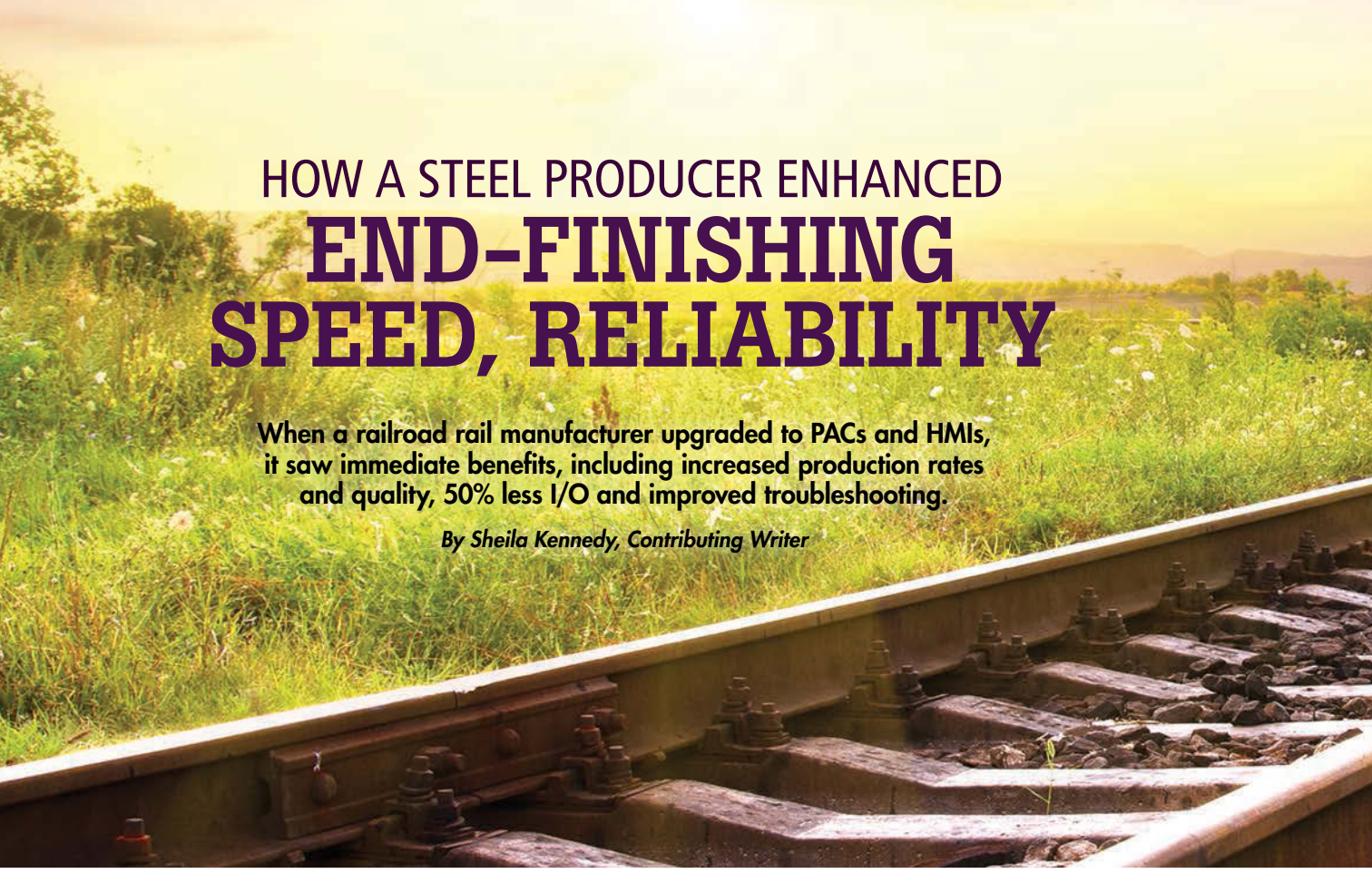

HOW A STEEL PRODUCER ENHANCED END-FINISHING SPEED, RELIABILITY

When a railroad rail manufacturer upgraded to PACs and HMIs, it saw immediate benefits, including increased production rates and quality, 50% less I/O and improved troubleshooting.

By Sheila Kennedy, Contributing Writer

Leading steel product manufacturers must constantly adapt to changing customer demands, industry standards, and various internal and external forces. Chicago-based EVRAZ North America, the largest producer of rail in North America, is attentive to such changes and committed to continuous improvement. As a result, EVRAZ invested in equipment upgrades and added a state-of-the-art Product Technology Center at its Pueblo, Colorado facility, which also is known as EVRAZ Rocky Mountain Steel. The Rail Mill manufactures specialty products such as deep-head hardened (DHH), long-wearing rail for some of the nation's major railways.

In 2012, EVRAZ asked Matrix Technologies, a system integrator and Rockwell Automation® Solution Partner, to lead the automation integration portion of the installation of new saws, roller tables and rail quality inspection equipment, which would allow for more efficient rail finishing.

"Matrix had done several projects for EVRAZ in the past, including upgrading our programmable logic controllers [PLCs] in the Rail Finishing Mill," says Bruce Barrett, a senior electrical engineer at EVRAZ Rocky Mountain Steel. "Since this new project primarily involved installation of new equipment for the same mill, Matrix was the logical choice. They knew our process and had demonstrated their ability to successfully get the job done."

