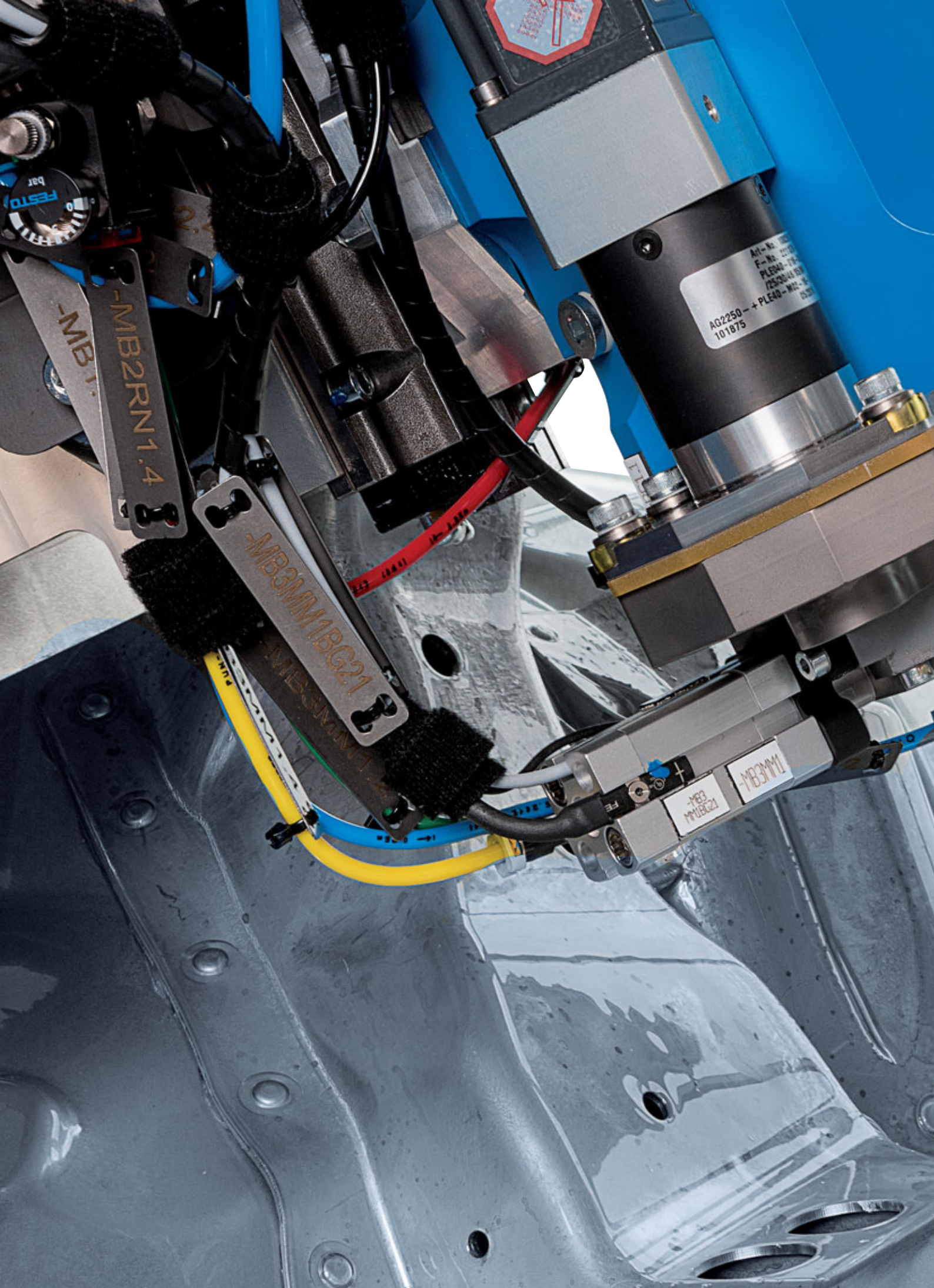


RIVTAC® Automation P

High-speed joining
Innovative and flexible

BÖLLHOFF



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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 RIVSETR 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.

