

LISTEN.
THINK.
SOLVE.®

Priming the Pipeline

Modernizing pipeline operations can enhance flexibility, data management and security



**Rockwell
Automation**

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An Aging Infrastructure

More than 3.5 million kilometers (2.2 million miles) of oil and gas transmission pipelines are in place today in more than 120 countries.¹

However, many pipelines are several decades old. For example, there are more than 300,000 miles of gas-transmission pipelines in the U.S. One-third of them were installed before 1960.²

These decades-old pipelines are creating challenges for pipeline companies, including:

- The pipeline systems give operators limited access to accurate and timely data
- They lack flexibility to help operators efficiently respond to market needs and commodity prices
- They present maintenance, reliability and safety issues
- They have compliance issues with new pipeline security regulations

“ Over 50 percent of the nation’s pipelines were constructed in the 1950s and 1960s during the creation of the interstate pipeline network built in response to the huge demand for energy in the thriving post-World War II economy.”³



¹ Field Listing: Pipelines, U.S. Central Intelligence Agency, 2013

² Miles By Decade Gas Transmission, U.S. Pipeline and Hazardous Materials Safety Administration, May 4, 2016

³ The State of the National Pipeline Infrastructure, U.S. Department of Transportation, 2011

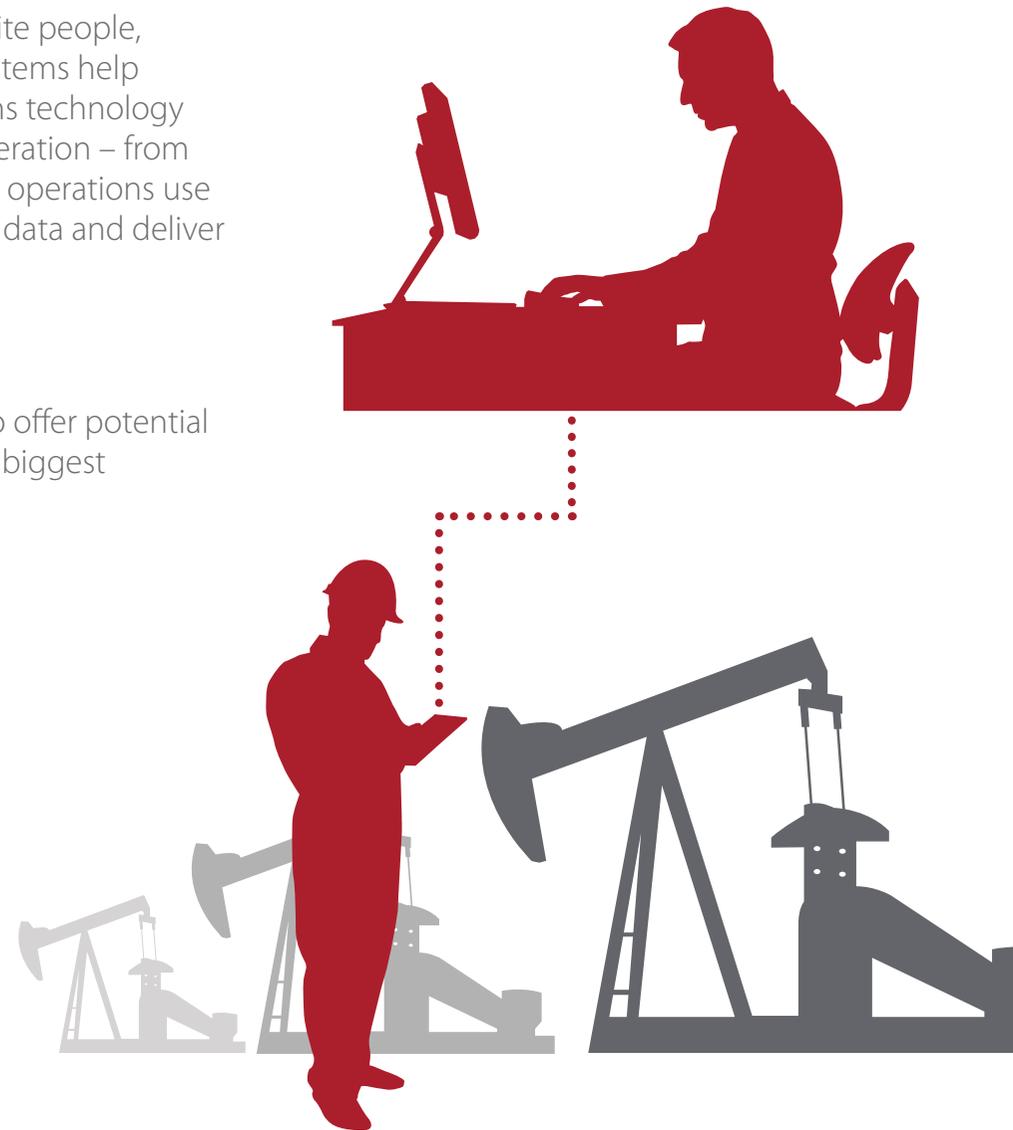
Modernizing and Connecting

Modern smart operations driven by the Industrial Internet of Things (IIoT) unite people, processes and technology in an integrated network architecture. Modern systems help converge business-level IT systems with station- and terminal-level operations technology (OT) systems to enable seamless connectivity across an entire oil and gas operation – from the pipeline to the oilfield, and processing plant to the enterprise. And smart operations use the latest integrated control and information solutions to collect operational data and deliver it to workers as actionable intelligence.

Today, modern systems are changing the oil and gas industry as we know it.

