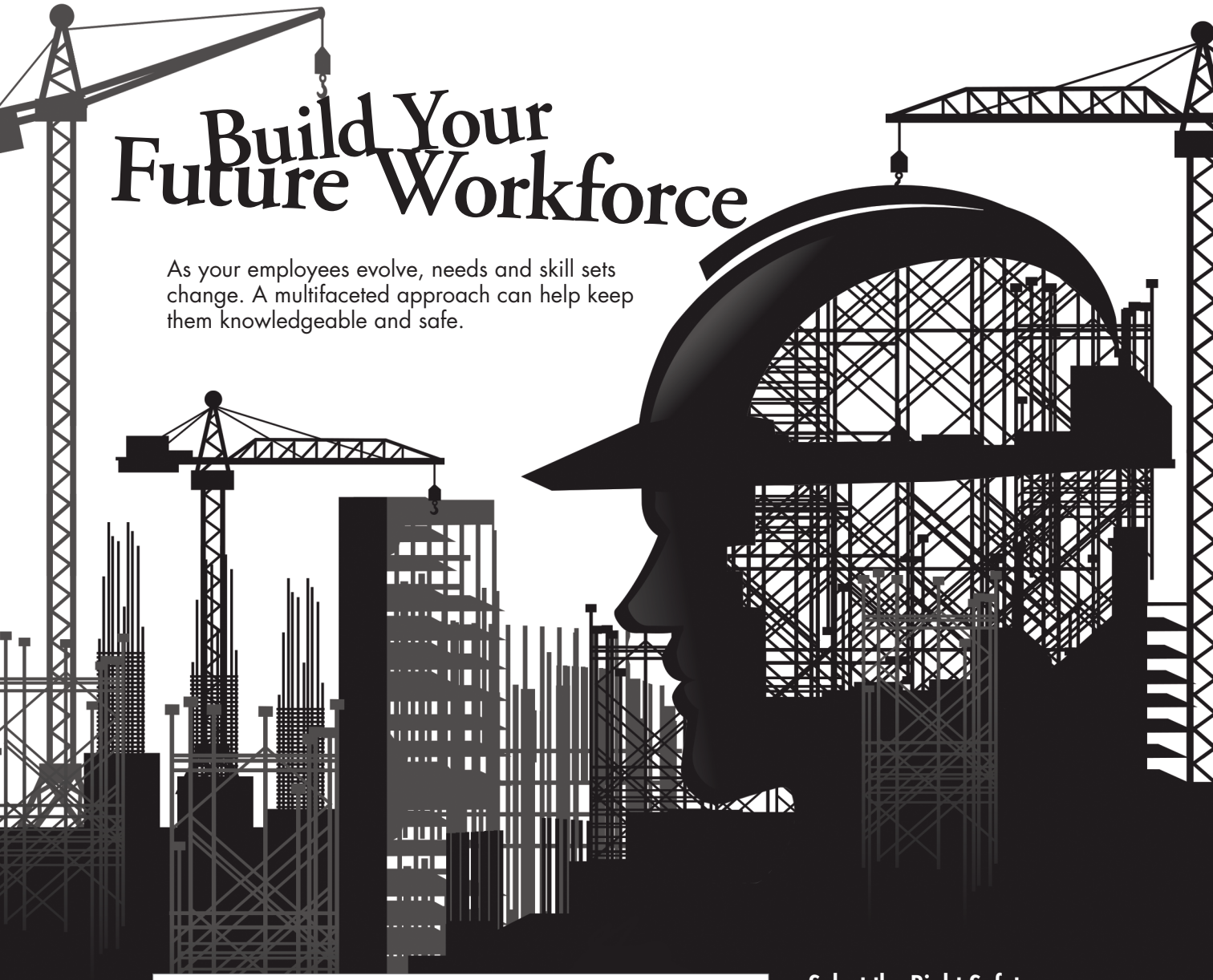
FEBRUARY 2016

THE JOURNAL

From Rockwell Automation and Our PartnerNetwork™



Build Your Future Workforce

