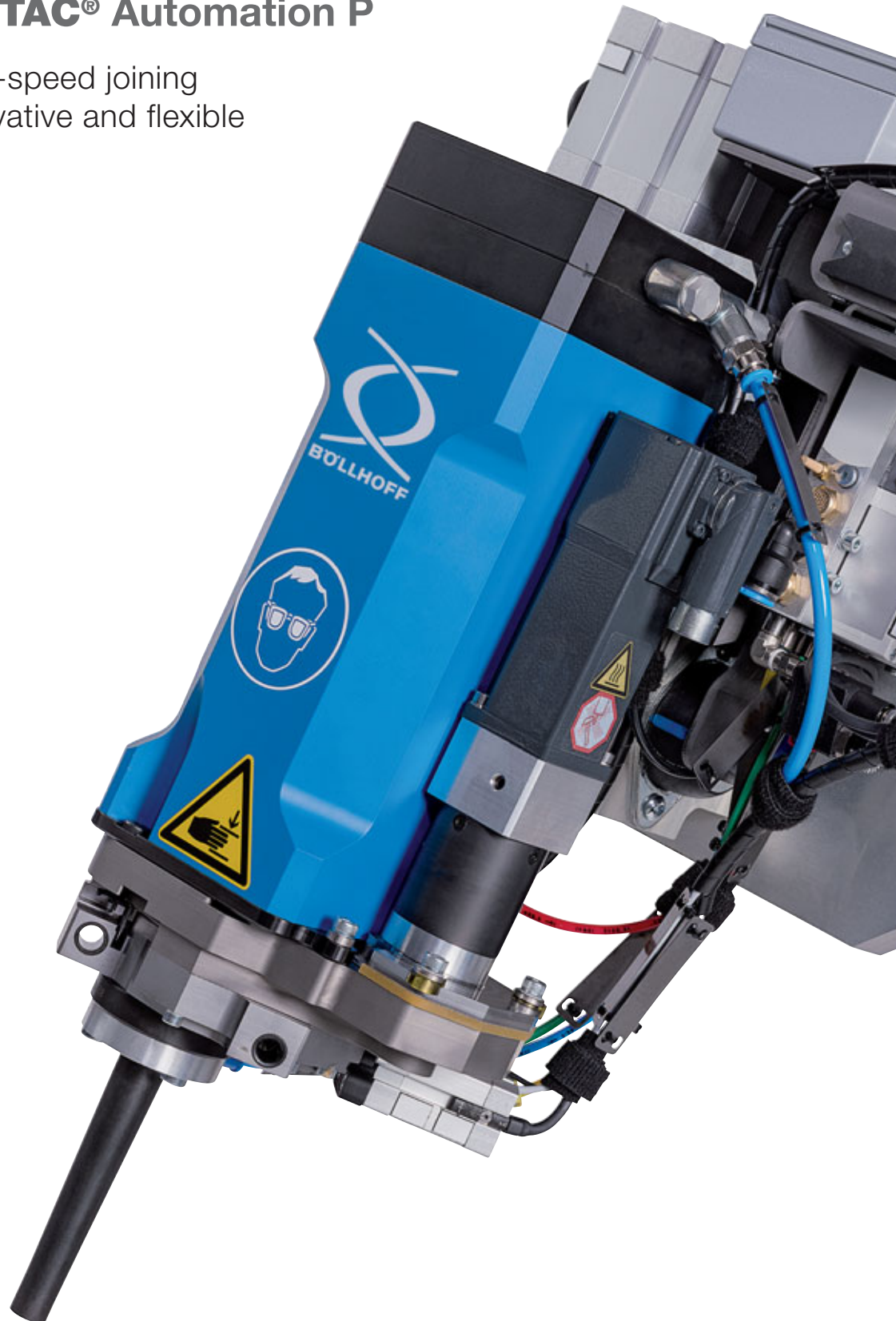
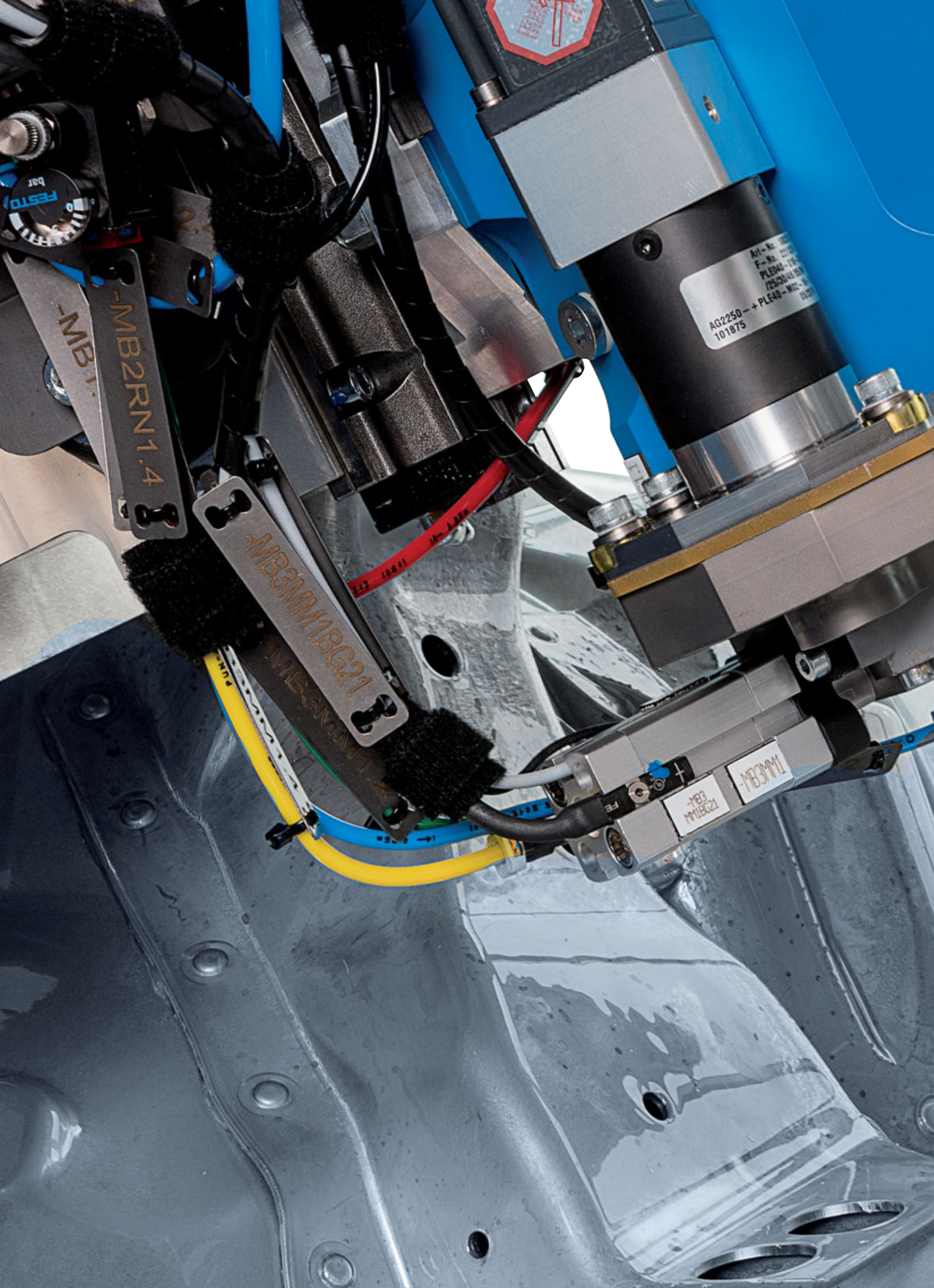


