



SYSTEM SOLUTIONS FOR THE PLASTICS AND RUBBER INDUSTRY



ALWAYS THE RIGHT MIX

PLASTICS INDUSTRY – INNOVATIONS FOR A BETTER LIFE





COST- AND ENERGY-EFFICIENT SOLUTIONS BY LÖDIGE

SOLUTIONS FROM LÖDIGE

Lödige supplies machines and systems for the following applications:

- Compounding
- Coating
- Wet mixing
- Friction mixing and
- Process-specific solutions in high performance units.



We deliver product specific mixing and processing systems that guarantee the best product qualities, long term availability and economic production. Functional mixing and processing systems – whether used for commodities or for special products – must be cost and energy efficient.

The plastics industry is a key industry in Germany

With an annual turnover of almost 70 billion euros and more than 300,000 employees, the plastics industry is one of the most important sectors of the German economy - and the number one in Europe.

Whether PET bottle, window frame or steering wheel, laptop or syringe - plastic products are an integral part of our lives. Accordingly, the plastics industry's innovative solutions are indispensable for numerous important sectors, from automotive and mechanical engineering to the packaging industry, electrical engineering, the construction industry and medical technology.

In order to remain competitive in the face of changing market conditions and increasing demands on the quality of products and their cost- and resource-saving manufacture, the efficiency of the processing methods used will become even more important in the future. Innovation potential lies above all in the use of novel technologies for material conversion. The preparation and mixing of the various materials play a central role in this.

Lödige provides the solution

For years Lödige has accompanied developments in the plastics industry with future-oriented systems which create measurable user benefits through precise configuration.

In addition to conventional processes, special applications for special products as well as sophisticated processing methods are increasingly in demand in the plastics processing industry. Handling these materials requires a high degree of experience and comprehensive knowledge of the specific properties of the components in order to be able to develop optimum mixing and preparation systems. Based on our product and process engineering know-how, we optimize together with the customers the necessary process and system technology. High quality machines, service from experienced professionals and a competitive price: this makes Lödige a valuable partner for the plastics processing industry. Decades of close cooperation with renowned manufacturers are proof of this competence: the result is more than 6,000 systems realized.

PIONEERING SYSTEMS PRODUCED BY PRECISION CONFIGURATION FOR MEASURABLE USER BENEFIT

Lödige Systems provide the user with essential benefits

- Comprehensive solutions to save space on site
- High comfort with regard to cleaning requirements
- Excellent mixing and cooling performance
- Maximum availability for production
- Prevention of product damage
- Individual process-optimized solutions
- Extensive know-how in wear protection technology

Processing EPS



- Continuous and discontinuous coating with additives
- Recycling of foamed moulded parts

PVAL processing



- Cold and hot water soluble foils

Masterbatches / Coating Powder



- Cold colouring
- Coating of powders or granulates with pigments
- Colouring with the introduction of friction heat
- Bonding of coating powders
- Dryblending of coating powders
- Colouring of plastics
- Toner processing

Processing polyolefins



- Continuous basis stabilization of PE/PP
- Crosslinked PE
- Talcum and chalk filled compounds



PIONEERING SYSTEMS PRODUCED BY PRECISION CONFIGURATION FOR MEASURABLE USER BENEFIT

Processing solvent-based adhesives



- Solvent-based adhesive
- Medical adhesive
- Medical plaster with active agent
- Acrylic resin dispersions
- Hot melts

Powder Injection Moulding



- Ceramic Injection Moulding
- Metal Injection Moulding

Processing rubber and caoutchouc



- Rubber granulate from used tires
- SBS compounds
- Rubber solution
- Bitumen
- Stabilizers

Additional applications



- Production of plastisol
- Processing of polyamide
- Conditioning of super absorber

TECHNOLOGY THAT SETS NEW STANDARDS: DISCONTINUOUS MIXING AND GRANULATION IN A HORIZONTAL SYSTEM

By inventing the Ploughshare® mixer, Lödige has revolutionised mixing and processing technology. Numerous patented innovations based on this system are proof of the incredible potential of this technology.

The heart of the mixer is a special systematic arrangement of Ploughshare® shovels on a horizontal shaft. They rotate in a horizontally fitted, cylindrical mixing vessel. The size, number, positioning, shape and circumferential speed of the elements are adapted to each other such that they cause a three-dimensional movement of the components during the mixing process. During this process, the mixture is continuously gripped by the mixing tools.

This reliably prevents dead space or low-movement zones, while guaranteeing quick, precise mixing action.

Due to the special shape of the mixing elements, the mixture is removed from the vessel wall during the radial movement, thus preventing the crushing of particles between the vessel wall and the mixing tools. This mixing principle is perfect for mixing processes involving components that differ in their bulk weight, grain size, rheological characteristics and percentage of mass.

