SIEMENS

Oil & Gas Production Automation

Optimizing asset utilization and maximizing profits

Siemens Automation. Fueling Efficiency.

Make the most of your assets – above and below ground

As an onshore oil and gas producer, you know that maximizing profits depend on maximizing asset utilization. Of course, that means making the most of your above-ground capital equipment to extract your in-ground reserves, while minimizing operating expenses.

But all this depends on optimizing another important asset that, like your reserves, is always subject to depletion: time. That's why overall efficiency and reliability are critical in upstream production facilities, as are faster engineering and commissioning of new gear and applications.

The need for speed, efficiency, reliability, and scalability, is what drives the trend of greater automation and integrated operations of onshore production fields. It is also what drives Siemens Totally Integrated Automation (TIA) to be your single-source solution to achieve these aims.

No more patchworks in the oil patch

For decades, upstream oil and gas production automation has used standalone mechanical and relay-based schemes, localized for an operation's specific requirements.

Complicating these have been manual controls and data-gathering systems that are expensive, time-consuming and often error-prone. That's not to mention unreliable. Worse still, little if any of this can scale across multiple sites.

Siemens TIA, on the other hand, eliminates such patchwork approaches. It's a matched portfolio of plug-and-play automation and control solutions that can provide the intelligent management of your entire production process, across all your well-head lifts, pumps, separators, power generation, and all other vital components.

It's also highly scalable so your automated systems can easily and quickly span multiple production sites, no matter how far apart.

Quantum operational gains

Based on open system architecture, the Siemens TIA portfolio features uniform hardware and software interfaces, global standards for interoperability with your legacy systems, and consistent data management.

Complementing this portfolio is the TIA Portal, an integrated engineering framework for all your automation tasks. Hundreds of Siemens industrial customers have used the TIA Portal to reduce engineering and commissioning times by as much as 30 percent and, in many cases, even more.

What else can the Siemens TIA portfolio of automation and controls do for your production efficiencies? Plenty.

For example:

- **Improved visibility.** You'll be able to gather, consolidate, and analyze real-time data from every point of your mechanical operations and process flows, as well as from the sensing fabric itself – even if your production facility is remote and unmanned, as most are. This visibility will support better, faster, and more informed decisions, too.
- **More uptime.** You'll dramatically cut the risk of costly production downtime. That's because predictive maintenance and remote system diagnostics will enable a much more cost-effective and proactive approach to overall reliability. Siemens components have ruggedness built-in, not built-on. If service technicians must be dispatched, they can have knowledge of the problem and needed parts in advance, helping them resolve issues much more quickly.
- **Simplified compliance.** You'll find it's much easier and faster to collect and compile the data for the detailed reporting required by federal, state, and local regulations. This not only saves time, but also reduces the risk of penalties, even production shutdowns, for non-compliance.
- **Greater safety and security.** You'll improve the safety of your production environment because Siemens TIA components have built-in, fail-safe protective features that don't need any additional hardware. In fact, many are certified SIL 3, one of the highest safety levels defined in IEC EN 61508, the global international safety standard. You'll also benefit from hardened industrial security to protect against cyber-attacks.

In all, Siemens and its TIA portfolio and TIA Portal can help put time on your side, ensuring that your capital assets above ground are always working and always drawing the most they can from your reserves below ground. Efficiency, reliability, safety, security, and scale; these are your keys to more profitable production. And Siemens can help make them happen.

Make your oil and gas facility a digital production field

As more and more oil and gas is drawn by unconventional means – such as horizontal fracturing that's opening stacked and ever-longer laterals – operators are increasingly locating their production assets on multi-well pads. This provides tremendous economies of scale that can dramatically boost their return on assets.

Transform legacy systems with minimal risk and downtime

Siemens has helped hundreds of oil and gas producers around the world and across North America transform their outdated, legacy production facilities into digital production fields. And they did it with minimal risk and downtime.

