

## **Setting of function elements to complete the TOX<sup>®</sup>-Sheet Metal Joining Systems**

The competence for TOX<sup>®</sup>-Joining Systems and sheet metal working has been enlarged by a system for setting the function elements like piercing nuts and bolts etc.

The challenges regarding the resource-saving and energy-efficient lightweight constructions of vehicles and technical equipment concern not only the development and use of new materials, but also and specially the joining and assembling technique. With its TOX<sup>®</sup>-Round Point joining system, TOX<sup>®</sup> PRESSOTECHNIK GmbH & Co. KG, D-88250 Weingarten, has created a standard already in the middle of the eighties, and since this time the system and many variants of it have succeeded in hundreds of thousands applications - not only in the white goods industry but generally in all sheet metal working industries. Based on the TOX<sup>®</sup>-Round Joint technology, the company offers just nowadays rational and economical solutions for the joining of sheet metals, hybrid and mixed metal components. In this way, the Round Joint and the Clinching process have not only gone through a continuous development, but have also been enlarged by processes which need the feeding of elements, like ClinchRivets or solid punch rivets. And also the competences have been enlarged by a complementary technology for the setting of function elements like piercing nuts and bolts.

### **Metal joining techniques for all kinds of application**

While the joining and connection processes from TOX<sup>®</sup> PRESSOTECHNIK hitherto referred to the Round Joint Clinching System and its variants, and to the setting of clinch and piercing rivets, the complementary process „Setting of function elements“ represents a completely different technology. Similar to the ClinchRivet and the solid rivet, here additional function elements, piercing, riveting and pressing nuts and bolts etc. made by various manufacturers are used. The piercing nuts may, for example, be used for sheet metals of generally used qualities up to a thickness of 2 mm. For each dimension a suitable swage head is needed. TOX<sup>®</sup> PRESSOTECHNIK has developed a special joining and setting device for the placement of such function elements and has developed it to series production. The whole setting unit for piercing nuts consists, for example, of just one swage head with integrated magazine and pneumatic pusher, a piercing nut conveyor with integrated process system as a complete unit, a standardized TOX<sup>®</sup>-C-bow with standardized installation plate and the pneumo-hydraulic cylinder TOX<sup>®</sup>-Powerpackage. Last not least the process control is equipped with hardware interfaces for Interbus, ProfiNet and Profibus, a process monitoring system with force/displacement evaluation and an interface coming up to the new automobile standard AIDA.

The main issue are quality and process safety

The sorting and conveying apparatus with storage bin is connected by a feeding tube (up to 10 m long) with the swage head and/or the incorporated magazine. Also the controller is connected by a 10 m long line with the setting unit. This offers clear spaces and flexibility for the design of the plant. The separate location of sorting and conveying equipment and the storage magazine and singulator mounted ideally in front of the swage head, make sure that in practical operation a high technical availability of the setting unit for the function elements is granted. The conventional feeding and setting units often caused problems just at this point and were mostly due to deviations in dimension and tolerance of the joining elements. The TOX<sup>®</sup>-C-Bows with setting units may alternatively be used in stand-alone machines or robot systems. Correspondingly the setting of the function elements will be semi-automatic or fully automatic. The function elements can be of the self-piercing type or designed for pressing or riveting and can be supplied by different manufacturers according to customer's requirements. Together with the TOX<sup>®</sup>-Systems for setting the function elements, the customer will receive complete process solutions for sheet metal connections and the joining of sheet metal parts as a whole package deal. After thorough tests, the TOX<sup>®</sup>-system solutions for setting the function elements have meanwhile be used by many manufacturers of passenger cars and commercial vehicles.

**Description of illustrations :**

Ill. 1 shows a TOX<sup>®</sup>-C-Bow with equipment for setting the piercing nuts with the press drive cylinder TOX<sup>®</sup>-Powerpackage, and setting tool as well as an incorporated magazine and feeding tube for the supply of piercing nuts

Ill. 2 shows the sorting and conveying system as one unit with storage bin and the appertaining process control system.

Ill. 3 shows an application example from automobile industry

March 2011

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