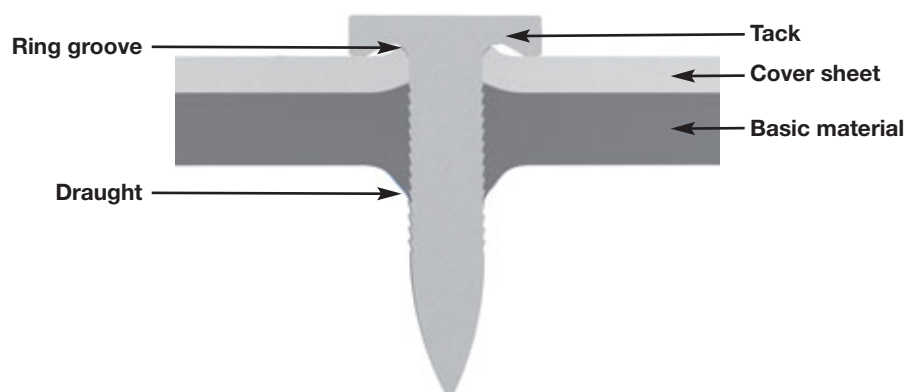
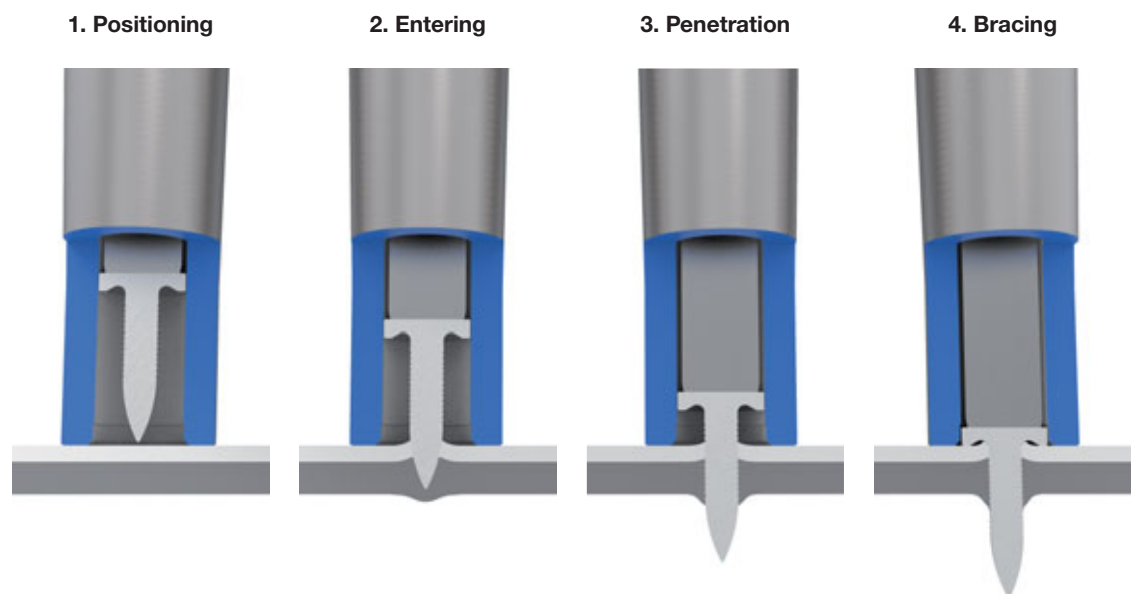
Joining process

