Customers' Stories on Their Digital Transformation

Transformation to Digital Assets

Rockwell Automation

START ▶

Introduction

Sustaining Profitability Using Advanced Technology

In a dynamic global industry like oil and gas, we are all aware of the need to manage costs, extract the most value possible from current assets and maximize up-time.

To help with this constantly evolving landscape, technology is available that will help you develop and deploy a truly connected enterprise, helping you to move closer towards operational excellence.

By leveraging this connectivity and the resulting data, cloud, mobility and analytics offer a real-time actionable view into production operations, so you can respond to issues as soon as they arise... from anywhere in the world.

These improvements in production can translate into increased efficiency and productivity.

So, whether you would like to upgrade legacy systems or make better use of the data you generate, we have the oil and gas equipment and resources you need to meet your goals.

We also bring a wealth of industry knowledge, drilling automation, and oilfield automation experience to help you remain competitive in a dynamic industry landscape.

Michael Corrieri
Rockwell Automation

Contents

Digital capabilities that can make you more competitive can also protect your oil and gas operations from cyber threats

More frequent and sophisticated, high-profile cybersecurity attacks on oil and gas operations have put the oil & gas industry on edge, as a result cybersecurity is now a major concern for executives in the board room and operators out in the field.

Not only are breaches disruptive and expensive, but incidents like the pipeline explosion in Ukraine remind us that an attack in the *digital* world can have dangerous consequences in the real world.

Without a doubt, you need comprehensive security as your operations become more digital. But this security doesn't need to come at the expense of your business-improvement goals. In fact, quite the opposite. The same digital capabilities that can help you better compete while helping to fortify your operations.

Security Synergies

As you plan and design your oil and gas cybersecurity strategy, capitalise on the aspects of your connected operations that have shared security and operational benefits. Five key examples include:

1. Dynamic Asset Inventory

A comprehensive, real-time understanding of your connected equipment and systems is essential.

Historically, taking an inventory of your equipment required physically sending someone to your production sites. This process is time consuming and limiting, because the data captured only gives you a snapshot in time of your inventory.

The industrial internet of things (IIoT) is changing this. Now, using software or connected services, you can use the same communications path as your control systems to gather asset data. With a continuous, real-time inventory of your operational equipment, you can stay on top of risks to your production environments. The data can also help you to track lifecycle risks and inform your modernisation strategy.

2. Real-Time Process Visibility

You need real-time visibility into how, when and where people are accessing or manipulating your equipment.

A threat-detection service can identify normal behaviour across your oil and gas network and monitor your operations 24/7 for deviations from that baseline. Operators can then be alerted of any irregularities or potential threats in real time.

This visibility can help you uncover a threat or attack at multiple stages, including:

- When they first gain a foothold on your network
- When they're moving around the network
- When they're making changes to assets

The service can also help you detect more common human errors and operational issues that, while lacking nefarious intent, can still disrupt your operations.

3. Lifecycle Management Support

According to the 2019 Global Energy Talent Index report, 40% of oil and gas respondents said a skills crisis has already hit the industry. And nearly 30% said the crisis would take hold in the next five years.

To lessen the impact of the skills shortage, more companies are looking to outsource the responsibility of managing their oil and gas production systems. And who better to monitor, maintain and modernise the systems than the companies that supply them?

4. Disaster Recovery

In the event of a security incident, you need a plan and policies in place to help you recover as quickly as possible. This will help you minimise the impact of security incidents and maximise your uptime.

A response plan can help you contain, eradicate and quickly recover from threats to your operations. It should include the steps workers need to take to get back to a fully operational state. Policies are just as crucial and should define a method for backing up your critical operational assets.

One solution is asset-management software that can automatically back up application code and configurations for devices like controllers, drives and operator terminals.

5. Good Security Hygiene

There are security best practices – known as security hygiene – that every oil and gas company should use. Some are simple, like changing default log-ins, and software with authentication and authorisation, which allows you to define who can access the software, what actions they can take and where they can perform those actions.

Other security hygiene is more complex. For instance, control and enterprise traffic should not be treated the same on your network. If the network infrastructure that handles both these traffic types goes down, then your entire enterprise is no longer functional. That's why you should use an industrial DMZ to segment control and enterprise traffic.

These best practices can also have operational benefits. Segmentation, for example, allows you to connect remote employees and partners with on-site workers to more quickly troubleshoot and resolve downtime issues.

Know Before You Go

Getting the most from your connected operations and securing them can go hand in hand. But before you do anything, you need a strategy to identify where you can be more competitive and where your threats lie. Then, you can see where these two areas share common ground.

If you're unsure of what to do or where to start, reach out to a service provider that can help you plan, deploy and optimize your connected oil and gas operations. Also, make use of freely available resources like the Converged Plantwide Ethernet (CPwE) design guides from Rockwell Automation and Cisco. They can help you create more competitive operations using the latest technologies and security best practices.

Columbia pipeline

Columbia Pipeline Group (CPG) recently modernised its operational environment by implementing a modern distributed control system to improve reliability, gain better insight into its production data, and ease maintenance.

