The right high-pressure mixing head for every production task

Engineering Passion

KraussMaffei
Facts and figures regarding the mixing heads

Application areas

Automotive  Utility vehicles  White goods  Medical

Consumer goods

Mixing head types process matrix

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The right high-pressure mixing head for every production task

The tailored linear and transfer mixing heads from KraussMaffei with variable output rates provide the right solution for every production requirement. The nozzle elements of the 2- to 6-component versions are tuned customer-specifically to the production requirements and processing parameters.

The highlights at a glance:

Tailored by means of:
- Comprehensive selection of mixing head types specially for your application
- Electronic shot time logging
- Optional proportional technology

User-friendly thanks to:
- Simplified change of nozzle elements with cartridge technology
- Self-cleaning design
- Comfortable and low-maintenance operation

Durable thanks to:
- Long service lives
- Special material pairings
- Extremely high cost-efficiency
Transparent technology
Take a tour of the mixing head
12/18 ULP-4K

Finely tuned nozzle range for high production flexibility
- Perfectly geared to the technical process conditions and customer-specific requirements

Mixing head available as a bell head, partly with foam blocker technology
- No foam carryover into hydraulic oil
- Low system maintenance

Component pressure control by patented Vario nozzles
- Simple system: Integration possible without changing the control system
- Constant volume and pressure conditions during shot
- Wide adjustment range of output rate up to 5:1 with almost constant pressure level
Patented and proven mixing head principle
- Simple, user-friendly configuration
- Laminar output behavior
- High mixing quality

Recirculation mixing head with needle nozzles
- Easy handling and maintenance

Premium quality material components with first-class production tolerances
- Long service life of the mixing head
Transfer mixing heads for standard at high level: Versatile, for sophisticated systems and laminar pour

For processing demanding systems and for laminar mixture pour into open molds, KraussMaffei offers the proven transfer mixing head in the product range.

In the transfer mixing head, the components are homogeneously mixed in the mixing chamber. The high quality is mainly the result of the special angle of injection into the mixing chamber. Downstream of the mixing chamber the output tube for reducing turbulence in the reaction mixture as it flows out is positioned at an angle of 90 °C. The high-pressure circuit of the components upstream of the shot operates according to the proven recirculation groove principle. The positioning of the cleaning piston in the outlet tube influences the mixing quality and the discharge behavior of the mixture. Transfer mixing heads are available for 2 to 6 components. They work cost-effectively and reliably with long service lives and high availability.

**Your benefits:**
- Laminar, homogeneous pour into open molds
- Outstanding, highly repeatable mixing quality at different output rates
- Flexible processing of different material systems
- Self-cleaning mixing head
- Cartridge system simplifies changing nozzle elements
- Maintenance-friendly

Small-volume mixing head MK 3,5-5-2K compact

Transfer mixing head:
Shot cycle sequence

Circuit position (before the shot)  Shot position  Cleaning position (after the shot)
Linear mixing heads
Proven and reliable

Linear mixing heads from KraussMaffei operate on the counterflow injection principle: Pressure energy is transformed into speed energy, reliably ensuring that the components are intimately mixed.

Linear mixing heads are relatively light and are available in 2-, 3-, 4- or 5-component versions. These are KraussMaffei standard mixing heads and they have proved their worth in many millions of shots. All component nozzles are simultaneously opened and closed by the mixing head control piston. The electronic shot-time logging guarantees very small shot-weight tolerances.

**Your benefits:**
- Attractive price
- Cost-effective investment
- Small size
- Light weight
- Trouble-free handling
- Minimal shot time down to 0.3 s (depends on polyurethane system)
- Electronic shot-time logging for very small shot-weight tolerances
- Top results when pouring into closed mold
- Compatible with many foam systems
- High reliability
- Low-maintenance

**Configuration of a linear mixing head**

- Control piston with recirculation grooves
- Adjusting bolt for pressure setting
- Polyol return line
- Polyol feed line
- Hydraulics
- Nozzle needle
- Component nozzle
- Isocyanate feed line
- Hydraulic piston

Mixing head MK 5·2K-RTM
MKE-3B mixing heads
Cost-effective alternative to laminar mixture pour

The provenly successful mixing technique and specific engineering details of the MKE-3B mixing heads ensure outstanding component mixing and laminar pour.

