

## Focus on lightweight construction – innovative metal multi-material joining systems

- ⊕ The market challenges
- ⊕ Joining multi-material mix
- ⊕ Integrating functional elements
- ⊕ All-encompassing services
- ➔ [www.arnold-fastening.com](http://www.arnold-fastening.com)



## Focus on lightweight construction: The challenges of multi-material mix joining

Lightweight construction has been a hot topic within the automotive industry for quite a few years. Lightweight means that different materials often need to be joined together – the key words being “multi-material mix”. Conventional welding is generally not appropriate here. Instead innovative joining processes are used, such as flowhole forming, clinching or punching. These methods also reduce cycle times and produce a more secure fastening.



Innovative solutions  
for pioneering markets

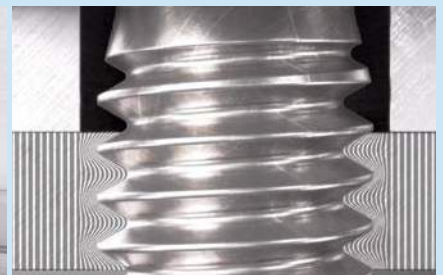
Flowhole-forming



Resistance element welding



Direct screw fastening





- aluminum sheet
- aluminum extrusion
- cast aluminum
- mild steel < 350 MPa
- high-strength steel (HSS) 350–450 MPa
- advanced high-strength steel (AHSS) 450–1000 MPa
- ultra high-strength steel (UHSS) > 1000 MPa

### Self pierce and clinching



### Self clinching







### Assembly



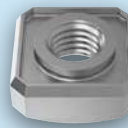


# Procedure for joining different materials in lightweight body construction

## Joining multi-material mix

<p><b>Flowform®</b></p> <p>Flowhole-forming screw for single-side joining applications and high strength joint properties</p>	<p><b>Flowpush®</b></p> <p>Flowhole-forming and clinch fastener for single-side joining applications and low strength joint properties</p>	<p><b>Flexweld®</b></p> <p>Resistance element welding for mixed material applications with ultra high-strength steel (UHSS) materials</p>	<p><b>Sheetite®</b></p> <p>Direct screw fastening pre-drilled sheet metals</p>
			
<p>✓ ✓ ✓ ✓ ✓ ✗ ✗</p>	<p>✓ ✓ ✓ ✓ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✓ ✓ ✓ ✓ ✗ ✗</p>

## Integrating functional elements

<p><b>RIVTEX® RXS</b></p> <p>Self-clinching screw for thin plates. Plate thickness: 0.75–2.0 mm</p>	<p><b>RIVTEX® RXM</b></p> <p>Round pierce-clinch nut for thin plates. Plate thickness : 0.75–2.0 mm</p>	<p><b>STRUX® SX</b></p> <p>Self-clinching screw for thick plate. Metal thickness: 2.0–5.0 mm</p>	<p><b>Rivorm® AX</b></p> <p>Rivet: Our strongest fastener as far as rivets are concerned</p>
			
<p>✓ ✗ ✗ ✗ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✗ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>
<p><b>RIVORM® HR</b></p> <p>Square rivet nut for thin and thick plate. Sheet thickness: 0.4 – 3.5 mm (4.5 mm)</p>	<p><b>RIVORM® TR</b></p> <p>Rivet suitable for any application</p>	<p><b>PIAS® KP</b></p> <p>Square pierce-clinch nut for thin plate. Sheet thickness: 0.6–2.0 mm</p>	<p><b>PIAS® HN</b></p> <p>Square self-clinching nut for thick plate. Sheet thickness: 2.0–4.0 mm</p>
			<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>
<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p><b>PIAS® HNR</b></p> <p>Heavy duty pierce-clinch nut</p>
<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>	<p>✓ ✗ ✗ ✓ ✓ ✗ ✗</p>



- aluminum sheet
- aluminum extrusion
- cast aluminum
- mild steel < 350 MPa
- high-strength steel (HSS) 350–450 MPa
- advanced high-strength steel (AHSS) 450–1000 MPa
- ultra high-strength steel (UHSS) > 1000 MPa

## Assembly

Ready-to-assemble plate modules with integrated fastener

**PIAS<sup>®</sup> KP 8H**  
Pierce-clinch nuts



**STRUX<sup>®</sup> SX M6**  
Selfclinchng screws



**PIAS<sup>®</sup> KP 8H**  
Pierce-clinch nuts



Focus on lightweight construction – innovative metal multi-material joining systems



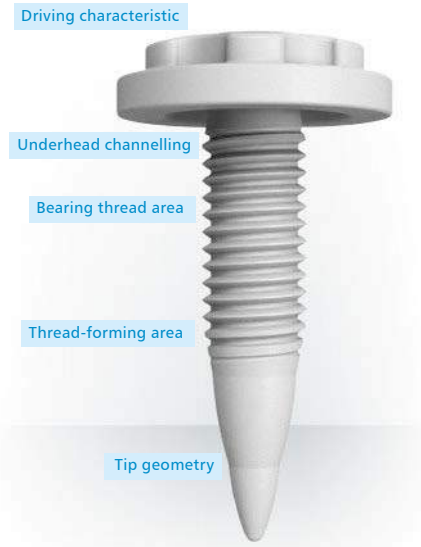
## Joining multi-material mix

- + Flowform<sup>®</sup> – flowhole-forming and thread-forming fastener
- + Flowpush<sup>®</sup> – flowhole-forming and clinch fastener
- + Flexweld<sup>®</sup> – resistance element welding
- + Sheetite<sup>®</sup> – direct screw fastening for sheet metals

➔ [www.arnold-fastening.com](http://www.arnold-fastening.com)



# Flowform® – flowhole-forming and thread-forming fastener



**New head geometry**

- ▶ External driving feature with chamfered edges
- ▶ Better locating (bit drive)

**Round shaft cross-section**

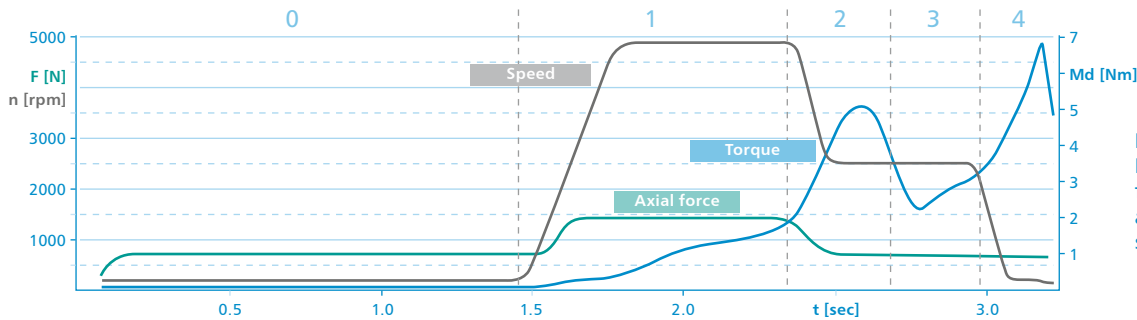
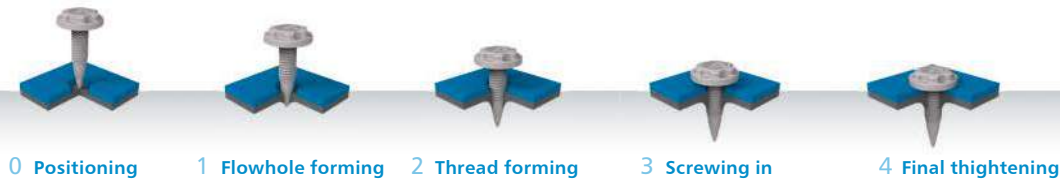
- ▶ 60° flank profile
- ▶ Over-proportioned diameter

**Polygonal shaft cross-section**

- ▶ Radius flank profile above the tapping zone
- ▶ Increasing thread formation

## Flowform® data

The values shown are by way of example parameters. Specific values must always be determined by carrying out trials on original production parts. Our applications laboratory is always happy to answer any further questions you may have.



**Cycle time**  
3.5–5.0 sec.

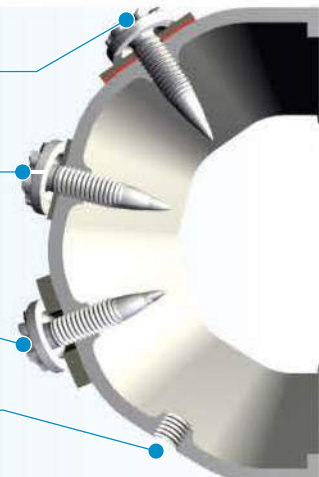
Flowform®  
Flowhole-forming screw  
for single-side joining  
applications and high  
strength joint properties

Single-side access joining technology **fastens** hybrid joints (including with adhesive).

Ideal for fastening aluminum to aluminum and aluminum to **high-strength steel**.

Generates a nut thread providing good **load capacity** for the fastening to meet strict **crash requirements**. Thicker join combinations require a **pre-drilled hole** in the clamping part. Thinner join combinations do not need to be pre-drilled.

Can be undone.