BOLLHOFF

RIVTAC® Automation P

High-speed joining
Innovative and flexible





RIVTAC® Automation P

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Innovative by tradition

Innovative industries require innovative partners. We are specialists in the field of mechanical joining technology. Thereby, we concentrate our know-how and experience in mechanical joining methods such as RIVSET® self-pierce riveting and the innovative RIVTAC® high-speed tack setting.

Our technical competence is in constant demand – as customers continue to design new products, introduce new materials and develop production processes. The trend in the automotive industry, for example, is still to make vehicles more efficient through strict lightweight construction using different materials. High-strength steels, light metals and plastics continue to be the main materials in automotive engineering. For such materials, there is a great number of new compositions as well as mutual substitutions. The requirements for the fastening technology are correspondingly complex and demanding.

Strict lightweight construction paired with intelligent detail solutions considerably reduce the weight. The required function-specific gravity and high-pressure die castings are a special challenge for the joining technology. On the one hand components, which are often heat-treated, shall be joined in a low-heat process so that the material characteristics are maintained. On the other hand modern manufacturing concepts, if possible, shall comprise only one production step (no pre-punching).

Apart from that, these components often have only one-sided accessibility. Mechanical joining methods like RIVTAC® high-speed tack setting are practically made for such demands.

Your benefits

- Joining without pre-punching in case of one-sided accessibility
- Reduction of joining and cycle times to a minimum
- Joining of high-strength materials without distortion in the component
- Flexible application for mixed joints, multiple-layer joints and hybrid joints
- Optimal possibility of combining with adhesion technology
- Environmentally friendly workplace design: no fumes, air extraction is not necessary
- Energy saving processing

Joinings

- Strength and reliability
- Suitable for visual inspection
- Reproducible and process reliable



Industry 4.0 with the RFID chip

- Storage of all tool-relevant data such as joining parameters, number of set tacks, calibration date, construction date
- Indication of maintenance intervals
- Data are transferred when the setting head is docked to the control
- When the setting head needs to be exchanged, the required information such as joining parameters can be transferred through the RFID chip so that the setting head is instantly ready to use – an economic solution

