

# VALUE PROPOSITION

**AUTOMOTIVE**

## SAFETY SYSTEMS: RELAY DELAY ELIMINATED

AUTOMOTIVE SUPPLIER STANDARDIZES ON PLC-BASED SAFETY SYSTEM TO REDUCE TIME-TO-MARKET BY 20 PERCENT

### SOLUTIONS

#### Allen-Bradley® GuardPLC™ 1600 Controller

- Flexible controller ensures system is safe and reliable

### RESULTS

#### Reduced panel build, design and wiring time

- Prodomax reduced design and wiring time by 25 percent
- Reduced panel build time by 40 percent

#### Decreased overall labor costs

- Saved 25 percent in overall labor costs

#### Reduced startup time

- 20 percent reduction in startup time



*Prodomax was able to decrease overall labor costs and reduce startup time with the Allen-Bradley® GuardPLC™ 1600 controller.*

### BACKGROUND

One of the biggest challenges for automotive manufacturers is to continually meet financial and production goals with today's stringent standards, lean manufacturing processes and economic turns. To meet this challenge, automotive manufacturers have compressed product development life cycles to lower their production costs without compromising the overall quality of the product. Automakers are asking their machine builders to deliver equipment that is not only cost-effective and reliable, but also flexible enough to keep up with frequent line changes and scalable enough to respond to evolving market demands.

With any manufacturing system in the automotive industry, safety is an important goal. However, most manufacturers typically don't



*Wiring was less complex with the implementation of the GuardPLC™ 1600 controller. Because of this, Prodomax was able to reduce design and wiring time by 25 percent.*

associate safety with flexibility. They often assume that they have to give one up to get the other. Automotive industry supplier Prodomax Automation found out that wasn't the case. In fact, its use of the GuardPLC™ controller instead of traditional safety relays allows its automotive customers to create both lean and quickly adaptable manufacturing processes that keep operators safe.

As a designer and manufacturer of automated manufacturing solutions for 35 years, Prodomax is frequently called upon to meet the demanding requirements of the auto industry. Based in Barrie, Ontario, Canada, the company produces a complete range of automated welding and assembly systems — from semiautomatic, single-station machines to fully automated, multicell lines with automatic part transfer. These systems produce automotive interior, structural and engine components.

Depending on the complexity and size of the project, Prodomax can produce

up to 20 systems a year, taking up to 40 weeks to complete a project from start to finish. Each system includes varying degrees of automation, depending on the specific customer requirements and application demands. The systems include dedicated and robotic systems for gas metal arc welding, resistance welding, laser cutting and welding of sheet and tubular products. The company's welding systems perform high-volume, high-accuracy, repetitive work, both on ferrous and nonferrous metals. The assembly systems join a wide variety of products using screw-driving, nut running, riveting, staking, crimping and ultrasonic welding processing. The systems also range from simple single cells to multicell lines based upon transfer conveyor lines to include all assembly, testing and data acquisitions processes.

## CHALLENGE

Relay-based safety controls have a long history of helping prevent hazardous encounters between worker and machine. Safety light curtains and

emergency stop push buttons connected by safety relays have been the method of choice to protect welding-system machine operators. Their simple, mechanical design provides a level of assurance not always given to programmable control. But that assurance comes with hidden costs.

The light curtains and E-stops have to be wired to a central safety control panel full of safety relays. If an extra E-stop needs to be added, maintenance personnel have to run the wire back to the safety panel and rewire the relay cabinet. They may also have to add additional safety relays. In addition, as mechanical devices, relays are prone to wear, which may introduce faults into the system. All these factors add cost and reduce safety system flexibility.

"Although safe and reliable, this relay-based approach lacks the flexibility and intelligence that today's complex systems require," said Kristian Kangur, lead controls specialist, Prodomax Automation. "Relays themselves offer limited fault diagnostics and also are difficult to adapt as applications change because of the hardwiring they require. And, for logic-intensive applications, relays can take up a significant amount of panel space."

For these reasons, more and more manufacturers are choosing safety systems that involve safety-rated programmable controllers and networks.

## SOLUTION

One of the largest tier one automotive suppliers in North America and Europe turned to Prodomax to create a new assembly system to manufacture a rear rail assembly for a major automotive manufacturer.

The new system would consume approximately 20,000 square feet and

need to be completed in 40 weeks, which was complicated by more than a dozen line configuration changes and numerous product design changes during the initial development stages.

In traditional designs, if a person entered the cell during production, all 33 robots in the cell would shut down. While this created a safe state, Prodomax was concerned about the customer's productivity: the manufacturing cell would not be able to produce the required number of parts per week if unnecessary shutdowns were occurring. Therefore, operators would be more likely to bypass the safety devices and enter the cell preventing the safety equipment from providing the protection it was designed for.

Prodomax sought a way to give operators the ability to shut down only the parts of the cell where personnel were actually present, allowing other parts of the cell to continue operating. Complex safety logic was needed, and the Allen-Bradley® GuardPLC controller from Rockwell Automation helped solve the problem.

With the new design, all 33 robots have a GuardPLC 1600 controller or distributed I/O block in their control panels and communicate over a safety-rated GuardPLC Ethernet network. Now, when a light curtain is interrupted, the robots in the immediate vicinity of the interruption are shut down while the rest of the cell continues to operate. When an E-stop is pressed, all 33 robots are shut down.

## RESULTS

Compared with large relay-based systems, a system based on GuardPLC is more cost-effective, according to Prodomax. The reduced wiring and panel space enables faster assembly and startup, and conserves floor space. The flexible platform also helps reduce maintenance and troubleshooting time while allowing easy scalability as needed.

"With the ability to decrease floor space by reducing wiring and using smaller enclosures, we allow our customers to create a leaner manufacturing process," said Kangur. "And, unlike with safety relays, the new safety control system gives our customers greater flexibility to expand their machines in the future."

The new safety control system allowed Prodomax to complete the project in 35 weeks — significantly ahead of schedule. Prodomax then simulated production at its Barrie facility, completed tear down, shipped the system to the United States on 34 trucks, powered the machines back up at the customer's site, and began producing parts within just three weeks. The simplicity of the safety control system, combined with other control systems changes allows equipment startup to be completed days, even weeks, faster than in the past.

Prodomax has now standardized its safety system design approach and plans to include the GuardPLC controller in future projects. Prodomax even uses the new safety control

system as a selling advantage over competitors who are still using more restrictive relay-based systems. The clear advantages they cite are:

- 40 percent reduction in panel build time;
- 30 percent reduction of wires;
- 25 percent reduction in design and wiring time;
- 20 percent savings in overall labor costs;
- 20 percent reduction in time-to-market; and
- 20 percent reduction in startup time.

In addition, these are only the savings up until the time it is up and running. Additional savings can be realized with elimination of safety down time.

"We recognized the need for a standard safety design," said Don Leslie, resistance welding systems business unit leader, Prodomax Automation. "The GuardPLC controller from Rockwell Automation has allowed us to create a standard design and reduced our troubleshooting and configuration time. This gets our machines to market faster, which ultimately helps our customers deal with the compression of product life cycles."

*The results mentioned above are specific to Prodomax Automation's use of Rockwell Automation products in conjunction with other products. Specific results may vary for other customers.*

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