

BÖLLHOFF

WELTAC®

Resistance element welding
for modern multi-material car body design





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Car bodies are increasingly influenced by multi-material design. The classical joining technologies, for example resistance spot welding, cannot be used since the materials are not or only limited thermally compatible. This concerns mainly aluminium and steel.

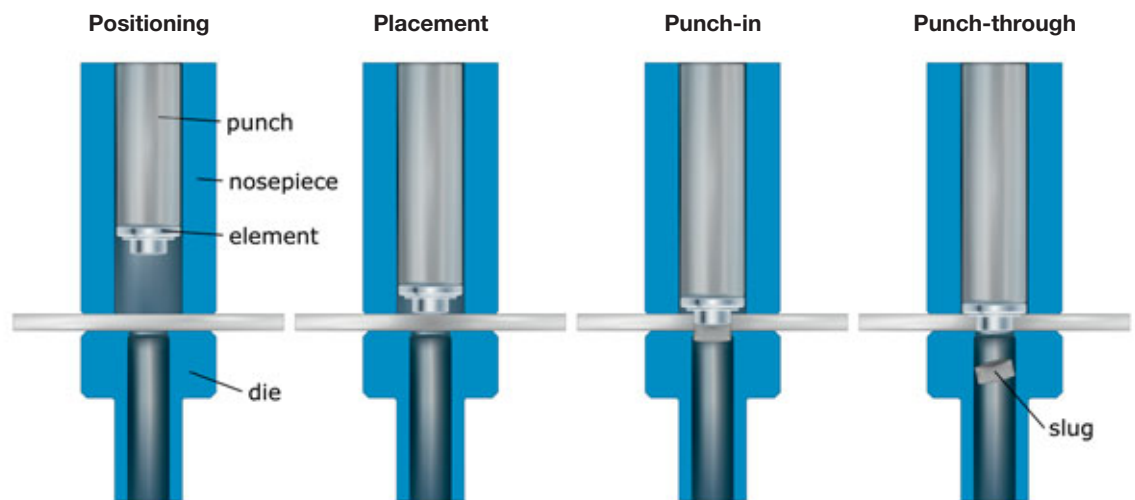
In order to fulfil these requirements, Böllhoff - as a specialist for fasteners and assembly systems - added another technology to its existing product portfolio. By using the resistance element welding WELTAC®, you are flexible: lightweight materials (aluminium, sandwich materials, polymeric materials) can be easily joined with steel of all qualities.

You also benefit from the possibility to still use your existing spot welding equipment in the modern body construction as well as to combine different multi-material designs on one production line.

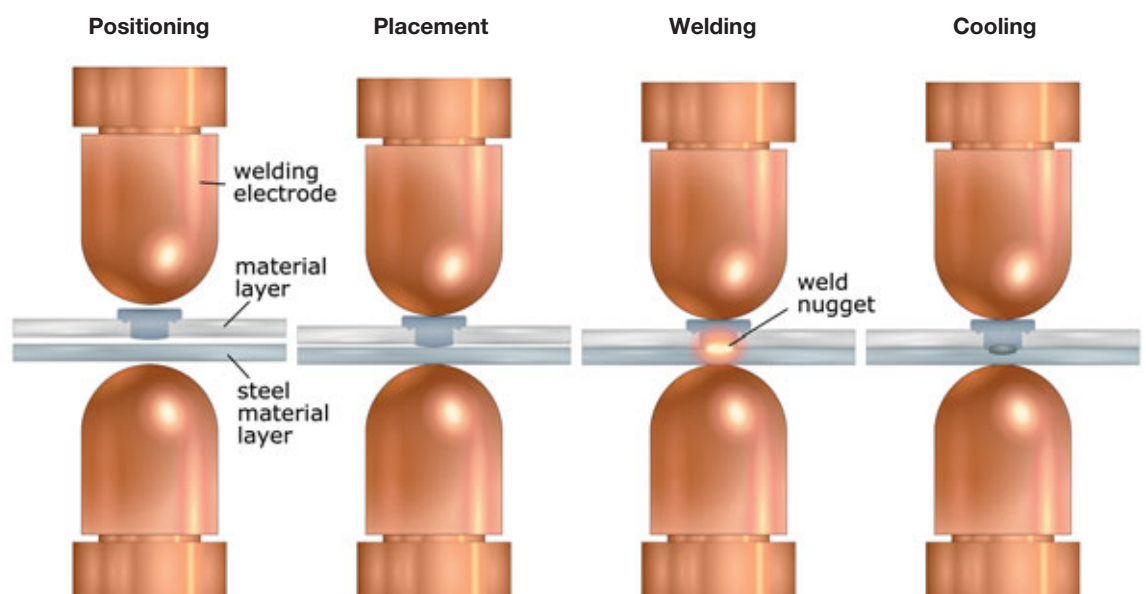
Flexible. Process-reliable. Robust.

