrifuge



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# Krauss-Maffei SZ pusher centrifuge

## Maximum reliability

**In continuous solid/liquid separation Krauss-Maffei pusher centrifuges combine the features of high availability with minimum maintenance and reduced specific space requirement.**

They enable effective dewatering of fast filtering products with high throughput rates. The quality of the final product can be increased using a variety of washing modes. Krauss-Maffei pusher centrifuges are applied in many fields of industry. Examples of these applications are to be found in bulk chemicals, plastics production, mining and minerals, the fiber industry and food processing. ANDRITZ KMPT boasts over 80 years of experience with Krauss-Maffei centrifuges in over 5,000 installations across the globe.

### Main applications

- Bulk chemicals  
(Borax/Boric acid, ferro sulphate, soda applications, sodium chlorate, sodium chloride, sodium sulphate)
- Agrochemicals  
(Ammonium chloride, ammonium sulphate, phosphates, potassium chloride, potassium sulphate, urea)
- Plastics  
(ABS, adipic acid, BPA, melamine, paraxylene, POM, sodium formiate)
- Foodstuffs  
(Lysine, phosphoric acid, sodium-hydrogen carbonate)

### Processing parameters

**Average particle size**

80-2,000 µm

**Solids content**

> 20% by wt.

**Solids throughput**

up to 150 t/h

**Solids recovery**

> 98%

**Solids concentration of slurry to be separated**

- 30-75 M% for crystalline products
- 2-12 M% for fibrous products
- 5-25 M% for plastics

**Materials of construction**

- Stainless steel



**Krauss-Maffei pusher centrifuge, SZ 630**

# Krauss-Maffei SZ pusher centrifuge

## Process advantages

### ■ Low energy consumption

More than 25% in energy savings compared to relevant competitors due to optimized design of process area and efficient pusher system

### ■ Outstanding product quality

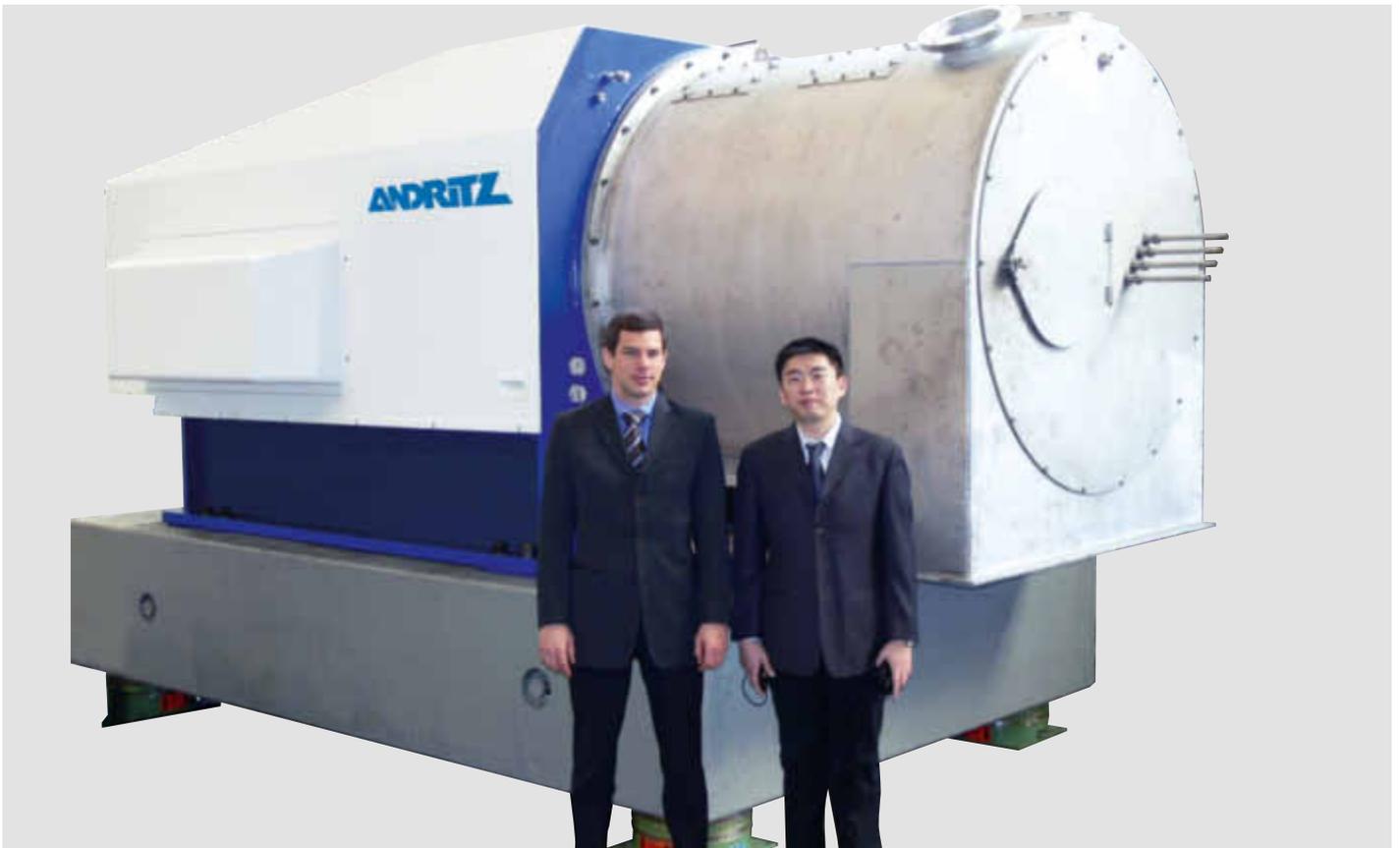
- Highly efficient cake washing modes.
- Minimum particle breakage with optimized feed system.
- Selection of screen configurations designed for your product parameters.