# Flowpush<sup>®</sup> – flowhole-forming and clinch fastener



Driving characteristic

Underhead channelling

Profiling

Acceleration area

Tip geometry



## New head geometry

- ▶ External driving feature with chamfered edges
- ▶ Better locating (bit drive)



## New shaft profile

- ▶ Profiling instead of thread
- ▶ alternating horizontal and sloping profiles
- ▶ sloping profiles for improved material flow when engaging

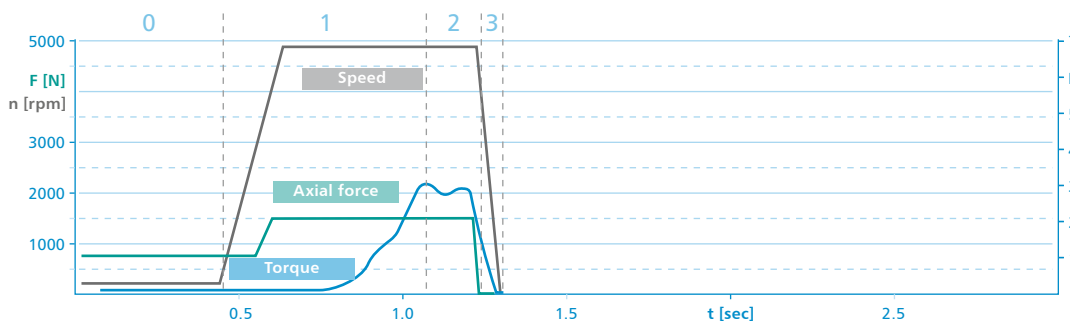
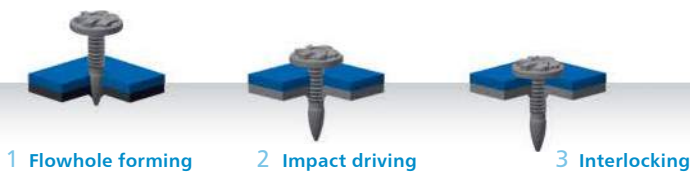


## Polygonal cross-section in tip area

- ▶ for low joining forces and shorter cycle times when forming the hole

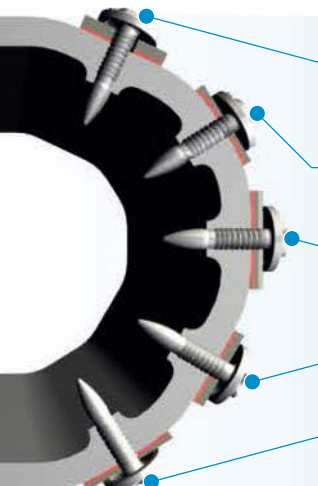
## Flowpush<sup>®</sup> data

The values shown are by way of example parameters. Specific values must always be determined by carrying out trials on original production parts. Our applications laboratory is always happy to answer any further questions you may have.



**Cycle time**  
max. 1.5 sec.

Flowpush<sup>®</sup> Flowhole-forming and clinch fastener for single-side joining applications and low strength joint properties



Ideal for fastening aluminum to aluminum and aluminum to high-strength steel.

Single-side access joining technology fastens hybrid joints (including with adhesive).

Thicker join combinations require a pre-drilled hole in the clamping part. Thinner join combinations do not need to be pre-drilled.

Multiple sheet metal fastenings in both thick and thin join combinations.

Cannot be undone.

# Flexweld® – resistance element welding

Resistance element welding for mixed material applications with ultra high-strength steel (UHSS) materials – with conventional resistance spot welding equipment.

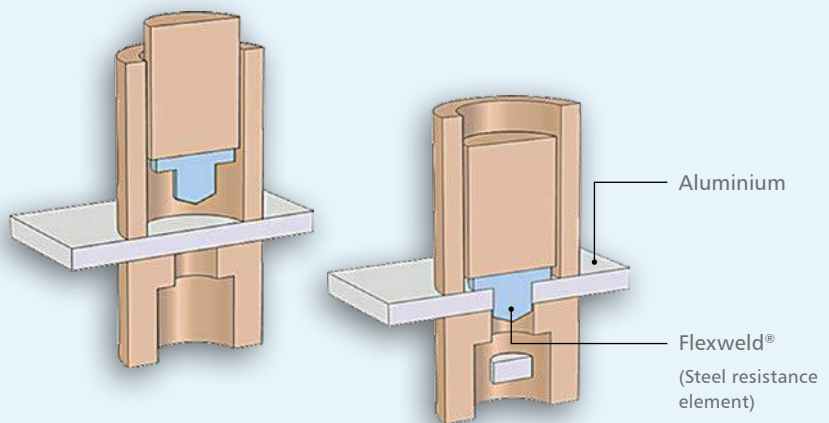
## This is how Flexweld® works

Flexweld® elements are pre-assembled into the aluminum sheet where they are permanently fixed. This component is then welded to steel components, using conventional spot welding guns and body in white adhesive.

### Pre-assembly production

Preassembly piercing and riveting by c-frame or progressive die

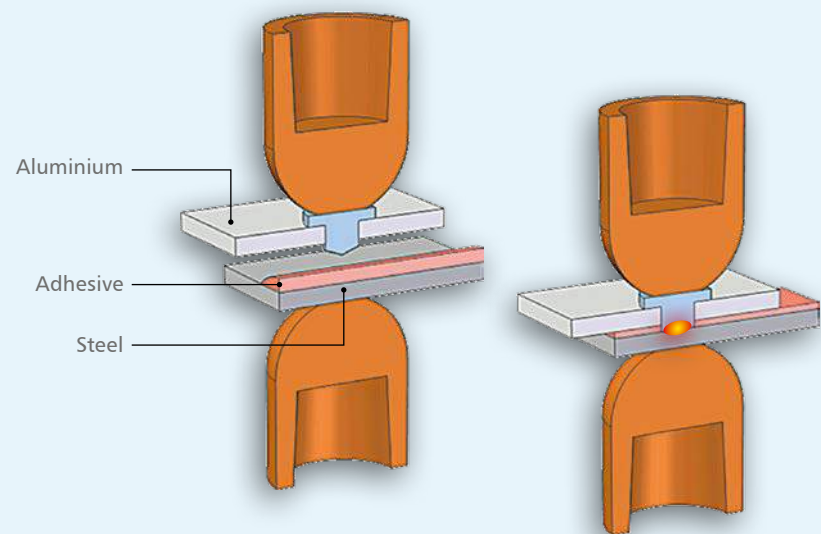
Step 1



### Welding on main assembly line

Adhesive bonding and resistance welding

Step 2



# The Flexweld<sup>®</sup> element and an application example

Element and system technology from one hand



## Element properties

- ⊕ All available automotive relevant surfaces.
- Different Element length for aluminum thickness range from 0,7–3,1 [mm]

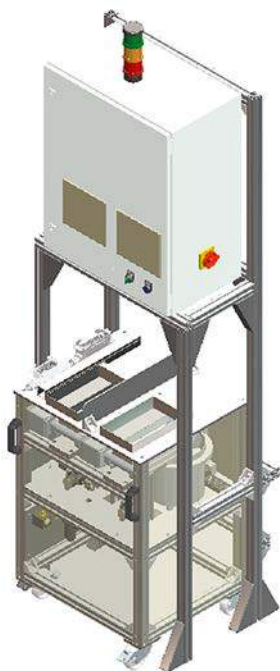


Aluminum parcel shelf joined to steel body in the VW Passat B8 using Flexweld<sup>®</sup>

➤ Flexweld<sup>®</sup> application in mass volume production **reduces more than one kilogram** weight per car.

Pictures: Volkswagen, Herr Dr. Th. Franz

## Flexweld<sup>®</sup> – Feedtec and Controltec

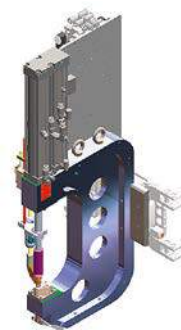


### Flexweld<sup>®</sup> feeder and control device

Modular feeder device suitable for application of all Flexweld<sup>®</sup> element sizes without tool changing. The operating panel and the PIC 2000 process control system can be integrated into the control cabinet or available as a mobile panel.

### Flexweld<sup>®</sup> – Tooltec

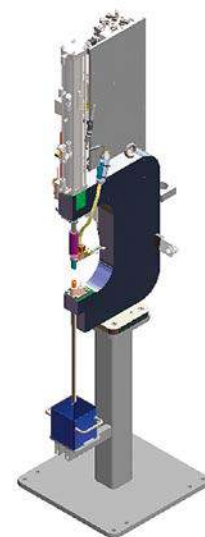
Example C-frame unit for robot.

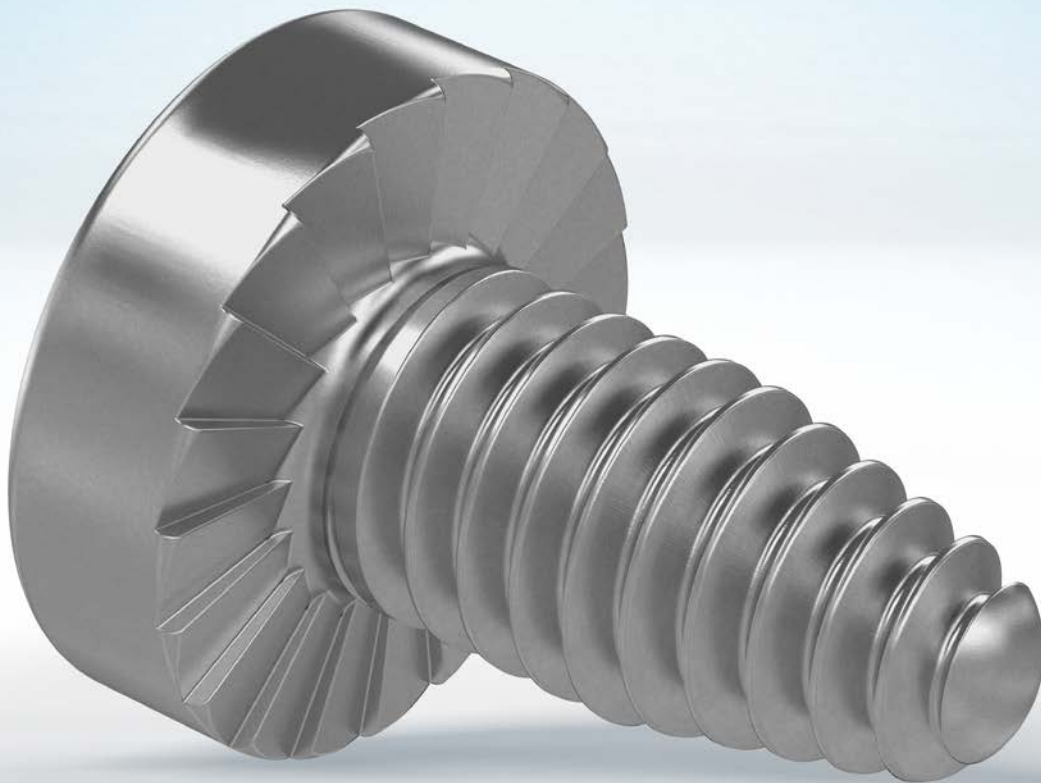


### Flexweld<sup>®</sup> C-frame unit

The c-frame unit can be mounted on a robot or used in a stationary system. The system is independent of the punch direction and operates at any angle position.

Example C-frame unit for stationary systems.





## Sheetite® – direct screw fastening for sheet metals

Speed up your production and greatly lower your overall fastener costs.  
With Sheetite® you make use of the technological and economical advantages of fastening directly into sheet metals.

