



TOP PERFORMANCE  
FOR CHALLENGING TASKS



Mixing Technology

# ENGINEERING YOUR SUCCESS



**Zeppelin Systems, the world leading plant manufacturer for high quality bulk material handling, has remarkably grown over the past 60 years. We cover the demands of a wide range of industries and supply all plant manufacturing services from one single source, whether basic engineering, in-house production of components, final assembly or comprehensive customer service. Thanks to our financial strength and our global network, we have long been a reliable partner for our customers.**

Every Zeppelin plant is developed according to the clients' specific requirements, and realized, thanks to our customized innovative processes and technologies.

The knowledge we have acquired over more than 60 years of plant manufacturing and the world's largest network for bulk material handling is the key to providing ideal solutions, whatever the challenge; after all, your success is our goal.

## **Zeppelin plant engineering – business fields**

### **Polyolefin Plants**

Plants for plastics producers and forwarders

### **Plastics & Rubber Plants**

Plants for the plastics processors and rubber industry

### **Food Processing Plants**

Plants for the food, confectionery and baking industry

### **Mixing Technology**

HENSCHEL-Mixers®, mixing systems

### **Silos**

Storage silos, mixing silos, process silos

### **Components**

Rotary feeders, diverter valves, discharge and dosing units, sifters, filters ...

### **Service**

Spare parts, customer service and consulting

### **Modernization/Revamping**

Optimization of production lines and plant controls



## SOLUTIONS CREATED THROUGH DETAIL KNOWLEDGE OF THE PROCESS

**Only through an understanding of all the links in the process chain can you avoid interface problems. Zeppelin Systems controls the complete raw material handling from A to Z.**

This is why we can integrate our mixing systems into an existing plant or even provide you with a complete turn-key plant from one single source. All essential key components have been developed and manufactured by us:

- Storage silos for bulk material
- Emptying stations for sacks and big bags
- Pneumatic suction and pressure conveying, secondary air conveying
- Mechanical conveyors
- Dosing scales and suction weighing systems, LIW feeders
- Liquid dosing and weighing systems
- Mixers and compounders
- Feeding of downstream equipment
- Filling stations

### **Top service is our trademark**

If desired, we carry out the installation and commissioning as well as training your staff – of course world-wide! We are at your disposal for developing the safety standards as well.

Maintenance work, carrying out inspections and repairs as well as a 24-hour spare parts delivery are naturally part of our services.

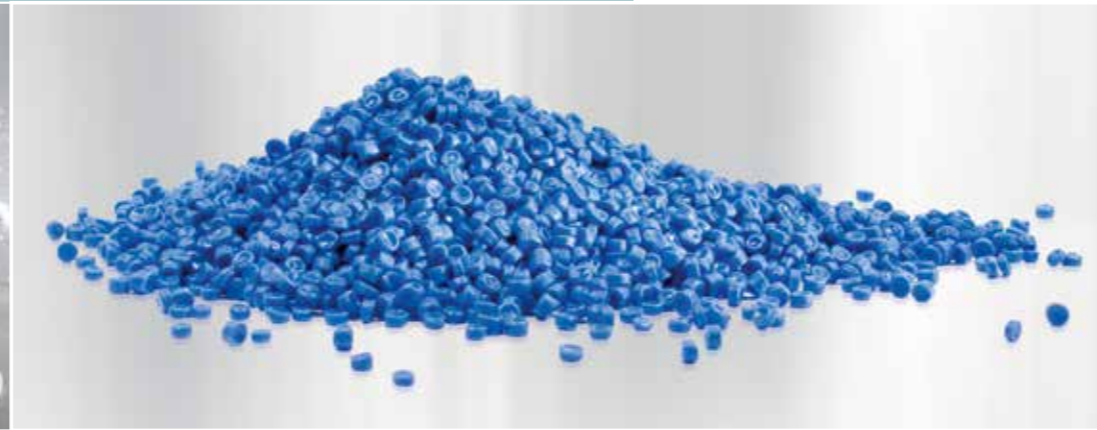
Do you need to rent a mixer, are you looking for second-hand machines or do you need to expand your capacity due to increased demands? We can help you here as well. Whatever your needs, **WE CREATE THE SOLUTION.** The mixers need to be installed, integrated into the process, operated, maintained and repaired. In any case, our qualified staff will provide you with outstanding services.

