

# Ridgeline Pipe Manufacturing's New Integrated, Information-Enabled Facility Delivers Parts Fast to Electrical Customers

Rockwell Automation Integrated Architecture™ System Helps PVC Pipe Maker Improve Quality, Ease MRO and Out-pace Competition

## Solutions

### Integrated Architecture System

- Allen-Bradley ControlLogix and CompactLogix PACs provide an integrated platform for motion and equipment control
- Allen-Bradley PanelView Plus human-machine interfaces provide easy access to production data from either end of each 160-foot extrusion line
- EtherNet/IP™ allows seamless communication across all four lines

### Intelligent Motor Control

- Allen-Bradley PowerFlex 700 AC drives meet demands for space, flexibility and reliability
- Allen-Bradley CENTERLINE 2100 low-voltage MCC with IntelliCENTER technology helps minimize downtime by quickly providing operators with diagnostic and predictive failure information

## Results

### Reduced Startup Time

- The new facility was producing PVC pipe within two hours of equipment startup, which the team hadn't seen done in under 48 hours

### Improved Efficiency and Flexibility

- Ridgeline Pipe estimates a 25 percent reduction in the number of operators needed on any shift, which helps dramatically reduce costs for a 24/7 operation
- Operators can make fast, easy product changeovers using HMI screens to accommodate frequently changing customer needs



Armed with nearly 100 years of experience, Ridgeline Pipe Manufacturing makes and sells about 100,000 pounds of electrical PVC pipe per day.

## Background

PVC is so ubiquitous in modern life that the man-made material is well-known by its acronym alone. Technically called polyvinyl chloride, this durable, water-and-fire-resistant plastic compound is used for everything from house siding to faux-leather clothing.

But it is most commonly cast into hard, white pipes, and used to contain and convey essential elements of everyday life. PVC pipes carry clean water to and through most homes and businesses in America, and 75 percent of the sanitary sewers in the United States are built using this lightweight, low-cost tubing.

Because PVC is electrically inert, it is also an ideal material for encasing power-charged wires.

Ridgeline Pipe Manufacturing in Eugene, Ore., manufactures and sells about 100,000 pounds of electrical PVC pipe, elbows, sweeps and molded fittings per day. Major electrical distributors rely on Ridgeline Pipe, sometimes on short notice. That is because end users – usually electrical, mechanical and commercial building contractors – often find themselves running low on a specific product at a construction site, or realize they need a different size, color or type of fitting to meet various construction codes.

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With a collective century of PVC-manufacturing experience, the founders of Ridgeline Pipe needed a nimble and efficient operation to meet the needs of the frequently unpredictable electrical market.

“We wanted a facility that allows us to react more quickly than our competitors,” said Jack Piper, engineering manager, Ridgeline Pipe Manufacturing. “We needed to be able to approve a customer’s order and begin production within minutes, rather than the one or two days it takes larger competitors.”

## Challenge

Ridgeline Pipe manufactures about 125 different PVC pipe products that vary in length, diameter, color, markings and other requirements. Four extrusion lines can produce about six feet of the company’s largest pipe and about 50 feet of its smallest pipe per minute.

But when a last-minute order comes in, speed matters less than the ability to instantly shift production to meet the customer’s need.

“We do a minimum of three product changeovers each day, and every product has its own unique set of parameters,” Piper explained. “We needed each line to collect, store and automatically download data that operators could fine-tune as needed.”



The MCC helps minimize facility downtime by quickly providing intelligent diagnostic information.

Traditional extruders are often mechanical, and use legacy technology and standalone components, such as temperature sensors. They also require a lot of manual operation, resulting in inconsistent pipe thickness. Without the ability to automatically program uniform parameters, operators often overestimated the amount of material needed by working against the minimum size requirements. The result is wasted PVC and reduced profits.

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Troubleshooting the reason why one line or shift produced higher quality pipe than another also proved difficult without sophisticated information capabilities.

“The more we automate production and monitor pipe thickness, the more we can track quality and deliver consistent product to our customers,” Piper said. “This also translates into increased revenue because we avoid wasting material. We needed an automation solution that could satisfy our many requirements and position us for growth.”

## Solutions

Ridgeline Pipe partnered with The Automation Group, the system integrator and Rockwell Automation to create a flexible, reliable and efficient production platform.