The technology: 2-step process

1. Process stage: punching-in the element *



2. Process stage: welding

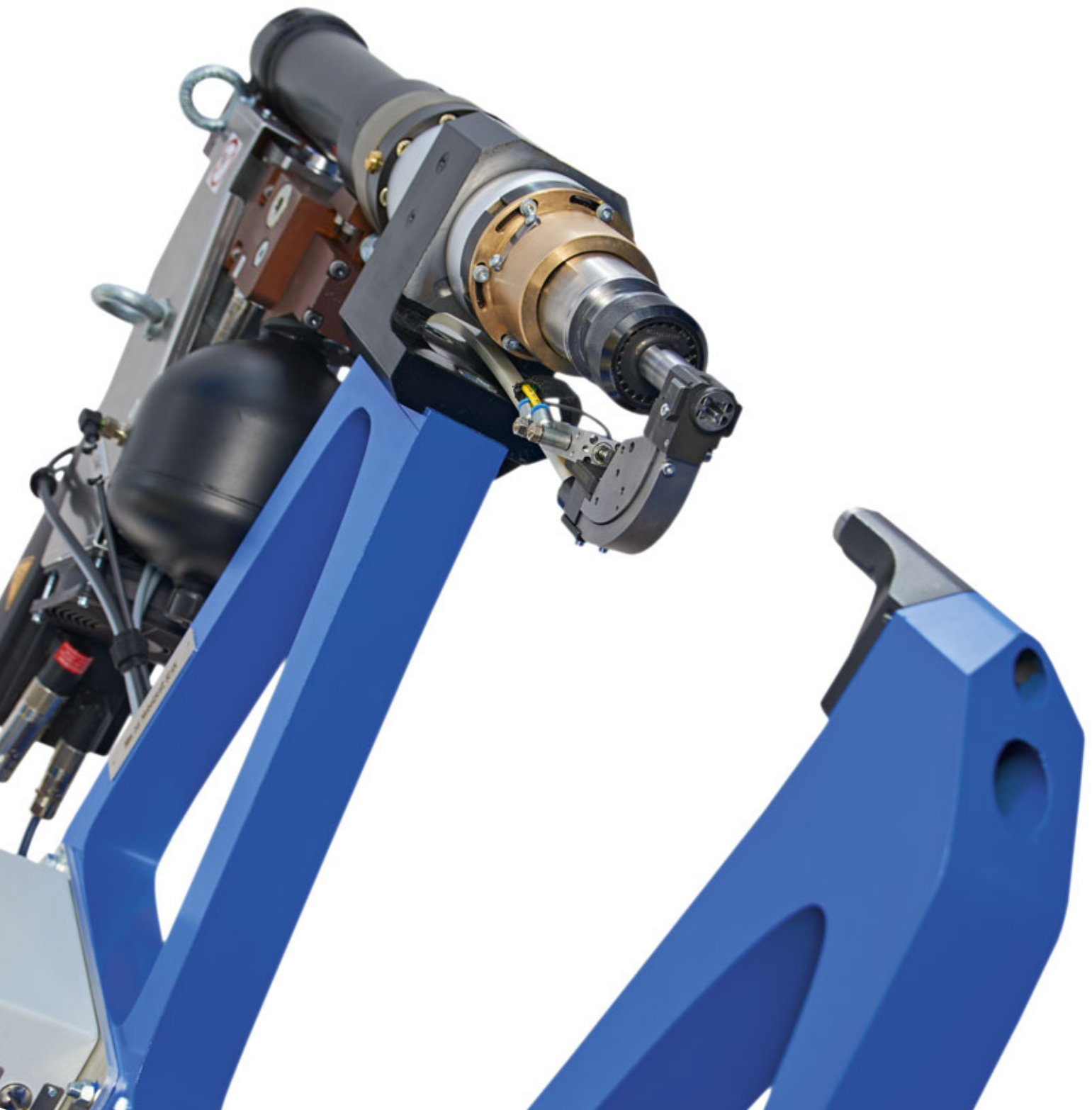


*Böllhoff only supplies the WELTAC® elements and the WELTAC® automation of the first process stage.

WELTAC® Resistance element welding – Your advantages

Your benefits at a glance:

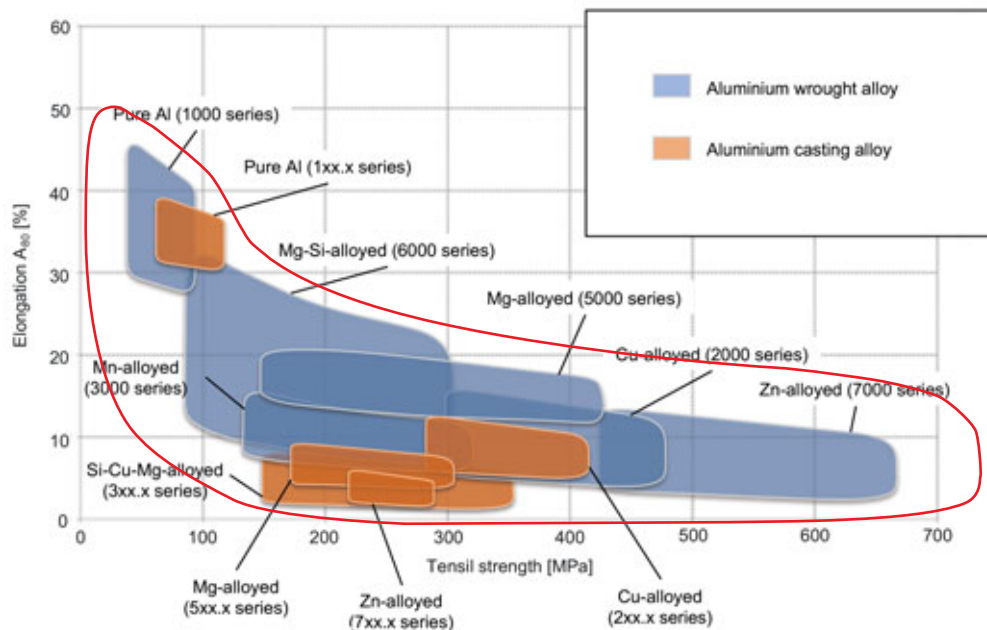
- High-strength joints
- Use of existing, conventional spot-welding equipment in the body construction shop possible
- On a single body construction line, different multi-material designs can be flexibly combined
- Wide application range regarding material qualities and thicknesses (aluminium and steel), incl. press-hardened steel
- Processing with a proven, electric-hydraulic RIVSET® system
- All from a single source: joint design, element, automation and worldwide after-sales service in the well-known Böllhoff quality