Joining process

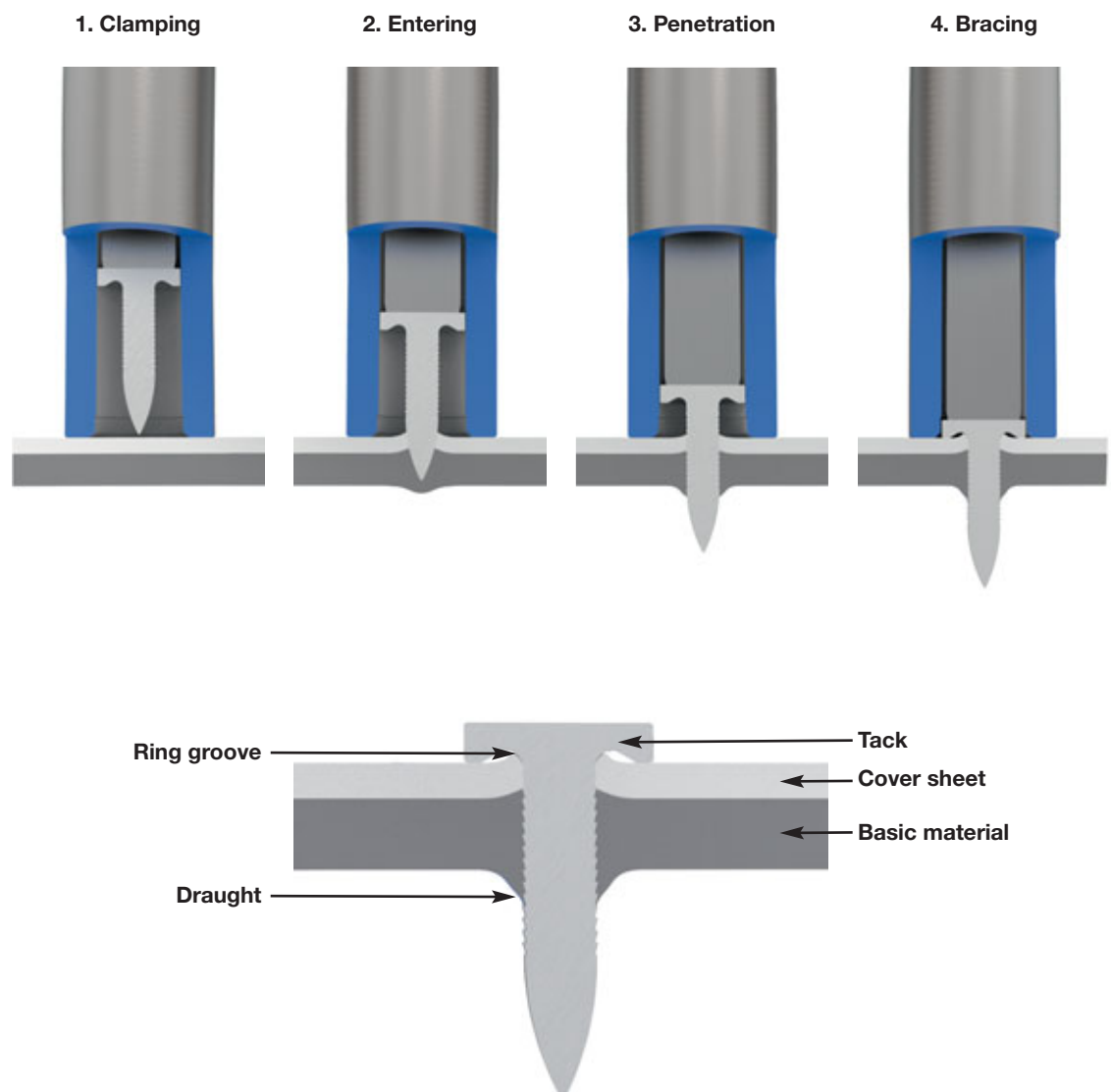
What is the concept behind RIVTAC® high-speed tack setting?

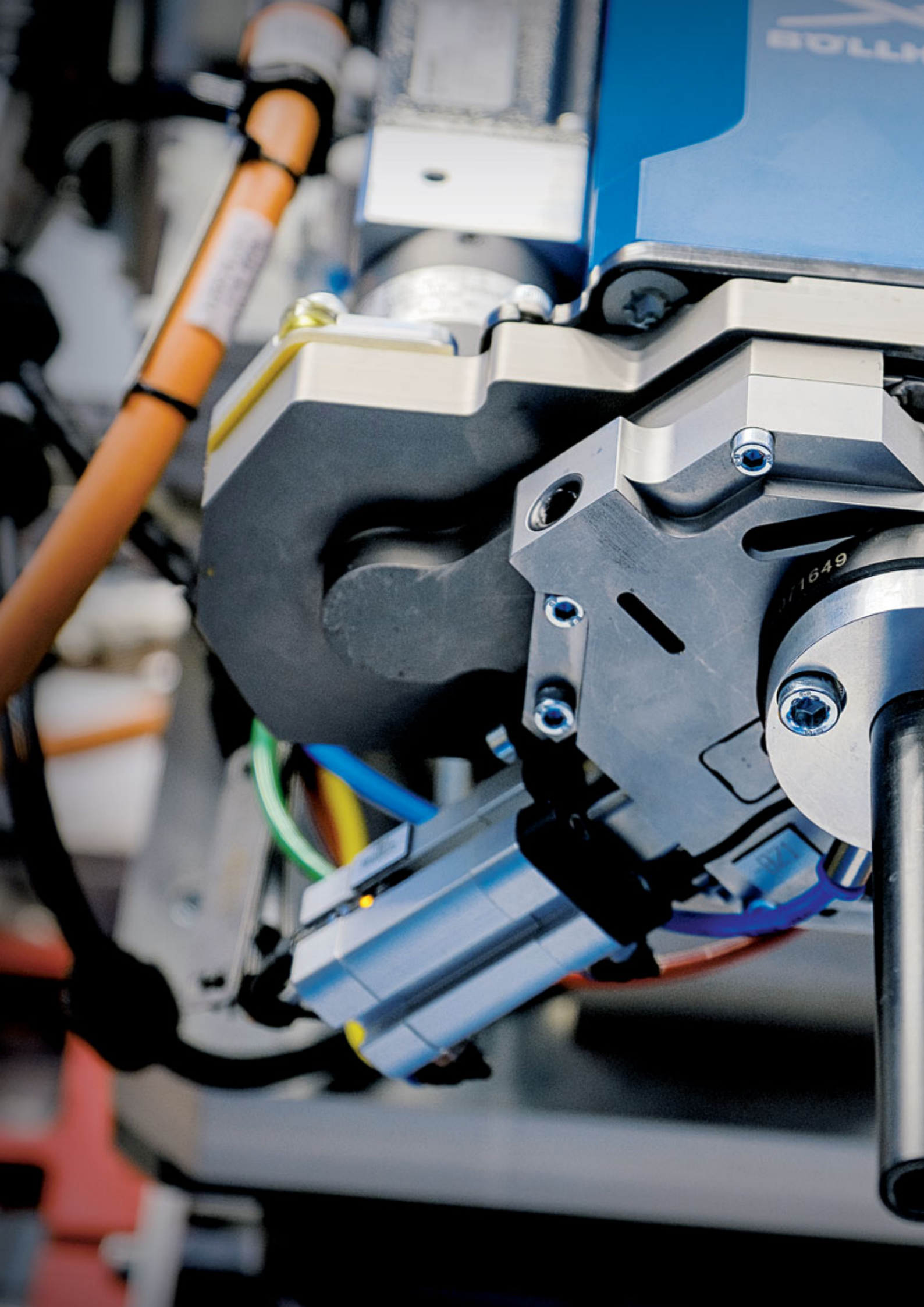
In this innovative mechanical joining process, a nail-like auxiliary joining part, the tack, is accelerated to high speed and driven into the joining parts which are not pre-punched. The speed can be controlled through the joining pressure and depends on the materials to be joined as well as on the component thicknesses.

