



**TEPRO®**

Engineering plastic products and subassemblies  
– tailor-made, precise and functional



**BÖLLHOFF**



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## Plastics – We know how!



As the market leader in fastening and assembly technology, Böllhoff has already recognized the high value of plastics many years ago. Since then, we have been producing sophisticated precision plastic parts under the name of TEPRO®.

From A to Z are we the partner for your projects – from the first concept to final production. Our dialogue with you is the thread of our working process. Thanks to smart innovation management and close working relationships we develop tailor-made solutions along your supply chain.

**Get to know us personally and find out all about the difference cooperation with us can make!**



## What is **TEPRO®**?

The brand name TEPRO® stands for engineering plastic products and subassemblies – tailor-made, precise and functional.

Do you have any special requirements regarding the shape, colour and function of your component? Are you looking for tight, high-precision, tolerance-compensating or adjustable solutions, for example?

### **In that case we are your solution.**

The TEPRO® range is subdivided into the following categories: design parts, subassemblies, precision parts, clip/plug-in connections, two-component products and TEPRO® K' in K' – a Böllhoff innovation.

- Design parts and subassemblies
- Precision parts
- Clip/plug-in connections
- Two-component products
- K' in K'



		Characteristics		
Product/ category	Clip	Selftapping (K' in K')	High precision	
 Load floor handle: Design parts and subassemblies	●			
 Function knob: Design parts and subassemblies	●			
 Assembly lock: Precision parts			●	
 One-piece thrust washer: Precision parts			●	
 Bar closure: Design parts and subassemblies	●			
 Wire clip: Clip/plug-in connections	●			
 Fastening knob: Two-component products	●			
 Window stop: K' in K'		●		

**of the product**

Adjustable	Screwable	Tight	Subassemblies	Specific surface requirement
			●	●
			●	●
●		●	●	
●			●	●
				●
●	●			

Our design parts are a real sight



**Bar closures**

Bar closures are used for stowage boxes for trays, first-aid kits and triangular safety reflectors, for example. The TEPRO® turn bar system is installed in the boot on the flap of the side stowage box. It consists of a knob, a bar, a detent washer and a housing completely made of plastic.

To install the turn bar system, first the housing is pushed into the receptacle in the side flap. Then it is locked into place with the washer from below so that the system is captively secured on the component. After that, the knob is installed from the top. Installation is simple. The knob is clipped on to the bar by means of two latches on the lock top.

The detent washer (guide groove) serves to open and close the joint by a quarter turn. A special challenge in the development of this design part was the desired surface quality combined with the corresponding colour design. The knob is produced in six different colours and therefore smoothly matches the corresponding boot design.

**Your advantages – an overview:**

- Open and close quickly
- High surface quality
- Design part with regard to special colour requirement



## Subassemblies, joining what belongs together



### Load floor handle

#### Function:

The flush-mount handle can be opened by application of slight pressure so that you can reach under the handle with your hand. When the handle is lifted, a locking cylinder is retracted so that the load floor can be pulled up.

After the handle is actuated, it automatically retrieves to the flush position and locks the load floor to prevent accidental opening.

#### Your advantages – an overview:

- No noise emission due to spring preload
- Closed surface
- Locked load floor



### Function knob

The function knob consists of two elements: a basic element and a function element. The basic element is also the carrier element and is used at different locations in the vehicle.

The function element, however, can have different functions. The corresponding element must be installed depending on the requirement — in this case it is used as a bag holder. In the previous solution, the basic element already consisted of two halves that had to be screwed together. The current solution thus offers a reduced number of parts and a considerably reduced installation time, since the element must simply be inserted into a bore hole.

Moreover, the hook has to overstretch noticeably under overload. That is provided by a spring holding the hook in the corresponding position. Afterwards, the original function is reestablished and a noise-free fit provided.

#### Your advantages – an overview:

- Simplified installation
- Reduced number of parts in receiving part
- Optimised bag hook function

## Precision parts – when precision is needed



### Your advantages – an overview:

- 100% tight fit
- Adjustable
- Oil-tight

### Assembly lock

The assembly lock serves to set the manual transmission in cars. It is installed in a die-cast aluminium housing through press fitting. Over the entire application range from -40 to +120 °C it is 100 % tightly fitted – with no need for any additional locking!