The company saved approximately $2.3 million from reduced maintenance costs in one year, showing that gas transmission companies can reach over 99 percent reliability while running at 100 percent capacity.

Challenge

- **Modernise the operational environment to improve reliability, gain better insight into production data, and ease maintenance.**

Solutions

- Virtualised PlantPAx distributed control system shares information across facilities and up to executive level.
- High-availability, virtualised servers from Stratus Technologies, a member of the Rockwell Automation® PartnerNetwork™ program, reduce physical hardware space and likelihood of downtime.

Results

- Reached 99.5 percent reliability at 100 percent capacity.
- Provided information to the Enterprise Analytics group to make business decisions based on real-time and historical data.
- Saved approximately $2.3 million in maintenance costs in 2014.

Delin Elettronica

DELIN Elettronica is a system integrator headquartered in Modena, Italy.

Established in 1983 as a distributor of electronics systems for industrial automation, the company has since moved its focus from sales to engineering and now offers its system integration capabilities in both automation and process control applications.

Challenge

- **Technical specifications imposed by the end-customer demanded a considerable evolution of the control system architecture, with safety management at SIL 2 Level, full redundancy and smart equipment management on Foundation Fieldbus**

Solutions

A PlantPAx system with

- Standard EtherNet/IP
- Device Level Ring
- SIL2 Architecture
- Foundation Fieldbus
- Vendor supplied Face Plates

Results

- Project standardisation
- Availability of real-time information on equipment diagnostics
- Smart equipment management on Fieldbus Foundation
- SIL 2 compliant Safety Management
- Further strengthening of an longstanding collaboration for future projects

Reliability-Centered Maintenance Uses Data to Slash Downtime

A proactive RCM strategy built on asset data can help you get ahead of failures, improve reliability and reduce risks.

Maximum asset availability with minimal risk has long been a goal for oil and gas operations, but it does require a deep insight into equipment performance metrics.

Many operators are collecting an abundance of data as they create a digital oilfield and these oil and gas producers are eager to take it to the next level and use data from their equipment, devices and systems as part of a reliability-centered maintenance (RCM) program – so they can identify and methodically address failures before they occur.

However, an RCM strategy isn't simply about collecting data. You need to make sure you get the right data from the right sources. And you need to consistently monitor and perform analysis to create a continuous improvement approach to reliability maintenance.

The journey to proactive and predictive maintenance can be a bumpy road, especially when you have hundreds of thousands of devices in the field, but there are ways to simplify the effort.

Understand Your Installed Base

An analysis of your installed equipment and systems is a critical first step and will tell you what technologies you have in place and identify the lifecycle status of each of these technologies.

Support providers have deep industry knowledge and can complete an analysis across multiple sites in mere weeks, helping you more quickly launch a full RCM strategy.

Get the Right Data

The identification of equipment failures and common failure modes are key outcomes of the installed-base analysis. But none of this is possible unless you're getting the right data, from the right places, and delivering it in the form of useful information.

The proliferation of Industrial Internet of Things (IIoT) devices – from sensors to smart machines – allow you to automate data collection from virtually any point in your process and can give workers real-time access to that information from anywhere, anytime.

Finally, analytics software can combine your real-time performance data and historical maintenance data into useful, contextualised information for workers.

Tackle Your Top Challenges

With your failure-mode findings in hand, real-time production information accessible and industry experts from a third-party service provider available, building an RCM strategy can be simple.

Step One: Identify priority equipment and systems to monitor and examine their performance. The following questions help you get the most out of the performance data:

- Is this asset doing its job?
- Is it producing the value it should?
- Is it operating at the availability level it should?

Step Two: Improvement plans can be built into your roadmap.

- For each asset, a successful RCM program will determine which failure modes and conditions you will monitor.
- Next, identify oil and gas analytics that you can apply to each asset.
- Lastly, develop an outline of the actions workers need to take to correct issues before they cause failures.

Your RCM strategy can also help you better manage labour costs. For example, you can create a predictive maintenance program for offshore platforms and automatically generate work orders in your maintenance system. This can help you minimise costly and risky travel to the platforms.

A Smarter Maintenance Strategy

Most failure modes in oil and gas operations are reoccurring. But even the most disciplined calendar-based preventative maintenance programs won't perfectly resolve these issues. Unexpected downtime can still occur.

Traditional time-based maintenance typically creates additional cost and work and doesn't necessarily identify the root cause of the failure mode. Service providers can help you implement an RCM strategy to provide you an understanding of the health and performance of your operation and assets, so your team can focus on production issues that improve performance rather than reacting to unplanned events.

Edina

The Izabela field is a GAS extraction and production plant, located off Croatia in the Adriatic Sea. The site comprises two offshore platforms, Izabela South and North, coupled to an onshore Central Control Room (CCR), located in Pula, Croatia.

The platforms are operated by **Edina**, a joint-venture company. One shareholder is Edison Gas, an Italian company, and the other is INA, a Croatian company.