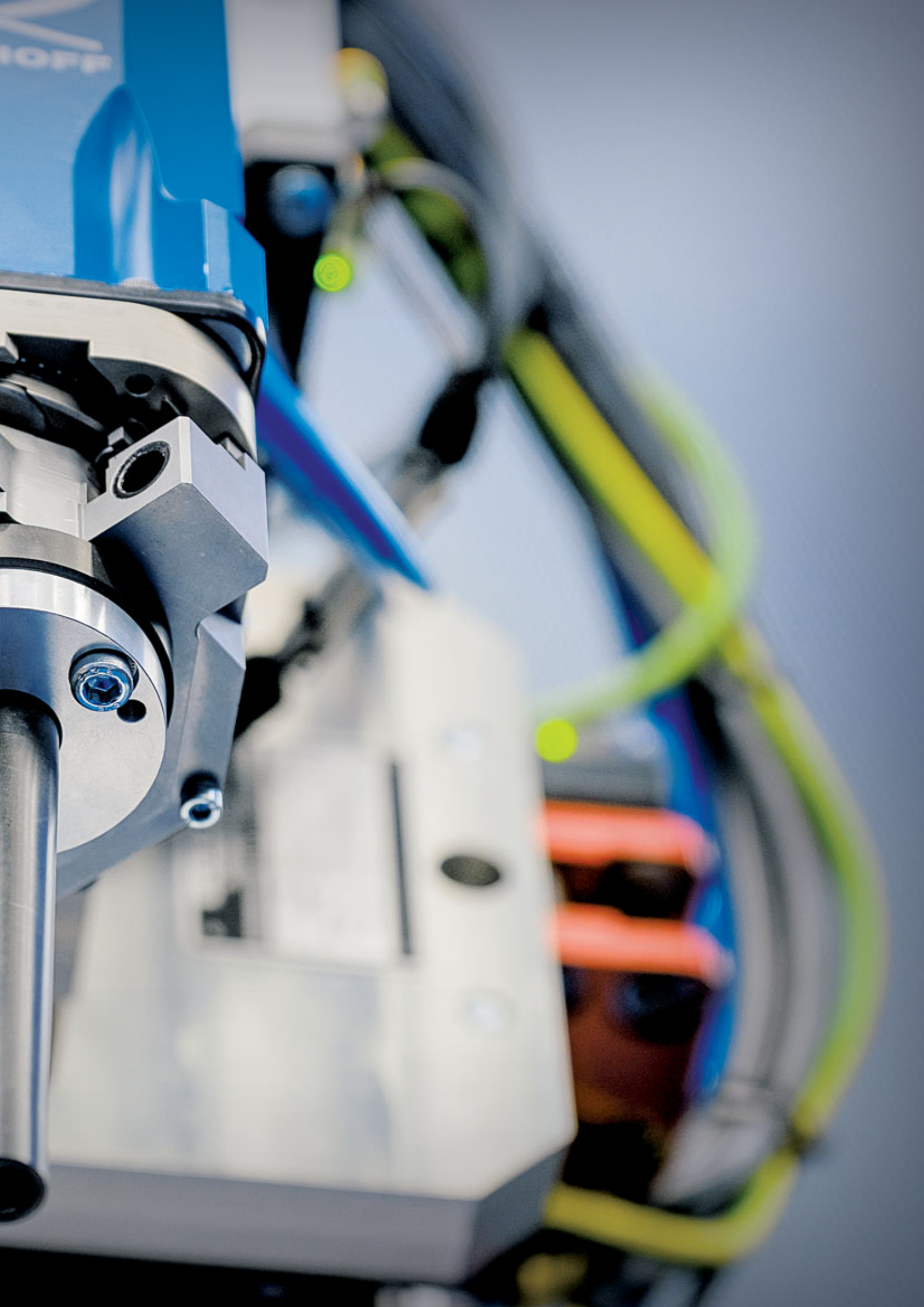
At the beginning of the joining process, the ogival point of the tack displaces material extruding it for the tack shank. The joining part materials can flow into the straight knurlings of the shank to result in positive locking. Particularly for higher-strength materials, a frictional connection is created because the joining parts are formed and pressed. Therefore, the joint strength results from those two principles of action.

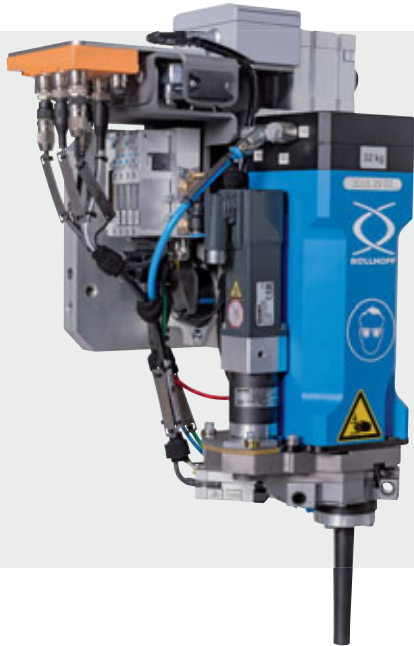
To apply this method, the joining parts must be sufficiently strong so that they can resist the penetration impulse of the tack without significant component deformation.

High-strength materials, mixed joints as well as multiple-layer joints can be joined without loss of performance – providing particularly good strength characteristics.









