AutomationWorld®

Web Technology, Digitalization, Cyber Security:

What Do the Latest Innovations in Process Control Mean for You?

INSIGHTS

- Major trends are driving the requirements for distributed control systems.
- System access is easier than ever thanks to zero-installation clients.
- Unifying control system editors into a single workbench enhances usability.
- Modular automation and integration based on open standards are driving scalability of control systems.
- When distributed control systems support collaboration, flexible project engineering and new engineering workflows become possible.
- By integrating automation, engineering, and simulation data, companies can create a digital twin of their plant.
- As control systems incorporate new technologies, robust cyber security is essential.

in partnership with

SIEMENS

As industrial process automation continues to advance, next-generation distributed control systems (DCS) can enhance the efficiency, productivity, and safety of plant operations. Siemens is completely rethinking process automation by developing an innovative, new process control system—SIMATIC PCS neo— to enhance access, scalability, usability, collaboration, digitalization, and cyber security.

OVERVIEW

In the industrial sector, many plants are operating with decades-old technologies. In times when digitalization is spreading rapidly, those who cling to the status quo lose out on tremendous potential for improving their competitiveness.

Siemens offers two products that address industry trends and give companies a competitive edge. SIMATIC PCS neo is an innovative, new distributed control system. Its web-based technology, central data management, and intuitive user interface offer companies greater flexibility and mobility in plant operations. SIMIT is a simulation platform for virtual commissioning and operator training. Its easy integration with Siemens control systems makes it a great foundation for building a digital twin.

KEY TAKEAWAYS

Major trends are driving the requirements for distributed control systems.

Seven major trends are influencing the features and functionality needed in distributed control systems.

> TO ADDRESS INDUSTRY TRENDS AND CHALLENGES, SIEMENS IS COMPLETELY RETHINKING PROCESS AUTOMATION. THIS MEANS REEVALUATING HOW CONTROL SYSTEMS OPERATE TODAY AND DEVELOPING A NEXT-GENERATION DCS TO MEET PROCESS INDUSTRY NEEDS.

Trend	Discussion
1. Global working	As companies engage in acquisitions, business operations are often globally distributed. It's becoming more important for control systems to allow engineers to work collaboratively on projects regardless of location.
2. Changing demographics	Engineers and plant operators are retiring and a new generation is entering the workforce that does not have the same knowledge or experience. Control systems that are easy and intuitive to use are a great way to help new hires become productive quickly.
3. Doing more with less	With fewer onsite staff, control system updates and upgrades can be time consuming and a distraction from the main plant priorities of supporting and optimizing production. A DCS that is easy to maintain and update helps process industry teams stay focused on their most important tasks.
4. Increased standardization from small units to large plants	As companies strive to improve their engineering and operations efficiency, many want the same control system running at all plant sites, regardless of the size of the process. Control systems must be effective both functionally and commercially for everything from very small pilot scale systems or OEM package units up to the largest plants in the world.
5. Combining the real and virtual worlds	Digitalization can play an important role in process automation. The DCS is a primary source of process data when organizations build a virtual representation of their plant. A "digital twin" can be used to make more informed decisions about the operation of the physical plant.
6. Integrated engineering workflows	Time to market is critical for competitive advantage. Integrated engineering workflows can minimize or eliminate rework and redundancies in project engineering. Rather than recreating data at each project stage, information can be passed seamlessly from one stage to the next.
7. Modular automation	Segments of the process industry are embracing this approach. They want to pull package units supplied from different vendors with different programmable logic controllers (PLCs) to build up their plant. The DCS should be able to easily facilitate this.

System access is easier than ever thanks to zero-installation clients.

With SIMATIC PCS neo, Siemens has taken the control system onto the web. Users can access the engineering and operations environments from client stations with an HTML5 web browser, such as Google Chrome. It is a completely web-based control system that resides on a local network and does not depend on the Internet or cloud connectivity.

This approach has four primary benefits:

1. No engineering or operations software licenses are needed on the stations used for engineering or plant operation.
2. Users can flexibly switch between the engineering and operations environments from the same device.
3. All software and licenses are centrally managed at the server level, which simplifies control system updates and upgrades.
4. It is easy to add new stations to the system using HTML5 supported devices.

