

KRIEGER

Mixing & Homogenising Systems



Pharmaceuticals

Cosmetics

Chemistry

Bio

Food



Over 50 Years of Experience

Krieger, founded in 1946, is well established in the production of mixing & homogenising equipment. In the early sixties, a concept combining two speed mixing and homogenising in one machine was pioneered by Krieger. At the time, both the pharmaceutical and the cosmetics industries recognised this emerging technology to be revolutionary, a technology allowing companies to produce more efficiently in one single vessel. The MOLTO MAT is now regarded as the industry standard throughout the world.

Today, Krieger's new Molto Mat range provides customers with the most complete and flexible machines currently available on the market. The completely crevice free interior, the integrated rotating CIP spray balls, and the Sterilisation In Place concept have made the MOLTO MAT the leading technology for the "poor of germs" and "sterile" production of emulsions, suspensions, solvents, etc.

With the new Molto Mat Link, Krieger provides an automation platform on PC basis, linking the recipe and control database of the lab equipment with those of the different production machines and vice versa. The New Molto Mat Link combines our customers' research and production data and facilitates scale-ups as well as validation of Krieger's mixing and homogenising systems.



Complementary to the Molto Mat range, Krieger offers the following equipment to process the production of liquids and semi-solids: Fat melting vessels, storage tanks, fermentation vessels, a mobile powder feed station, an external homogeniser and a complete mixing & stirring programme including magnetic mixers. All equipment may be combined in complete turnkey systems for the pharmaceutical, cosmetics, chemical, bio and food industries.

Krieger represents over 50 years of experience and know-how in the field of liquids and semi-solids processing. Our technology has made its way into many complete liquids processing systems built to meet both individual customer requirements and the latest industry standards.

Multinational companies as well as independent manufacturers rely on Krieger equipment to meet the increasing demands of their markets, research institutes and production sites. The Krieger equipment is recognised for its reliability and durability, equipment made to last even in most demanding working conditions.

Krieger Maintenance Service

Krieger mixing & homogenising systems generally require little maintenance, which reflects the quality of their design and manufacture. Production details of each individual machine are filed to ensure the long-term supply of all spare and mechanical parts regardless of the year of registration.

Our service technicians are specially trained for interventions at customers' sites around the world in order to guarantee that your Krieger equipment remains operational at all times.



Krieger Financing Support

Krieger equipment is built to last. It is an investment that pays off more than once over the years. Regardless its age, Krieger equipment does not deteriorate in value and is therefore very much sought after on the second-hand machine market. To support your decision in favour of a new Krieger system, our services include help in finding a customer for your used Krieger equipment as well as interesting leasing conditions.



Krieger Technology and Customized Design

Our aim is to provide solutions resulting in state-of-the-art mixing and homogenising systems. We therefore continuously improve our machines technically, thus guaranteeing top quality and high standard machines. In order to satisfy current and future technological as well as FDA, GMP, GAMP, CE, ISO requirements new developments are necessary. To achieve this goal we work in close cooperation with our customers.



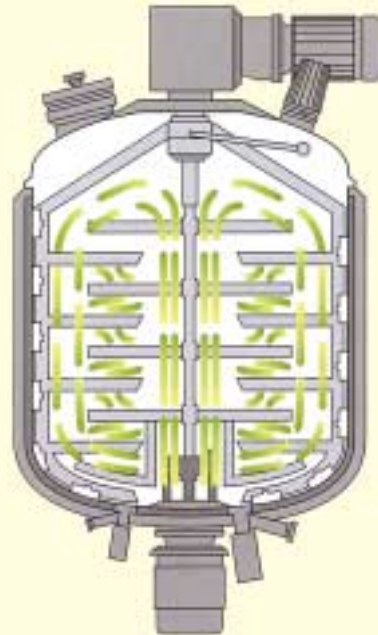
Left: Machine for the production of sterile ophthalmic products used in eye surgery. For these applications, the customer required a "sterility assurance level" of 100%. Krieger therefore modified the design of the standard MMU 20 lab machine, which included a physical separation of the mixer's sealing point and the vessel interior.