**Screw head with drive**

**Underhead geometry**

**Bearing thread area**

**Thread-forming area**

**Tip geometry**

**Potential characteristics**

- + flat head, truss head
- + customer-specified solutions

**Potential characteristics**

- + locking tothing, milled tothing
- + customer-specified solutions

**Round shaft cross-section**

- + optimized load capacity
- + metric female thread

**Polygonal shaft cross-section**

- + low tapping torques
- + no chip formation during thread-forming

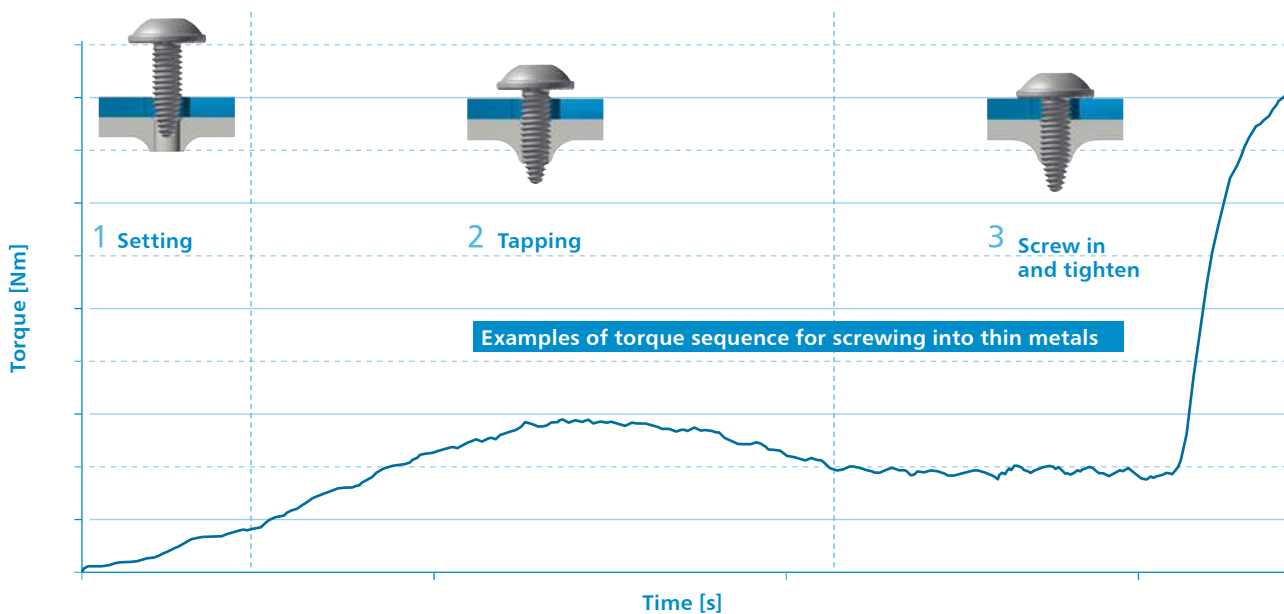
**Rounded tip**

- + improved hole location
- + reduces risk of injury
- + protects other components

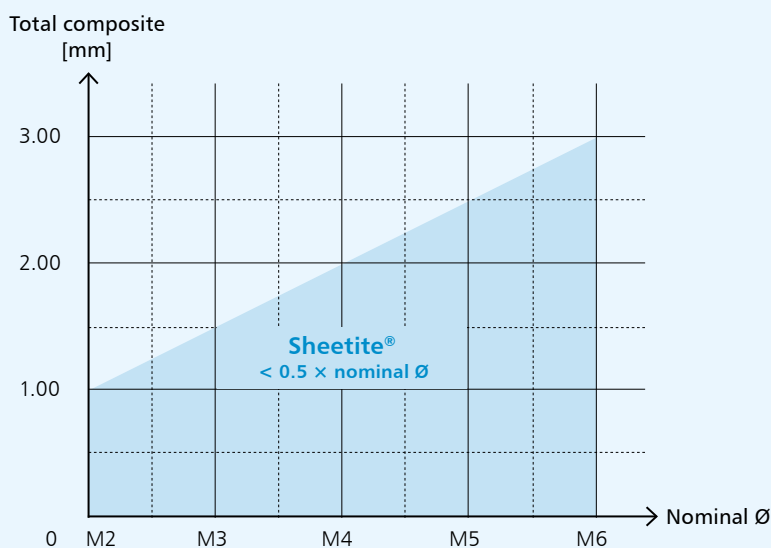
## The screw-fastening operation for thin plate

Sheetite® screws are fastened into pre-drilled sheet metals (through-holes and extruded holes) using a simple screwing-in procedure, which helps to form a metric thread.

The Sheetite®'s special shape ensures a high delta between the screw-in and overturn torques.



## Application notes



Sheetite® is designed to connect two or more plate-shaped components placed one on top of the other, with a total composite of 0.5 times the nominal diameter or less. This composite consists of a minimum of an upper clamping part with a through-hole and a lower pre-bored screwed part with or without a through-hole.

It can be used to join the following materials:

- ⊕ steel
- ⊕ aluminum

other metallic materials possible on request.

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Note: The values shown are by way of example parameters. Specific values must always be determined by carrying out trials on original production parts. Our applications laboratory is always happy to answer any further questions you may have.



## Integrating functional elements

- + RIVTEX<sup>®</sup> | STRUX<sup>®</sup> self-clinching screws
- + PIAS<sup>®</sup> | RIVTEX<sup>®</sup> pierce-clinch nuts
- + Rivorm<sup>®</sup> rivets
- + System technology – Feedtec / Tooltec / Controltec
- ➔ [www.arnold-fastening.com](http://www.arnold-fastening.com)



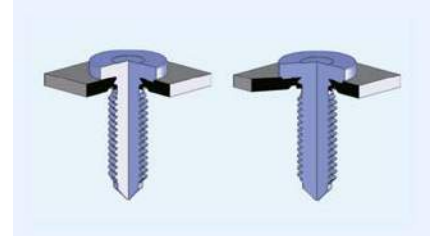
# RIVTEX® RXS Self-clinching screw

## The benefits of RIVTEX® RXS self-clinching screws

- ⊕ especially suitable for use in thin sheet-metals
- ⊕ can process several self-clinching screws in a single stroke
- ⊕ can be used in steel and aluminum
- ⊕ Sheet thickness: 0.75–2.0 mm
- ⊕ Strength class: 8.8 and 10.9

## The advantages compared with welding

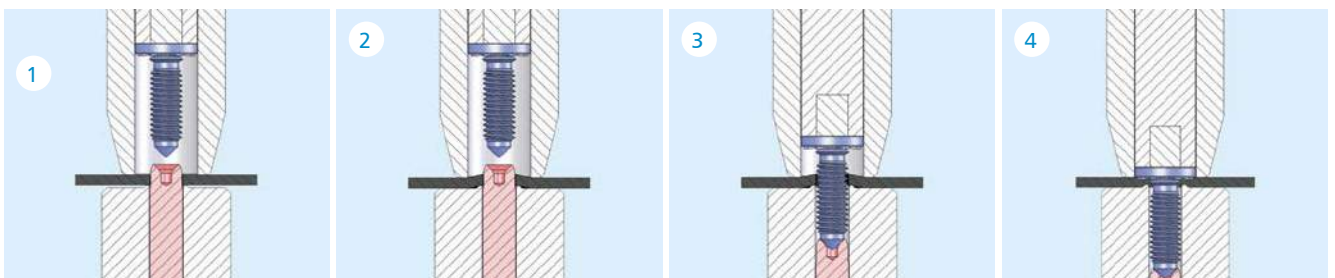
- ⊕ low inspection and control costs
- ⊕ avoids emissions and reduces energy costs
- ⊕ no thermal weakening at the fastening position



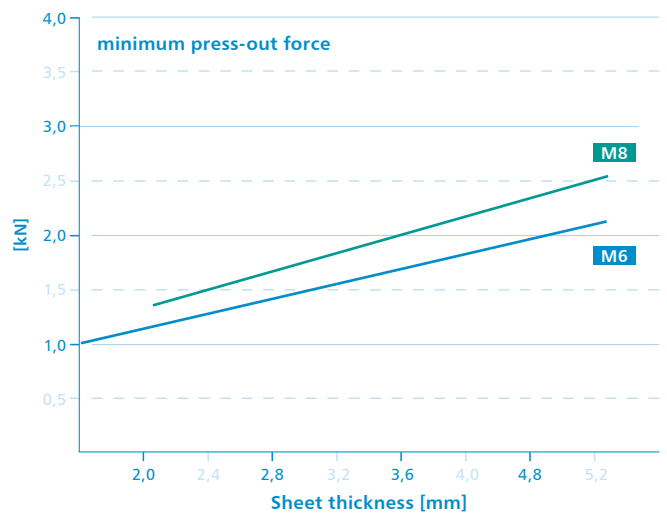
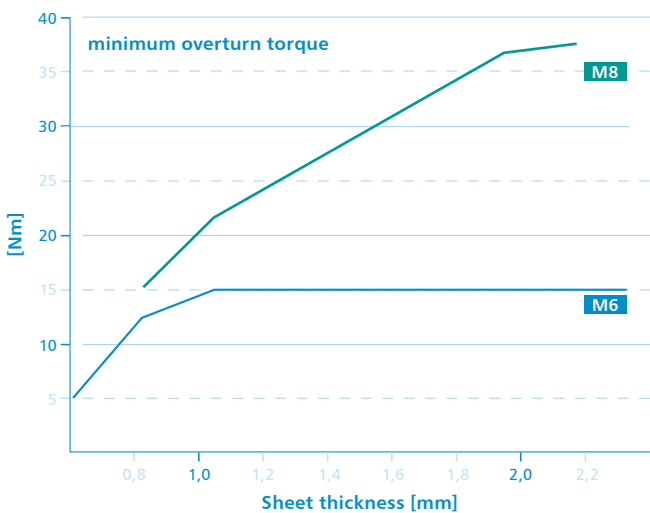
### Technical data

Sheet thickness	0.75–2.0 mm
Strength class	8.8 and 10.9

## Function sequence



## Press-out and torque values (material Rm 350 N/mm<sup>2</sup>)





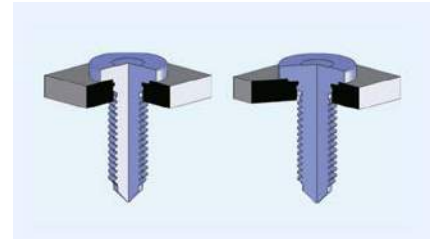
# STRUX<sup>®</sup> SX Self-clinching screw

