GE Intelligent Platforms

Achieving Optimal Returns from Wellhead Operations

Increasing Production Uptime and Asset Performance While Also Lowering Total Cost of Ownership

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About Alan:
With extensive experience in infrastructure environments, Alan helps today’s oil and gas companies leverage the latest automation technologies powered by the Industrial Internet to increase productivity, reduce downtime, and improve safety. His work enables companies to optimize performance while protecting their people, assets and bottom line.

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Introduction

With rapidly growing global demand for energy resources, oil and gas exploration & production (E&P) companies face mounting pressure to maximize supply and increase the rate of discovery for new energy sources. Increasingly operating in more remote locations and investing heavily in equipment and facilities, companies face greater financial and operational risks than ever before.

Focusing on wellhead control in both new and existing fields can increase uptime and productivity while reducing total cost of ownership—and the key is to achieve this without compromising human, environmental and equipment safety and performance.

Let’s explore how oil and gas companies can leverage Industrial Internet-enabled technologies to optimize wellhead control for increased production uptime, increased asset performance, and lower total cost of ownership.

Intelligent wellhead control is pivotal in helping companies increase uptime and productivity without compromising human, environmental, and equipment safety and performance.
Challenges in wellhead environments

Manned and unmanned wellheads play a critical role in exploration and production, which make system reliability and uptime evermore crucial. If an RTU fails, resources need to be deployed to remote locations at the wellhead to replace hardware and to bring the unit back online—resulting in production loss as well as high mobilization costs, increased safety risk, and greater overall compliance costs.

The critical and complex nature of E&P operations calls for technology solutions that ensure reliability and safety for intelligent wellhead monitoring and control—delivering ultra-dependable production, accurate measurement, and fault-tolerant communications between production assets. These solutions must also withstand harsh environmental challenges and address the need for exploration and production from increasingly distant fields.

Secondly, companies that lack accurate, timely and integrated information cannot adequately control and optimize well production. They cannot leverage a centralized repository of data for real-time and historical analysis, or monitor and enhance field production strategies—leading to sub-optimal performance.

Solutions need to provide continuous monitoring and control of pressures, temperatures, flow rates and other critical production characteristics—ensuring efficient flow of oil and/or gas out of a well as well as mitigating risks. Effectively leveraging information enables companies to quickly address pending asset and production issues, maximize asset performance, and reduce expensive trips to the field.

Finally, increasing costs and intense shareholder pressure for maximized return on investment require E&P companies to be vigilant of their total cost of ownership. Costs can get exorbitantly high, which not only reduces profitability but takes away from investing in other growth areas.
To optimize the performance of wellhead controls for increased uptime and productivity, integrated control and safety systems such as GE’s PAC8000 SafetyNet offer a distinct advantage. They help companies monitor, diagnose and maintain wellhead control assets and activities for utmost reliability, productivity and lower costs while ensuring safety—all through a common platform.

These integrated systems include measurements for tubing pressure, differential pressure/flow, and temperature, and analytic capability at the central control room to determine overall well integrity—and provide features such as built-in intrinsic safety and remote diagnostics capabilities. They are also SIL2-certified by TUV Riehland, an independent agency, meeting the needs of most safety requirements.
Optimizing uptime, performance and costs

Let’s discuss how an integrated system can deliver on four key areas that are integral to maximizing production uptime and asset performance while also lowering total cost of ownership as they relate to wellhead control operations.

Preventing equipment failures for increased production uptime

As unplanned downtime disrupts production plans and hurts the bottom line, the need for continuous monitoring and control is vital in E&P operations. Take for instance, a well that produces 10,000 barrels of oil per day at an oil price of $75 USD per barrel; one day of downtime would equate to a loss of $750,000 USD. What is more, this cost increases exponentially for offshore rigs due to the high cost of sending out maintenance crew.

Integrated solutions with redundant controllers are critical to preventing failures, whereby the redundant controller pair operates in parallel, checking status multiple times through the processing loop and enabling the backup controller to continuously monitor the health of the master controller. Rapid and bumpless transfer to the standby controller also helps maintain operations on a continuous basis.

Solutions that offer network redundancy in addition to high availability for the controllers can further minimize downtime events. For example, with two high-speed Ethernet ports to provide communication redundancy, each port can be connected to an independent LAN, which is continuously monitored for its integrity. If the primary port detects a network failure, traffic can immediately switch to the other LAN to maintain full communication—ensuring greater availability and higher productivity.