We have experience in transforming all kinds of facility configurations, too. We recognize the need for flexibility because "one size doesn't fit all."

Variable factors can include different types of geological formations, surface topologies, target hydrocarbons, well fluids, regulations, and even the operating specifications and standards of the field's company owner.

Gain flexibility from a broad modular portfolio

To provide that flexibility, our Siemens Totally Integrated Automation (TIA) portfolio offers a broad range of modular automation and control solutions – from programmable logic controllers (PLCs) to wireless networking systems to analytics and instrumentation.

Few other suppliers can match the breadth of our offerings. We can also provide wide array of drives motors and motor controls, with just about every power rating, size, and capability your operation might need.

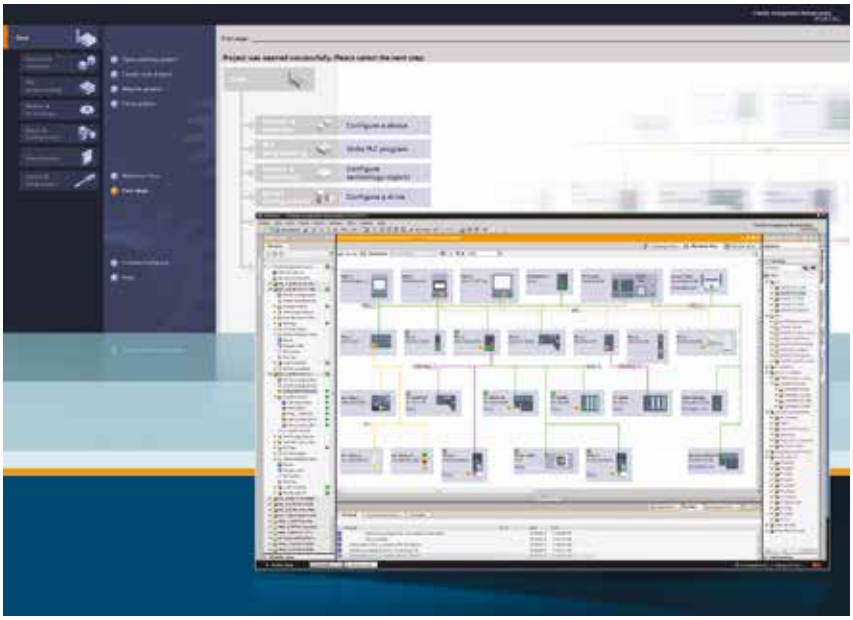
The interoperability of our Siemens TIA portfolio makes the integrated operations of the digital production field much easier, faster, and more economical. Our solutions can scale to fit your specific assets and can be easily replicated to work across all of your operations.

