Jürgen Fuhrmann Elektrotechnik GmbH (JFE) from Atten-dorn, Germany is a medium-sized company that special-izes in applications for everything having to do with handling, bending, cutting and welding pipes, wire and sheets of steel. JFE recently solved a challenging project to update the electrical and mechanical components of a stretch-bending system for automobile gas tank holders manufactured out of strips of steel. The client was Kico Kirchhoff GmbH & Co, KG, a renowned system supplier to the automobile industry based in Halver in the western part of Sauerland, Germany. For over 25 years the stretching-bending system has been producing gas tank holders in various designs and materi-als, for instance, aluminum through steel up to stainless steel.

As a result of frequent downtimes, the operating compa-ny contacted JFE and gave them the task of finding a new solution that was fit for the future.

The material must flow
In the stretching-bending process, a strip of sheet steel is clamped at both sides, and drawn downwards across the tool. It must then be bent again in the transverse direc-tion, so that after returning to the initial position, a holder with the precise design and dimensions is obtained. To achieve these precise specifications, the traversing paths and velocities of the two clamping devices at both sides are calculated independently.
Not only this, the sheet steel must be continuously subject to a defined tension in order to keep the material in the elastic range above the yield/stretching limit. Both the material and bending sequence must run continuously. This had to be realized only using a sophisticated closed-loop speed/positioning control without the use of a complex closed-loop force control. Not only this, the process for new products or for modified properties had to be simple to set up, taught-in and subsequently had to be precisely reproducible. Of course, it goes without saying that the machine output was to be increased and the amount of waste when setting up reduced. Siemens was involved into several projects from the beginning. Fuhrmann is using close to 95% of the technologies and components from the market leader Siemens. There are a lot of reason for it, which has shown at that project and result once again.

**Motion control on embedded PC – designed for harsh industrial environments**

Simotion P320 is a powerful, ultra-compact and maintenance-free embedded industrial PC from Siemens that has proven itself under the toughest of application conditions. The motion control functionality runs on Windows Embedded Standard 2009 and a real-time capable Simotion kernel. The P320 combines the ruggedness of a PLC, the speed and flexibility of a PC with the full motion control functionality of Simotion. It’s reliability under extreme application conditions is because it has no rotating components such as fan or hard disk.

**Changeover times and waste reduced**

The new solution has significantly reduced the amount of waste. This is because when setting up, positions are approached block by block and can be corrected as individual modules. Up until now, the complete process had to be parameterized and executed, and only a process was completed, could quality be assessed. In order to make corrections when teaching in, the cams must be immediately calculated on-the-fly after the position values have been transferred. In addition to a deep mathematical understanding, this also required a powerful PC system. The P320 has this computational performance, and calculates the cams extremely fast, therefore facilitating quick setup without long waiting times. In operation, only the calculated values from the cam tables are transferred to the Sinamics S120 drive system via Profinet; Simotion coordinates the Sinamics S120 and therefore the four 1FK7 servo motors. Production changeovers were also optimized. As a consequence, a specialist is no longer required each time a program is changed; previously he always had to re-parameterize the drive controller using a notebook. Instead of this, programs, saved on the operator panels, are automatically loaded based on the tool being used. This slashes production changeover times by at least 50 percent – for the operator, only a couple of buttons have to be pressed.

**Productivity and stability are improved**

With the new automation & drive technology, the stretching-bending machine can now operate closer to the limits of what is mechanically feasible with reproducible precision. The result was a yield increase of about 20 percent. The company operating the machine is extremely satisfied with the results of the retrofit, which from the automation perspective, was completed in about 3 days.

**Highlights**

- Increased production rate
- Lower percentage of waste
- Seamless block transitions
- Optimized production changeover
- Ruggedized PC based motion control for industry high degree of functionality
- High computational performance
- Increased precision