TOX®-ClinchRivet
Ingeniously simple

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The patented TOX®-ClinchRivet

Sheet metal joining system with special die and full rivet for the permanent, perfect joining of metal plates (steel, aluminium etc.). A joining system similar to self-piercing-riveting but without cutting, i.e. the surface including the coating of the sheets to be joined remains intact like in the case of the TOX®-joint.

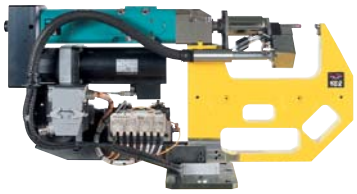
The technology of the TOX®-ClinchRivet is based on many elements of our successful TOX®-Clinching technology.

TOX®-Guaranty:
We offer the **only** solution for a reliable rivet-clinching application, with a functional guarantee. **TOX® test report** with all relevant data for the TOX®-ClinchRivet application with guaranteed strength data.

Quality control is easily done by monitoring the "Dimension X" or by electronic process monitoring in connection with the TOX®-Monitoring Force-Travel tool-control-system.

Comprehensive product range featuring our modular components.
Example:

TOX®-Robot Tongs with ElectricDrive



Singulator

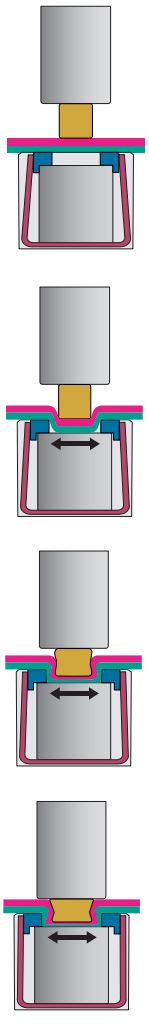
ClinchRivet swage-head:
TOX®-Slider

ClinchRivet

SKB-die

TOX®-ClinchRivet Singulator with Controls
A combined agitation and blowing process is enough to send the symmetrical rivet reliably into the feeding track.
Here is also evident: the simple construction of the feeding and control units, and thereby, high process reliability. Sensors monitor fill levels.

The special advantage of the **TOX®-ClinchRivet** is the simple, symmetrical and inexpensive rivet. This results in the troublefree feed and compression. The material to be joined takes over an additional retaining function. A clean and highly reproducible joint is created.



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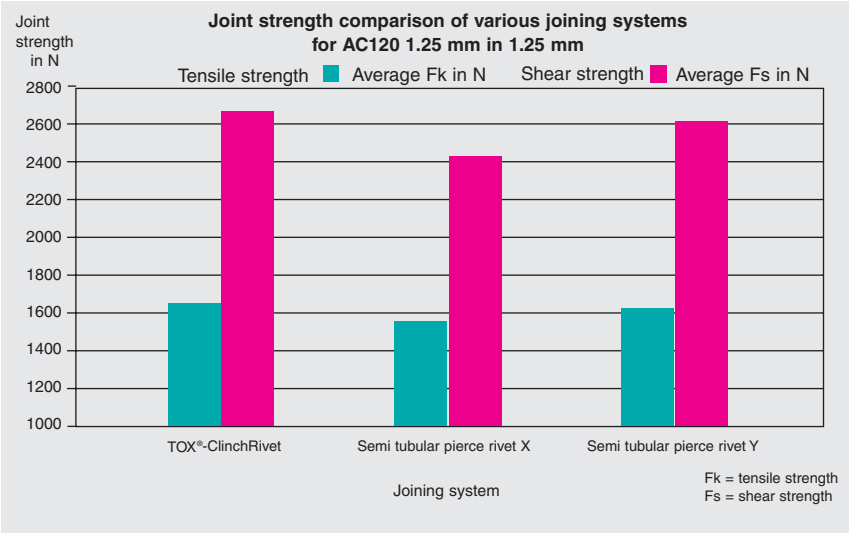
TOX®-ClinchRivet Technology



Durability comparison of standard cold joining processes

Due to the filling of the TOX® clinch joint with the rivet, the stability of the joint and especially the shear strength are obviously increased.

TOX®-ClinchRivet

Competitor 1
Semi tubular pierce rivet X

Competitor 2
Semi tubular pierce rivet Y

Compared to known semi tubular pierce rivets, the TOX®-ClinchRivet is far superior in strength and is especially applicable for use with thin sheet metals.

Additional advantages of the TOX®-ClinchRivet:

- no cutting of the sheet on the punch side
- no damage to material coating
- few die versions result in higher flexibility
- no punching scrap in the joint
- very high retention forces, increased joint strength with thinner sheets than obtained with the punch rivet
- symmetric rivet geometry, thus smooth feed and high productivity
- simple control by dimension "X" (remaining rivet height + remaining bottom thickness)
- no mechanical notch effect, high dynamic work capacity
- automatical process and tool monitoring is possible
- little hold-down forces
- pressing force approx. 20% lower (source: Studiengemeinschaft Stahlanwendung e. V.)
- multijoint capability
- less investment cost
- higher process reliability even with unfavorable production conditions, e.g. application with gaps and adhesives between layers.