WELTAC® offers a wide application range in regard to steel and aluminium combinations in two-sheet, three-sheet and four-sheet stack-ups:

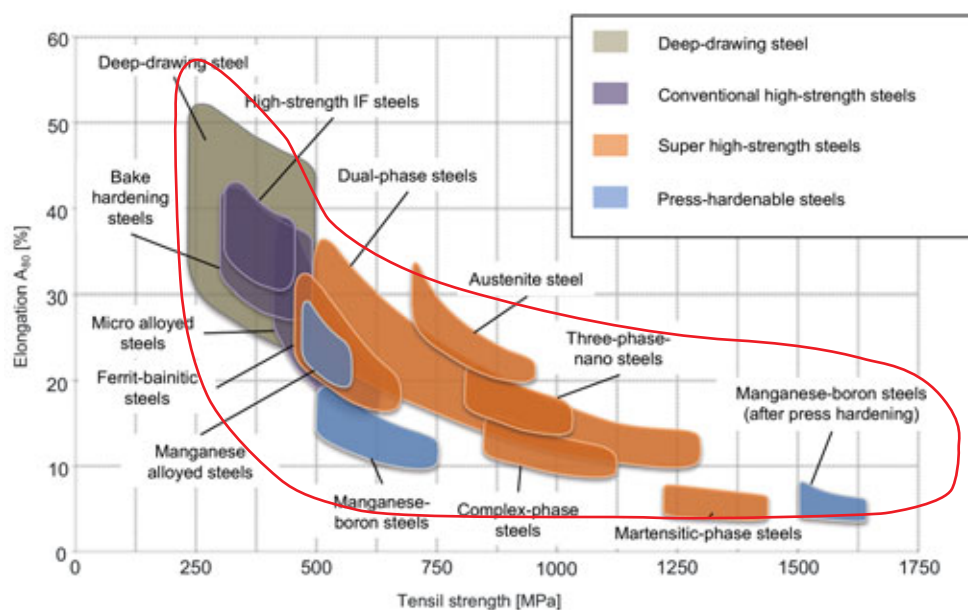
Aluminium

- Aluminium sheets, extruded profiles and die casting components
- Aluminium material thicknesses from 0.8 mm to 3.2 mm using standardised fastener design (higher material thicknesses available on request)



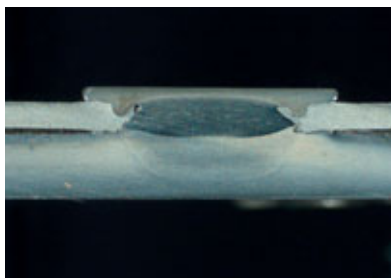
Steel

- Cold- and hot-rolled steel of all property classes
- Press-hardened steel

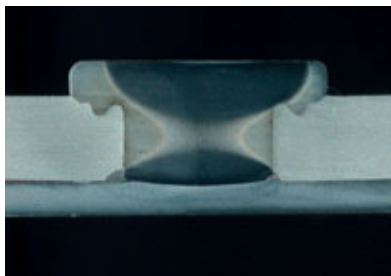


Do you have individual requirements regarding material combinations? Talk to us.

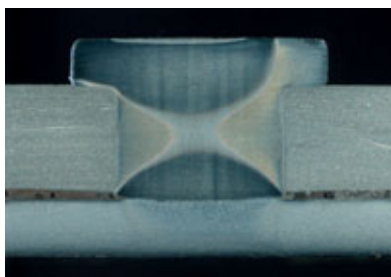
WELTAC® Resistance element welding – Material combinations



Al5xxx sheet 0.8 mm
High-strength steel 2.0 mm



Al6xxx extrusion profil 3.0 mm
Structural adhesive
Steel deep-drawing grade 1.0 mm



Al die cast 3.0 mm
Structural adhesive
High-strength steel 1.75 mm



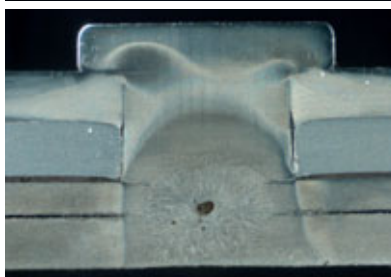
Al6xxx sheet 1.2 mm
Steel deep-drawing grade 1.0 mm
Press-hardened steel 1.6 mm



Super high-strength steel 1.5 mm
Al5xxx sheet 1.5 mm
Structural adhesive
Steel deep-drawing grade 1.0 mm



Al5xxx sheet 0.8 mm
Al7xxx sheet 2.0 mm
Steel deep-drawing grade 1.0 mm
Press-hardened steel 1.6 mm



Super high-strength steel 1.5 mm
Structural adhesive
Al5xxx sheet 1.5 mm
Structural adhesive
Press-hardened steel 1.0 mm
Press-hardened steel 1.6 mm



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Assembly system module


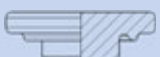




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WELTAC® Resistance element welding – Variants

