



EFFICIENCY is EVERYTHING

Learn how U.S. Pipe implemented a new automation system to monitor its automated ductile iron pipe manufacturing operations.

U.S. Pipe required an OEE system to help managers understand the efficiency and downtime of their new facility. Solution Provider Stone Technologies worked with U.S. Pipe to define reporting requirements, and designed and implemented a solution.

»» When designing and implementing a new manufacturing system, manufacturers depend on their partners to develop and implement industrial automation systems that meet their goals without delaying production. U.S. Pipe and Foundry Company's automated ductile iron pipe manufacturing operation in Bessemer, Ala. is an efficiency-based, streamlined,

flow-through process facility. It is the only ductile iron pipe facility in the United States to employ state-of-the-art machinery and transport systems.

U.S. Pipe announced plans for the automated operation in May 2007, and it began producing orders in the fall of 2008.

Two of the goals for the Bessemer operation were to improve quality and lower cost, and both goals have been met through automated processes and improvements in technology.

The facility was designed to operate up to 24 hours per day, making maximum asset utilization a requirement. New equipment assets have advanced U.S. Pipe's level of automation, while under-utilized assets at sister facilities were used where appropriate for the new operation.

Let's examine how the project team implemented the new facility's industrial automation system, the technologies they used and the goals achieved by U.S. Pipe.

What the Company Needed

U.S. Pipe required a system integrator to develop and install an OEE system to help its managers understand

»» Stone Technologies Named System Integrator of the Year

Rockwell Automation Solution Provider Stone Technologies was recently named the 2010 Control System Integrator of the Year by *Control Engineering* magazine in the up to \$10 million in revenue category. Judges reviewed system integrators on their achievements in areas of technical expertise, business skills and customer satisfaction. Learn more at <http://bit.ly/ce5CCf>.



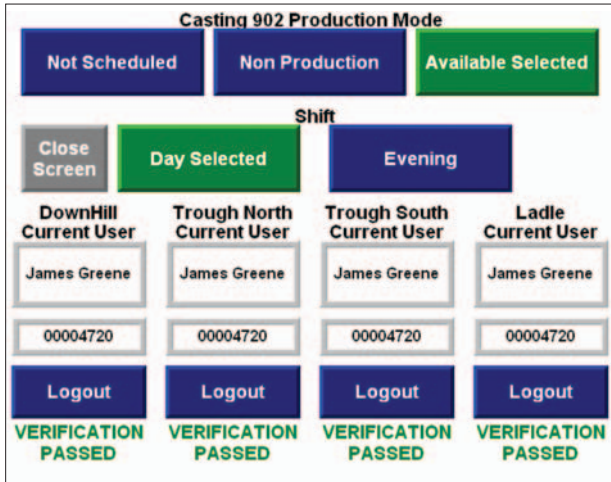


Figure 1. This custom FactoryTalk View ME HMI screen allows operators to select the production mode for the operation. Operators also can choose the current shift and log into the operation.

the efficiency and downtime in its automated ductile iron pipe manufacturing operation in Bessemer. The integrator needed to deliver a complete OEE and human-machine interface (HMI) solution. The solution had to include custom-reporting capabilities and HMI operator-login screens for downtime and event logging. The system also required data acquisition and transfer to the following facility locations:

- North and South holding furnaces
- Treating ladle
- Casting 901
- Casting 902
- Pipe run
- Paint
- Packaging

The company was working with its local system integration partner, Rockwell Automation Solution Provider Revere Control Systems, Inc. for controls integration. Because the application also required OEE for advanced data collection and reporting, Revere introduced U.S. Pipe to Stone Technologies, Inc. because of Stone's experience in the manufacturing execution system (MES)/OEE space (see sidebar on **page 30**). Stone Technologies is a Rockwell Automation Information Solution Provider, and the firm was engaged with the project for responsibilities that included:

- Hardware and software procurement
- Database design
- OEE system configuration
- Custom-report development
- HMI design
- Creation of custom reporting portal

>> Who is U.S. Pipe?

U.S. Pipe and Foundry Company was incorporated in 1899 as United States Cast Iron Pipe and Foundry Company. The incorporation consolidated 12 companies located in eight states. Each of the company's original plants manufactured pipe by the pit cast method. With this method, molten iron was poured in vertical molds lined with sand.

In 1921, the Company began manufacture of cast iron pipe using the centrifugal casting method.

Today U.S. Pipe and Foundry Co., a wholly owned subsidiary of Mueller Water Products Inc., is the largest domestic producer of ductile iron pipe in sizes 4 in. through 64 in. U.S. Pipe says it perfected ductile iron pipe production, with a product superior in strength to cast iron. It was the first in the industry to use ductile iron exclusively for all pressure pipe and fittings.

Headquartered in Birmingham, Ala., the company has facilities in Bessemer, Ala. and Union City, Calif.

Technology Supporting the OEE Solution

Stone Technologies worked with U.S. Pipe to define reporting requirements, and designed and implemented an appropriate solution. The new system tracks the efficiency, downtime and operators at each point on the line to provide visibility into production.