## The benefits of STRUX<sup>®</sup> SX self-clinching screws

- ⊕ especially suitable for heavy loads in thick sheet metals
- ⊕ can process several self-clinching screws in a single stroke
- ⊕ can be used in steel and aluminum
- ⊕ Sheet thickness: 2.0–5.0 mm
- ⊕ Strength class: 8.8 and 10.9

## The advantages compared with welding

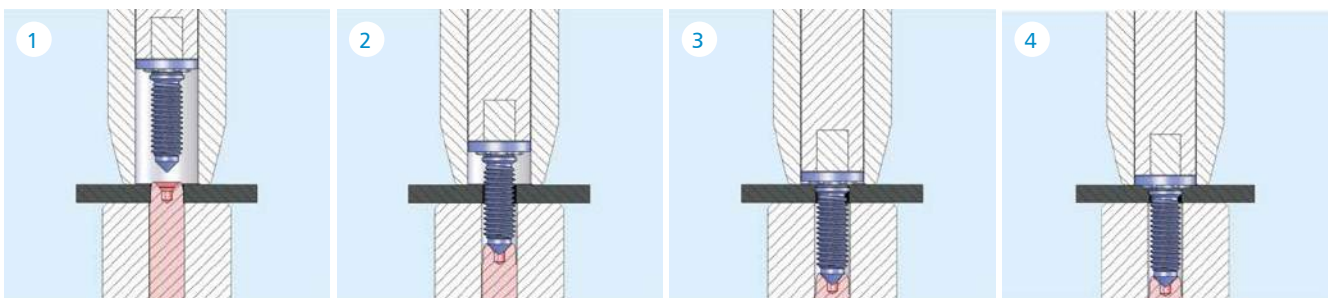
- ⊕ low inspection and control costs
- ⊕ avoids emissions and reduces energy costs
- ⊕ no thermal weakening at the fastening position



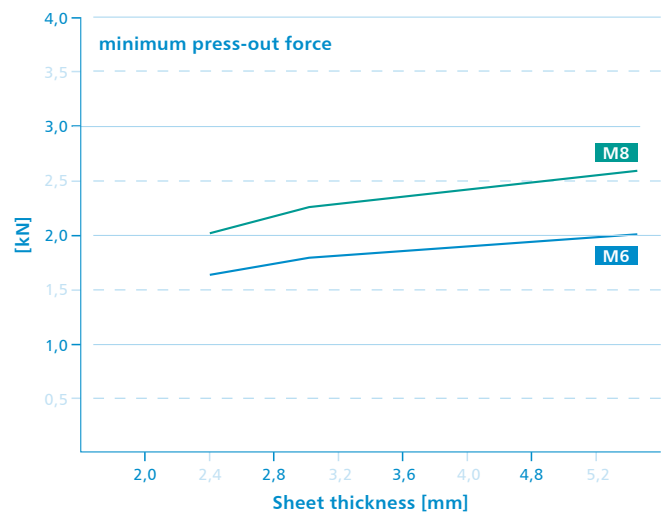
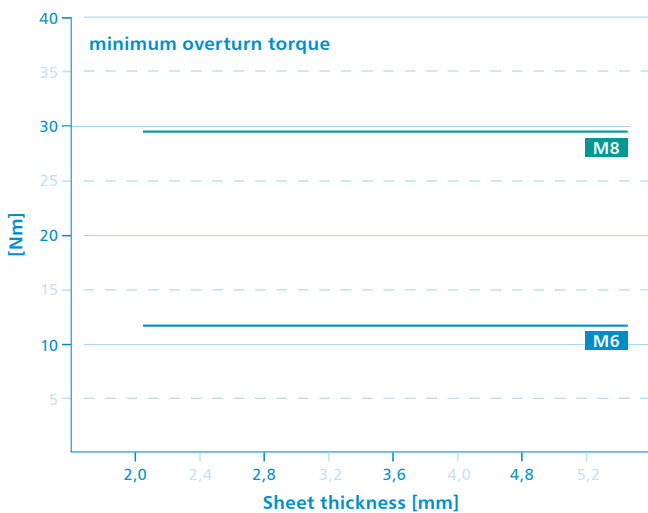
### Technical data

Sheet thickness	2.0–5.0 mm
Strength class	8.8 and 10.9

## Function sequence



## Press-out and torque values (material Rm 350 N/mm<sup>2</sup>)



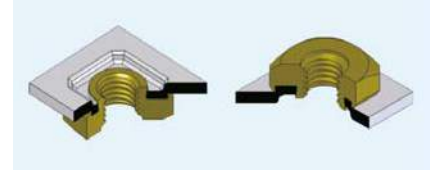
# PIAS® KP – Pierce-clinch nuts

## The benefits of PIAS® KP Pierce-clinch nuts

- ⊕ self-piercing
- ⊕ higher torque requirements
- ⊕ high process reliability in fully-automated processing
- ⊕ flush-mounted processing
- ⊕ manual, semi / fully automated processing possible
- ⊕ self-locking thread possible

## The advantages compared with welding

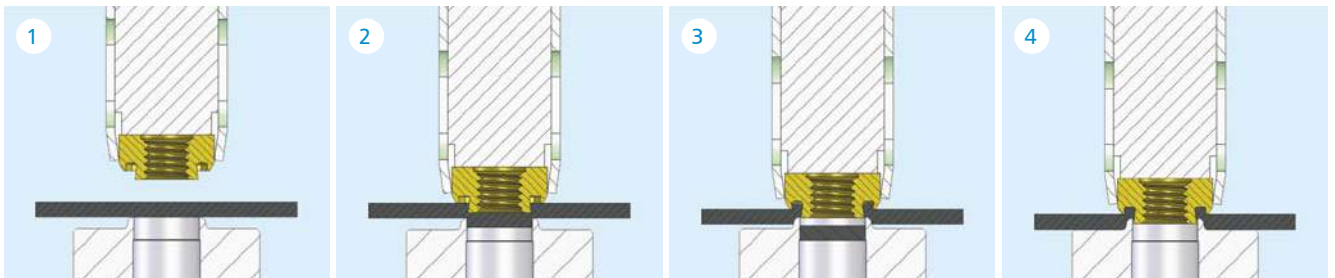
- ⊕ corrosion resistant
- ⊕ no weld spatter on the thread
- ⊕ no thermal weakening at the fastening position



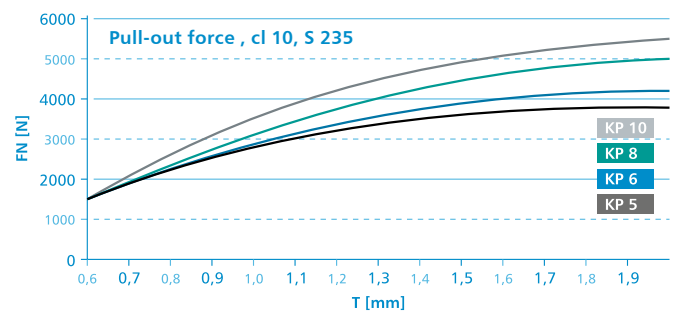
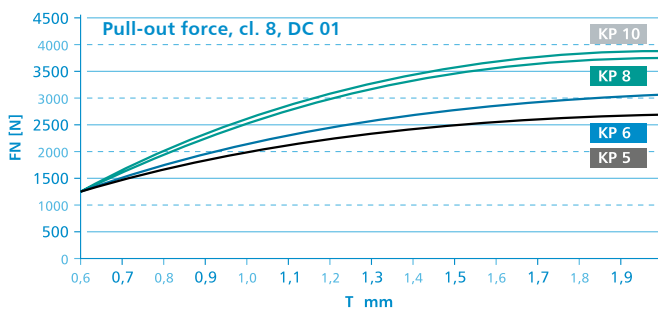
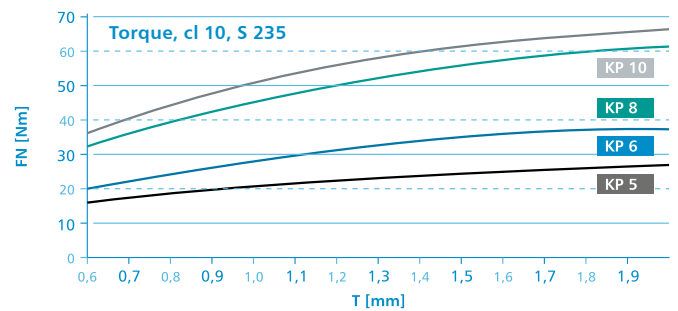
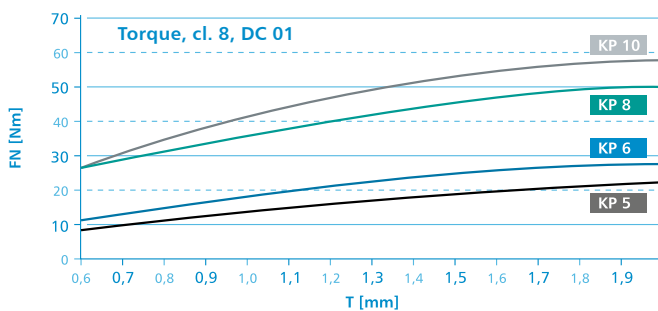
### Technical data

Sheet thickness	0.6 – 2.00 mm
Strength class	8 and 10

## Function sequence



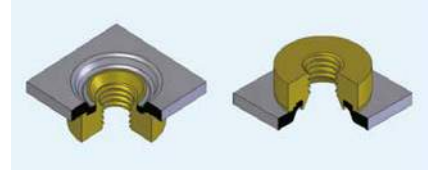
## Pull-out and torque values



# RIVTEX<sup>®</sup> RXM pierce-clinch nut

## The benefits of RIVTEX<sup>®</sup> RXM pierce-clinch nuts

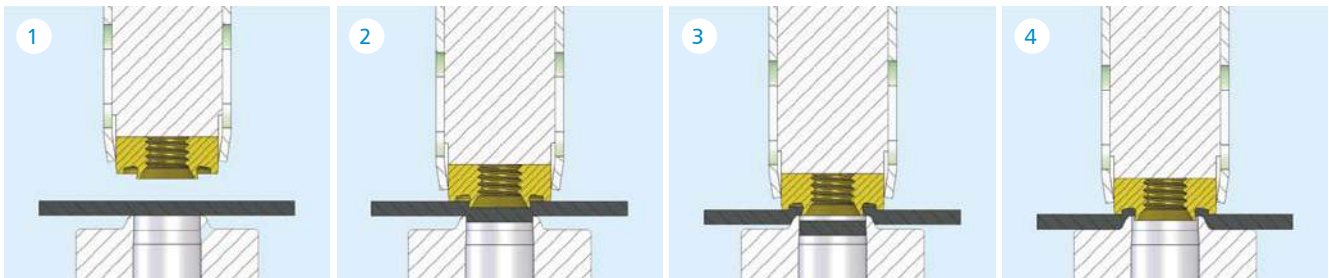
- ⊕ self-piercing
- ⊕ one nut for all sheet thicknesses from 0.75 mm to 2.0 mm
- ⊕ flush-mounted processing
- ⊕ very good press-out and torque values
- ⊕ self-locking thread possible
- ⊕ corrosion resistant
- ⊕ no weld spatter on the thread
- ⊕ no thermal weakening at the fastening position



