

# Krauss-Maffei TT plate dryer



# Krauss-Maffei TT plate dryer

## Table of contents



|                               |    |
|-------------------------------|----|
| Krauss-Maffei plate dryer, TT | 3  |
| Process advantages            | 4  |
| Operation                     | 5  |
| Designs                       | 6  |
| Data/systems                  | 7  |
| Test centers                  | 8  |
| Services                      | 9  |
| Company profile               | 10 |
| Product lines                 | 11 |

# Krauss-Maffei TT plate dryer

## Continuous drying

Where continuous drying of free-flowing bulk materials is required, the Krauss-Maffei plate dryer is the right choice.

It has been proven in over 400 applications and is available in atmospheric, gas-tight or vacuum configurations. The plate dryer can dry products with sensitive, toxic or solvent contents, gently and without any impact on the environment.

### Main applications

- Chemicals  
(Additives for plastics and rubber, detergent additives, fungicides, herbicides, insecticides, polycarbonate, pigments, removing residual monomers from plastics (POM), salts, UV blockers, etc.)
- Pharmaceuticals  
(Antibiotics, aspirin, acetylsalicylic acid, caffeine, pharmaceutical intermediate products, vitamins, etc.)
- Foodstuff/related  
(Coffee, tea, etc.)

### Process data

#### Operating principle

Contact drying, contact cooling

#### Operating mode

Continuous with carrier gas or under vacuum

#### Product transport

Mechanically using plows

#### Size

Heat exchange area up to 200 m<sup>2</sup>

#### Heat transfer medium

Water/steam/thermal oil

#### Consistency of wet product

Free-flowing

#### Drying temperature

Up to 300°C

#### Particle size

Up to 5 mm

#### Retention time

5 min-300 min

### Materials of construction

- Stainless steel
- Special materials



Krauss-Maffei TT plate dryer

# Krauss-Maffei TT plate dryer

## Process advantages

### ■ Highly reproducible quality of the material to be dried

- Precise temperature control with plates heated and cooled separately.
- Residence time can be set exactly.
- No remixing of the product.
- Low mechanical stress on the product.

### ■ Maximum flexibility

is achieved by optimization of product layer height, plow arm speed, number of plow arms, and number of plows.

### ■ Minimal dust accumulation

by means of integrated filters, thus the dust remains in the dryer.

### ■ Low carrier gas consumption

### ■ Easy solvent recovery

### ■ Minimal energy consumption

as a result of the high thermal efficiency of contact drying.

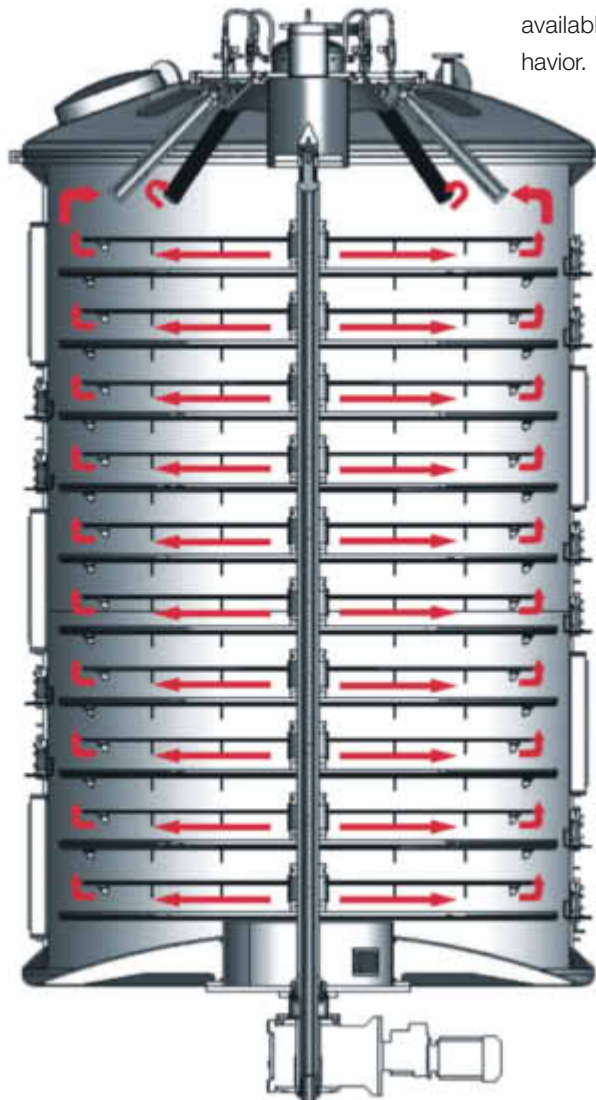
### ■ Small footprint

### ■ Easy inspection

– the plate dryer is fitted with wide door openings on both sides extending from top to bottom.