### ■ Unmatched capacity

- Welded or milled screens depending on application.
- Highest pusher volume.
- Different types of patented feed distributors.

### ■ Superior maintenance concept

- Innovative, ANDRITZ KMPT patented cartridge system provides minimum production downtime.
- Optimized wear parts offer fast replacement.
- Low screen wear by using vane type feed distributor.



Krauss-Maffei pusher centrifuge, SZ 1250

# Krauss-Maffei SZ pusher centrifuge

## Designs and drives



Hydraulic drive



Mechanical drive with eccentric

### Drives for rotary and pusher action

**Krauss-Maffei pusher centrifuges use two drives, one for the rotary motion and one for the oscillating pusher motion, and are controlled independently of each other.**

The rotary motor accelerates the empty rotor during the start-up process. During operation, the continuously fed product is accelerated in radial direction. The rotary drive is an axially parallel motor which drives the rotor via a V-belt. The pusher drive generates an oscillating motion by the pusher element. Its task is to generate the axial, alternating pusher force and to control the movement process. The pusher drive can be of hydraulic or mechanical design.

#### Hydraulic pusher drive

Pusher centrifuges with a hydraulic pusher drive offer very high throughput rates based on their high pusher force and high G-force. Machine sizes with a basket diameter of 630, 800, 1,000 and 1,250 mm are equipped with the hydraulic drive arrangement, which is optional for the machines with a basket diameter of 400 and 500 mm. The pusher motion is generated in machines with hydraulic drive by alternating admission of hydraulic oil to the rotating pusher cylinder. In this process the exact quantity of required oil is pre-accelerated. Compared to systems with bypass regulation, this is a benefit resulting from distinctly lower energy consumption with reduced cooling and drive outputs. The reciprocating motion is achieved by slide valves which can be actuated electrically, hydraulically or mechanically. The pusher frequency and stroke length can be adapted to the operating conditions while the machine is running.

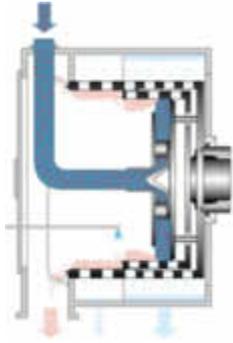
#### Mechanical pusher drive

With the mechanical drive a worm screw is driven by a motor via a V-belt. An eccentric converts the rotary motion of the gear output shaft into a pusher motion. The pusher frequency depends on the ratio of the V-belt drive of the motor to the worm gear.

Pusher centrifuges with a mechanical drive are extremely maintenance-friendly. This is because no significant maintenance work is required apart from recurrent lubrication of the bearings. The individual drive components can be replaced without disassembly of the centrifuge. A major advantage: the machine does not require cooling water. Machines with a basket diameter of 250, 315, 400 and 500 mm are fitted with the mechanical drive concept.

# Krauss-Maffei SZ pusher centrifuge

## Operation

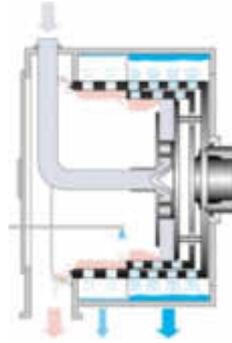


**Feeding**

### Function

Krauss-Maffei pusher centrifuges are continuously operating centrifuges. The product is fed through a feed pipe (or feed screw in the case of products which do not flow freely) into the feed distributor which rotates with the basket. This accelerates the slurry and feeds it with uniform distribution to the feed zone, where the largest portion of the liquid (approx. 80%) is filtered. In the feed zone the solids grow to form a stable filter cake ring. The filter cake is conveyed in the direction of the solids discharge stroke by stroke due to the axial relative movement between pusher bottom and screen basket. During this process an intact filter cake forms over the entire length of the screen. As the filter cake progresses from the feed zone to the solids discharge it can undergo washing, as required. For this purpose a wash liquor is applied to the cake surface and displaces the suspension liquid and impurities. Multi-stage washing is also possible with several successive washing zones.