A further advantage of a closed rivet form compared to the open semi tubular pierce rivet form lies in the absence of any adhesive or air pockets, and their potentially higher risk of corrosion in the riveted joint, as well as a guidance of the rivet by the die.

Compared with the semi tubular pierce rivet, the TOX®-ClinchRivet is less sensitive for negative production influences, such as clearance between the sheets, misalignments and the use of adhesives. Provided the punch side stripper force is sufficient, the existence of a small gap between the metal sheets will be of no influence on the joining strength.

Further more, thanks to the essentially smaller diameter of its die, the TOX®-ClinchRivet permits the utilisation of significally more slender flange widths for the joining process.

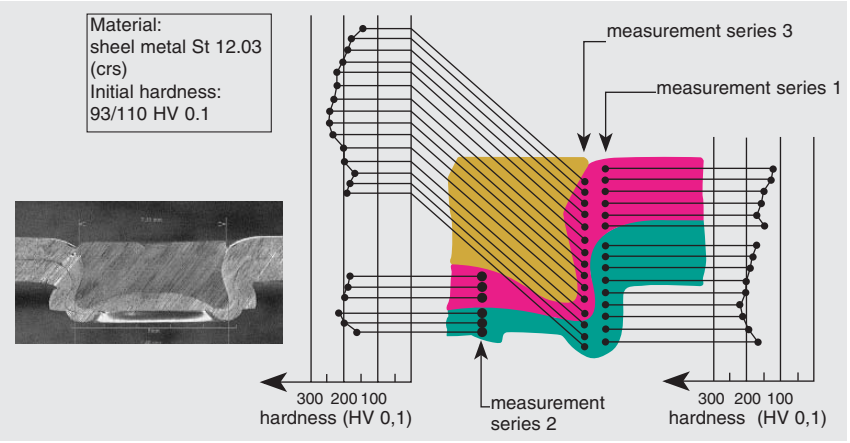
TOX®: The only way for a reliable application of ClinchRiveting with functional guarantee:

TOX® Test Report: contains all relevant data of the application, with **guaranteed** performance values of the TOX®-joint.

TOX® Tool Passport: included with every delivery of TOX® tools, valuable information for your production and maintenance department.

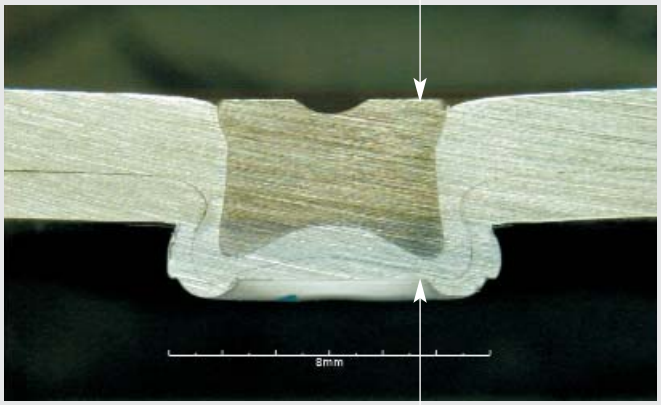
TOX® Data Sheet: which is constantly updated with all available data about tool and application.

Why TOX®-ClinchRivet is so resistant
The TOX®-ClinchRivet joint obtains its high strength values from the formed full rivet firmly positioned in the joint, and the hardening of the sheet metal materials in the neck zone created during the deep-drawing process. The special TOX®-ClinchRivet die with solid and flexible elements allows this comprehensive forming. The diagram on the right shows the hardness distribution in the cross section of a TOX®-ClinchRivet. Because there is no mechanical stress concentration, the bearing capacity is high.



