

Drive & Control profile

German Automotive Supplier Designs New Transfer System for Car Seat Manufacturing



Ergonomics were a key consideration in designing the *TS4plus* transfer system to accommodate workpiece pallets at a 45-degree angle.

From racy sports cars and zippy compacts to mini-vans that accommodate up to eight people, Germany is home to nearly 39 million cars. And when German auto manufacturers design new cars, they often design new production facilities, as do their suppliers—like Faurecia's Unna, Germany, production site which specializes in car seat manufacturing.

Admittedly most drivers probably never question where their car seats came from, but in Germany it is

likely they came from Faurecia. Comfort, safety, and style, the defining features of Faurecia seats, also determine the company's research and production activities. As a result, Faurecia uses the *TS4plus* flexible assembly conveyor system from the Linear Motion and Assembly Technologies group of the Bosch Rexroth Corporation to meet new seat assembly specifications.

A New Angle on Assembly

With more than 20 just-in-time plants, Faurecia is close to the

Challenge

Provide improved assembly system for new line for car seat manufacturer

Bosch Rexroth Solution

- *TS4plus* conveyor system
- PE4 positioning units

Benefits

- Modular system provides fast setup and greater flexibility
- Workpiece fixturing designed for optimal parts positioning in each system
- Positioning units with repeatability of 0.1 mm ensure pallets precisely positioned at assembly points
- Durable, flexible aluminum construction ensures system meets multi-year service life and can be adapted for future uses



The few manual workstations in the TS4plus transfer system do not require outfeed and are integrated into the main circuit along with the automated stations.

customer anywhere in the world. Its production site in Unna employs 600 workers who specialize in making car seats. Faurecia began making coil-spring seats in the 1960s, and today, the company draws upon its decades of experience to produce seats with a high degree of production depth — anything from a stamped part to a complete seat, depending on the order. Orders are placed according to the car model, and Faurecia builds all of the various seats required for that model.

When Faurecia received an order from a major carmaker to manufacture a new seat, the company decided to install a new assembly line. Faurecia consulted the Frames Manufacturing Engineering North East Europe (FME) division in Stadthagen, Germany for the design and component selection. FME recommended implementing the Rexroth TS4plus flexible assembly conveyor system. FME engineers were already familiar with the Rexroth TSplus system, and based on their positive experiences, favored the installation of the TS4plus to meet the new seat assembly requirements.

“The TS4plus can be set up quickly, since all of the components for the modular transfer system are perfectly coordinated with each other,” says Thomas Stoltze, manager of FME’s Tools and System Construction department. “The product we had to make, the forces to be absorbed, and the required service life were key reasons for selecting the robust TS4plus system.”

Eight different backrests for the new vehicle are produced in the Unna facility. The system layout features two separate rectangular conveyors for pre-assembly and final assembly, including testing, while a robot performs the parts transfer. The dual-conveyor layout facilitates the respective processes, with workpiece fixturing designed for optimal parts positioning in each system. For example, parts that lie flat are necessary in pre-assembly for adhesive application, while backrests positioned at an angle are an advantage for final inspection.

All processing stations, such as the adhesive-application area, are directly integrated into the transfer system through the use of robots. This was a major reason that Faurecia placed stringent requirements on the precise positioning ability of the transfer system. Rexroth PE4 positioning units, with a positioning repeatability of 0.1 mm, ensure that the workpiece pallets are stopped exactly at the prescribed point.

The actual transfer system, consisting of an accumulation roller chain for conveying, workpiece pallets, positioning and lift transverse units, and transport control, is built from standard components of the modular Rexroth TS4plus system; however, the new system includes the special ability to tilt the pallets at a 45 degree angle at the corner transfer station and transport them onto the in-feed section at this angle.



The seats’ metal structures, which are placed on the pallets, weigh approximately 88 pounds, thus the angle of the pallets offers workers needed support to prevent back injuries.



(Left) Because the system areas containing automatic stations such as robots are enclosed by a Rexroth protective fence, "accidental" entry into these areas is impossible. (Right) The pallets are rotated by 180 degrees on a lift-rotate unit prior to further processing.

Examining Ergonomics

In addition to more readily accommodating assembly, angling of the seats has ergonomic benefits. Internal studies of Faurecia systems using comparably heavy components revealed that if the products are placed by hand onto the pallets, an enormous ergonomic stress results, and the transfer system workers do this so often every day that serious back problems could result in the long term.

The 45-degree angle, previously tested by the simulation group of FME using CAD simulation software, is now being used for the first time with the Rexroth *TS4plus* conveyor. Initial production runs showed that this design is a good aid when inserting the heavy workpieces because the workers do not have to bend forward with them. As a result, better cycle times can also be achieved.

Likewise, the pallets employed were optimally adapted to the geometry of the seats' metal structures. Two workpieces and the complete backrest were fixed on a pallet, which together weigh about 80 kg, or just over 175 pounds. This loading weight was one of the reasons that Faurecia decided in favor of the *TS4plus* for the application, as the maximum permissible load of 250 kg, or approximately 550 pounds, allows the systems to be re-purposed for production of other products as required.

For Faurecia, the option of additional uses is important because products such as car seats generally have a life cycle of about six years. Although the system runs almost around the clock during this time (three-shift operation is included in the planning), the service life of the system is also much longer.

Accordingly, the changeover and rebuilding options of the transfer system play a significant role.

In this respect, Stoltze values the conveyor's flexible design using the Rexroth aluminum framing system. "In the past we've used a lot of steel in our plants for such transfer systems. In comparison, the aluminum construction is considerably more adaptable."

As a result of the positive experience with the *TSplus* and *TS4plus*, Faurecia will continue to use Rexroth flexible assembly conveyor systems in the future. The systems' robust design and long-life, coupled with the flexibility to allow reconfiguration as production needs change, are just what Faurecia had in mind for a precision assembly system.

Rexroth
Bosch Group