LÖDIGE
PROCESS TECHNOLOGY


# Mixing systems for the Food Industry

**LÖDIGE – ALWAYS THE RIGHT MIX**

# Lödige mixing systems for the production of international, high quality products

Lödige systems provide the mixing and process precision essential for optimum design of a wide range of production. Our customers include producers of well-known food brands and our systems are used worldwide due to their efficient, cost-effective and optimum processing concepts.
Lödige processing systems for the food industry have been developped on the basis of wide ranging experience in the production of mixers and processing units in this specific branch. This is backed-up by process technology know-how obtained from innumerable mixing trials.

**Processing powders**

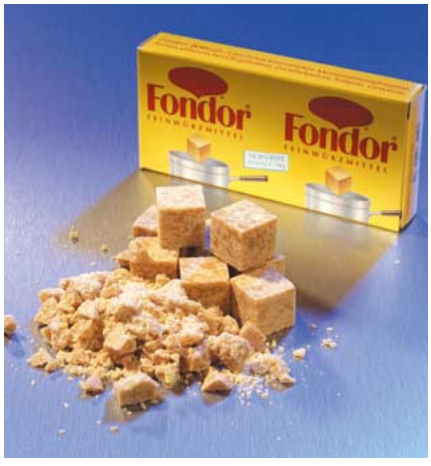
- vitamin powder
- ice cream powder
- flavourings
- oven-ready flour mixes with addition of fat and lecithin
- flour
- milk / whey powder
- enzymes

**Processing granulates, grains or powders containing pieces**

- table salt
- convalescent preparations
- stock cube mixes
- special diet foods
- coffee and tea extracts
- oven-ready mixes
- soluble fruit drinks

**Processing fragile materials**

- muesli
- instant, dried soups
- spice mixes with concentrates
- tea mixes
- dried vegetables
- frozen fruit and vegetables


# Combined processes

**In addition to the classical process step of pure mixing, it is also technologically possible to combine all additional processing steps usually required by the food industry in a single Lödige Mixer. This means, for example, that work intensive premixing is unnecessary.**

- alkalinization
- fat intermixing
- moistening/coating
- conching
- heating
- homogenization
- iodizing
- crystallization
- cooling
- lecithinizing
- mixing/granulating
- pasteurizing
- fusion granulating
- sterilization
- drying
- coating
- compacting
- melting in polyphase processes

... and many more

**Processing viscous products**

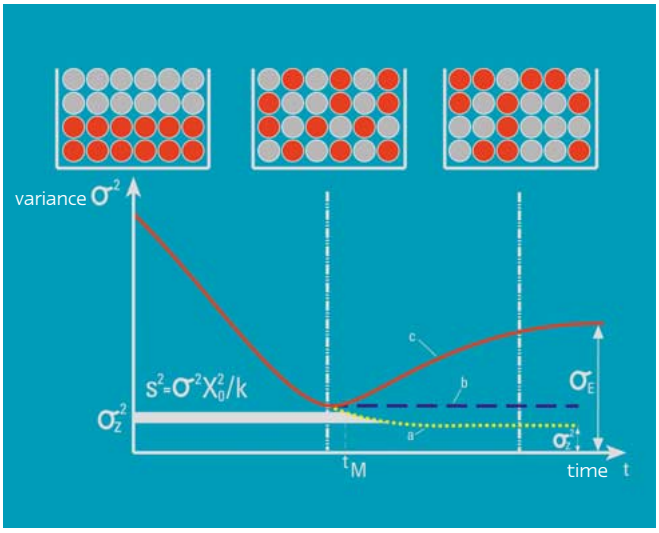
- sauces containing pieces
- basic fruit pulps
- chocolate ingredients
- wafer fillings etc.
- glazings
- cheese spread ingredients
- cooking fat
- margarine
- other emulsions and pastes
- baby food
- creams / dressings
- mustard