Challenge

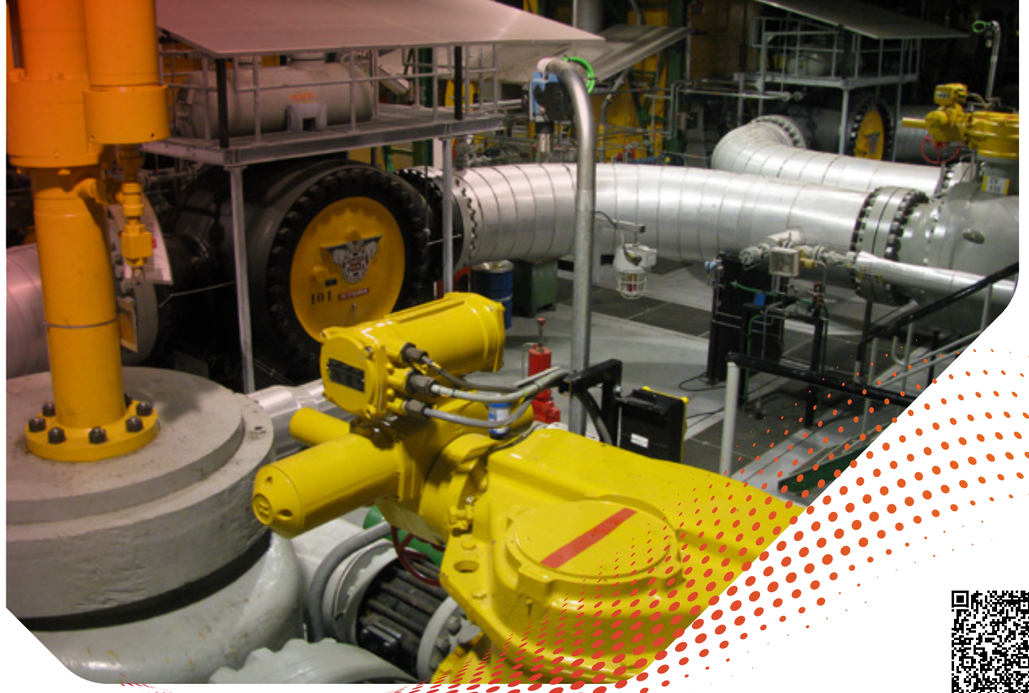
- **Edina's mandatory requirement was the installation of an ICSS on both offshore platforms and in the onshore CCR Operator stations.**

Solutions

- A PlantPAx Process Control and Safety System from Rockwell Automation was installed
- Redundancy and Hot Backup
- Historic Trending
- Remote connection through Terminal Services
- Trusted TMR SIL 3 safety controller

Results

- Seamless integration between offshore and onshore systems
- Performance enhancement
- Significantly reduced design, commissioning and start up costs due to domain and system knowledge across all parties
- Reduced training needs
- Reduced spare-parts inventory



Gasunie

Gasunie is a European gas infrastructure company that provides and manages the transport infrastructure of natural and green gas in the Netherlands and the Northern part of Germany. Founded in 1963 as gas trading company, it is now owned by the Dutch Government and is only responsible for the transportation of gas – some 120 bcm every year.

Challenge

- **O&G Solutions Architect Delivers Control Solution for 15,500 km Gas Network – Bilfinger Greylogix was tasked with developing and then installing a standardised control solution across a 15,500 km gas distribution network**

Solutions

Control System with :

- Condition Monitoring solutions
- OPC Link
- Integrated Safety

Results

- Integrated solution, including special instrumentation
- Easier scalability
- Instant/real-time data availability
- Single technology vendor
- Forms a foundation for future projects

How Analytics Help You Get More from Digital Oilfield Equipment

Gathering your system's raw data via easy-to-use dashboards to analytics can help you make real-time maintenance, production and business decisions.

Optimising oil and gas equipment can be an impossible task when you can't answer critical questions about health and performance. It's difficult to improve equipment availability and get ahead of failures when you don't have real-time information about performance, or when the data you do collect is confined to silos.

Hoping to capitalise on the promise of the digital oilfield, oil and gas producers are seeking to connect equipment, devices and systems, and integrate their data. Most critically though, producers are looking for ways to transform all of that data into operational intelligence.

Rockwell Automation refers to a connected oilfield that makes data useful and allows for better decision-making as the ConnectedProduction™ environment. In it, you're connected in real time to better understand equipment performance and downhole conditions and use those insights to help minimise the unknowns that impact your operations. You even can begin to predict future performance and address issues before they cause unexpected downtime.

Finding Answers in Data

Analytics involves collecting and contextualising data into information, and then presenting that information to workers in the form of useful, actionable insights, in order to help users make better production decisions that positively impact business results.

Oil and gas producers that want to create a roadmap for deploying analytics should first understand the four analytics categories:

1. Descriptive analytics summarise events and describe *what happened.*

2. Diagnostic analytics associate events with root causes or reasons to explain *why something happened.*

3. Predictive analytics use modelling and machine learning to predict *what will likely happen.*

4. Prescriptive analytics use previous instances of similar events to suggest *what should be done* to correct an issue or optimise performance.