Locked between the 1st and 2nd gear it allows to adjust the length of the Bowden cable between gear lever and gearbox. It is also oil-tight.

Oil tightness is achieved by the parts geometry and the use of an O-ring that is checked for usability upon the automatic assembly of the seven component parts via video monitoring.



### Your advantages – an overview:

- Temperature and oil resistance
- Increased surface pressure
- Sliding friction properties
- Rib as anti-rotation device

### One-piece thrust washer

This product is installed in the differential gears as a sliding friction disc.

The differential gears are located between the driven wheels to ensure that the driving force is transmitted as required by driving situation and vehicle position. To achieve good sliding friction behaviour, this washer is installed as an interconnection between wall, differential gears and bevel gear.

The requirements for that product result from the high reproducibility caused by the rod gauges for the four bore holes relating to the developed length of the part.

**TEPRO® K' in K' securely screwed into plastics**



**Your advantages – an overview:**

- Resists shear forces of 600 N
- Reduced costs due to full-plastic solution
- Noise insulation
- Reverse lock

**Window stop**

For this screw joint principle (K' in K'), thread geometry is of decisive importance, since K' in K' threads have to self-form or self-tap a "holding thread" into pre-fabricated cylindrical drill holes.

The K' in K' system is characterised by special thread profiles. The different system variants are self-locking, self-forming, adjustable and tolerance-compensating.

A specially developed window stop, for example, absorbs noise when the window is stopped.

This window stop is fastened to the glass plates of the side doors with a self-tapping TEPRO® K' in K' screw.

Rough tolerances of the glass drill hole can be compensated by the circumferential fins on the window stop. A clearance-free fit results from the taper recess of the K' in K' screw. This is possible due to the press fit in the cone of the window stop.

In addition, the K' in K' screw has a reverse lock. With this joint solution, the stop of the window pane is noise-insulated.



You find detailed information about our TEPRO® K' in K' range in the separate catalogue No 4330.

**K' in K' is a registered trademark of the Böllhoff Company.**

The patented geometry is of decisive importance for the K' in K' principle. The K' in K' thread forms or taps a „holding thread“ into a cylindrical drill hole. Due to the special thread shape of the K' in K' thread, the screw joint is locked against loosening.

A self-locking action results in combination with the receiving part. The K' in K' principle can be identified from the torque: A higher torque is required to unscrew the thread than to screw it in.

The K' in K' fastener has a characteristic thread shape with two offset thread halves.

## Two-component products – several components in one



### Fastening knob

Two-component injection moulding is a special method of injection moulding technology. What is so special about it is that simultaneously or consecutively two plastic melts are injected into one mould. This way multifunctional parts can be produced for different functional requirements at particularly low cost.

The illustrated fastener was optimised through the two-component method. In the modified solution, the number of parts was reduced from six component parts to two ready-to-use components. Apart from that, there is no assembly effort.

### Function:

The bottom part is fastened to the top component by means of a bracket and consists of two materials: a hard material for clipping to the top part and a soft material for the SNAPLOC® function.

The SNAPLOC® basic principle is a two-part system consisting of a coupling and a ball stud. Inside the coupling there is a ball socket which the ball stud as the counterpart can snap into.

In the described application, this function has been integrated into the bottom part. The ball stud can have different connection options such as a metric internal or external thread, a self-tapping TEPRO® K' in K' thread, a clip version or a moulded in version.

The system is assembled and disassembled by simply plugging and unplugging. The joint can be repeatedly opened and closed and is also tolerance-compensating and vibration- and noise-decoupling. The top component must comply with design requirements regarding surface and colour. Due to the combination of material properties, sealing functions can also be realised.

### Your advantages – an overview:

- Reduced number of components
- Reduced costs due to reduced assembly effort

## Clipping – doing things the speedy way



As an expert in fastening technologies, of course we also offer clip and plug-in connections. Those fasteners stand for quick, secure and thus cost-effective fastening of e.g. cables, covers and coverings.