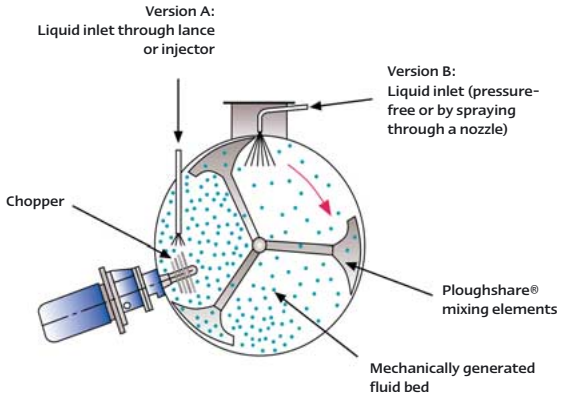


# Batch mixing and granulating in a horizontal Lödige system

**The invention of the Ploughshare® Mixer has set a high standard for mixing and processing technology. Large numbers of patented innovations are based on this system. Lödige Mixers guarantee homogeneous, precision mixing within minimum mixing times.**

Ploughshare Shovels® rotate as mixing elements in special arrangement on a horizontal shaft in a 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 and promotes high speed, precision mixing.
The specially shaped shovels lift the product radially from the wall of the drum to prevent particles from becoming squashed between the mixing elements and the drum wall. The hurling and whirling principle is, therefore, ideal for gentle mixing if fragile and heat sensitive components are included in the mix.




Horizontal Lödige Ploughshare® Mixer operating on the hurling and whirling principle

Modified Ploughshare® Shovels – so called Becker Shovels – can be used for special applications or particular component characteristics to further intensify this effect.
In special cases, in particular in combined processes, the effect of the mixing elements may require additional support and this is provided by separately driven, high speed choppers.
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. The excellent accessibility to all inside parts of the mixer reduces considerably the time and expenditure for cleaning and inspection.
The mixers can be adapted as an option to WIP/CIP processes and therefore provide the highest standard of hygiene for even the most difficult, microbiological components.

# Individual production yield due to precise configuration of the system

**Lödige systems produce maximum homogeneity of even the most difficult products. Quote*: "... Ploughshare® Mixers, running at the appropriate speed, are the most suitable... The best possible mixing quality is obtained under production conditions after only 16 seconds. In vertical ribbon blenders products are mixed more slowly and the quality of the end mix is poorer than that obtained in Ploughshare® Mixers."**

**** Lebensmitteltechnik 3/2000***

**Ploughshare® Mixer type FKM**

**Batch Mixer type Easy Clean**

**GMP® Mixer**

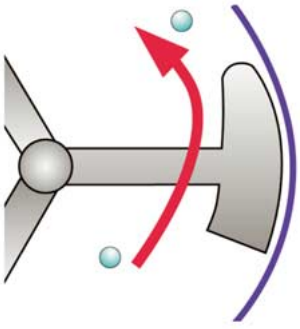
**Batch Mixer type Eco Line**

**Batch Mixer type FKM with 2 inspection/cleaning doors**

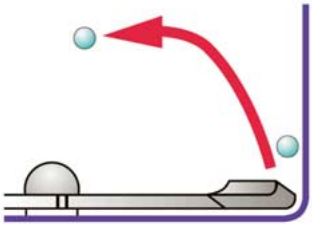
# Batch mixing and granulating in a vertical system

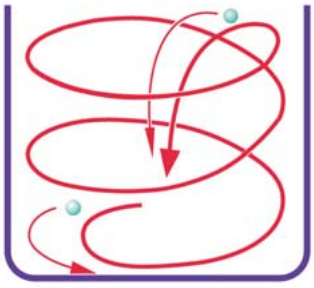
**Mixing Granulators are standardized systems compliant with all GMP / WIP design requirements.**
**They are extremely easy to clean and require a minimum of maintenance.**

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 granulation endpoint can be determined precisely.
The MGT of series "S" are "Single-Pot-Machines" with heated jackets and vacuum design for mixing, granulating and drying in one single machine.



The concept of the Lödige Universal Container Mixer is based on the vertical Mixing Granulator.
This mixing process is characterized by an excellent traceability of each batch. The product remains in the same container starting with weighing of the raw material until discharge of the end product and is therefore protected against contamination.
This is a vital feature particularly for the food industry (see EU regulation No. 178/2002).