Increase standardization for reliability, efficiency and lower costs

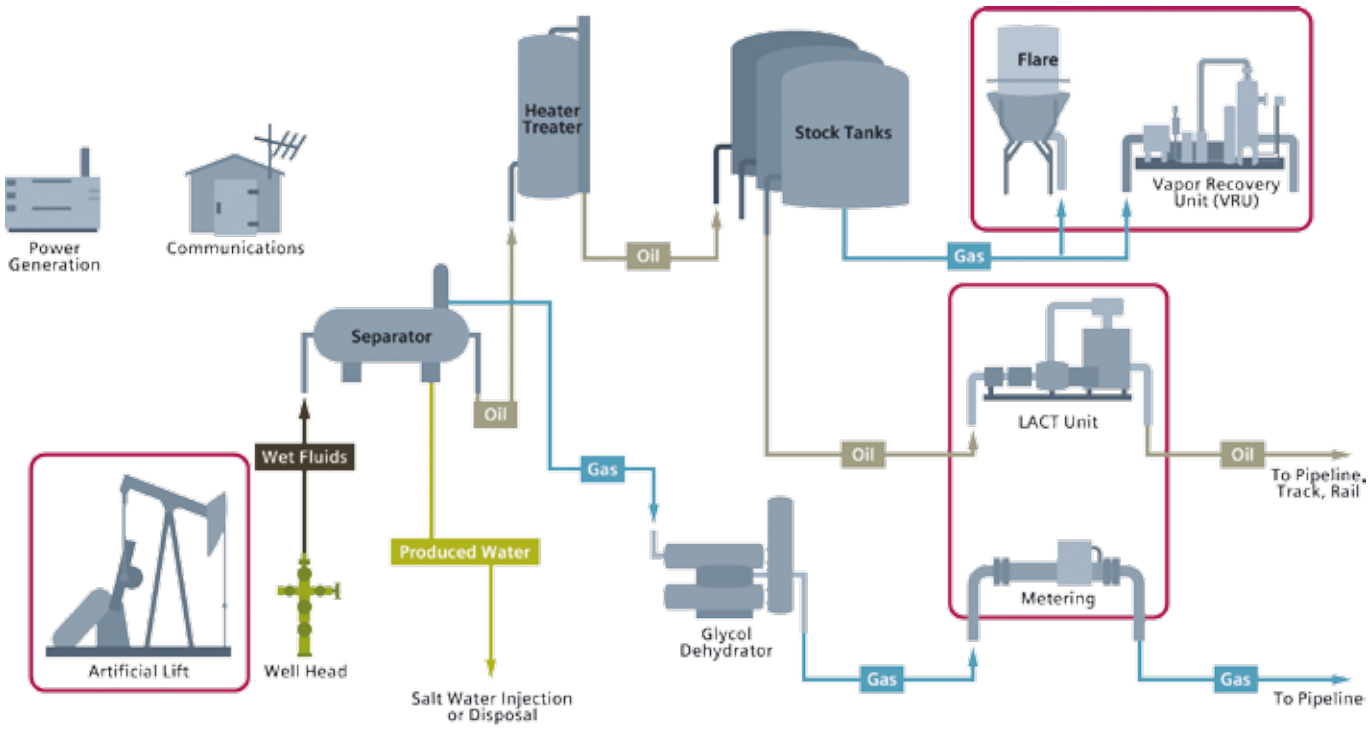
In addition to flexibility, the architectural uniformity of the Siemens TIA portfolio can tremendously improve standardization throughout your production enterprise. This will further simplify and streamline your operations, improve reliability, enhance efficiency, and reduce costs.

If stranding your existing investments in legacy automation and control assets concerns you, rest easy. The Siemens TIA portfolio's open architecture and protocols such as PROFIBUS and PROFINET make it possible to internetwork data collection with products from a wide range of suppliers.

Never worry about your Siemens investment going out of date, either. Our hardware components are designed for optimal modularity and replicability, so you won't outgrow them; you'll just add more as needed. Plus, with software now providing most of its value, periodic firmware downloads will keep all of it up-to-date.



Functional capital assets used in the typical operation of an onshore oil and gas production facility



Well-Head Monitoring

- Tracks hydrocarbon temperature, pressure and flow, and provides valve control
- Power via grid, generator, or solar/battery combination
- Communicates via 3G cellular modem

Rugged components:
SIMATIC S7-1200 PLC, WinCC SCADA, SCALANCE X Ethernet switch and M875 3G cellular modem

Artificial Lift
(e.g., Hydraulic Rod Pumping System)

- Monitors down-hole conditions, logs data, and provides pump off control
- Power via grid, generator, or solar/battery combination
- Communicates via 3G cellular modem

Rugged components:
SIMATIC S7-1200 PLC, WinCC SCADA, SIMATIC HMI Comfort Panel, SCALANCE X Ethernet Switch and M875 3G cellular modem

Gas Mitigation
Combustor (Flare) System Control & Monitoring

- Controls ignition, monitors flame, and logs data
- Power via grid, generator, or solar/battery combination
- Communicates via 3G cellular modem

Rugged components:
SIMATIC S7-1200 PLC, SCALANCE X Ethernet switch and M875 3G cellular modem