### **Our Technology Center – giving you the edge**

In order to achieve considerable improvements to our customer's products, it is not enough to only adjust technical details to the production parameters. Together with our customers, we develop completely new methods of processing and manufacturing of sensitive raw materials.

All essential processes used in mixing technology can be tested under production conditions in our Technology Center. Preliminary results can be verified immediately at our state-of-the-art laboratory. Without our Technology Center, many innovations would not even have seen the light of day. Several standard mixing and preparation processes still in use today were developed here. Our consistent research efforts ensure our customers a competitive edge in the field of products such as metallic powder coatings, masterbatches, battery production and ceramic powders. Come in and talk to our experienced engineers. We are always ready to carry out individual tests for you.

## INTELLIGENT SOLUTIONS FOR COMPLEX TASKS



We have been setting standards in the mixing technology for decades with our HENSCHEL-Mixers® and have proven expertise in the areas of plastics, additives, colors, paints, pigments, toners, food, plastic, ceramic, mineral and metal compounds. We know what is important and we have the skills to process and handle sensitive materials. We offer solutions for the mixing task and procedure as well as for up/down-stream handling and processing.

It is no surprise that the brand HENSCHEL-Mixer® is synonymous with first-class mixing results for international experts. The mixing technology of the 20th century is characterized by innovations, inventiveness and solution-oriented engineering. World leading plant manufacturer Zeppelin acquired the brand in 2009. Our mixers provide outstanding technical solutions and optimum quality of the end product within the overall plant process solution.

## The ideal mixer for every application

### Solutions for PVC-P films, cables, medical technology

- Exact reproducibility of end product characteristics
- Elimination of defects (fish-eyes) by means of exact component feeding and intensive dispersion
- Perfect solutions for various plasticizer concepts
- First-class quality for challenging medical engineering tasks

We know the optimal raw material handling and mixing process, even for the most demanding formulas and tasks.

### Solutions for PVC-U window profiles, pipes, sheets, films

- Minimal extrusion scrap rate due to consistent characteristics of the dryblend
- Compact, space-saving construction with high specific throughput of up to 12 batches per hour
- Long service life despite abrasive characteristics of raw materials and dryblend thanks to wear protected mixer
- Safe operation in compliance with the ATEX directive for handling additives

Repeatable good formula characteristics with constant bulk density, color and particle size distribution are the decisive factors for manufacturing high-quality dryblends. Our turn-key concepts, from raw material intake up to extruder feeding by including the mixing technology and its control system, lead to outstanding production results.



#### Solutions for wood compounds

- Suitable for various formulas, i.e. polymer type, fiber type and level of humidity, mixing ratio of the raw materials
- Drying and compounding in one process step ensures cost-effective operation
- Fully automatic operation ensures a highly efficient material handling process
- Controlled dehumidification through the mixing process

Our process technology ensures highest process stability even with high humidity levels. We provide solutions for processing wood compounds with our mixer – the heart of the system.

#### Solutions for coating

- Continuous mixing technology (e.g. EPS):
  - Direct downstream processing without intermediate storage with a continuous mixer
  - Highly precise dosing even with the smallest concentration of powder or liquid additives
  - Constant and uniform wetting/coating
- Batch process (e.g. EPS, minerals):
  - Safe and consistent process technology that can be used for various materials to be coated
  - Guaranteed coating

Highest product quality even when using small quantities of coating material.

#### Solutions for powder coatings/bonding

- Production free from cross-contamination in the premix
- Intelligent process technology for large variety of formulas
- Container system prevents demixing during transport of premix
- Batch tracing to ensure highest product control
- Special explosion protection for maximum safety
- Bonding process fully managed by process technology and automation – independent of operator experience

We have set standards in the industry by perfecting the bonding process for the production of metallic powder coatings. Our mixers with intelligent control technology provide the ideal solution for the specific processes and requirements of these temperature-sensitive products. This innovation guarantees brilliant, consistent color powder coatings without demixing and ensures our customers a competitive edge on the international markets.