Multi-stage centrifuges with several baskets loosen the filter cake and reshape it by moving it from the inner basket to the next larger basket. As a result of this re-shaping process, moisture that forms between the particles is exposed and filtered. The solids

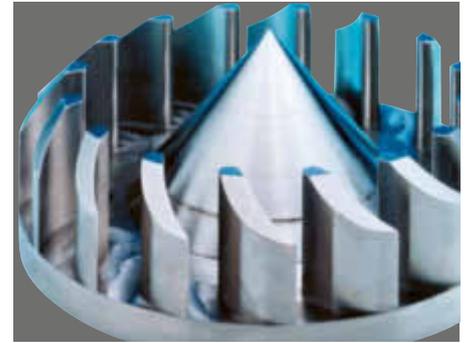


**Cake washing**

are discharged at the end of the basket after each pusher movement.

### Feed conditions

For machine size optimization and maximum operating reliability it is important to provide a uniform and concentrated slurry feed. As upstream equipment such as crystallizers or reactors frequently do not meet these requirements satisfactorily, a pre-thickener system is usually applied. This system levels out fluctuations in the feed conditions and minimizes the hydraulic load of the centrifuge. This can often lead to a smaller machine size being selected. Stationary or dynamic equipment have become established as pre-thickeners, depending on the type of application. Examples of stationary equipment are sedimentation tanks and thickener filters, examples of dynamic equipment include curved screens, hydrocyclones, vibration screens, and EC screen thickeners. In stationary thickeners, a metering unit is required to control the feed to the centrifuge, and in dynamic thickeners the feed to the thickener must be monitored.



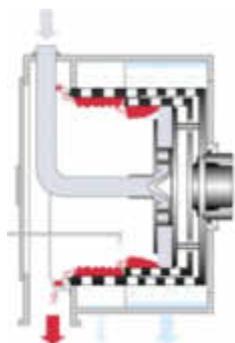
**Vane-type feed distributor**

### Feeding

The feed system has the most significant impact on operation of the centrifuge. The ANDRITZ KMPT patented vane-type feed distributor has to pre-accelerate the slurry and distribute it uniformly in the feed zone in order to achieve uniform cake formation. Uniform distribution of the slurry is the basic requirement for trouble-free operation of the centrifuge.

# Krauss-Maffei SZ pusher centrifuge

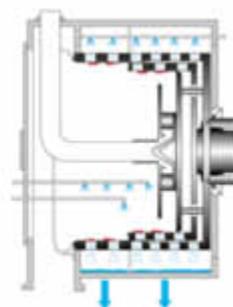
## Operation



### Discharge

#### Vane-type feed distributor

A special feature of Krauss-Maffei pusher centrifuges is the vane-type feed distributor. The slurry flow is diverted in the direction of rotation of the basket by the vane-type feed distributor. The slurry is pre-accelerated to such an extent that the difference between the speed of the slurry and the screen is practically zero. In this way, particle attrition is noticeably reduced in comparison with other feed systems. This results in more uniform formation of the filter cake and higher throughput rates. The machine is filled evenly and runs much more smoothly and quietly as a result. Benefits are obtained from reduced maintenance costs as a result of low wear.



### Cleaning

#### Filtration

In addition to the pre-acceleration the residual moisture can be influenced by a variable residence time of the product in the centrifuge. The residence time is usually between 10 and 60 seconds. It is mostly dependent on the adhesion factor between the product and the filter media. By changing the stroke frequency the residence time during the operation is optimized and adjusted to the actual throughput rates. There is a wide range of screens available for providing the optimum filter media for the variety of separating tasks. The width between the slots and the screen profile are optimally adjusted to the respective product. The slot widths of the screen generally range between 0.1 and 0.5 mm.



### Special discharge design

#### Discharge conditions

The two flows of filtrate and solids are discharged separately from the machine. It is important that there is no congestion of the filtrate during this process. As the baskets have the effect of a fan, filtrate and vapor are frequently mixed, although vapor in the filtrate flow is not desirable in most cases. To avoid this, the filtrate flow is subjected to further separation in a degassing cyclone. The vapor is either fed back to the centrifuge housing or discharged to a ventilation system. During solids discharge it is important that the product is ejected without product congestion or deposits. The solids discharge must be designed differently depending on the properties of the product.