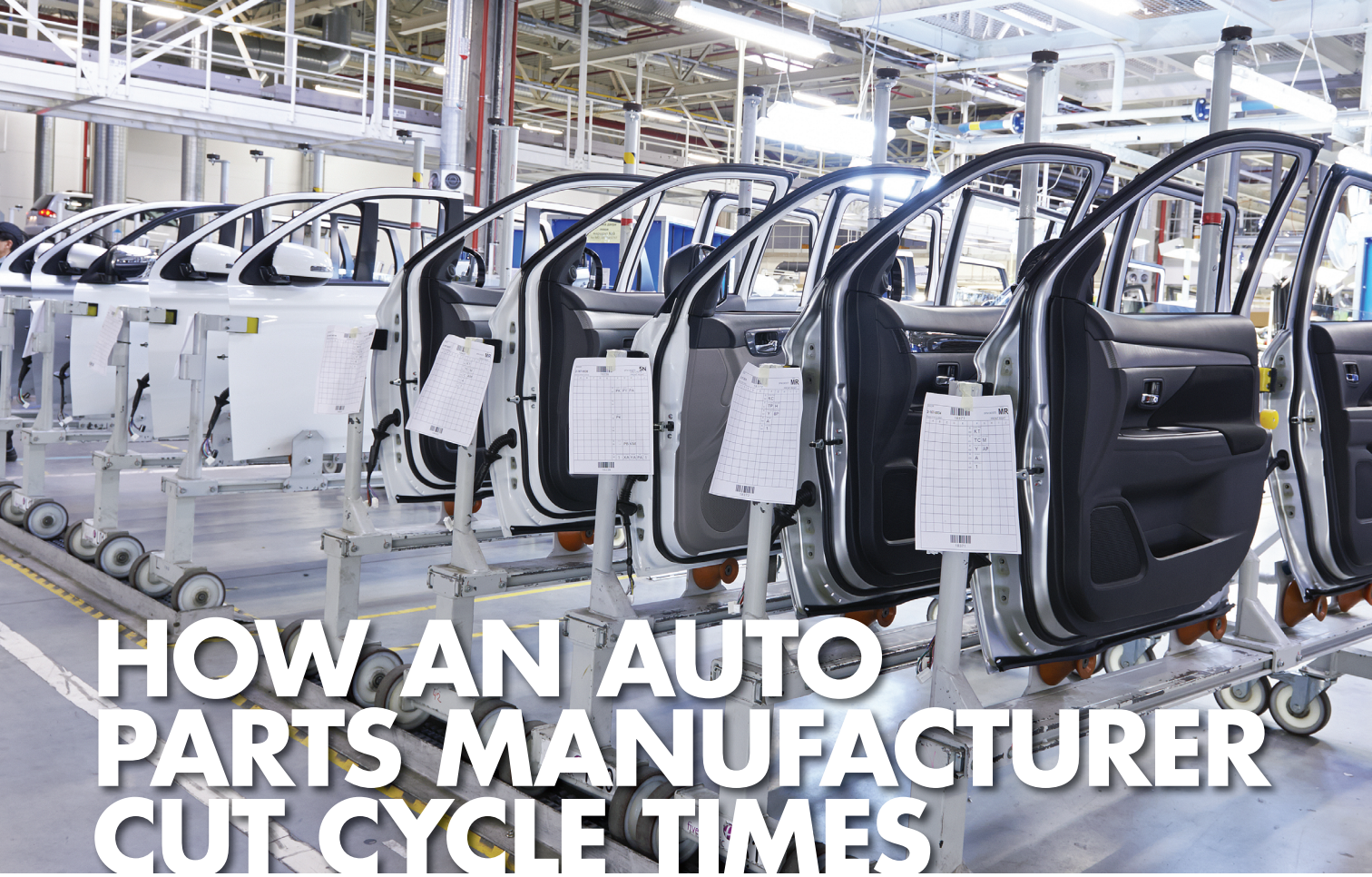
As your employees evolve, needs and skill sets change. A multifaceted approach can help keep them knowledgeable and safe.

