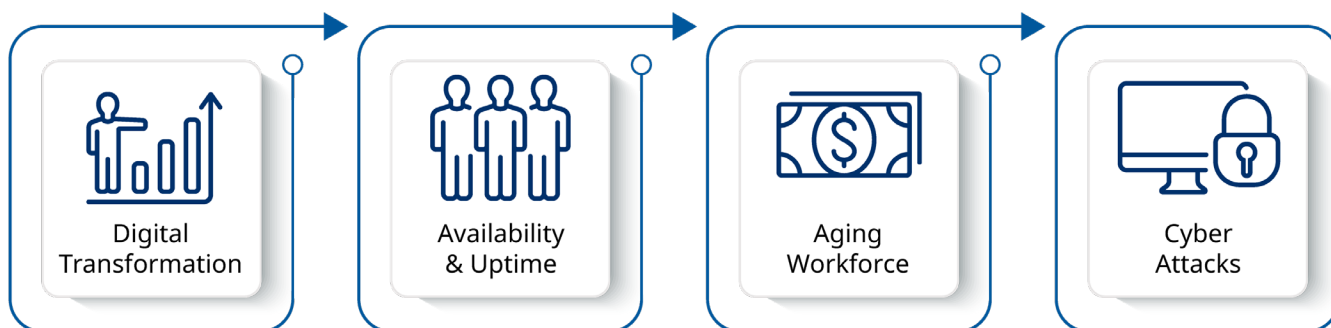


Solutions For Chemical Operations Leaders

Rising Trends in the Chemical Industry

The rapid expansion of the chemical industry in recent years has created new challenges for chemical plants. In order to adapt to the demand of the growing chemical market, industry executives must utilize new technologies, resources, and solutions to remain competitive. In response to this growth, Yokogawa has identified four key trends transforming the chemical industry and offers solutions for companies to achieve success in this evolving market.



Rising Trends Transforming the Chemical Industry

The world's leading chemical companies partner with Yokogawa as a full scope automation leader to achieve operational excellence, reliability, and safe operations. Yokogawa is committed to delivering solutions across the entire plant lifecycle that meet the evolving needs of the market.

As a part of our dedication to helping executives maneuver the ever-changing chemicals market, Yokogawa has identified the following four trends as the most critical factors transforming the industry.

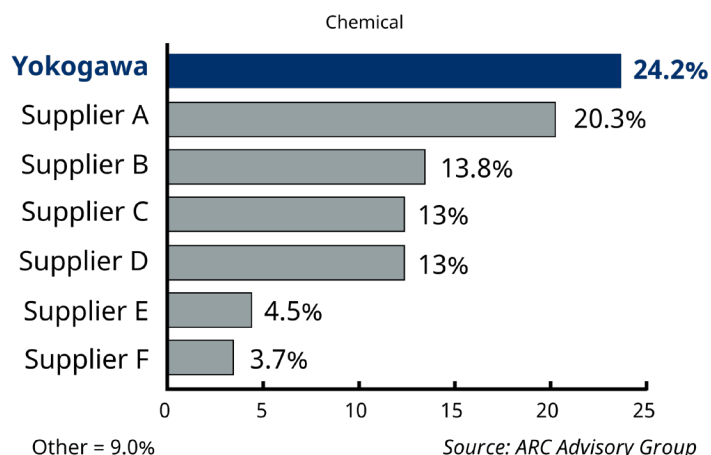
Digital Transformation Opportunities Await Realization

Industry Challenge: The remarkable pace of technology is creating significant changes and opportunities in the business environment. Yet industry surveys show that less than 5% of chemical companies have successfully executed a digital transformation. Business leaders are eager to unlock the value of digital but are unclear about how to approach and execute.

Solutions: Organizational strategy is built with business improvement objectives and outcomes that are implemented through a combination of people, process, and technology.

Digital transformation is a journey that integrates a wide variety of applications, technologies, and business processes in line with a company's aims.

Leading Suppliers for Industry Revenues = 3,840.7 Millions of USD



Rising Trends Transforming the Chemical Industry

Yokogawa delivers value to the process industry by focusing on smart manufacturing; optimizing the supply chain; improving the decision-making process; changing the culture, organization, and mindset; creating new business models, and generating further revenue.

Yokogawa co-innovates with customers by:

- Identifying where they are in the digital transformation journey
- Defining potential value creation opportunities
- Assembling a team of professionals with deep chemical domain knowledge
- Deploying solutions that maximize efficiency and increase profits

Availability and Uptime are Linked to Total Cost of Ownership

Industry Challenge: Unplanned shutdowns and outages continue to upset operational performance. The loss of production, waste of energy, and other inefficiencies directly impact the bottom line. Root causes can range from aging equipment to inadequate maintenance workflow, and limited operations personnel expertise.

Chemical companies are seeking to achieve the highest levels of asset integrity and availability, while continuously driving down the total cost of ownership (TCO).

Solutions: Plant safety, availability, cost efficiency, and operational excellence are ingrained in all aspects of Yokogawa. It is in our products, services, mindset, and culture.

Yokogawa's reliability, availability and maintenance consultants combine global best practices with a human performance approach and are enabled by technology applied across the organization. From process controls systems to instruments, analyzers,

and plant asset management, Yokogawa works with customers to deploy asset performance management solutions that maximize plant uptime and availability.