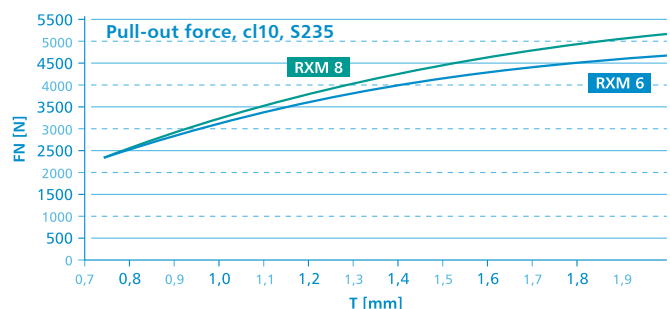
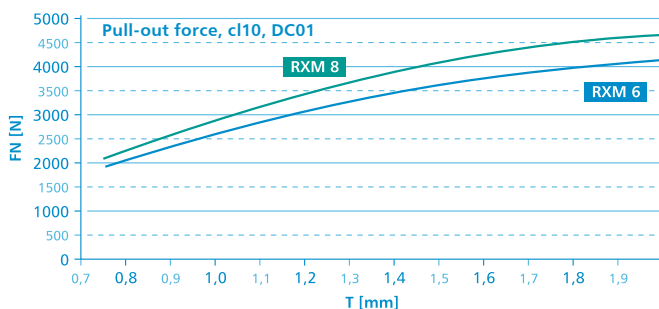
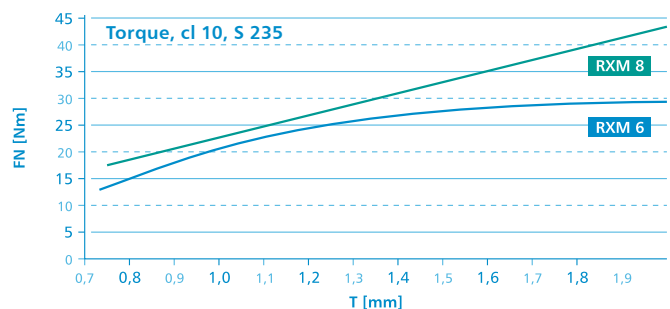
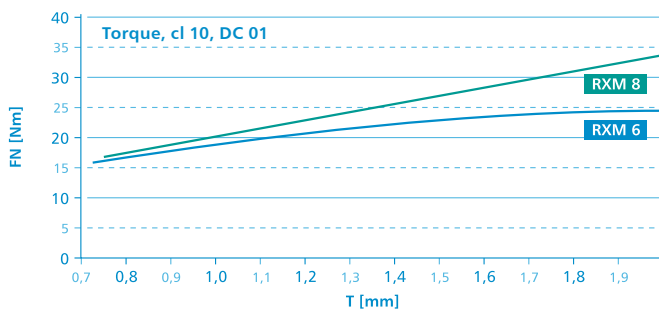
### Technical data

Sheet thickness	0.75 – 2.00 mm
Strength class	10

## Function sequence



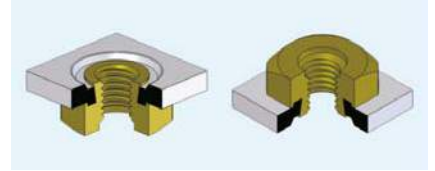
## Pull-out and torque values



# PIAS® HN – pierce-clinch nuts

## The benefits of PIAS®HN pierce-clinch nuts

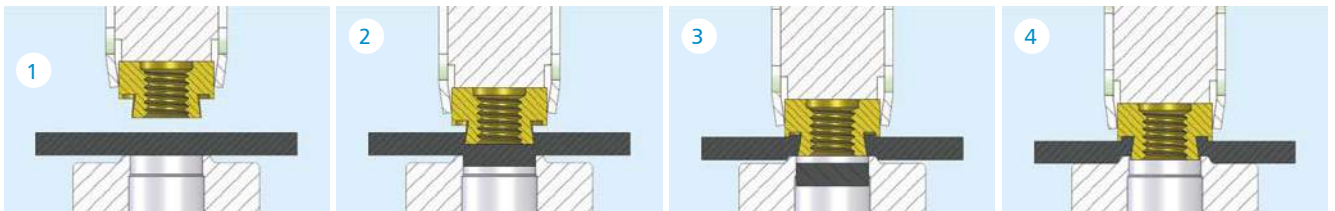
- ⊕ self-piercing up to 4.0 mm.
- ⊕ high mechanical rigidity
- ⊕ high torque
- ⊕ high level of process reliability
- ⊕ self-locking thread possible



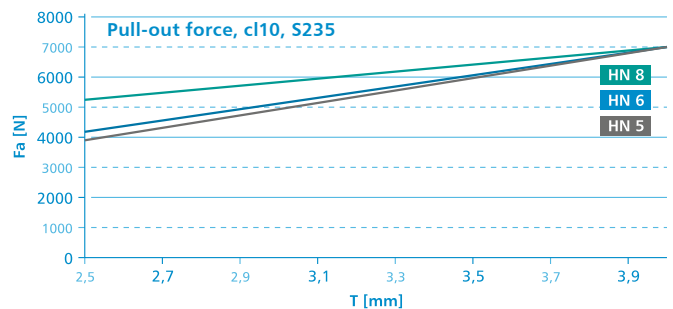
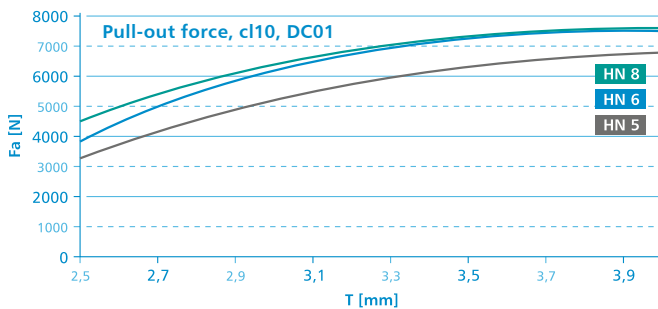
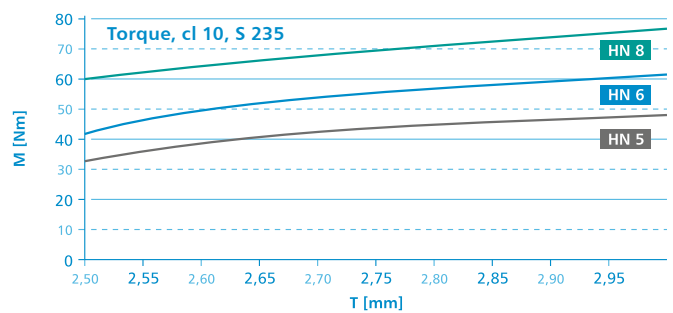
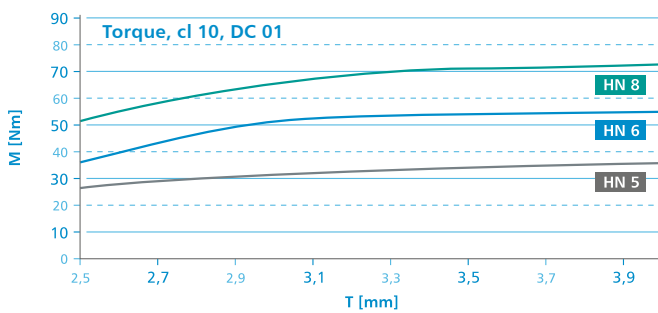
### Technical data

Sheet thickness	2.0 – 4.0 mm
Strength class	10

## Function sequence



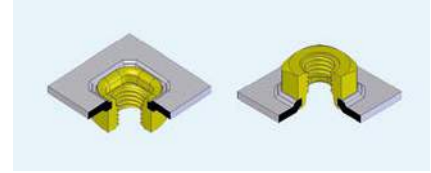
## Pull-out and torque values



# Rivorm<sup>®</sup> HR rivet nuts

## The benefits of the Rivorm<sup>®</sup> HR rivet nut

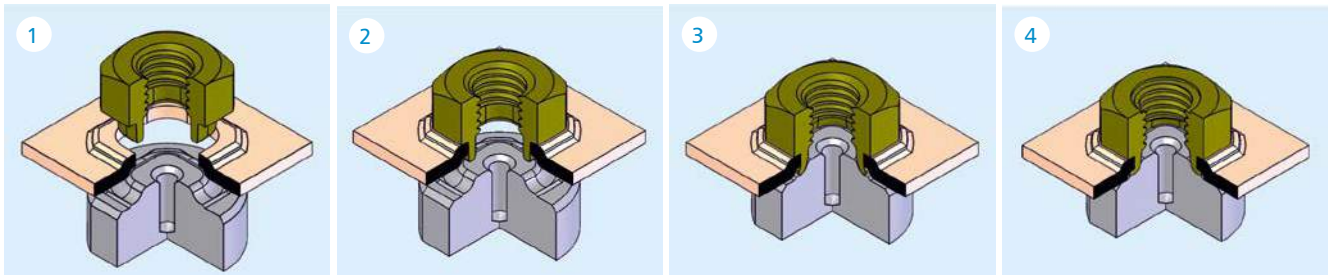
- ⊕ one nut for any sheet thickness up to 4.5 mm
- ⊕ Cost-saving because fewer variants
- ⊕ high-strength, press-hardened and hot-stamped steels
- ⊕ very good torsional strength regardless of metal strength
- ⊕ high pull-out force
- ⊕ ARNOLD processing technology for process-reliable and cost-optimized production
- ⊕ existing ARNOLD processing technology for other nut types can be altered at little cost (and permanently) to convert to HR nuts.
- ⊕ also available in stainless steel



