

# Rethink What You Should Expect From Your Distributed Control System



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## Introduction

Today, process industry professionals face difficult challenges. How can we adhere to increasingly tighter compliance requirements while competing for market share in today's globalized economy? How can we meet the continuous demand for new sources of productivity and margin growth while using the same automation approach and control system strategy we have been using for decades? A modern Distributed Control System (DCS) is designed to help you address these challenges.

Typically, automation is accomplished by a mixture of diverse systems and tools specifically developed for the tasks they control based on limitations of the technology that is available. Manufacturing uses one system for process control, another for discrete control, and yet another for power control. For example, specific functions in a plant with high speed, discrete logic might be controlled using dedicated Programmable Logic Controllers (PLCs). While DCSs are used when multiple controllers and multiple points of access need to be connected and accessible throughout the plant. The main process area in a facility is typically automated using a dedicated DCS. Integration of the DCS with the automation systems used in the balance of plant is often costly and engineering intensive. Maintaining multiple disparate automation systems is straining operations and support resources, restricting flexibility and responsiveness.

What is needed is a modern approach--one that delivers all of the core capabilities of a DCS to address the requirements of process control, but is built on contemporary technology that easily integrates with other automation systems, operators' activities, and critical business systems.

A modern DCS is built using plant-wide control technologies. Today, process control, discrete control, power control and safety control no longer have to be a choice of separate technologies. Today, manufacturers can choose to implement a plant-wide control system.

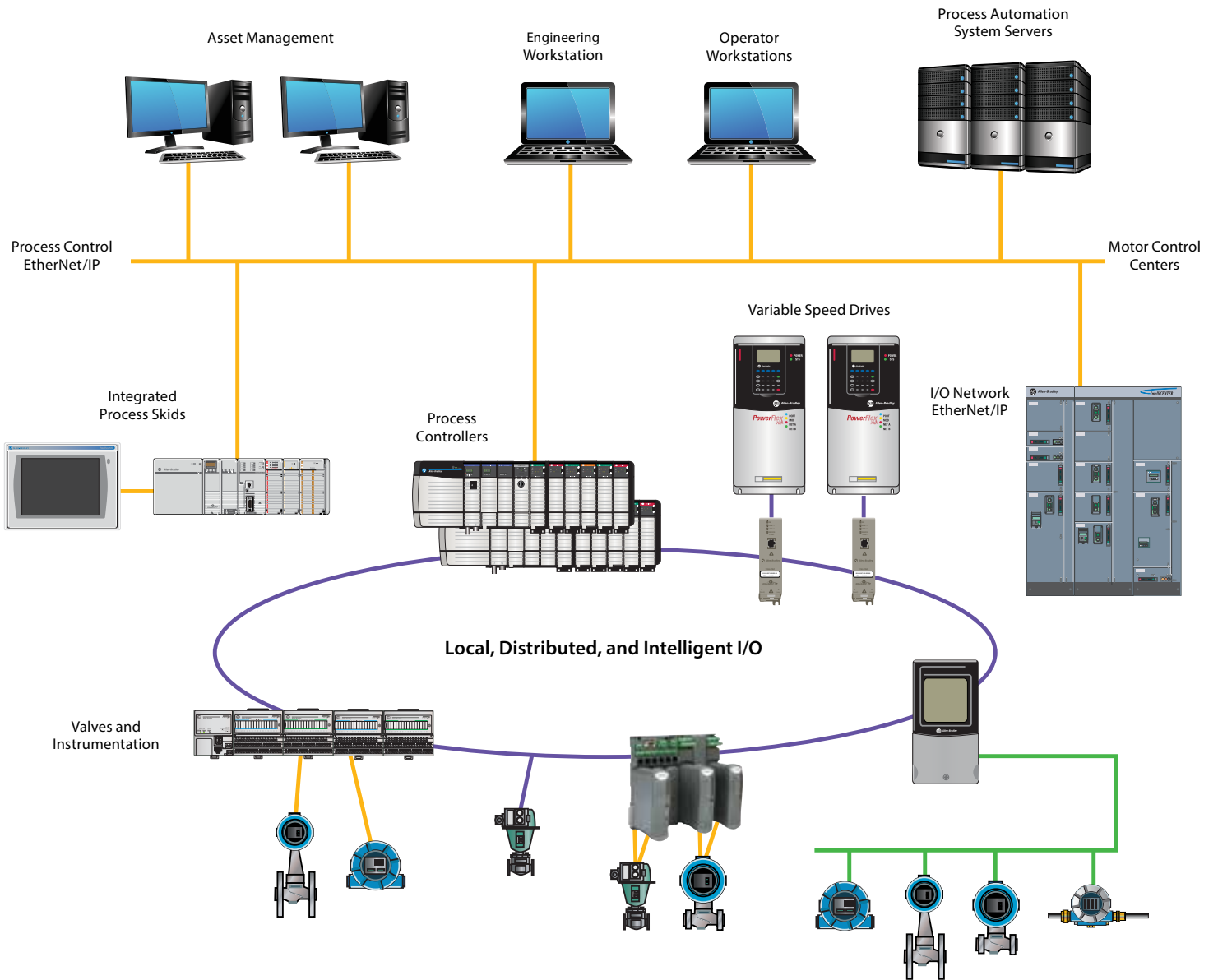
A DCS has specific requirements, such as the capability to handle thousands of I/O with a highly reliable architecture, known performance, and a deep set of process control programming functions. With a modern DCS, common technologies (e.g. servers, workstations, controllers, and networks) are applied in a prescribed way to meet these requirements. These same automation technologies can be designed and configured to automate all other control functions throughout the plant.