An Aging Workforce is Affecting Operations

Industry Challenge: The effects of an aging workforce are beginning to show in plant operations. One major chemical company analyzed their demographics and found that they would soon lose 75% of their operating staff due to retirement.

Solutions: Yokogawa offers Modular Procedural Automation (MPA), Operator Training Simulators (OTS), and other operational support solutions. As experienced operators begin to retire, some procedures with manual intervention are at risk of being lost. Implementing modular automation and providing training solutions to reshape a new workforce is critical to mitigating risks. Yokogawa solutions reproduce actual plant behaviors that provide realistic operations training. Virtual plant training gives customers the knowledge of how to best respond to various emergency situations, which contributes to reductions in time and cost, while improving control strategy, productivity, and efficiency.

Achieving Net Zero while Maintaining Profitability

Industry Challenge: Companies in the chemical industry are now pursuing environmental sustainability goals (ESGs). They are reducing waste, reducing their environmental footprints, and finding ways to enable a circular economy. The more they can do with less, the better. This requires them to streamline processes and use existing assets to increase yields. However, at the same time, they must increase their agility and resilience to thrive in the "next normal" business ecosystem.

Solutions: Most companies realize that they must transform from their current automated operations to autonomous operations, which possess learning and adaptive capabilities that enable responses with minimal human interaction. Yokogawa is setting a

Rising Trends Transforming the Chemical Industry

course for transformation from industrial automation to industrial autonomy, "IA2IA." Yokogawa is driving this to empower customers to achieve breakthrough results and thrive in markets that continually present new challenges. To enable a Net Zero, circular economy, autonomous operations allow companies to maximize efficiency. In a rapidly changing environment, autonomous operations provide the high responsiveness required to adapt and move quickly—even with disruptions in the market and supply chain.

Increased Risk of Cyber Attacks

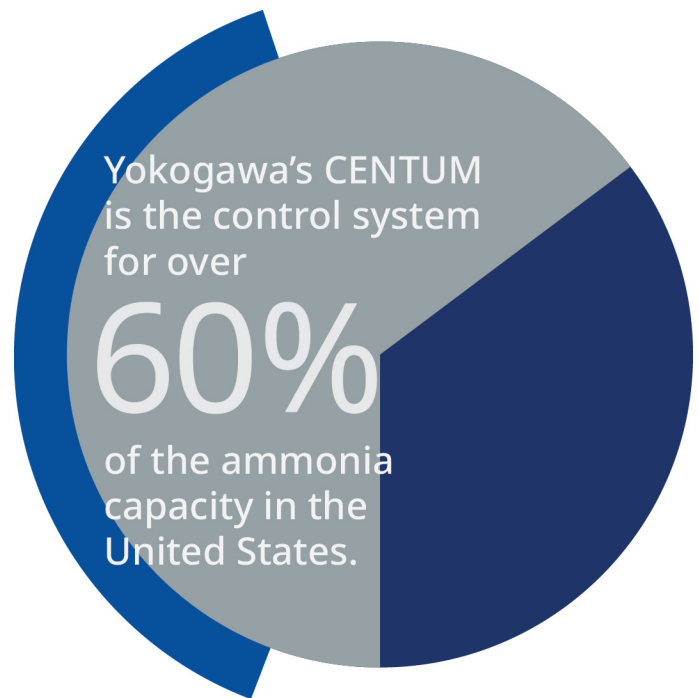
Industry Challenge: Industrial producers around the world face cyber threats in this increasingly connected world, which pose a pervasive threat to safety and system availability. Without a perpetually strong cyber security solution, plants and corporate networks are targets for hackers.

Solutions: Yokogawa, in partnership with Cisco, provides industry leading cyber security services to the chemical industry. These cyber security services help customers implement proper security solutions for their plants to ensure safe operations and reduce risks. This end-to-end cyber security approach provides effective measures that also deliver increased business agility and risk awareness, decreased operational costs, and reduced downtime.

The top 15 largest chemical companies rely on Yokogawa for control and automation solutions



**“Yokogawa
control solutions are
deployed at over
7,300
chemical facilities
around the world”**



ESG Criteria and Compliance

As chemical manufacturers digitally transform to achieve autonomous operations, criteria for environmental, social, and governance as well as compliance have risen to the forefront. While Yokogawa transforms our own business practices toward achieving a sustainable society, we find our goals are completely aligned with those of our customers. Our solutions not only remove burdens presented by sustainable development goals and compliance, they synergistically present additional opportunities.

For example, compliance can be achieved while simultaneously reducing energy costs. Hazardous waste can be managed in a way that reduces the impact to local populations and ecosystems while converting waste byproducts into revenue for distributed energy markets. Users are also finding that migrating to new technology platforms is not only smart, but also critical to meeting regulatory compliance and revolutionizing workforce enablement for the future. By embracing the latest technology, efficiency and productivity rise while the potential for compliance failure risks are dramatically reduced.

Deployment of new technologies such as artificial intelligence, the Cloud, digital twins, and IoT provides businesses the automated processes they need to increase awareness to potential threats and add predictive qualities to safeguard their systems. As safety regulations expand along with the cyber threat landscape, Yokogawa is working with customers to manage all risks in a sustainable manner.

For additional information call: (800) 888-6400, or visit: www.yokogawa.com/us



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