Lightweight plastic components. For cars and commercial vehicles. Multifunctional, durable, efficient.
Experience mobility – Drive the future. 
The ElringKlinger Group.

We are dedicated to developing cutting-edge solutions and new technologies for current and future generations of vehicles. As an expert development partner and approved OEM supplier, we take an all-embracing approach and focus on the vehicle system as a whole. Our particular strength is that we are one of the few automotive suppliers capable of developing and manufacturing technologically sophisticated components for all types of drive system – based on either combustion engines or electric solutions. Customized components from ElringKlinger for engine, transmission, exhaust gas system, underbody, chassis, and body are used by virtually all vehicle and engine manufacturers and countless automotive suppliers worldwide. Our product range includes gas-kets, lightweight polymer components, shielding systems, battery and fuel cell technology, transmission control plates, exhaust gas purification systems, components made of high-performance plastics, tooling technology, and development services. Building on our innovative products, we set industry benchmarks and help to achieve environmentally compatible mobility. We also supply an extensive range of spare parts to the aftermarket sector in more than 140 countries. In addition, ElringKlinger boasts a successful track record in other branches of industry, e.g., with exhaust gas purification systems, PTFE products, and fuel cells. These efforts are supported by a dedicated workforce of more than 9,000 people at 49 ElringKlinger Group locations around the globe.

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EXPLANATION OF SYMBOLS

Car applications
Commercial vehicle applications

Information on lightweight plastic components for shielding technology is provided in our brochure “ElroCoustic® shielding systems. Sound solutions for vehicle acoustics.”.
ElringKlinger worldwide.

North America

CANADA
Leamington

USA
Plymouth
Southfield
Buford
Austin
Fremont

South America

BRAZIL
Toluca
Piracicaba

Africa

SOUTH AFRICA
Johannesburg

Cylinder-head gaskets
Sealing systems
Transmission control plates
Lightweight plastic components
Plastic modules
Thermal and acoustic shielding systems
Exhaust after-treatment systems
Europe

**GERMANY**
- Dettingen/Erms
- Langenzenn
- Runkel
- Geretsried-Gelting
- Thale
- Lenningen
- Bissingen/Teck
- Bietigheim-Bissingen
- Heidenheim
- Mönchengladbach
- Idstein
- Rottenburg am Neckar
- Magdeburg
- Neubrandenburg
- Nürtingen

**GREAT BRITAIN**
- Redcar
- Gateshead

**FRANCE**
- Nantiat
- Chamborèt
- Poissy

**SWITZERLAND**
- Sevelen
- Elsau

**NETHERLANDS**
- Enschede

**SPAIN**
- Reus

**ITALY**
- Settimo Torinese
- Milan

**HUNGARY**
- Kecskemét-Kádafalva

**ROMANIA**
- Timisoara

**TURKEY**
- Bursa

Asia

**PR CHINA**
- Changchun
- Suzhou
- Qingdao
- Chongqing

**SOUTH KOREA**
- Gumi
- Seoul

**INDIA**
- Ranjangaon

**INDONESIA**
- Karawang

**THAILAND**
- Bangkok

**JAPAN**
- Tokyo
- Saitama

## Services
- PEM fuel cell stacks
- Electric Drive Unit
- Development services with hofer powertrain
- PTFE components
- Engine development services
- Tooling technology
Improved safety, more comfort, better handling: the modern car has a great deal to offer. At the same time, there is a need for intelligent lightweight design to ensure that these extra features and enhanced performance do not add to the weight of the vehicle. Indeed, lightweight design has emerged as one of the key technologies for reducing fuel consumption and, consequently, CO₂ emissions. In addition, rising petrol prices, the climate debate and strict statutory limits on fuel consumption send a strong message that every gram counts. This applies not only to the combustion engine; in the case of electric vehicles, for example, fewer kilos mean a greater mileage per battery charge, which in turn leads to greater acceptance among car buyers. Elsewhere, the commercial vehicle sector is relying more and more on lightweight design to improve efficiency, as a lower weight not only helps save fuel but also increases loading capacity, enabling fleet operators to transport a higher payload.