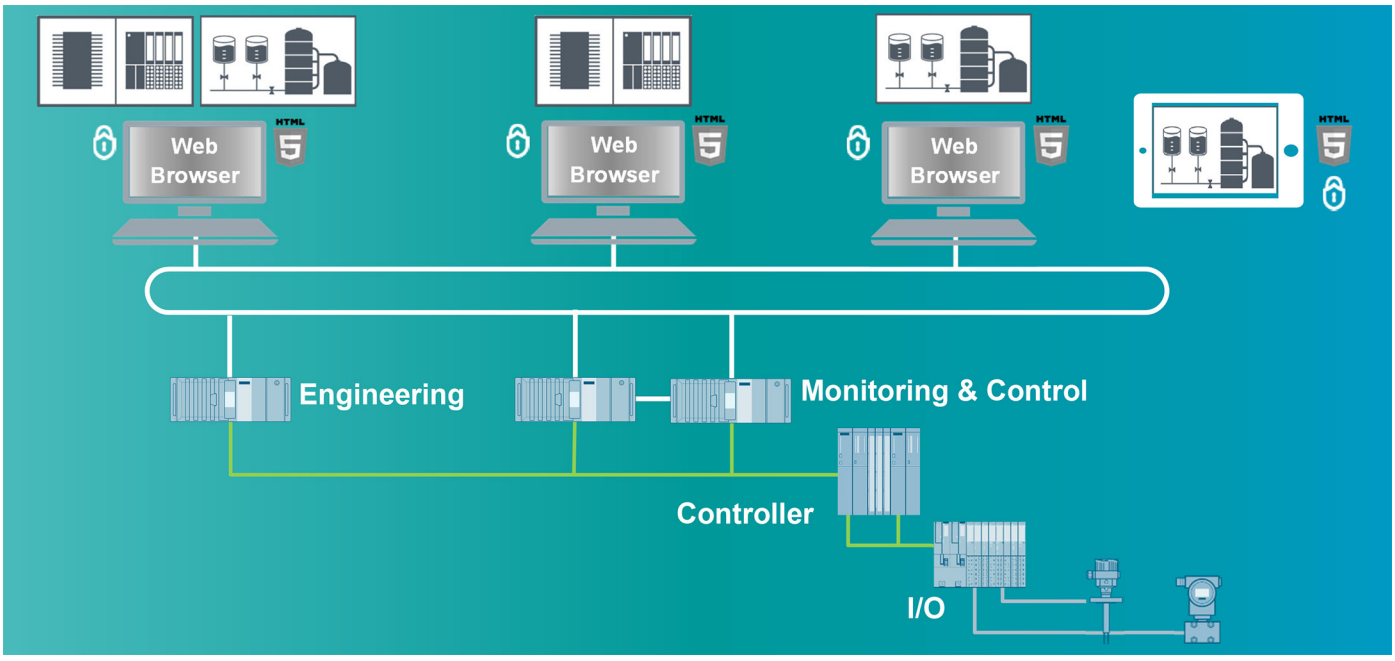
Key elements of the control system architecture include:

The engineering server	This is where engineering software is installed and the control system project is implemented.
The monitoring and control servers	The operation software is installed on these servers. They communicate process values and signals to the clients and to the controllers.
The controller	Projects are downloaded from the engineering server to the controller. During plant operation, the controller processes the control program.
The I/O	This integrates various field devices and instruments into the control system.

Unifying control system editors into a single workbench enhances usability.

Historically, engineers have worked with multiple tools to successfully configure an entire control system project. Each tool has its own user interface and database. When a change is made in one editor, that change must be manually transferred to all other editors in the system. This is time consuming and potentially introduces errors.

Figure 1: Control System Architecture



© 2020 PMMI Media Group. All rights reserved.

SIMATIC PCS neo is easier, more intuitive, and efficient. The new workbench concept provides engineers with a consistent user interface and a single, centralized database. It's easy to train new staff. In addition, a change made in one facet of an automation project automatically updates everywhere in the project.

Modular automation and integration based on open standards are driving scalability of control systems.

Traditionally, process plants have been designed from the ground up by one engineering company and segmented into different process units or process areas. These process areas typically define the control system strategy.

Companies in many process industries are now shifting to modular automation, so they can build their production facilities using a series of smaller modular units. This approach has two key benefits:

- **Increased flexibility in production.** Modular units can be added or removed as production demand fluctuates.
- **Reduced project engineering time.** Units come preconfigured from the OEM.