T-mixing is highly efficient because the dual mixing fronts make sure injection energy translates into excellent mixing quality. It ensures balanced, well-centered conditions in the mixing chamber, so that virtually no turbulence occurs outside of the mixing mid-point. B pins ensure non-turbulent flow and enhanced mixing effect by employing principles of hydraulic flow.

Your benefits:
- 3-nozzle technology for two components
- Capable of processing higher-viscosity materials
- Laminar, splash-free pour due to B-pin damping in mixing head
- Rapid shot sequences: Opening and closing in under 0.5 s
- Wide range of pour rates
- Maximum reproducibility
- Simple, reliable hydraulic positive action control
Multicomponent CN transfer mixing heads
Fast and precise

Multicomponent mixing heads play an important role in the production of PU flexible foam. The shorter the time intervals between shots, the higher the requirements of the mixing head controllers.

The multicomponent mixing heads are equipped with four or six hydraulically controlled needle valves grouped in a star formation around the mixing chamber for component changeover and a bypass system designed for maximum efficiency. This permits up to six components for flexible PU foam mixtures to be selected quickly. The 4- and 6-component mixing heads not only simplify switching between different PU formulations, they also contribute to improving foam quality thanks to the optimized nozzle design and the variable cleaning piston positioning.

Your benefits:
- One mixing head for processing from 2 to 6 different components
- Very short shot times
- Extremely short shot sequence of 0.8 s with cleaning stroke and complete formulation adjustment
- High mixing quality thanks to an excellent nozzle geometry and variable cleaning piston positioning
- Change in output rates and formulations from shot to shot
- Adjustment of pour rate via new Vario nozzle in range 1:5
Spray mixing heads
Compact and rugged

KraussMaffei has developed spray mixing heads for many different spray applications with enhanced design freedom.

Mixing heads MK 2.0-2K-S, MK 3.0-2K-S
The spray mixing heads are characterized by their extremely compact design and light dead weight. This makes them suitable for the automated spraying process also with smaller robots or handling systems. They are available in two versions depending on the required output rate.

They can be optionally equipped with:
- Wide-slit nozzle for creating a fan-type flat jet for large-surface application of the polyurethane mixture on relatively flat, large-surface components such as sandwich elements or structural components, e.g. luggage compartment covers in the automotive sector. Depending on the nozzle used and the distance between mixing head and component, the width of the jet can vary with clearly defined spray limits and minimal overspray.

Your benefits:
- Compact design of the mixing head
- Two sizes for different output rates
- Suitable for round or flat-fan nozzle
- Depending on material properties, cleaning is only possible with air
- Lower tooling costs

Mixing head MK 10P-2K-F-S
The most robust of the spray mixing heads was developed for processing highly-filled PU systems. A large quantity of highly abrasive BaSO₄ is added to the polyol specially for acoustic absorption. The armor-plated mixing head also makes it possible to spray such systems. During the processing sequence, the mixture is sprayed onto the component in one or more layers depending on the required properties. Such components are found, among other things, in engine hood insulation and floor mats in the automotive sector.

Your benefits:
- Excellent mixing quality even under extreme mixing conditions
- Low level of overspray, clearly defined spray limits
- Material savings thanks to optimized material application
- Flexible and cost-competitive component production

Air-supported round spray nozzle for creating a finer spray. This nozzle type is mainly used for components with complex geometries. The nozzle can also be equipped with an extension for more accurate spraying of corners and undercuts.
LFI process mixing head
Fibers and PU in composite material

The LFI-PU (long-fiber injection polyurethane) process has a successful track record in the production of high-strength, lightweight parts.

The LFI process head performs three main tasks that are decisive in determining the quality of the end product.
- Transporting and chopping the roving
- Mixing the reaction components
- Wetting the reinforcement fibers with the reaction mix.

The reaction components are mixed according to the high-pressure, countercflow injection principle, i.e. the components are shot at high velocity into a mixing chamber where the speed energy is transformed into mixing energy. The reaction mix then moves to the stilling chamber of the mixing head. Here, the flow-optimized geometry of the cleaning piston generates a hollow, hose-shaped material flow.

The glassfiber from the roving, chopped by the cutter head is forced by air pressure through the cleaning piston into the center of this hose-shaped where it is wetted with the reaction mix and, simultaneously, poured into the open cavity.