The use of common automation technologies enables seamless integration of the modern DCS with plant-floor and business systems, creating more opportunity for plant-wide optimization. Furthermore, using common technologies lowers the total cost of ownership of a modern DCS.

A modern DCS provides:

- All the core capabilities expected of a DCS, while enabling plant-wide control and optimization
  - Scalability and modular architectures to match exact requirements
  - Open, information-enabled, and secure architectures
  - Flexibility in the delivery and support for the system
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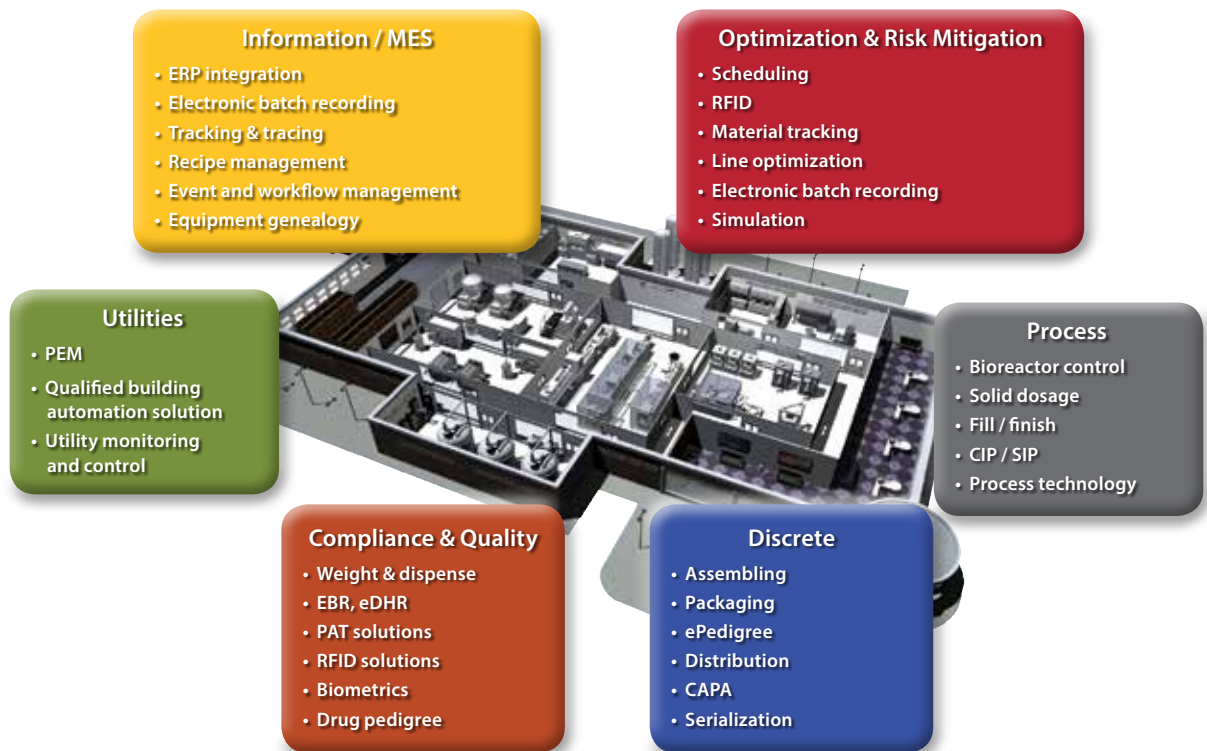
**DCS Architecture**