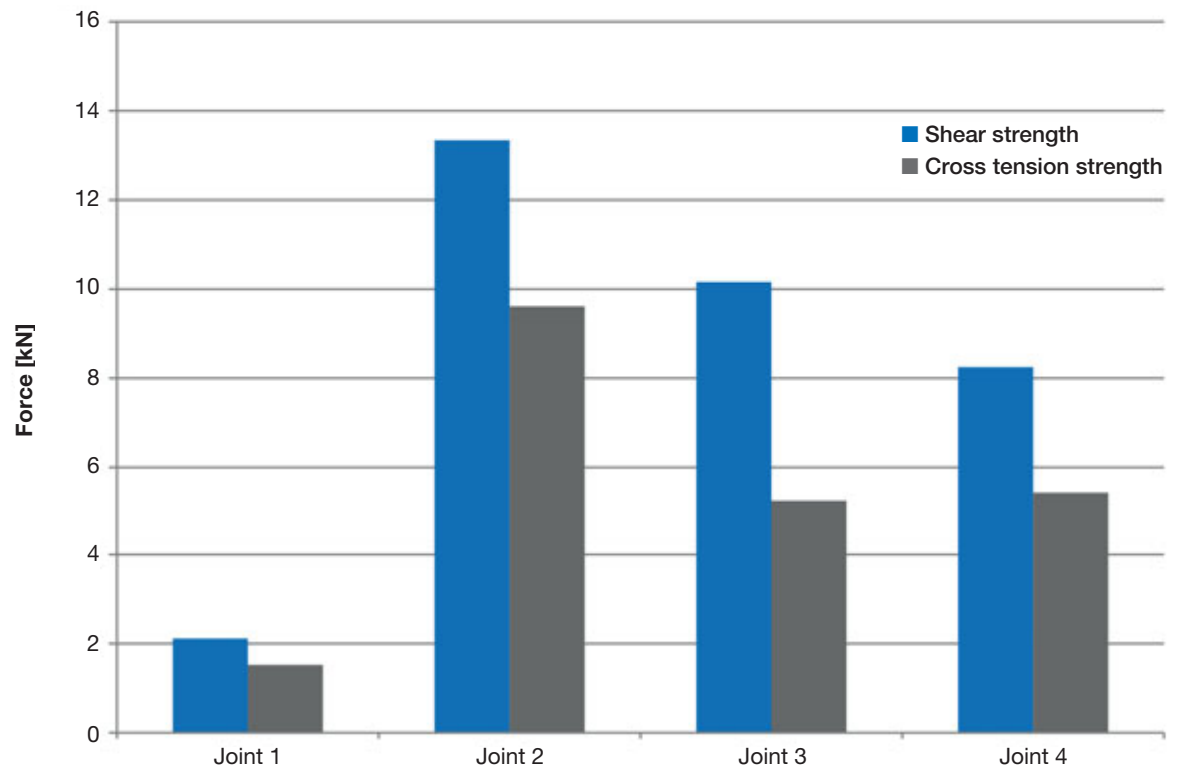
- Standard portfolio includes 6 geometrical variants
 - 5 variants using a flat head
 - 1 variant using a countersunk head (interference contour < 0.4 mm)
- Variation of shaft length, shaft diameter and head height aligned with material thickness and mechanical requirements
- Heat treatment
Standard: cured to 410 HV10
- Plating systems
 - Zinc
 - Zinc-nickel
- Produced in our own production using a cold-forging process

	Field of application sheet thickness (mm)	Interference head (mm)	Clamping groove* for loosening necessary?	Design/mechanical load
	0.8 – 1.2	< 0.4	✓	Flat head shape/ low mechanical load
	0.8 – 1.2	≈ 1.0	✓	High head shape/ high mechanical load
	1.3 – 1.7	≈ 1.3	✓	Reinforced head and shaft part/ increased mechanical load
	1.8 – 2.2	≈ 1.3	✓	Reinforced head and shaft part/ increased mechanical load
	2.3 – 2.7	≈ 1.5	–	Increased reinforcement in head and shaft part/ maximum mechanical load
	2.8 – 3.2	≈ 1.5	–	Increased reinforcement in head and shaft part/ maximum mechanical load

*The patented clamping ring geometry increases the contact pressure applied to the element shaft thus ensuring captive locking during transport and handling processes between punching and welding process.



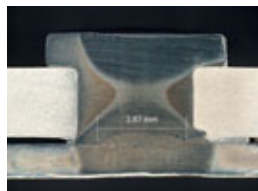
WELTAC® Resistance element welding – Joint qualities



Joint 1
AlMg3 [0.8] -
HX220YD+Z100 [1.25]



Joint 2
EN AW 6082 [3.0] -
HCT590X+Z100 [1.5]