The Krieger Molto Mat Mixing Homogeniser

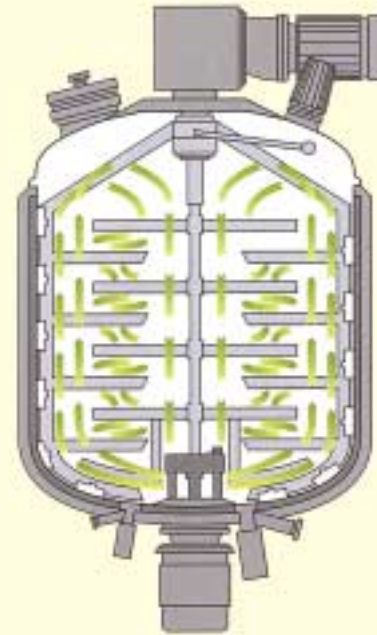
A Controlled Process with Guarantees

OUR CONTROLLED PROCESS

- Controlled product flow
- Controlled velocity of homogeniser
- Controlled heating & cooling
- Automatic vacuum & pressure regulation
- Cleaning in Place system
- Sterilisation in Place system
- Mechanical sealing concept
- PLC automation



Clockwise rotation of homogeniser with controlled product flow



Anti-clockwise rotation of homogeniser reverses the product flow and creates a vortex

OUR GUARANTEES

- Perfect mixing of all ingredients
- All particles equally homogenised
- Equal product temperature in the whole processing batch
- Same quality of low and high viscosity products
- Prevents damage to product and active ingredients by overheating or uncontrolled cooling
- Perfect deaeration
- Smooth discharge
- Easy introduction of large powder quantities
- Easy and quick cleaning procedures
- Clean and sterile processes
- Easy and quick sterilisation procedures
- FDA approved design
- Easy operation
- Exactly repeatable processes
- Processes can be validated

The Krieger Molto Mat Range

A universal and flexible concept for all needs

Krieger's new Molto Mat range was designed specially to enable a flexible production. The standard Molto Mat processes all process steps in one single vessel, making it the best solution for poor of germs and sterile production.

When the new Molto Mat range was designed special emphasis was laid on scale-up, cleaning and sterilisation abilities of the vessels. The basic models MMU, MMD and MMS, worldwide accepted as a standard for "poor of germs production" come with the famous rotating Krieger Cleaning and Sterilisation In Place system. This ensures that every Molto Mat can be equipped to meet cleaning and sterilisation requirements specific to each individual customer.

The ability to transfer formulations successfully developed in the laboratory to a larger production machine (scale-ups) is essential as it reduces development costs to a minimum and allows quick reaction to new trends on the market and to new product requirements.

In addition to the standard Molto Mat range, a mobile version (MMM) is also available.



Lab unit 15 litres, explosion proof design



MMD range: 50 - 1000 litres



MMS range: 500 - 5000 litres

Applications processed on the Molto Mat models:

All types of emulsions: O/W, W/O, for pharmaceutical and cosmetics (ointments and creams), food and chemical applications

All types of solvents: Eye drops, nose gel, nail polish

All types of suspensions: Lipstick, make-up, face masks, toothpaste, mascara, gel

Range of viscosity: 10 - 400,000 CPS

Three Independent Mixing Elements

The Molto Mat has three mixing elements:

The outer agitating arm, fitted with wall scrapers, ensures a perfect heat transfer from vessel wall to product.

The counter-rotating inner agitating tool. This can be a paddle mixer or a high speed shear blade.

A homogeniser based on the rotor-stator principle. Different designs are available (low shear/high flow, high shear/low flow, variable gaps, etc.)

To achieve the ultimate mixing possibilities, all three mixing elements can be driven individually with separate speed controls.

The Krieger Molto Mat comes with counter-rotating agitating tools which are placed in the centre of the vessel. Due to their special design the tools generate a "controlled product flow". This guarantees that every particle of the product follows a pre-determined flow pattern the same number of times within a given time. Eccentrically fitted agitators are unable to provide a guaranteed flow pattern.

The homogeniser reduces the size of the product particles to a few microns. The Krieger homogeniser guarantees superior quality, long product life, and a viscosity level that remains the same in each production batch if required.



A pioneering innovation is the homogeniser which rotates clockwise and anticlockwise, thus changing the product flow in the vessel and creating a vortex. Powder and other ingredients can be added from the top and is then directly drawn into the clockwise and anticlockwise rotating homogeniser, resulting in an optimal dispersion of the added ingredients.