**Lightweighting made easy:**
Plastic components for cars and commercial vehicles.

**SYSTEM EXPERTISE CREATES SCOPE**

Whether it is for cam cover modules, oil pan modules, intake air manifolds, oil intake pipes or cross-car beams – for ElringKlinger, intelligent lightweight construction means using lighter materials such as glass fiber-reinforced plastics, thermoplastics, thermosetting polymers, organo sheets (continuous fiber-reinforced or fabric-reinforced thermoplastics) and aluminum, in combination with state-of-the-art production processes. This goes hand in hand with composite design, or design optimizations, the integration of several functions in one component and the reduction of the overall number of parts. Plastic modules and components from ElringKlinger are matched precisely to the respective requirements for media, temperature, rigidity, acoustic behavior and appearance.

For both passenger car and commercial vehicle segments, we make effective use of our innovative strength and system expertise: from development through serial production to automated function and quality checks and just-in-time delivery of the ready-to-install components.

**INTELLIGENT LIGHTWEIGHT DESIGN**

- Reduced material use
- High cost-effectiveness
- Integration of numerous functions
- Improved NVH characteristics
- Design freedom
- Shorter development times
- Reliable and easy assembly
- Functional check of complete module
- Recycling capability
Plastic parts for the drive train. Lightweight performance.

Lightweight construction is well established at ElringKlinger. Serial production of the first plastic cam cover started as far back as the late 1990s, and we are now producing about 10 million units every year worldwide. As well as being used in cars, plastics – mainly short glass fiber-reinforced polyamides – are also gaining ground in commercial vehicles. ElringKlinger’s design engineers have managed to develop high-performing plastic components, such as oil pan modules, that can easily withstand the high mechanical stresses typically associated with commercial vehicles.

Ready-to-install plastic housing modules with complete sealing and fixing technology and other functions have also replaced the separate components used in transmission systems to date. They not only save weight and material but also cut development times and costs. This is a result of an impressive combination of quality and system expertise from ElringKlinger.

In the e-mobility sector, ElringKlinger is also pursuing pioneering lightweight product solutions: our battery holders and housings in glass fiber-reinforced plastic make an important contribution to further improving the weight of electric vehicles.
Cam cover modules.

The weight of the latest generation plastic cam cover modules has been reduced yet again, with the wall thickness of some components measuring less than 2 mm. Important elements of the overall module are ElringKlinger’s own sealing technology and fixing components. Another key function is crankcase ventilation featuring pressure control function and highly effective oil separators. Depending on the ventilation concept for the engine, diaphragm valves or flow limiting valves may also be used as an alternative to regulate crankcase pressure. Our patented separating systems ensure the removal of fine oil particles (< 0.5 μm) from the crankcase blow-by gas. They are among the leading systems worldwide.

Temperatures in the engine compartment are constantly increasing. Hot gas conducting components, such as the turbocharger and exhaust gas manifold, are coming into ever closer proximity to plastic parts as installation spaces get even more compact; this applies in particular to the cam cover. As a result, the integration of shielding components is also becoming more important. This is another key area of expertise of ElringKlinger, as we have established ourselves as a successful development partner for thermal and acoustic shielding systems.

With some car manufacturers, the trend is to combine cam covers and charge air manifolds in one module. Here too, ElringKlinger offers customized lightweight plastic solutions. One particular area of focus is the internal pressure tightness of the charge air manifold (2 to 3 bar pulsating internal pressure) at very high temperatures (180 to 200°C). The cam cover and charge air manifold are sealed off by separate gaskets specific to requirements. In some cases, special polyamide materials with a permanent temperature resistance of up to 200°C are used.

The area of the module responsible for sealing off the oil chamber of the cylinder head accommodates a high-performance oil separator. Additionally, it can integrate other functions like pressure control valves and oil filler caps.
In the commercial vehicle sector, plastic has also become an established material for components in the vicinity of the engine. New or improved Euro 6 or EPA 10 compliant engines in particular are nowadays almost exclusively fitted with polyamide cam covers. Given our comprehensive sealing expertise and in-house production facilities, ElringKlinger products are especially well represented in this market segment. These large components for commercial vehicles are produced on machines with clamping forces of 1,200 to 3,200 metric tons. By way of comparison: injection-molding machines used in the manufacture of typical car products operate with clamping forces of 300 to 900 metric tons.

