SOPHISTICATED. PRECISE. DURABLE.

DISCOVER OUR MOLDS FOR ANY APPLICATION

KraussMaffei

Pioneering Plastics

FACTS AND FIGURES
ABOUT MOLDMAKING

Commercial vehicles

Automotive

Automotive

Consumer goods

Consumer goods

Consumer goods

Construction industry

Medical technology

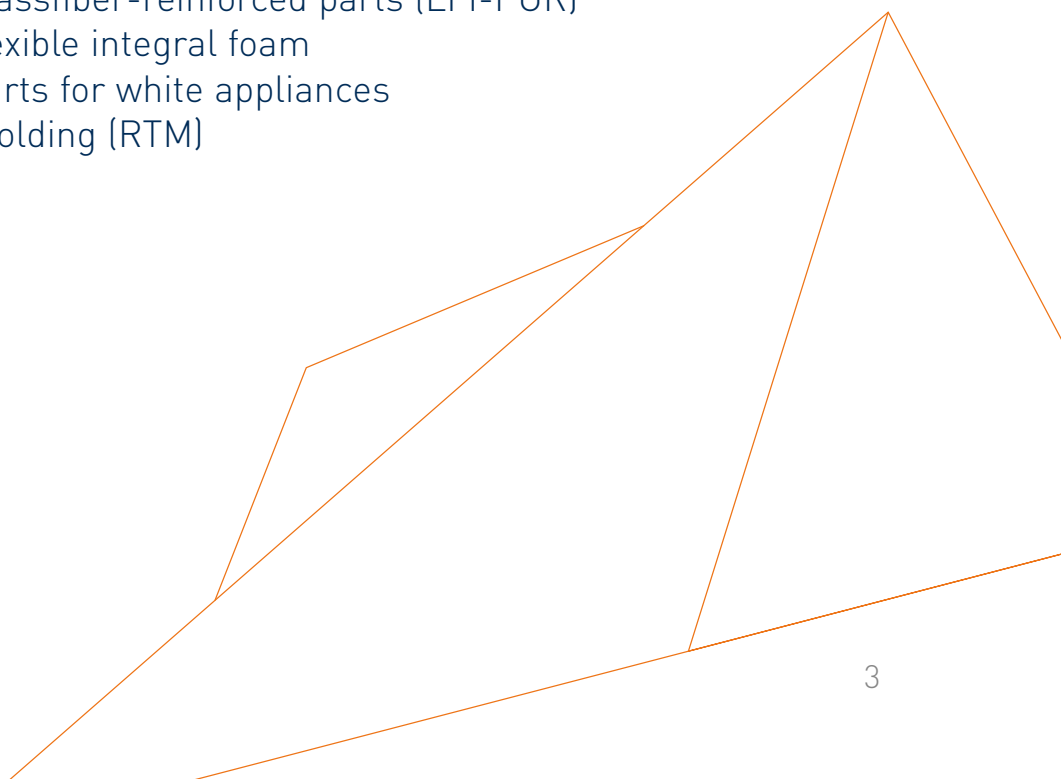
Our molds can also be put to a wide variety of uses in the construction, electrical/electronics and white appliances industries.

MOLDMAKING FOR PERFECT PARTS
THE RIGHT MOLD FOR EVERY APPLICATION

From casting and foaming to backfoaming of parts – KraussMaffei makes molds for creating the perfect parts every time. Molds for open or closed mold pouring are made of steel or aluminum and/or with a polymer surface if required by the application. Our molds are engineered as custom tools for your specific applications and provide process-specific heating. The molds have ejector concepts for damage-free demolding, are fitted with product-specific seal systems and can also come with wear-resistant surfaces if required. This means that the process, machinery, mold carriers and molds are all perfectly integrated.

The various processes at a glance:

– Clear Coat Molding process (CCM)
– Processing flexible foam
– Processing rigid foam
– Processing semi-rigid foam
– Manufacturing glassfiber-reinforced parts (LFI-PUR)
– Manufacturing flexible integral foam
– Manufacturing parts for white appliances
– Resin Transfer Molding (RTM)
– Pultrusion



MULTIPLE APPLICATIONS
OUR MOLDS ARE USED TO MAKE ALL KINDS OF PRODUCTS

Jet skis

Boat hulls

Office furniture


Car roofs
Instrument panels

Molds for Clear Coat Molding (CCM)
Premium quality coating in next to no time

Clear Coat Molding (CCM) is an automated process for coating premium quality substrates, e.g. luxury wood veneers, with a transparent two-component PUR system. Typical applications are trim parts for vehicle interiors, consumer electronics and the furniture industry.