In particular, the IIoT enables the connection of smart devices and systems to offer potential for pipeline operators seeking to optimize their operations and address their biggest challenges. This includes four key opportunities:

1. **Improving control room management**
2. **Achieving greater operations flexibility**
3. **Addressing maintenance, reliability and safety issues**
4. **Complying with emerging security regulations**



Control Room Management

Pipeline operators need accurate, real-time and easy-to-understand data to be effective in their jobs.

Using enabling technologies and the IIoT operators can collect critical operational data, contextualize it into easily understandable and actionable information, and deliver to operators in real-time to improve reliability and availability. Exception reporting can direct operators to immediate areas of need, while advanced alarming can help identify equipment issues before they progress into failures.

Altogether, this deeper and real-time asset visibility can help operators track and more quickly respond to maintenance, operation and flow-control issues.

Advanced visualization software with faceplate-driven control also can improve ease of use and simplify information access. This can reduce information overload and help keep operators focused on the most pertinent issues.

Alarm-Management System Eliminates Nuisance Alarms

A major energy-infrastructure company had an antiquated alarm system in place at one of its gas processing plants.

The system caused frequent nuisance alarms, requiring undue attention from operators who lacked documentation to determine how to accurately respond. The system also lacked historical record keeping, hampering searches for alarm sources.

An advanced alarm-management system was installed. It provided comprehensive visualization of plant operations, along with more control over alarms and process variables.



“We’ve eliminated the bursts of nuisance alarms that were so distracting to operators,” said a control specialist at the pipeline company. “The new system also gives us all the information we need to determine whether an alarm is critical or lower priority.”