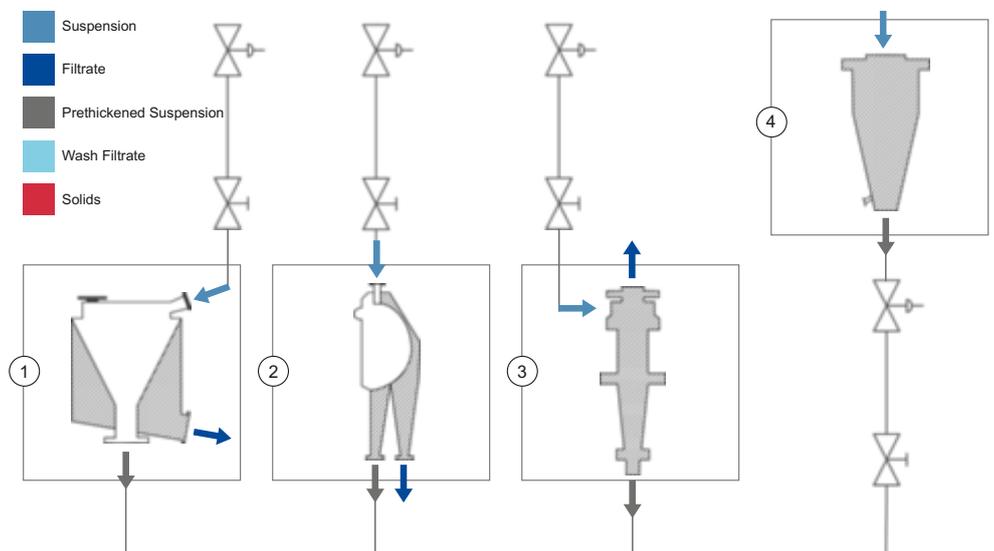
# Krauss-Maffei SZ pusher centrifuge

## Peripheral equipment

**A pusher centrifuge requires stable feed conditions with solids concentrations in the feed slurry in the range of 30-65% (by wt.) for crystalline products.**

Crystallization and evaporation systems are subject to operational variability. In order to stabilize the feed slurry from such systems, ANDRITZ KMPT offers several solutions for pre-concentrating the feed slurry.

This is mainly achieved with an additional, external unit which provides the most economical and safest solution. Internal pre-concentration is an option, but is less flexible as it is limited to removal of liquid and has high power consumption due to acceleration of the entire slurry to the rotational speed.



**ANDRITZ KMPT can offer different systems:**

### **EC prethickener (1)**

A dynamic prethickener using a filter element to remove liquid and improve the feeding conditions to the centrifuge. This is an ANDRITZ KMPT development and is used for crystal and plastic material (examples: ammonium sulphate, PE).

### **Bent screen (2)**

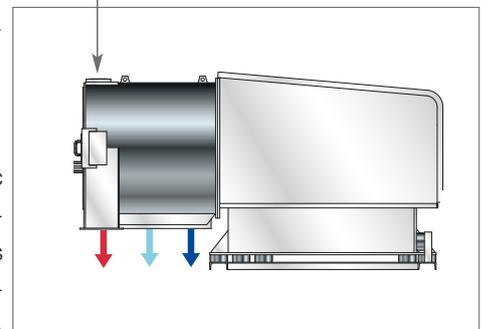
ANDRITZ KMPT bent screens are designed for gas-tight requirements (examples: adipic acid).

### **Hydrocyclone (3)**

Suitable for all products with density differences (examples: soda application, salts).

