THE RIGHT MOULD FOR THE JOB

Foam moulds from KraussMaffei
KraussMaffei is a premium partner for the plastics and rubber processing industries worldwide.

Whatever you aim to achieve in plastics or rubber processing, KraussMaffei is your partner. We are the only company with intensive expertise across the three main engineering fields. And we have a strong track record in integrating this expertise to develop new processes and systems.

Ready for any challenge
Our Injection Moulding Machinery Division supplies machinery and systems from 35 to 4,000 tonnes for standard applications and for all processing variants, together with fully automated solutions. We have a strong customer base in all the relevant industries worldwide.

Our Reaction Process Machinery Division supplies machines and complete systems for processing polyurethanes and other reactive materials. Completing our product portfolio, Automotive Component Systems supplies foam moulds, cutters and routers. Our customer base is wide, with a focus on the automotive, construction and white appliances industries.

Our Extrusion Technology Division supplies machinery and systems for compounding, for pipe, profile and sheet extrusion, physical foaming, and the production of technical rubbers and intermediates for tire production. Machinery from the company’s range – from single extruders to complete extrusion lines – is used in many industries, including chemicals, pharmaceuticals, automotive, construction, furniture and packaging.

People for Plastics
We are the “people for plastics”. We are your partners from the first exploratory discussion, through development to commissioning, servicing and operating your system, and final disposal. At all times, you are assured of outstanding competence in planning and engineering, as well as reliable and fast spare parts, service and support.

Adding value for customers
We put our expertise to work for your success. With machine ranges engineered for modularity, we can deliver application-specific solutions based on our wide range of standard modules and specially engineered solutions. This strategy offers customers technical and cost advantages.

Close to customers around the world
As an international company, KraussMaffei has a presence in all the major markets for the plastics and rubber processing industries and employs over 3,000 people worldwide. Our sales and service network keeps us close to all our customers around the world.
For top quality parts and low reject rates

KraussMaffei makes moulds for pouring, foam-moulding and backfoaming. Moulds – for open or closed pouring – are made of steel or aluminium, with an epoxy surface if required.

Each KraussMaffei mould is engineered as a custom tool for a specific application – with process-specific temperature control, a demoulding concept for efficient, non-damaging demoulding, with product-specific seal systems, and where necessary with wear-resistant surfaces. Process, machinery, mould carriers and moulds are perfectly matched.
Clear Coat Moulding (CCM) is an automated process for coating high-value substrates, eg, 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 coating methods, CCM is a one-step process. The substrate item is positioned in the mould. When the mould 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. The CCM process produces a brilliant, high-quality coating in a relatively short time. The precise temperature control and a stable, repeatable process, which are features of KraussMaffei CCM systems, ensure that the coated parts meet very high criteria for optical quality.

Stable, consistent process for high part quality
The production system has a mould carrier and a mould. The mixing head is mounted on the centrally positioned robot, so that it can dock alternately onto the moulds to discharge the CCM material into the cavities. The wait times between shots are relatively short to eliminate the risk of problems with hardened material residues. This configuration also makes it possible to achieve high production rates.

CCM moulds must combine seal tightness with venting capability. The coating must compensate for manufacturing tolerances from previous processes. Seal tightness must be guaranteed with minimal flash and the substrate to be coated must be held firmly in place.

KraussMaffei’s CCM moulds are perfectly adapted to the process:

- Moulds
  a) With highly polished steel surfaces
  b) With contoured nickel shell as insert
- All moulds with process-specific temperature control:
  a) By inserting heat-transfer lines
  b) Through deep-hole drilling
- Metal seal edges, manually finished/bedded in, milled or eroded
- With optimized ejector concepts for non-damaging part removal
- With product-specific seals in the mould to prevent flash and over-foaming
- Process-specific fixture to hold inserted substrate
- Process-specific venting
Flexible foam systems (hot and cold foam) are generally processed on high-pressure metering machines. High-pressure metering means high-precision metering for the PUR components, high mixing quality and splash-free pour into the mould. Producing flexible foam from PUR has two major advantages: one is the very high output, the other is the excellent quality.

