

Drives for accurate force/path functions

Mechatronic servo drives ensure reproducible clinching and pressing in quality.

Streamlined and at the same time efficient joining, assembly and pressing procedures as well as similar processes, which must not only be completely reproducible, but most of all seamlessly traceable through process monitoring and documentation, can only be realised with significant effort for traditional presses and conventional press force drives. Furthermore, current and future quality requirements of companies mean that the production processes need to be put under scrutiny time and again. The automotive industry in particular is considered a pioneer of a seamlessly to be documented manufacturing and product quality, based on a partly extreme interpretation of the global legislation with regard to product liability. The resulting list of demands is reflected in the DIN EN ISO 9001 as well as the VDA 6.4 ISO TS 16949 standards and describes the seamless process monitoring and documentation as a mandatory requirement.

For the manufacturers and suppliers of components, assemblies and subsystems for vehicle manufacturing and equipment, this results in new and significantly extended challenges. For example, manual and automated production facilities needing to be equipped with process monitoring tools. This means that conventional pneumatic, hydraulic and also mechanical drives soon reach their limits with regard to the documentation of quality of joining, clinching and pressing for sheet metal and assembly groups. However, with mechatronic servo drive systems that can be precisely controlled and adjusted, consistent force/path processes can not only be realised, but also seamlessly monitored and documented. For the manufacturers of conventional drives and drive cylinders this means that new drive technologies need to be developed. The crux here is on the one hand the combined requirement of the partially very high (press) force demand, certain strokes and (very) fast working cycles. On the other hand, these processes must be recorded, evaluated, possibly controlled and adjusted and finally documented with regard to stroke, press force progress and ultimately applied press force throughout the entire force/path process.

New drive concepts - more than just alternatives

The technology company TOX[®] PRESSOTECHNIK GmbH, D-88250 Weingarten, which has been dealing with the entire process chain for joining, clinching, marking and machining of sheet metal parts and sheet metal assemblies in all sheet metal processing industries for more than 30 years, has addressed these challenges with the series of mechatronic servo drive cylinders of the TOX[®]-ElectricDrive product range. In parallel there is still a comprehensive series of common pneumohydraulic drive cylinders, so customers have the option to perform individual processes in a conventional way. The electromechanical/mechatronic servo drives

TOX[®]-ElectricDrive of the EPM (EPM = Electric Power Module) series have a modular design and are supplied as complete units ready-to-install and ready for operation. They are supplied with mechanical and electrical interfaces and can be easily installed in workstations, fixtures, machines and special machines, handheld, machine mount and robot tongs.

While designers and mechanical engineers could so far resort to a range of services of 0.5 to 400 kN press force, this was now significantly extended to the range of 0.25 to 700 kN!

Overview of the TOX[®]-ElectricDrive series

Based on the mentioned modular construction kit, the standardised motor, planetary gear, spindle unit, working piston, resolver, force transducer and housing assemblies turn into different standard drive units.

EPMS: Available in tight press force increments in the force range up to 200 kN as well as with strokes of 200 to 300 mm; modular design, slim structural shape for restricted installation conditions, structure otherwise similar to EPMK.

EPMK: Available in tight press force increments in the force range up to 700 kN as well as with strokes of 200 to 300 mm. Modular design, compact and slim structural shape with parallel setup of all components, high performance planetary roller gear, force sensor technology setup in the housing.

The new version EPMK 700 is available as particularly slim version. With servo motor with external fan for increasing the power density with simultaneous reduction of the cycle times. Force range of +/- 35 to +/- 700 kN, force measuring pulling or pushing with a measuring accuracy of 0.5% (3500 N), stroke up to 300 mm.

The two new versions EPMS/EPMK 005 have a tapered structural shape for increasing the sensitivity of the force transmitting device (accuracy 0.5% of 25 kN). Force range 0.25 to 5 kN, stroke up to 200 mm, safety brake available for installation in manual workstations.

EPMR: Equally parallel arrangement of all components for a very short and more compact structural shape and additionally with precision flange as tong drive, for press forces of 55 and 100 kN (application in robot tongs).

Line-Q²/EPQS: This price is positioned between the established eponymous TOX[®]-Powerpackage and the TOX[®]-ElectricDrive series with regard to performance and costs. The servo powerpackage EPQS is available in three sizes for nominal forces of 25, 55 and 100 kN and as standardised unit only as version "S". Plug & play preconfigured and instantly ready for use, permanently controlled synchronous motor and sturdy roller thread spindle ensure energy efficient and reproducible precise operation, safety rod catcher integrated in engine, stroke lengths up to 200 mm, stroke speeds up to 100 mm/s, usable pulling or pushing with the same performance.

