ConnectedProduction™: Bringing the Digital Oilfield to Life

Visualize and optimize oil and gas production, from wellhead to point of transfer
Tapping the Data Well

Data is the lifeblood of the digital oilfield. It can help producers improve nearly all aspects of oil and gas production, from maximizing equipment performance and meeting production targets to lowering operating costs.

In many operations, however, data is still collected manually and confined to silos, with limited integration between systems. In other cases, it’s a blowout: too much data overwhelms operators, and it lacks the context needed to help them make more informed decisions.

These data-related challenges limit the visibility producers have into their individual devices, systems and full oilfields. And they hinder producers’ abilities to truly reap the benefits of the digital oilfield.

A major opportunity exists to make the most of your production operations by creating an intelligent automation ecosystem – one where data collection is automated and stakeholders always have actionable information at their fingertips. This is the ConnectedProduction™ offering from Rockwell Automation.

“Oil and gas companies that respond to the shift toward efficiencies by building sustainable digital capabilities will be tomorrow’s winners.”

Within the first year of deployment, a digital oilfield can deliver:

- As much as 25 percent in operating cost savings
- As much as 8 percent higher production rates
- 2 to 4 percent lower project costs
- As much as 6 percent improved resource recovery

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1 The Digital Oilfield Goes Global, Chevron, September 2012
2 Improving Oil and Gas Efficiency Through Digital, PwC, April 7, 2016
How Does the ConnectedProduction Environment Work?

Our ConnectedProduction environment brings the digital oilfield to life in three key ways:

• It connects your production equipment, devices and systems.

• It integrates all of your data seamlessly.

• It transforms that data into useful operational intelligence.

Moving to a ConnectedProduction environment does not require a complete infrastructure overhaul. Instead, you can maintain use of your current investments – connecting your existing automation systems and intelligent field equipment all the way from the wellhead and production facilities to custody transfer. This environment can be deployed, configured and run either on-premise, in the cloud, or in a hybrid model that combines both options.

Once in place, our ConnectedProduction environment allows you to visualize and control all aspects of production. By collecting the right data and contextualizing it into real-time diagnostics, production trends and KPIs, you can help your workers better understand equipment performance and make more informed decisions.

All of this can help you:

• Maximize operations performance

• Optimize production facilities

• Enhance production agility

• Reduce downtime

• Apply resources where they benefit your business most
Maximize Operations Performance

Smart, integrated systems can provide a wealth of well information to help you maximize oil and gas production. Some of these systems include:

**Artificial lift systems**, including single-well and multi-well pad systems, offer improved visibility into your processes. Operators can use these smart systems to assess well conditions more accurately and make informed decisions to optimize operations. For example, the production and run life of a pumping station could be improved by remotely managing pumping speed – keeping equipment operating in the recommended range. With artificial lift systems, operators can use analytics to identify trends in well behavior and performance, and to proactively address any lost production or downtime issues that may arise.

Artificial lift systems also can collect and analyze energy data to help you monitor your energy usage. They can combine multiple data streams – such as flow data, well-test data, well-completion data and other surface-processing equipment data – into a single data stream that’s easier to analyze. This data is accessible via desktop or mobile device, and is cloud-based so you can make informed decisions without having to physically visit each site.

**Wellhead-monitoring systems** enable you to view real-time data and alarming from remote locations. The data is put in context and validated. This creates higher-quality data, which means your operators can make more informed decisions when faced with factors that impact production. For example, in natural flowing wells, the tubing head pressure could be modified by automatically adjusting the choke size – keeping the well stable and maintaining expected production levels.

**Virtual, multi-phase flowmeters** calculate a well’s three-phase flow (oil, gas and water) in real-time using existing instrumentation at the well. This allows you to compare production estimates against allocation targets. Operators can use these production estimates to better understand changes in well production and make decisions about where to apply resources.

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**Leverage Libraries**

Libraries of prebuilt content can be used to speed system development and lower costs for assets, such as:

- Rod pump controllers
- Electric submersible pumps
- Progressive cavity pumps
- Gas lifts
- Plunger lifts
- Jet pumps
Optimize Production Facilities

A ConnectedProduction environment takes all the automation systems in your production facilities and equipment – from separators and scrubbers to tanks, compressors and pumps – and connects them under one platform and one production model.

This gives you the comprehensive visualization and control you need to optimize production and improve efficiencies across your entire operation. It offers the opportunity to access previously unavailable equipment diagnostics – and even predictions of future performance. In a ConnectedProduction environment, operators can better track equipment conditions and maintain top efficiency.

“The key reason [oil and gas] companies are investing in digital technologies is to improve operational efficiency.”

1 Oil and Gas Digital and Technology Trends Survey, Accenture/Microsoft, 2015
Enhance Production Agility

**Automate Workflows:** Model-driven workflows can automate standard operating procedures to help you be more efficient and meet regulatory requirements. The workflows can be configured for a wide range of use cases and initiate an ERP system, user or field event (e.g., a process condition).