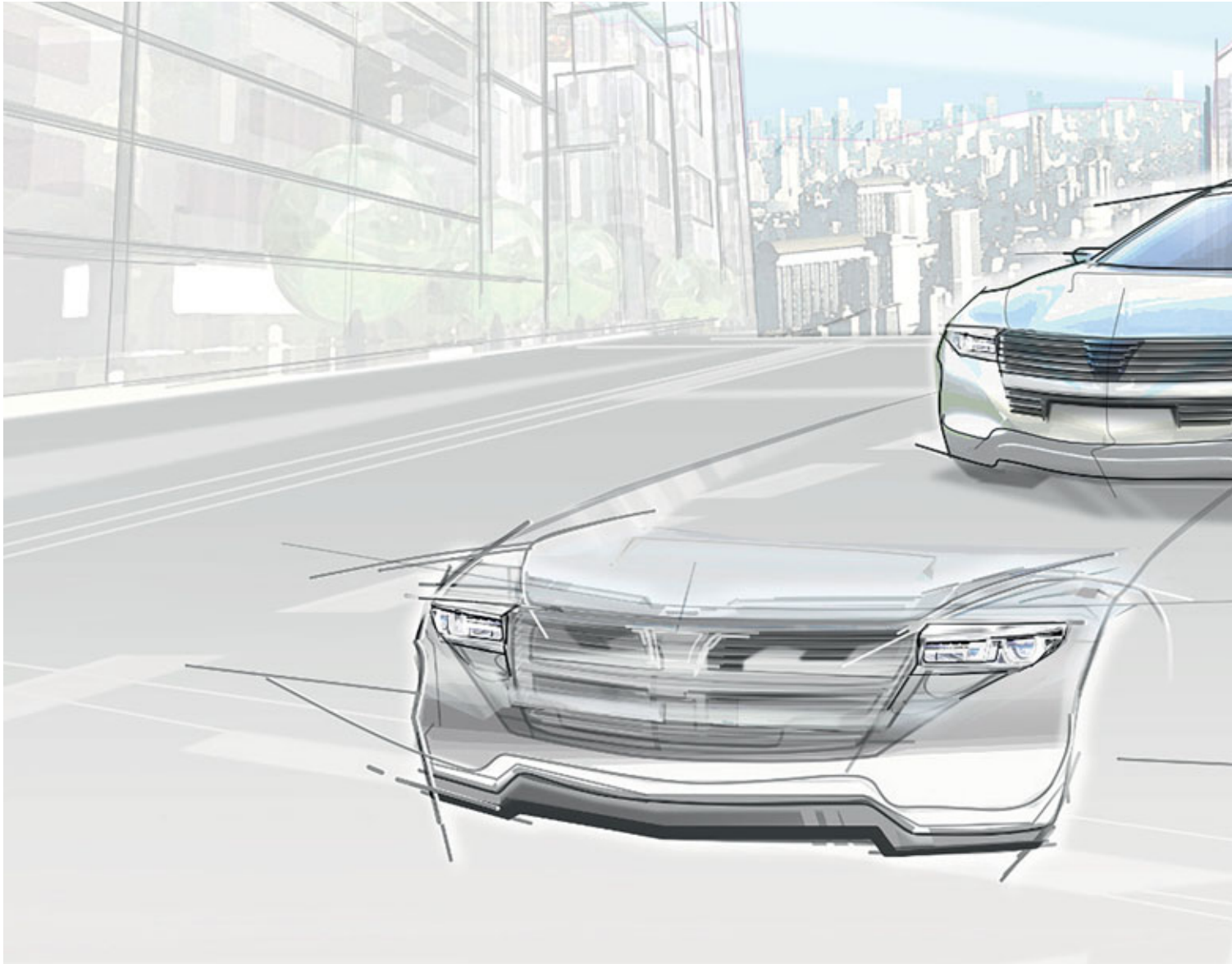


Joint 3
EN AW 7075 [2.0] -
press-hardened steel [1.5]



Joint 4
AL 6016 [1.0] - AL 6016 [2.0] -
press-hardened steel [1.5]





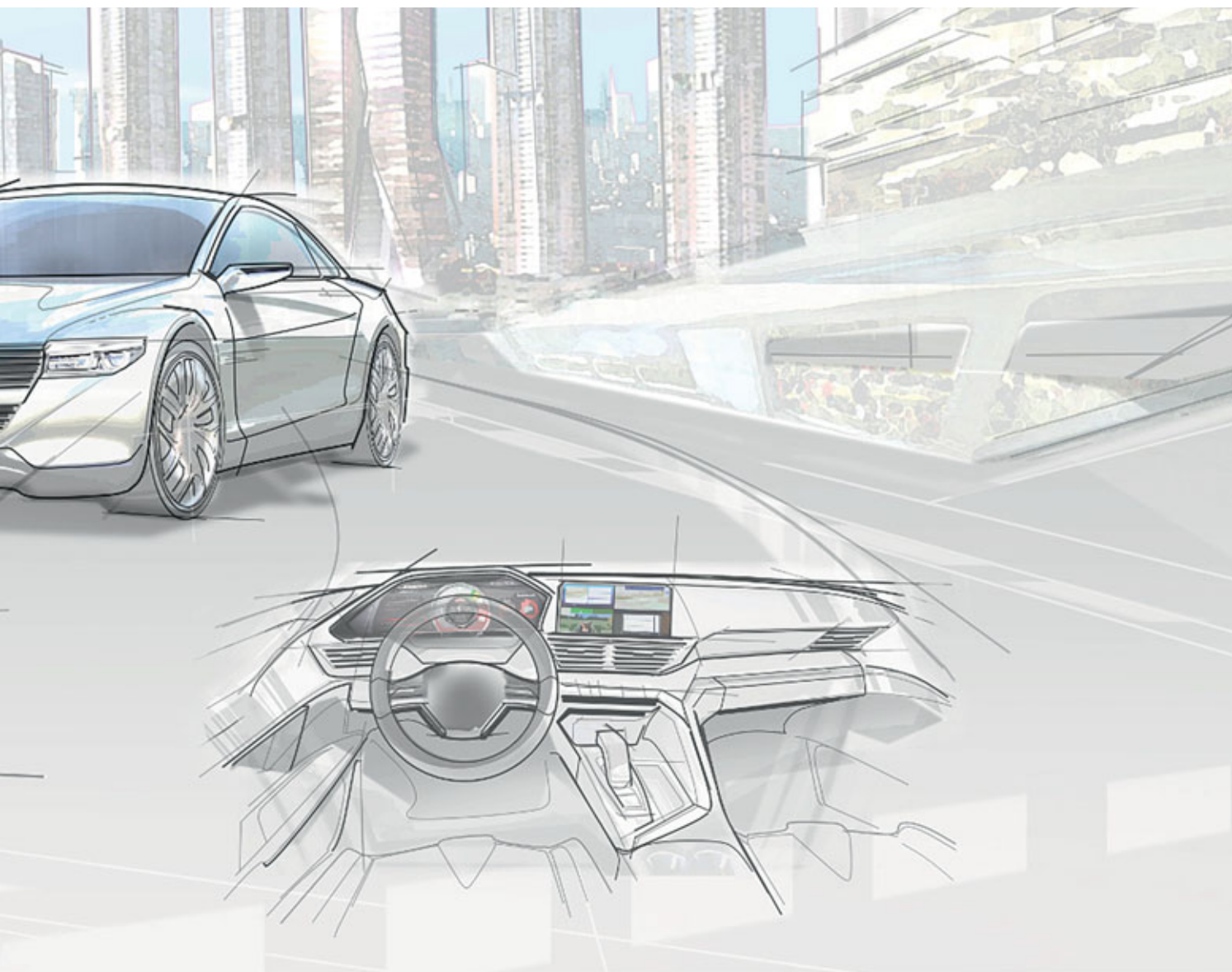
The WELTAC® technology has been particularly developed for special requirements in the car body design. Components made of different materials can be joined reliably with WELTAC®, e.g.:

Outer panels in aluminium (thin sheet) on steel structures

- Side panels
- Roof

Panel components made of aluminium in steel environments

- Floor parts
- Front wall



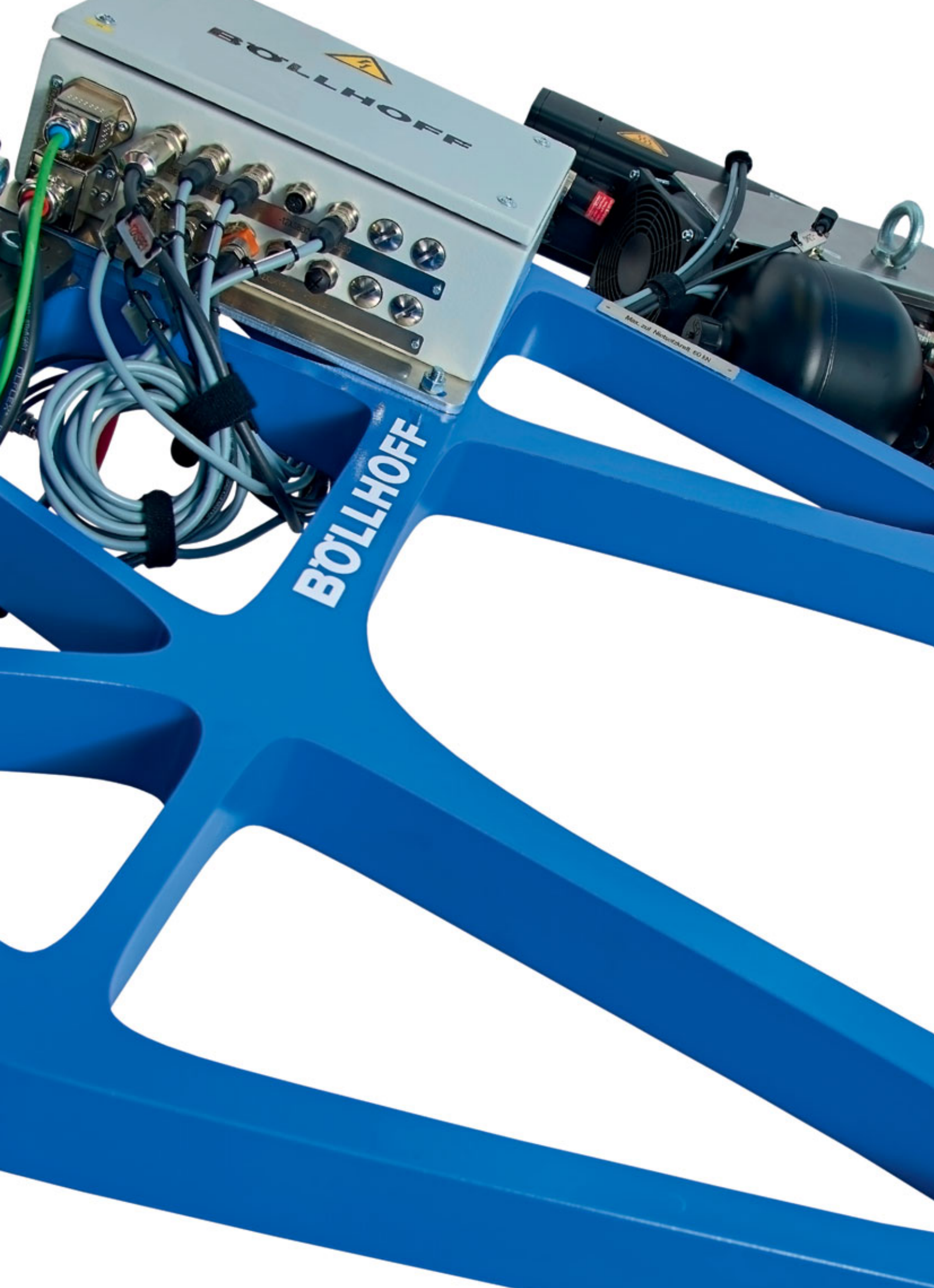
Structural parts made of aluminium in steel environments