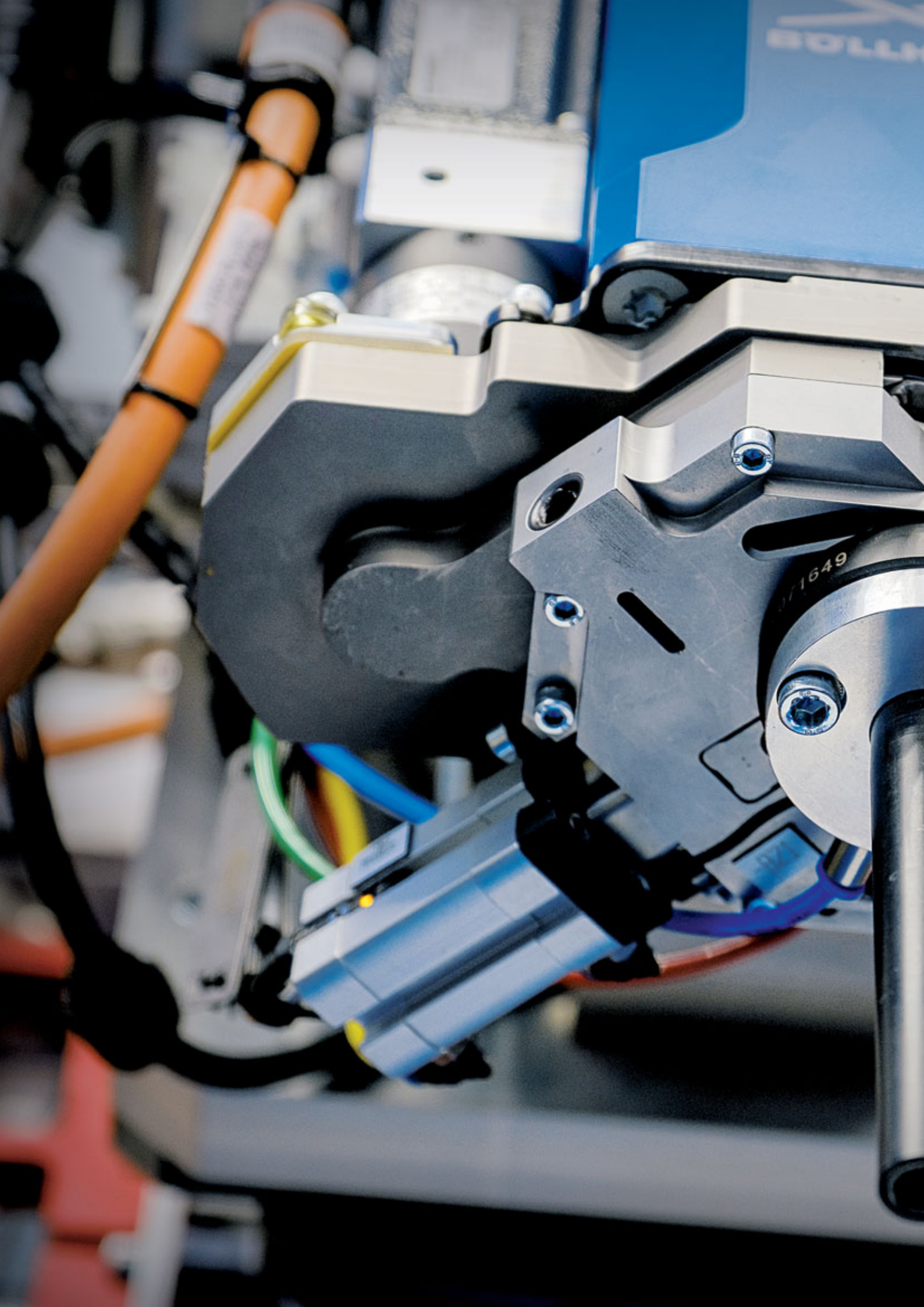
What is the concept behind RIVTAC® high-speed tack setting?