Select the Right Safety Logic System

Digital Oilfields Connect Upstream, Midstream & Downstream Operations

Automation Fair 2015 in Review

PRSRT STD
US POSTAGE
PAID
HARRISBURG PA
PERMIT # 249



HOW AN AUTO PARTS MANUFACTURER CUT CYCLE TIMES

Using control loop monitoring software, a major lug nut producer slashed its lengthy heat-treatment batch process cycle time by 9.3% to improve production output.

From Control Station, Inc.

The process industry's objectives are simple: increase efficiency and throughput. Some process manufacturers are increasing productivity through technological innovations. Segments such as oil and gas and power have invested in new technologies to improve control over complex, often highly interactive processes. Whether multivariable or predictive in nature, these solutions can be costly and complex, creating obstacles for adoption by other process industry sectors. While other manufacturers may lack the broader energy industry's resources, their need for growth is equally significant.

McGard LLC is one such manufacturer. Based in Orchard Park, New York, the company produces automotive lug nuts, wheel locks and more. Their proprietary lug nuts keep automobile tires where they belong — on your car. In fact, McGard is a leading manufacturer of mechanical anti-theft devices.

Indeed, double-digit growth in demand for McGard's products understates their predicament. When production constraints forced management to invest in additional infrastructure, they simultaneously consulted their engineering team for input on more immediate solutions. Adding new production lines would be a multi-year project. McGard needed a short-term strategy that could run in parallel and deliver immediate improvements.

Cycle Time Conundrum

Dan Corby, plant engineer at the Orchard Park manufacturing complex, played a key role in developing a strategy to increase production. "We assembled a team and focused on the process itself," he shared. "While we understood the need to reduce the overall production cycle time, the phases of the process that consumed time excessively weren't obvious."

McGard applies a proprietary and time-intensive approach to its manufacturing. Critical to production is a multi-zone furnace and heat treatment process that completes the material transformation. This production phase also represents the primary bottleneck. After batches of semi-finished product enter cold through the furnace they automatically are transferred from zone to zone. Allen-Bradley® ControlLogix® programmable automation controllers (PACs) from Rockwell Automation control the temperature within each zone.

While McGard chose ControlLogix and other Rockwell Automation products based on their reliability and proven uptime, significant drops in temperature still occurred as each batch entered and exited the furnace. With every temperature drop the furnace required valuable time to reestablish the target temperature.

As with most every manufacturer, tight regulation of control loops is a critical success factor. When at temperature, McGard's control system can hold the process within a tolerance of less than 1% or roughly 25°F. The length of time would vary from batch to batch due to other factors, such as the relative mass of different batch sizes.

> Better awareness facilitates better decision-making, which enables performance improvements.

While the temperature's variability didn't affect product quality, the additional time involved with elevating each batch to reach the designated temperature extended the cycle time unnecessarily, therefore affecting throughput. Mounting market demand forced McGard's engineering team to look for help with their cycle time conundrum.

Complex Challenge

While temperature control is commonplace, its dynamics are by no means simple. Temperature is highly nonlinear, it's relatively slow to respond, and it tends to drift. In terms of nonlinearity, temperature's dynamics vary both at different levels of operation and in their direction (heating vs. cooling). Unlike fast-responding processes such as flow and pressure, temperature changes can be sluggish.

In the case of McGard's furnace, the process required nearly 35 minutes to recover from each drop of 200°F to 225°F in temperature. What's more, convection caused the furnace's temperature to drift after reaching the target temperature. Each of these presents unique challenges. For McGard, the goals of a fast ramp with zero overshoot added to the complexity.

