Intelligent TOX®-Tongs for efficient joining solutions

With standardized, network compatible components from the TOX®-Modular Tongs System, TOX® PRESSOTECHNIK realizes flexible production systems for the cold forming joining of sheet metal parts

The company TOX® PRESSOTECHNIK GmbH & Co. KG stands for highest competence for joining technologies as well as for economical production facilities when it comes to the production of car bodies and sheet metal parts. The scope of service includes sheet metal joining or joining procedures (clinching, riveting, setting of functional elements) as well as drive cylinders for press force generation and conveyor technology for the joining elements (semi-hollow punch rivet, solid punch rivet, ClinchRivet® and functional elements) up to system control and the TOX®-Process Monitoring including software. With TOX®-Multi Technology Systems, consisting of the technology control as central component as well as the peripheral component TOX®-ZVK as part of the TOX®-Tongs for clinching, riveting or setting of functional elements, the customer receives complete solutions, which are characterized by high production output, flexibility and monitored processes.

Following close consultation with the customer, on the one hand tongs (C-frame as standard or customer-specific special design), and on the other optimal drives (pneumohydraulic cylinders from the TOX®-Powerpackage series or electromechanical servo drives from the TOX®-ElectricDrive series) are selected from the TOX®-Modular Kit. These in turn are equipped with the respective rivet heads and dies for automated processing, e.g. of semi-hollow punch rivets, solid punch rivets, ClinchRivets® or functional elements. The tongs are optionally also to be equipped with a drive on die side, which provides even more application flexibility. The components of the TOX®-Multi Technology Systems like robot tongs and peripheral modules (conveyor technology, spraying units, TOX®-ToolCheck) and TOX®-Process Device as well as motion controllers are connected to the technology control via Industrial Ethernet (EtherCAT).

The benefits of the bus system with intelligent bus node ZVK are obvious. The bus node prepares data signals and also serves as data buffer.
Status and configuration data are stored residually in the data buffer and are still available after a voltage drop. Analog signals are digitally prepared before transmission.
Naturally, the data provided by joining tongs also include maintenance and service life meters. Predictive Maintenance requires continuously updated meter readings to be able to be operated highly efficiently. Each joining tong has its own meter readings and can thus be maintained individually.
Furthermore, far more data measured by sensors can be transmitted to the multi-technology control. Temperature states as well as cycle times or individual movements, pressures, voltages, currents, fill levels etc. provide information required for controlling and adjusting a technology system. In the

event of an emergency, these sensor data permit a targeted, rapid intervention, if the system has not yet acted itself.
The provision of configuration data on the bus node also simplifies maintenance of the joining equipment. Tong replacements can be performed very quickly by using the electronic datasheet, which is stored on the ZVK bus node. For example, the joining tong automatically logs into the control again following a tong replacement. The autoconfiguration feature thus helps to reduce downtimes to a minimum in case of system downtime. Separately required maintenance documentation is now a thing of the past.
The volume of data, which are sent from the joining tongs to the control, is reduced in preparation. This saves bandwidth in communication in the system environment.
The various signal requirements of the different technologies are combined via the bus line. The cable package as connecting element between joining tongs and control is standardized. This way, different technologies can be operated via the same cable package on one robot. Extensions like the external periphery, e.g. tool changer, spray medium tank etc., are integrated into the technology system via the EtherCat system bus.
In combination with the multi-technology control, the system provides highest flexibility, which can be used beneficially when planning system layouts and when operating systems. Depending on requirements, customers can choose between three controls with different extension levels. The Basic version assumes a customer-owned PC, the Advanced version does not need a customer's PC, but requires a customer-owned visualization. Finally, for the multi-technology Smart control, TOX® PRESSOTECHNIK provides the entire control and operating concept.

Intelligent and versatile systems are achieved combined with the standardized and flexible support architecture (element conveyance, bus architecture, control architecture and system cabling) as well as standardized interfaces like TOX®-HMI = intuitive user interface, data output (configuration, process, system data, errors, warnings) and data input (process database, configuration database). With the option of changing tools, tongs, technologies, sensor tools and more, these can also be used with short changeover times for upcoming tasks, and thus represent a future-proof investment in every regard. The data determined in detail and in the system, which are initially available as unstructured information (process, inventory, system data and configurations etc.) are filtered via TOX®-Software tools, which in turn are fed through the know-how of the manufacturer and user. The analyzed data are available to all decision makers, i.e. maintenance planning, predictive maintenance, monitoring and analysis as well as simulations for process optimizations.

Image descriptions:

Image 1 shows TOX®-Robot Tong with servo drive TOX®-ElectricDrive

Image 2 shows the multi technology control TOX®-HMI. Several tongs that are equipped for different joining processes can be controlled with one software.

TOX® PRESSOTECHNIK GmbH & Co. KG
Riedstraße 4
D-88250 Weingarten
Tel. +49 (0)751 / 5007-0
E-Mail: info@tox-de.com
www.tox-pressotechnik.com

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