Flexible foam products for transport 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 different density PUR foam to create different hardness zones – the resulting products are outstandingly comfortable and durable. Moulds are adapted to the special demands of processing flexible foam – with aluminium, special epoxy resin or steel surfaces and with process-specific temperature control systems, using either cast heat-transfer lines or deep drilled holes. This mature technology makes it possible to produce a range of seat squabs, armrests and backrests with varying hardness zones – using the same PUR system and one and the same production machinery. Upholstery fabric can be inserted in the mould and foam backed, and inserts can be foamed-in. It is also feasible to foam onto a substrate material; the parts can subsequently be upholstered with selected décor material.
Mould carrier with mould for door armrest, front foaming process

The moulds are specially adapted to the flexible foam process:

- Moulds:
  - a) Surfaced with epoxy resin
  - Temperature-resistant up to 150°C
  - Resin applied in a front pouring or surface coating process
  - b) With aluminium surface
  - Cast aluminium, inner surface polished
  - Milled from cast aluminium or aluminium block, inner surface polished
  - Special aluminium capable of taking a high-gloss polish
  - c) With steel surface, milled and polished
- All moulds with process-specific temperature control
  - a) With inserted heat transfer lines
  - b) With cast heat-transfer lines
  - c) With deep drilled holes
- Metal seal edges, manually finished/bedded in, milled or eroded
- Plastic seal edges stamped or coated, with specially filled polymer resins
- With optimized ejector concepts for non-damaging part removal
- Process-specific brackets or fixtures for padding aids, inserts or stiffening elements
- Process-specific venting to remove gases generated during foaming from the mould safely and without damaging the part
- Moulds engineered for foaming in open or closed moulds
- Moulds engineered for use with KraussMaffei mould carrier or self-contained, depending on target production volumes
Moulds for rigid foam

PUR rigid foams are used in civil engineering, in industrial plant, in plumbing and heating applications, in air conditioning and refrigeration and district heating applications. The foam systems meet physical criteria for buildings and comply with the legal requirements in different sectors of the construction industry.

**Proven excellent mixing quality for constant high product quality**

- Rigid foam systems have outstanding thermal insulating properties, even with very thin walls.
- The bulk density of the rigid foam can be set within a wide range.
- The rigid foam will create a self-adhesive bond with different outer layers.
- The composite elements are highly stable.
- Good flow behaviour opens up wide design freedom, even complicated cavities can be filled.

Foam mould for a pillar trim – rigid foam back-foamed onto film inserts
The moulds are specially adapted to the rigid foam process:

- Moulds:
  a) Surfaced with epoxy resin
  - Temperature-resistant up to 150 °C
  - Resin applied in a front pouring or surface coating process
  b) With aluminium surface
  - Cast aluminium, inner surface polished
  - Milled from cast aluminium or aluminium block, inner surface polished
  - Special aluminium capable of taking a high-gloss polish
  - With etched graining in the aluminium
  c) With steel surface, milled and polished
  - With etched graining
  - With nickel shell as contour insert
  d) All moulds with process-specific temperature control
  a) With inserted heat transfer lines
  b) With cast heat-transfer lines
  c) With deep drilled holes
- Metal seal edges, manually finished/bedded in, milled or eroded
- Plastic seal edges stamped or coated, with specially filled polymer resins
- Optimized ejector concept for damage-free demoulding
- Process-specific seals (made of polymer or other material) in the mould prevent flash and over-foaming.
- Process-specific brackets or fixtures for parts to be encapsulated, inserts or stiffening elements
- Process-specific venting
- Moulds engineered for foaming in open or closed moulds
- Moulds engineered for use with KraussMaffei mould carrier or self-contained, depending on target production volumes
Moulds for semi-rigid foam

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

The great advantage of semi-rigid foams lies in their lower cost due to short demoulding times, low material consumption and the ability to reduce material and energy consumption by using “lightweight” foams with low bulk density. PUR foams ensure very strong adhesion when they are combined with PVC, ABS or PUR film. In the automotive industry, the use of foam for sound-proofing and to dampen vibrations makes for a more comfortable driving experience for driver and passengers.
The moulds are specially adapted to the semi-rigid foam process:

- Moulds:
  a) Surfaced with epoxy resin
  b) Temperature-resistant up to 150 °C
  c) Resin applied in a front pouring or surface coating process

- With aluminium surface

- Milled from cast aluminium or aluminium block, inner surface polished

- All moulds with process-specific temperature control:
  a) with inserted heat transfer lines
  b) with cast-in heat-transfer lines
  c) with 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 brackets or fixtures for inserts or stiffening elements

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

- Moulds engineered for foaming in open or closed moulds

- With several vacuum circuits for perfect positioning of moulded skins

- Moulds engineered for use with KraussMaffei mould carrier or self-contained, depending on target production volumes
KraussMaffei is a highly competent partner for moulds used in manufacturing structural parts reinforced with long glass fibres.

The LFI process
The LFI process produces glass-reinforced composite parts in a one-step process. The reinforcing fibres are drawn continuously from a roving and chopped in the special mixing head to filaments with the specified length. These filaments are thoroughly wetted with the reaction mix as it is discharged from the mixing chamber of the mixing head. The PUR-glassfibre mix is discharged into the open mould using a robot spray arm.

The moulds are specially adapted to the requirements of the LFI process:

- Special wear protection
- Surfaces with clean contours
- Constant part quality

LFI mould made of aluminium as combination mould for four different parts
Moulds for flexible integral foam

The combination of a light, flexible foam core with a tough, compact skin generates characteristic product properties:

- Decorative surface with pleasant haptics
- High abrasion resistance
- Good mechanical and chemical resistance
- Remains elastic even under continuous load
- Low thermal conductivity
- Moisture repellent

Cable encapsulation

Cable harnesses held in the required shape and orientation by polyurethane are far easier to install, maintain and repair. Complete cable encapsulation guarantees reliable protection against moisture – even under extreme conditions.

Steering wheel

Steering wheels with a surface that gives a good grip and an integrated airbag cover, need a grippy, non-slip surface structure, low-temperature impact strength and must also meet safety-related design specifications. As regards design, the scope for attractive design solutions is wide.

Glass encapsulation

Glazing panes are inserted in a mould and overmoulded with a compact PUR system. The PUR material not only acts as a seal, it also compensates for manufacturing tolerances, making it easier to assemble the glass panes.
The moulds are specially adapted to the foaming process:

- **Moulds:**
  - a) Surfaced with epoxy resin
    - Temperature-resistant up to 150 °C
    - Resin applied in a front pouring or surface coating process
  - b) With aluminium surface
    - Cast aluminium, inner surface polished
    - Milled from cast aluminium or aluminium block, inner surface polished
    - Made of special aluminium capable of taking a high-gloss polish
    - With etched graining in the aluminium
  - c) With steel surface, milled and polished
    - Made of special steel capable of taking a high-gloss polish
    - With etched graining
  - d) With nickel shell as contour insert

- All moulds with process-specific temperature control
  - a) With inserted heat transfer lines
  - b) With cast-in heat-transfer lines
  - c) With deep drilled holes

- Metal seal edges, manually finished/bedded in, milled or eroded
- Plastic seal edges stamped or coated, with specially filled polymer resins
- Optimized ejector concept for damage-free demoulding
- Process-specific polymer seals in the mould prevent flash and over-foaming
- Process-specific brackets or fixtures for parts to be encapsulated, inserts or stiffening elements
- Process-specific venting to safely remove gases generated during foaming without damaging the part

- Moulds engineered for foaming in open or closed moulds
- Moulds engineered for use with KraussMaffei mould carrier or self-contained, depending on target production volumes
Special moulds

This category includes moulds for special materials, for instance, elastomer-modified Nylon® such as caprolactam or PUR elastomers such as Technogel.

It also includes moulds for the SkinForm process, a 2C injection moulding process where one of the two components is itself a two-component reaction material. The category also includes moulds for structural or sandwich parts, where a reaction material is the key to bonding the different layers. Another special area is spray-RIM moulds where the part is produced by spraying a reaction mix into the mould.