Apart from efficient sealing and fixing technology from ElringKlinger, most cam covers in commercial vehicles also incorporate pre-separators for crankcase gas cleaning, which are capable of reducing the load on the main separator. In addition, we are working on new developments in which the main separator is built directly into the cam cover.

In some engine concepts, the camshaft bearing is integrated into the cam cover or an appropriate cam frame, making it difficult to use conventional plastics as a cam cover material. ElringKlinger’s solution is to integrate the crankcase ventilation including pressure control valve and blow-by separator into compact plastic oil separation modules that can be mounted either on an aluminum camshaft bearing case, directly on the crankcase or on a timing case cover. Similar modules are also used as pre-separators or fine oil separators in the case of engine designs including ventilation.

Oil separation modules.
Oil separation systems.

Modern downsizing engines are capable of combusting the fuel more and more effectively, but they do so under high pressure. As a result, the oil droplets in the blow-by gas, which also flows past the piston into the crankcase, are becoming increasingly smaller. At a diameter of just one micrometer they pass through conventional separating systems like cyclone separators or baffle plates almost unimpeded. To resolve this issue, ElringKlinger has developed and patented a system comprising impactor, fleece and baffle plate that is installed into the cam cover as a prefabricated plug-in unit and represents an ideal combination of reliable functionality and simple installation.
Whereas traditional passive oil mist separators like cyclones, impactors and impactor-fleece systems have a fixed characteristic curve, the CIFS+ adapts variably to the flow rate. This means that the pressure loss characteristic and/or separation efficiency can be systematically influenced to cover a wide range of blow-by streams. By way of comparison, for instance, better separation can be achieved in the case of low blow-by streams and a lower pressure loss in the case of large volume flows. In the CIFS+ the fleece is arranged radially around a spring-loaded ball that moves in the impactor tube and gradually releases more holes for the flow as volume increases. The separation mechanism is similar to that of impactor-fleece systems.

The separating unit that rotates at up to 10,000 rpm consists of individual flat interlocked disks that allow better use of the installation space available than conical disks. By means of centrifugal force and the Coriolis effect, particles are separated on the channel walls and slung as a film onto the surrounding housing. The involute channels have a constant wall thickness and are therefore easier to fabricate. The drive is either hydraulic and uses a turbine via the pressurized oil circuit, or is powered by an electric motor. Aerosol particles with diameters of 200 nm and smaller can be very well separated, so that the total separation efficiency is almost 100 percent. The volute channel centrifuge is made largely from plastic.
In this system, coarse oil droplets (scrubbing droplets) are used to clean the aerosol-laden blow-by flow. This wet scrubbing process is comparable with flue gas cleaning in power plants. The scrubbing droplets are produced using a nozzle connected to the engine’s pressurized oil circuit. The droplets collect the small droplets of the blow-by and can then be readily separated as large droplets. The scrubbing device can be installed, for example, in a cam cover, either instead of or in combination with conventional passive separators (IFS, CIFS+).

The advantage is that no external drive is necessary. Aerosol particles with diameters of less than 0.5 μm can therefore be removed with minimal pressure loss.
As engine performance increases, resulting in higher pressures in the combustion chamber, the blow-by gas contains more and more fine oil droplets (< 700 nm), which conventional passive systems struggle to manage. The challenge is that separation efficiency can only be improved through a higher flow speed in the separator, i.e. by a greater pressure loss. However, this runs counter to the desired increase in engine efficiency through dethrottling. The solution is to use an ejector (ejector pump) connected to the charge air to provide additional pressure loss for separation. The pressure conditions in the overall system remain unchanged. A plastic ejector is very robust and can be inserted conveniently in the space available. It can either be combined with a passive separator and used as an integrated component or can be supplied as an external module, for example as a retrofit solution. Due to the significantly improved separation, the oil load on functional components (turbocharger, inlet valves, intake section) is reduced.
Apart from the trend towards light polyamide cam covers, there is another trend making inroads into commercial vehicles: a plastic cam frame is being installed between cylinder head or aluminum camshaft frame and cam cover. The reasons for this approach are that it has been proven to substantially improve the noise emission from the engine. Additionally, the cam cover can be dismantled much more easily due to its flatter design, an important factor for engine maintenance in particular. Another key reason is that the entire cabling for the injectors and engine brake is completely integrated into the cam frame and ready to install. The cables are passed through the frame using specially matched oil-tight connector solutions. Other advantages are that because various components are combined in one assembly, installation on the car maker’s production line is much simplified, resulting in cost benefits and greater system robustness.