Descriptive and diagnostics analytics are the starting point for oil and gas producers. They inform workers at the most basic level of how things are performing and the conditions in which they're operating. These analytics can help technicians quickly diagnose the problem and help make sure they send the right person to the right place, with the right tools and spares to resolve the problem.

Predictive analytics look for known conditions and relationships within the data that indicate a device or piece of equipment is approaching failure. You can use this to identify and resolve equipment failures before they happen, providing a tremendous opportunity to reduce costly downtime.

Deployment Considerations

When you want to deploy analytics, consider the analytics approach when determining the information solution that's right for you. In many cases, upgrades to existing infrastructure will be needed before the operator can fully utilise data in an analytics approach, as some analytics software is not vendor agnostic, which can create integration challenges.

Many producers also will benefit from scalable analytics solutions that process data as close as possible to where the data originates; the three tiers being device-level, system-level and business-level. The information solution should also be able to validate data coming from the field, as well as minimise data gaps that could impact the results of analytic software and hence the decisions made by operators.

Finally, consider how operators interact with the results of the analytics software and other systems as they take actions to improve performance. Intuitive, easy-to-use dashboards can help workers not only identify and understand critical production information, but also respond to it as quickly as possible.

Analytics in the ConnectedProduction Environment

Analytics can help you identify performance trends, quickly identify and react to events affecting production and equipment uptime, and even proactively prevent lost production and downtime. You also can monitor production across multiple fields from a single, central location. And when they're combined with business systems, you can quickly adjust production in response to market changes and business needs.

Given the opportunity that analytics present and the pressures facing oil and gas producers, the question isn't: Can analytics help improve our operations? But rather: How long can we compete without them?

Leonardo

The LNG Portovenere and LNG Lerici are two ships designed for the transportation of liquid natural gas. Built in 1997 by Fincantieri and having reached the middle of their lifespan, their owner, in collaboration with their management company, the Belgian firm EXMAR Ship Management, made the ships the object of a significant, total renovation project to prolong their lifespan by at least 15 years.

Challenge:

- **Supply two LNG tankers with a modern supervisory and control system that combines all on-board control systems**

Solutions:

A Rockwell Automation PlantPAx DCS was implemented, including the following features:

- Process Control System Architecture
- Operator work stations
- Redundant servers
- Standalone operator work stations
- Remote acquisition units
- Emergency Shutdown System
- Ethernet backbone network based on a fibre optic DLR topology

Results:

- Improved speed in execution of commands due to increase in data acquisition and exchange speed between the controllers and I/O modules
- Modern, intuitive and easy to use operator interface
- Graphical recall and refresh speed faster, thanks to an increase in the speed between the controllers and the supervision system
- Reduction in operating costs thanks to considerable savings in energy consumption

Liquid Petroleum Distributor

One of the largest, independent liquid petroleum distributors in the United States operates a marine oil terminal that occupies 250 acres on the East Coast. In 2012, the company expanded its operations with the acquisition of a busy terminal. The tanks at the acquired terminal can hold more than 4 million barrels of petroleum products, and are strategically located in a major U.S. harbor for easy transportation access via water, pipeline, rail and truck.

Challenge

- **United States liquid petroleum distributor needed to automate a newly acquired major oil tank farm**

Solutions

- Virtualised PlantPAx System With Production Intelligence – Intuitive modern DCS platform that integrates with simulation software for pre-testing and training
- Pre-configured objects and faceplates for easy integration
- System provides production intelligence by collecting and reporting plant-wide data
- MAVERICK Technologies, a Rockwell Automation company, designed and implemented the system

Results

- Decreased Implementation Costs – PlantPAx DCS and the Rockwell Automation library of process objects eased implementation, cutting costs in half
- Rapid Operator Training – The intuitive system platform and simulation software reduced operator training to one day
- Eased Troubleshooting – Integrated production intelligence provides insight to real-time data, saving valuable time troubleshooting

Five Common Mistakes When Purging and Pressurising Enclosures

Purge and pressurisation is a method of protection that allows non-hazardous enclosures and equipment to be located in hazardous areas. It uses air or an inert gas to keep a positive pressure within the enclosure and prevent hazardous gases or combustible dust from entering.

For hazardous gas environments, air or inert gas is used to purge the inside of the enclosure before it can be energised. For combustible dust environments, dust is physically removed, and the enclosure pressurised before it can be energised. As long as the enclosure is pressurised, the equipment within the enclosure can operate normally in those environments.

The purge and pressurisation technique is a simple concept if done properly, but too often this method is implemented without knowing the required standards or the system's characteristic gas flow. Even if the protection components are certified, users might implement them incorrectly. Here are eight common mistakes:

1. Failure to Include a Pressure-Relief Vent

In hazardous gas atmospheres, purging is required, and a pressure relief vent is necessary. Without a vent, the enclosure's internal atmosphere has nowhere to escape; the increasing pressure within the enclosure will prevent proper purging.