Clip and plug-in connections are not only increasingly used in the automotive industry because in today's technology-oriented industry time is becoming ever more important. Optimised assembly processes are the key to efficient production.

A screw-in operation, for example, takes about six seconds. So very quickly considerable assembly times can result.

Much time can be saved by simply clipping or plugging in. We develop those time-saving fasteners with functional design according to your wishes and requirements. The design is completely adapted to the corresponding specifications. You can see this in the example below.

## Filter unit

The task was to install a sealing plug with integrated filter element into the cooling circuit of an air conditioning system.

**The following major process steps had been required in the past:**

- 1) Time-consuming production of a locating bushing to fasten the sealing plug (filter element).
- 2) Welding the locating bushing into the aluminium tube of the cooling circuit.
- 3) Subsequent screwing in of the filter element.

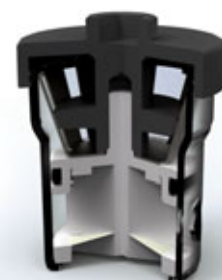
**The Böllhoff solution:**

For the Böllhoff solution, the only thing to do is to deform the aluminium tube as defined. The new injection-moulded filter element is inserted and locked into the aluminium tube by means of spring elements. The challenging aspect is the production of the filter element because the filter fleece is moulded in in one production step.



### Your advantages – an overview:

- Cost saving
- Significant reduction of assembly time
- Discontinuation of complex production





### Project management as partners

We are satisfied whenever when can exceed your expectations.

The foundation of our competence is an efficient concept of counselling, development and support. The joint aim is to realise the technically optimal and economically most attractive solution. That is also the standard of our project management.

Our project management supports you with management- and product-specific expertise.

Our personnel can look back on many years of experience in planning technical plastic products and realise tailor-made solutions according to your requirements. We think systems: process optimisation, cost reduction, strengthening of market positions.

Our project management stands for interdisciplinary coordination of complex activities. That means planning, controlling and monitoring in all project phases. All our teams cooperate, so that we all work together successfully. From our point of view, that is the most efficient way to find quicker and better solutions.

Before we start, we have a close look to evaluate what needs to be done. After that, we conduct the project and carefully coordinate the process steps. Knowledge transfer starts from development and does not end until the final production.

We offer reliable solutions for every part of your supply chain – all over the world.



## Wherever you need us

Innovative ability and technical potential are becoming increasingly important as the basis for chances of success.

You have a personal contact person who will be glad to discuss your wishes and requirements. So you save precious time.

Our expertise and experience reflect in a worldwide distribution network. The headquarters of this family business, with four generations of history, is located in Bielefeld, Germany. Apart from that, Böllhoff has sales and production facilities in 21 countries. Outside these 21 countries, Böllhoff cooperates in close partnerships with representatives and merchants to serve international customers in other important industry markets.

Passion for successful joining! This company credo is the motivation for our everyday work at Böllhoff. On the one hand, there is our product range – the whole world of fastening technology. On the other hand, „Passion for successful joining!“ puts the focus on us as persons. Persons who, with their personal internal and external connections, create the basis for today's and tomorrow's success. Courage, fairness and loyalty are the cornerstones of our corporate culture.

Your  
 Wilhelm A. Böllhoff  
 and Michael W. Böllhoff



● = Böllhoff representations

## Quality

Our focus is always on sophisticated production processes and modern measurement and monitoring technology.

Good quality is no coincidence, but the result of systematic planning and implementation.

You define all the technical requirements – if you wish so in cooperation with our qualified team – which are then tested for practicability. Your benefit is increased through process reliability and the avoidance of unnecessary costs.

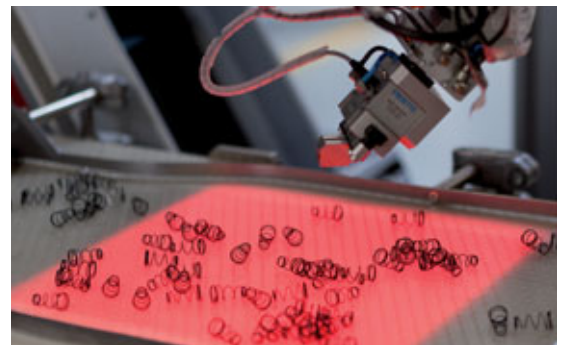
In that process, you can count on the support through our certified laboratory. We employ modern equipment and competent testing experts to realise mechanical-technological, physical, chemical and metallographic tests.