Your benefits:
- Wide variety of applications, including instrument panel substrates, interior trim and, in combination with sandwich components, in honeycomb
- Directly wetting fibers ensures optimal adhesion between the polyurethane matrix and the reinforcing fibers
- Local fiber content and fiber length can be varied within the part
- High automation and a high return on your investment
- Cost-effective production of high-strength lightweight components

Sectional drawing of LFI process mixing head
Filler mixing heads
For abrasive PU systems

KraussMaffei offers armored transfer or linear mixing heads for processing abrasive fillers.

These armor-plated filler mixing head is a modified version of the linear and transfer mixing head, developed specially for processing PU systems with abrasive fillers, as is necessary for example in RRIM techniques.

Your benefits:
- Outstanding processing for a very wide range of polyurethane/filler formulations using e.g. glassfiber, mineral fibers, flakes, glass pearls, calcium carbonate, barium sulphate, flame retardants and graphites
- Very good homogeneous mixing
- Extremely stable process
- Long service lives
Mixing heads for white goods and rigid foam processing

Special solutions

The KraussMaffei high-pressure mixing heads are engineered to be the perfect answer for your production tasks. They promise a high return on investment, extreme reliability and minimal costs. Furthermore, they have been optimized for specific production processes. In particular, we have developed two specific types for the white goods sector.

Mixing head MKE-3B
KraussMaffei mixing heads, operating according to the B principle, are considered the first choice for foaming out refrigerator appliances. For thermal insulation of refrigerator doors, a high-performance PU insulating layer is applied in an open pour technique, whereby the polyurethane mixture is poured into an open mold.

Your benefits:
- Absolutely laminar and splash-free pouring for the entire pouring time
- Good PU distribution in the open mold
- Particularly homogeneous foam structure
- High production flexibility

PU rigid foam processing: High output rates and long outlet tube for housing production
KraussMaffei developed the MK UL-2K_I mixing head to meet the special challenges of applying rigid insulating foam to refrigerator cabinets.

Your benefits:
- High output
- Nitrogen flushing can be integrated directly at the mixing head
Mixing heads for HP-RTM (high-pressure resin transfer molding)
Fast and high strength

The RTM process uses a high-pressure mixture to process fast resin systems that are suitable for epoxy, PU and PA. This achieves short cycle times.

The process is characterized by simple handling. A semifinished product, usually preformed from a fiber composite, is placed in the mold. The liquid epoxy resin is then injected under pressure and allowed to cure under holding pressure and heat. Resin and hardener are metered separately as individual components and mixed in a high-pressure process immediately before the mix is injected into the closed mold. This is implemented by the compact and simple, but highly efficient mixing head system including linear mixing head. In conjunction with the dosing technology developed by KraussMaffei, the HP-RTM process is suitable for the production of light and high-strength components in large series production. If the appropriate materials are used, the process has the potential of lowering the cycle times to the values of below three minutes required by the automotive industry.

Your benefits:
– Fast filling of the mold for processing fast reacting resin systems, resulting in shorter cycle times
– Production of high-strength components in high unit counts and with excellent surface quality
– High degree of process reliability and repeatability
– Self-cleaning mixing head – release agent dosing possible at the mixing head as an option
– Possibility of building up high internal pressure in the cavity to soak long flow paths and complex 3D geometries
– Can be used at high mold temperatures
– Sealing system pressure-resistant to mold cavity pressures
This module is used wherever release agents are added directly at the mixing head.

Transfer molding (RTM) and wet molding both with epoxy as well as with PU systems. The module is used to dose precisely the volume required for release agent of the A-component directly at the mixing head and only during a shot. The A-component therefore does not have to be mixed with release agent in advance in the tank.

**Your benefits:**
- Shorter cycle times because the release agent does not have to be applied in an additional process step
- Variable release agent share in the resin from shot to shot
Cleaning piston positioning
Variation of flow restriction position from shot to shot

To achieve a particularly high mixing quality with transfer mixing heads, the polyurethane flow is restricted once again when it leaves the mixing chamber to optimize the flow behavior. The cleaning piston is positioned so that the cross-section of the mixing chamber outlet is tuned to the output rate.

Cleaning piston positioning during the shot
The fast and automatic positioning of the cleaning piston makes another useful process variant possible. The cleaning piston can thus also be moved during the shot. In this manner, the flow restriction can also be adapted exactly if the output rate changes during the shot. We therefore have the right solution to your flexible foam challenges.