In hazardous dust environments, purging isn't required, but the enclosure must be cleaned before pressurising. Most users do not use a pressure relief device, which is acceptable under normal use. However, if the regulator being used to pressurise the enclosure fails, a large increase of flow into the enclosure could damage the enclosure if a pressure-relief vent isn't present.

2. Forgetting to Purge Before Pressurizing

If purging is neglected and the enclosure is just pressurised, it may still contain hazardous gas. Industrial enclosures rated Type 4x or IP66 are not gas tight, so hazardous gases can still leak into the enclosure.

3. Not Knowing the Required Volume Exchange

Standards exist that specify the number of volume changes required before the enclosure is considered safe. A flow measurement is required to determine the necessary time that must pass for a successful purging. Some purging systems will measure the flow for determining purge time.

4. Failure to Address Combustible Dust

A raw material used during the manufacturing process might not be listed as combustible, but dust formed during the process itself could be combustible.

5. Not Knowing the Standard

Putting a certified purge system onto an enclosure and populating that enclosure with equipment doesn't necessarily make the complete enclosure a certified system. The applicable standards for purging/pressurisation might require further system testing to make sure it complies with the area classification. Additional testing is normally required for full and complete certification, including heat measurements from the equipment for T-codes, overpressure testing of the enclosure to help ensure it doesn't break or permanently deform, and flow checks to confirm all points within the enclosure are purged and pressurised properly.

Other standards and requirements might apply to other parts of the system, including wiring, terminations, gas handling elements and alarm management. By using certified purge and pressurisation components, the implementation and final certification of the system will be easier, faster, and hopefully less expensive.

Although the area classification is important in identifying the type of purge system required for the application, the above issues apply to both NFPA 496 Type Y, Z, X (North American requirements), and EN/IEC 60079-2, Type pyb, pxb, pzc (European and International requirements) and local codes.

An understanding of the applicable standards and the hazardous area classification is important in applying any hazardous area protection method. Safety is the ultimate goal and should always be the first consideration in operating equipment in hazardous areas.

ProLabNL

ProLabNL, located in Arnhem in The Netherlands, is an independent test facility for oil and gas process equipment. The company offers state of the art, large-scale test facilities that operate with live hydrocarbons (natural gas and crude oil) at high pressures in order to simulate real oilfield conditions. Its flow loops have been used extensively for subsea technology qualification programs of major oil and gas companies.

Challenge

- **ProMotion BV was tasked with finding a replacement process control system that could address multiple technical- and time-related engineering issues coupled with stringent customer demands**

Solutions

PlantPAx with

- Asset Management tools
- Vendor Supplied Face Plates
- Support Contract
- Historic trending

Results

- 50% reduction in set up
- Significantly reduced engineering effort and easier-to-use software
- Better information presentation using multiple displays
- Far more flexible system that benefits from significant support
- Up-to-date library keeps pace with industry changes

Repsol

Repsol is a global, oil and gas company with operations spanning the entire supply chain.

On the upstream side, the company produces more than 650,000 barrels of oil equivalent per day and has a reserve volume of more than 2 billion barrels.

Downstream, its businesses include oil-refining operations, crude oil and products trading, and more than 4,700 service stations throughout Europe and South America.

Headquartered in Spain, Repsol has activities in more than 40 countries and more than 27,000 global employees.

Challenge

- **Replace existing safety instrumented systems (SIS) at two production facilities to comply with new, internal safety standard**
- **Reduce risk of downtime associated with aging equipment and improve visibility into system performance**

Solutions

- SIS system with standard of the shelf controllers
- Alarm and event server with capabilities to provide better visibility into the systems' performance and downtime issues

Results

- SIS complies with Repsol's new, corporate safety standard
- Migration to new technologies reduces risk of downtime
- Reduced spare-parts inventory by standardising on one platform
- Improved system visibility helps operators more quickly troubleshoot and predict failures
- Ability to meet higher SIL requirements provides greater system flexibility

Control Upgrade Helps Optimise Well Pad

Well-manager solution that integrates a modern control system and HMI, enhances flexibility, production visibility and safety in large oil and gas operation.

In northeast British Columbia, Canada, ARC Resources is one of the largest operators in the Montney region, which is considered one of the best tight gas plays in North America.

It was here that ARC Resources began optimising the control systems it was using for its large, multi-well natural-gas production sites. The systems in place at these sites didn't support artificial lift, which would be needed to maintain production levels. The existing systems also presented expansion and safety challenges that the company wanted to address.

Operations at a Crossroads

ARC Resources already had control systems in place that supported the use of artificial lift systems at its smaller pads (one to four wells), but its larger pads – of five or more wells –lacked these control systems , and as some of these sites approached production milestones of 10 to 15 years, the company knew it would need to make improvements.

The existing controllers couldn't handle the large amount of I/O required to run the entire well pad. As a result, the company had to use multiple controllers, hardwired together, along with remote terminal units (RTUs). This approach not only made the control infrastructure more complex, but also limited the amount of information available for control and monitoring.