Plastic intake systems and/or charge air manifolds have already become state of the art in cars but are not yet in general use in the commercial vehicle segment due to the necessary long service life of components and the in part higher charging pressures. In this area too, ElringKlinger is doing some pioneering work with customized product solutions in materials with higher temperature resistance (200°C, for brief periods up to 220°C). These include charge air manifolds and ducts with EGR feed-in point. Pulsating charge pressures of 3.5 bar at temperatures of up to 200°C are not uncommon here. Apart from high temperature-resistant materials and coatings that exhibit substantially improved EGR condensate resistance, ElringKlinger is able to rely on an innovative welding process developed in-house: the JoinMelt process (see page 31) enables very strong welded connections to be achieved even for extreme conditions.

Even in commercial vehicles, weight reductions of 30 to 50 percent are achievable using plastic, depending on the field of application. Increasingly, we are also using the design and process technologies developed to meet the very exacting requirements of the commercial vehicle sector for cars and small engines.
Resonators/EGR mixers.

Resonators are frequently used in modern engines to counteract the noise from turbochargers and pipework. They can be positioned at various points on the charge air section. Due to the high temperatures often occurring in these areas (up to 220°C) and pulsating charge pressures (up to around 3 bar), the plastic resonators have to meet stringent requirements. For the acoustic design we make use of our expertise in flow simulation using CFD and FEM/BEM, allowing us to develop the ideal resonator geometry for damping and pressure loss and for the space available – quickly and effectively. The calculation results are validated promptly on our own acoustic test rigs.

In some cases, resonators are still being designed as welded metal structures. The switch to plastic, however, results in a weight and cost reduction potential of up to 50 percent. A further advantage is that plastic solutions allow for more effective use of the available installation space. Thus, the acoustic damping and flow resistance can be optimized.

To achieve higher EGR rates within the entire engine performance map, low-pressure EGR systems are increasingly being used. Here too, there are new areas of application for product solutions made of plastic. ElringKlinger uses CFD simulation technology when designing EGR mixers and developing resonators to calculate and if necessary improve the mixing behavior of EGR gas with fresh air and the pressure loss in the system. To reduce installation space and weight, a combination of resonator and EGR mixer in one component is also conceivable.
With the development of Euro 6 and EPA 10 compliant engines, polyamide engine oil pans have also become established in the commercial vehicle segment. Today, almost every newly developed oil pan worldwide is made of polyamide. ElringKlinger is the global market leader in this segment, with the ability to produce state-of-the-art components on 3,000 metric ton injection-molding machines in Germany, China and the NAFTA region. The reasons for polyamide’s triumph are manifold. On the one hand, there is the considerable weight and cost savings potential (30 to 50 percent depending on degree of integration) compared with deep-drawn steel oil pans and die-cast aluminum oil pans; on the other, various components can be easily integrated using welding processes. This integration capability is much lower for metal and thermoset polymer oil pans. Extra “side walls” that are injection-molded onto the oil pan body and welded oil-tight with a cap are one example of how favorable welding properties can be exploited. This is an inexpensive way of creating considerably more oil collecting volume and thus longer oil change intervals than would be possible with other materials. Other functions that can be integrated are oil intake lines, oil suction pipes, including filter strainer, oil filter, high-pressure oil lines to connect oil pump and filter, plastic oil drain plug, oil surge plates, oil dipstick guide and connection options for sensors, oil fill and suction, plus captive seals and screw connections.