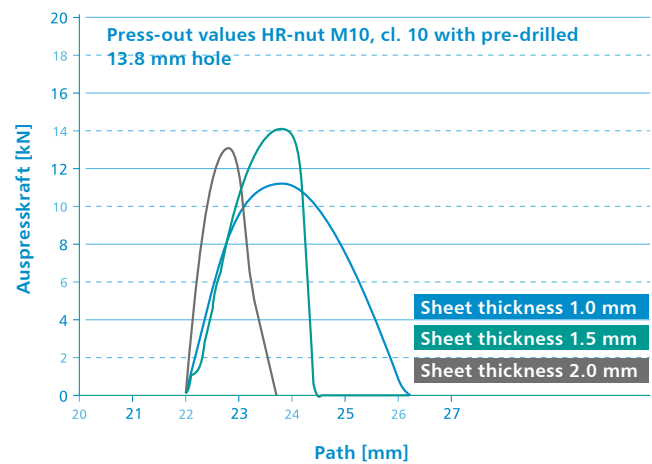
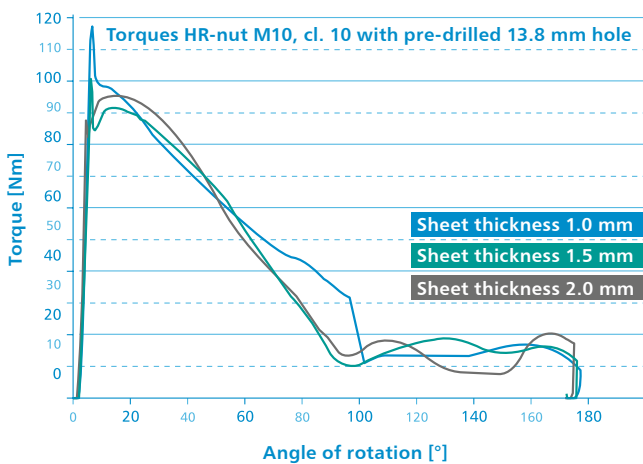
### Technical data

Sheet thickness	0.4 – 3.5 mm (4.5 mm)
Strength class	8 and 10
Surface	as required

## Function sequence



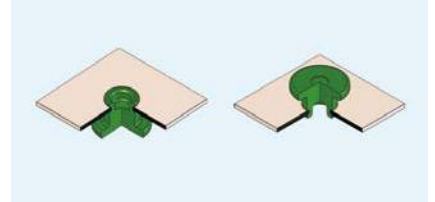
## Pull-out and torque values (material 22 MnB5, press-hardened 49HRC)



# Rivorm® TR rivet

## The benefits of the Rivorm® TR rivet

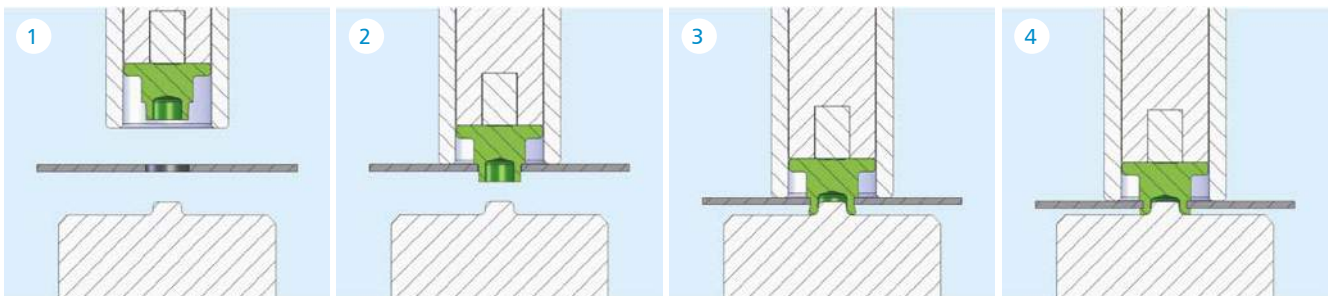
- ⊕ for fitting ties and springs
- ⊕ fully automated processing possible in the subsequent composite tool
- ⊕ can be applied universally for different assembly jobs, such as fastening electrical control units, or other plastic parts, simply by clipping them in
- ⊕ can be processed in all metal strengths
- ⊕ Application as positioning and assembly aid



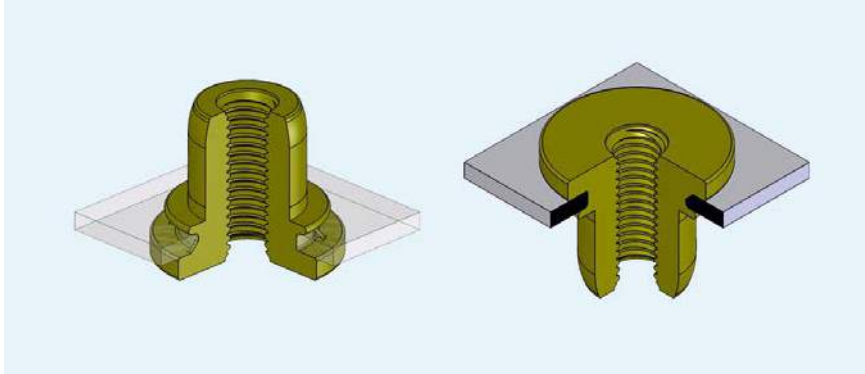
## Technical data

Dimensions	10 x 6 to 16 x 8
Strength class	8
Surface	as required

## Function sequence



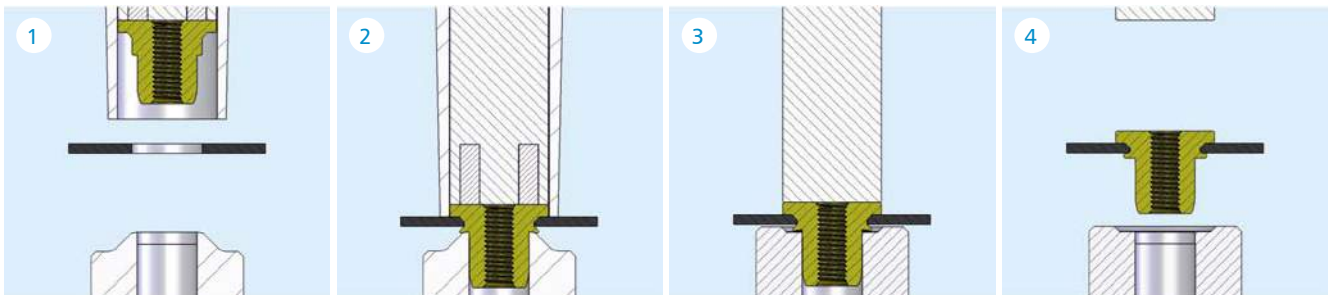
## Rivorm<sup>®</sup> AX rivet



By patenting the innovative fastening method into metals, with the Rivorm<sup>®</sup> AX rivet, Arnold is providing a further customized fastening solution.

In applications with integral functionality, such as a bearing seating, assembly aid or spacer, the new product line from Dörzbach has already proved itself in several series applications. Depending on the geometrical design of the rivet, the Rivorm<sup>®</sup> AX rivet is setting new standards of strength between fastener and sheet metal. Moreover, it can be used to fasten a wide range of sheet thicknesses.

### Function sequence



#### How the fastener functions

The material is peeled and a collar formed so that a flush and positive fit of the fastener is created with the sheet metal material. This can either transfer very high forces (e.g. AX 20x14) or with a version that is flush with the sheet, the fastener can be used to directly mount connected parts (e.g. AX 16x4). This principle can be applied to almost every material.

## System technology

Our complete solutions for your production processes.

We have been producing complex system technology for more than 20 years. We design the feeder and tooling technology, along with the necessary control systems, custom-tailored to your application.

In the stamping and pressing sector you have standardized tool and feed technologies to make your selection. When integrated into your tools, this system technology provides maximum efficiency and a high level of process reliability. The aim must be, regardless of the pressing system used: ready-to-use components straight from the press.

ARNOLD produces complete system solutions, comprising Tooltec, Feedtec and Controltec, to feed fasteners into the assembly line or the shell body.



### Controltec

Precise monitoring of individual pressing processes

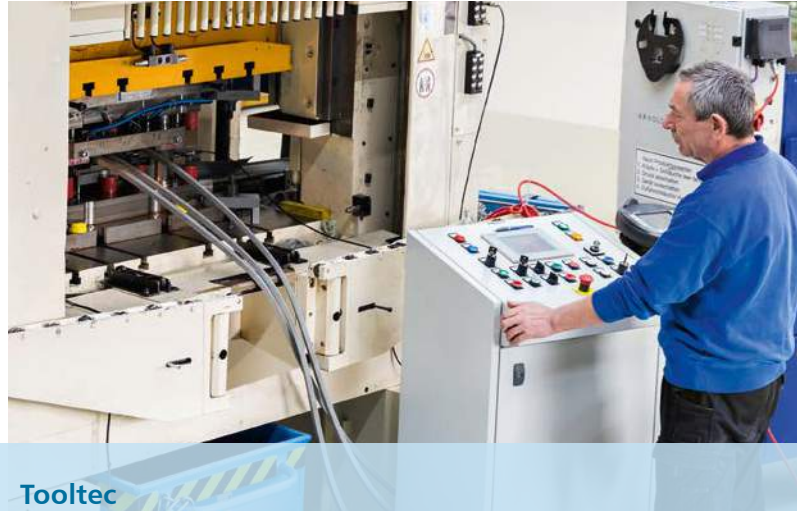
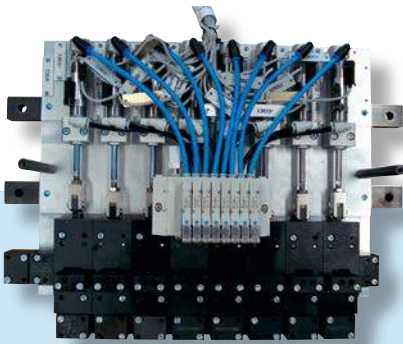
A fastening must reliably maintain its specified properties. Car manufacturers ensure that it does so with high repeat accuracy by making use of self-clinching systems. The accompanying monitoring technology records and monitors the correctness of the required parameters.



Controltec PIC2000, the clinch monitoring system developed by ARNOLD, checks that the specified limiting values - such as insert depth and assembly pressure - are maintained, thus making a valuable contribution to process reliability.

The PIC2000 is distinctive for its ease of operation, flexible analysis and reliable monitoring of the clinching processes.