The use of multiple hardwired controllers also presented safety challenges. ARC Resources relies on its control architecture to monitor toxic and explosive gases and to take actions such as turning on an exhaust fan or blocking wells as conditions dictate.

However, the controllers could lock up and freeze their outputs and give no indication of a fault, forcing the company to add "watchdog" timer hardware to monitor for such conditions.

A 'Canned Package'

Charlie Kettner, programming specialist for ARC Resources, reached out to Rockwell Automation to begin discussions about optimisation options that would support artificial lift systems at the large multi-well pads, as well as simplify control and address safety concerns.

Their talks led them to the ConnectedProduction™ well manager solution from Rockwell Automation, which includes an out-of-the-box Allen-Bradley® ControlLogix® programmable automation controller (PAC) and a FactoryTalk® View HMI that require no custom coding.

The PAC gives ARC Resources single-platform control for large sites – with as many as 32 artificial lift wells – and contextualised production information to help operators maintain optimal production levels and troubleshoot issues.

Kettner and his team piloted the new technology at an eight-well production site, before installing it at four other multi-well pad sites. One of the first benefits they discovered during this trial run was the Add-On Instructions included in the ConnectedProduction solution helped them save approximately two days of programming during the installation process. In addition, because the solution uses an open architecture, integration with other vendor hardware at the site was easy.

Enhanced Visibility and Safety

The ConnectedProduction solution has dispensed with the need for multiple controllers and RTUs. Now, all well pad controls have been consolidated into a single control platform; simplifying the architecture and helping to lower hardware and software costs.The solution also allows the use of artificial lift systems, including on/off timers and plunger lift systems, and provides visibility into those systems.

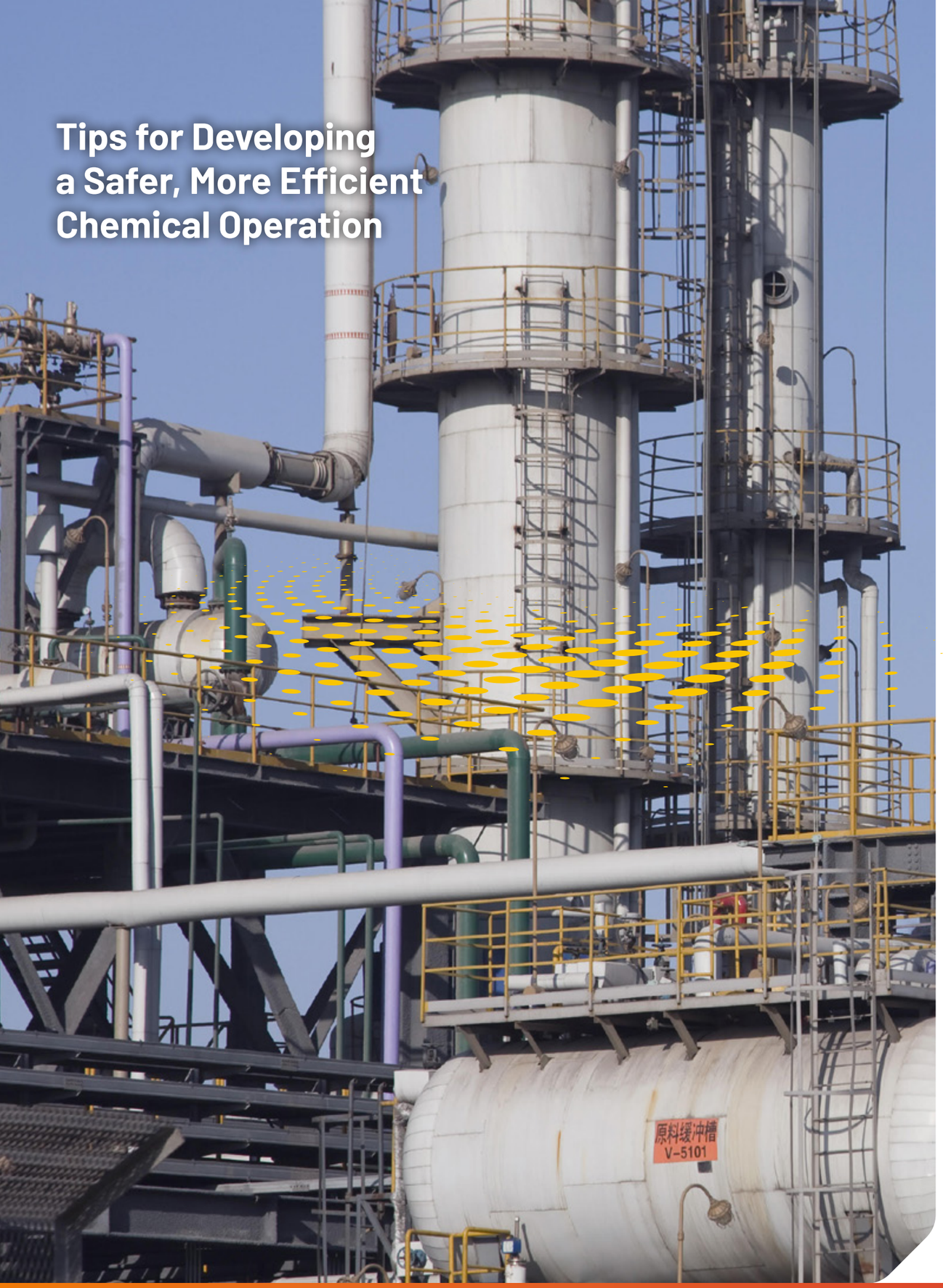
The new system also is helping ARC Resources enhance safety by reducing the risk of faults going undetected at the Sunrise site.