In contrast to other methods of coating such parts, CCM is a one-step process. The substrate items are initially inserted in the mold. When the mold closes, there is a gap the thickness of the coating layer left free. This gap is flooded with transparent polyurethane in a high-pressure process. This way you can produce premium-quality coatings in a short time. Precise temperature control and the system's stable, repeatable process ensure that the parts meet extremely high criteria for visual quality.

Stable and repeatable process for superior part quality

Based on the specific requirements of the component, we develop customer-specific solutions from our comprehensive portfolio of mold carriers, mixing heads and automation systems. High component quality, short cycle times, and efficient workflows are the vital selection criteria in this application.

Combining precision seals with venting capability

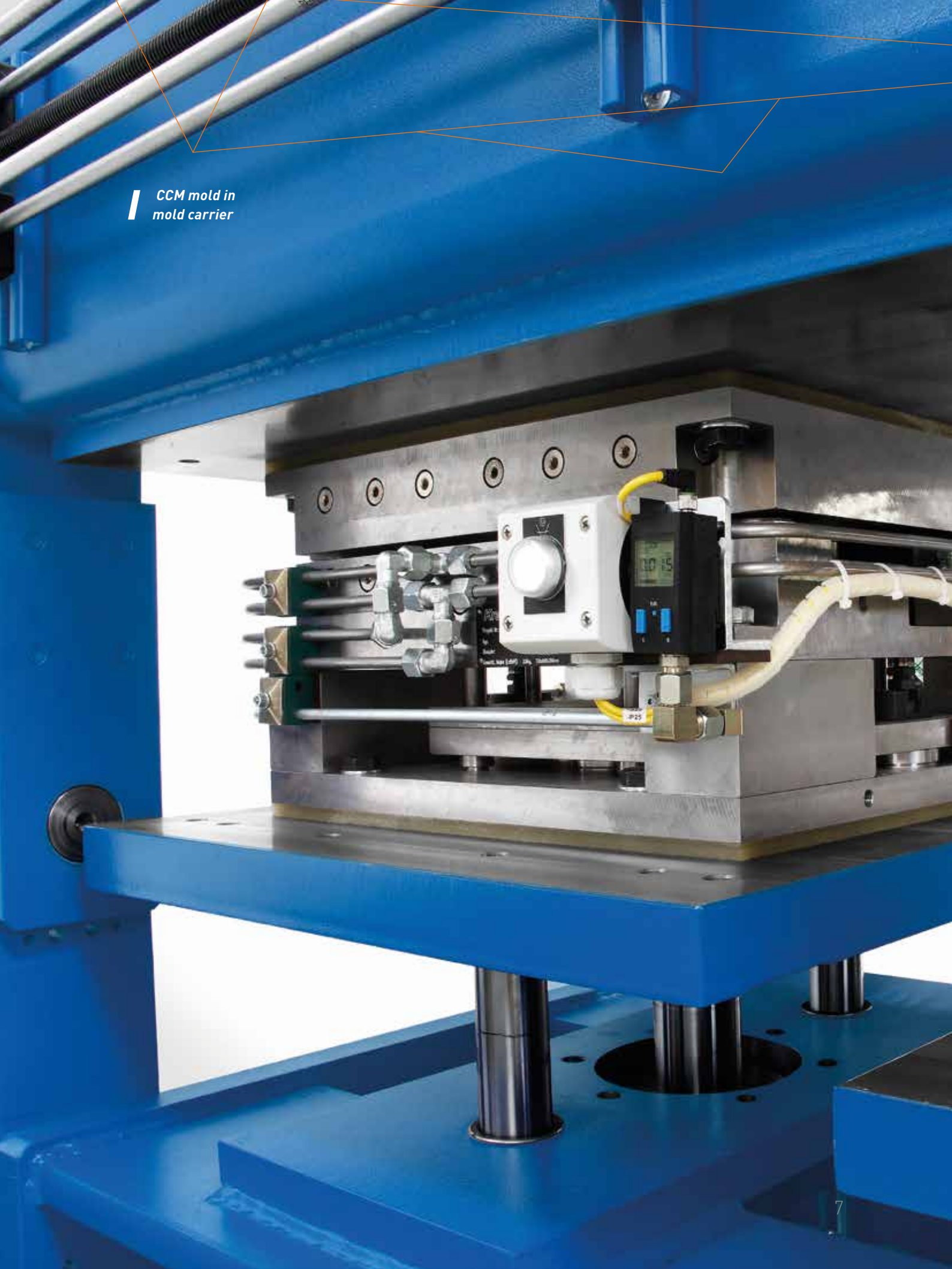
CCM molds have to combine a close tolerance seal with venting capability at the same time. In addition, the coating needs to compensate for manufacturing tolerances from previous processes. Maximum seal tightness must be guaranteed with minimal flash, which means the substrate to be coated needs to be held firmly in place.