#### Solutions for chemicals

- Safe operation provided by explosion protection measures
- Compliance with hygiene regulations
- Consistent product quality
- High flexibility in design and machinery
- Pressure-tight, vacuum-tight or high temperature designs

The mixing process manages even the most diverse requirements of the chemicals industry. A dosing and weighing accuracy of 0.1 – 0.05 % ensures optimal product quality when processing powdery or granulated stabilizers.



#### Solutions for the ceramic industry

- Production of an injectable feedstock in one process step
- End product characteristics significantly improved thanks to unprecedented homogeneity
- Very short cycle times
- Considerable increase in productivity
- Investment costs lower than conventional systems
- Higher flexibility when changing formulas or modifying the machinery

The conventional process requiring long kneading and heating time as well as costly machinery is modified so that all components can be mixed, homogenized, dispersed and friction heated in one single step.

#### Further applications

- ABS
- Battery compounds
- Biopolymers
- Cosmetic products
- Detergents
- EPDM
- Epoxy resins
- Fertilizers
- Flame retardants
- Magnetic compounds
- Masterbatch
- Melamine resins
- MIM/CIM compounds
- Minerals
- Pencil and color pencil compounds
- Polyamides
- Polycarbonates
- Polyethylenes
- Polypropylenes
- Powder caoutchouc
- PTFE
- Rubber flours
- Stabilizing compounds
- Stearic acid and aluminium hydroxide
- Toner
- TPE
- WPC (natural fiber) – PO and PVC based

## THE WHOLE WORKS FOR CHALLENGING MIXING TASKS

Our machines and systems have led mixing technology for decades. Innovative detail solutions and numerous patents are proof of our competence in machine development. Our wide range of machines provides the solutions to various application challenges.



### Laboratory mixer FML

For the development of new applications and scale up for production (4, 10, 30 and 40 liters)

Laboratory mixers represent the little versions of the big production machines. The laboratory machines aim for an accurate downscaling of equipment and functions of the production machines to guarantee appropriate results when laboratory results are scaled up for production.

To the digital datasheet



### High intensity mixer FM

High-speed mixer for heating, dispersing, coating (75 – 2,500 liters)

#### Design

Upright cylindrical mixing container with vertical mixing shaft and fast rotating mixing tools.

#### Operating principle

The rotating mixing tools distribute the product in a vortex and then heat it by induced friction.

#### Advantages

- Short heating times
- Excellent dispersion
- Self-cleaning effect ensures minimum downtime
- Designed without dead-spots

#### Applications

- Suitable for plastics, chemicals, minerals and colorants
- Wide variety of applications

#### Characteristics

- Easy access to mixing chamber
- Parts in contact with the product made of stainless steel
- Variable tool configuration
- Quick cleaning discharge
- Options:
  - Chopper for dispersing
  - Henschel-Transformer cleaning package



### Process mixer MB

Friction mixer with water-cooled mixing tools for temperature-sensitive products (10, 40 and 75 – 1,000 liters)

#### Design

Upright cylindrical mixing container with vertical cooled mixing shaft and fast rotating mixing tools.

#### Operating principle

The rotating mixing tools distribute the product in a vortex and then heat it by induced friction. Even the most difficult process can be controlled reliably thanks to the cooling of the tool.

#### Advantages

- Water-cooled tool
- Multizone temperature control (cooling/heating)
- Excellent dispersion
- Extremely high process reliability
- Designed without dead-spots
- Accurate process temperature control

#### Applications

- Suitable for plastics, masterbatch, colorants, color concentrates, bonding, metallic/effect powder coatings

#### Characteristics

- Easy access to mixing chamber
- Nitrogen inerting and residual oxygen measurement for excellent operational safety
- Quick cleaning discharge



## Continuous turbo mixer CTM

For constant temperature coating  
and precise temperature transfer  
(100 – 1,000 kg/h)

### Design

The processing principle of the CTM is based on counter-rotating mixing elements: the inner screw segment tool transports the product from the inlet to the outlet at the opposite side of the drum.