## Plant-Wide Control and Optimization

Plant-wide control and optimization delivers a seamless flow of information between all automation systems, including process, discrete, safety, and power. Traditional DCS systems require large amounts of capital on custom integration between them and the disparate control systems used in the balance of plant. A modern DCS uses scalable, multi-disciplined control technology to provide a common automation platform for seamless integration between it and balance of plant. For example, a Modern DCS controller can communicate directly with other controllers in your plant, without the use of OPC bridges or other custom interfaces, even across system boundaries. These same controllers can be scaled to handle all automation systems, from small packaged systems to large process applications. (See illustration below.)

This approach provides improved productivity, lowers energy consumption and reduces total cost of ownership.



*A modern DCS is able to leverage a common automation platform to easily integrate an entire Life Sciences plant*

## Improved Productivity

Productivity is absolutely critical for any industrial company and crucial for investment growth. Its objectives cascade throughout the organization, beginning with the CEO. But while productivity is a key driver from the top levels of a company to the plant floor, each segment within the organization views productivity—and the automation investments that drive it—from a different perspective.

At the corporate level, productivity is defined within the context of achieving a Return on Assets (ROA) or Return on Invested Capital (ROIC). Executives are focused on reducing costs, improving cash flow and decreasing time to market—and often direct Operations to reach these targets with existing and/or aging control systems and assets. To achieve these goals, Operations looks

for ways to improve asset utilization or inventory velocity. Engineering is charged with keeping all assets running at top capacity and maximum yield—and often must ensure that their automation solutions are scalable and maintainable so they can be deployed in multiple plants and with diverse equipment.

But these objectives are difficult to achieve with legacy or disparate automation systems in place. Utilizing a modern DCS to enable plant-wide control capabilities is often the key to improving productivity. A modern DCS is able to deliver greater visibility into information-rich production intelligence into ERP systems providing the visibility necessary to drive efficiency and productivity across all layers of the organization.

### Lower Energy Consumption

The industrial sector consumes more energy than any other. Yet, energy usage is one of the most difficult costs to manage in a production environment. The ability to control those costs can result in significant savings.

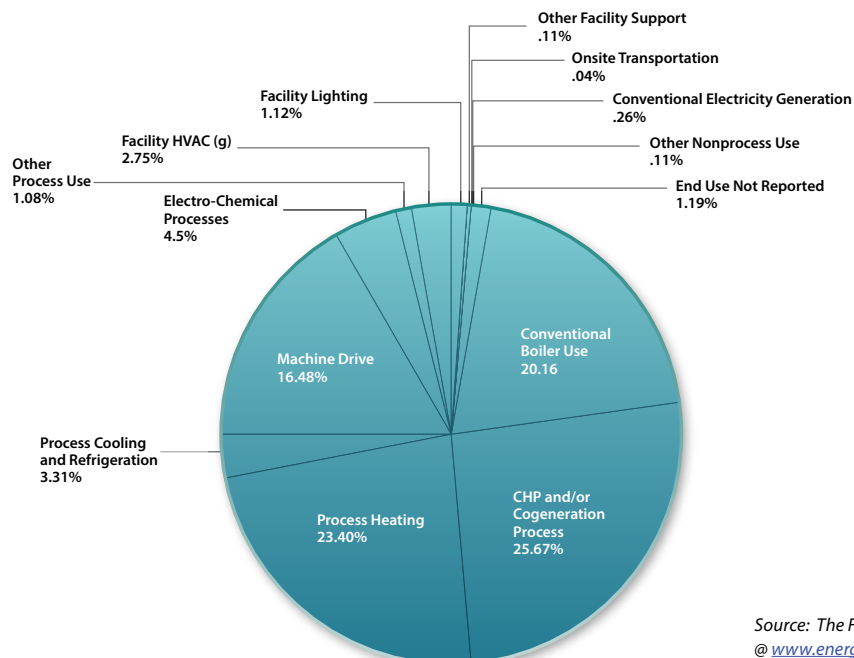
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Research by **TechValidate**