Setting tool

- Compact design for ideal joining point accessibility
- Low weight
- Pneumatically driven with drive piston and elastic, internal stop
- Spiral feed magazines store for up to 47 tacks
- Filling level and separation monitoring
- Limit position and position sensing
- Robot connection with standard adapter plate (special plate on request)
- Force and displacement sensor for optimum process monitoring
- Real-time data processing
- Media docking
- RFID chip to store all tool- and process-relevant parameters



Valve terminal

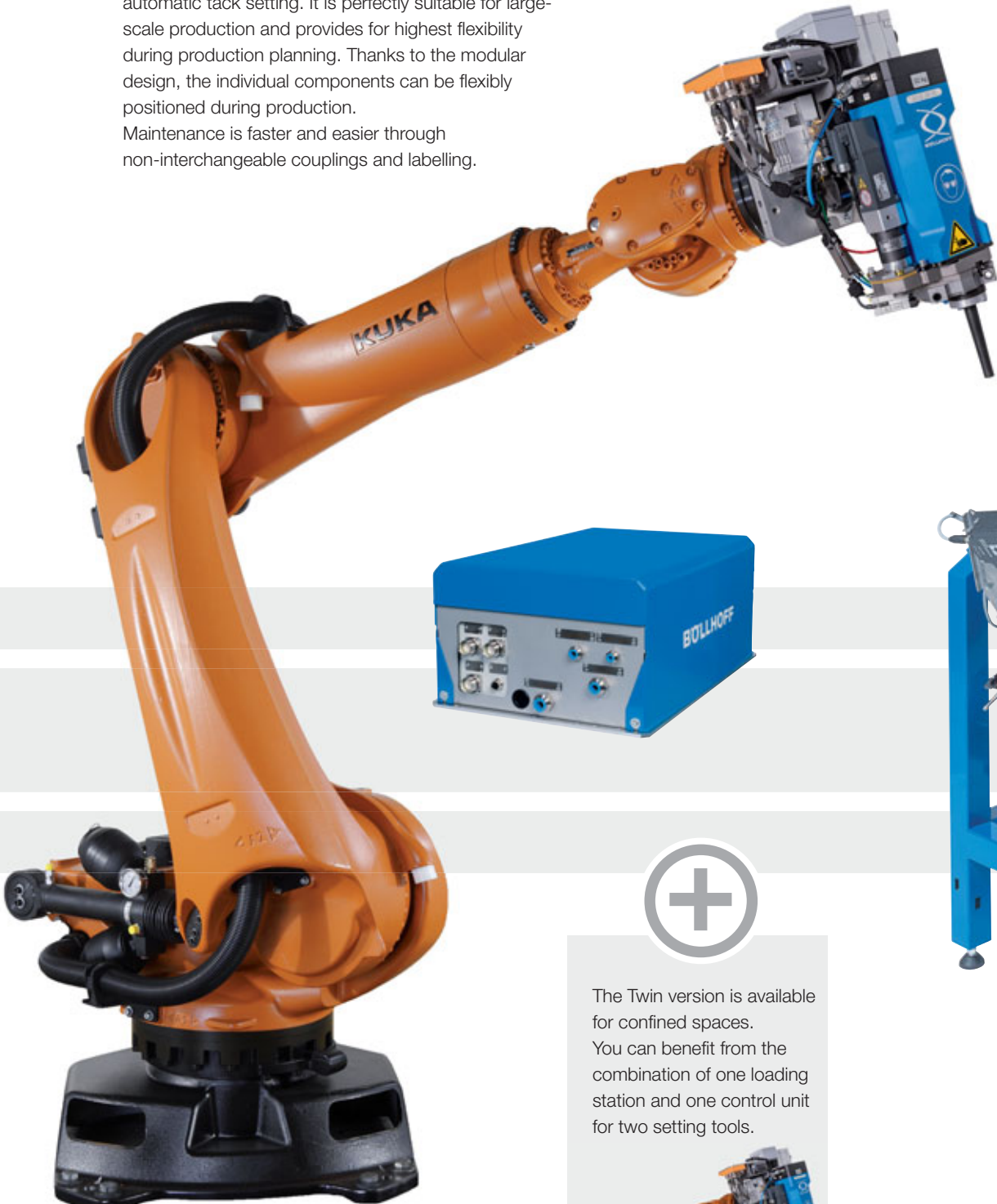
- Fast response times due to short strokes
- Proportional valves continuously regulate joining and feed pressure
- Energy-efficient control of the joining tool
- Add-on housing for installation on the third robot axis



Station

- With a max. loading capacity of 35,000 tacks
- Fast reloading of the joining tool
- With the Twin version, two joining tools can be loaded
- Gimbal-mounted feed rail
- Feeding system with vibratory bowl feeder
- Built-in compressed air service unit with air filter and pressure control sensor
- Local terminal box incl. communication line to the power unit
- RFID receiver to forward tool- and process-relevant parameters to the control

The new RIVTAC® automation system allows fully automatic tack setting. It is perfectly suitable for large-scale production and provides for highest flexibility during production planning. Thanks to the modular design, the individual components can be flexibly positioned during production. Maintenance is faster and easier through non-interchangeable couplings and labelling.