“The main goal was to build fully integrated PVC extrusion lines that would reap repeatable results and could be managed remotely,” Piper said. “It made clear financial sense to choose the Rockwell Automation Integrated Architecture™ system because it allows seamless communication across all equipment. Operators can make fast product changeovers, and the platform provides the foundation for an even more data-ready, information-enabled system in the future.”

The brain behind each 160-foot extrusion line is the Allen-Bradley® ControlLogix® L61 programmable automation controller (PAC), which manages all control and motion functions for each piece of equipment in the PVC manufacturing process.



An HMI placed at each end of the four 160-foot extrusion lines allows operators to view any piece of equipment while standing at either end of a line, simplifying maintenance and repair.

First, a powder mixture of PVC resin moves from a storage hopper through one end of an extruder, which heats and pumps the melted resin through the metal die that forms each PVC piece. A puller moves the plastic tube through the die. The PVC tube then passes through other pieces of equipment that size, cool, cut and print markings on the piece, based on customer requirements.

The Logix control platform's single programming environment enables The Automation Group's engineers to fully integrate this process. Using Allen-Bradley PanelView™ Plus 1000 human-machine interfaces (HMIs), operators can view any piece of equipment when standing at either end of each 160-foot extrusion line. With these user-friendly interfaces operators can make fast product changeovers, and simplify maintenance and repair.

Ridgeline Pipe also uses an Allen-Bradley CENTERLINE® 2100 low-voltage motor control center (MCC) with IntelliCENTER® technology. The networked MCC's integrated hardware and software is preconfigured and pretested, helping reduce installation time. The MCC also minimizes downtime by quickly providing Ridgeline Pipe operators with intelligent diagnostics and predictive failure information.

With DeviceNet™ integrated into the MCC, engineers can remotely access detailed production information from the MCC without potential exposure to dangerous conditions and power equipment. Remote monitoring also allows maintenance personnel to monitor the MCC's performance from anywhere, thus minimizing the need for workers to travel through the heavy-traffic facility and enter the MCC. Operators can safely monitor, troubleshoot and diagnose potential problems, and help prevent equipment failures – ultimately resulting in improved productivity and reliability.

Each line also includes Allen-Bradley PowerFlex® 700 AC drives, and pressure and temperature sensors from Rockwell Automation. The sensors precisely control heating and cooling temperatures, and manage pressure throughout the process. The Allen-Bradley CompactLogix™ PACs control the pulverizing and grinding system, which processes byproduct and waste.

## Results

The biggest implementation challenge was writing the unique software code needed to control each extrusion line.

"A program is only as good as the knowledge base behind it," Piper said. "The Automation Group developed the code using the Rockwell Automations sample code library for temperature control. By using the sample code we were able to save time and headaches in the design stage."

***"Rockwell Automation is always at the top of the technology curve, and we trust the company to keep us poised to take advantage of advancements."***

Ridgeline Pipe was manufacturing product within two hours of equipment startup.

"Our team had never seen that done in less than 48 hours in any similar production environment," Piper said.

Representatives of The Automation Group, Inc., a Recognized System Integrator for Rockwell Automation, were equally impressed.

"We've never seen any other supplier match the time and dedication Rockwell Automation provided during the design and implementation stages of this project," said Gary Jenks, vice president of technology at The Automation Group.

Now that the new control platform is in place, Ridgeline Pipe is enjoying the benefits. The ease of using the Logix control platform makes troubleshooting and predictive maintenance easier. Ridgeline Pipe also estimates it needs 25 percent less operator time per shift – a nice boost to the bottom line for a 24/7 operation.

The nearby location of Rockwell Automation distributor, North Coast Electric, eliminates the need for Ridgeline Pipe to stock many spare parts.

"This means less money is sitting on our shelves, which is a big part of reducing overhead expenses for a small company," Piper said.

The Integrated Architecture system incorporated into Ridgeline Pipe's operation also opens up the possibility of utilizing the FactoryTalk® Historian software for real-time access to past process and production information across the facility. Employees at all levels could view historical data for each extrusion line on demand, and easily locate the source of any issues. Production supervisors could also compare and assess the performance of each line during each shift, and use the information to educate employees about best practices.

"Rockwell Automation is always at the top of the technology curve, and we trust the company to keep us poised to take advantage of advancements," Piper said. "Any additional upfront cost pays off 100 percent through the cost savings we see in ease of integration and implementation."

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

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### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846