- C- and D-pillar
- Crash reinforcements
- Instrument panel support

Multifunctional die casting parts in steel environments

- Suspension strut
- Hinge knot rear lid

... and many more applications





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Fastener module

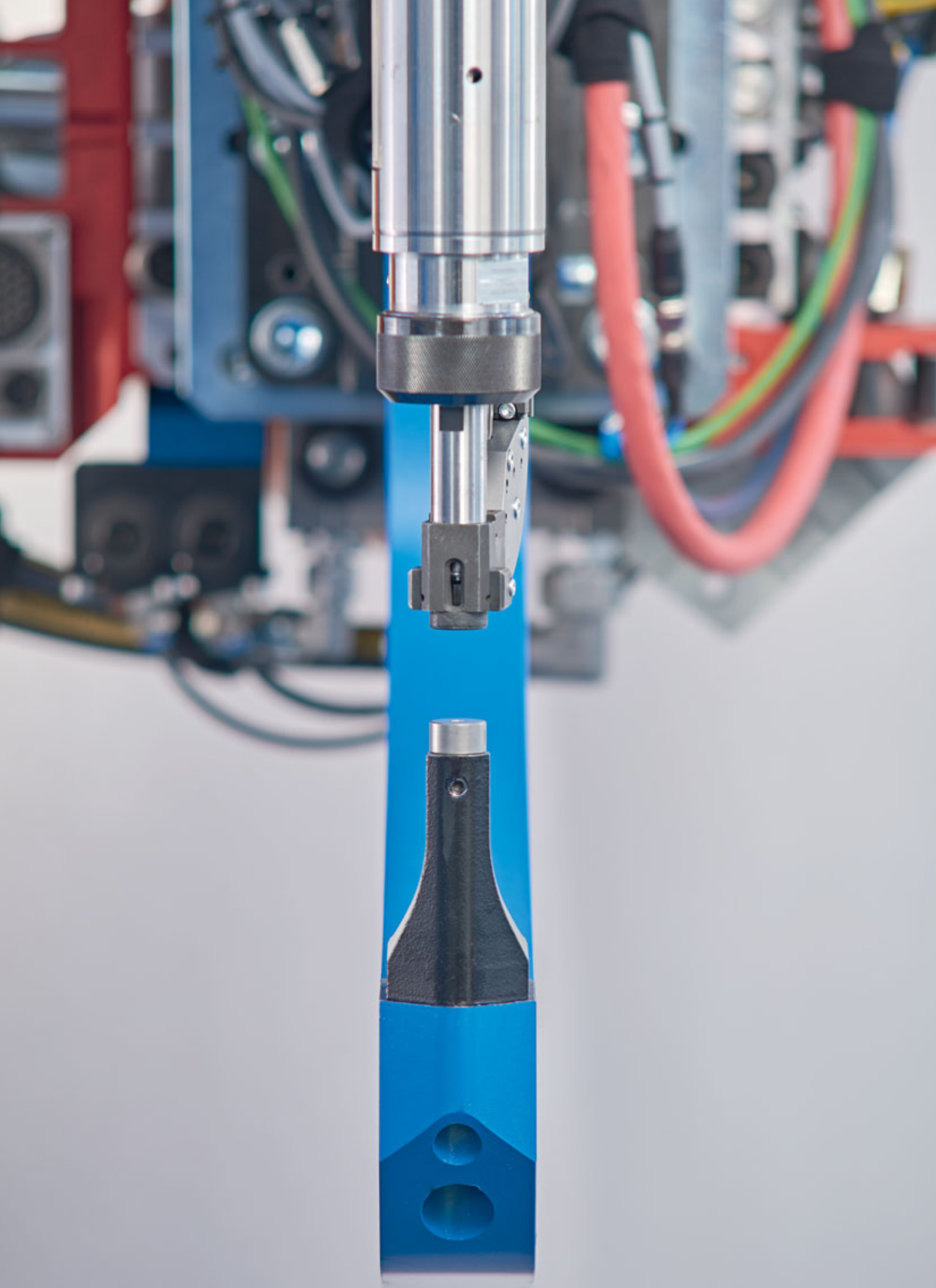
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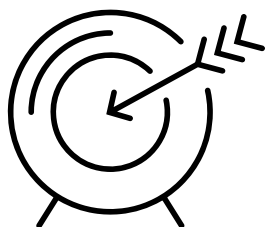
WELTAC® Automation EH

Our resistance element welding WELTAC® is linked to our proven assembly system RIVSET® Automation EH. Due its the modular design, the system is designated for applications in large-scale production with maximum flexibility during production planning.

A high duration of life and minimum maintenance effort are important factors and basis for a successful production.

The highlights of WELTAC® Automation EH at a glance:

- Modular and comprehensive machine designs
 - Machine configuration via plug & play
 - Process times ≤ 1.5 seconds / element (depending on the setting tool)
 - High machine availability
 - Open interface for different robot interfaces (ProfiNet, EtherNet/IP, etc.)
-



WELTAC® outlook

The resistance element welding technology is developed constantly.

1. WELTAC® Automation E

Böllhoff will break new ground again with the innovative assembly system WELTAC® Automation E.

The main requirements for this system are a 100 % electrical installation on robots, the compact design of setting tools and short process times, for some applications ≤ 1.5 s.

Your advantages

- Path-controlled process with 7th axis function included in control
- Travel speeds of up to 320 mm/s
- Low interferences due to a coaxial drive technology without further mounting parts

2. Press-integrated setting head

The press-integrated setting head, which is still under development, will smoothly fit into the existing production environment and increase the productivity and efficiency.

Your advantages

- Installation of the joining elements directly in the forming tool
- Optimisation of the tolerance chain of the punching to the welding process
- Significant cost-savings

It's time to shape the future.