Our CCM molds are perfectly adapted to the requirements of the process

Molds: a) With grained steel surface
All molds with process-specific heating: a) By inserted heat-transfer lines b) Through deep drilled holes
Metal seal edges, manually finished, milled or eroded
With optimized demolding concepts for damage-free demolding
With product-specific seals in the mold to prevent flash or over-foaming
Process-specific supports or fixtures for holding inserted substrates
Process-matched ventilation including sensors for tried-and-tested mold cavity pressure shutdown from KraussMaffei

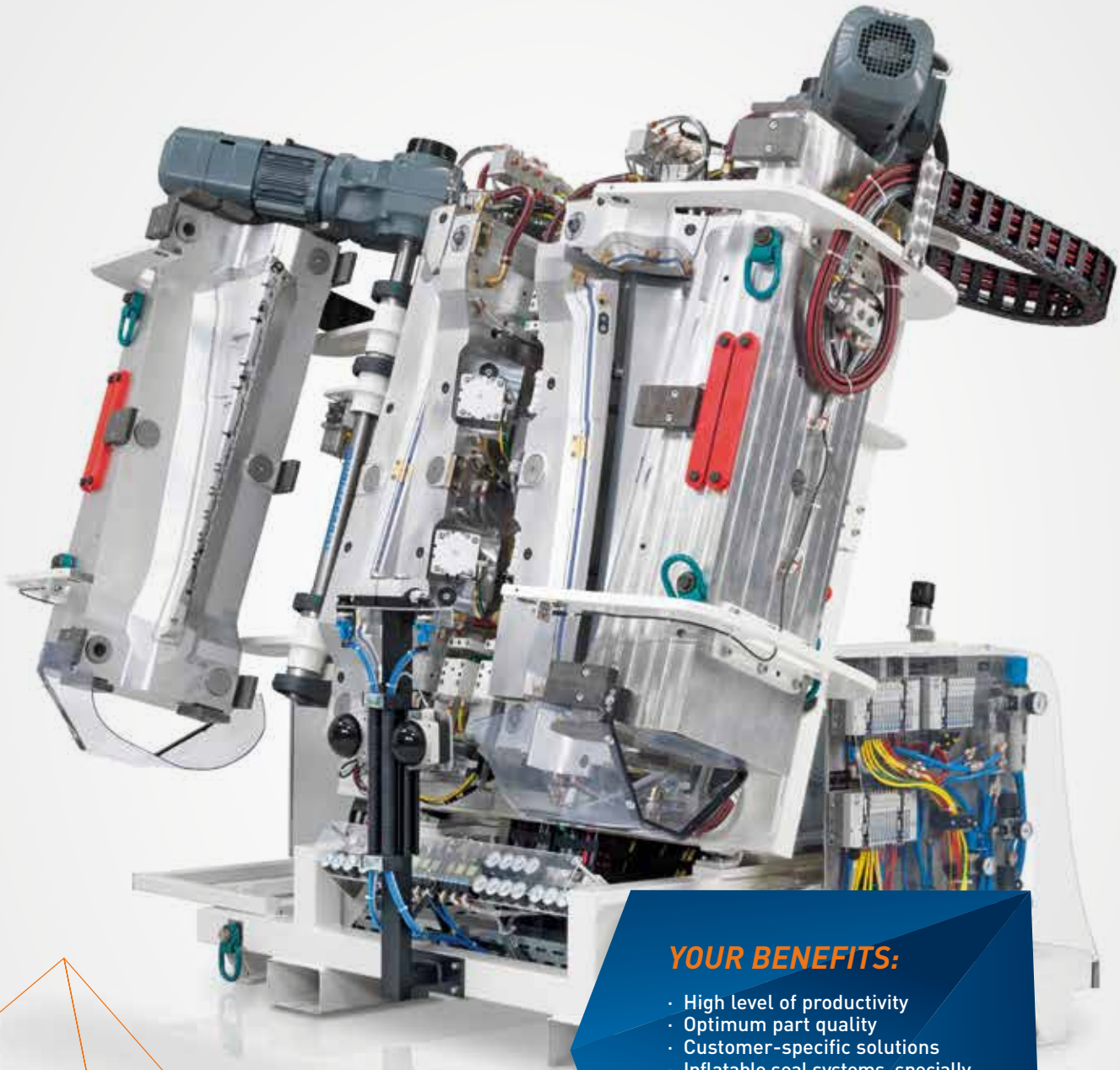
YOUR BENEFITS:

- Premium-quality coatings in just a single cycle
- Superior part quality thanks to repeatable processes
- High production rates
- Combining precision seals with venting capability



CCM mold in mold carrier

Mold carriers with mold for door panels



YOUR BENEFITS:

- High level of productivity
- Optimum part quality
- Customer-specific solutions
- Inflatable seal systems, specially tailored to the component
- Molds are adapted to the special demands of processing flexible foam
- Broad range of applications
- Portfolio extends to include all processes
- Sustainable, environmentally friendly solutions for foaming without liquid release agents

Molds for flexible foam systems
High output and premium part quality

Flexible foam systems (hot and cold foam) are mostly processed into parts on high-pressure metering machines. High-pressure metering means high-precision metering for PUR components, while high mixing quality ensures splash-free pouring into the mold.

Producing flexible foam from PUR has two major advantages: one is the very high output, the other is the excellent quality of the parts.

Flexible foam products for vehicle and furniture applications

Flexible foams are produced to comply with customer specifications; for example, the density can vary between 35-60 kg/m³. Ergonomic seat squabs and backrests can be produced in a single work process by pouring PUR foam of different density to create different hardness zones; the resulting products are outstandingly comfortable and durable. Molds are adapted to the special demands of processing flexible foam, with aluminum, special epoxy resin or steel surfaces and with process-specific heating using either cast heat-transfer lines or deep drilled holes. This makes it possible to produce a wide range of seat cushions, armrests and seat backs with varying hardness zones – using the same PUR system and one and the same production unit. Upholstery fabric can be inserted in the mold and foam backed, and inserts can be foamed-in. It is also feasible to foam onto a substrate material; the parts can subsequently be covered with selected décor material.

Foaming without release agents

Based on our experience in injection molding and moldmaking, we have developed anti-stick solutions that enable reliable demolding of the components without liquid release agents. At the same time, they fulfill current requirements for sustainable production and a healthy work environment.

These molds are specifically adapted to the flexible foam process:
Molds: a) With high-temperature-resistant surface – Resin applied in a front pouring or surface coating process b) With aluminum surface – Molds made of cast aluminum, surface polished – Milled from cast aluminum or aluminum block – Made of special, highly resistant aluminum c) With milled steel surface
Seal systems are specially tailored to the component. There are a number of rigid and/or inflatable sealing systems available as a solution; combinations are also possible
Process-specific supports or fixtures for padding aids, inserts or stiffening elements
Process-specific venting to remove gases generated during foaming from the mold safely and without damaging the part
Molds engineered for foaming in open or closed molds
Molds engineered for use with a KraussMaffei mold carrier or self-contained, depending on target production volumes

Molds for structural components
Consistently high product quality

Structural components can be manufactured as a sandwich panel with a rigid foam core or by fiber-reinforced polyurethane shells separated by a cardboard or plastic honeycomb to form a sandwich. Structural components can also be made of PUR without a core as a flat or three-dimensional component. A high fiber content provides the necessary strength here.

Rugged mold design for fiber-reinforced PUR components

Due to the usually abrasive behavior of the fibers, processing fiber reinforced plastics is usually more complex than normal PUR processing. The mold surfaces must be resistant to abrasion and the mold seals must seal tightly even if isolated fibers or even fiber bundles lie on the sealing edge. Here, our many years of expertise guarantee success in moldmaking for your application. Fiber-friendly design and material selection ensure good mold service life and minimal effort for mold maintenance.