To provide the desired data management functionality,

U.S. Pipe personnel can use custom HMI screens to interact with or modify data.

the solution uses Rockwell Software® FactoryTalk® Metrics, FactoryTalk Transaction Manager and FactoryTalk Historian Classic from Rockwell Automation (<http://bit.ly/4RdRov>). These data management tools enable integration and workflow across disparate systems, and storage of master data, event, process and production information. They organize, synchronize, archive and aggregate data collected by automated or manual systems.

The new solution also uses Microsoft SQL Server 2005 and Microsoft SQL Server 2005 Reporting Services. This allows the facility's managers to understand information from its casting operations, including valuable data for each of the different chemistries captured.

In addition, U.S. Pipe has several internal applications that store data related to production and created by its Plant Systems group. New custom reports provide vis-

ibility into the data stored within the Plant Systems database structures.

Stone Technologies also developed a custom application using Microsoft ASP.Net so U.S. Pipe can recategorize downtime events and enter notes that team members can review to help make process improvements.

How U.S. Pipe Uses the Tools

Using these tools, U.S. Pipe personnel can use custom screens to meet their needs. Each screen interacts with data that either will be captured by FactoryTalk Metrics, or that will modify data previously captured by FactoryTalk Metrics.

Production Mode Selection/Operator Logon.

The HMI screen shown in **Figure 1** allows operators to select the current production mode for the operation. Operators also can choose the current shift and log into the operation.

HMI Screen, Operator-Stop Selection. **Figure 2** shows an HMI screen that allows the operators to choose from several categories of operator stops. Once the operators select the category for the downtime, they can then select a more detailed reason for the downtime.

Downtime Recategorization. The screen in **Figure 3** allows the operations team to clarify data recorded by the system. The operations engineer selects the operation for data modification, the shift and the product to be modified. The user then can review downtime events



Figure 2. HMI screens allow operators to choose from several categories of operator stops. Once operators select the downtime category, they can then select a more detailed reason for the downtime.

and make any necessary modifications, such as splitting events into multiple time buckets or changing descriptions or adding notes. **Figure 4** shows a screen with a display of detailed events to be recategorized.

The screen in **Figure 5** illustrates U.S. Pipe personnel's ability to enter run notes by operation, shift and product. **Figure 6** is a report showing the run notes entered by operations personnel.

Sum of the Parts

The automation system provides U.S. Pipe with multiple benefits, including the ability to:

- Get real-time downtime data.
- Track operators at each location in the facility.
- Get real-time efficiency information.
- Use FactoryTalk Transaction Manager to move data between the control system and its Plant Systems group data sources.

An interesting facet of the Bessemer project is that the combined result of existing technologies in its layout is what's leading to superior performance. The sum of the parts is the key to the plant's success. All the equipment deployed in the facility is similar to successful solutions in manufacturing operations around the world; the plant has no trial or research and development-designed equipment.

While the Bessemer operation uses far more automated processes than traditional ductile iron pipe facilities, it re-



Figure 3. This screen allows the operations team to clarify data that the system recorded. The operations engineer selects the operation for which he/she wants to modify data, the shift and product. The user then can review downtime events and make any necessary modifications, such as splitting events into multiple time buckets, changing descriptions or adding notes.

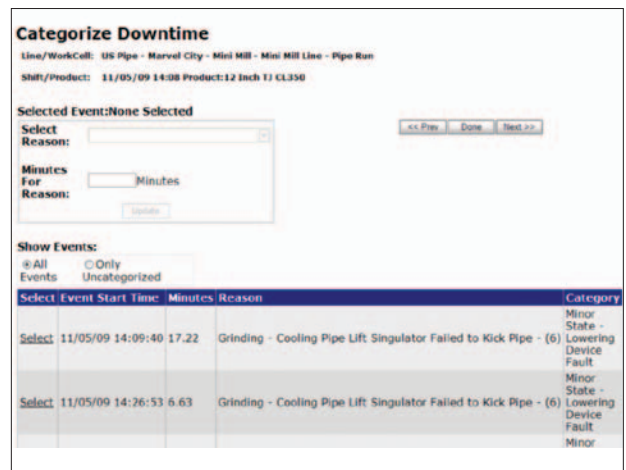


Figure 4. This custom screen displays detailed events to be recategorized.

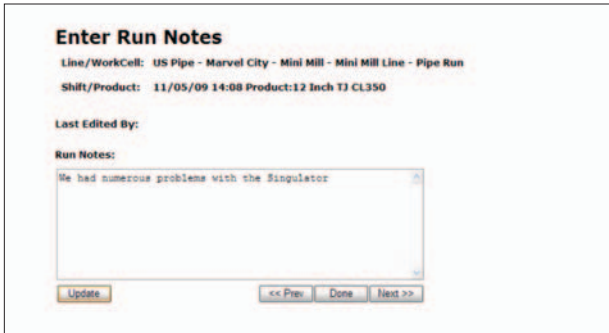


Figure 5. This screen in provides the ability to enter run notes by operation, shift or product that was run.