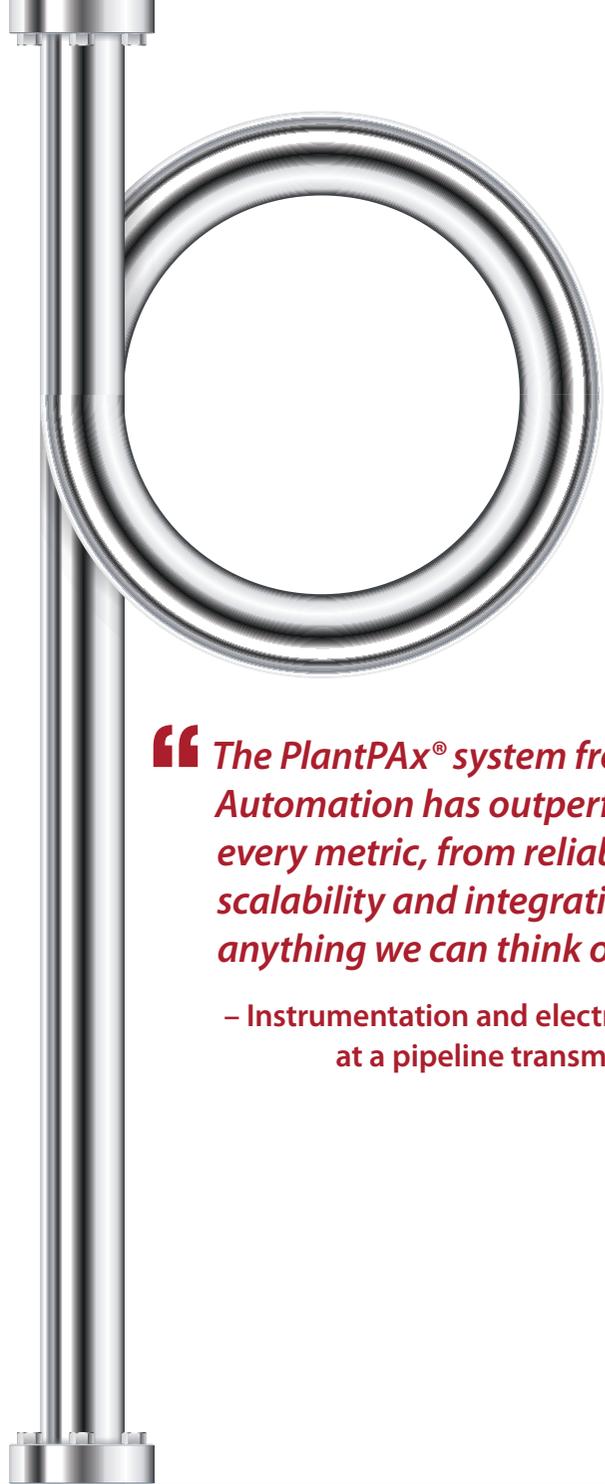
Operations Flexibility

Flexibility in pipeline operations is critical. Companies want to be able to respond to fluctuating commodity prices and serve new customers without delay.

This can place a couple different burdens on pipeline operators.

They must be able to quickly change the flow route or destination and pump rate.

- A **modern distributed control system (DCS)** that combines control and information is vital at a pump station. An information-enabled DCS allows sharing of information across all facilities, enabling agile and accurate decision making.
- A **Supervisory and Data Acquisition System (SCADA)** provides functionality to seamlessly connect multiple systems across pump stations, compressor stations and terminals.
- **Premier Integration** consolidates controller programming, device configuration and maintenance activities into a single software environment. The result is better controller-to-device integration. And when adjusting delivery routes, this can simplify configuration and reduce start-up time.



“The PlantPax® system from Rockwell Automation has outperformed on every metric, from reliability to scalability and integration of most anything we can think of.”

**– Instrumentation and electronics specialist
at a pipeline transmission company**

Maintenance, Reliability and Safety

Modernizing operations and taking advantage of connected technologies can help pipeline operators address maintenance, reliability and safety challenges.

Maintenance and Reliability

Many pipeline operations have amassed a mix of different control products across multiple sites over a period of years or decades. However, each product requires the right expertise and spare parts to maintain it.

Standardizing equipment as part of an upgrade can reduce these maintenance demands and ultimately help improve reliability. It also can lower the learning curve for new employees and reduce the risk of losing crucial “tribal knowledge” as older workers retire.

Additionally, **operational intelligence** can help transform maintenance from reactive to predictive. Operators can collect asset data in real-time, and easily put the data into context through intelligent reports. Performing analytics and monitoring asset performance helps operators catch issues and initiate repairs before a failure occurs.

