The press shop of Audi AG in Ingolstadt, Germany, wanted to increase its yield to meet future demand by modernizing three 800 t transfer presses (built in 1980) used for approximately 80 body interior parts. For this purpose, almost the entire electrical installation was renewed with state-of-the-art Siemens components, and the rigid, mechanical bar transfer was replaced with flexibly programmable units moved by electronically connected single drives.

To minimize labor and costs, standard and safety-related communication were for the first time implemented by a single programmable logic controller (PLC), thus reducing the number of bus systems used. Audi’s partners in the retrofit project were FMI systems GmbH in Kassel, which specializes in press conversions and served as the general contractor, and GPA-Jakob Pressenautomation GmbH, a provider of tailor-made press transfer systems in Karlsruhe.

**High performance and flexibility**

The heart of the solution is the electronic transfers developed by GPA-Jakob. They were equipped for the first time with the drive-based Simotion D445 motion control system; adapted drives of the modular Sinamics S120 series; and individually driven, electronically connected 1FK7 servomotors. Now the movements in all transfer axes can be freely programmed by two electronically connected servomotors each, linked in any conceivable constellation and operated as desired. Whereas the cycle times used to be determined by the transfer, the distances and thus the cycle times can now be adapted to the respective tool or pressing exactly to the millimeter by decoupling the press and transfer movement.

With electronic transfers, the stroke rates can be increased from 14–16 to up to 20 cycles per minute, which means an increase of 30 percent on average. In order to have enough reserves for this, the current converters were replaced by devices of the Simoreg DC-Master (6RA70) series in the 130 kW press main drives. Like the Sinamics converters of the transfers, these are capable of feedback, which also has an effect on the energy budget in the long term. Providing that suitable tools are used, the increased stroke rates enable the pressing of a wider range of parts, allowing Audi to plan production more flexibly.

**Integrated process and safety control**

The press shop owner is entering new territory in terms of safety technology. FMI systems implemented a fail-safe Simatic S7-400F PLC (CPU 416F) on an Audi press for the first time. It controls and monitors both the “normal” process and the safety devices. A separate safety control is no longer
required, which reduces the hardware and wiring expense. Matching up several controllers is now also superfluous. Standard and safety-oriented communication on just one Profibus cable and the Profisafe profile are a proven, economical, and flexible alternative to the previous fixed wiring, also on presses.

Prefabricated, certified press safety components for Simatic PLCs support and speed up the programming of the safety program. The integrated safety functions of the Sinamics S120 drive system, with which effective protection for persons and machines can be implemented very easily and efficiently without additional hardware, were also used at Audi.

**Easy operation and engineering**
The part transfers can be set up by portable Simatic Mobile Panel MP177s on every press and are linked by pluggable Profibus connections. The setup technician can therefore go directly to the scene of the action and have a complete overview when he or she operates the transfer at reduced speed in jog mode. Every press also has a stationary Simatic Multi Panel MP377 with a graphical user interface under Simatic WinCC flexible for intervention in the event of faults, among other things. Each of the networked presses has its own Simatic programming unit in the control room. This ensures that the right software versions, projects, and circuit diagrams in PDF format are always immediately available when switching on.

Siemens supported the retrofit specialists from FMI systems and GPA-Jakob in their introduction to the new technologies of Safety Integrated and Simotion, allowing the three presses to be converted and put into operation sequentially in just six weeks each. They have been running without faults and with a higher yield ever since. “The collaboration of all the people involved worked perfectly. Everyone demonstrated the flexibility and motivation essential for such a project,” says Franz Weber, head of central machine technology in the Press Shop division at Audi Ingolstadt.