

LISTEN.
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The Connected Chemical Plant

Improve asset utilization, lower support costs and reduce risks with a modern distributed control and information system



**Rockwell
Automation**

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Constrained by Aging Assets

Chemical producers building new plants need technologies that help them get the most from their assets, while also helping them minimize safety and quality risks. Meanwhile, those with decades-old plants must address a wide range of challenges, including:

Old and inflexible automation technologies

Aging and obsolete distributed control systems (DCSs, PLCs and ESDs) are more prone to failures and high MTTR. This can increase both unplanned downtime and support costs. A lack of flexibility and agility can reduce asset utilization and increase costs by limiting your ability to optimize production and accommodate processing changes for new products.

Limited visibility into critical-asset performance

A lack of insights into critical asset performance can make it difficult to anticipate problems which may lead to increased unplanned downtime. It limits operators from optimizing assets and determining variation sources, resulting in lower throughput and quality. And it restricts management's ability to make strategic business decisions around plant-to-plant or site-to-site capacity and performance.

Absence of automation standards and multiyear automation plans

A lack of standards and a multiyear automation plan can make operations, maintenance, and support more complex and costly. It can also increase CapEx and time-to-market as designs and standards must be defined and rebuilt on each project.

Whether launching a new plant or revitalizing an aging plant, chemical producers must prioritize investments around the technologies that deliver the best ROI to solve their most pressing business challenges. Furthermore, today's "smart" automation technologies require producers to navigate the challenges of integrating their information technology (IT) and operations technology (OT) systems while ensuring protection from outside cyber-security threats.

In addition to aging infrastructures, chemical producers must contend with:



A Diminishing Skilled Workforce



Increasing Compliance Requirements



Growing Security Risks



High Production and Energy Costs

Maximize Production and Mitigate Risks

The technologies utilized in The Connected Chemical Plant are far superior to what was available just 10 years ago. They can help chemical producers:

- **Merge IT and OT systems** that have historically remained separate to bring data in real-time to the right decision-makers.
- **Provide seamless connectivity** across people, processes and technologies.
- **Transform data** into actionable information and unprecedented insights.
- **Bridge the workforce gap** by utilizing technology to contextualize and present information intuitively to the newer generation of operations personnel.

Where to Start?

Many chemical producers are eager to deploy a Connected Chemical Plant, but they struggle with where to begin.

Often, the best place to start is the automation and information infrastructure. It only makes up a fraction of a plant's capital investment, but it has a significant impact on ability to increase competitiveness and meet business objectives.

This connected, information-driven approach to chemical production is called The Connected Chemical Plant. It does more than replace obsolete systems. It presents new, nearly unlimited opportunities to monitor and improve production performance through real-time production performance insights. Four key opportunities for chemical producers include the following:



A modern DCS and information solution creates the foundation for seamless connectivity and real-time information sharing. It allows chemical producers to take advantage of other information-enabled technologies, such as process and maintenance analytics, integrated power control with connectivity to Intelligent Electrical Devices (IEDs), smart instruments, and "smart" skids. And with a solid foundation and integration into smart devices in place, analytics can be deployed to further increase asset performance.



“By using digitization to integrate business and manufacturing systems, optimize production footprints and redesign processes, chemicals companies can capture gains of up to 25 percent in capacity utilization.”

- 2017 Chemical Industry Trends, PwC, 2017

“The same operator has become more productive with the automated process. We can quickly determine if an adjustment needs to be made on a batch, and we make it.”

- Systems integration specialist, food producer



Increase Asset Utilization

Optimizing asset utilization begins with being able to measure asset performance and identify production problems in real time.

A **modern DCS** integrates all aspects of automation and information into a single, plant-wide infrastructure. And because it is based on open communication standards and uses EtherNet/IP™ as its backbone, a modern DCS can provide readily available information across IT/OT – served up in a manner which is tailored to the consumer.

This gives chemical producers access to data from a growing number of industrial IoT or smart devices, as well as third-party systems, so they can monitor and measure virtually any aspect of their operations.