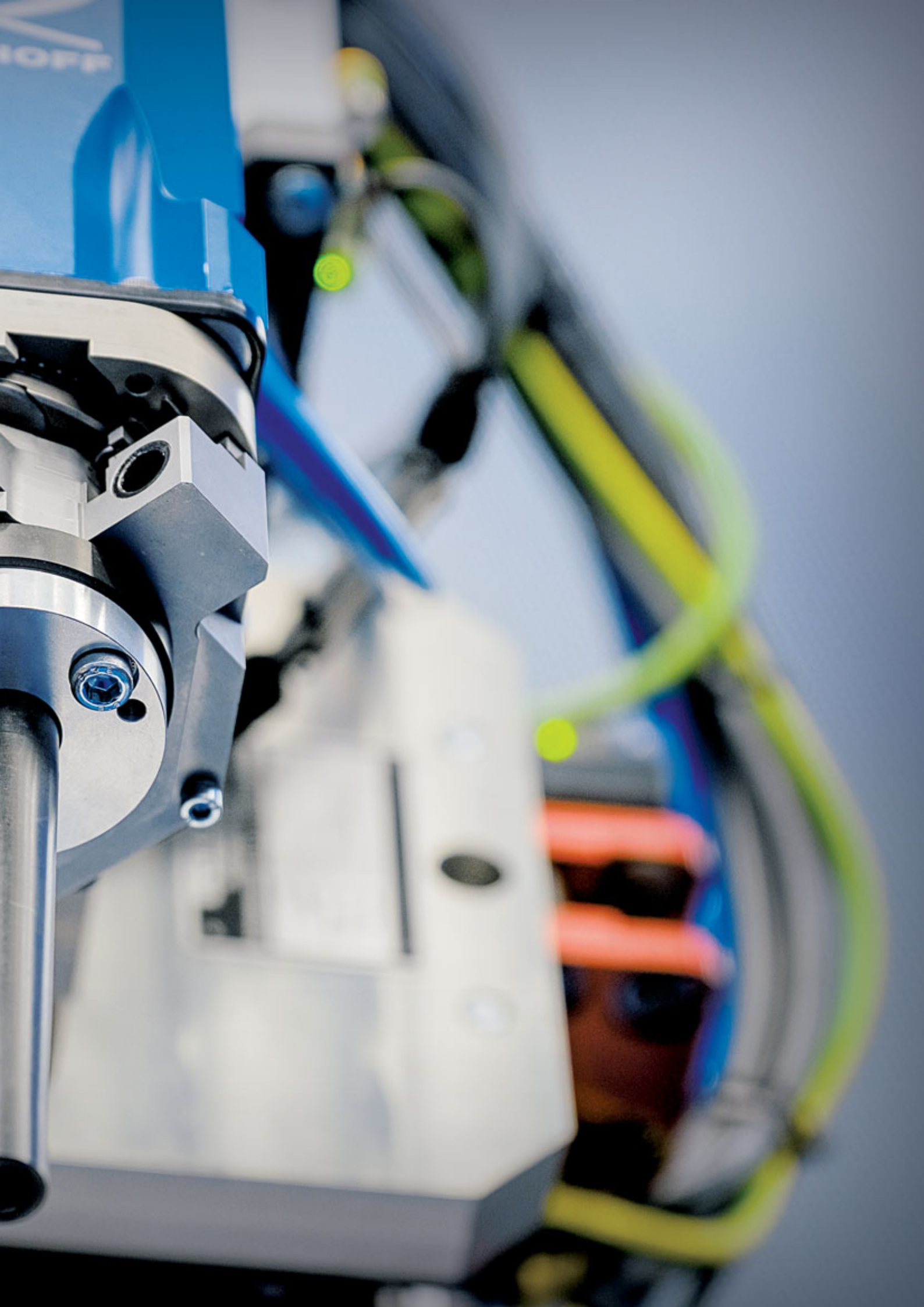
In this innovative mechanical joining process, a nail-like auxiliary joining part, the tack, is accelerated to high speed and driven into the not pre-punched joining parts. The ogival point of the tack displaces the material. The speed can be controlled through the adjustable pressure and depends on materials and component thicknesses.