YOUR BENEFITS:

- Excellent abrasion resistance of the surfaces
- Fiber-optimized design of the sealing edges
- High imperviousness and good press properties

These molds are specifically adapted to the rigid foam process:

Molds:
a) Surfaced with epoxy resin
– Resin applied in a front pouring or surface coating process
b) With aluminum surface
– Molds made of cast aluminum, with cast surface
– Milled from cast aluminum or aluminum block
– Mold made of special aluminum capable of taking a high-gloss polish
– Possible with graining, surface structures in the aluminum
c) With milled steel surface
– With etched graining
b) With nickel shell as contour insert

All molds with process-specific heating
a) By inserted heat-transfer lines
b) By cast-in heat-transfer lines
b) Through deep drilled holes

Metal seal edges, manually finished, milled or eroded

Plastic seal edges stamped or coated, with specially filled polymer resins

Optimized demolding concepts for damage-free demolding

Product-specific seals (polymers) in the mold to prevent flash or over-foaming

Process-specific supports or fixtures for parts to be encapsulated, inserts or stiffening elements

Process-specific venting

Molds engineered for foaming in open or closed molds

Molds engineered for use with a KraussMaffei mold carrier or self-contained, depending on target production volumes

Foam mold for A pillar trim. For composite components with inserted decorated film.

Molds for semi-rigid foam
Low cost and energy efficient

Semi-rigid polyurethane foam systems are used mainly for backfoaming films, skins or leather.

The great advantage of semi-rigid foams lies in their cost-efficiency due to short demolding times, low material consumption and the ability to reduce material and energy consumption by using "lightweight" foams with low bulk density. Combining PUR foams with PVC, ABS or PUR films results in good adhesion. In the automotive industry, the use of foam for sound-proofing and to dampen vibrations makes for a more pleasant driving experience.

YOUR BENEFITS:

- Extremely cost-effective production
- Short demolding times
- Efficient use of resources and energy
- Integrated sensors for transparent process monitoring and automation (optional)
- Modules for customer-specific process control and component-specific production reporting (optional)

These molds are specifically adapted to the semi-rigid foam process:

Molds:
a) Surfaced with epoxy resin
– Temperature-resistant up to 150 °C
– Resin applied in a front pouring or surface coating process
b) With aluminum surface
c) Milled from cast aluminum or aluminum block

All molds with process-specific heating
a) By inserted heat-transfer lines
b) By cast-in heat-transfer lines
b) Through deep drilled holes

With product-specific sealing systems. There are a number of rigid and/or inflatable sealing systems available, combinations are also possible