Vessel Design

One of the key features of the new Molto Mat range is the entirely "crevice free interior" and the use of "smooth cleanable angles". The crevice free interior and the smooth angles provide a perfect processing environment for cleaning and sterilisation procedures.



Crevice free design with the famous rotating CIP arms with spray balls for a perfect cleaning of the vessel cover and upper parts of the agitating tools.



Cleaning

An integrated CIP system has the advantage that the time needed to prepare the machine for the next batch is minimised and therefore valuable production time is saved.

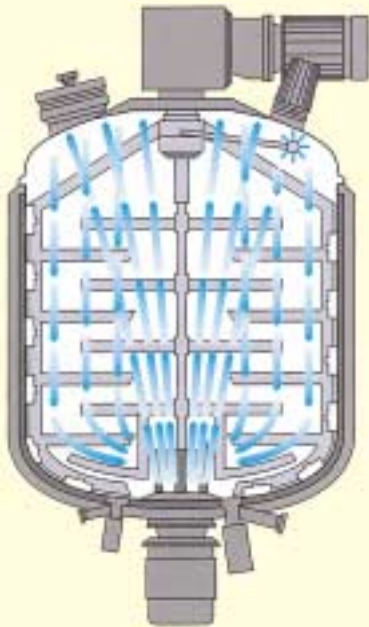
To get the most out of your Molto Mat's cleaning abilities, Krieger offers a wide variety of CIP add-ons like:

- Recirculation pipework and pumps
- Detergent preparation tanks and dosage pumps
- Water preparation tanks
- CIP software
- Instruments to measure water quality

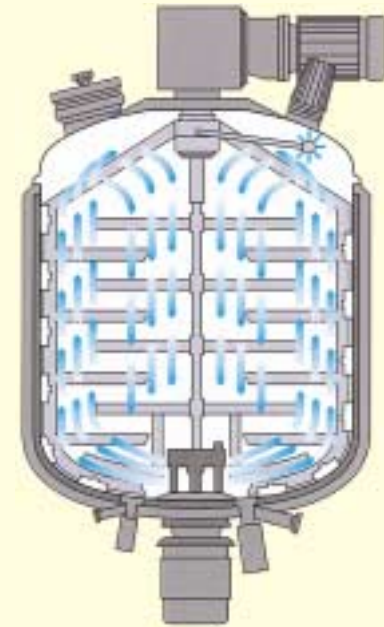
These features can be combined to form a customised CIP system.

Water consumption is low due to the special CIP design. The CIP system is controlled by PLC resulting in a fast and efficient system that can be entirely validated.

In order that you achieve best cleaning results, Krieger provides you with the necessary information such as type of detergent to be used for your product, use of pre-rinses, required wash time, and best processing temperature.



MMU with integrated CIP system. The CIP pump, recirculation pipework and water connections are integrated in the machine frame and comply with GMP requirements.



Sterile Processing

During the last few years, Krieger – in cooperation with several renowned customers – has gained some excellent experience in the field of sterile processing. Highly sterile processes require that a guaranteed sterilisation temperature is maintained for a defined period in the whole production system and that the risk of product contaminations through periodical sys-

tem errors in the mechanical processing cycle is eliminated or clearly indicated (e.g. particles from usage of seals, dirt particles in small gaps, sterility leaks in the cooling water of mechanical seals, etc.). With Krieger's technology, the Molto Mat can easily be upgraded to process products in these highly sterile conditions.

Some features used by Krieger to establish a sterile processing environment:

- Direct steam entry via rotating spray balls of CIP/SIP system
- Temperature assurance system on critical points
- Condensate draining system
- Drying of the vessel cover through the rotating CIP/SIP spray balls
- Sterile filters on utility connections
- Special design of valves and energy connection tubes
- Sterilisable mechanical seals with sterilisable cooling lubrication system
- High speed dry running mechanical seals with particle traps
- Gearbox with controlled single sealing point
- Etc.



Controlled Single Sealing Point

The Krieger counter-rotating gearbox with integrated CIP and SIP system reduces the critical sealing points encountered in processing equipment to only one. This remaining sealing point has two mechanical seals and can be fully sterilised. The mechanical seals can run dry with special high-speed mechanical seals or can be cooled with a sterile liquid.

The entire sterilisation process of this gearbox can be monitored and documented before and during the production process providing the highest "sterility assurance level" available on the market today.