**The Universal Container Mixer is a flexible system designed for small scale production. The weighing, transportation, feeding, mixing and discharging take place in one single vessel, with minimum dust. This mixer is designed for quick and minimized cleaning, suitable for frequent change of product.**

The mixing impeller can be raised up

Mixing Granulator
type MGT
with swivelling lid

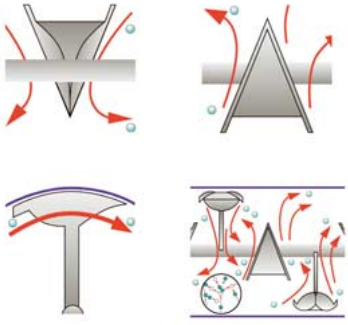
Universal Container Mixer
with product container in
position

# Continuous mixing and granulating in a horizontal system

**The continuous Ploughshare® Mixers operate on the hurling and whirling principle introduced to mixing technology by Lödige. The mixing elements are specifically adapted to individual applications. This mixing system achieves high throughputs which can be varied dependent upon residence time, filling degree and product properties.**

The resultant individualisation of the particles in the mix (fluid bed) allows the addition of liquids and coating of the particles in a continuous process too. The continuous process is operable at filling degrees between 20 and 50 % without influencing the mix quality. The mixing elements are adjustable in order to achieve constant backmixing during the residence time prior to discharge the mixed product via the outlet.
The adjustment of the size of the discharge opening by means of a slider or a weir has a direct influence on the residence time.
Dosing fluctuations due to the plant operation can be compensated by this system.

**Continuous unit for the production of salt comprising weighing and dosing system**

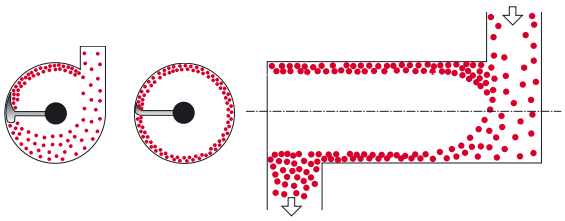


**Continuous Mixer, type KM-D with adjustable slider in the discharge chute**

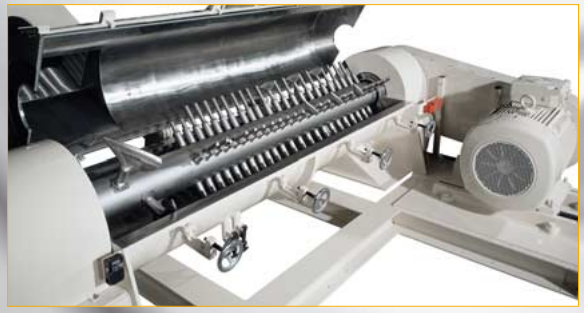
# Mixing and processing in a continuous ringlayer system

**The Lödige High Speed Continuous Mixer CoriMix® CM excels with wide range of applications for mixing, humidifying, granulating and densifying processes. The systems produces constant product quality and provides controlled granulation.**

The system is based on the high peripheral speed of the mixing shaft of up to 40 m/s, the resultant centrifugal force forming an annular layer of product.
The profile of the annular layer features a high mixing intensity, which is caused by the high differential speed between the rotating specially shaped mixing tools and the mixer wall.
The product is moved through the mixing chamber in a plug-like flow, with the residence time being influenced by the degree of filling, the rotation speed, the geometry and adjustment of the mixing tools as well as the mixing drum length and the volume flow rate.
The system offers the possibility to divide the mixing chamber into zones of different shear intensity, thus permitting system optimisation for varying product properties.
The liquid components are directly introduced into the annular layer. This ensures a homogeneous distribution within the mixture and avoids wetting of the mixer wall and mixing shaft.
CoriMix® systems provide optimal cleaning as the mixing drum is divided axially over the entire drum.
High feed rates are achieved with machines of compact design (e.g.Type CM 20: 20 – 200 kg/h.)



**CoriMix® CM 175 with liquid addition from the outside**



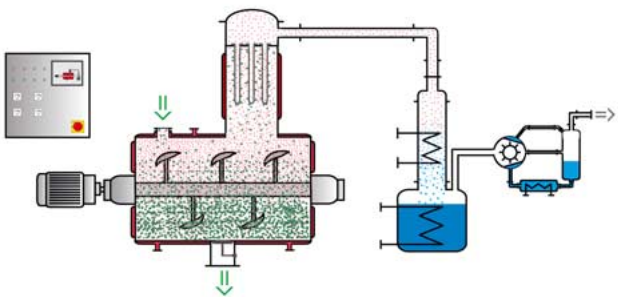
**CoriMix® CM 50 with liquid addition from the inside (hollow shaft)**