It’s imperative for companies to quickly get production wells operating and to maintain reliability and tight control throughout ongoing wellhead operations for optimal oil and gas recovery.
In addition, hardened environmental specifications are essential for increased reliability, enabling systems to be mounted in non-cooled conventional enclosures, which saves the cost of expensive cooled panels. With such hardened specs, the mean time between failure (MTBF) should be upward from 99.99% minimizing downtime risk with consistent, reliable operations and avoiding the need for maintenance trips to the field.

**Leveraging advanced diagnostics for increased asset performance**

The availability and use of accurate, reliable and timely data is a powerful tool that can enhance asset performance. With today’s Industrial Internet, where machines and data are connected, integrated solutions offer advanced diagnostics to help companies manage their wellhead control assets more effectively.

For example, they can alert operators about potential problems to enable quick response to issues and even prevent problems before they occur.

Access to timely and accurate mission-critical information from the oil and gas wells helps identify issues and eliminate critical gaps in oil and gas operations. The information provides valuable insight that helps boost asset performance. For example, effective analytic systems can preempt alarm and failure events based on historical modeling, enabling “active avoidance” to minimize asset downtime and hence increase yields.

Coupled with offline tools that identify causes of production problems and present the opportunity to prevent issues in the future, operators can visualize process upsets and their causes. Such insight enables companies to proactively maintain assets and control costs with better predictability for improved planning. It also reduces the need for unnecessary trips to the field by resolving issues that can be addressed remotely as well as enabling the right knowledge and tools.

**Reducing solar panel use for lower total cost of ownership**

The use of solar panels for power at wellhead operation sites drive significant installation and maintenance costs, coupled with expenses for associated batteries, redundant power supplies, charging systems, and related hardware. Solar panels often have to be installed in remote locations where wide temperature ranges and harsh environments are typical, which also drive up complexity and costs. The need for power to remain operational 24/7 is imperative, challenging companies to implement solutions that enable lower consumption.

Companies need to compare the overall power consumption of their wellhead systems in operating conditions and consider how it impacts costs; those that consume less power without compromising performance and reliability can significantly reduce expenses by decreasing the number of solar panels required for operations.

For example, GE’s purpose-fit wellhead integrated control and safety systems are designed for lower power consumption than general-purpose systems, whereby the difference can be up to 8%.
Integrating wellhead automation as part of the overall process with a pre-configured solution enables rapid implementation—saving significant time and costs for discovery and startup.

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**Minimizing time to production for lower total cost of ownership**

Time is of the essence—from initial discovery and startup through production. The sooner companies can automate a well once drilling is complete, the faster it can start production to achieve ROI, while minimizing unnecessary costs due to delays. The availability of reliable information is at the core of faster time to oil and gas production and proactive maintenance, and it requires integrating wellhead automation as part of the overall process.

An advanced control system that includes RTUs, programmable logic controllers, safety controllers, HMI and SCADA, controls and monitors all aspects—from the wellhead to the storage tank. These systems need to be programmed to meet the operational requirements of the process, and the HMIs must be configured to provide monitoring, alarms and control set point functions.

Hence, pre-configured solutions with a common development environment provide a critical advantage. They enable rapid, reliable and safe implementation—reducing engineering time, overhead, and equipment. For example, software toolsets that ensure repeatability in application programs help reduce implementation risk and time for the development of wellhead control automation solutions to bring assets online as quickly as possible, lowering the total cost of ownership.
Optimize Your Wellhead Operations

More than ever, E&P companies are under intense pressure to maximize productivity, reliability, and efficiency while addressing increasing cost and profitability pressures. Significantly high financial and operational stakes in oil and gas recovery production, coupled with sophisticated processes in extremely harsh environments, calls for renewed focus on the criticality of wellhead operations.

With the latest technology solutions enabled by the Industrial Internet that integrate safety and control onto a single platform, you can achieve more reliable, efficient wellhead operations. Such solutions deliver continuous monitoring and precise control in a wide range of situations—onshore and offshore—delivering increased production uptime and asset performance, and lower total cost of ownership.

Let GE help you set the path toward maximizing the uptime and productivity of your wellhead operations—without compromising safety and reliability—for a long-term competitive advantage.

www.ge-ip.com/oilandgas
About GE Intelligent Platforms
GE Intelligent Platforms provides industrial software, control systems and embedded computing platforms to optimize our customers’ assets and equipment. Our goal is to help our customers grow the profitability of their businesses through high performance solutions for today’s connected world. We work across industries including power, manufacturing, water, mining, oil & gas, defense and aerospace.
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