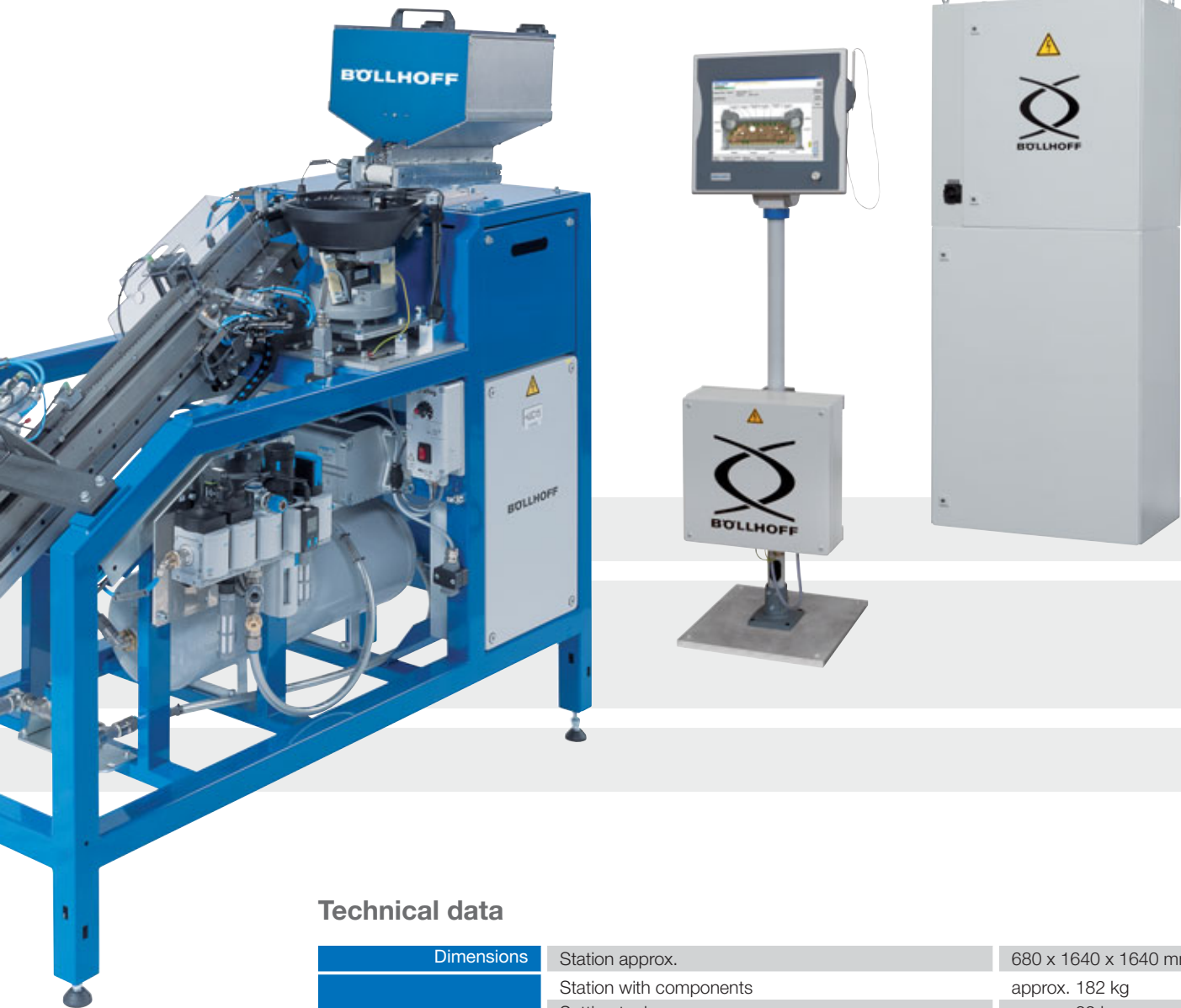


Source: KUKA AG



The Twin version is available for confined spaces. You can benefit from the combination of one loading station and one control unit for two setting tools.

RIVTAC® Automation P – The components of the system



Control Unit

- Local hardware configuration with central controlling of machine components by bus-system
- Embedded PC based control for the connection of a visualisation system
- Open interface for different robot interfaces (ProfilNet, Interbus, Profibus etc.)
- Qualification of all components conforming to standards
- Optimal space utilisation due to the integration onto the robot power unit
- Twin version also available



Visualisation (option)

- Easy operation with an industrial touch screen
- Equipped for communication via EtherCAT
- Multi visualisation of several RIVTAC® systems
- Joining and process parameter entry
- Process monitoring visualisation
- USB Port
- Customer-specific adaptations of the visualisation also available

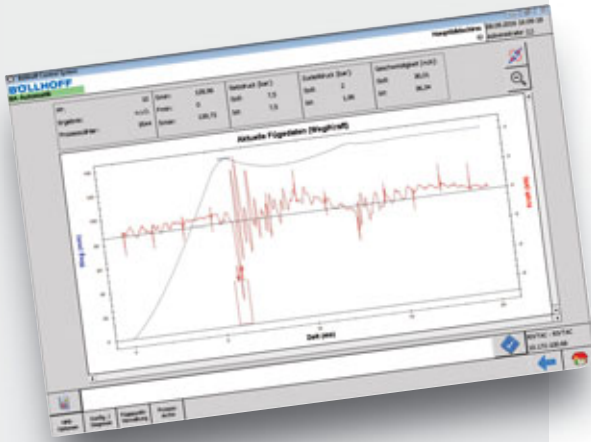


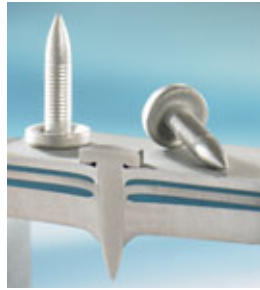
Technical data

Dimensions	Station approx.	680 x 1640 x 1640 mm
	Station with components	approx. 182 kg
Weight	Setting tool	approx. 32 kg
	Power and control unit	approx. 70 kg
	Valve terminal	approx. 19 kg
Compressed air filtered compressed air supply in accordance with DIN ISO 8573	Compressed air supply	2 x 1/2 inch
	Max. air consumption (setting tool)	6 NL/joining
	Max. air consumption (station)	400 L/min.
	Operating pressure	10 bar
	Working pressure	3.5 to max. 8 bar
Electrical power supply	Electrical supply	230 V/50 Hz; 120 V/60 Hz
Cycle time	"Start" joining process until "new start"	0.7 – 1.2 sec.
Noise emission	Setting tool	> 105 dB(A)
	At working	+ 15°C to + 40°C
Ambient temperature	At stocking	+ 10°C to + 60°C
	Humidity class	According to DIN 40040
Air humidity	Annual average	75%
	30 days	95%
	On the other days	85%

Software

- PLC and HMI software for control and visualisation via Ethernet
- Calibration functions such as basic calibration, in-process calibration and referencing
- Parameterisation of the individual joining points on the component
- Process monitoring module with displacement transducer and windowing incl. statistics function
- Process data transfer to a superordinate quality management system
- Wear detection for selected components
- Easy-to-use with display of help texts





Variable material combinations become increasingly important, especially during the development of innovative automobile and car body concepts. RIVTAC® is particularly suitable for joints of aluminium, steel, plastics, non-ferrous metals as well as for mixed joints, multiple-layer joints and hybrid joints of these materials.