To ensure the highest quality, we regularly take part in audits by our customers as well as accredited certifiers.

### Among others, we are certified according to:

- ISO 9001
- ISO 14001
- EN 9100
- ISO/TS 16949, the highest international standard for the automotive industry

When it comes to particularly complex, unusual challenges, you can benefit from our close cooperation with universities and institutes.



## Development, construction, prototyping

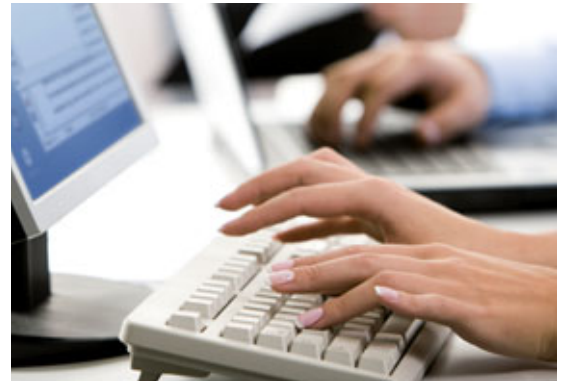
Your very first conceptual ideas are our starting signal to develop tailor-made solutions. Special design requirements, component assembly, precision plastic parts, hybrid articles or subassemblies – we welcome you to benefit from our development, production and assembly know-how. The earlier we can contribute our competence, the greater the potential.

Products and markets are undergoing changes at incredible speed – which means your requirements are changing just as fast. Therefore, product development must always be one step ahead. Whether a new product must be developed or whether we have to tackle a specific problem in close cooperation with you. Only the creative dialogue and knowing about the interaction of processes and developments allow thinking ahead. That is how ideas become real innovations.

To make those ideas become reality, we work according to the current requirements in the automotive sector using modern CAD systems. Data transfer is agreed with the customer. All projects are subject to permanent progress tracking and systematic quality checks.

Thanks to generative production methods (rapid prototyping, e.g. FDM 3D Printing) we have very short lead times for conceptual models, functional models and prototypes. Thus you have hands-on product ideas. 3D models can be printed in no time. The benefit is obvious: functional tests can be made at an early stage

and the development process is speeded up. With this procedure, design faults can be identified early. Development times are reduced and the design and product quality improved. Generative production methods give you additional security regarding the shape and functionality of your component.





## Tool manufacturing

Our up-to-date in-house tool manufacturing department allows us to establish a close connection between construction and production with short reaction times. That is where the foundations for high-quality end products are laid. Our injection moulds are individually developed and comply with high quality requirements.

### Our capabilities include:

- Cold-runner moulds
- Hot-runner moulds
- Unscrewing mould
- Injection moulds for inmoulding of metals