### Tooltec Optimum tool technology

With Tooltec, ARNOLD is supplying the optimum tool technology for assembling parts. The components we supply are distinctive for the following:

- ⊕ a high level of process reliability
- ⊕ low space requirement
- ⊕ multi-distribution options

Moreover, the systems are low-maintenance, robust and available in modular form. We will be delighted to help you plan complex manufacturing systems, for example to feed pierce-clinch nuts as seen in the example below.



### Feedtec High quality feeder technology and systems

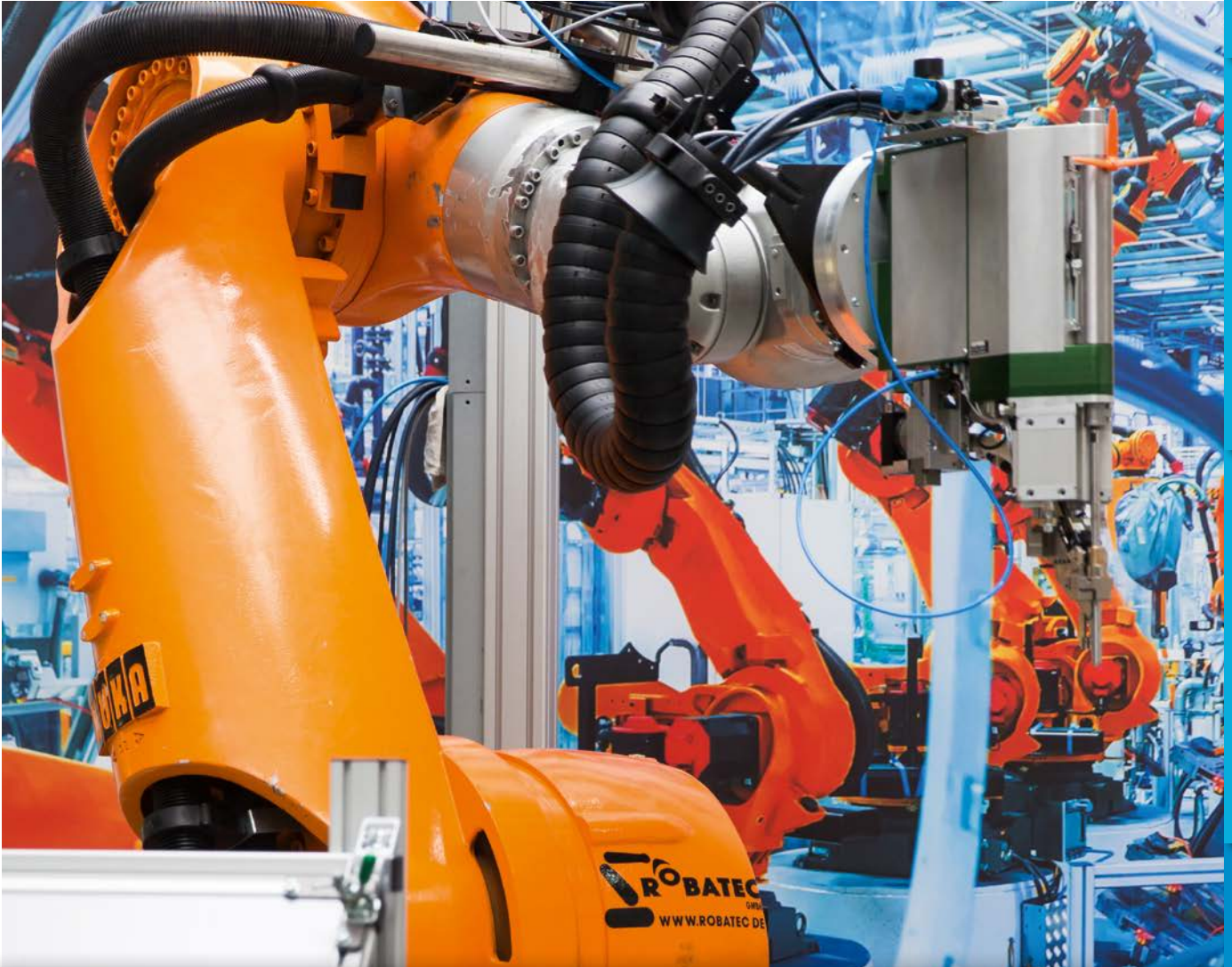
With Feedtec we supply the best possible feeder technology and systems for the machine-aided transportation of your parts to the point of manufacture. We can assist you to the best possible effect with magazine configuration, vibration feeders, drum and segment feeder devices.

Feedtec systems are distinctive for the following:

- ⊕ their compact construction,
- ⊕ low wear and
- ⊕ their high level of process reliability

Moreover, the systems are low-maintenance, robust and available in modular form.

Focus on lightweight construction – innovative metal multi-material joining systems



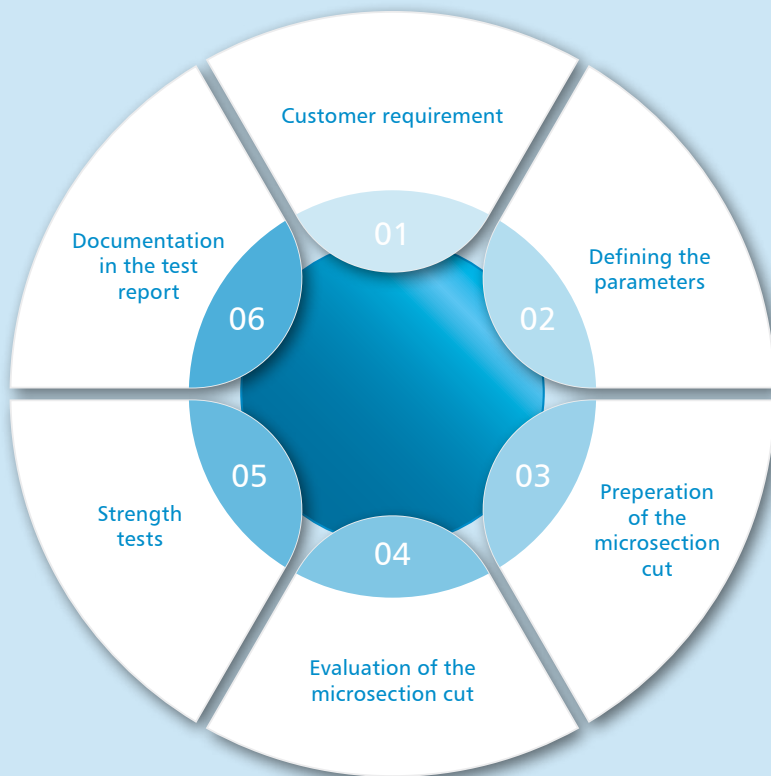
## Engineering services

- + Laboratory Sheet Metal Applications – joint investigations
- + Robtec – automated joining using robot technology
- + Assembly – ready-to-assemble plate modules with integrated fastener
- + [www.arnold-fastening.com](http://www.arnold-fastening.com)



## Laboratory Sheet Metal Applications – joint investigations

Several validation steps are required to ensure a reliable series process. This includes a laboratory joinability investigation as well as further joining validations using original components. Then the applications characteristics achieved with the Arnold fasteners are checked for functionality. The investigations illustrated here merely show the preliminary trials under laboratory conditions.



Standardized joint investigation in every ARNOLD Laboratory Sheet Metal Applications center



## ARNOLD joint investigation laboratory equipment

### Flowhole screwdriving systems for Flowform<sup>®</sup> and Flowpush<sup>®</sup> joint investigations

- + Speeds: up to 8000 rpm
- + Joining forces: up to 3.5 kN
- + torques: up to 20 Nm



+ Manufacturer: DEPRAG



+ Manufacturer: KLINGEL



+ Manufacturer: WEBER

### High-speed camera

- + Frame rate: up to 16,000 Bps
- + Storage: 2.6 GB = 4.2 sec recording time
- + Application: Recordings used to investigate the exact joining process



### Hand-held adhesive gun

- + operating temperature: 50 °C to 210°C
- + Application: Attach a wide variety of adhesive materials in cartridges to produce hybrid (joined with adhesive) solidity samples or customers' components



### Thermal imaging camera

- + Temperature ranges: -20 °C to 100 °C / 0 °C to 250 ° / 150 °C to 900 °C
- + Application: to record temperature variations at and around the join position during the joining process.



### Laboratory drying cabinet

- + Temperature range: 50 °C to 330°C
- + Application: To harden hybrid (joined with adhesive) solidity samples or customers' components





### 3D printer

- + Print volume:  
145 × 145 × 175 mm
- + Application:  
Printing joining elements during the development phase, along with feasible functioning components to develop and enhance processing equipment.



### Servo presses

- + Max. force: 35 kN
- + Application:  
To insert and compress function elements during joint investigations, and to record the process curve.



### Tensile / compression test machine

- + Max. force: 250 kN
- + Application: To compress function elements and place tension on solidity samples in joint investigations, and to record the process curve.

### Corrosion test chamber

- + Corrosion tests to  
DIN EN ISO 9227:2012
- + Application: Corrosion test on individual joining elements and joined samples during joint investigations.



### Resistance spot welding gun

- + Type: C-frame gun with servomotoric drive
- + Electrode force: 6 kN



### Wet cutting / grinding machine

- + Application: Preparation of the microsection cut



## Customer requirement

### Collecting information from the checklist

#### General Information

- + Description of project
- + Contact details
- + Scheduling
- + Contact
- + Project name

#### Application

- + Clamping part
- + Basic drawing
- + Part for joining
- + Corrosion protection
- + Pre-drilling
- + Initial application
- + Material thickness
- + Seal requirement
- + Material
- + Safety criticality

#### Fastener

- + Dimensions
- + Shape of under-head
- + Shape of drive
- + Quantity required
- + Initial sample
- + Tensile strength
- + Corrosion protection requirements

## Documentation in the test report

### Producing the test report

- + Selecting the fastener print
- + Assembly designation (clamping and joined part)
- + Measured value, statistics and screw-in curves
- + Micro-sections
- + Predictions
- + Notes

### Documentation

The results of the laboratory test are gathered together into a final document, and then discussed with the user.



## Robtec – automated joining using robot technology

Robtec makes it possible to use several different joining technologies and come a step closer to Industry 4.0 and the system concept. It is also helping to better illustrate the series process by producing realistic events, such as system flexibility.

A further application option is the endurance testing facility for development trials and problem analysis. We can feed and fasten several thousand joining elements per feed system fully automatically, with the aim of producing meaningful statistics and establishing possible sources of error.