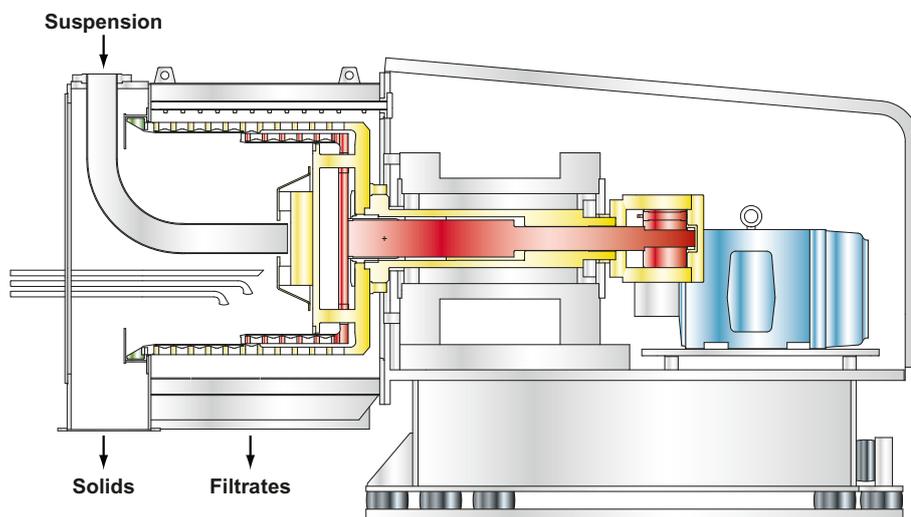
### **Static thickener (4)**

Also an ANDRITZ KMPT design, the static thickener is used to improve the feed conditions and achieve maximum feed solids concentration. This system uses the sedimentation effect. Liquid is removed by overflow and/or filtration elements. Feeding can be performed by an ANDRITZ KMPT feed system or an agitation outlet device combined with standard valves to control the flow (Examples: adipic acid, salts).



# Krauss-Maffei SZ pusher centrifuge

## Applications



**Soda production**

**The application spectrum of pusher centrifuges ranges from the processing of minerals to the dewatering of highly specialized plastics.**

### Soda

In the soda industry, pusher centrifuges are used for dewatering of a wide range of sodium carbonate compounds. The process engineering requirements vary from product to product: Some products are sticky, with caking tendency, others require specific temperature control. Based on the experience gathered, ANDRITZ KMPT is able to provide tailor-made solutions. An example is the further dewatering of sodium hydrogen carbonate. The product has very specific characteristics. A feed screw ensures the continuous feed of the product. Basket and feed systems are optimally aligned to the process engineering requirements.

### Potash industry

Pusher centrifuges in the potash industry have to meet the following requirements:

- High wear resistance

- High throughput rate
- Low energy consumption

Our experience in processing potash resulted in a unit with many special wear-resistant features, yielding longer operational life with minimal maintenance downtime.

### Adipic acid

The requirements in dewatering of raw, pure and superpure adipic acid are:

- Protection of the operating personnel and the environment against nitrous gases.
- High level of purity of the final product.
- Protecting the particles against breakage.

ANDRITZ KMPT pusher centrifuges meet these demands by utilizing a gas-tight design housing, two-stage backwashing to achieve product purity, and gentle handling of the feed with our patented vane-type feed distributor.

### ABS

Dewatering of ABS is a major application for Krauss-Maffei centrifuges. In those applications with large particle sizes, pusher centrifuges offer many benefits:

- Gas-tight design and special gas control system minimize risk of dust explosion.
- High surface quality finishes to avoid plugging and caking of the product.
- Compliance with ATEX safety regulations for hazardous processes.

### Sodium chloride

High product quality, low costs and high performance are requirements for processing bulk products such as sodium chloride. Krauss-Maffei pusher centrifuges, with their continuous dewatering operation, meet these requirements all along the line. They are extremely reliable and feature high availability, as a result of the unique ANDRITZ KMPT maintenance concept.

ABS, adipic acid, ammonium chloride, ammonium sulphate, BPA, urea, borax, calcium nitrate, ferro sulphate, lithium salts, lysine, melamine, nickel sulphate, paraxylene, PE, phosphate, POM, potassium chloride, potassium nitrate, potassium residue, potassium sulphate, sodium carbonate monohydrate, sodium chlorate, sodium chloride, sodium cyanide, sodium formate

# Krauss-Maffei SZ pusher centrifuge

## Foundation/installation

### Arrangement/foundation

The centrifugal forces produced by the rotation of the basket are used to separate the solids from the liquid. If the product is not uniformly distributed into the centrifuge basket imbalance may develop. To keep the dynamic loads exerted on a building to a minimum vibration-insulated installations are used. This is implemented by installing the centrifuge on a concrete or steel block which is mounted on spring-damper elements.

### Important guidelines

- Feed pressure should be ~0.5 bar.
- Supply pipes as short as possible.
- Install all supply and discharge pipes with a maximum gradient.
- All connections to the centrifuge must be flexible.

### Maintenance concept

#### Maximum availability

In pusher centrifuges with hydraulic pusher drive the basket, shaft, bearing, pusher drive and a part of the rear wall combine to form one unit – referred to as the KMPT patented cartridge. This cartridge can be completely removed in one piece with very little effort. After reinstalling a spare cartridge all maintenance work on the rotating elements can be carried out in the workshop area without being under any time pressure. In this way, downtimes are reduced to a minimum. All connections are on the process housing and do not have to be removed for maintenance work. For pusher centrifuges with mechanical drives no significant maintenance is required apart from recurrent lubri-

cation of the bearings. Large inspection openings and a large door to the process area facilitate access for inspection, maintenance and cleaning work.