Each of these types of moulds is specially adapted to the process. This starts with the choice of material for the mould – KraussMaffei makes moulds from plastic, aluminium or steel. The seals and venting system are also process-specific, as are the slides, flaps, individual items and inserts necessary for demoulding the moulded part.

Moulds can be made of a combination of materials; KraussMaffei can advise on the best combination for a specific application. Factors that influence these decisions are the number of parts to be produced, the material being processed and the part geometry.

Reaction moulding moulds can be built for the temperature range from 30 to 150 °C. Moulds must be tight, even at high temperatures, the slides must move as specified and reliably, and the entire mould technology must function as specified for the life of the mould.

KraussMaffei can provide pre-engineering support from an early stage of product design and can follow this up with support as an extended workbench 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.

The KraussMaffei team is your expert partner for a complete service and machine package – from the product idea to series production.
All moulds and support frames are specially adapted to process requirements:

- Moulds:
  a) Surfaced with epoxy resin
  b) With aluminium surface
  c) With steel surface, milled and polished
  d) With nickel shell as contour insert
- All moulds with process-specific temperature control
  a) With inserted heat transfer lines
  b) With cast-in heat-transfer lines
  c) With deep drilled holes
- Metal seal edges, manually finished/bedded in, milled or eroded
- Plastic seal edges stamped or coated, with specially filled polymer resins
- Optimized ejector concept for damage-free demoulding
- With product-specific seals in the mould to prevent flash and over-foaming
- Process-specific brackets or fixtures for parts to be encapsulated, inserts or stiffening elements
- Process-specific venting to remove gases generated during foaming from the mould safely and without damaging the part
- Moulds engineered for foaming in open or closed moulds
- Moulds engineered for use with KraussMaffei mould carrier or self-contained, depending on target production volumes
Rely on us for a fast and competent response to all your service needs anywhere in the world. Whatever you need – from troubleshooting and training to spares or repairs – we’re on the job.

We’re dedicated to supplying service quality on a par with the outstanding quality of our machines and systems. We offer far more than spare parts and hotlines. We’ll work with you to choose the best and most cost-effective solution for your operation. We’ll help you test new applications and we’ll plan customized service packages.

**All-round service**
Our service offering is broad. We’ll configure your system, install and commission it, train your staff, plan measures to minimize your downtime risk and maximize productivity, and carry out maintenance, repairs and upgrades. You’ll find us fast, reliable and competent. Our hotline is manned by highly-trained and experienced service technicians. If necessary, we’ll get a technician to you quickly. Remote diagnosis, interfacing directly with your machine’s control system, can be a practical alternative. Spares for all important wear parts are available at short notice. We’re continuously expanding our service network to speed up spare parts shipment. Talk to us about the right service solution for your business.

**Customer trials and prototyping in our test lab**
The Reaction Process Machinery Division operates a test lab fitted with the latest machinery and equipment. We can run trials, produce prototype parts and fine-tune processes on your behalf. We can work with you to test and evaluate processes, machines and equipment in order to identify the best approach for a particular project. Our highly-qualified application engineers are there to help you.

**Training with high hands-on content**
Courses are held in our lab and training centre, or, optionally, on your premises. We offer clearly-structured basic and advanced training in operation, process control and maintenance for KraussMaffei reaction process machinery. On request, we’ll plan and hold special courses on topics of your choice. All participants spend a high proportion of their training working hands-on with original KraussMaffei machines. A well-structured training program produces skilled operators and technicians, which will positively impact your up-time and productivity.
How to contact us

Apart from email you can contact us on our service hotline or by post at this address:

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KraussMaffei is a premium partner for the plastics and rubber processing industries worldwide. KraussMaffei machines and systems are used wherever plastics and rubber are converted into products. As a knowledge-driven technology company, we build on many decades of experience and a strong commitment to research and development.

KraussMaffei offers you security and reliability for your production, because the process, machinery, mould carriers and moulds have been optimized to work together perfectly. Because KraussMaffei makes moulds for **foam moulding and backfoaming parts**. Every mould is custom-engineered for your application, with process-specific temperature control, the best ejector concept for high-precision gentle demoulding, seal technology to suit the product – and wear protection, if necessary. Choose the mould that will ensure your production success – from KraussMaffei.