

# SYSTEM SOLUTIONS FOR THE COSMETIC INDUSTRY



**ALWAYS THE RIGHT MIX**

**COSMETIC INDUSTRY –  
INNOVATIONS FOR A MORE BEAUTIFUL LIFE**





# PROCESS SOLUTIONS FOR PRODUCT-SPECIFIC APPLICATIONS



## **Cosmetic – a worldwide demand**

Immaculate beauty and eternal youth – these are the desires which lead enthusiastic customers around the world to reach for cosmetics. Customers spend about 15 billion euros every year in Germany alone for beautiful hair, a bright white smile, a radiant complexion or other health and beauty aids.

Although the cosmetics industry belongs to the chemical industry, it has its own separate, unique character because many of its products literally get under the customer's skin – or on it. Yet, the target group's direct, personal sense of well-being always plays the decisive role. Therefore, product quality is always first priority.

## **Lödige provides solutions**

For this reason, the production of cosmetic products worldwide is subject to the absolute highest standards regarding safety, purity and reproducibility – and is therefore predestined for our systems. All Lödige solutions are always developed, manufactured and certified in accordance with the international valid directives. Particularly for the versatile applications used in the field of cosmetics manufacture. These quality standards form the basis of the Lödige system solutions for the cosmetic industry around the world.

We bring constantly our competence to our close cooperation with representatives of major manufacturers of cosmetic products and thus make an innovative contribution to the latest cosmetic developments.

# LÖDIGE SYSTEMS PRODUCE **INTERNATIONAL** **QUALITY PRODUCTS**

## Solid applications



- Face powder
- Pigments of every type



- Hair coloration
- Decorative cosmetics in general



- Eye shadow
- Eyeliner

## Liquid/pasty applications



- Toothpaste



- Mascara



- Lipstick ingredients





# BATCH MIXING OF SOLIDS IN A HORIZONTAL SYSTEM

Invented by Lödige, the Ploughshare® Mixer has set a high standard for mixing and processing technology. It is the perfect choice when it's about performing a homogeneous mixing within minimum time. Large numbers of patented innovations based on this system prove the high potential capacity of this technology.

Ploughshare Shovels® arranged in a special way on a horizontal shaft are the heart of the mixer. These mixing elements rotate in the horizontal, cylindrical mixing drum. The size, number and positioning, geometric shape and peripheral speed of the mixing elements are coordinated to cause three dimensional movement of the components. Turbulence in the product, with total involvement of all material, prevents the formation of dead or low-movement zones in the mixing drum. This ensures high speed, precision mixing. The specially shaped shovels lift the product radially from the wall of the drum to prevent particles from remaining between the mixing elements and the drum wall.

The mechanically generated fluid bed is therefore ideal for gentle mixing if fragile and heat sensitive components are included in the mix. Modified shovels can be optionally used for special applications or particular component characteristics. These achieve an optimal effect even in the case of very fragile products.

In special cases, in particular when dispersing pigments or introducing liquid binders, the effect of the mixing elements may require additional support. This is provided by separately driven, high speed choppers. In this way, a short mixing time with optimum adaptation of the drive power ensures minimized power consumption.

The low-maintenance concept of Lödige Mixers guarantees maximum availability of production units. This is achieved by an elaborate design: all inside parts are easy to access and can be inspected and cleaned in a simple manner.

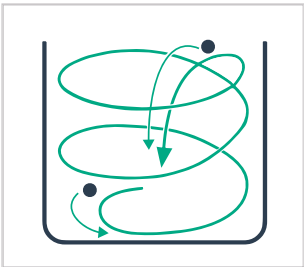
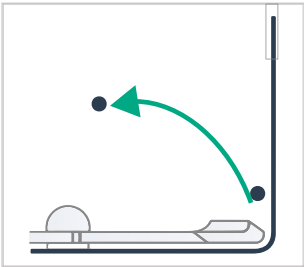
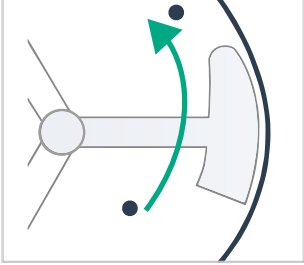


Schematic representation of the fluid bed generated mechanically

Lödige Ploughshare® Mixer type FKM for batch operation for small production and laboratory purpose



