

RIVTAC®

The innovative high-speed joining process

Kel
BULGARIA

BÖLLHOFF

Contents

	Page
The technology	3
The material combinations	4
The joint qualities	5
The fully automatic system with process monitoring	6
The components of the system	7
Reliable	9

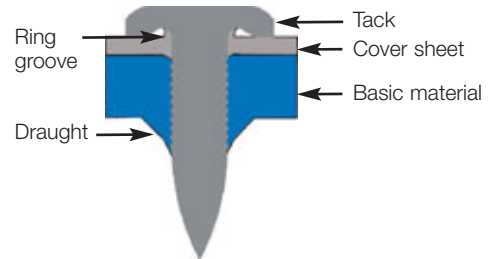
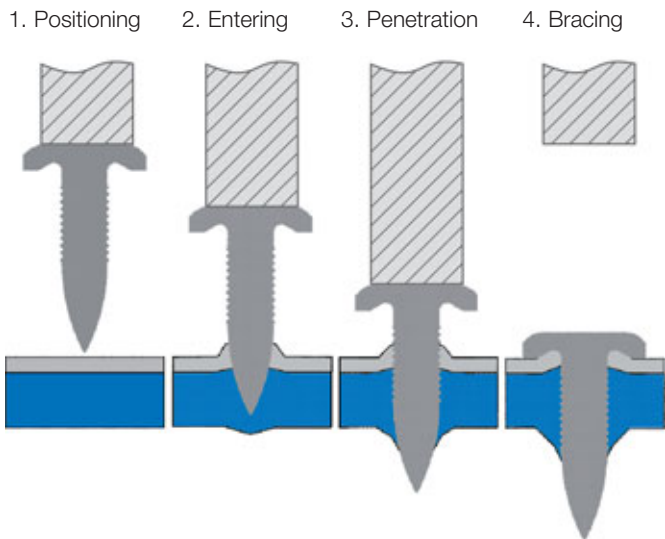
RIVTAC® Automation – The technology

The high-speed joining RIVTAC® occurs in a simple and fast process. In a single step, the tack penetrates the materials and joins them efficiently without pre-punching.

The tack connects with the components to be joined at high speed. The speed, which can be controlled via the adjustable pressure, is optimised to suit the materials and their thicknesses. The tack penetrates both components. A momentary rise in temperature in the joining zone and the resulting improved flowability, causes the parent material to be displaced into the annular grooves on the shank of the tack. As a result, there is a high form fit within the joint. Moreover, for higher-strength steel materials, there is a non-positive connection due to grouting and compression of the material.

RIVTAC® High-speed joining – The innovative joining process for numerous materials

Procedure



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

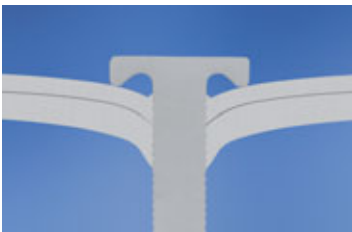
Joints

- High-strength
- Suitable for visual inspection
- Reproducible and process reliable
- No pre-punching
- Strength and reliability

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



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 Rm up to 1,400 N/mm²
- 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

RIVTAC® Automation – The joint qualities

High-strength joints

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

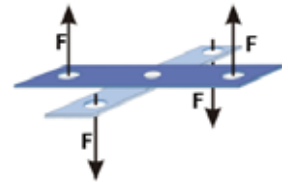
Material cover sheet	Sheet thickness (mm)	Material basic material	Sheet thickness (mm)	Cross tension values (kN)	Shear load values (kN)
AlMgSi1	1.00	AlMg3	4.00	ca. 2,40	ca. 3.00
AlMgSi1	1.20	AlCu4MgSi	2.00	ca. 3,60	ca. 3.60
AlMg3	1.20	H340LAD	2.00	ca. 3,00	–
AlMgSi1	1.20	22MnB5 (UsiBor)	1.15	ca. 4,00	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.