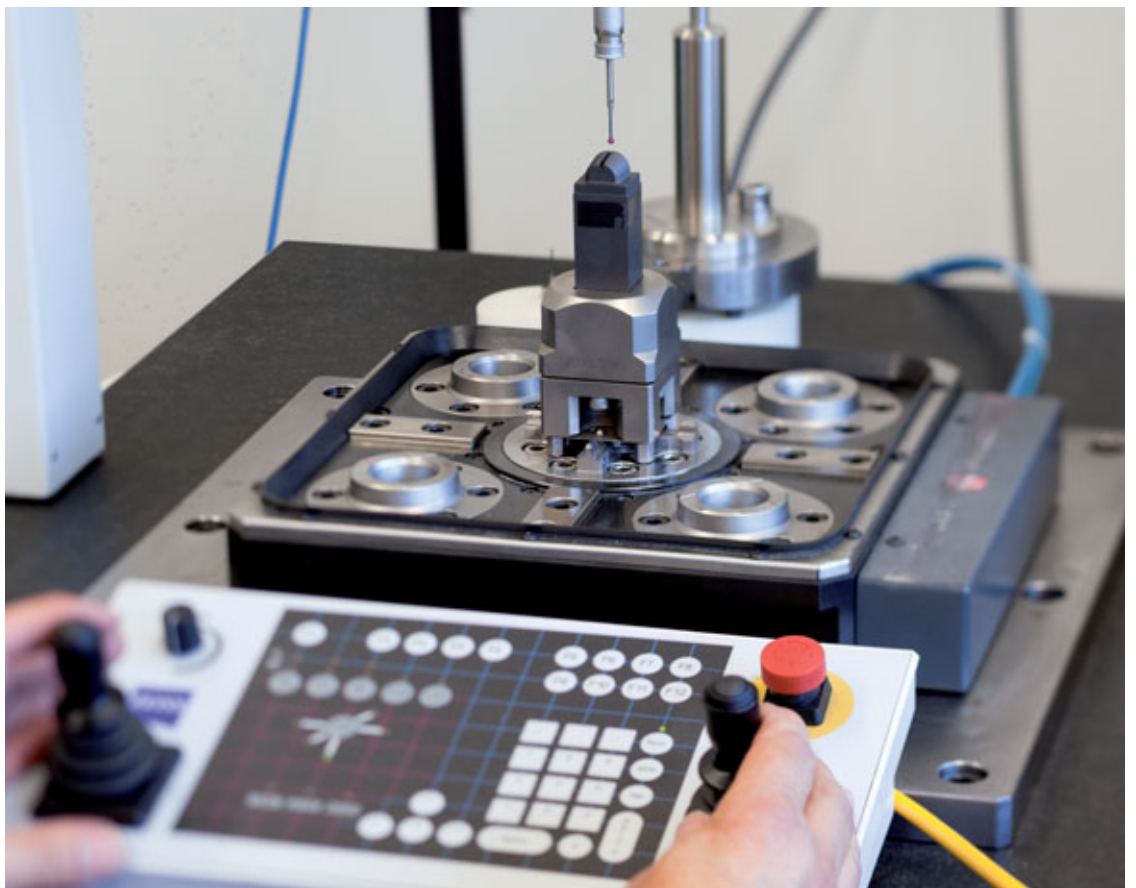
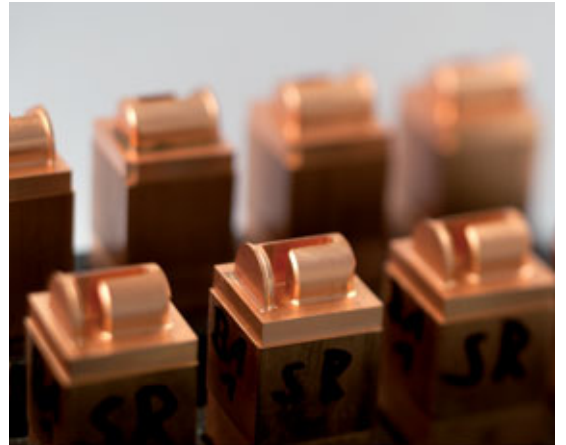
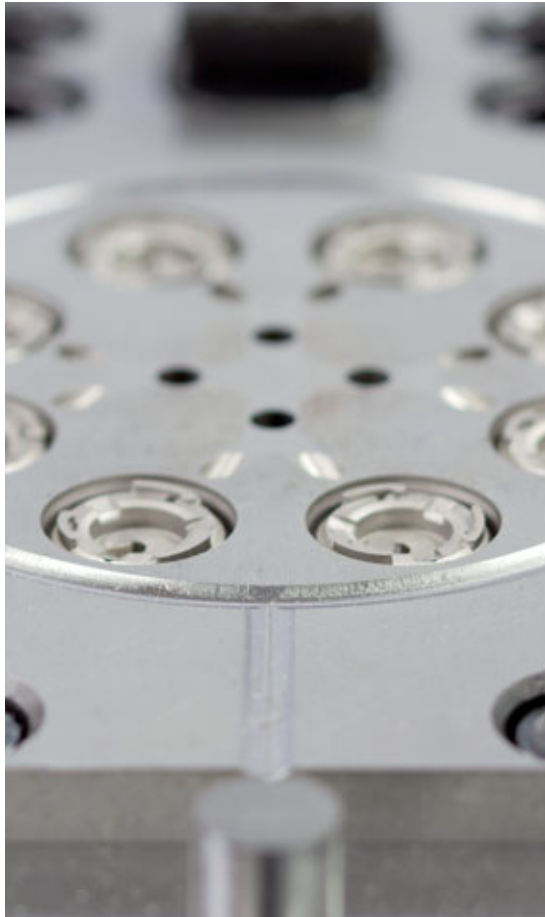
Since we use special steels and processing procedures, our tools provide maximum wear resistance and long tool life. Optimum temperature control ensures short cycle times and reduced manufacturing costs. To guarantee efficient injection mould manufacture, our tool manufacturing department has the machines required for milling, diesinking, grinding, turning, etc. Tool manufacture is computer-aided.