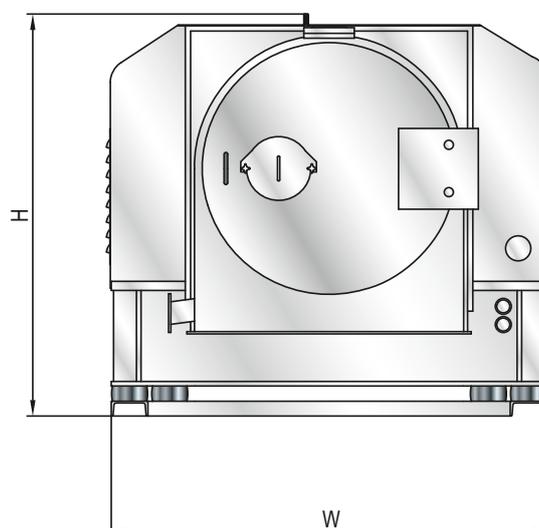
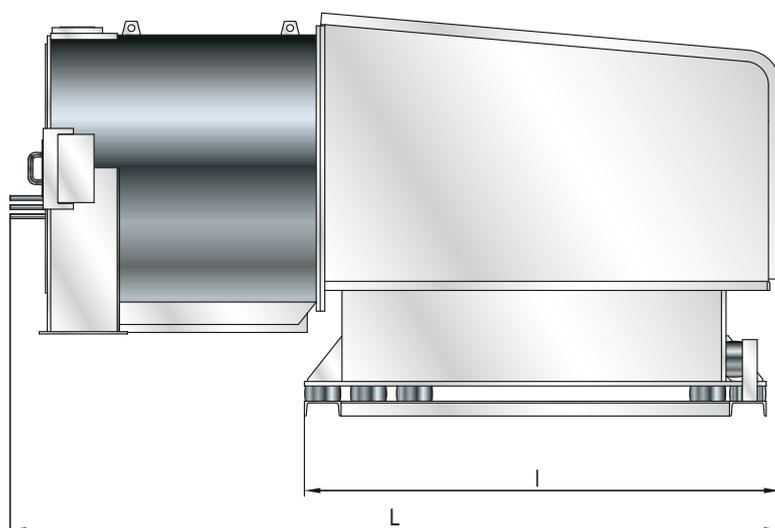
Krauss-Maffei pusher centrifuge SZ 1000 with cartridge

# Krauss-Maffei SZ pusher centrifuge

## Dimensions and weights

Model	Nominal diameter [mm]	L [mm]	I [mm]	W [mm]	H [mm]	Operating weight [kg]	Pusher drive
<b>SZ 250</b>	250	1,750	1,000	1,150	970	1,000	Eccentric
<b>SZ 315</b>	315	1,910	1,100	1,250	1,000	1,350	Eccentric
<b>SZ 400</b>	400	2,350	1,400	1,440	1,340	2,300	Eccentric
<b>SZ 500</b>	500	2,870	1,770	1,530	1,130	3,350	Eccentric
<b>SZ 400</b>	400	2,380	1,570	1,470	1,350	3,500	Hydraulic
<b>SZ 500</b>	500	2,530	1,570	1,470	1,350	3,700	Hydraulic
<b>SZ 630</b>	630	3,000	1,780	1,620	1,530	5,300	Hydraulic
<b>SZ 800</b>	800	3,410	2,070	1,950	1,770	8,400	Hydraulic
<b>SZ 1000</b>	1,000	4,060	2,530	2,190	1,950	13,300	Hydraulic
<b>SZ 1250</b>	1,250	4,950	4,000	2,490	2,060	19,500	Hydraulic

Machines are designed with 1, 2 or multiple stages, depending on the application.



All technical data are approximate and subject to change without notice.

# Krauss-Maffei SZ pusher centrifuge

## Process automation

### Perfection in process engineering requires perfection in process automation.

The superior performance of our process equipment is based on perfecting the interface between equipment hardware, electrical components, electronics, informatics, and process know-how to create an all-encompassing custom-tailored solution for each application. Using intelligent sensors and state-of-the-art communication systems, we control and monitor our machines on a result-oriented basis.

The benefits of our process automation are:

- Enhanced equipment performance
- Consistent high product quality
- Reduced consumption of utilities
- Optional condition diagnostics

### Automation of machines

Individual adaptation – we can incorporate the automation concepts for our machine into your existing control system.

A modular controls concept enables the automation of single units up to complex control systems in existing plants. PLC, PLC-Failsafe and discrete technologies, including the required visualization, are used to display important information on plant and machinery. State-of-the-art technology enables ANDRITZ KMPT to provide remote maintenance of your automation equipment - subject to your approval.