Shear load values



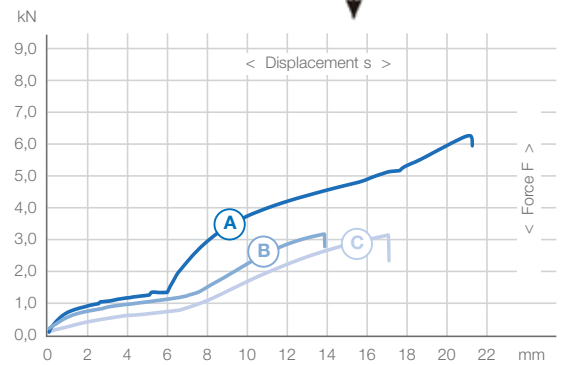
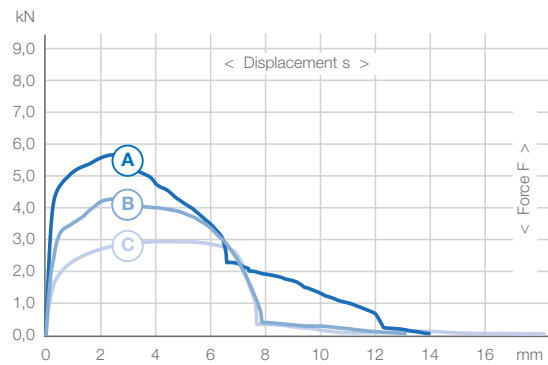
Cross tension values



Joint A
HX220YD (0.95) –
HCT600 (2.00)

Joint B
AlMg3 (1.20) –
H340LAD (2.00)

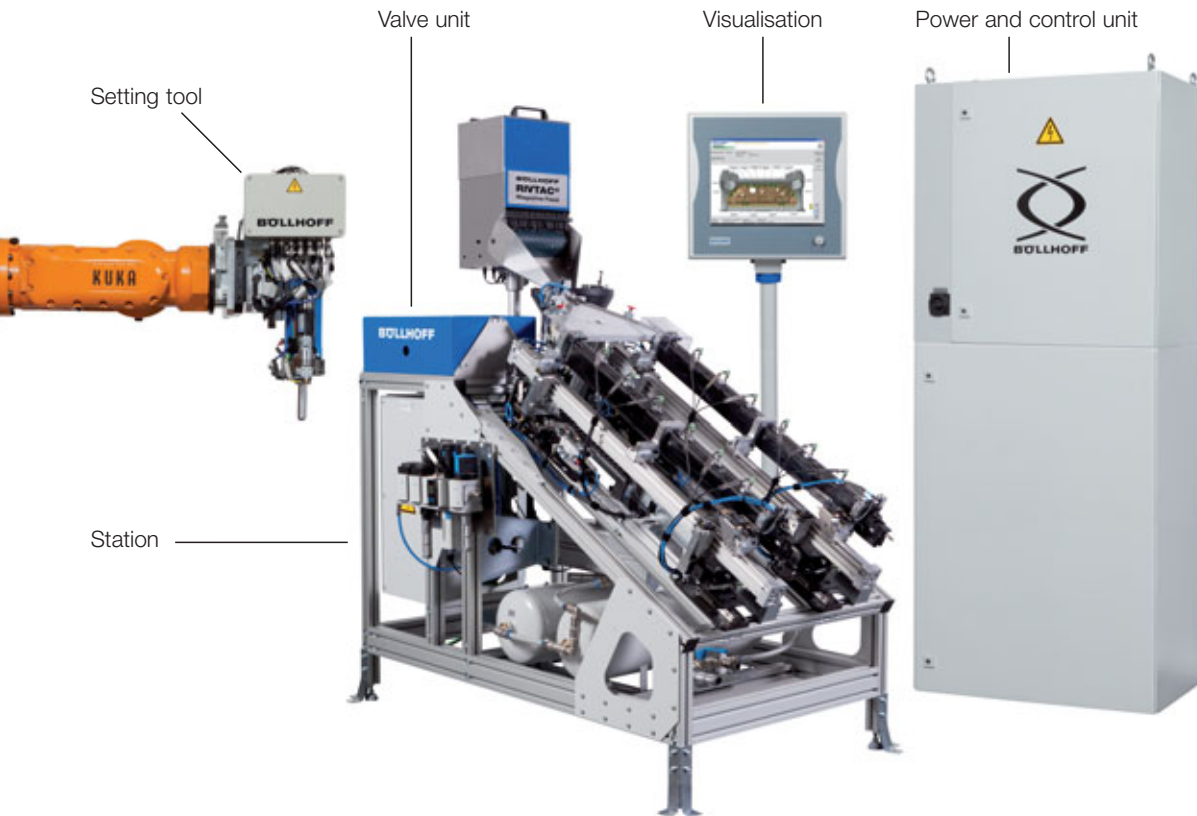
Joint C
AlMg3 (1.20) –
AlMgSi1 (4.00)