# BATCH MIXING OF SOLIDS IN A VERTICAL SYSTEM



Mixing principle  
in the Mixing Granulator MGT

Mixing Granulators (MGT) are standardized systems compliant with all GMP / WIP design requirements. They are extremely easy to clean and require a minimum of maintenance. A three-arm mixing impeller rotates close to the base of a vertical, cylindrical mixing drum. The special form of this element and its peripheral speed are coordinated in such a way that the mixing product is circulated as vortex and thereby accelerated horizontally and vertically. This type of product movement produces a high-speed, intensive mix, even in cases where the granular structure and shape, bulk density and surface condition of components differ considerably. High quality mixing is ensured in minimum time.

If necessary, a high-speed, separately driven chopper disperses any lumps and promotes uniform liquid distribution and moist granulation. The endpoint of granulation can be controlled and reproduced as required. Liquid addition is carried out by gravity or with a pump. The liquid is added into the mix right above the chopper in order to achieve best possible distribution. The liquid can be just filled in or introduced by means of airless or airborne nozzles. The optional wet sieve placed at the discharge ensures the calibration of the wet granules while discharging from the mixer.



Mixing tool which can be raised up



MGT with sieve downstream



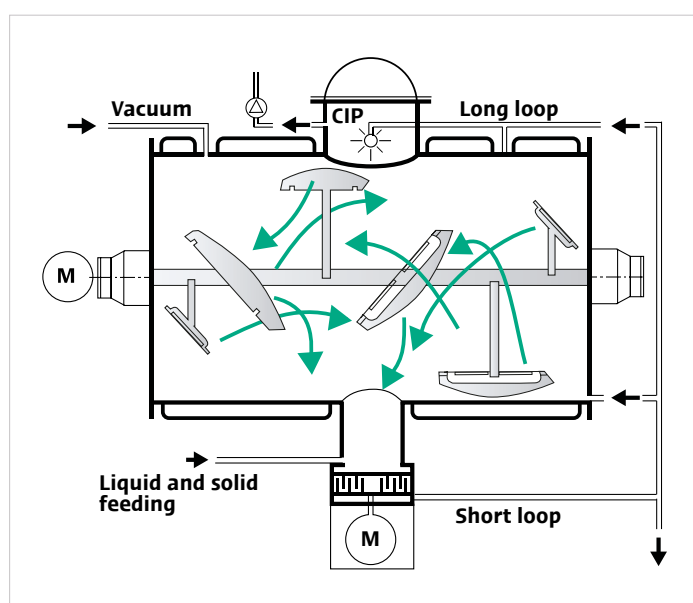
# MIXING, DISPERSING AND EMULSIFYING IN A HORIZONTAL SYSTEM

Lödige Ploughshare® Mixers with scrapers combine the horizontal mixing system with homogenizer technology in accordance with the rotor-stator principle to provide a new mixing and emulsifying system of high performance and efficiency. Furthermore, this concept is convincing due to its minimal construction height and an excellent heat transfer, specifically with regard to large batch sizes. The creation of very fine similar sized drops and their homogeneous dispersion are important criteria in the emulsifying technology.

The production of semisolid and paste-like products has been mainly performed in vertical systems until now. However, these systems have certain disadvantages due to their form. Mixing performance, heat exchange via the heated/cooled jacket, deaeration, cleaning as well as the sometimes large construction height of vertical systems are not optimal and often influence negatively the efficiency of the process. Based on the practice-proven mixing principle of the horizontal Ploughshare® Mixer, these systems have been made suitable for processing semi-solid and pasty products like creams, tooth paste, hair wax, etc. by modifying certain technical features to adapt to the new application.

This consists mainly of the installation of a high performance homogenizer in place of the normal mixer discharge. This homogenizer, flanged in the discharge, is a high-speed rotor-stator system. Furthermore, the horizontal mixing shaft is fitted with wear resistant scrapers which move along the mixer wall.

This machine is usually equipped with a heating/cooling jacket and is also suitable for vacuum operation for deaeration of the product. Due to the pumping capacity of the homogenizer, the product is reintroduced into the drum via a recirculation loop ensuring that all material passes through the rotor-stator system. The discharge of the product is also carried out via the rotor-stator system.