Example material combinations in cross section



Steel sheet / Steel sheet



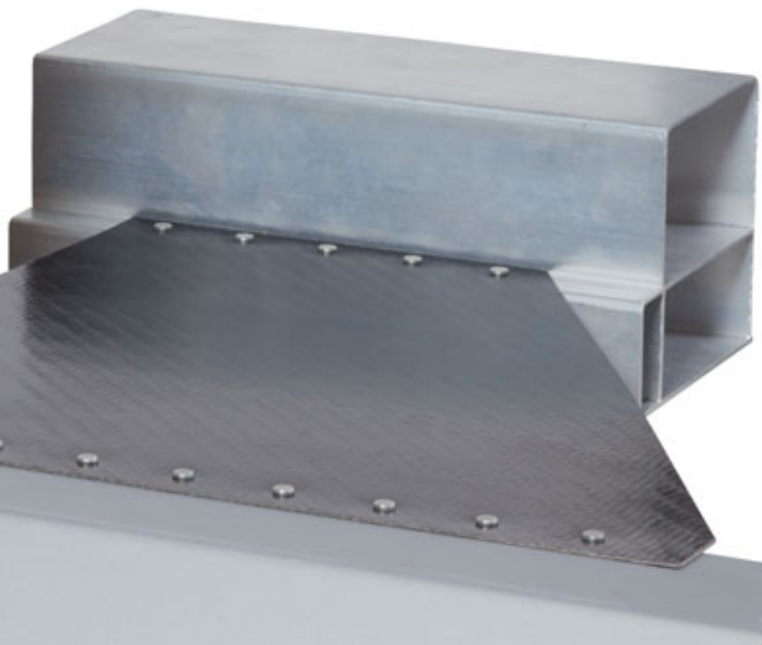
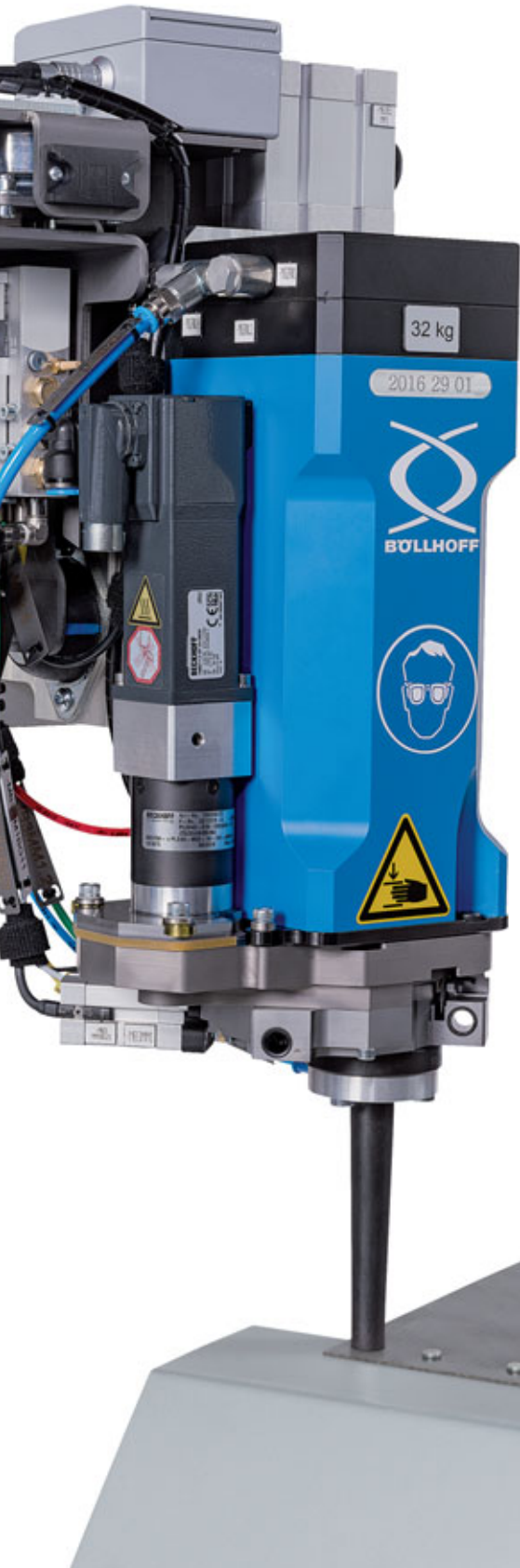
Aluminium sheet /
Aluminium profile



Aluminium sheet /
Aluminium profile with
adhesive

Joints:

- Aluminium (pressure cast, extruded, sheet)
- Steels
- Plastics and fibre-reinforced plastics (e.g. fibre glass or carbon)
- Also material combinations with magnesium, copper, films, metal mesh, wood, sandwich materials
- Joining of mixed joints, multiple-layer joints and hybrid joints of these materials
- Adhesive as a laminate layer



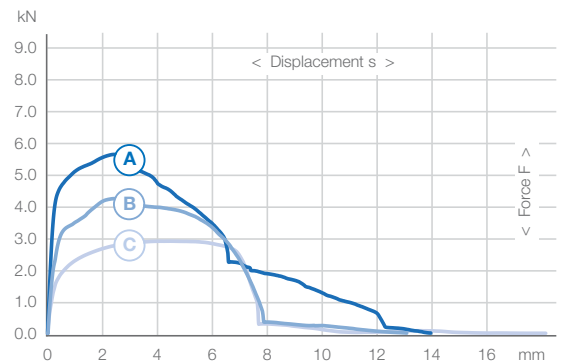
High-strength joints

The following chart illustrates the joining strength of example material combinations under sheer and cross tension load. In addition to the pure steel and aluminium joints representing the joining technology, mixed joints are shown as well.