### Operating principle

A coaxially mounted mixing ring tool redirects the product flow towards the inlet and generates friction between the two directions of flow.

### Advantages

- Variable process control
- Constant temperature coating
- Specific temperature transfer
- Low energy requirement

### Application

- Continuous mixing process for homogenizing and for complex coatings, e.g. EPS with stearates

### Characteristics

- Sizes: 125 to 400 mm drum diameter
- Capacity: 100 – 10,000 kg/h (depending on product)

To the digital  
datasheet



## Horizontal cooler mixer HC/HM

Product cooling and mixing processes  
with high throughput rates  
(500 – 8,500 liters)

### Design

Horizontal cylindrical mixing container with double jacket, horizontal mixing shaft and rotating mixing tools.

### Operating principle

Rotating tools generate a radial and axial mixing. The tool's special design ensures excellent material circulation with low energy input. Temperature control is achieved through heat transfer in the very effective cooling jacket.

### Advantages

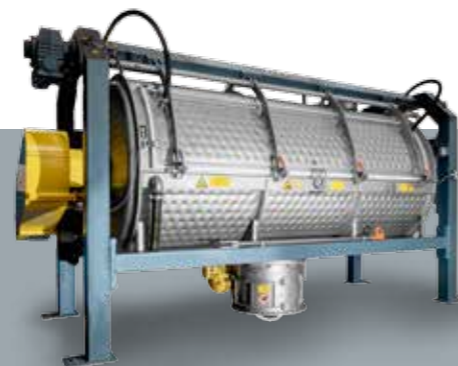
- Intensive component mixing and cooling
- Short mixing and discharging times
- Double jacket pressure-tight up to 7 bar (only HC)
- Dosing of liquids on the surface or below product level
- Quick and easy cleaning thanks to large lid

### Applications

- For cooling and mixing of dry ingredients with good or poor flowability and various bulk densities
- Homogenization and cooling volume of up to 8,500 L

### Characteristics

- Stainless steel double jacket with special cooling matrix (HC) or carbon steel (HM)
- Option: Chopper



## Horizontal efficiency cooler mixer HCE

Cooler mixer for  
highly efficient cooling  
(1,700 – 6,000 liters)

### Design

Horizontal cylindrical mixing container with double jacket, horizontal mixing shaft and rotating, cooled mixing tools.

### Operating principle

Higher cooling effect is achieved through the cooling of the tool inside the mixer in addition to the cooling jacket.

### Advantages

- Stainless steel construction
- Very short cooling times
- 30 % larger cooling surface compared to conventional mixers with same container size
- Increased throughput rates
- Double jacket pressure-tight up to 7 bar

### Applications

- For mixing tasks in which the material must be cooled extremely fast
- For high cooling performance in limited space

### Characteristics

- Stainless steel container
- Cooled mixing tool
- Robust frame construction



## Vertical cooler mixer KM

For cooling processes and homogenization  
of bulk materials  
(23 – 3,600 liters)

### Design

Upright cylindrical mixing container with vertical mixing shaft and mixing tool rotating close to the container bottom.

### Operating principle

The rotating mixing tool lifts the product and distributes it radially. Product cooling is achieved through the double jacket.

### Advantages

- Effective and compact cooler mixer
- Very good residual discharging
- Increased cooling performance through cooling cone
- Easy to clean

### Applications

- Cooling of powder mixtures
- Homogenization of numerous bulk materials

### Characteristics

- Parts in contact with the product made of stainless steel
- Quick cleaning discharge
- Options:
  - Cooling cone
  - Chopper





## Vertical universal mixer HU/HUF

**Gentle material homogenization  
(23 – 3,600 liters)**

### Design

Upright cylindrical mixing container with vertical mixing shaft and mixing tool rotating close to the container bottom.

### Operating principle

The rotating mixing tool lifts the product and distributes it radially for a gentle yet intensive mixing effect.