"Now if something goes wrong with the processor or if an I/O rack comes undone, the ControlLogix platform can fault to a safe state where it shuts down all the processes," Kettner says. "It takes all the power off the solenoids and essentially results in an emergency shutdown."

The ConnectedProduction system also supports a flow-measurement card within the control panel, removing the need for a separate flow-measurement computer, which is saving the company tens of thousands of dollars.

Looking ahead, Kettner already has orders to bring the ConnectedProduction solution to at least four more large multi-well pads in the area. "We've seen the value of the Rockwell Automation solution and want to bring it to our other sites where we need assisted lift," he notes. "On new pads, we'll implement this right from day one so it's there and available when it's needed, and we can just turn it on."

Tips for Developing a Safer, More Efficient Chemical Operation



A proactive, standards-based approach that addresses a plant's process safety throughout its life cycle can help reduce both risk and costs.

A standards-based approach to process safety, one that actively addresses risks across a plant's lifespan, can lead to safer chemical processes, fewer safety functions and lower operating costs.

The problem, however, is that too few companies take this approach, opening themselves up to greater risk of a catastrophic incident as a result. Today, as many chemical companies look to replace decades-old safety-related technologies, they have an opportunity to put an end to this trend by rethinking their approach to process safety.

Why Is Process Safety Falling Short?

One problem many chemical companies face is they simply don't have dedicated resources for process safety. As a result, they're unable spend sufficient time to help meet requirements for specifying, designing and implementing a safety instrumented system (SIS), as well as helping to maintain it properly throughout its life including functional safety assessments and periodic audits.

Some companies will specify a certified programmable logic controller (PLC) with a specific safety integrity level (SIL) because it meets their expected highest level of protection. The result, however, is that they don't apply the same rigor to the field devices or to other layers of protection necessary for effective process safety.

Another issue is companies will strive for compliance when they deploy a SIS but not its functional safety management aspects throughout its lifespan.

Independent reports, such as the U.K. government's Health and Safety Executive (HSE) report on control system failures, help illustrate where failures are causing or contributing to industrial accidents. The report found that 44% of failures were caused by an inadequate specification, due to either a poor hazard analysis or an insufficient assessment of the impact of control system failure modes on the specification. Meanwhile, 15% of failures were caused by inadequate operation and maintenance and 20% were caused by changes after commissioning.

Since 2003, there has been an international standard (IEC61511) based on a life-cycle approach to process safety. This standard addresses these known issues and was largely written by end users for end users.

The Definitive Standard

The functional safety standard IEC 61511 should be the foundation for a standards-based life cycle approach to process safety. It defines the requirements that must be met, not only in designing and implementing a SIS, but also in maintaining it for the system's entire operating life.

Applying this standard requires more upfront work because of its analysis phase and management aspects. Managing the safety loops throughout a system's life cycle also creates more work, but the payoff from this added effort is significant: the likelihood of fewer safety risks, a right-sized SIS and increased process uptime.

Moving Through the Life Cycle

A life cycle-based safety approach has three main phases of execution: analysis, realisation and operation. When moving through these phases, it's important to remember every task must be verified by someone independent from those who performed the task.

1. Analysis: Understand how much risk exists within the process, and then define where and how that risk can be mitigated. Processes such as the hazard and operability (HAZOP) study identify the risk and generate the safety requirements specification (SRS) and techniques to mitigate the risk.

2. Realisation: A functional design specification can be developed from the SRS, which describes how the safety functions defined in the SRS are implemented using the selected SIS technology, thus meeting the SRS.

In the design and engineering portion of this phase, technology is selected to help implement the required behaviours. There's no requirement that the technology be certified by groups such as TÜV Rheinland and exida, but choosing such solutions can help users meet the required integrity with less documentation. The SIS then can be installed and validated in a documented manner to confirm it meets the requirements outlined in the SRS.

3. Operation: Organisations must make sure the identified and implemented risk-reduction measures are maintained throughout a plant or process's lifespan. This even includes identifying how hazards will be managed during decommissioning.

Safety integrity performance will degrade over time, which is why regular proof tests are critical. Also, any changes to a SIS can impact safety. Clause 17 of IEC 61511 provides guidance for SIS modifications.

Decision Time

Chemical companies seeking to replace their decades-old SIS have a choice. They can continue with the status quo or grandfathering, which assumes what has been providing protection for the past 20+ years will continue to do so, or they can take a more proactive, standards-based approach that addresses their plant's process safety needs across its entire life cycle.