Source: VDI-Z (German Engineers Association) 131 (1989), No.1

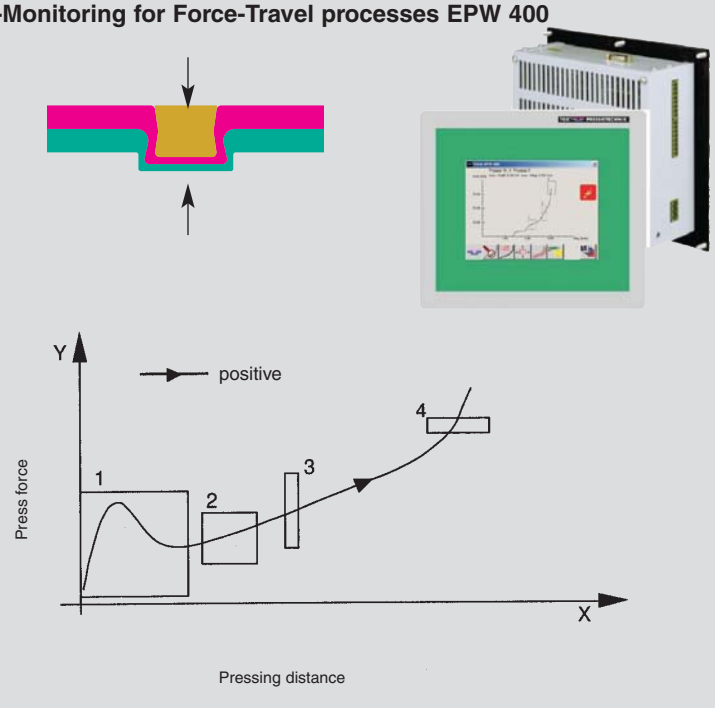
TOX®-ClinchRivet - quality assurance already starts with the production of the rivet, here the radius, diameter and length of each rivet are controlled. The control dimension “X” is proportional to the shear and pull strength, provided that the joining parameters and service life of the TOX® tools have been appropriately observed. The dimension “X” can be measured easily and non-destructively to provide an excellent means of quality control.



Dimension “X” = remaining rivet height
+ remaining bottom width

TOX®-ClinchRivet-Monitoring
Function:
A force sensor measures continuously the press force during the entire joining process. A travel sensor monitors the total pressing travel. The results are displayed as a Force-Travel signature curve. The process monitoring allows up to 6 control windows defined over the Force-Travel curve. With this monitoring strategy, the following parameters can be monitored: type of material, sheet metal thick-ness, number of layers, missing layer, rivet length, die depth, punch breakage and press force.

TOX®-Monitoring for Force-Travel processes EPW 400



See our catalog "TOX®-Controls" for detailed information.

TOX®-ClinchRivet

For use in all standard single-point and multi-point machines.

The TOX®-ClinchRivet Swage Head – a complete joining unit with the “slider-principle”

Joining possible in any direction, even upside down.

The simplicity of the **TOX®-ClinchRivets** allows for a trouble-free, small feeder and smaller swage-heads. In addition to this range we offer our complete press series, also for multi-joint applications.

Trouble-free feeding is ensured by the simplicity of the rivet.

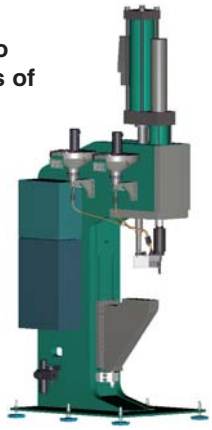
Stationary Presses

Function:
The rivet is gravity fed from the singulator to the swage head, preferably installed vertically, e.g. in a press. The fill level sensor controls the singulator and stops the flow of rivets when the tube is full. The tube is pressurized with air which forces the rivet to the swage head. The rivets are fed inside the swage head by means of a positively controlled slider mechanism. Only one rivet at a time can be fed into the setting punch.

One press or tongs can be used with optimum joining parameters to join sheet metals with several different thicknesses using different length rivets. This is possible due to the slider feeding head, which guides the proper rivet type into place.

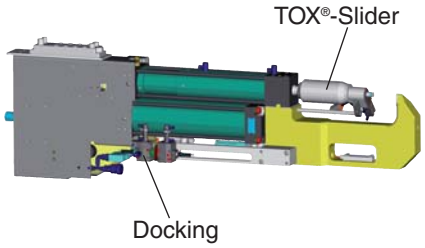
Function:
Depending on the type of rivet required, a pneumatic cylinder actuates the slider, and the rivet is guided below the setting punch, centered and pressed.

Press with two different types of rivet



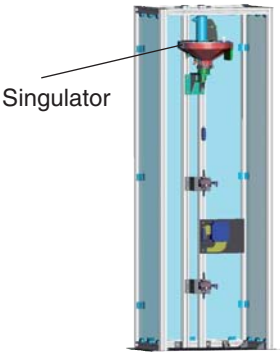
Mobile TOX®-ClinchRivet Robotic Units

Robotic unit with rivet supply module, consisting of simple and exchangeable components



Robotic tongs with TOX®-ClinchRivet swage head and docking gate in loading position.

Docking lock valves



TOX®-ClinchRivet supply module

The TOX® concept for optimum versatility: the rivet supply module provides a steady flow of ClinchRivets in the feeding tube. The robotic tongs gate valves dock with the loading magazine as required and fill the tongs own magazine. The loading takes only a few seconds during idle times and guarantees the supply and function of the tongs. Depending on the process and accessibility, the location of the docking valves on the tong can vary. The singulator in the rivet supply module is typically located outside the robot cell and can be easily refilled at any time. The module is connected with a magazine tube to its docking valves, which are located within easy reach of the tongs, e.g. at the robot cell guarding fence.