3D data from construction are the basis for CNC programs for milling and eroding electrodes for mould making.

The existing machines allow to produce moulds up to a size of 400 x 500 mm. Larger dimensions are produced by reliable external mould makers in our region with whom we cooperate. We also offer maintenance and repair services as well as the modification and optimisation of tools.







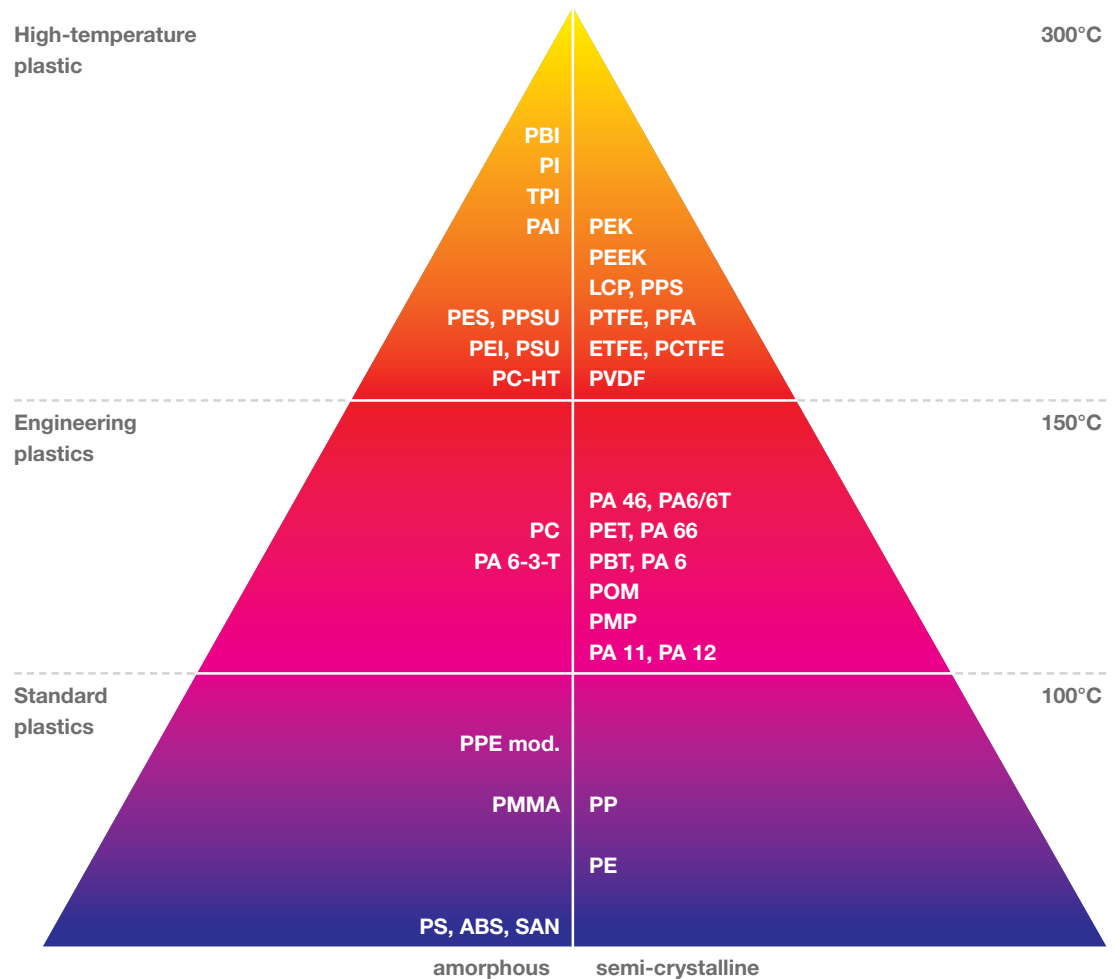
## Injection moulding

The modern world can't do without them: plastics. Therefore it is not surprising at all that they are conquering more and more fields of use.

According to your requirements for the component we define the plastic material that is most suitable for the corresponding application. The close cooperation with leading raw material producers is just a logic result.

Our choice of materials ranges from **standard plastics** such as polypropylene (PP), polystyrene (PS) and polyoxymethylene (POM) to all **engineering plastics** such as polyamides (PA), polyterephthalate (PET, PBT) and polycarbonate (PC) to **high-performance engineering plastics** such as polyetheretherketone (PEEK).

To provide for optimum processing, our range of machinery is always up to date. We use the newest Arburg and Engel injection moulding machines with a capacity ranging from 400 to 1,500 kN. Shot weight is 0.5 to 290 g (PA). Quality checks at the production sites guarantee you products free from any defects.