“PlantPAX enabled our Engineering/Maintenance team to pinpoint process issues quicker and implement solutions where they will make the most positive impact on the plant operations. With the ability to monitor real-time data and historical trending, along with plant-wide visualization and standardization, this platform enables us to put our resources where they are needed and reduce overall operation costs.”


Source: Chief Technology Officer,  
Medium Enterprise Food Company


### Typical Energy Consumption In Chemical Sector



Source: The Future of Energy  
@ [www.energyfuture.wikidot.com](http://www.energyfuture.wikidot.com)

Most companies have a passive account of their energy usage which is costly in today's economy. They apply these costs as a burden or overhead cost and view it as a percentage of operating cost to the company. The plant-wide control capabilities of a modern DCS can help optimize the production and utilization of water, air, gas, electricity, and steam (WAGES), throughout the entire manufacturing process. These capabilities provide the information to help you:

**Rockwell Automation** Research by  **TechValidate**

83% of surveyed energy and utilities customers realized the benefits of investing in the PlantPAx system in 3 to 6 months or less. 

*Source: Survey of 29 Energy and Utilities users of Rockwell Automation - Industrial Solutions*

- Measure and monitor energy consumption data
- Leverage collected data when deciding on implementing energy management solutions
- Predict the impact of production changes on energy use
- Automate production for optimal energy use
- Predict and plan for energy in production process cost (energy on the bill of material).

Because of its plant-wide control capabilities, the modern DCS is able to easily integrate with motor control devices. Since motors typically consume over 60% of the energy in any industrial facility, having the ability to gather data from these critical assets allows you to build an energy management strategy to

bring immediate and measurable impact on your operational efficiency—and efficiently running equipment equates to great savings. For example, the more information you have to drive variable torque loads in an application or reduce the inrush current of critical rotating assets, the greater your ability to improve device energy consumption. The level of integration achieved between a modern DCS and your motor control devices results in information that helps you drive improved plant availability by reducing unplanned downtime as it can trigger manual or automatic intervention before an occurrence—predictive and preventative measures.

*The world's largest office furniture supplier, Steelcase, set aggressive goals for improving the company's bottom line through improved efficiencies and sustainability efforts. They implemented a modern distributed control system with energy management software to more cost-effectively operate their boilers and gain better insight into company-wide energy consumption. In doing so, they reduced energy consumption by 15 percent and shrunk their overall carbon footprint by 25 percent.*

## Reduced Total Cost of Ownership

Manufacturers who utilize a modern DCS with plant-wide control capabilities help reduce their total cost of ownership (TCO). If they take into account the lifecycle costs associated with engineering, inventory, training, system maintenance & support, and future system expansions, the savings can be substantial (see illustration below).

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“The PlantPAx System allows for lower cost and greater flexibility when production control changes are required and/or additional systems need to be integrated.”

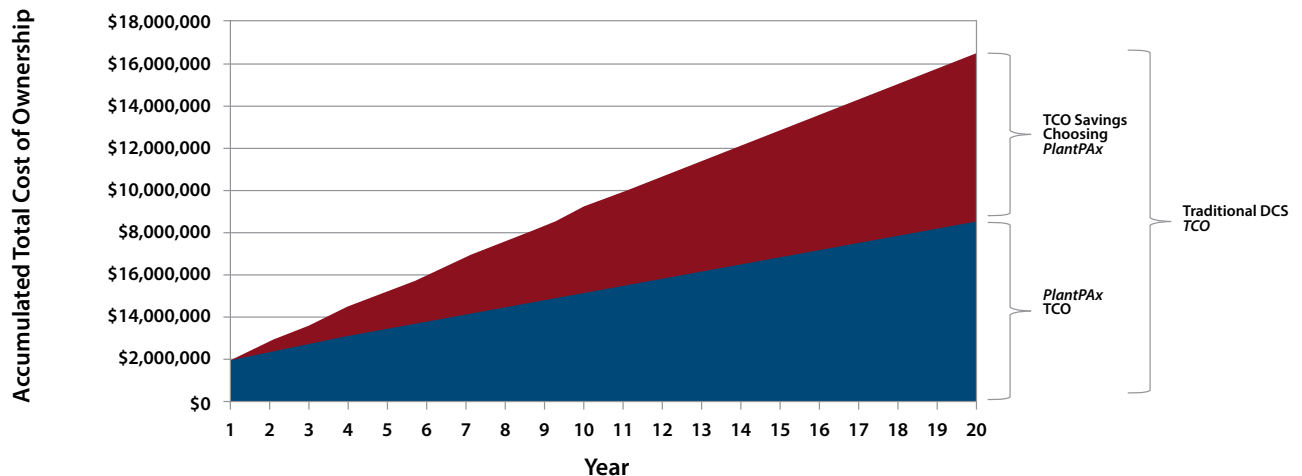
Source: Vice President, Small Business Chemicals Company