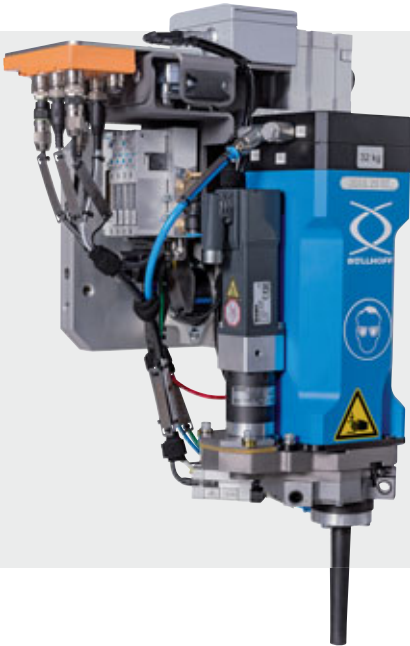
Due to the rapid temperature rise in the joining zone, the joining part material flows into the straight knurlings on the tack shaft. A strong form-closed joint results. Since, particularly with higher-strength steels, the material is pressed and compressed, a force-closed joint results. An important condition for this method is sufficient stiffness of the joining parts so that they can resist the penetration impulse of the tack without major deformation. High-strength materials, hybrid construction joints and multiple-layer joints can also be joined without loss of performance — providing particularly good strength characteristics.

Moreover, the RIVTAC® method can be perfectly combined with adhesive bonding.









Setting tool

- Compact design for ideal joining point accessibility
- Low weight
- Pneumatically driven with drive piston and elastic, internal stop
- Spiral feed magazines store 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

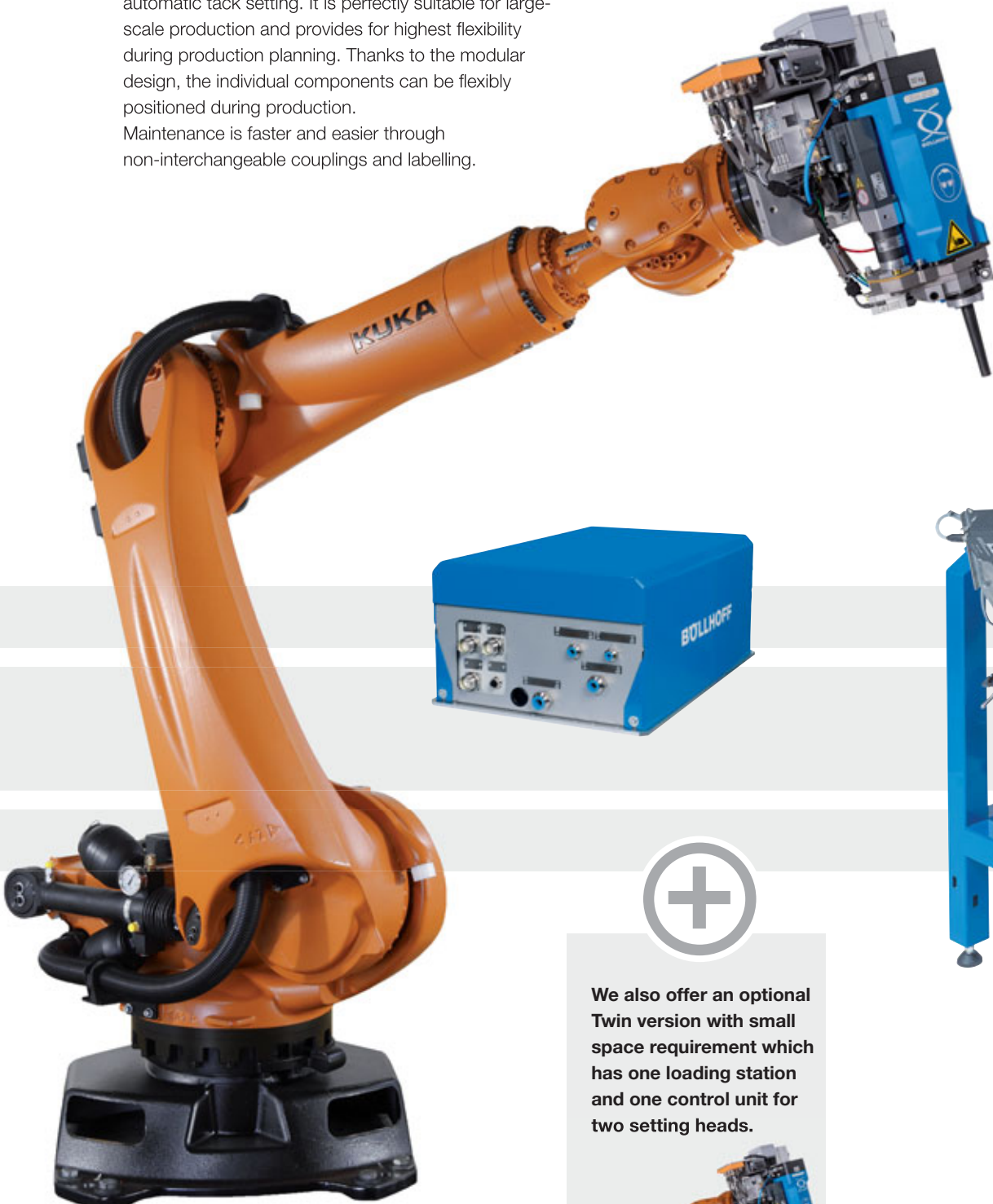
- Fast response times due to short strokes
- Proportional valves infinitely control joining and feed pressure.
- Energy-efficient control of the joining tool
- Add-on housing for installation on the third robot axis