Especially for the materials being processed in the petrochemical sector, modified ploughshare-like shovels, also referred to as “Becker shovels”, achieve this effect even more specifically. Some mixing tasks necessitate supporting the mixing effect of the mixing elements. For this purpose, separately driven choppers rotating at high speed are installed.



Ploughshare® mixer for batch operation type FKM 1200

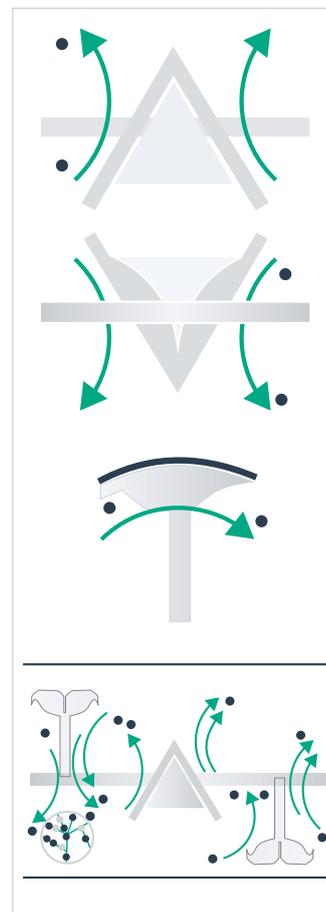
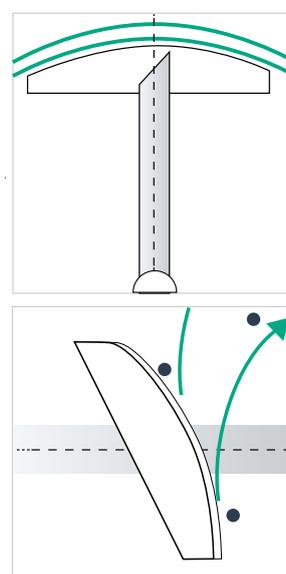


Diagram of the mechanically generated fluidised bed



Becker-Shovels



CONTINUOUSLY OPERATING HORIZONTAL SYSTEMS

Mixing and Granulating in the Ploughshare® mixer

The Ploughshare® mixer is also available for continuous operation. Equipped with tools that are specifically adapted to the particular task, it produces mixtures of the highest quality. The high throughput rates achieved in continuous production can be varied based on dwell time, filling level and component properties.

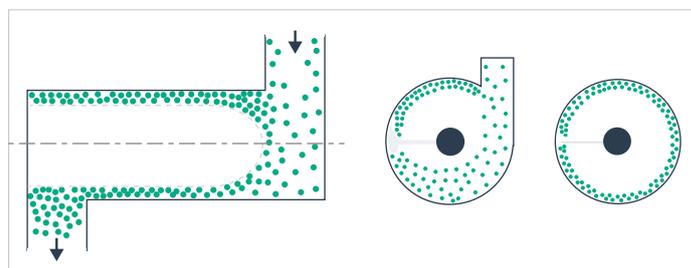
The continuous three-dimensional movement of mixture components in the Ploughshare® mixer ensures consistent separation of the particles in the fluidised bed. This makes it very easy to add fluids and coat the particles in a continuous process. The process can be performed with filling levels between 20 % and 50 % without any impact on the mixing quality.

The mixing units can be set to perform constant re-mixing even during the dwell times. This guarantees that the mixture keeps moving at all times until it is drained through the discharge opening for further processing. The duration of dwell times can be adapted to the specific requirements. The size of the discharge opening, which can be regulated using slides or an adjustable weir, has a significant effect on the dwell time. This reliably compensates for any system-induced dosage fluctuations.

Mixing and preparation in a ring layer system

Be it mixing, moistening, granulation or compaction – the compact Lödige ring layer mixer CoriMix® type CM is perfect for a particularly wide range of applications.

The operating principle of the CoriMix® type CM is based on its high speed: The mixing tool moves the product at up to 40 m/s. The resulting centrifugal force pushes the product into a ring layer with a high shearing intensity in its profile. This intensity is the result of the significant speed difference between the rotating, specially shaped mixing tools and the mixer wall. The filling level and speed, geometry and mixing tool settings as well as the mixing vessel length and volume throughput affect the dwell time of the components.



Principle of the ring layer mixer

At the same time, the system is highly variable: The mixing compartment can be divided into zones with different shearing intensities. This permits adaptation to the individual characteristics of the products being mixed. Liquid components are guided directly into the ring layer to ensure perfectly homogeneous distribution within the product. This also successfully prevents unwanted moistening of the mixing shaft and mixer wall. The cleaning process is also incredibly user-friendly: The drum of the CoriMix® systems can be opened along its entire length, making it easily accessible.