Polyamide oil pans also offer acoustic benefits. They exhibit less noise emission over the engine performance map than all other material concepts. This is achieved primarily through targeted structural rigidity combined with the good damping properties of polyamide. ElringKlinger has also worked hard on the issue of safety in the event of stone chip impact, with our plastic oil pan modules meeting all the respective requirements.

Although highly integrative plastic oil pan modules are being used in cars, there is also a trend towards simple plastic oil pans to replace deep-drawn sheet metal or die-cast aluminum parts. The main reason for this is the potential to reduce weight. To be competitive with existing concepts in terms of cost, ElringKlinger is endeavoring to dispense with solid gaskets where a suitable connection is possible and to develop the parts so that they can be glued on in engine assembly lines.
Oil intake modules – some with integrated oil return check valves, high-pressure lines and filter strainers – are used for cars (often with plastic oil surge plates) and also for commercial vehicles. Here too, it is possible to save up to 50 percent weight and costs compared with metal and hybrid solutions – with the additional benefit of enhanced functionality. ElringKlinger products, especially welded components, feature excellent burst pressure resistance (> 60 bar at RT) and therefore also offer superior lifetime resistance against internal pressure pulsations (typical values 10 ± 5 bar) at up to 150°C.

Especially for vehicles with a low center of gravity, the engine oil often has to be collected in a separate receptacle. The concepts developed by ElringKlinger can be installed on the side of the crankcase or at various points in the engine compartment, making it easier to change oil and filters during servicing.

Numerous additional functions can be integrated: crankcase ventilation including oil separation, screwed-in oil pressure sensor, oil drain plug, holder and connecting hole with dipstick, liquid level sensor, oil filler cap, oil filter with integrated oil drain for drip-free oil filter change and detached fastening on vehicle structure.
Apart from areas like cam covers, (charge) air conducting parts and oil pans, where the use of plastic dominates, plastic housing parts are increasingly being used for the engine front and rear. ElringKlinger has already successfully realized relevant projects for both cars and commercial vehicles.

For these components, for example, it was possible to integrate the radial shaft seal for the crankshaft, position sensors, static seals, fresh air valves and screwed connections as well as preliminary separation for the oil in the blow-by gas. It is also feasible to attach the engine mounting to the plastic housing; In this case we are systematically applying our know-how in the area of plastic engine and transmission mounts (see page 25).
As well as in the engine area, plastic is also being used increasingly for components in and around the transmission system. For these applications ElringKlinger offers efficient and customized product solutions, for example transmission oil pan modules for automatic gearboxes. It is possible to integrate components such as suction filters, magnets for separating metal particles out of the transmission oil and sealing and bolting technology.

Other potential applications for plastic housing parts on transmission systems include covers for the control electronics and/or hydraulics and end shield covers and double yoke covers. Every detail is testimony to innovation and efficiency: in some cases we seal the connector glands for such applications using patented sealing technology or the connectors are supplied as integrated housing components.

Transmission modules.
Plastic gearbox oil pans are used predominantly in dual clutch transmissions. Thanks to the special geometries of the plastic shells, splash oil is diverted to the gear wheels that do not become immersed in the oil sump. Integrated sealing technology regulates the flow behavior and level of the gearbox oil.

As a gasket specialist, ElringKlinger also develops precision plastic components with complex vulcanized seal geometries. The PPS transmission control plate depicted here – with integrated elastomer sealing function on both sides – is the centerpiece of a pneumatic transmission control module for heavy-duty commercial vehicles.

As gear shifts have to be controlled with the highest possible accuracy, narrow tolerances and repeatability are essential prerequisites when it comes to component design. Additionally, shift valves and sensors are mounted on the control plate.
Lightweight plastic components for car body. Tough performers.