Station

- With a max. loading capacity of 35,000 tacks
- Faster reloading of the joining tool
- Simultaneous loading of two joining tools – Twin version
- 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



We also offer an optional Twin version with small space requirement which has one loading station and one control unit for two setting heads.



RIVTAC® Automation P – The components of the system



Technical data

Dimensions	Station approx.	570 x 1350 x 1600 mm
Weight	Station with components	approx. 182 kg
	Setting tool	approx. 32 kg
	Power and control unit	approx. 65 kg
Compressed air <small>filtered compressed air supply in accordance with DIN ISO 8573</small>	Valve terminal	approx. 19 kg
	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
Electrical power supply	Working pressure	3,5 to max. 8 bar
	Electrical supply	230 V/50 Hz; 110 V/60 Hz
Cycle time	"Start" joining process until "new start"	0,7 – 1,2 Sek.
Noise emission	Setting tool	> 105 dB(A)
Ambient temperature	At working	+ 15°C to + 40°C
	At stocking	+ 10°C to + 60°C
Air humidity	Humidity class	According to DIN 40040
	Annual average	75%
	30 days	95%
	On the other days	85%

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 to diverse robot cutting sites (ProfiNet, Interbus, Profibus etc.)
- Qualification of all components conforming to standards
- Optimal space utilisation due to the integration onto the robot power unit
- Air conditioning available
- Twin version also available



Visualisation (option)

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



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
- Mobile Link – proactive maintenance management incl. maintenance indication and machine logbook
- 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