RIVTAC® Automation – The fully automatic system with process monitoring

Fully automatic system for stored feeding

The new RIVTAC® automation system enables fully automatic joining. It is designed for high volume applications and provides maximum flexibility in production planning.



Technical data

Dimensions	Station approx.	780 x 1800 x 1400 mm
Weight	Station with components	approx. 250 kg
	Setting tool	approx. 45 kg
	Power and control unit	approx. 65 kg
Compressed air <small>(DIN ISO 8573)</small>	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 110 V/60 Hz
Cycle time	„Start“ joining process until „new start“	0.9 – 1.5 sec
Noise emission	Setting tool	> 105 dB(A)
Ambient temperature	At working	+ 15°C bis + 40°C
	At stocking	+ 10°C bis + 60°C
Air humidity	Humidity class	According to DIN 40040
	Annual average	75%
	30 days	95%
	On the other days	85%

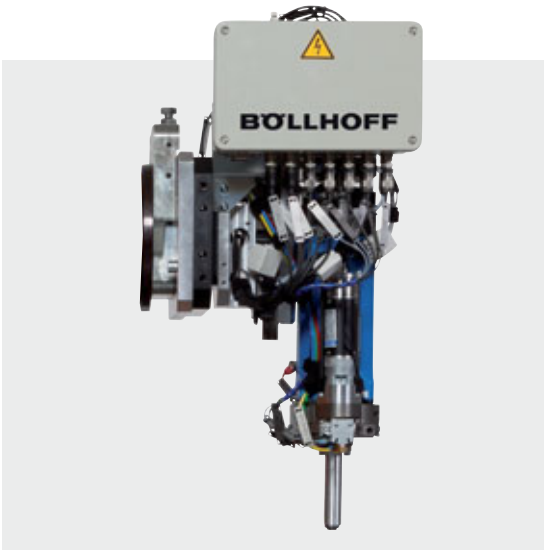
Application examples



RIVTAC® Feeder



Joining head



Setting tool

- One-sided accessibility to the joint
- Low profile setting head gives optimal accessibility
- Pneumatically driven with drive piston and elastic, internal stop
- Spiral feed magazines store up to 95 tacks incl. level monitoring and separation stop control
- Transfer unit with sensors for stroke stop and position control
- Standard adapter plate for robot interface
- Force and displacement sensor for optimum process monitoring
- Coupling module for real-time data processing and export
- Special adapter for robot interface available on request



Station

- Loading station for storage and feeding of loose RIVTAC® tacks
- Separation of tacks on two independent feed rails via an automatic director plate
- Individual stop-start operation of feed rails incl. position control and step-by-step level monitoring per feed rail
- Feeding system with vibratory bowl feeder and storage bin for up to 35,000 tacks
- Integrated pressure rise unit and pressure maintenance unit
- Local terminal box incl. communication line to the power unit
- Easy to maintain due to well described couplings and markings
- Adaptability to customised configurations