Your benefits:
- Fast and reproducible adaptation of the mixing head to different processing requirements
- Positioning from shot to shot
- Premium quality processing of mixtures with different output rates and viscosities
- Production of top quality parts with different hardness zones

Control of the cleaning piston (cleaning position)

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
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<tr>
<td>Position accuracy of the cleaning piston</td>
<td>+/- 0.1 mm</td>
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<td>Setting time between 2 flow restriction positions</td>
<td>0.2 s</td>
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<td>Time for complete cleaning stroke</td>
<td>&lt;0.8 s</td>
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<td>Min. time between two shots (without cleaning)</td>
<td>&gt;= 0.2 s</td>
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Optional upgrade, Vario nozzle
For optimum pressure values

The new KraussMaffei Vario nozzle is designed for systems with volume adjustment and is an alternative to the spring-loaded nozzle.

The Vario nozzle operates with a pressure pad that counteracts the component pressure. It operates without moving seals in the nozzle system and thus prevent the well-known slip-stick effect (static friction).

Benefit from a high mixing quality over a wide output rate range combined with increased production reliability.

Your benefits:
- Maximum pressure and volume consistency during the shot
- Excellent repeatability
- Very high pressure consistency with volume change up to 5:1
- Compatible with existing KraussMaffei nozzle systems
- High mixing quality
- Low maintenance costs
Further information which might also interest you

Are you looking for a suitable solution to your production tasks?

You can read more here:
- RimStar (dosing technology)
- Mold carrier and conveying concepts (system technology)
- Foam molds
- Cutting technology

You can find our brochures and flyers on other topics online at: www.kraussmaffeicom. On request, we would also be happy to send you information and technical data for our products free of charge.
KraussMaffei
A strong brand in a unique global group

Cross-technology system and process solutions
Whether in Injection Molding, Reaction Process Machinery or Automation – the KraussMaffei brand stands for pioneering and cross-technology system and process solutions in plastics processing worldwide. For decades, our expertise, innovative ability and passionate commitment to plastics engineering have been your competitive edge. As a cross-industry system provider, we offer you modular and standardized systems as well as solutions customized to your needs.

There for you around the world
With our worldwide sales and service network, we offer our international customers an excellent basis for a successful business relationship. Due to the close proximity to our customers, we are able to answer your individual inquiries very quickly. We work out the best possible technical and economical solution for your product and production requirements together with you. Test our machine technology for your applications and let our experts put together an individualized service package for you.

Individualized service
Our employees from customer service, application technology and service help you with your questions and needs on every topic dealing with machines, systems and processes – around the globe, quickly and with a high level of expertise. We have developed an extensive customized service spectrum with our lifecycle design, which accompanies you throughout the entire lifecycle of your machines and systems. Take advantage of the personal interaction and flexibility we offer in our practically oriented seminars. We carry out customer-specific trainings either at your location or at our sales and service locations.

KraussMaffei Group
Comprehensive expertise

Unique selling proposition Technology
The KraussMaffei Group is the only provider in the world to possess the essential machine technologies for plastics and rubber processing with its KraussMaffei, KraussMaffei Berstorff and Netstal brands: Injection Molding Machinery, Automation, Reaction Process Machinery and Extrusion Technology.

The group is represented internationally with more than 30 subsidiaries and over ten production plants as well as about 570 commercial and service partners. This is what makes us your highly skilled and integrated partner. Use our comprehensive and unique expertise in the industry.

You can find additional information at: www.kraussmaffeigroup.com

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The KraussMaffei Group has a global presence. Countries with subsidiaries are marked in dark blue. In the white-colored regions, the Group is represented by over 570 sales and service partners.
KraussMaffei high-pressure mixing heads are tailored to your specific production applications to maximize profitability. Extremely high shot counts, premium product quality and top production performances are the results of decades of experience at KraussMaffei and continuous further development of all of our mixing heads. You benefit directly from our extensive range of mixing heads from linear and transfer mixing heads to special mixing head versions engineered for highly specific applications. We have the right mixing head for you and can meet even highly specific production requirements.

High-pressure mixing heads from KraussMaffei are very user-friendly and durable and guarantee you the highest degree of cost-efficiency and reliability.