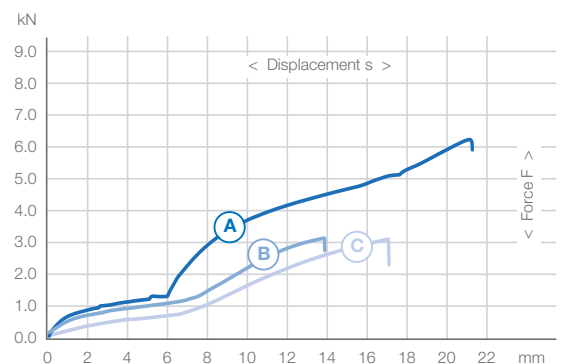
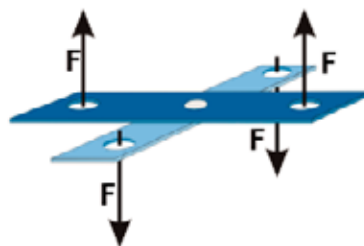
Material cover sheet	Sheet thickness (mm)	Material basic material	Sheet thickness (mm)	Cross tension values (kN)	Sheer load values (kN)
AlMgSi1	1.00	AlMg3	4.00	ca. 2.40	ca. 3.00
AlMgSi1	1.20	AlCu4MgSi	2.00	ca. 3.60	ca. 3.60
AlMg3	1.20	H340LAD	2.00	ca. 3.00	–
HX220YD	0.95	HCT600XD	2.00	ca. 6.00	ca. 4.00
HX220YD	0.95	DP1000	1.50	ca. 5.50	ca. 4.10
HX220YD	0.95	DP1000	1.20	ca. 4.80	ca. 4.00
DC04	1.00	AlMg3	4.00	ca. 5.00	–
DC04	2.00	DC04	2.00	ca. 3.10	–

The following figures show the load/deflection trends of similar steel/steel and aluminium/aluminium joints and also those of dissimilar aluminium/steel joints. You can easily recognise dependencies between the material/thickness combinations and the achieved joint strengths. Depending on the material combination, however, joint strengths comparable with those of aluminium basic material can be achieved even with an effective tack shank length of only 3 mm. In the cross tension test, the aluminium sheet is then unbuttoned from the tack head. With respect to this component failure, the strength is rather limited through the material properties than the joint itself. This is a revolutionary further development in the mechanical joining technology, in addition to the one-sided accessibility of the joining point.

Sheer load values



Cross tension values



Joint A
HX220YD (0.95) – HCT600 (2.00)

Joint B
AlMg3 (1.20) – H340LAD (2.00)

Joint C
AlMg3 (1.20) – AlMgSi1 (4.00)



Sales

Innovation and technical development are important factors for a company's success.

Every customer has a personal contact person who will be glad to discuss all your requirements. Our expertise and experience reflect in a worldwide distribution network.

The headquarters of this family business, which has now been in the family for four generations, is located in Bielefeld, Germany. Apart from that, Böllhoff has sales and production facilities in 24 countries. Outside these 24 countries, Böllhoff cooperates in close partnerships with representatives and merchants to serve international customers in other important industry markets.



Project management

We are satisfied whenever we 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 automation solutions for assembly systems and realise tailor-made solutions according to your requirements. We think in 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.



Design and development

In development, we focus on the design and application of production systems to process Böllhoff fasteners. We consider the process device as well as the feed technology for fasteners our core competence.

The main requirements for such systems are reproducible processes, industrial-quality availability and short process times.

The earlier we can contribute our competence, the greater the potential.

To make ideas reality, we employ modern CAD systems complying with today's requirements in the automotive sector. Data transfer is agreed individually with each customer.



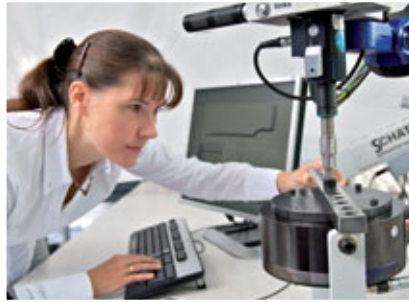


Production

Our fasteners are exclusively manufactured at Böllhoff production facilities. They are subject to most stringent quality checks in every single production step. This is the only way for Böllhoff to meet the high customer requirements. Product by product.

The manufacture of important mechanical components (know-how parts) is a main part of our manufacturing expertise. The machinery as well as our employees' know-how concentrate on these aspects. Our know-how and machinery make us a competent partner when it comes to pre-development and development for the manufacture of prototypes and samples.

Another of our core competencies is the installation and functional testing of processing systems. All final assemblies and commissioning activities are in-house operations that are not subcontracted.



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. You also benefit from process reliability and the avoidance of unnecessary costs.

Our certified laboratory, which fulfils the requirements of DIN EN ISO 17025, is also there to support you.

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



Service

We are there when you need us. 24/7.

To help you protect the value of your investment and ensure the economic efficiency of your production is what the Böllhoff Service Team specialises in. That is why we can offer you service agreements to even extend the long life of our technically advanced machines.



BÖLLHOFF

Worldwide for you a strong partner – at 39 locations in 24 countries.

Böllhoff Group

Please find your local contact on www.boellhoff.com
or contact us under fasteningtechnology@boellhoff.com