# Drying in a DRUVATHERM® Vacuum Shovel Dryer

**Lödige horizontal drying systems ensure precisely reproducible, constant and reliable processes. All shovel dryers variations can be manufactured in containment design.**

The large product surfaces produced in a mechanically generated fluid bed increase heat exchange whilst greatly reducing processing times. Intensive and homogeneous mixing prevents the development of temperature and moisture gradients in the product and increases at the same time the contact frequency and thereby the heat exchange between product particles and heating jacket. When drying is carried out under vacuum, the process can be run at low, product-protecting temperatures.
A high temperature gradient is obtained between the product and the heating jacket resulting in the effective introduction of heat.
Mixing and drying processes can be run with high precision ensuring the reproduceability of a product formulation.

Shovel dryers up to 1200 l total volume are constructed with only one drive-end bearing.
Larger dryers are rather built with pull-out mixing shaft.



**Vacuum Shovel Dryer type VT with one drive-end bearing**

**Vacuum Shovel Dryer with pull-out shaft**

# Drying, granulating and coating in a Fluid Bed Processor

**The Lödige Fluid Bed Processor LFP provides a wide range of options ensuring customizing to your production requirements and specific product properties. The LFP is available in different sizes suitable for batches from 0,1 to 1800 kg and for optimal selection of the requested capacity.**

The Fluid Bed Technology of the Lödige LFP achieves constant and reproducible product quality while ensuring gentle process in short process times. Processes ranging from powdery materials to free-flowing materials can be carried out as well as the drying of moist products. Powders, granulates and other shapes can be coated in this system too.

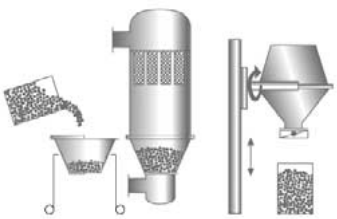
During the process, heated air – in defined quantity and speed – continuously flows through the special designed vessel bottom (Conidur® bottom) into the product vessel. The product starts to fluidize and can be dried or moistened and granulated, depending on the application.

Tangential spray nozzles or a Wurster system are used for coating pellets. Integrated filters hold back the powder particles in the processor. The particles are retained in the process by continuous filter cleaning.

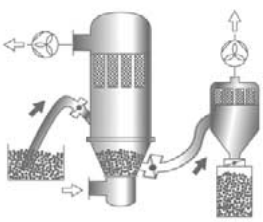
**Fluid Bed Processor type LFP 140 for production**

**Fluid Bed Processor type LFP 8 for development and small batches**

**Manual product handling**



**Pneumatic product handling**



# Unitherm systems for homogenizing and thermal processing of paste-like and crystallizing products

**The production of high-quality products with specific properties requires defined control of the units. Unitherm systems comply precisely with these requirements.**
**High throughputs and uniform crystal structure – combined with a homogeneous product structure – are achieved by using a fully automatic evaporation system and having optimal mechanical influence on the product.**
**The process steps cooling / crystallizing / pasteurizing / sterilizing, with the possibility of introducing solid components, are carried out in one system.**