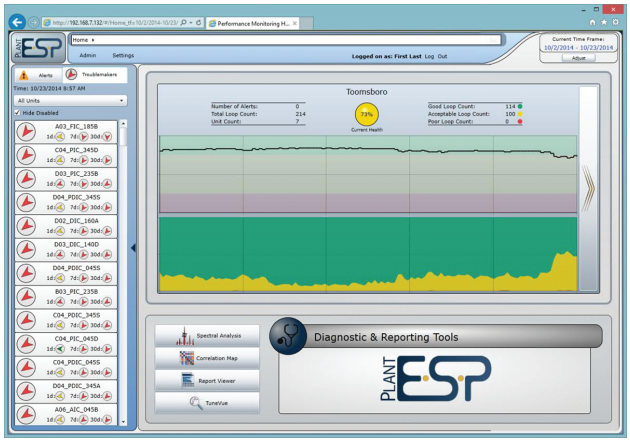
Recognizing the need for additional process control expertise, McGard engaged Manchester, Connecticut-based Control Station (www.rockwellautomation.com/go/p-controlstation), a global member of the Rockwell Automation Encompass™ Partner Program. The collaboration matched McGard's subject matter experts with Control Station's process diagnostic and optimization technologies.

Control Station's PlantESP, a plant-wide control loop performance monitoring (CLPM) system, identifies performance issues, isolates root causes and recommends corrective actions. Using the plant's historical process data, PlantESP would provide the necessary analytics and become the cornerstone of McGard's three-phase strategy of find, correct and sustain.

Ideally suited for use at small to midsize production facilities, the CLPM system's architecture can be deployed rapidly. It links directly to a plant's data historian and automatically establishes key performance indicator (KPI) benchmarks for each PID control loop. KPIs assess a range of issues affiliated with PID control loops, including controller tuning, process interaction and mechanical issues.

Within two days of installing the CLPM system, the McGard team received its initial reports. The information singled out upstream loops that were interacting with the furnace and hampering control. Specifically, the CLPM system identified a motor that drove the process' cooling tower fan. The motor regularly ramped from 0-100% and had a history of failing. While the motor's behavior was a known source of unplanned downtime, it had not been linked previously to variability in the furnace's temperature control. The CLPM system pinpointed this and uncovered an array of other issues limiting control and lengthening the process' cycle time.

To help reduce cycle time, the team used the CLPM system to baseline the performance and timing of all phases of the production process. Chief among its findings was the furnace's role as a bottleneck. It took about 60 minutes from the time



PlantESP software monitors the performance of PID control loops on a plant-wide basis. It identifies performance issues, isolates the associated root-causes, and recommends appropriate corrective actions.

a batch first entered the furnace to the time it exited into the Quench. Using these insights, McGard's engineering and production staff targeted a reduction of 7.5 minutes — 13.51% of the original cycle time. Doing so would allow them to satisfy their short-term objectives for output.

Productivity Gains

Diagnostic tools like PlantESP aren't the complete answer, but they play an essential role in achieving effective process control. While PlantESP confirmed many of McGard's hunches, it also revealed many issues which the engineering team was unaware. Ultimately, the McGard staff's understanding of both their process and manufacturing objectives made the gains possible. Equipped with the new findings, they were able to implement the necessary corrections. Adjustments to the Quench and Wastewater Conductivity processes in particular, combined with retuning key control loops, reduced cycle time 9.3% and increased throughput up to 13.5%.

Better awareness facilitates better decision-making, which enables performance improvements. The improvements in control and the associated reduction in cycle time represent a significant win for McGard. Even so, they recognize that performance improvements often are temporary. The CLPM system can help McGard sustain those gains and find others. While their processes may be less sophisticated than those in the energy sector, McGard's needs proved equally significant and the gains were equally compelling. In the end, the goals of increased efficiency and throughput are shared. □

Encompass™ Product Partner Control Station, Inc., headquartered in Manchester, Connecticut, offers the LOOP-PRO Tuner software that simplifies the tuning of PID controllers, and PlantESP for monitoring plant-wide performance of control loops.

Control Station, Inc.
www.rockwellautomation.com/go/p-controlstation

Rockwell Automation Encompass Product Partner Program
www.rockwellautomation.com/go/tjencompass