To further illustrate the impact of disparate controls systems on the total cost of ownership, consider the following:

- Are your control systems proprietary and require specific vendor support? And what are those costs annually?
- How many vendors are needed to support the different control systems in your plant? Are they able to provide on-site support in a timely manner?
- Do your engineers, operators, and maintenance professionals need training on all those systems? And how often?
- Do you carry inventory/spare parts for each of your control systems? What about spares for legacy devices?
- Do the disparate systems integrate easily with your skid equipment or are excessive integration time and resources necessary?
- Can you transfer real-time information across your facility with disparate systems? How does that affect optimization and productivity?
- Are there added licensing fees associated with future system expansions?

These often overlooked factors result in higher costs over the lifetime of any control system. By utilizing a modern DCS with plant-wide control capabilities, manufacturers can help reduce their total cost of ownership.

### Typical Modern DCS “Total Cost of Ownership” Customer Value Proposition



## Scalable and Modular

Operational flexibility, quick changeover and simple operation are just a few of the benefits of modular plant design. A skid-based approach allows the equipment and automation to be assembled and tested prior to shipment to site, improving consistency and reducing time to market.

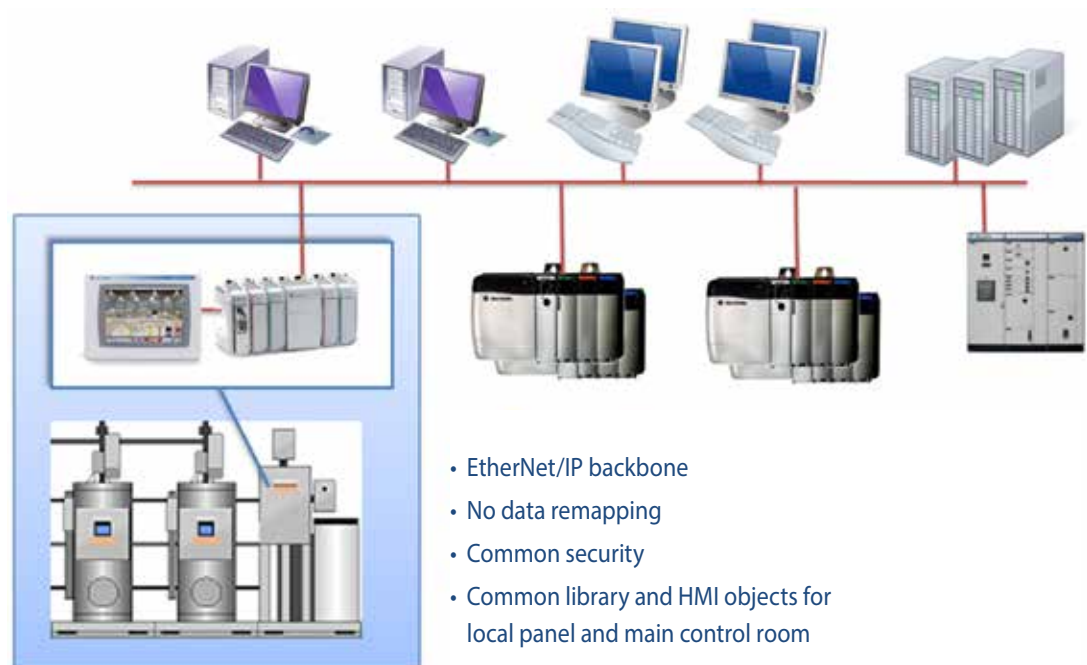
Because traditional DCS systems were built at a time when plants were created from the ground up, these systems were uniquely designed, closed, and non-scalable. They carried a high minimum cost due to their use of dedicated servers and networks. Additionally, they typically offered a single choice of controller designed to be optimal only for very large applications.

