Process solutions for plant engineering

Process solutions competence by projecting and supplying complete, ready-to-install processing stations, consisting of the components TOX®-Joining Technology, TOX®-Robot Tongs and TOX®-ElectricDrive

Today, special purpose machine and assembly plant engineering is characterized on the one hand by the know-how-based integration of detail processes in system solutions and on the other by the extensive use of plant engineering components available on the market. Adding to this the competence for one or the other detail process, customers get a functional production system from one responsible source. As the complexity of plants is continuously growing due to this integration of detail processes, for the sake of risk minimization it is clearly necessary to cover oneself with the support of a technology supplier. The special machine manufacturer M.A.i. innovative Automation und Montagetechnik GmbH & Co. KG, D-96317 Kronach-Neuses, regularly develops and produces large linked assembly lines for customers, amongst others from the automotive industry. These production lines themselves represent complex tasks due to numerous plastic and electronic components to be assembled as well as the required production capacities and cycle times. One of the last implemented plants consists of a rotary workpiece carrier transport system integrated in a 30 metre long production line with three modules and a 48 metre long production line with five modules. Integrated into the plant are a total of 15 manual workstations, furthermore automated handling and assembly stations as well as three assembly rotary indexing tables with six stations each, which are in turn operated by industrial robots. Amongst others, some of the assembly stations as well as one of the three assembly rotary indexing tables are equipped for joining and bonding different power rails and safeguards. To be able to meet the demands of end customers like high electrical conductivity, process-reliable joining of metallic components to form the power rail assembly, seamless monitoring and documentation of the joints, durable components and reliable backup supply, the developers and designers of M.A.i. got together with the application engineers of TOX® PRESSOTECHNIK GmbH & Co. KG, D-88250 Weingarten.

Assembly plant engineering from a single source

As technology company, TOX® PRESSOTECHNIK not only has clinching technologies for joining sheet metal etc., but also press technology equipment, respective press force drives and also press force/process monitoring systems. As the electrical conductivity of the clinching process TOX®-Round Joint has long been proven scientifically and in industrial applications, this also came into play for joining the sheet metal parts for the power rail assembly. In addition to the conventional design as single point, the process variant TOX®-TWINpoint is also used for this. This is a double joint with protection against twisting, ideal for narrow flange widths. A total of 10 stations are set up in the production line for joining the sheet metal parts, where TOX® PRESSOTECHNIK was commissioned with
complete delivery of all TOX®-Presses. The individual joining process stations all consist of the same standard components of the TOX®-Modular Kit for process solutions. The TOX®-Robot Tongs of type TZ are used as basic unit. These in turn are equipped with electromechanical TOX®-Servo Drives of type EPMR for creating the press forces for clinching. Furthermore, guide carriages (plunger guide), stripper with TOX®-ToolCheck (process-related monitoring of the clinching die status), spraying system (minimal lubrication with air enriched with oil for reducing the stripping forces on the clinching tools), cable set and control interface as well as TOX®-Round-Joint tool sets are part of the setup. Despite different requirements, all components have the same performance features. This makes them interchangeable, which has a positive effect of course on the stocking of spare parts and costs.

Technology-based process solutions as complete system

The machine mount tongs for the individual stations have an extension of 150 mm and an opening between the tools (punch and die) of 95 mm. The electromechanical servo drives installed here create up to 55 kN press force. This safely covers all sheet metal parts of different thickness combinations to be joined with the TOX®-Round Joints; also as regards product changes as well as future product versions. The machine mount tongs in all joining/clinching stations are equipped with the TOX®-Software, which monitors and registers all relevant process parameters during clinching. With the production and supply of the respectively ready-to-install TOX®-Tongs for joining the sheet metal parts to form the power rail assembly, the plant manufacturer M.A.i. and the end customer/user received process-related complete solutions from one source, which just had to be mechanically adapted and integrated in relation to control technology.

Captions:

Image 1 shows a section of the production plant, in this case an assembly rotary indexing table with six stations, three of which TOX®-Clinching Stations, consisting amongst others of TOX®-Machine Mount Tongs with electromechanical TOX®-Servo Drives

Image 2 shows one of ten TOX®-Machine Mount Tongs equipped ready for assembly incl. drive, clinching tool and control/interface ready for docking

Image 3 shows a TOX®-TWINpoint Joint

Images 4a and 4b show single point and TWINpoint joints on power rail assemblies
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