Gas Mitigation
Vapor Recovery Unit (VRU) System Control

- Controls compressor motor or variable frequency drive (VFD), as well as pipe valves and switches
- Monitors for pressure, temperature, and flow
- Power via grid or generator

Rugged components:
SIMATIC S7-1500 PLC

Lease Automatic Custody Transfer (LACT)

- Controls compressor motor or variable frequency drive (VFD), as well as pipe valves and switches
- Monitors pressure, temperature, and flow
- Power via grid or generator

Rugged components:
SIMATIC S7-1500 PLC, WinCC SCADA, SIMATIC HMI Comfort Panel, SITOP Power Supply, SCALANCE X Ethernet Switch

Gain the experience, expertise, portfolio, and support you need

Use Siemens Totally Integrated Automation to improve your midstream efficiency, reliability, and safety

Siemens Totally Integrated Automation (TIA) solutions portfolio can help provide your midstream transport solutions and operations with:

- **Increased availability.** Cut the risk of costly downtime. Predictive maintenance and remote system diagnostics will enable a much more cost-effective and proactive approach to overall reliability. Built-in ruggedness ensures greater reliability. If service technicians are needed, remote diagnostics can provide them with troubleshooting insights and needed parts in advance, so they can resolve issues much faster.
- **Improved visibility.** Gather, consolidate, and analyze real-time data from every point of your mechanical operations and process flows as well as from the sensing fabric itself, along the full length of your midstream infrastructure. This visibility will support better, faster, and more informed decisions, too.
- **Better safety and security.** Improve the safety of your pipelines with Siemens TIA components that have built-in, fail-safe protective features. Many are certified to the highest safety levels defined in IEC EN 61508, the global international safety standard. Also, their hardened industrial security will help protect against cyber-attacks.
- **Simplified compliance.** Collect and compile the data for the detailed reporting federal, state, and local regulations require much faster and more easily. Not only will you save time, but you'll also reduce non-compliance risks of penalties or, worse, shutdowns.

Siemens' approach to help you address your issues first starts with learning your transport challenges, learning your business, and learning what keeps you awake at night. We then help you turn these challenges into opportunities to fuel greater efficiency, reliability, and safety across all your operations.

Siemens counts among its customers all the industry majors as well as the top oil services firms worldwide. In fact, with some, we have strategic global partnerships. At the same time, hundreds of smaller oil and gas producers are among our best customers, too.

Our experience and expertise is yours to use

Point is, we have decades of experience – experience that's yours to use – in providing solutions to all sorts of issues that the oil and gas industry faces. In the most remote places. And in the harshest conditions.

From the towering waves of the North Sea and deep waters off Brazil, to the steaming jungles of Africa and Latin America. From the blistering deserts of West Texas and Saudi Arabia, to the sub-zero tundra and boreal of Alaska and Canada. Wherever you go, you'll find Siemens there.

With that experience, comes expertise in our people and some of the world's best and brightest engineers and technicians. Their experience and expertise includes designing and engineering automation and controls for the world's most sophisticated and complex industrial applications. This includes critical infrastructure like nuclear plants, high-speed transportation, health care and, yes, oil and gas.

Expert support when and where you need it

The value of our experience and expertise is demonstrated through the technical support we provide for all of our Siemens TIA solutions throughout the lifecycle of our engagement with you. After all, we know that when you have a problem that threatens or disrupts hydrocarbon transport, minutes matter.

You can count on expert support whenever and wherever you need it. From the pre-sale, through solution design, engineering, deployment, and thereafter. From your day-one commissioning, to system diagnostics 10 years from now. Highly trained technicians are available via toll-free phone support 24/7/365.

For issues requiring onsite assistance, Siemens' authorized distributors and certified solution partners can send skilled service technicians in your area. These technicians have the training, knowledge, and parts needed to troubleshoot and solve the most vexing problems quickly and effectively.