ANDRITZ KMPT offers variable drive systems, which provide the following benefits:

- Optimized adjustment of machine to process.
- Reduced operating costs due to energy-saving drives.

### Safety features and equipment

A reliable machine protects operating personnel and equipment. Machinery directives, ATEX, hazardous location regulations – there are many regulations to be obeyed at the plant site. ANDRITZ KMPT serves as your knowledgeable advisor for your plant. Of particular importance are safe actual speed values, deadlock and over speed monitoring, door locking, belt slippage, and safe inertisation.

**ANDRITZ KMPT process automation reduces investment, operation and maintenance costs.**



# ANDRITZ KMPT Services



## Refurbished equipment

**Our goal is to provide our customers with fast and reliable service, from the first process consultation throughout the entire service life of your ANDRITZ KMPT process equipment.**

To assist our global customer base, we operate service facilities around the world staffed with experienced, dedicated service teams.

## Spare parts

We keep over 6,000 different spare parts and components in stock for you. Our service centers in the USA, the UK, Italy, France, and China, for example, maintain their own spare parts stock to enable faster delivery to your plant site.

## Reconditioned units

We maintain a select stock of reconditioned units available for fast delivery from our facility. All machines are fully disassembled, inspected and reconditioned by replacing worn or damaged parts. A final test run validates the mechanical guarantee we provide with our refurbished equipment. With our factory reconditioned units you gain production capacity quickly with minimal capital investment.



## Commissioning

### Repairs and maintenance

Our service centers are ready to provide you with regularly scheduled maintenance or emergency service at your site. Our experts provide assistance including assembly work, installation support, commissioning, upgrades, repair work, and optimization of your process conditions.

### Advisory service

Our customer service team is ready to answer any question concerning machine safety, equipment upgrades, and process optimization.

### Installation and commissioning

Our experienced service personnel assists you with the installation and start-up of your equipment.

### Remote diagnostics

Using modern communications and diagnostic systems, our customer service is able to offer even faster and more efficient support. Via remote access our specialists receive information on the operating condition of your machine and carry out fault diagnoses. Maximum data security is of course guaranteed at all times. We only access the data from your machine when you give your specific approval for us to do so.



## Spare parts

### 24-hour on-call service

You can reach our skilled and experienced service team around the clock.

### Maintenance contracts

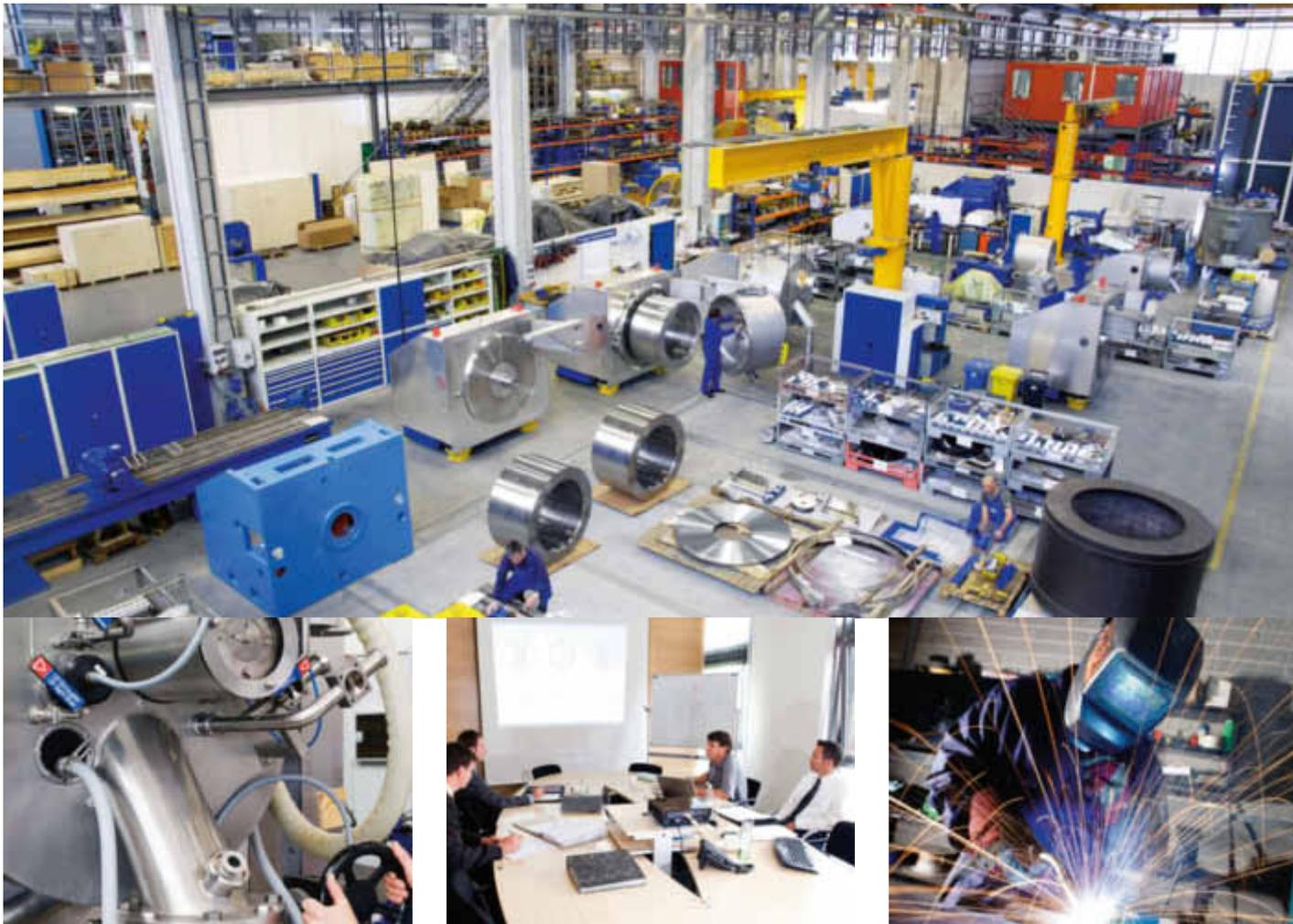
We offer you tailor-made, long-term contracts for preventive maintenance of your equipment.