Phased Modifications

The first project task was to replace the saws that cut the ends of each rail, making the process much faster. EVRAZ contracted an Austrian company to build the six new saws, two for each of the three finishing beds. The finishing beds would also be modified to use Allen-Bradley® PowerFlex® drives (www.rockwellautomation.com/go/tjpowerflex) and ControlLogix® programmable controllers (www.rockwellautomation.com/go/tjcontrollogix).

"This was the biggest modification in the project," says Ray Baca, project manager at Matrix. "The three finishing ends were upgraded consecutively, beginning with the most convenient one."

Matrix was simultaneously leading the mill-wide PLC upgrade already underway. "Our old PLCs were obsolete, and support was no longer available," explains Barrett. "We needed to replace and upgrade them, but do it without affecting production. ControlLogix L62 controllers were successfully installed over three years in three phases, and production actually increased with each phase."

"From the beginning, we'd had a vision of everything on the finishing end communicating with each other," Baca adds. "We designed the network architecture for EVRAZ with that in mind."

The second phase of the project focused on the roll lines, or roller tables, that transport the rail into the new

saws. Eight roll lines were replaced with new hardware. PowerFlex 755 AC drives were added to control the newly designed roller tables.

Next were the walking beams that lift the rail from the roll line to a chain that transports it into the saw. "We replaced motors, clutches, and limit switches controlled by AC starters on three walking beams," says Barrett. The walking beams also were retrofitted with new PowerFlex 700 drives with encoder feedback. Matrix provided the PowerFlex drives and PLC logic for the control.

"The new rail transport system is very reliable, which is a huge benefit to us since the old system was problematic and caused significant downtime," adds Barrett.

Following that, six operator stations were replaced with PanelView™ Plus 6 graphic terminals (www.rockwellautomation.com/go/2711). "We have a new common Ethernet communication network architecture for all nine PLCs, seven human-machine interfaces [HMIs] and 10 AC drives," says Barrett.

"Everything previously had digital I/O. There was no HMI," remarks Baca. "The PanelView Plus implementation eliminated roughly 50% of the I/O on the finishing end."

Matrix then created a new HMI application for the mill's distribution pulpit, which allows the distribution operator to continuously track all rail throughout the facility.

Lastly, a new state-of-the-art nondestructive testing (NDT) station was added for quality control, and Matrix integrated the transport of the rail into and out of the European-made NDT station. "A lot of handshaking had to take place, but since we already had the network architecture set up to communicate, it wasn't really that difficult," explains Baca. "The NDT station gives EVRAZ better control of the transport of the rail, and the operator can see everything through the HMI."

The NDT station also enhances safety. "Now that the entire finishing end is communicating over one Ethernet network, we are able to create system alerts for them," he says. "Information transfers from PLC to PLC easily, and that communication helps to ensure that the rails don't collide with one another, for example."

Integrating the European-made NDT station and saws into the mill presented a challenge for Matrix. European OEM equipment often uses European controllers, but EVRAZ specified ControlLogix controllers. "There was a communication barrier to overcome," says Baca. "We worked very closely with the Austrians and Germans to make sure we understood each other and what data had to pass back and forth, but in the end, it was a successful project for EVRAZ as well as Matrix Technologies."

To complete the finishing end transformation, EVRAZ chose Rockwell Automation push buttons, selector switches, proximity sensors, pilot lights, and other components.

Quality control improvements with additional nondestructive testing (NDT) enhance flaw detection. The NDT station also improves safety. Because the entire finishing end now is communicating over one Ethernet network, EVRAZ can create system alerts for operators that are useful for situations such as preventing rails from colliding with one another.

Redesign Delivers Rewards

By 2014, all elements of the transformation project were live. The total solution took a little over one year to implement, and it delivered several major advantages, including:

- The mill now can more efficiently produce high-quality rail.
- Transfer of information between PLCs on the finishing end is easy with no hard-wired inputs, making maintenance troubleshooting easier, reducing equipment failures and increasing safety.
- Production rates are increased because of faster finishing (cutting) of rail ends.
- The mill eliminated about 50% of the I/O on the finishing end by replacing its operator stations with PanelView Plus HMIs.
- Quality control improvements with additional redundant NDT methods provide enhanced flaw detection, thus improving customer satisfaction and reducing potential product loss due to quality issues.
- New diagnostics and alerts have improved troubleshooting for maintenance.
- The distribution operator can continuously track all rail from a centralized, graphical distribution pulpit HMI.
- The common communication network architecture is a modular solution, offering greater flexibility and

agility in adapting to production growth and changes.

"Ray Baca did an outstanding job," praised Barrett. "The amount of hardware and software changes required to integrate all of this new equipment was enormous, the system architecture is great, and Matrix also provided several other additional installations throughout the course of the project."

The upgrades at the EVRAZ Rocky Mountain Steel Rail Mill reflect the corporate-wide commitment to safety, quality and customer service. □

Matrix Technologies, headquartered in Maumee, Ohio, is a Rockwell Automation Solution Partner with more than 30 years of experience in the industrial market. Matrix provides integration engineering services, including control systems integration; process and facilities systems integration; engineer, procure and construct services; and MES/enterprise integration. Industries served include metals, chemical, pharmaceutical, food and beverage, and oil and gas.

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