Integrated power control systems can capture the electrical data from aging production assets to monitor their performance and help minimize unexpected downtime.

Chemical producers can use this data to better understand electrical distribution and motor-driven asset performance. They can also use the data to schedule repairs or maintenance during planned downtimes or turnarounds, rather than risking a wait-to-fail approach or performing unnecessary maintenance out of an abundance of caution. And they can use the data to help better monitor and optimize asset energy usage.

Once these core capabilities are in place, chemical producers can begin to explore using advanced controls and analytics to further increase asset utilization. For example, self-aware equipment and collaborative skids, like turbines, boilers, compressors or pumps, can act with little human intervention to help prevent incidents and downtime, increase productivity, and reduce energy consumption.

DCS Drives Productivity

For its new chemical-production plant, a leading herbicide producer used a modern DCS and information solution to automate previously manual processes and improve visibility into the production process.

This integrated control and information approach helped the company increase productivity by 166 percent compared to its previous plant.

Operational Results

A modern DCS and integrated power control systems continuously drive your plant to help achieve multiple business objectives including cost reductions, decreased emissions, consistent quality and production increases.

Additional benefits of an intelligence layer on top of basic automation systems include:

- Reduce product quality variability up to 75%
- Reduce specific energy consumption up to 20%
- Maximize throughput up to 25%
- Maximize processing yield

Improve Operations Flexibility

Batch producers that rely on disparate control systems and manual processes can experience high cycle times and inconsistent product quality. A Connected Chemical Plant can make batch production more agile and efficient by allowing operators to more easily make changes and bring new products online faster.

For example, chemical producers can use a modern DCS with a manufacturing execution system (MES) to:



Automate the entire process of pulling work order management from an ERP system, retrieving the right recipes for those orders, and delivering the corresponding work instructions to operations.



Significantly reduce the time spent on manual data-recording processes for accounting and compliance purposes.



Help manage quality for different batches by verifying operator activities and validating that prescribed processes were followed.

Operators using high-performance HMI, historical data collection, KPI monitoring and “golden batch” comparisons can track the flow of raw materials and make real-time decisions. This can help improve batch cycle-time and quality while reducing costs and waste. Operations management can monitor production performance against production targets and optimize production to future orders.



“ Having connected terminals allow us to respond quicker to changing market conditions without compromising our way of running our terminals.”

- Infrastructure manager for a large operator of bulk liquid-storage facilities

“ The scalability of the PlantPax® DCS from Rockwell Automation will allow us to grow the system as we grow the operation.”

- Automation project manager



Reduce Safety, Compliance and Security Risks

The many operational and regulatory risks chemical producers face in their operations can be more easily understood and managed in a Connected Chemical Plant.

SAFETY

The protection of people, assets, and the environment is the primary goal of any chemical producer. Understanding how to identify hazards, the proper and “right-fit” application of layers of protection, and life-cycle management can be challenging. This requires experienced personnel familiar with regulatory requirements and standards and process control technologies. Whether building a new greenfield facility or modernizing an existing facility, understanding Process Safety Management (PSM) is critical.

Scalable safety instrumented systems (SIS) allow chemical producers to apply the appropriate layer of protection to meet their specific risk mitigation requirements.

Pre-engineered SIS solutions are available which helps reduce lead times and eases deployments when replacing aging or noncompliant safety systems.

When the in-house expertise is not available, many chemical producers turn to automation vendors for a full range of safety services, including:

- Risk assessments and compliance-conformity audits
- Safety designs
- Installation and validation support
- Integration and startup support
- Compliance consulting
- Safety-product and safety-standards training
- TÜV certification training



“ Only 52 percent of executives in advanced manufacturing organizations appear confident that assets are protected from external threats.”

- *Digital Transformation: Are Chemical Enterprises Ready?* Deloitte, January 2017



Reduce Safety, Compliance and Security Risks

COMPLIANCE

In addition to complying with safety standards and regulations, chemical operations must meet stringent environmental regulations.