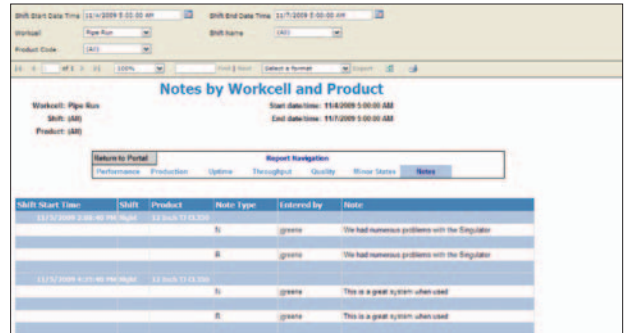


Figure 6. Operators can generate a report showing all of the run notes entered by operations.

lies heavily on a highly skilled work force. Time and development was spent on bringing the new workforce into the facility to assist with the completion of the installation.

Training is a fundamental foundation of U.S. Pipe's culture by investing in people, helping them grow and providing challenges to stimulate minds. Employees are cross-trained on all jobs within the facility including on preventive maintenance duties. Through automation, U.S. Pipe has moved towards a workforce

that monitors processes. The resulting work environment encourages lower turnover and provides a stable employee environment. State-of-the-art performance monitoring software established performance standards for continuous improvement. Combining new controls and automation with existing manufacturing technologies has lead to superior performance.

The collaboration between the two Solution Providers is a hallmark of Rockwell Automation partner companies.

>> SOLUTION PROVIDERS

A select group of Rockwell Automation system integrators has achieved Solution Provider partnership status. This is a heightened and exclusive business relationship with Rockwell Automation. Solution Provider partners are proven, trusted and established organizations that offer extensive experience in the design, implementation, project management and maintenance of customers' industrial control systems.



Discipline: You can feel confident choosing a Rockwell Automation Solution Provider (SP). To earn the SP partner status, integrators must possess high corporate standards, financial stability, proven methodologies and competency using Rockwell Automation technologies.

Credibility: SPs are well-established organizations that offer extensive experience in advanced automation solutions. They have been trusted advisers for their customers from initial design and consultation, system development, through the commissioning of comprehensive Rockwell Automation solutions.

Expertise: Whether your need is in design, project management, implementation or manufacturing systems maintenance, SPs possess the industry knowledge, domain expertise, resources and skills to deliver world-class solutions.

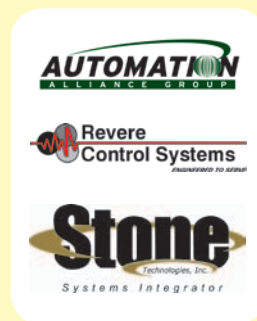
In 2009, Rockwell Automation expanded its Process Systems Integrator Program with 45 new members. With expertise in the metals, power generation and other process industries, the new program members will support the Rockwell Automation PlantPAx™ Process Automation System, bringing plant-wide control on a single platform to manufacturers looking to migrate their aging DCS systems. New program members also include 18 Latin American Solution Provider partners.

These process system integrators are reviewed for domain expertise, engineering excellence and geographic reach, among other criteria. They're selected for their abilities to help Rockwell Automation deliver value through the design, development and delivery phases of our customers' projects.

For more information on the Rockwell Automation Process System Integrator Program and Solution Provider Program, visit www.rockwellautomation.com/go/sitj.

>> What is Automation Alliance Group?

Rockwell Automation Solution Providers Revere Control Systems and Stone Technologies both worked on the U.S. Pipe project. These two system integrators are business units of Automation Alliance Group (AAG), a corporation owned by system integrators. AAG provides process and technological capabilities globally. Its member companies have more than 200 engineers, 250 technicians and 600 employees, with offices in the United States, South America, Europe, Australia and Asia. AAG has every major skill set required in the industrial control and information field, from PAC and DCS systems to MES and ERP, and can provide complete turnkey design and installation for electrical, control and information system projects. As member companies, Stone Technologies and Revere Control systems share resources with the entire group for specialty technologies, to supplement its staff or to provide additional geographic coverage.



"This is a great example of how the Rockwell Automation PartnerNetwork benefits our customers," says Lee Tschanz, Rockwell Automation vice president of North America sales. "Our customer is more successful because of the power of collaboration between two independent Solution Providers working together."

Automating the processing, combined with technology improvements to improve quality, service and operational efficiencies. The goal is to create a work environment that encourages safety, continuous improvement exceeding customers' expectations. □

Rockwell Automation Solution Provider Stone Technologies is a system integrator headquartered in St. Louis, Mo., with operations in seven states and one in Canada. Stone serves the consumer products, food & beverage, pharmaceutical and chemical industries. For more information on this project, contact Dan Engelhard at dengelhard@stonetek.com.

Rockwell Automation Solution Provider Revere Control Systems, Inc., Birmingham, Ala, is an engineering firm specializing in true design-build control system integration. The company provides real-world simulation testing, documentation and Web-based access to all project files.

Stone Technologies, Inc.

www.rockwellautomation.com/go/p-stone

Revere Control Systems, Inc.

www.rockwellautomation.com/go/p-revere

Rockwell Automation Solution Provider Program

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