### Scope of services

- + Original components can be used
- + Can join complex customer-specific components
- + Endurance testing
- + Close-to-series customer application
- + Several joining technologies can be represented
- + Module manufacturing
- + Test objectives for possible future enhancements

### Robot: KUKA KR 360-2F

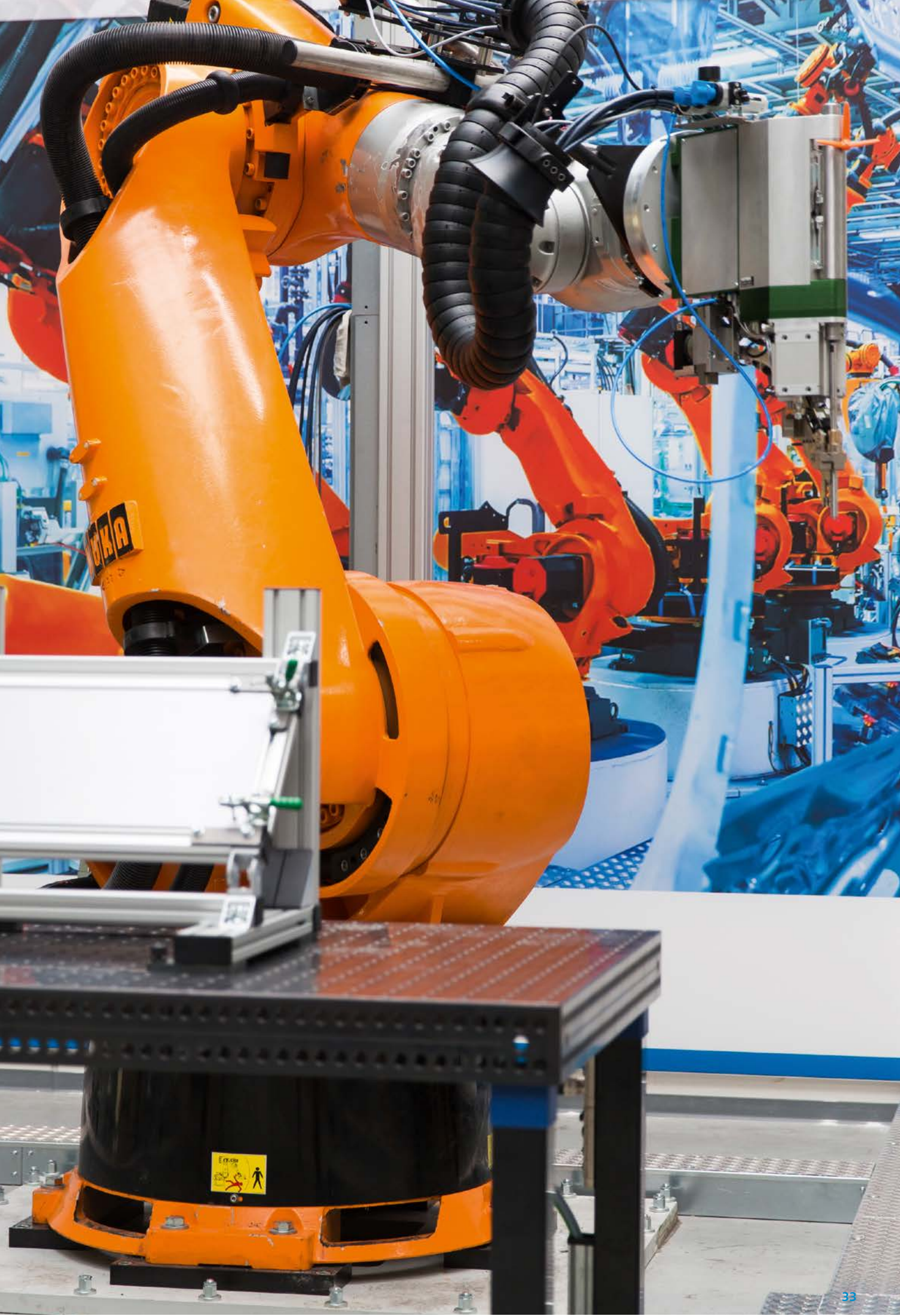
Working range 1: Door opening: 3.8 m

Working range 2: Door opening: 1.8 m

Flexible tool options, for example for:

- + Resistance spot welding guns
- + Adhesive applicators
- + Flow-hole joining systems
- + Semi-hollow punch rivet guns
- + C-frame guns (pierce nuts, etc..)





# Assembly

## Ready-to-assemble plate modules with integrated fastener

ARNOLD UMFORMTECHNIK's sheet metal module production with integrated fasteners is often the most economical way to manufacture small and mid-sized series where major investment in tools and processing technology is not feasible, or where, for other reasons, the process cannot be incorporated into the production process - or only in a limited way.

### Variants of sheet metal module production



#### For mid-size and small production runs: processing within the shell

ARNOLD UMFORMTECHNIK has a number of different solutions for processing fasteners on the assembly line. The main component here is on the C-frame press with fully automated feed. Then there are semi-automated solutions or manually operated systems. All the system types are in use in a wide variety of applications.



#### For large quantities: deployed in the pressing tool

Deployed in a stamping and pressing plant the fastener/tool system can demonstrate its benefits to the full because the fastener insertion process is integrated into the sheet-metal manufacturing process. Processing the fasteners on the tool guarantees that the fastening components will maintain their location tolerances. The fastener is connected to the sheet metal in a single work step. The pressing and stamping process leaves a clean working area. Thus, rapid cycle times are assured, while at the same time the number of work steps can be reduced. A ready-to-assemble sheet-metal component with the required fasteners is the result of the process.



**Optimum parts production  
already chosen by well-known companies**

ARNOLD UMFORMTECHNIK's innovative service is distinctive for its high degree of automation and integral process monitoring systems, ensuring optimum and stable parts production. For many years, well-known companies in the automotive, electrical, domestic appliance and furniture industries have placed their confidence in ARNOLD UMFORMTECHNIK's manufacturing expertise.

Press	Pressing force	Equipment
C-frame press	80 kN	For manual insertion
Hydraulic press	200 kN	For manual insertion
Hydraulic press	400 kN	For manual insertion
Differential travel press	800 kN	With conveyor system
Eccentric press	1600 kN	With conveyor system



Sheet-metal part with PIAS® KP 8H pierce-clinch nuts



Sheet-metal part with STRUX® SX M6 self-clinching screws



Sheet-metal part with PIAS® KP 8H pierce-clinch nuts

Focus on lightweight construction – innovative metal multi-material joining systems



## The ARNOLD GROUP

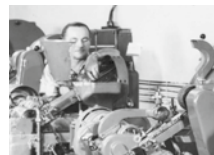
- + Efficient, sustainable and international
- + BlueFastening Systems –  
our expertise for innovative markets
- + [www.arnold-fastening.com](http://www.arnold-fastening.com)





## The ARNOLD GROUP

ARNOLD - internationally the name stands for efficient and sustained technology at the highest level. With a foundation of many years of expertise in the production of intelligent fastening systems and very complex extruded parts, over a number of years the ARNOLD GROUP has developed into a comprehensive supplier and development partner for complex fastening systems. With our positioning of "BlueFastening Systems" this development will now continue under a unified and harmonized structure. Engineering, fastenings and functional parts, together with feeder processing systems, all from a single source – efficient, sustained and international.



★ 1898

Established by Louis & Carl Arnold  
Production of wooden screws

★ 1945

Production of metal and cutting screws

★ 1970

Licences for trilobular products and TORX screw systems

★ 1994

Acquisition by the Würth Group  
ARNOLD & SHINJO established

★ 2002

ARNOLD TECHNIQUE FRANCE S.A. established

★ 2007

ARNOLD FASTENERS SHENYANG established



The market challenges

Joining multi-material mix

Integrating functional elements



★ 2012

ARNOLD FASTENING SYSTEMS established in USA

★ 2014

Fasteneering<sup>®</sup>: Systematic development of fastening solutions

★ 2015

Systeneering<sup>®</sup>: Definition of the systematic development of fasteners

★ 2017

Merger of ARNOLD UMFORMTECHNIK with ARNOLD & SHINJO

★ 2020

The ARNOLD GROUP achieves sales of € 300m

Engineering services

# BlueFastening Systems

## Our skills and expertise for innovative markets

### Engineering

Reliable expertise at every stage of development



**Fasteneering®**  
Developing the ideal fastener



**Systemeering®**  
Complete systems for perfect production processes

### Production

Because engineering needs a strong base

Integrated processes such as toolmaking, heat treatments, and surface finishing, along with a sophisticated quality assurance system, all ensure reliability in all ARNOLD products and services.



### System technology

For the entire processing section



**Feedtec**  
Conveyor technology and systems



**Tooltec**  
Tool technology



**Controltec®**  
Control technology



## Fasteners

Much more than "just" a screw



**Joining metals**  
TAPTITE 2000<sup>®</sup>



**Joining synthetic materials**  
REMFORM<sup>®</sup>



**Joining plate metals**  
RIVTEX<sup>®</sup> | STRUX<sup>®</sup>  
PIAS<sup>®</sup> | Rivorm<sup>®</sup>  
Sheetite<sup>®</sup> | Flowform<sup>®</sup>  
Flexweld<sup>®</sup>



**Lightweight construction**  
Alufast<sup>®</sup>  
Eco-Sert<sup>®</sup>



**Rapid fastening system**  
TriPress<sup>®</sup>



**Security lock systems**  
LocTec<sup>®</sup> | MATHread<sup>®</sup>  
TORX PLUS<sup>®</sup> | Threadloc<sup>®</sup>  
ARNOLD<sup>®</sup> Seal

## Functional parts

Complex cold extruded parts for multi-functional applications



**Conform<sup>®</sup>**  
Precision parts



**Conform<sup>®</sup>**  
Interlocking parts



**Conform<sup>®</sup>**  
Hollow parts and nuts



**Conform<sup>®</sup>**  
Bushes



**Conform<sup>®</sup>**  
Component assemblies



**Conform<sup>®</sup>**  
Multi-functional fasteners

Focus on lightweight construction – innovative metal multi-material joining systems

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The values shown in this brochure are by way of examples. Specific values must always be determined by carrying out trials on original production parts. Our applications laboratory is always happy to answer questions.

# The ARNOLD GROUP

Wherever customers need us.

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Rochester Hills  
USA



**ARNOLD UMFORMTECHNIK**  
Ernsbach  
Germany



**ARNOLD UMFORMTECHNIK**  
Dörzbach  
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**ARNOLD  
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