The latter can reduce the potential for a catastrophic safety incident, help verify operations teams are living up to corporate leadership's expectations for safety and create overall safer and more productive chemical operations.

The Frames Group

The Frames Group describes itself as providing the vital link between the well and the pipeline in the international oil and gas industry.

It designs, builds and delivers separation technology, oil and gas treatment, flow control and safeguarding systems and modules and integrated solutions, such as total plants, working directly with its customers to optimise upstream, onshore and offshore processes.

Challenge

- **Frames Flow Control & Safeguarding was challenged with constructing nine autonomous well-site control and safety skids that could operate effectively in a remote location with minimal operator interaction**

Solutions

- ATEX-certified Controllers & I/O
- ATEX-certified managed Ethernet switches
- ATEX-certified panel PCs and OWS
- AADvance safety controllers and software
- In depth industry and application knowledge

Results

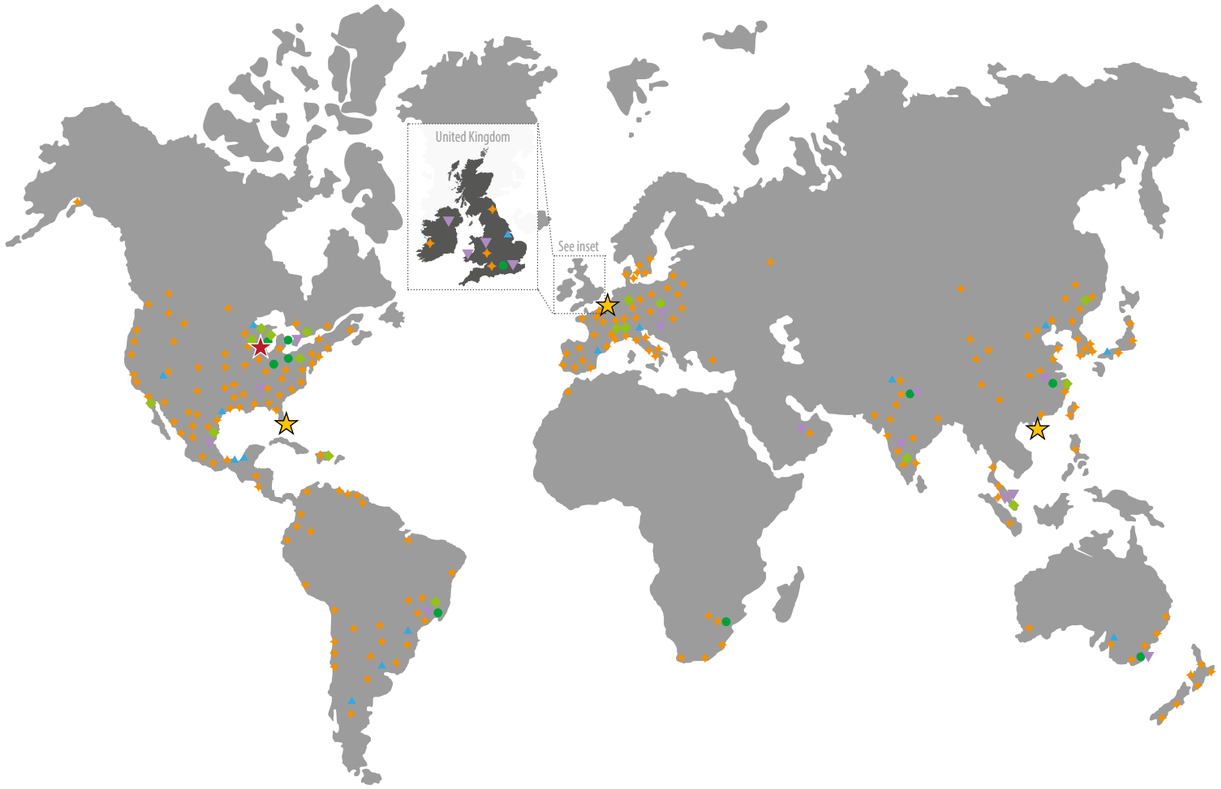
- Fully autonomous, solar-powered well-site control and safety skids
- Fully integrated control and safety solution
- Simpler integration with ESD and third-party equipment
- Simpler installation due to open integrated environment
- All on single skid – real estate and cost savings

DOING BUSINESS GLOBALLY

Rockwell Automation stands ready to serve you from more than 80 sales, service and support locations around the world.

To find your nearest Sales office, visit:
www.rockwellautomation.com/rockwellautomation/distributor-locator/sales-locator.page

- World Headquarters (Milwaukee, WI USA)
- Regional Headquarters (Hong Kong / Diegem, Belgium / Miami, FL USA)
- Manufacturing Operations
- Remanufacturing Centers
- Parts / Exchange Hubs / Repair Centers
- Drive Centers
- Support & Sales Offices



Rockwell Automation

Connect with us.

rockwellautomation.com — expanding **human possibility™**

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

Publication OAG-BR007A-EN-P - August 2019