Process-specific supports or fixtures for inserts or stiffening elements

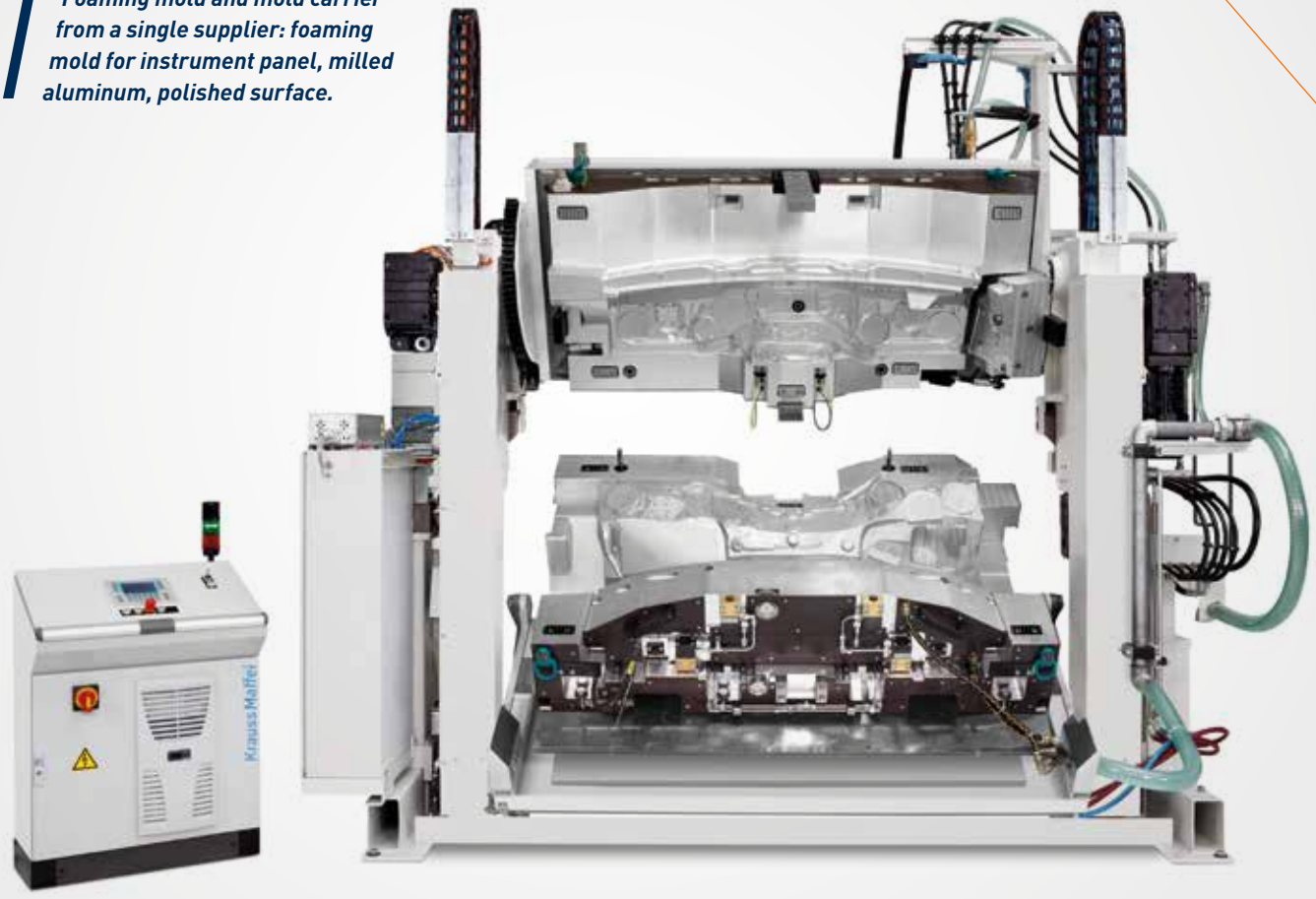
Process-specific venting to remove gases generated during foaming from the mold safely and without damaging the part

Molds engineered for foaming in open or closed molds

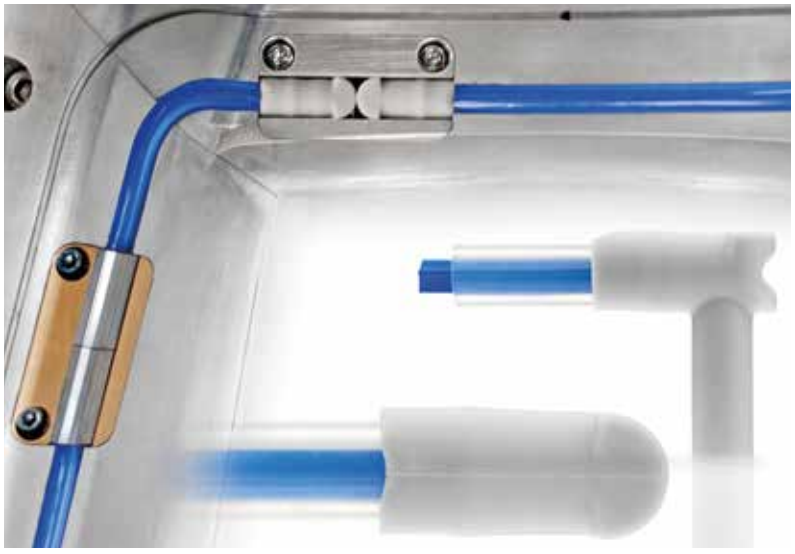
With several vacuum circuits for perfect positioning of molded skins

Molds engineered for use with a KraussMaffei mold carrier or self-contained, depending on target production volumes

Foaming mold and mold carrier from a single supplier: foaming mold for instrument panel, milled aluminum, polished surface.



Innovative seal systems for perfect components.



