Higher stroke rates, flexible manufacturing, and quick product changeovers – these are just some of the benefits of implementing electronic transfer in the Volkswagen press shop in Wolfsburg.
As part of a modernization of the press shop, Volkswagen Wolfsburg decided to retrofit three 15-year-old press lines. Because of the increasing difficulty of sourcing spare parts for the control technology, the project team decided to change the mechanical transfer in the lines to motion-controlled servodrives.

**Retrofit allows rapid resetting of the lines**

Volkswagen modernized the press lines itself, but Siemens was involved at an early stage as a partner for the electrotechnical equipment. With regard to the hardware and software, Volkswagen was able to use internal standards that had been drawn up jointly with Siemens in the course of previous projects. "For example, we are using fail-safe Simatic PLC and Simotion hardware controllers. On the software side we are using, among other things, a hydraulic controller developed by Siemens and Fraunhofer," explains Mark Walz, Volkswagen project manager and responsible for press retrofits at the Wolfsburg press shop. The three press lines are being used to make various body panels, and this requires frequent changes of products and tools. It is therefore important for production planning to be able to reset the lines quickly when required. Also, the tools, settings, and motion profiles need to be interchangeable between the lines. This means that all three lines must be able to produce multiple parts.

**Press line simulation maximizes potential**

Despite the fact that the lines have different pressing forces, Volkswagen has equipped all three with identical components – that is, equivalent feeds, drive controls, and motors. "The savings far outweigh the extra costs of the individual components," stresses Walz. The installation of the multi-axis electronic transfer system also enhances the possibilities for positioning the sheet metal. The performance of the planned transfer was checked in advance via simulation. To do this, the Press Line Simulation software produced a virtual model simulating all mechanical, electrical, and software components that are relevant for dynamic motion control. "Without being able to test it in this way, you can’t really fully exploit the potential of a servo-driven transfer," says Walz. Initial simulations then also confirmed that additional time would be required for reliable sheet metal transport at higher stroke rates. The time required to reduce the maximum acceleration was gained by means of a phase displacement of the plunger. This meant that safe parts transfer was possible despite the higher stroke rates.

**Increased productivity and high availability**

For the first time, the modified press lines now have a direct data connection between the press line simulation and the press line controllers. Thus, the prepared motion profiles can be transferred to the plant in a matter of seconds. Similarly, motion profiles that exist on the plant can be loaded into the simulation software, optimized, and transferred back to the controller. In this way the simulation not only reduces the set-up times for introducing new workpieces but also makes for quicker resumption of production after tool changeovers. In the long term, the associated increase in productivity meant that the number of press lines could be reduced from 17 to 8. This offers considerable potential savings, but it also increases dependence upon the individual machines. Consequently, another important objective of the retrofit was to achieve availability of at least 96 percent. The press lines are therefore monitored by the Siplus CMS condition monitoring system.

Another welcome outcome is the drastic reduction in energy consumption. Thanks to the DC link coupling of the Sinamics converter, the braking energy that is regularly produced during cyclical movements can be directly reused for acceleration processes. Moreover, high-maintenance uninterrupted power supplies can be eliminated completely. Because of the consistent DC link, the kinetic energy stored in the press is sufficient to bring all the axes into a safe state in the event of a power outage and to rundown all the control technology in an orderly manner.

**Simple, cost-effective, and flexible**

Everyone involved was delighted by the greater simplicity of the automation system and has rated the project a huge success. The retrofit has made an important contribution toward standardizing machine automation in the press shop. In addition, maintenance is much simpler and more cost-effective because of the standardized technology. Electronic transfer also means that sheet metal transport is considerably more flexible, and the sheets can now be positioned with greater accuracy as well. In view of the enormous boost to productivity in the press shop, the retrofit has proved to be much more economical in the long term than buying new press lines with a comparable output.