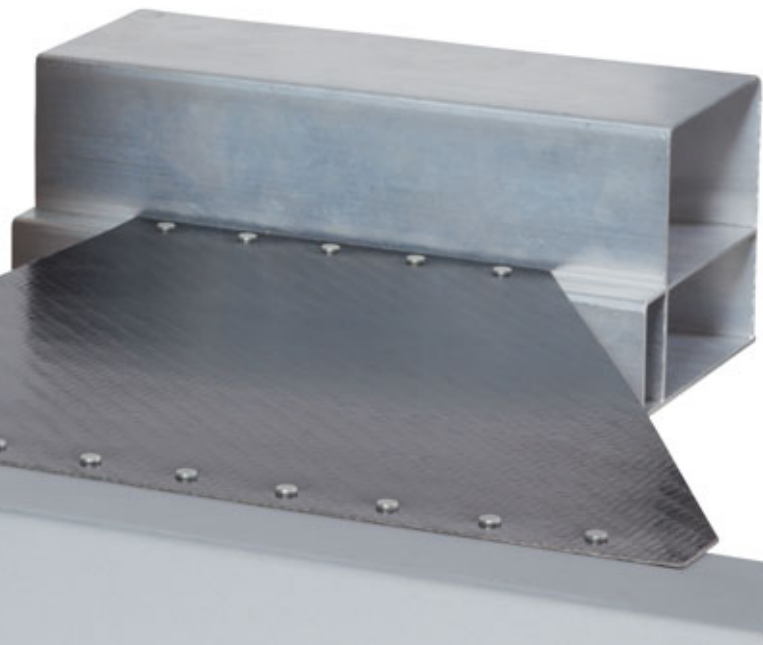
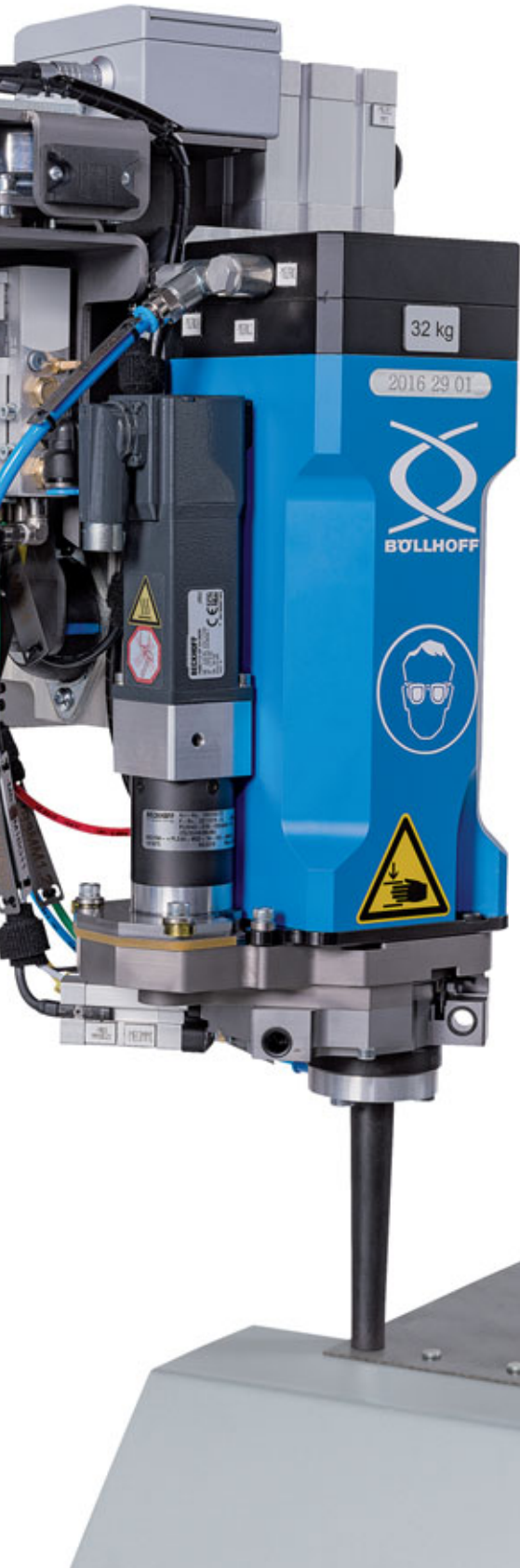
Aluminium sheet /
Aluminium profile