The geometric freedom of LFI technology and the versatility of PUR systems mean that the range of applications is very wide. LFI parts can vary from a small trim part for a car interior to a large structural component with a Class A visible surface.

YOUR BENEFITS:

- Broad range of applications
- Extremely strong yet lightweight parts
- First-class surfaces with simple process combinations (IMP, film inserts)
- Moderate mold and system costs
- High design variability

Molds for Long Fiber Injection molding (LFI-PUR)
Stable and lightweight parts

We are your highly competent partner for molds used in the production of structural components reinforced with long glass fibers.

In the LFI (Long Fiber Injection) process, endless fiber from a roving is chopped to length in a cutter unit. A blower then separates the filaments. Immediately downstream of the cutter unit, the fibers are wetted with the PUR mix from the mixing head. The fiber/PUR compound is poured into the open mold, under robot control, using a sharply focused spray cone. Once mold filling is complete, the mold is closed and the compound cures.

Specific, localized properties

Fiber lengths can be varied between 12.5 and 100 mm and fiber content can be varied continuously during pouring from 0 to 50 percent. 50 percent is the limit to ensure good wetting with PUR. Today the most commonly used PUR systems are either compact or foamed. This means that the property profile of LFI is comparable with that of SMC.

LFI mold made from aluminum as combination mold for four different parts.

Molds for flexible integral foam and compact systems
Tough skin and soft core

The combination of a light, flexible foam core with a tough, compact skin generates characteristic product properties that are useful for three applications in particular.

Cable encapsulation

Polyurethane cable harnesses that are keeping their shape and direction are far easier to install, maintain and repair. Complete cable encapsulation guarantees reliable protection against moisture – even under extreme conditions.

Steering wheels

Steering wheels with an integrated airbag finisher are distinguished by their textured, non-slip surface structure, have low-temperature impact strength and meet all safety design specifications. The scope for attractive design solutions is also very wide.

Development from idea to component testing

At our TechCenter, we develop the optimal production system for your components on close-to-production systems. We provide ideal conditions here, from visual models fabricated by 3D printing to prototypes, pre-batch production to series testing of components.

These molds are specifically adapted to the foaming process:

Molds: a) With aluminum surface – Milled from cast aluminum or aluminum block, surface polished or with graining – Mold made of special aluminum capable of taking a high-gloss polish or with graining b) With steel surface, milled and polished – With etched graining
All molds with process-specific heating a) By inserted heat-transfer lines b) By cast-in heat-transfer lines b) Through deep drilled holes
Metal seal edges, manually finished, milled or eroded
Optimized demolding concepts for damage-free demolding
Product-specific polymer seals in the mold, to prevent flash or overfoaming
Process-specific supports or fixtures for parts to be encapsulated, inserts or stiffening elements
Process-specific venting to remove gases generated during foaming from the mold safely and without damaging the part
Molds are engineered for foaming-in
Molds engineered for use with a KraussMaffei mold carrier or self-contained, depending on target production volumes

YOUR BENEFITS:

- Decorative surface with pleasant haptics
- High abrasion resistance
- Good mechanical and chemical resistance
- Low thermal conductivity
- Moisture repellent

Non-slip materials ensure that specific items like steering wheels and door panels are entirely comfortable and extremely safe to use.

Cable sheathing

Steering wheel mold carrier

Glass encapsulation

Special molds
From ideas for parts to series production

Special molds are needed for particular materials such as elastomer-modified Nylon® or Caprolactam and PUR elastomers such as Technogel. KraussMaffei has the optimal solution for you for these materials too.

One such example is the SkinForm process, a 2C injection molding process in which each component is itself a two-component reaction material. This category also includes molds for structured or sandwich pane configurations, where a reactive resin is key to bonding the different layers. Another special area is Spray-RIM molds where the part is produced by spraying a reaction mix into the mold.

Each of these types of molds is specially adapted to the process. This starts with the choice of material for the mold – KraussMaffei makes molds from plastic, aluminum or steel – and includes the seals and venting system as well as the chosen splitters, flaps, removable parts and inserts necessary for take-out automation of the molded part.

Molds can be made of a combination of materials and KraussMaffei can advise on the best combination for a specific application. Decisive factors are the number of parts to be produced, the material being processed and the part geometry. Molds for reaction molding can be built for the temperature range from 30 to 150 °C. Molds must be tight-sealed, even at high temperatures, the splitters must move as specified and reliably, and the entire mold technology must function as specified for the life of the mold.