Simplify, simplify, simplify

In dealing with the kinds of complexities we have, we've learned one important lesson: *Simpler is better.* That's the core philosophy you'll find underlying our Siemens Totally Integrated Automation (TIA) portfolio of plug-and-play automation and control solutions.

Our comprehensive and well-coordinated collection spans process and motor controls, analytics, instrumentation, networking, I/O, and HMIs.

You'll also find simplicity to be at the heart of our Siemens TIA Portal. It's a fully integrated, highly intuitive, and easy-to-learn engineering framework that can cut automation and commissioning time by as much as 30 percent or more by centralizing all your systems engineering.

For example, it has vast libraries of drag-and-drop software code to make software development much faster and replicable. To serve the needs of the oil and gas industry, we created American Petroleum Institute (API) and American Gas Association (AGA) function blocks.

Siemens TIA portfolio

Here are just a few highlights from the many hundreds of products in our Siemens TIA portfolio that you can deploy in your onshore production facilities:

■ SIMATIC S7-1500 PLC

Innovative features

- Large memory (storage and data management)
- Secure 128-bit encryption for tamper-proof operation and greater cyber security
- System and IO diagnostics pinpoint issues quickly from built-in screen, web server, or HMI panel
- Advanced interface and open communications, including PROFIBUS and PROFINET
- Available flow calculation blocks designed to API 21 standard
- SIL 3 safety optional for safe system shutdown

What this means for you

- Offers more deployment flexibility with scalability for systems – large and small
- Reduces engineering and commissioning time and costs via simplified design
- Provides multiple levels of application security
- Provides future proof infrastructure capability for data driven architecture

■ SIMATIC S7-1200 PLC

Innovative features

- Powerful processor and software features provide big PLC performance in a cost-effective microcontroller
- 64-bit processing and Structured Control Language (SCL) provide a framework for advanced calculations needed for pump control
- Numerous communication options provide flexibility for both local and remote connectivity

What this means for you

- Increases operational flexibility control systems using proprietary PLCs
- SIL 3 level of safety in compact size

■ SIMATIC Comfort Panel HMI

Innovative features

- Global hazardous location certifications in 4" to 12" models
- 80,000-hour LED backlight provides more than 9 years of continuous operation
- Daylight-readable, 16:9 widescreen with 16 million colors provides photo-realistic graphics
- Both data and system SD cards provide easy replacement of failed systems in the field without a computer need
- High-performance processor with Visual Basic for Applications (VBA) scripting allows for advanced HMI application development in 4" to 22" panels
- Maximum data security during a power failure

What this means for you

- Reduced energy costs due to lower current consumption and longer lifespan
- Inexpensive preservation of all data without using an additional battery
- Operational efficiency through innovative commissioning, operating, and maintenance features

WinCC SCADA & Open Architecture

Innovative features

- Complete SCADA solutions for wide range of requirements
- Support for latest Object Linking and Embedding for Process Control (OPC) Foundation standards for third-party interfaces
- Remote monitoring over a variety of wireless and wired networks
- Hot standby redundancy and Disaster Recovery System
- Platform Independent – installable on Windows, Linux and Solaris OS
- TÜV SIL 3 Certification for critical applications
- Long term support and streamline upgrade and migration support

What this means for you

- Reduced system costs and complexity while providing scalable solutions
- Highest levels of system reliability and availability
- High versatility and portability along with scalability
- Can be deployed for mission critical projects
- Global availability and data transparency
- Investment protection and reduced TCO

SCALANCE X Ethernet Switches

Innovative features

- Rugged design with the features and certifications needed for oil and gas applications
- Scalable managed and unmanaged switches available in different port configurations
- Memory card aids in field replacement of managed devices
- Built-in diagnostics, web server, and capabilities to integrate managed switches into control applications

What this means for you

- Maximizes uptime and provides scalable solutions for your most demanding applications
- Future proof through highest operational performance
- Connecting IT and Control network according to their requirements
- Reduction in total maintenance and change costs
- Investment protection and reduced TCO

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