Functional principle



Pilot machine 130 I

# HYGIENIC DESIGN FOR LÖDIGE MIXING SYSTEMS

Lödige demonstrates a broad know-how not only in the field of mixing solids. For instance hygienic requirements imposed upon the Ploughshare® Mixers are consequently taken into account by design. In case of hygienic production, an optimal ease of cleaning has to be considered without influencing the functionality of the machine and some machine components are particularly important for this purpose. The mixing elements and the choppers have to be easy to clean and accessible. A large inspection door thus enables the inspection of the complete drum inside. Rinseable air purge seals or mechanical face seals are usually the best technical solution for the main shaft and the chopper seals. The product contact surfaces have a surface roughness of  $Ra < 0.8 \mu m$ .

Generally, surface roughness has to be smaller than the particle size of the material adhering to the surfaces in order to achieve direct wetting of residue with the cleaning substances. Smoothed and polished surfaces are ideal. The surface can also be electro-polished to further reduce its roughness. In this case, the mixing elements are completely welded onto the mixing shaft and have the same surface roughness as the inside surface of the drum.

The shaft seals are purged with compressed air during the production process and prior to the product feeding steps. This prevents the product from penetrating into the gap static and rotating part of the sealing. The compressed air flow is controlled by a flow meter and can be monitored. The operator can check the air quantity and pressure at the Operator Panel.