MMD 600 with outer agitating arm, high-speed shear blade and gearbox with controlled single sealing point. Fully sterilisable, used for ophthalmic applications.



MMD 30 for sterile applications

Automation/PLC Controls – Recipe Handler & Data Logger

To facilitate the operation of the machines and to avoid operator errors, Krieger mixing & homogenising systems can be controlled by PLC. Different recipes with all the specific requirements necessary for the production process can be stored on the machine's PLC or on a connected computer. The CIP and SIP processes can be integrated with the option to clean the machine overnight. Different automation platforms can be chosen in order to integrate best with the customer's existing automation philosophy. New is the PC based recipe handler and data logger. After establishing a link between the PLC of the machine and a remote PC, complete recipes can be written and filed in the recipe handler software. The selected recipes can then be transferred to the PLC of the Molto Mat where they are available for the operator. With the link in place the PC functions as a data logger during the production process, registering all operations, alarms and manual operator interventions for each processed batch (executed recipe).

The recorded information is compatible with MS Office® software. The recipe handler and data logger are a real support for the production of validation documents.



Molto Mat Link

Another useful help in the scale-up and validation process is provided by the Molto Mat Link. The Molto Mat Link is a software that enables the transfer of the data captured or produced by means of the recipe handler from one machine to another PC (mostly over a network) which can write this data to the PLC of the next machine. As such the databases produced in research and laboratory can directly be transferred to production machines by means of the Molto Mat Link. Due to our Molto Mat Link, Krieger customers can facilitate the scale-up process and save valuable time in the validation process.



Bio

Our excellent reputation as a vessel builder and our know-how in processing, sterilisation and automation have opened new opportunities in the BIO market. The individual design of the fermentation vessels, the extremely fine interior finish, and the sterilisation features of the equipment appeal to numerous customers.



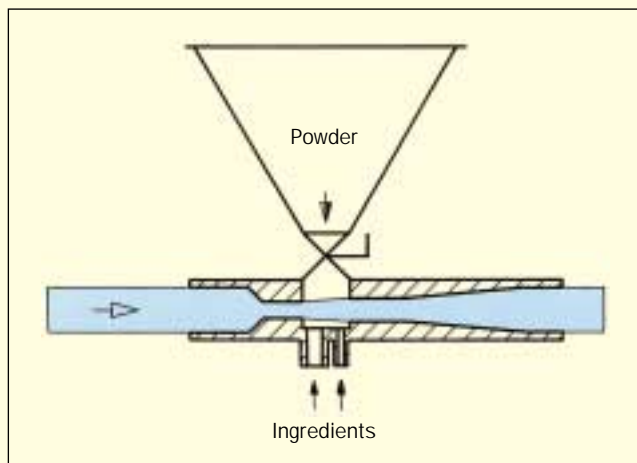
Powder Feed Station

The powder feed station is specially built to add large quantities of powder to liquids and semi-solids. The system brings the product flow into a jet stream in which the powder is continuously injected. The powder is then carried off in particles in the jet stream



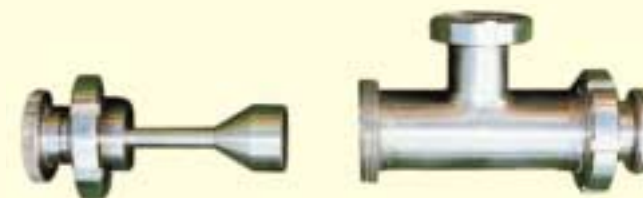
and is moisturised simultaneously. The mobile station can be used with every Molto Mat or with separate vessels. The powder feed station is the ideal tool for smooth and fast powder introduction with exactly repeatable results and colours. Both liquids and powders can be added.

Important applications are pharmaceutical syrups and suspensions, decorative cosmetics, and a wide range of food applications.



In the large Jet Feed Injector the powder is injected into the generated jet stream.

