Ford AG, Germany

Real-Time Press

With Simotion and real-time communication via Profinet, Ford achieved control clock times of one millisecond in a deep drawing press.

Ford AG replaced a mechanical head press for large body parts in its Saarlouis press shop with a hydraulic deep drawing press. The key functions of this double-action press are controlled and regulated by the coordinated assembly of a Simatic S7-400 controller, the Simotion D445 motion control system, and Simatic ET 200S HS high-speed I/O modules. Communication is based on Profinet with real time (RT) and isochronous real time (IRT) for the first time. Although this was the press manufacturer’s first project with Simotion, the installation and commissioning of the press took only 36 days.

Fast clock times ensured

Fast communication is a decisive factor in deep drawing. The press ram, sheet holder, ejector, and, in this specific case, hydraulic four-point table cushion must be finely tuned, and a total of 10 hydraulic axes must be coordinated. The high control performance of the Simotion D445 motion controller (500 microseconds at a jitter below 1 microsecond) easily supports precise, jolt-free switching of pressure and position control (and vice versa) during the pressing process, which is indispensable to the deep drawing of many body parts. Sensors and actuators are connected with analog high-speed Simatic ET 200S HS I/O modules and IM151-3 PN HS interface modules. Communication between Simotion D445 and the slave modules of the controlled system runs on Profinet with IRT. This easily achieves the required control clock times of 1 millisecond and the cycle time of the press line of 8 seconds at the present time. Depending on the tools and material used, up to 12 large parts per minute can be produced in high quality.

Ford has consciously chosen to share automation jobs between a Simatic S7-400 PLC and the Simotion D system. The motion controller takes over the mentioned control jobs while the Simatic S7-400 coordinates the functions of the ram, the process, and the exchange with the periphery. “This means that not all of our maintenance staff have to be familiar with the complex control functions,” explains Robert Steier from the local works planning at Ford, “and they can intervene quickly and right on target in the general process in case of faults so that all the prerequisites for maximum availability were satisfied from the start of production.”

New standard for hydraulic presses

The new hydraulic head press has since been approved by the German TÜV. “The head press has been running trouble-free since commissioning and soon reached the clock time specifications of the old machine,” Steier sums up. Ford AG has already initiated the first follow-up application with the same concept on a press at Ford in Valencia, Spain.

Advantages of Simotion D

- Saves space and reacts quickly because it is integrated directly into the Sinamics S120 control module
- Integrates motion control technology and PLC functionality directly in the drive
- Uses the Scout engineering system for simple programming, commissioning, testing, and diagnosis
- Uses runtime software with PLC in accordance with IEC 61131-3 and optional functions for fast and simple creation of a movement sequence
- Increases communication performance with Profinet and real-time synchronization of drives in the microsecond range