Horizontal Lödige Ploughshare® Mixer type FKM 1200 DR



Fully welded mixing elements in hygienic design



Operator Panel and service unit for seals in hygienic design



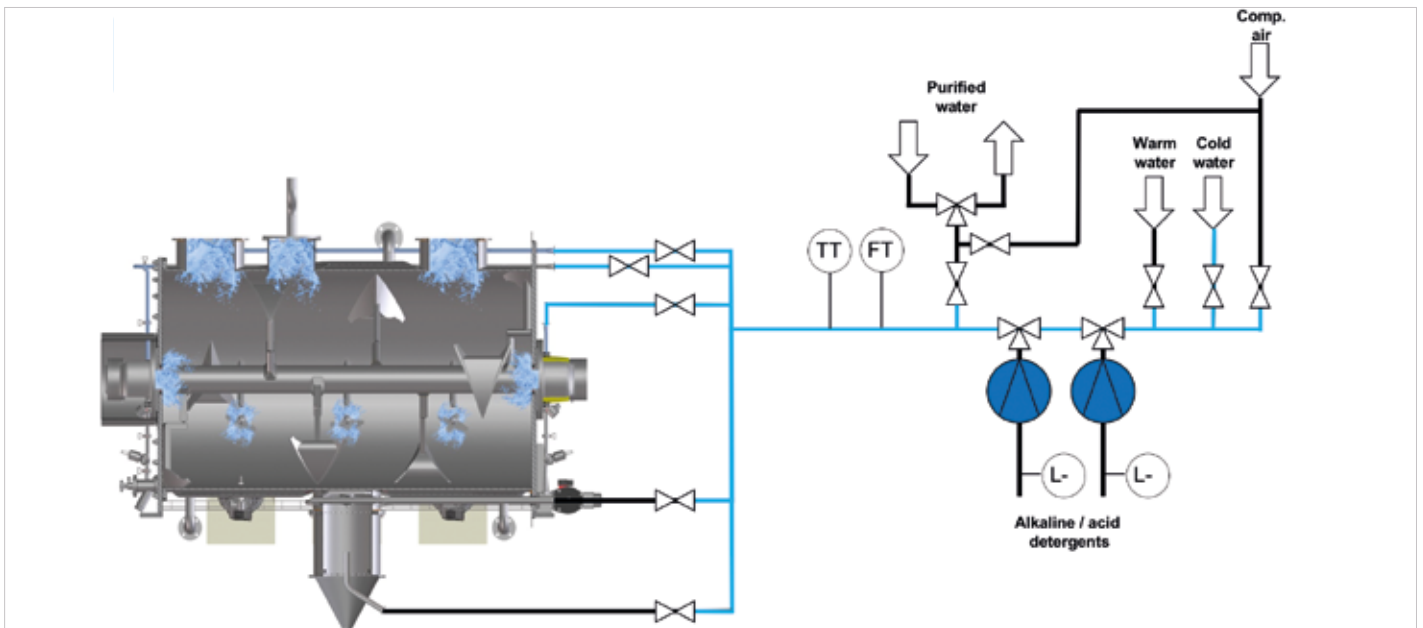


# AUTOMATIC CLEANING PROCESSES

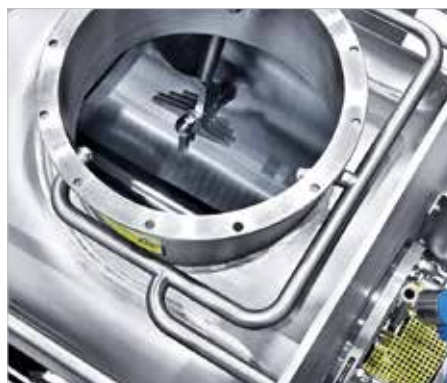
Lödige provides not only the classical manual dry and wet cleaning, but also automatic wet cleaning processes which can be customised. By definition, the so-called Washing in Place (WIP) is an automatic cleaning but some manual preparations are still required to perform this.

The Washing in Place is processed as follows: all shaft seals are purged with water and therefore equipped with drain valves. The feeding and discharge are cleaned by means of rotary nozzles which are installed on a removable washing adapter. During cleaning, the main shaft runs forwards and backwards at intervals.

The ventilation filter has to be cleaned separately. The opening is closed with a washing adapter. A drain funnel can be docked onto the machine outlet in order to drain off the wash water. As an option there is the possibility to swivel the complete outlet to the side to clean the discharge door separately. After the wet cleaning, all mixer parts, seals, pipes and valves which have been supplied with water will be dried by conditioned compressed air.



Ploughshare® Mixer with stainless steel piping for efficient wet cleaning



Cleaning nozzles for WIP cleaning process



Coverings over bearing housing and motors ensure easy to clean surfaces

# MACHINES FOR RESEARCH, PRODUCT DEVELOPMENT AND SMALL PRODUCTION

Lödige machines for laboratory purpose work in accordance with the same principle as production machines and ensure reliable scale-up to production machine sizes.

Know-how concerning quality of the mix, product behaviour and process parameters can be scaled up without restriction. Small scale production can be therefore carried out in accordance with the same quality criteria.



Laboratory Ploughshare® Mixer with interchangeable drums



Laboratory Vacuum Dryer



Vertical Laboratory and Pilot Mixing Granulator



Ploughshare® Mixer type L50 with feeding funnel



# RESEARCH AND TEST CENTRE

The Lödige Research & Test Centre is equipped with the most modern machines for:

- Mixing
- Kneading
- Dispersing
- Emulsifying
- Wet granulating
- Drying
- Heating/Cooling
- Coating

to ensure testing under production conditions and in compliance with hygienic conditions.

The Lödige Research & Test Centre with floor space of more than 400 m<sup>2</sup> provides trial capacity for more than 30 machines including a laboratory for physical analysis. A separate area is dedicated to cosmetic trials.



Among others, we use the following machines for test purpose:

## Ploughshare® Mixer FM



### Process

- Mixing
- Granulating
- Moistening
- Adding fat
- ... and more

### Machine sizes

- L 5
- L 10
- L 20
- L 50
- FM 130

## Ringlayer Mixer CoriMix® CM



### Process

- Mixing
- Granulating
- Densifying

### Machine sizes

- CM 5
- CM 20

## Mixing Granulator MGT



### Process

- Mixing
- Granulating
- Wet granulating
- Drying

### Machine sizes

- MGTL 5
- MGT 30
- MGT 70
- MGT 125



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Lödige offers high-quality partial systems and service for process engineering applications in various industries in the fields of mixing, granulation, coating, drying, reaction and related processes. Our motivated employees and their expertise in processes, development and production are the key to our success and the success of our partners all over the world. Focusing on core industries and proximity to our customers through local presence is a crucial component of the positive development of our company.

Lödige, which was founded in 1938, is a family-run business in its third generation now. With the invention of the Ploughshare® Mixer, Lödige created a mixing unit that can cover a wide range of different processing tasks. This unit forms the basis for numerous innovations in the area of mixing and processing technology. Industrial mixing and processing technology has been significantly influenced by Lödige and will continue to be so in the future.

Over 500 patents and more than 35,000 machines and systems demonstrate our experience with customer-oriented system solutions. Lödige operates with more than 500 employees worldwide and supports its customers with a network of subsidiaries, technical offices and agencies.

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