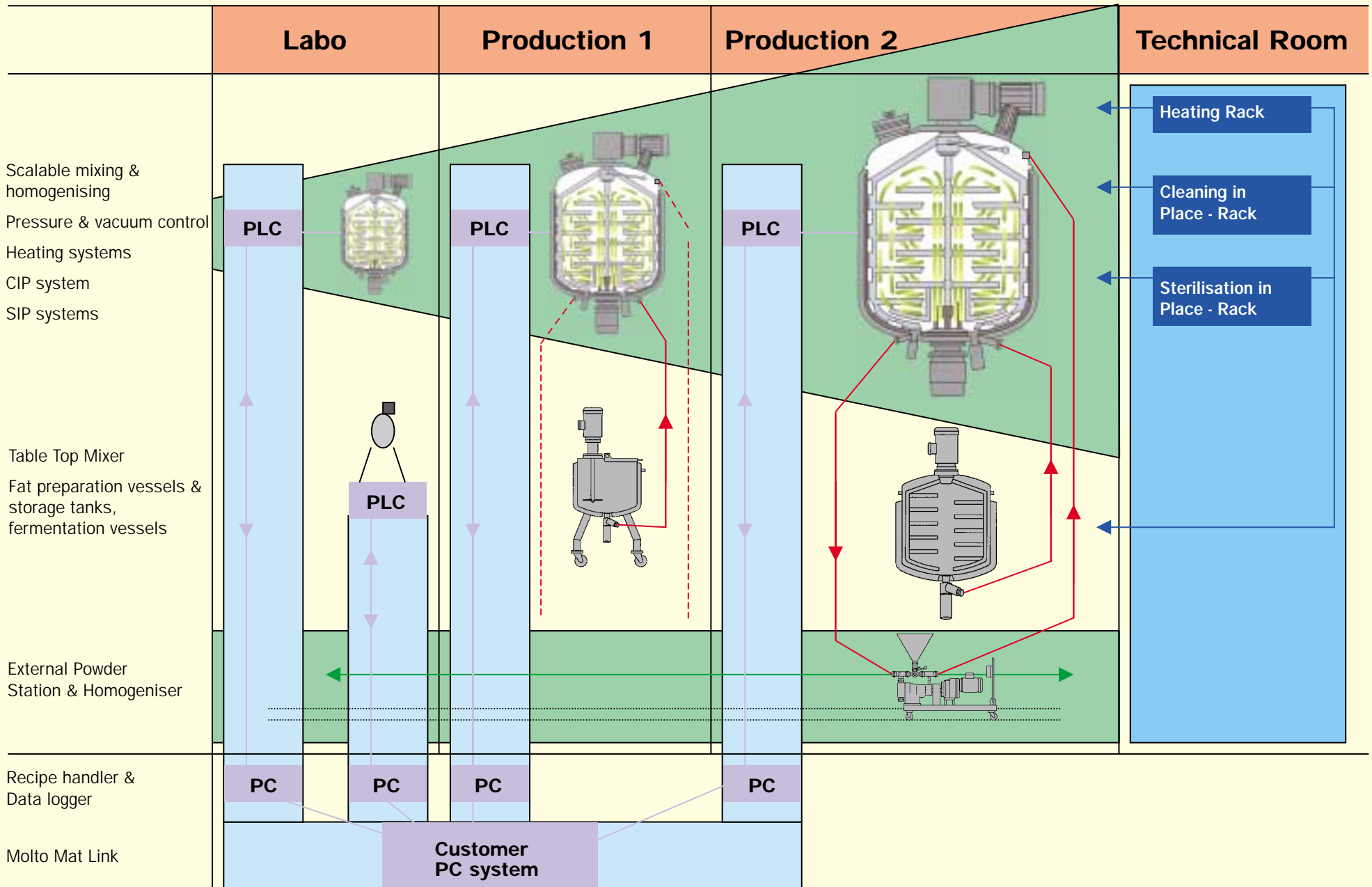
External Homogeniser CVTR



The in-line homogeniser CVTR homogenises the product flow by creating a heavy turbulence in which the product is bounced back and forth between the CVTR housing and an interlocked toothed face plate. This intense product movement onto the specially shaped edges of the face plate creates a superbly homogenised product of which the resulting drop size can be exactly defined by varying the space between homogeniser housing and face plate.

In comparison with traditional external homogenisers that cut the product (rotor/stator principle) the CVTR works on a natural principle "action and reaction" to decrease the particle size of the product. The CVTR is therefore ideal to process shear sensitive products. As the construction has no motors and special sealing points, the CVTR is the ideal homogeniser for sterile applications. The external homogeniser CVTR can be used in a recirculation pipework with any existing vessel, together with the powder feed unit or together with the Molto Mat in controlled single sealing point design.

The Krieger Integrated Liquids/Semi-Solids Processing System





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