Integrating DCSs with disparate skid-based systems was, and still is, very expensive. This integration typically involves additional hardware and software, custom data mapping (truth tables), duplicate HMI configuration, and additional licensing. Each interface is custom, resulting in greater risk and a higher premium for services.

Studies have shown that the cost to integrate is often 50-70% of the cost of the actual skid equipment. Even after integration, the end user must deal with fragmented operator experience between the traditional DCS and the skid equipment.

In contrast, a modern DCS is built for the needs of today's end users, providing wider ranges of architecture options and increased flexibility. A modern DCS combats the "single-size" controller with a scalable control platform that provides the right-size control at the right cost. This helps users avoid purchasing expensive control capacity that isn't needed—a waste of valuable assets. A modern DCS also provides scalable system capabilities, such as HMI, batch management and data collection that does not require a server or workstation—perfect for process skid equipment.

### *Skid Integration on a Modern DCS*



This design is ideal for modular implementations, providing wider ranges of build options and increased flexibility. At the same time engineering costs are dramatically reduced when the same programming tools are used, regardless of system size or I/O capacity. Scalable HMI displays, alarms, data collection and batch management requirements can be provided at a small scale without a workstation or server. This skid-based automation system can also become part of the on-site control system network, connecting with the site-wide HMI, historian, and batch management servers, and thus become quickly integrated with the modern DCS.

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Research by  **TechValidate**

“The PlantPAx system allows standardized code development both by internal and external engineering resources, and allows integration of both processes and machine control systems within a common domain of software tools.”

*Source: Engineering Manager, Global 500 Consumer Products Company*

## Open, Information Enabled, and Secure

The DCS can no longer be an isolated operation. As industrial organizations move toward gaining greater visibility into their operations, their need to establish a seamless flow of information from device to enterprise has become a requirement of modern industrial automation systems.

A traditional DCS is usually limited to a single choice option for servers, workstations, and network switches on closed networks. This makes it difficult to manage IT support and integrate with business systems. Newer IT technologies, including cloud computing, mobile and virtualization, are often seen as disruptive and are at odds with the traditional DCS

architecture. Improvised communication networks linking them to other systems on the plant floor and across the enterprise can expose the traditional DCS to security breaches. Cyber risks from both internal and external sources increase with each new connection, creating threats capable of disrupting control system operations, safety, productivity and the ability to protect equipment, assets, and confidential company information and intellectual property.

A modern DCS is open to commercial off-the-shelf servers, workstations, and servers, supporting the adoption of the latest IT technology for automation. By rationalizing to a common IT infrastructure, companies can mitigate security risks and improve uptime, while protecting people, assets and information. The level of safety is easily reached by investing in secure industrial control systems that are part of the corporate-wide security program. A modern DCS addresses industrial security from the individual device on the plant floor to the enterprise, which contrasts with the traditional approach of securing plant and enterprise systems separately.

A modern DCS is designed upon a foundation that utilizes open standards such as EtherNet/IP. EtherNet/IP is capable of handling the widest range of industrial applications, including process, safety, discrete, power and motion control. It allows the use of readily available, off-the-shelf products because it complies with IEEE 802.3 and TCP/UDP/IP standards and conventions. This helps Operations


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Research by  **TechValidate**

**How has the PlantPAx system helped manage information visibility within your organization?**

“Being able to drill into the production data easier has allowed business to target the harder-to-spot efficiencies in production which increases profits.”

*Source: IT Director, Large Enterprise Energy and Utilities Company*

**Rockwell Automation** Research by  TechValidate

100% of surveyed CEOs of small businesses improved visibility into production data with the PlantPax system. 