As a partner to the automobile industry, ElringKlinger is constantly working on new technologies and innovative product solutions for the current and future generation of vehicles. In the process, we always remain focused on the vehicle as a whole. The requirements for functionality, safety, stability, environmental compatibility, design and comfort are exacting. We systematically deploy our comprehensive expertise in materials, processes and fabrication to allow us to also offer customized lightweight components for the vehicle body. This includes cockpit cross-car beams and front-end carriers made of polymer hybrids, engine and transmission mounts in glass fiber-reinforced thermoplastics and structural components in organo sheet.
ElringKlinger cockpit cross-car beams in hydroforming hybrid (HFH) technology combine maximum functionality with minimum weight. They support instrument panel, steering wheel, heating and ventilation modules, airbags, glove box, center console and other elements and connect them safely to the car bodywork. Thanks to the intelligent combination of plastic and metal, they represent a creative lightweight solution.

The front-end section produced as a hydroformed hybrid design can serve as a support for the intercooler, headlight modules, windscreen wiper water reservoir, horn, distance radar module or air intake. It also supports the bonnet. To reduce the weight, ElringKlinger relies on a combination of polymer injection molding, metal sheets and hydroforming of metal tubes.

**PLASTIC MEETS METAL:**
**HYDROFORMING HYBRID TECHNOLOGY**

In lightweight hybrid construction, an ideal material combination plus connecting technology are crucial. ElringKlinger is a series supplier for cockpit cross-car beams and front-end carriers. With these new kinds of polymer metal hybrids, the strengths of both materials complement one another. These include weight reduction, excellent shape and dimensional accuracy, improved flexural rigidity and buckling resistance in the event of a crash, realization of complex geometries, lower number of individual parts thanks to multi-functionality, time-saving due to several process steps in one working operation as well as less material used resulting in lower costs. Our structural components are produced in a world-leading manufacturing process that combines hydroforming and injection-molding in just one process step: hydroforming hybrid technology (HFH, see page 30).
Engine and transmission mounts made of glass fiber-reinforced polyamide offer decisive advantages over conventional aluminum structures. Improved acoustics, higher thermal insulation and the distinct reduction in weight speak for themselves. In addition, the engine bearing made of natural rubber is better protected from the heat of the engine and as a result service life is increased.

**PLASTIC REPLACES METAL:**
**GLASS FIBER-REINFORCED THERMOPLASTICS**

As a specialist for plastic injection-molding, ElringKlinger is also taking a step further with engine and transmission mounts and is replacing the metal materials used previously with glass fiber-reinforced thermoplastics. This allows further weight and cost reduction, together with improved NVH properties and optimized thermal characteristics. Inserts and bushings, but also heat shields, can be easily integrated.
Innovative materials and technologies open up new approaches. To show just what is possible, ElringKlinger played an active part in the concept study “All-plastic wheel rim in glass fiber-reinforced polyamide”. This is a solution that is cost-efficient and suitable for volume manufacturing. The benefits are obvious: 30 percent weight reduction (12 to 20 kg per car), improved aerodynamics and crash safety, reduced energy consumption, design flexibility plus an innovative image.

Wheel rim concept study.
Structural components.

**PLASTIC “BECOMES” METAL:**
**STRUCTURAL COMPONENTS MADE OF ORGANO SHEETS**

ElringKlinger product solutions in continuous fiber-reinforced thermoplastics are used wherever the weight of structural and energy-absorbing components is to be reduced. Organo sheet components are as strong and durable as metal; in addition they can be manufactured quickly and reproducibly, even in volume production. The thermoplastic matrix of organo sheets combined with injection-molding processes and joining technologies (welding, gluing, riveting, etc.) provides more design flexibility for structural components. Typical applications are seat structures, pedals and pedal bearing blocks, footboards and crash elements.
Short development cycles, the complex interaction of the individual components and exacting requirements on economic efficiency and sustainability call for holistic thinking. This is the only way to achieve customized lightweight plastic solutions for the drive train and car body at the highest technological level. For ElringKlinger, system expertise means creating the scope for our customers to be able to take different approaches and reach their goals sooner. In our development work, therefore, we use the latest FEM/BEM software for the structural-mechanical and acoustic analysis of components and FVM for CFD flow simulation. And it goes without saying that we use 3D-CAD to design components in all standard OEM systems.