### Safe decision

The correct equipment and process are key considerations at the start of any drying process. Our engineers and technicians have gained experience with more than 8,000 completed applications and 2,000 tested products. In our test centers we establish the necessary data to give you the basis on which to choose the right type and size of drying equipment. Firstly, the behavior of the material to be dried is established in the laboratory using a plate dryer simulator. These results allow reliable dimensioning of the dryer. Transportable pilot plants are available to study long-term behavior. With these plants, the data established in the laboratory can be verified under real conditions.



# Krauss-Maffei TT plate dryer

## Operation

### Mode of operation

The wet material to be processed is fed continuously into the Krauss-Maffei plate dryer from the top. The rotating arms are equipped with plows to spread the product in spirals over the flat plate surface. On the first plate, the product is transported to the rim so that it finally drops onto the larger plate beneath. On this plate the product is transported to the center and falls through the central opening onto the smaller plate below. The material to be dried thus moves in a cascade through the plate dryer. This continuous agitation causes intensive heat transfer between the product and the plate. The product is dried either by evaporating the solvent in a carrier gas stream or by direct evaporation. The carrier gas stream helps to dissipate the solvent and can be kept to a minimum. Processing in a vacuum means that the product dries, even at low temperatures, without using any inert gas. The dried material falls from the last plate into the central product outlet and is then carried to the outlet system.

### Product transport

The product transport system consists of a central upright shaft with plow arms and plows. On every plate level, two, four or six horizontal arms are fixed to the shaft. These arms have free-moving plows positioned at an angle, which rest on top of the plate surface only under their own weight. Variable plow widths are available depending on the product requirements. The product transport system is driven by a fully adjustable speed drive or a frequency-controlled drive. Transportation of the product is optimized by using different plow lengths and different plow arrangements. The product's residence time in the dryer can be adjusted quickly and easily by varying the speed.

### Optimized purge gas flow

For installations containing nitrogen purge gas loops with solvent recovery systems it is important to optimize the purge gas flow through the system in order to minimize operational costs and dust formation. The latest Krauss-Maffei GTT gas-tight plate dryer allows a controlled flow of purge gas through different drying zones. The purge gas enters the process area in the center of the dryer between every other plate and flows above the product concentrically from the middle to the outside. High purge gas velocity in the middle of the dryer provides good heat and mass transfer. Low velocities at the outer diameter keep the amount of dust in the purge gas to a minimum. The purge gas outlet is located in the center of the dryer top cover. Dust filters are installed to avoid any product losses.

### Internal condensation

Process control, without or with only small quantities of carrier gas, means that more or less 100% of the solvents separated in the plate dryer can be recovered by condensation. The vapor condenses when the vessel walls inside the plate dryer are cooled at a sufficient distance away from the product to be dried. This „short-path drying“ method delivers process as well as design benefits in comparison with conventional installations using a dryer, vapor filter and condensation unit. The short path between the place of evaporation and condensation means there is virtually no loss of pressure for vapor removal. The solvent needs to be kept at a high temperature for only a short time. This means, for example, that temperature sensitive aromas can be separated thermally with no drop in quality.

### Cleaning

For pneumatic cleaning, compressed gas is fed to nozzles integrated into the plow arms. The product is blown to the outlet and then separated from the gas in a separator. The dryer can be cleaned without closing down the entire system. Production downtime is reduced to a minimum. The nozzle system is also suitable for cleaning with liquid.

### Plates

The fixed plates have a jacket on the underside and can be heated or cooled with a liquid or vaporous heat carrier medium. Each separate plate can be heated individually, allowing exact temperature control for optimal thermal treatment of heat-sensitive products.

This is a unique ANDRITZ KMPT feature for continuous contact dryers. The number and the size of the plates is determined by the heat transfer surface required by the process, and the number of temperature zones needed. For processes dependent on residence time, the dryer size can be optimized by adjusting the thickness of the layers.