TOOL

Setting tool EH

- Setting tool with electrical drive for setting forces 10 – 35 kN
- Pre-clamping force adjusted with pressure springs
- Various mounting points on the setting tool for perfect position on the robot
- C-frames throat depths to 1,000 mm
- Modular die post with special die support and C-frame for the slug removal



FEED

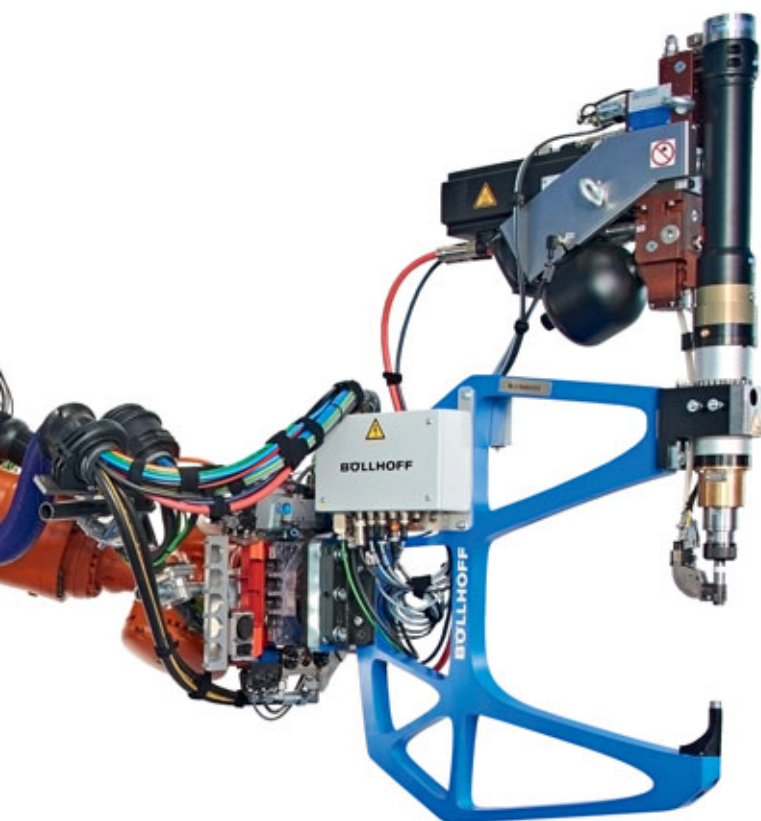
Element feeder

- Minimum maintenance at maximum availability
- Feeds approx. 45 elements/minute
- Stockage of approx. 4,000 elements (optionally expandable)



SETTING HEAD

- Blow feeding and processing of WELTAC® elements via pneumatic-controlled transport into the duct bend
- Ensures also the feeding of small WELTAC® elements (shaft Ø 4 mm, total length 2.6 mm), with or without clamping ring



C-FRAME

The modular system:

With the new C-frame, you will have the possibility to generate a minimum number of base frames for a maximum number of setting tool variants.

Your advantages:

■ Optimised

Nearly parallel opening of the C-frame supports improved connectivity quality.

■ Simple

You can configure the rivet setting tools by yourself.

■ Effective

The process of designing rivet setting tools, whether for new versions or changes, is drastically shortened.

■ Light

The new C-frame brings on average 20 % less weight on the scale and thus contributes to a compact design.



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Our general competencies – One by one

Sales

Innovative ability and technical potential are becoming increasingly important for a company's success.

Every customer has a special 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. Böllhoff also 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 further important industry markets.

Product and 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 product and project management; they support you with management and product-specific expertise.

Our product and project management stands for interdisciplinary coordination of complex activities. Our employees call on many years of experience in the application engineering of joining and automation solutions and realise tailor-made solutions according to your requirements.

We think in terms of systems: optimising processes, reducing costs, strengthening competitive positions. Our product and project management stands for interdisciplinary coordination of complex activities. That means planning, controlling and monitoring in all project phases.

We provide product and project management on three continents:

- Europe
- North America
- Asia



Design and development

The development of fasteners depends on the material trends of our customers. For the respective assembly systems, we focus on functionality, flexibility and design.

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.

FEM simulation reduces the amount of iteration loops and therefore the time-to-market.

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

Production

WELTAC® elements are exclusively manufactured at Böllhoff production facilities. They are subject to stringent quality checks in every single production step. This is the only way we can meet the high customer requirements for every product. For every element.

With extending our production facilities at the Sonnewalde location from about 4,900 to 8,900 m², we are well prepared for the future and the market requirements.

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.



Our general competencies – One by one

Joining laboratory and quality

Our focus is always on sophisticated production processes as well as modern measurement and monitoring technology. Good quality is no coincidence, but the result of systematic planning and implementation.

You define all the technical requirements – by request 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/IEC 17025, is also there to support you.

We evaluate the joint quality in mechanical joining, support you by applying numerical modeling procedures and also assess technical feasibility.

The Böllhoff in-house trainings

Are you looking for hands-on machine presentations and trainings in a modern training centre?

Our training concept has a strong practical focus and obtained knowledge can easily be transferred to your work environment.

That is how we stand out. Our trainers are renowned and experienced experts who are happy to introduce you to the up-to-date practice of our modern joining systems.

This is what you can expect:

- Machine presentations on real assembly systems
- Training on a robot cell
- Theory and practice in an informative and inspiring combination
- A relaxed and at the same time intense training atmosphere with small groups and plenty of time to answer individual questions and talk about specific aspects

At our training centre, you find ideal conditions for maximum learning success.

We offer specialised trainings for equipment manufacturers, service personnel and experts.



After Sales Service

Our full-service in detail:

- Start-up of the systems
- External repairs of systems
- On-site system maintenance → spare parts supply
- Production support for machine parameter adjustments
- Support with initial joint evaluation and checking the system parameters in cooperation with your quality assurance department
- Testing of the joint parameter at real parts on site “Joint-Commissioning”
- Assistance with preparing maintenance concepts and TPM schedules
- Repair and compliants management
- Start-up schedule testing
- Remote servicing on request
- Spare parts management
- Tele-service
- 24/7 hotline

Repair centre

In the unlikely event that our tools do need repair, you can resort to our Repair Centre for:

- Evaluation of defective/damaged products
- Cost estimates
- Scheduling and coordination of repair
- Provision of replacement and exchange equipment
- Repair with subsequent function test
- Repair reports
- Assembly and commissioning of repaired equipment
- Generation of repair and maintenance packages







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