Wide selection of types for creative freedom

Due to the different types, designers have sufficient leeway to install the alternative and standardised drive technology even under restricted installation conditions or to replace the existing conventional force/press drives with electromagnetic servo drives. Simply put, the electromechanical drive cylinders combine the mechanical gear components with the finely controllable and adjustable servo electronics. A specific force is to be realised or requested per servo control in each working piston position. The respective performance data are permanently recorded, evaluated, readjusted if required and seamlessly documented. Or put differently: With the TOX[®]-ElectricDrive drive cylinders, a previously specified force is to be retrieved with reproducible precision on the respective position point on the one hand, and on the other hand all process steps can be reviewed, optimised and if required also redefined with regard to their parameterisation. The scope of delivery for a drive unit includes, apart from the drive cylinder ready for assembly/connection, the associated cable set, the axis controller and the TOX[®]softWare software bundle, which consists of the different programs Server (connection between PC and controller), Worx (sequence programming and process control) and HMI (Human-Machine-Interface). With this the axis controllers can be easily operated, configured, documented and parameterised.

Within the scope of the product development, the following changes have been implemented in the TOX[®]softWare:

Envelopes can now be individually edited in the HMI program. This results in improved and flexible monitoring of processes. The statistic modules were also further optimised. Processes can now also be selected with barcode scanners as well as the combination of customer-specific information (e.g. serial numbers) with the quality data of the processes.

The newly developed .NET.dll provides the option to integrate the TOX[®]softWare functionality in customer visualisations. This enables even deeper integration into the customer's operating structure.

TOX[®]-Hardware meets TOX[®]softWare

With the axis controller, individual equipment options are provided for troubleshooting: Standard hardware with pluggable modules (memory module, fieldbus, communication). This means users only purchase what they need! With the intelligent and flexibly usable drive cylinders TOX[®]-ElectricDrive, a wide diversity of joining, clinching, connecting, pressing and assembly tasks can be designed delicately and at the same time highly productively. The drive cylinders are particularly suited to application in presses or assembly stations and joining machines. Otherwise, the largely standardised drive cylinders are characterised by the usage of components as equal as possible. This means stock-keeping of spare parts can be minimized. Particularly as the technical availability - due to comparably

fewer mechanical components - is positioned very high in direct comparison with conventional drive cylinders, and thus takes account of another requirement, i.e. of the automotive industry and its suppliers. And this brings us full circle, as with the drive units for reproducible realisation of force/path-related operations/process steps, the precise-robust cylinder construction, control technology, safety installations confirmed by the professional associations, the modular software, defined interfaces for data exchange with additional or superordinated systems, and last but not least the practical consultation and after sales service, TOX[®] PRESSOTECHNIK is the ideal partner for production and assembly automation in the field of sheet metal processing and sheet metal forming.

Image descriptions:

Image 1 shows an electromechanical drive TOX[®]-ElectricDrive EPMK

Image 2 shows the EPMK servo drive with accessories as pre-assembled construction kit

Image 3 shows a drive system EPQS of the TOX[®]-ElectricDrive line-Q² series

Image 4 shows a press system with both TOX[®]-ElectricDrive EPMK and control drive

Image 5 shows TOX[®]-Robot Tongs whose TOX[®]-ElectricDrive EPMR drive enables flexibly programmable clinching

Image 6 shows the TOX[®]-Robot Tongs with electromechanical TOX[®]-ElectricDrive drive in the robot station

July 2013

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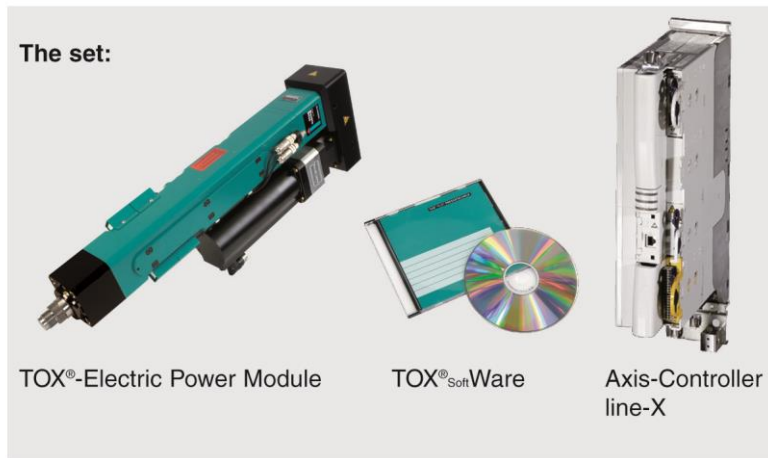


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