# Krauss-Maffei TT plate dryer

## Design

| Type                                  | Applications   | Design  | System design  |
|---------------------------------------|--|---|--|
| <b>TTB</b><br>Atmospheric plate dryer | Processing wet non-hazardous bulk materials with atmospheric air as carrier gas                          | Octagonal casing in frame construction, doors on two sides from top to bottom of the casing. External heating media connection for each plate. Carrier air supplied via air ducts or distribution pipes. Carrier air heater directly flanged. | Metering device, plate heater carrier air heater, air filter, exhaust air fan, product outlet  |
| <b>GTT</b><br>Gas tight plate dryer   | Processing toxic, flammable or explosive bulk materials with inert gas as carrier gas                    | Round casing, gas-tight, doors or manholes on two sides over the entire height of the casing. External heating media connection for each plate or inside pipes. Carrier gas supplied via gas ducts or pipes.                                  | Metering device, plate heating, inert gas circulation with carrier gas heating, solvent recovery, fan, inerting unit, product outlet, integrated filter, internal condensation |
| <b>VTT</b><br>Vacuum plate dryer      | Processing temperature sensitive products such as solvents, toxic, flammable or explosive bulk materials | Round casing, vacuum sealed, man holes on two sides over the complete height of the casing. External and internal heating pipes.  | Metering unit, inlet lock, plate heating, vacuum and solvent recovery system, outlet lock, integrated filter, internal condensation  |



Plate dryer simulator

# Krauss-Maffei TT plate dryer

## Reference data

| Model | Surface area per plate [m <sup>2</sup> ] | Max. number of plates | Max. surface area for heat transfer [m <sup>2</sup> ] |
|-------|--|-----------------------|---|
| 12    | 0.7                                      | 10                    | 7   |
| 20    | 2.5                                      | 20                    | 50  |
| 27    | 5.0                                      | 40                    | 200   |

The plate dryer has a modular design. The number and size of the plates depend on the individual application. The plates are available in three different sizes. Two plates each form a set.

## Systems

Solids and liquids are usually separated initially by using mechanical and then thermal separation equipment. ANDRITZ KMPT manufactures a wide range of filtration and drying equipment and therefore has extensive experience in all aspects of solid/liquid separation. Complete separation systems, combining Krauss-Maffei centrifuges and dryers, ensure troublefree operation while providing the throughput and product quality required. ANDRITZ KMPT designs, engineers and installs all the peripherals needed for the Krauss-Maffei TT plate dryer, such as solids handling, heating, solvent recovery, and cleaning systems in a modular system.

### Your benefits:

- One contact partner for the entire system from process equipment to peripherals and automation.
- Detailed engineering performed by our knowledgeable staff.
- Reduced installation time with pre-assembled process modules.



# ANDRITZ KMPT

## Test centers



**Test center in Vierkirchen, Germany**



**Production works in Florence, USA**



**Consulting**

**ANDRITZ KMPT operates fully equipped test centers in Germany and the USA, offering both bench and pilot scale equipment.**

Our experienced engineers will consult with you to determine the equipment most appropriate for your product, then will perform the necessary trials to optimize the operating conditions for your process.

Based on these tests, we will provide a complete report which will recommend the best solution for your solid/liquid separation process, including scale-up information for the production equipment.

We can also assist in running long-term trials at your site with equipment from our rental machine pool.



# 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

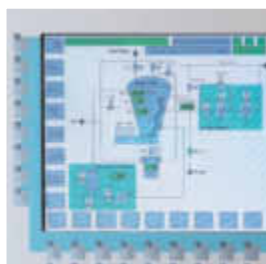
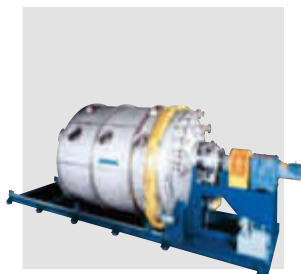
ANDRITZ SEPARATION is one of the leading global suppliers of plants, equipment, and services for mechanical and thermal solid/liquid separation (coal, ore and mineral processing, chemical, petrochemical, and food industries). The business area's field of activity covers design and manufacture of key 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

#### **ANDRITZ KMPT GmbH**

Industriestrasse 1-3  
85256 Vierkirchen, Germany  
Phone: +49 (0)8139 80299 - 0  
kmp@andritz.com

#### **ANDRITZ AG**

Stattegger Strasse 18  
8045 Graz, Austria  
Phone: +43 (316) 6902 0  
separation@andritz.com  
www.andritz.com