### Customer training

We train your operating personnel during commissioning of the plant. In addition, we also offer you seminars for maintenance and operation of our entire line of process equipment. This training can be conducted at our site or yours.

# ANDRITZ KMPT

## Company profile



### The ANDRITZ GROUP

The ANDRITZ GROUP is a globally leading supplier of plants and services for the hydropower, pulp and paper, metals, and other specialized industries. The Group is headquartered in Graz, Austria, and has a staff of approximately 16,100 employees worldwide. ANDRITZ operates over 120 production sites, service, and sales companies all around the world.

### ANDRITZ SEPARATION

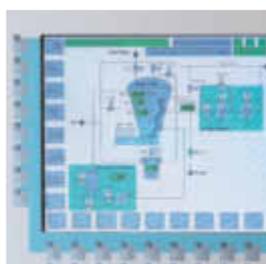
ANDRITZ SEPARATION is one of the leading global suppliers of plants, equipment, and services for mechanical and thermal solid/liquid separation (coal, ore and mineral processing, chemical, petrochemical, and food industries). The business area's field of activity covers design and manufacture of key components (centrifuges, filter presses, rotating filters, drying plants), as well as erection and start-up of turnkey plants, including automation, safety engineering, and services.

### ANDRITZ KMPT

ANDRITZ KMPT has been a world leader and innovator in the chemical process industry for over 75 years. The extensive experience of our engineers comes from testing more than 3,000 products and putting over 9,000 applications to work. Over 500 patents demonstrate our capacity for innovation. This extensive knowledge governs our process and equipment recommendations, all tailored to meet our customers' requirements with an optimum in performance and cost.

# ANDRITZ KMPT

## Product lines



### ■ Krauss-Maffei centrifuges

With horizontal peeler centrifuges known for reliability, pharma centrifuges designed to meet highest quality standards, innovative vertical basket centrifuges and continuously operating pusher centrifuges, ANDRITZ KMPT has the capability to handle a broad range of separation applications in the chemicals, pharmaceuticals and environmental industries.

### ■ Krauss-Maffei filters

For vacuum or pressure filtration, our rotary drum and disc filters combine high yield with low production costs in the processing of chemicals, plastics and minerals.

### ■ Krauss-Maffei dryers

Batch drying in our conical mixer dryer with helical mixing assembly or continuous drying of free-flowing materials in our plate dryer – we offer the right choice of dryers for fine chemical and pharmaceutical producers.

### ■ ANDRITZ KMPT process systems

We apply our experience and expertise to create fully functional processing modules including peripherals and automation, saving the customer from having to deal with multiple vendors. ANDRITZ KMPT provides all the detailed engineering and reduces installation time with pre-assembled systems.

ANDRITZ stands for ultimate know-how in solid/liquid separation. Our decade-long background in this field and comprehensive technology offering enable us to supply our customers with the best solution for each application, whether in municipal or industrial sewage sludge treatment, the chemical or food industry, or for preparation of minerals and ores.



Food



Chemicals



Minerals



Mining



Environment

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