With a modern DCS, virtual sensors and visualization software, operators can track the flow of chemicals and monitor emissions, such as effluent discharges and releases – even in areas where measurements are challenging. This information can be used to create automated compliance reports and review-by-exception procedures to speed time-to-market. It also can be used to notify regulatory agencies of potential hazardous releases.

SECURITY

While the use of information-enabled devices and the integration of IT and OT is required to compete in the modern economy, these technologies may increase cyber-security risks.

Chemical producers must deploy a comprehensive and layered security approach to help protect their intellectual property, people and assets. A defense-in-depth approach assumes any one security measure can and likely will be defeated, and therefore uses multiple fronts of protection.

A defense-in-depth security strategy should target risks at six levels:



POLICY



PHYSICAL



NETWORK



COMPUTER

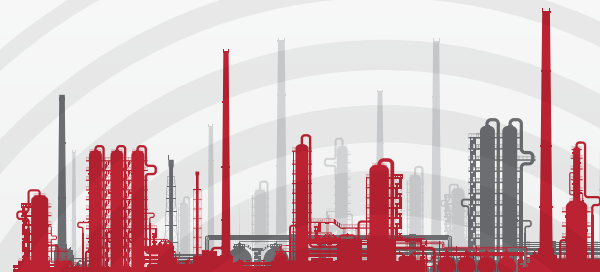


APPLICATION



DEVICE

When the in-house expertise is not available, many chemical producers turn to their automation vendors to address their security needs through best practices, security assessments, training and certification, and security monitoring.



“Only 52 percent of executives in advanced manufacturing organizations appear confident that assets are protected from external threats.”

- *Digital Transformation: Are Chemical Enterprises Ready?* Deloitte, January 2017



Improve Maintenance and Support

Replacing obsolete automation technology with modern technology reduces the risk of not being able to repair critical assets or find replacement parts. The Connected Chemical Plant with modern technology also offers chemical producers open systems with options for life-cycle management which can reduce risk and OpEx expenditures.

SIMPLIFIED MAINTENANCE

Many producers struggle to support the mix of automation technologies that they have procured from multiple vendors and modified many times over many years. Standardizing or consolidating these technologies when creating a Connected Chemical Plant can help reduce the number of systems with which maintenance technicians and support teams must be familiar.

This can help speed up troubleshooting and repairs - which reduces MTTR, limits unplanned downtime, reduces the amount of necessary operator training, and lowers support costs. The ability to capture and maintain maintenance information also can help companies retain critical "tribal knowledge" before it walks out the door with retiring workers.

REMOTE SUPPORT

Chemical producers can fundamentally rethink support in a Connected Chemical Plant.

Instead of staffing specialists on-site or sending them to a plant following a failure, producers can use remote access to provide near real-time support from a centralized location. This can empower and significantly increase the effectiveness of your limited in-house expertise, which is often geographically dispersed. Some producers with limited resources utilize third-party remote monitoring and support services to track production performance in real time and send alerts if any issues arise.

These capabilities could prove to be especially valuable in the coming years as the chemical industry faces a growing skills shortage.

**Source: The Talent Imperative in the Global Chemical Industry, Deloitte, September 2015*

“Following the control-system upgrade, I was thrilled to learn that the recommended spare-parts list for the [new] hardware was only a third of the old control-system components, both in terms of the number of items and the cost for those items.”

- Maintenance manager, ethanol producer

Within the next 10 years,
23%
of the chemical workforce will be eligible to retire*

Transforming Chemical Production

A Connected Chemical Plant presents an entirely new way of doing business. It can give chemical producers immediate relief from the constraints of obsolete equipment. But it also can transform chemical production by providing:

- Real-time insights into asset utilization, downtime, product quality and changeover times to drive continuous-improvement efforts.
- A better understanding of safety, environmental and quality risks.
- Simplified troubleshooting and maintenance to help reduce downtime and lower support costs.
- More strategic opportunities to address skills shortages, such as by using remote monitoring and support.
- New insights into energy consumption to drive a more sustainable operation.

To learn more about creating *The Connected Chemical Plant*, visit our **Process Solutions** home page or contact your local sales representative.



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