“*Our technicians are already familiar with Rockwell Automation technology, but the consistency of the controls from one station to the next makes their jobs even easier. No matter which compressor unit they are working on, the technology is the same.*”

– Automation manager at a major pipeline and energy company



Maintenance, Reliability and Safety

Safety

Transportation incidents are the leading cause of fatal workplace injuries in the U.S. They accounted for 40 percent of fatal workplace injuries in 2014.³ Any opportunity to help take workers off the roads should be embraced.

Remote monitoring seamlessly integrates sensors, hardware, software and wireless connections to extract asset information along pipelines. Rather than traveling to the assets, operators can remotely view operating conditions, troubleshoot issues and make adjustments all from a centralized workstation.

Remote monitoring can also help prevent potentially dangerous and costly damage to equipment. For example, if a compressor motor is using more power than usual, an intelligent drive with embedded Ethernet connectivity can send a signal to central control. Operators can then remotely stop the motor and dispatch a maintenance crew to determine the root cause of the issue.

“The Integrated Architecture solution from Rockwell Automation has enhanced our levels of communications. When a fault occurs now, it is far easier to remotely interrogate the system to pinpoint the cause of the problem.”

– Control systems engineer at an electricity and gas distribution company

Northern Natural Gas Company moves natural gas along its 14,700 miles of pipeline, from Minnesota to Texas.

FactoryTalk® software from Rockwell Automation collects the control data from each compressor station and converts it into easy-to-comprehend visual graphics, which operators can access at company headquarters in Omaha, Nebraska.

³ Census of Fatal Occupational Injuries Summary, 2014, U.S. Bureau of Labor Statistics, Sept. 17, 2015

Safety

More connection points mean more opportunities to improve pipeline operations. But they also create new entry points for cyber threats, resulting in greater security needs.

The NIST “Framework for Improving Critical Infrastructure Cybersecurity” provides excellent guidance for developing a security program. Adoption is voluntary but recommended as the U.S. Pipeline and Hazardous Materials Safety Administration and state-based regulatory bodies develop policies and legislation that incorporate it.

Rockwell Automation recommends a security approach that aligns with the NIST framework:

1. **Requirements Development:** Create a document that defines terminology, identifies stakeholders, defines program requirements and goals, and assigns roles and responsibilities for your cybersecurity program
2. **Analysis:** Conduct an analysis that not only identifies your risks and threats, but also describes their potential consequences, severity and likelihood
3. **Design:** Research industry-standard mitigation strategies and identify the tradeoffs, such as their cost, efficiency, complexity and impact on operations
4. **Implementation:** Create a plan that defines how the mitigation strategy will be implemented, as well as how testing, verification and maintenance activities will be performed
5. **Educate & Improve:** Commit to continuous improvement through ongoing education, training and auditing



Resources

The challenge of successfully operating a decades-old infrastructure while meeting today's business and security demands can be overwhelming. You need a partner that can help you deploy modern and smart systems, yet also understands the pipeline industry and your business challenges.

Whether you're deploying new pipeline or upgrading your existing systems, Rockwell Automation and its team of oil and gas specialists can help.

We can deliver the right information, process control, motor control and safety solutions for your pipeline infrastructure, compressor and pump stations, and terminal and storage facilities. Our industry experience includes operations in extreme environments, rotating equipment management and remote asset management.

Columbia Pipeline Group Reaches 99.5 Percent Availability With Modern Process Control System

The Columbia Pipeline Group sought to modernize its operational environment to improve reliability, gain better insight into operational data and better predict maintenance needs.

The company implemented a virtualized PlantPAx process control system to share information across facilities and up to the executive level. It also installed high-availability virtualized servers to reduce physical hardware space and likelihood of downtime.

With the new system in place, the company reached 99.5 percent availability of its compression fleet. It also saved approximately \$2.3 million in maintenance costs in 2014.

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