Ploughshare® mixer for continuous operation type KM 1200 D



Ring layer mixer CoriMix® type CM 2500

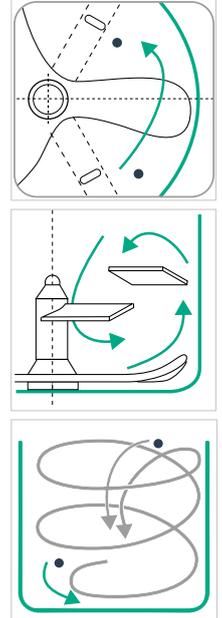
FUNCTIONAL PRINCIPLE OF LÖDIGE'S **MIXING AND PROCESSING SYSTEMS OF VERTICAL DESIGN**

Highspeed mixer type TSHK

Vertical mixing system for treatment processes with systematic heating of the mixture through friction and increased energy application of 0.2 - 0.5 kW installed power per kg of mixture. Additional heating by the double jacket is not required for most applications. The specific geometric arrangement of the mixing tools permits homogeneous liquid distribution without build-ups even at a low circumferential speed of ≤ 27 m/s.



Highspeed mixer type TSHK



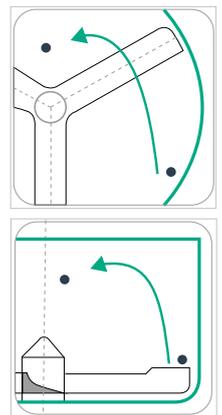
Mixing/heating/processing in a vertical mixing system at high circumferential speeds, high energy application through friction effects; precise temperature control possible

Universal mixer type KUM

Easy-to-clean vertical system with low energy input and high mixing capacity with low temperature increase during the treatment process. The mixing tool used allows a circumferential speed of ≤ 9 m/s to achieve a distinctive mixing vortex and thus guarantees optimum product quality even when mixing different particle sizes and bulk densities. For the addition of liquid components, special machine equipment is used depending on the material properties and quantity.



Universal mixer type KUM



Mixing in a vertical system at medium circumferential speed Vortex-shaped circulation of the material to be mixed; gentle mixing with constant complete material movement



FUNCTIONAL PRINCIPLE OF LÖDIGE'S **MIXING AND PROCESSING SYSTEMS OF VERTICAL DESIGN**

Wet mixer type NOHK

Vertical mixing system for batchwise homogenization, dispersion and emulsification. By the additional use of transport and dispersing tools with increased frictional introduction, even starting materials with very different properties can be processed. The selection of the cylindrical or conical vessel geometry in vacuum and pressure resistant design as well as all necessary additional equipment depends on the special mixing task.



Mixing and processing in a wet mixer system; suitable for all viscosities < 3000 mPas; various mixing tool combinations for transport, dispersion, deagglomeration or deflection effect



Wet mixer type NOHK

MACHINES FOR **LARGE-SCALE INSTALLATIONS**

Quality assurance and certification is becoming more and more demanding. Lödige uses modern technology to ensure that these demands are met in the future.

The exact adjustment of the processing system and the integral system components to the production requirements ensures a high, consistent quality of the products.



Ploughshare® mixer for continuous operation type KM in explosion-proof design for base stabilization of polyolefins



Ploughshare® mixer for batch operation type FKM with heated drum and shaft for thermal processes



MACHINES FOR **PRODUCT DEVELOPMENT AND SMALL-SCALE PRODUCTION**

Machines for product development

The functional principle of Lödige laboratory systems is identical to that of Lödige production machines. They therefore enable product development under real industrial conditions. A scale-up of the parameters determined in tests and the knowledge gained here on product behaviour to production scale is possible without restriction.



Ploughshare® mixer for batch operation type FKM 130 D



Ploughshare® mixer (laboratory machine) with fixed container, sizes 5, 10, 20 l, optionally with base frame

Machines for small production

The specific criteria for mixing tasks with small production quantities or batch sizes are met by graded machine sizes and equipment for manual handling or semi-automatic operation. For special applications, the machines can also be equipped with automated loading and emptying systems. The advantages of this system design are particularly evident in variable applications, such as frequent product changes or the need for flexible process handling. Application-adapted machine technology ensures high system availability with reduced service intervals. The possibility of fast and comprehensive cleaning is guaranteed by the appropriate machine design.



Ploughshare® mixer for batch operation with a sack chute and discharge station



**Gebrüder Lödige
Maschinenbau GmbH**

Elsener Straße 7–9
33102 Paderborn
Germany

Phone: +49 5251 309-0

Fax: +49 5251 309-123

E-mail: info@loedige.de

Contact numbers

Sales Department:
+49 5251 309-107

Customer Service Hotline:
+49 5251 309-111

www.loedige.de

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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