Aluminium sheet / Aluminium profile with adhesive

Joints:

- Aluminium (pressure cast, extruded, sheet)
- Steels
- High-strength steels with a tensile strength up to 1,200 MPa
- 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



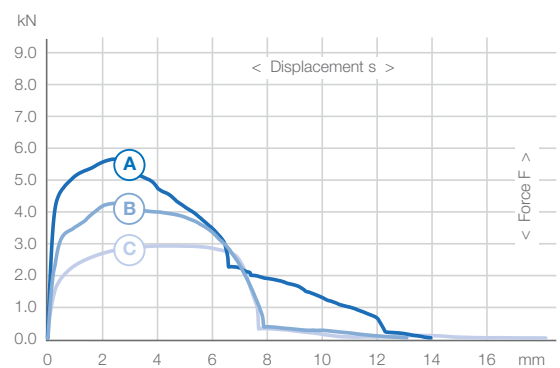
High-strength joints

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.

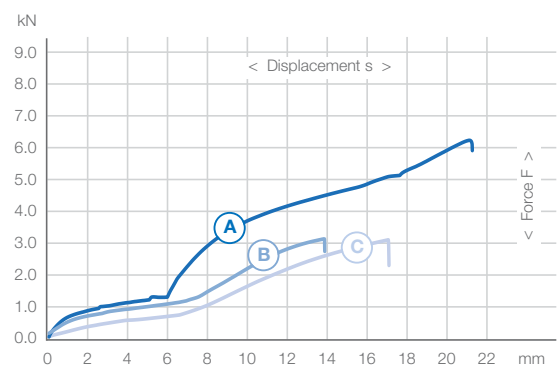
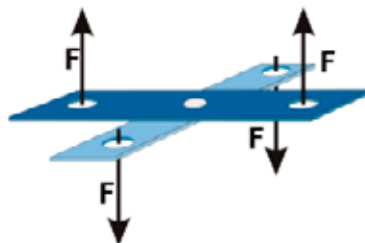
Material cover sheet	Sheet thickness (mm)	Material basic material	Sheet thickness (mm)	Cross tension values (kN)	Sheer load values (kN)
AlMgSi1	1.00	AlMg3	4.00	ca. 2.40	ca. 3.00
AlMgSi1	1.20	AlCu4MgSi	2.00	ca. 3.60	ca. 3.60
AlMg3	1.20	H340LAD	2.00	ca. 3.00	–
AlMgSi1	1.20	22MnB5 (UsiBor)	1.15	ca. 4.00	ca. 4.40
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
H340LAD	1.00	22MnB5 (UsiBor)	1.50	ca. 5.00	ca. 5.20
DC04	1.00	AlMg3	4.00	ca. 5.00	–
DC04	2.00	DC04	2.00	ca. 3.10	–

The force-vs-displacement curves of both pure and classic mixed joints can be seen in the charts below. In spite of a lower force transmitting shank diameter of 3.00 mm, high joining strengths can be transferred by the RIVTAC® tacks. This result signifies the further development of the mechanical joining in addition to the unique benefit of the one-sided accessibility.

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

Innovative ability and technical potential are becoming increasingly important to decide over a company's success.

Every customer has a personal contact person who will be glad to discuss all wishes and requirements. So you save precious time. 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.



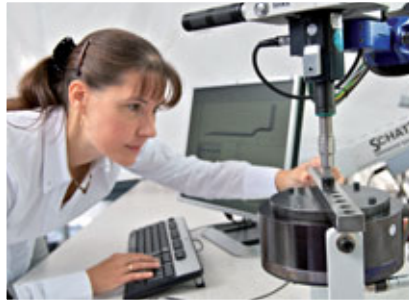


Production

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 International with companies in:

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India
Italy
Japan
Mexico
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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.

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