KraussMaffei can provide pre-engineering support from an early stage of product design and follow up this support with process technology in the TechCenter during the testing phase.

In addition, we have expertise in and machinery for downstream die punching, trimming and routing processes, so that we can advise here too.

YOUR BENEFITS:

- **Comprehensive expertise in special materials**
- **Specific mold development for specific tasks**
- **Long-term functional capability**
- **Support throughout the entire process chain**

Mold for a caprolactam pulley.
Property patterns:
– Polished surface
– Temperature > 140°C
– Four external slides and one core retraction
– Material is poured into the closed mold

All molds and fixtures are specially adapted to process requirements

Molds:
a) Surfaced with epoxy resin
b) With aluminum surface
– Made of cast aluminum
– Milled from cast aluminum or aluminum block; surface polished or with graining possible
– Mold made of special aluminum capable of taking a high-gloss polish
– With etched graining in the aluminum
c) With steel surface, milled and polished
- With etched graining
b) With nickel shell as contour insert

All molds with process-specific heating:
a) By inserted heat-transfer lines
b) By cast-in heat-transfer lines
b) Through deep drilled holes

Metal seal edges, manually finished, milled or eroded

Plastic seal edges stamped or coated, with specially filled polymer resins

Optimized demolding concepts for damage-free demolding

With product-specific polymer seals in the mold to prevent flash or over-foaming

Process-specific supports or fixtures for parts to be encapsulated, inserts or stiffening elements

Process-specific venting to remove gases generated during foaming from the mold safely and without damaging the part

Molds engineered for foaming in open or closed molds

Molds engineered for use with a KraussMaffei mold carrier or self-contained, depending on target production volumes

OUR WORLDWIDE EXPERTISE IS YOUR ADVANTAGE
DIGITAL & SERVICE SOLUTIONS

With your KraussMaffei machine, you have chosen a product that delivers the highest levels of productivity and reliability. In addition to our range of machinery, KraussMaffei focuses on comprehensive and future-oriented solutions, innovative business models and an innovative portfolio of digital products.

Customer service at the touch of a button

The process of digital transformation is becoming faster and easier than ever for the customer. Our Digital & Service Solutions unit makes your production chain even more flexible and efficient with future-oriented solutions. KraussMaffei thus globally provides an all-inclusive customer service package and networks machines and processes with each other. Our global support offers a sound basis for your local long-term success.

Individual challenges in mechanical engineering call for intelligent solutions

With our services portfolio, we support you throughout your machine's lifecycle with a strong focus on your specific needs. In order to satisfy your wishes, we offer you a wide range of solutions in order to ensure maximum availability and optimum productivity of your machines.

Technology³ as a unique selling proposition

KraussMaffei is the only supplier in the world with a product range comprising the most important machine technologies for plastic and rubber processing: injection molding machinery, automation, reaction process machinery and extrusion technology. KraussMaffei is represented worldwide with more than 30 subsidiaries and over 10 production plants as well as about 570 commercial and service partners. Working together with our customers and partners, we are thus in a position to offer vast and unique expertise in the industry.

You can find further information at:
www.kraussmaffei.com

KRAUSSMAFFEI –
PIONEERING PLASTICS

Extensive expertise from a single supplier

KraussMaffei is one of the world's leading manufacturers of machinery and systems for producing and processing plastics and rubber. Our brand has been synonymous with cutting-edge technology for over 180 years. Our product range includes all technologies in injection molding, extrusion and reaction process machinery. KraussMaffei has a unique selling proposition in the industry as a result. By drawing on our proven innovative capacity, we can guarantee our customers sustained additional value over their entire value-adding chain through our standardized and individual product, process, digital and service solutions. The range of our products and services allows us to serve customers in many sectors including the automotive, packaging, medical and construction industries. We also supply manufacturers of electrical and electronic products and household appliances.

At your service all over the world

KraussMaffei is represented all over the world. Subsidiaries provide you with support in the countries shown in light blue. Our sales and service partners take care of you in the regions shown in white.

You can find all contact information at www.kraussmaffei.com

0.0 WE . 3rd edition 09/21. RPM 474 BR 08/2013 EN ··· Subject to technical changes ··· Printed in the Federal Republic of Germany.

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