**Centralize Production Monitoring:** By using oil and gas equipment that incorporates remote monitoring, you can visualize production and equipment diagnostics across multiple wellheads from a central location. This can reduce the need for workers to travel from site to site to monitor operations. It also can help operators more quickly identify and respond to any issues that arise.

**Improve Response Times:** Real-time connectivity to business systems combined with seamless integration across automation systems allows you to quickly adjust production in response to market changes or new demand. Real-time connectivity can also help reduce unplanned downtime because a centrally located subject matter expert can quickly diagnose issues and evaluate performance.

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**Cloud-Based System Reduces Transfer Billing Delays and Errors**

Hydrocarbon transfers can have lengthy billing delays and errors in the range of 2 to 8 percent.

To combat these issues, Rockwell Automation partnered with a provider of truck and LACT data-analysis tools to develop a cloud-based, asset-performance management solution to access distributed LACT skids.

At the LACT, truck drivers input an ID number into the HMI, start the transfer and watch as their “tickets” are populated automatically when they unload or fill up on crude. This information is sent to the cloud, and an invoice is generated for the customer automatically.

In field testing, the new system has reduced billing cycle times and virtually eliminated billing errors.
Reduce Downtime

A ConnectedProduction environment can help you more quickly resolve unexpected downtime – or address issues before they lead to downtime.

• Smart assets can provide the information you need to operate by exception. This allows you to allocate your skilled personnel only to areas that need attention and to issues with the greatest production impact.

• An intelligent notification system can send text messages, emails, push notifications or all of the above to key stakeholders. This can help verify issues are identified in real-time.

• Advanced analytics and reasoning software can include predictive analytics to help spot trends that could lead to downtime. This can help your teams improve planning and allocation of resources around known issues.

• Asset-management software can provide audit trails and asset-configuration backups. Technicians can use these tools to speed troubleshooting and downtime resolutions.

• Scalable HMI systems can maximize system availability with built-in failure detection and recovery. Operators can make application changes in the systems from anywhere on the network, and mobile support helps keep stakeholders connected.

Remote Asset Management Enables Predictive Maintenance

A leading heavy-equipment and machinery OEM needed a remote, asset-management solution for its fracturing vehicles. The company teamed with Rockwell Automation on a new system using the Microsoft Azure™ cloud-computing platform.

The system provides real-time visibility into asset performance and allows the company to offer preventive maintenance alerts. This has resulted in far more effective vehicle utilization and opened the door to new aftermarket support services.
Implementation Approach

Moving your existing operations to a ConnectedProduction environment requires five key steps:

1. Conduct an assessment of your critical assets to identify any technology gaps you may have.
2. Implement state-of-the-art engineering solutions to close those gaps.
3. Collect and aggregate data from multiple sources into a single platform and production model.
4. Use analytics and reasoning tools to convert your data into contextualized and actionable information.
5. Use these capabilities to continually optimize your assets, production environment and workflows.

It’s important to remember that this will be a journey, not a one-time project that you can embark upon with a single vendor. Each company will enter its own journey at a different stage, and a commitment to ongoing optimization means your journey will have no end date.

Your assessment should examine your existing automation infrastructure, including:
- Production control and monitoring systems
- Production planning and reporting systems
- Production data historians
- Network communication systems and infrastructure
- Network security
- Safety instrumented systems
- Motor control systems

Analytics tools that contextualize data into meaningful information can help workers:
- Determine well and reservoir conditions
- Track equipment diagnostics, production trends and KPIs
- Implement predictive-maintenance strategies
- Test or operate by exception
- Identify optimal oil, water and gas rates
Ready to Start Your Journey?

As you plan, design and move through your ConnectedProduction journey, keep some guiding principles in mind:

**The best approach is open.** Your digital oilfield technologies should support not only your main automation vendor’s systems, but also the full range of third-party systems that you have in place or may someday use. Using open-architecture technologies is the best way to do this.

**Security is non-negotiable.** Be sure your digital oilfield approach – including the hardware and software you use, and the vendors you work with – supports a secure pathway from production data to actionable information.

**The right partner is paramount.** Most oil and gas companies will rely on an automation provider to help deploy a digital oilfield environment. Make sure you choose a vendor with the right mix of project management, domain expertise and global experience to fit your needs.

**Resources**

For more information or help in creating a ConnectedProduction environment, call a Rockwell Automation representative or visit www.rockwellautomation.com/global/go/connectedproduction.
Rockwell Automation, Inc. (NYSE:ROK), the world's largest company dedicated to industrial automation, makes its customers more productive and the world more sustainable. Throughout the world, our flagship Allen-Bradley® and Rockwell Software® product brands are recognized for innovation and excellence.

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