Product design using simulation tools is supported by customer- and component-specific function and durability tests on components. These are designed and performed specifically for the existing requirement profiles. For product testing, ElringKlinger also has well-equipped applications engineering laboratories and its own engine test rigs. This means that ElringKlinger is also setting benchmarks in product development and is regarded by automobile manufacturers as a system vendor with a significant technological edge.
Plastic components make vehicles lighter and more cost-effective. With processes such as plastic injection-molding combined with sophisticated sealing technology, lost core injection-molding, hydroforming hybrid technology, MuCell®, JoinMelt or combinations of different fabrication technologies, ElringKlinger offers the right solution for all applications – fast, clean, efficient and in the highest quality. We have production facilities at numerous locations worldwide – in proximity to our customers.

Hummel-Formen, which can look back on 50 years of success in mold and die construction, has been part of the ElringKlinger Group since 2011 and is significantly enhancing our system expertise in plastic injection-molding and the processing of fiber composite materials. Its particular strengths lie in realizing complex geometries and technically sophisticated product solutions. An added bonus is the efficient application and optimization of new technologies.

**HUMMEL-FORMEN PRODUCTS AND SERVICES**

- Single-source supplier: product design, sampling, calibration and fabrication of molds including all necessary welding processes and assembly steps
- Mold and die range: injection molds for producing plastic parts with shot weights ranging from 20 g to 120 kg
- High-gloss molds for glazing applications
- Lost core process for producing hollow plastic bodies
- Molds for producing organo sheets
- SMC and GMT press molds (hot press processes)
- GID and WID molds
- Hybrid molds for different material combinations
- 2-component molds that reduce manufacturing steps
To produce structural components – also known as polymer metal hybrids (PMH) – ElringKlinger uses a combination tool that combines hydroforming and plastic injection-molding in just one process step. A thin-walled metal tube is placed into the mold automatically. After the two halves of the mold are closed, the interior of the tube is filled with a fluid under high pressure and it expands to assume its precise final contours.

The injection-molding process then begins in the same cavity. Molten plastic is injected into the mold and then cools down and solidifies in the cavity and around the deformed tube. The hybrid component is then removed from the mold automatically and transferred to the downstream processing stages.
JoinMelt as a hot gas welding in the mold combines two steps in one process: plastic injection molding and welding of two plastic parts to a finished product in just one mold. There is no need for additional welding devices or other steps. The JoinMelt technology substantially increases quality and functional reliability.

The benefits at a glance: clean parts with no weld flash or particles, no geometric restrictions, minimizing of part weight, ideal for producing media-conducting parts from glass fiber-reinforced polyamides, reduction of manufacturing and material costs. JoinMelt is suitable for all thermoplastics.
Compared with conventional injection-molding processes, physical foaming allows additional weight to be saved; up to 8 percent, for example, in the case of cam covers. Moreover, the component exhibits less warpage following cooling. In the MuCell® process, the inert gas nitrogen is introduced in a supercritical state into the molten plastic, where it dissolves. The injection mold is then filled to 95 percent and the gas pressure fills the remainder. The surface of the part is solid and dense, because it solidifies very quickly in direct contact with the mold, so that there are no gas bubbles.

At its Lenningen site, ElringKlinger has a unique manufacturing cell that operates with maximum flexibility according to the zero error principle to produce items such as oil pans, intake pipes or cam cover modules e.g. for sports cars. The facility uses state-of-the-art camera technology and flexible robot systems and can be programmed for a wide range of components, including all plastic welding processes.

\[1\text{ SMALL BATCH FABRICATION}\]

***MuCell***

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\[1\text{ Registered trademark of Trexel, Inc., USA}\]
Last but not least, ElringKlinger’s comprehensive expertise in materials is based on our decades of experience in plastics processing. All elastomer materials are developed in our own materials laboratories. An optimum, application-specific selection of material plus a precisely matched component design also ensure maximum functionality, safety and durability even under the toughest environmental and application conditions.

Shaping metal, processing thermoplastics and thermosets in injection-molding techniques or bringing high-performance elastomers into shape using injection-molding technology: no matter what technology is required, ElringKlinger has the necessary experience in the development and processing of all materials.

- Technical thermoplastics and thermosetting polymers
- High-performance elastomers
- Continuous fiber-reinforced thermoplastics (organo sheets)
- High-strength aluminum and steel alloys
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