RIVTAC®

The innovative high-speed joining process
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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**

1. Positioning  
2. Entering  
3. Penetration  
4. Bracing

**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 sheer and cross tension load. In addition to the pure steel and aluminium joints representing the joining technology, mixed joints are shown as well.

<table>
<thead>
<tr>
<th>Material cover sheet</th>
<th>Sheet thickness (mm)</th>
<th>Material base material</th>
<th>Sheet thickness (mm)</th>
<th>Sheer load values (kN)</th>
<th>Cross tension values (kN)</th>
<th>Sheer load values (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlMgSi1</td>
<td>1.00</td>
<td>AlMg3</td>
<td>4.00</td>
<td>ca. 2,40</td>
<td>ca. 3.00</td>
<td></td>
</tr>
<tr>
<td>AlMgSi1</td>
<td>1.20</td>
<td>AlCu4MgSi</td>
<td>2.00</td>
<td>ca. 3,60</td>
<td>ca. 3.60</td>
<td></td>
</tr>
<tr>
<td>AlMg3</td>
<td>1.20</td>
<td>H340LAD</td>
<td>2.00</td>
<td>ca. 3,00</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>AlMgSi1</td>
<td>1.20</td>
<td>22MnB5 (UsiBor)</td>
<td>1.15</td>
<td>ca. 4,00</td>
<td>ca. 4.40</td>
<td></td>
</tr>
<tr>
<td>HX220YD</td>
<td>0.95</td>
<td>HCT600XD</td>
<td>2.00</td>
<td>ca. 6,00</td>
<td>ca. 4.00</td>
<td></td>
</tr>
<tr>
<td>HX220YD</td>
<td>0.95</td>
<td>DP1000</td>
<td>1.50</td>
<td>ca. 5,50</td>
<td>ca. 4.10</td>
<td></td>
</tr>
<tr>
<td>HX220YD</td>
<td>0.95</td>
<td>DP1000</td>
<td>1.20</td>
<td>ca. 4,80</td>
<td>ca. 4.00</td>
<td></td>
</tr>
<tr>
<td>H340LAD</td>
<td>1.00</td>
<td>22MnB5 (UsiBor)</td>
<td>1.50</td>
<td>ca. 5,00</td>
<td>ca. 5.20</td>
<td></td>
</tr>
<tr>
<td>DC04</td>
<td>1.00</td>
<td>AlMg3</td>
<td>4.00</td>
<td>ca. 5,00</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>DC04</td>
<td>2.00</td>
<td>DC04</td>
<td>2.00</td>
<td>ca. 3,10</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

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.

### 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

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Station approx.</th>
<th>780 x 1800 x 1400 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Station with components</td>
<td>approx. 250 kg</td>
</tr>
<tr>
<td></td>
<td>Setting tool</td>
<td>approx. 45 kg</td>
</tr>
<tr>
<td></td>
<td>Power and control unit</td>
<td>approx. 65 kg</td>
</tr>
<tr>
<td>Compressed air supply</td>
<td>2 x 1/2 inch</td>
<td></td>
</tr>
<tr>
<td>Max. air consumption</td>
<td>6 NL/joining</td>
<td></td>
</tr>
<tr>
<td>(setting tool)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. air consumption</td>
<td>400 L/min</td>
<td></td>
</tr>
<tr>
<td>(station)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure</td>
<td>10 bar</td>
<td></td>
</tr>
<tr>
<td>Working pressure</td>
<td>3.5 to max. 8 bar</td>
<td></td>
</tr>
<tr>
<td>Electrical power supply</td>
<td>Electrical supply</td>
<td>230 V / 50 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>110 V / 60 Hz</td>
</tr>
<tr>
<td>Cycle time</td>
<td>„Start“ joining process until „new start“</td>
<td>0.9 – 1.5 sec</td>
</tr>
<tr>
<td>Noise emission</td>
<td>Setting tool</td>
<td>&gt; 105 dB(A)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>At working</td>
<td>+ 15°C bis + 40°C</td>
</tr>
<tr>
<td></td>
<td>At stocking</td>
<td>+ 10°C bis + 60°C</td>
</tr>
<tr>
<td>Air humidity</td>
<td>Humidity class</td>
<td>According to DIN 40040</td>
</tr>
<tr>
<td></td>
<td>Annual average</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>30 days</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>On the other days</td>
<td>85%</td>
</tr>
</tbody>
</table>

Application examples

RIVTAC® Feeder

Joining head
**Setting tool**

- One-sided accessibility to the joint
- Low profile setting head gives optimal accessibility
- Pneumatical drive 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!
Apart from these 23 countries, Böllhoff supports its international customers in other important industrial markets in close partnership with agents and dealers.