**Unitherm RW 2-375/1800**

**Unitherm RW 4-180/1800**

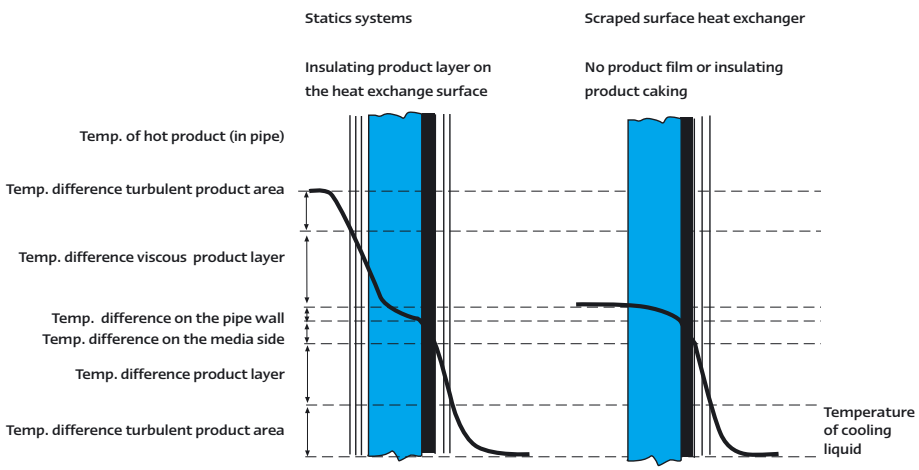
**Unit 2 RW 2-250/2100-2PM**

A shaft fitted with knives rotates in a horizontal, heated/cooled cylinder. These knives continuously scrape product from the inside of the heat exchanger surface to prevent product caking, crystallizing and burning on the inside wall, whereby an effective heat transfer is achieved.
Heat transfer is influenced by:

- Material of construction and wall thickness of the cylinder
- Product properties (e.g. viscosity)
- How frequently the product is scraped from the wall (speed of the knife shaft, number of rows of knives)
- Heat transfer of the heat medium
- Temperature difference between heat medium and product.

The system is designed for pressure up to 120 bar and is suitable for processing products with a viscosity up to 1.000.000 mPas.
Even products with pieces up to 20 mm can be thermally processed.

## Resistance to heat transfer



# Machines for research, product development and small scale production

**Lödige laboratory systems 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 type L 5-10-20 with interchangeable drums

Vertical Laboratory Mixing Granulator type MGT-L 1 - MGT 30

Laboratory Ringlayer Mixer type CoriMix® CM 5

Laboratory Vacuum Dryer type VT 20

Fluid Bed Processor type LFP-Mini

Laboratory Scraped Surface Heat Exchanger type Unitherm RW2

# Automated production units


**Measurement and control techniques are developed and supplied according to requirement. Modular components enable the user to extend automation in sequences, including recipe administration and integration into the host controls. The operation of the unit can be carried out by means of PLC or PC based controls. Production and cleaning processes are freely programmable. All curves, events and errors are saved in a data base and are readily printed.**

A basic unit control includes a control panel, an electric cabinet and – if necessary – a pneumatic cabinet. The control panel is often placed next the machine and the cabinets are placed in the technical area.

**Electrical power part and pneumatic part**

This part contains all pneumatic and electric control elements like frequency converter, motor protections, PLC and PC, as well as modems for remote servicing.

**Measurement technology**

This includes measurement recording equipment and all elements for preparing measured values. All relevant parameters are recorded, like for example temperature, rotation speed, moisture, pressure, product and air quantity, etc.

**Control part**

The control part of each system consists of a monitor integrated in a suitable housing. Either a PLC with Operator Panel is used or a PC-based system (Windows with visualisation system Win CC). The PC controls usually contain the following modes:

- *Service mode* for the separate control of all functions
- *Manual mode* for preparatory tasks
- *Learn mode* for creation of recipes
- *Recipe mode* with fully automatic execution of a recipe created in learn mode ore stored.

The controls are designed for a recipe administration up to 200 recipes and protocols.

# Lödige Pilot Plant

**The Lödige Pilot Plant is equipped with the most modern machines for:**

- **Mixing**
- **Wet granulating**
- **Drying**
- **Cooling / Heating**
- **Coating**

**at production conditions and in compliance with hygienic conditions.**

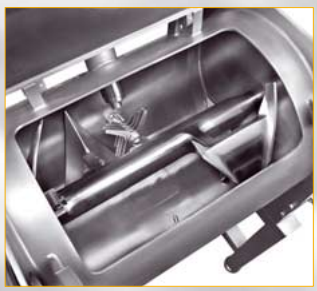
**Laboratory and Pilot Plant**

The Lödige Pilot Plant of more than 400 m² provides trial capacity for more than 30 machines including a laboratory for physical analysis. A separate area is dedicated to food trials. The pilot machines are designed for the production of small batch sizes under production conditions. All machines are suitable for WIP / CIP.

**Ploughshare® Mixer FM 130**

Working volume 90 l

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



**Mixing Granulator MGT 125**

Working volume 90 l

- Mixing
- Granulating
- Wet granulating
- Drying

**Laboratory Ringlayer Mixer CoriMix® CM 5**

Throughput up to 240 l/h

- Mixing
- Granulating
- Densifying

**Fluid Bed Processor LFP 70**

Working volume up to 140 l

- Drying
- Granulating
- Coating

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