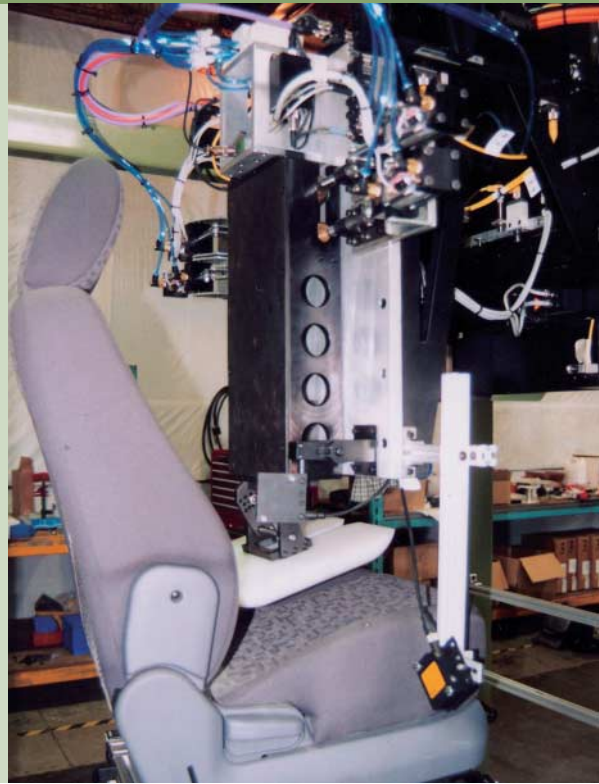


# Optimized: 30 percent reduction in I/O wiring and fewer control components

→ Safety system suppliers to the automotive industry continually strive to utilize the latest technologies to stay ahead of the curve of evolving safety regulations. Knowing that its safety testing equipment can be responsible for saving lives, Sterner Automation believes that simply meeting expectations is just not good enough. Equipped with automation technology from Beckhoff, Sterner feels well prepared for the future.



A seat undergoing sensor test and calibration in the testing station.



The "butt form" applies varying degrees of weight. This test the sensors to make sure the safety system will be able to differentiate between an adult and a child by weight.

Sterner Automation is a Toronto-based engineering firm, specializing in custom testing machinery and end-of-line test calibration equipment. They recently looked for an alternative to their PLC and motion-controller-based machine that calibrates and tests in-vehicle safety sensors for the automotive industry. Sterner Automation sought a solution that would allow remote monitoring of their machines' performance, while reducing training and maintenance costs within the plant. Sterner Automation also sought to decrease assembly time and to simplify the hard-wiring and connections required in the machines.

## Optimizing remote diagnostics while maintaining programming standard

"We used to apply a typical PLC architecture along with either an industrial PC running an operator interface package or a simple touch screen," Victor Hilario, manager of the electrical and control systems group for Sterner Automation, said. "Our systems used DeviceNet and SERCOS networks for I/O and Motion Con-

trol. We felt that a PC-based system would allow us to enhance the remote diagnostic and troubleshooting capabilities of the product, while staying within industry accepted standards for programming."

Hilario was attracted to the Beckhoff open IEC 61131-3 TwinCAT programming package, which defines six different languages for programming logic control systems. "We didn't want to offer a PC-based solution that was going to be heavily proprietary and would limit our ability to program effectively. TwinCAT allowed us to apply the appropriate language to the algorithms we were writing, resulting in code that was cleaner and easier to maintain."

Sterner Automation's engineers designed a system that uses a Beckhoff C6140 Industrial PC with PROFIBUS and SERCOS network cards, TwinCAT NC point-to-point software, SERCOS servo drives and PROFIBUS I/O. For sensor connection, they chose IP 20 Bus Terminal I/O and rugged IP 67 Fieldbus Box I/O. "Fortunately, the engineers on my team had previous experience working with IEC 61131-3. This gave us a running start on the project," Hilario said.

### **Streamlined, integrated, high-speed system**

The integration of the PC control into the customers' plant network reduced the need for machine wiring and interconnections. "The new system has one PC operating on TwinCAT that runs all the controls and communicates with Beckhoff servo drives using SERCOS. There are three servo drives in our system to manage the x, y and z axes," Hilario explained. "We communicate with the factory information system to determine the identity of the device under test. Based on that, we use the appropriate recipe for the x, y, and z positions of our testing equipment."

The system utilizes an oscilloscope card (KL3362 Bus Terminal) to capture a time-varying signal from the test process. This card made it possible to obtain data at a capture rate as fast as 100 microseconds. These data are then analyzed to ensure that the test parameters are within specified limits. The data are then transferred from the oscilloscope card to the main PC using PROFIBUS communications and a dedicated 1 millisecond PLC task. This makes it possible to retrieve over 4000 data values from the card within a limited period of time.

### **A smooth ride ahead**

Hilario was impressed with the support he received during the development period. "We worked closely with Beckhoff engineers in the U.S. and Germany, as well as with the local technical sales staff in Toronto. Their assistance contributed significantly to the rapid success of the project." The new control solution also offers convincing cost optimization benefits. "We achieved a 30 percent reduction in I/O wiring due to terminating signals directly to field I/O stations (distributed I/O)," Hilario said.

This newly designed control system also offers Sterner Automation's customers a testing machine with expanded diagnostic capabilities. "With TwinCAT, we are able to get detailed information about each individual I/O node. With the TwinCAT event logger hooked into our Visual Basic application, we are able to offer data logging and create a pop-up alarm handler," the automation expert explained. "The PC also provides remote communication with machines half-way around the world. We can pull out historical performance data and provide a greater wealth of information to our customers."

"I/O components from Beckhoff lend themselves to making the machine more modular," Hilario said. "We also reduced the overall component count and were able to maximize our hardware panel space rather than wasting that space on additional terminal blocks for intermediate connections. All these new features give Sterner Automation greater freedom of design and add up to a huge value for our customers," Hilario said.