### Advantages

- Gentle mixing with lower rotational speed
- Short mixing time
- Very good residual discharging
- Easy to clean
- Dosing of liquids on the surface or below product level
- Low energy input

### Applications

- Homogenization of powder mixtures
- Homogeneous mixtures of bulk material with various density and grain sizes

### Characteristics

- Parts in contact with the product made of stainless steel
- Easy access to mixing chamber
- Options:
  - Chopper
  - Double jacket for temperature control
  - Suitable for food industry

To the digital  
datasheet



## Horizontal universal mixer HUH/HMF

**Mixing processes with high throughput rates  
(400 – 8,500 liters)**

### Design

Horizontal cylindrical mixing container with horizontal mixing shaft and rotating mixing tools.

### Operating principle

Rotating tools create a radial and axial mixing. The tool's special design ensures excellent material circulation with low energy input.

### Advantages

- Intensive component mixing
- Short mixing and discharging times
- Dosing of liquids on the surface or below product level
- Quick and easy cleaning through large lid opening
- Low energy input

### Applications

- Homogenization of powder mixtures
- Suitable for liquids of various viscosities

### Characteristics

- Parts in contact with the product made of stainless steel
- Options:
  - Chopper
  - Liquid dosing unit
  - Suitable for food industry



## Container mixer CM/CMI

**Patented mixing principle with rotating container  
(75 – 2,000 liters)**

### Design

The mixer consists of a rotating mixing head with integrated mixing tools. This, together with the docked container, forms the mixing chamber.

### Operating principle

The moveable container with the formula ingredients is docked to the mixing head which then swivels into mixing position at 120°. Mixing is achieved through the counter rotation of the mixing tool and the container.

### Advantages

- Intensive and fast mixing
- Low heat input
- Mixing without product buildup
- Easy to clean mixing head and tools
- Extremely high fill factor
- Ideal for frequently changing formulas
- Residue-free complete discharging
- Reliable batch tracing with system solutions

### Applications

- Mixing of various powdery or granular raw materials
- Contamination-free mixtures

### Characteristics

- CMI design with interchangeable inliner (75, 120 L)
- Variable container sizes
- Options:
  - Filling and discharge stations
  - Suitable for food industry



## Container mixer CMS

**Robust container mixer system  
(150 – 2,000 liters)**

### Design

The mixer consists of a mixing head with integrated mixing tools. This, together with the docked container, forms the mixing chamber.

### Operating principle

The moveable container with the formula ingredients is docked to the mixing head which then swivels into mixing position at 180° to operate as a vertical mixer.

### Advantages

- Easy handling mixing system
- Container guide rails on the ground not required
- Easy positioning of the container with self-centering system
- Intensive and fast mixing
- Good dispersion
- Ideal for frequently changing formulas
- Easy cleaning of mixing head and tools
- Residue-free complete discharging
- No pneumatic parts in standard design

### Applications

- Mixing of various powdery or granular raw materials
- Contamination-free mixtures

### Characteristics

- Many tool variants
- Variable container sizes
- Options:
  - Liquid injection
  - Chopper
  - Filling and discharge stations
  - Suitable for food industry



## MIXING COMPLETED

Many processing techniques would not have been possible without our new specific features in mixing and control systems. The mixer's technical requirements are constantly redefined and adapted to the individual tasks in order to optimize our customer's products. Formulas and product parameters are tested and validated in our Technology Center. By choosing optional features, the HENSCHEL-Mixers® can be tailored to the customer's production specifications. The following features are only a selection of the options available. Please refer to the individual product data sheets for more details.

### Safety features

- Explosion protection according to ATEX or US standards
- Nitrogen inerting
- Residual oxygen measurement
- Pressure-tight or pressure containment design
- Explosion suppression systems

### Cleaning and handling

- Wall and lid scraper
- Non-stick coating for mixing tools
- Aspiration systems
- Lid variations
- Henschel-Transformer cleaning package

### Wear protection

- Containers and mixing tools with high-strength hard-coating
- Ceramic coatings and linings

### Process optimization

- Numerous drive variations
- Variable mixing tool configurations
- Vacuum equipment
- Moisture measurement
- Chopper
- Temperature control
- Shear energy adjustment

### Control system

- Fully automatic mixer controls
- Flexible mixer program for various process steps
- Formula management, security control, quality control
- Batch tracing
- Customized visualization
- Intelligent, learning controls (Industry 4.0)





## Presented by:

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## Global presence

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