*Source: Survey of 10 small business CEOs who use Rockwell Automation - Industrial Solutions*

and IT professionals collaborate on deploying and maintaining a secure, reliable and robust network infrastructure within the enterprise and throughout the industrial environment. Utilizing EtherNet/IP increases your flexibility, assures compatibility, and offers ease of device integration into new or legacy systems.

By reducing the number of disparate technologies on the plant floor and by providing open secure networking, the Modern DCS facilitates the daunting task of integrating the plant floor with the enterprise achieving a seamless flow of information that translates to greater visibility into plant operations.

## Flexible Delivery and Support Network

Traditional DCS systems are generally only implemented and serviced by the specific DCS vendor. In some cases, this results in longer wait times for service, and higher costs. Furthermore, the traditional DCS approach requires the plant to support several disparate automation systems and the custom integration necessary for them to work together.

With a modern DCS, multiple choices for implementation and support are available. Different integration routes may be selected depending on the scope of the project.

- It may be beneficial for manufacturers to engage the specific vendor for commissioning the modern DCS system. This often results when a very large user elects to deploy the “same” system in several locations across a large geographic area.
- Smaller manufacturers may select a local process system integrator because of an established relationship and the availability of the local resources.
- A user may also rely on process equipment manufacturers to provide automation and equipment to leverage their specific expertise.

**Rockwell Automation** Research by  TechValidate

“I was blind, but now I see’ comes to mind when I think of the contribution PlantPax made to our facilities. The accuracy and timely data permits better decision making for all of production.”









*Source: Engineer, Global 500 Electronics Company*

In many cases, a combination of delivery partners are required to meet the requirements and schedule demands of a project. A modern DCS allows manufacturers to choose from a vast global network of local experts, including the modern DCS vendor team, system integrators, partners, OEMs and process professionals for design, implementation, maintenance, and support.

Following is a simplified table highlighting the attributes of a modern DCS.

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**Differentiation between a Modern DCS and Traditional DCS**

Traditional DCS	Modern DCS
<p> <b>Purpose built on disparate technology</b></p> <p>The balance of plant automation (e.g. ancillary systems, skidded systems, motor control) handled by disparate technology – separate automation systems which are difficult to integrate.</p>	<p> <b>Purpose built on plant-wide technology</b></p> <p>The same automation technology can be used throughout the plant enabling seamless integration, easy access to information, and easy modifications as demand or products change.</p>
<p> <b>Not scalable</b></p> <p>System features one size for all applications. Automation on skidded equipment is difficult to integrate or the integration has to be done on the DCS system adding risk to the end customer and project schedule.</p>	<p> <b>Scalable</b></p> <p>System capabilities are scalable, yet share common technology and development tools. Can be easily integrated into a distributed system on site, greatly reducing startup time and risk improving time to market.</p>
<p> <b>Closed system</b></p> <p>Only proprietary, vendor-specific DCS equipment is permitted on the Ethernet network. Servers, workstations, and network switches are limited to a single vendor-provided option, making it difficult to manage IT support and integrate with business ERP systems.</p>	<p> <b>Open, information enabled, and secure</b></p> <p>Open to commercial off-the-shelf servers, workstations, and servers. Allows rationalization of IT infrastructure and enables the use of the latest IT technology for automation. Integration with other systems can be added as needed.</p>
<p> <b>Delivery and support by vendor only</b></p> <p>Implementation can only be commissioned and supported by the DCS vendor, whose resources are limited and not always readily available. Balance of plant systems supported separately. Integration between systems are custom with no clear ownership of support.</p>	<p> <b>Flexible delivery and support</b></p> <p>Global delivery and support by the DCS vendor. Vendor support enhanced through a global network of local experts, including system integrators, distributors, and OEM partners allowing the freedom to choose what is best for their application.</p>

## The Modern DCS from Rockwell Automation

In today's competitive world, manufacturers need to rethink what to expect from their DCS. They need to choose a modern DCS that:

- Enables plant-wide control and optimization for lower total cost of ownership
- Provides system scalability and modularity for engineering flexibility and faster time to market
- Is open to enabling new technologies which improve operation and integration with the enterprise
- Can be delivered and maintained by a support eco-system — whether the system vendor, local distributor, system integrator, or OEM — chosen by the manufacturer.

The PlantPAx system is the Modern DCS from Rockwell Automation that delivers all of these capabilities.

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

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