up-to-date robot control





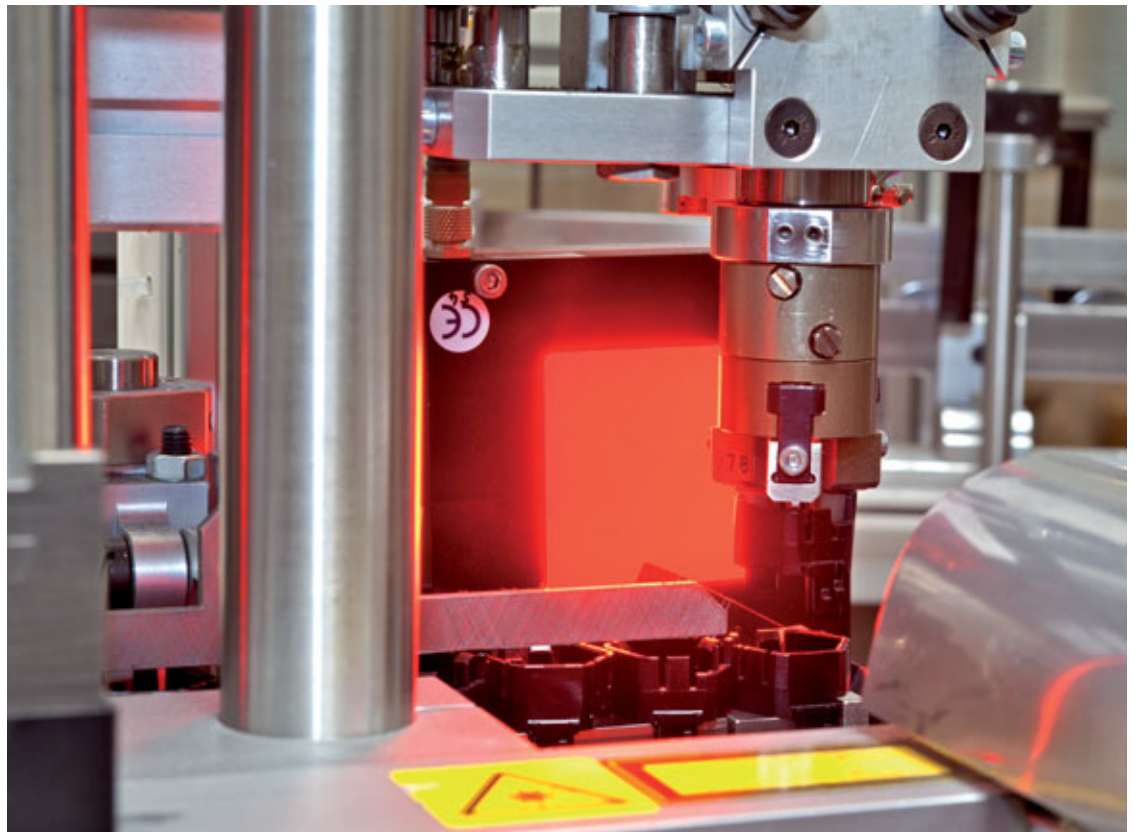
## Assembly

### **We do not only produce, but also assemble.**

Our expertise in assembly technology reaches from the assembly of component parts to the final product or subassemblies. Our in-house capacities of mechanical engineering allow us to realise complex assembly sequences such as are required for the assembly of plastic or hybrid components and the automatic assembly of subassemblies.

Thanks to intelligent automation and assembly methods for components and subassemblies as well as to up-to-date technology, production methods and results are constantly being optimised. For economic reasons, the assembly area is adjacent to the injection moulding facilities. You provide the specifications. We provide the finished and tested subassemblies.

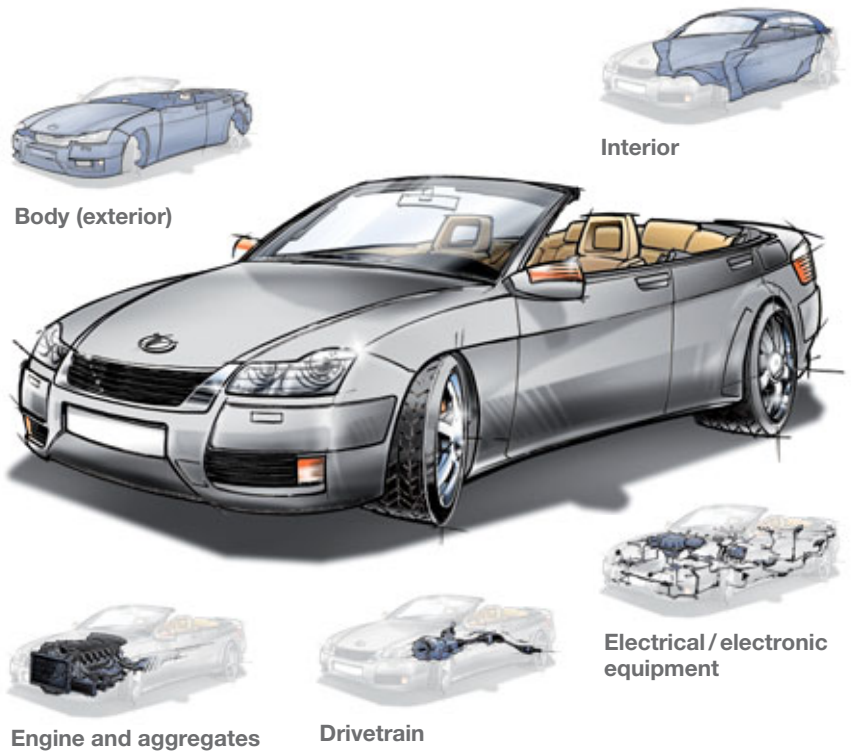
Sophisticated logistic processes, customer-specific procurement and supply systems as well as great competency when it comes to special packaging solutions – that is what we also have on offer.



Industry know-how

**Automotive**

- Interior
- Drivetrain
- Electrical/electronic equipment
- Engine and aggregates
- Body (exterior)



Please feel free to also leaf through our module catalogues (order number front/rear end: 0942 and door: 0941).

**General industry**

- Aerospace industry
- Rail cars
- Agricultural machinery
- Construction machinery
- Mechanical engineering
- Medical engineering
- Solar





**Böllhoff International with companies in:**

Argentina  
Austria  
Brazil  
Canada  
China  
Czech Republic  
France  
Germany  
Hungary  
India  
Italy  
Japan  
South Korea  
Mexico  
Poland  
Romania  
Russia  
Slovakia  
Spain  
Switzerland  
Thailand  
Turkey  
United Kingdom  
USA

Apart from these 24 countries, Böllhoff supports its international customers in other important industrial markets in close partnership with agents and dealers.

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