Valve unit

- Fast response times due to short strokes
- Integrated proportional valves for a continuous regulation of joining pressure
- Energy-optimised drive of the setting tool
- Capable of being integrated on the third robot axis
- Easy to maintain due to well described couplings and markings

Power unit: Böllhoff Control System (BCS)



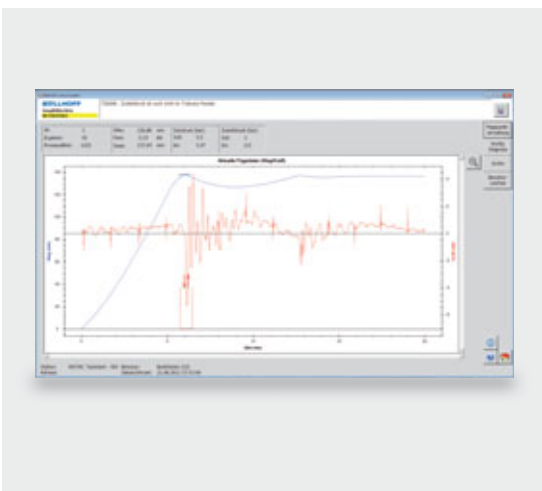
- Local hardware configuration with central controlling of machine components by bus-system
- „Embedded PC“ based control for the connection of a visualisation system
- Optimised process times of 0.9 sec. to 1.5 sec./tack (high economic efficiency)
- Drive up to 3 rivet feedings (standard)
- Open interface 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



Visualisation

- Visualisation on an industrial-suited screen
- Visualisation via external panel
- Operation instruction via touch screen
- Multi visualisation of diverse systems by one control panel
- Integration of the calibration function possible
- Media docking possible
- Maintenance counter / maintenance display possible
- Customised visualisation available on request
- Application-specific add-ons

Process monitoring

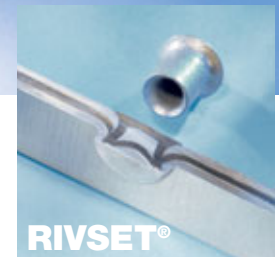


- Process monitoring module by measurement of response force and / or displacement measurement
- Analysis of the response force measurement via windowing
- Analysis of the displacement measurement via windowing
- Statistical control of the process monitoring data
- Integrated final window check
- Add-ons concerning statistical analysis and process curves
- Internal and external saving of process curves
- Process data transfer to a higher-level quality management system

Reliable!

Böllhoff is one of the leading international service providers of fastening, assembly and system technology.

An independent, family-run enterprise for four generations, our headquarters are in Bielefeld, Germany. Over 2,400 staff are employed in the organisation's network of 38 locations in 23 countries. Here, dialogue with our customer is the essence of our work. We support you throughout your development process to create tailor-made fastening solutions, step by step.



Innovative!

Innovative industries require innovative partners. We are specialists in the field of mechanical joining technology.

By so doing, we have pooled our knowledge and experience of self-pierce riveting and clinching as well as other innovative joining technologies as the high-speed joining RIVTAC®. Our technical competence is in constant demand – as customers continue to design new products, introduce new materials and develop production processes.

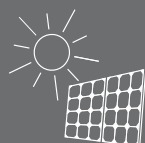
Focussed!

Our products are top of the class in their markets and we continue to offer the most appropriate joining method throughout all industrial sectors. Collaboration with our customers leads to the development and application of consistent and reliable fastening solutions.

You can benefit from our experience!



Automotive



Solar



Rail and transportation



Agriculture machines



Metal structures

Böllhoff International with companies in:

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

Apart from these 23 countries, Böllhoff supports its international customers in other important industrial markets in close partnership with agents and dealers.

KEL Bulgaria Ltd.
Please find your local contact on www.kelbulgaria.com
or contact us under info@kelbulgaria.com
Telephone: +359 877008832
Fax: +359 24922552