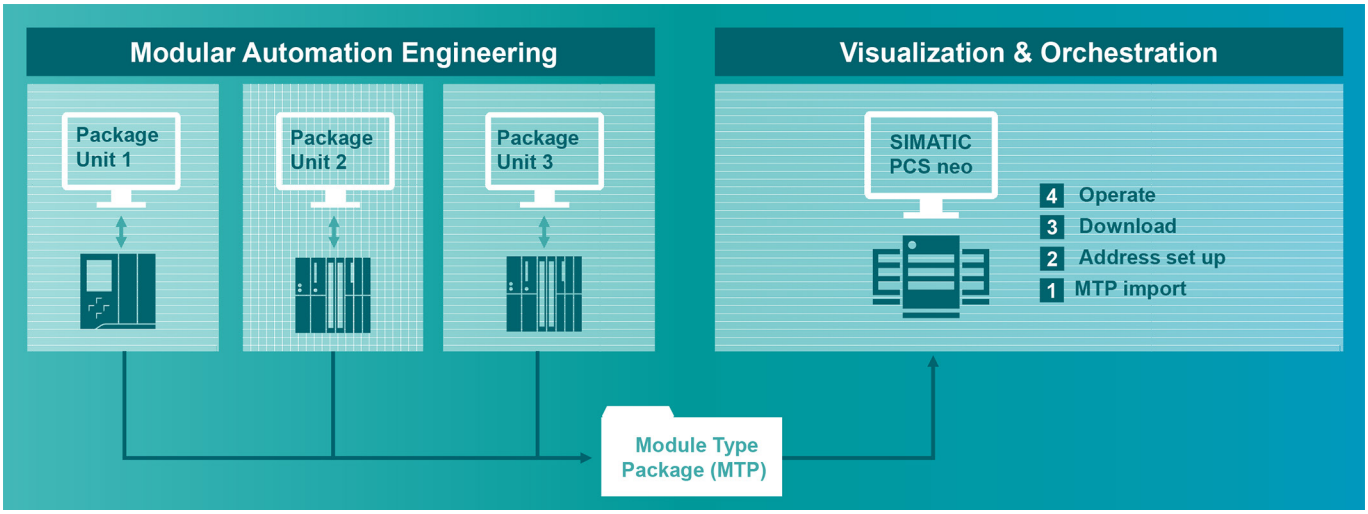
Modular automation can introduce challenges. Each package unit is usually provided with its own controller; the brand of controller is predetermined by the OEM. As a result, companies often struggle to integrate PLCs from different vendors and maintain a consistent look and feel.

One promising solution is a standard interface for different modules. NAMUR, an international association of automation end users in process industries, is currently working on vendor-agnostic standard communication. The Module Type Package (MTP) concept provides a standard, non-proprietary description of process modules to ensure efficient integration of PLCs into the overarching distributed control system. An MTP is a file containing a description of human machine interface (HMI) information and the controller attributes of a package unit.

Although the MTP standard is still in development, it already has been implemented in control systems, such as SIMATIC PCS neo, in pilot phases. This not only gives operation teams a DCS with a consistent HMI regardless of package unit vendor, but also drastically reduces the engineering effort of integrating the package unit in the DCS in the first place.

> MODULARIZATION TECHNOLOGY HAS GREAT POTENTIAL FOR INCREASING PLANT FLEXIBILITY IN THE FUTURE, AS WE CONTINUE TO SEE COLLABORATIONS BETWEEN AUTOMATION COMPANIES AND END USERS.

Figure 2: Modular Type Packages Support Modular Automation Engineering



When distributed control systems support collaboration, flexible project engineering and new engineering workflows become possible.

True collaboration on a DCS means multiple engineers can work on the same project, at the same time, from any location. All users should have the ability to work independently from each other while the system ensures consistency of the data. This prevents users from writing over each other's work and corrupting the project. Once each engineer finishes their work, it can be synchronized back into the project for others to view. Additional functions such as versioning can provide a history of changes made and by whom, and when. Setting access rights for each user keeps the system secure. The system administrator can empower engineers to have access to all engineering functions or limit a user to offline modifications of specific area units, without the ability to perform downloads.

SIMATIC PCS neo multi-user engineering supports late-binding by separating the application engineering of the control system from the hardware engineering, allowing both to occur in parallel or serially depending on engineering resource availability. This opens the possibility for new engineering workflows. For example:

- Team members responsible for different tasks, such as hardware, technology, and process display engineering, can work on a project in parallel.
- Different teams of engineers can work on the same type of engineering at the same time, but for different process areas of the plant.

By integrating automation, engineering, and simulation data, companies can create a digital twin of their plant.

Throughout a project, one of the biggest challenges is managing different tools. Passing information from one tool to another creates data loss, rework, and inconsistent data. To avoid these issues, more tightly integrated workflows and processes are needed between engineering and automation tools.

By integrating engineering, simulation, and automation programs and information, data can flow seamlessly between them. With a simulation platform like SIMIT, that is tightly integrated with the SIMATIC PCS neo control system, it is possible to create a complete digital twin that will support better engineering and operations decision making over the entire plant life cycle.

This opens a whole new world of opportunities such as using simulations to test the control system while it's being engineered or when changes are being made to it. Training operators on plant procedures and emergency scenarios is also much more effective in risk-free simulation environments.

As control systems incorporate new technologies, robust cyber security is essential.

To protect against cyber attacks at industrial plants, security and detection must be applied at multiple levels at the same time. In addition to security features built-in to SIMATIC PCS neo right from installation, SIMATIC PCS neo adopts the "Defense-in-depth" approach, a comprehensive protection strategy based on recommendations from ISA99/IEC 62443, which is the leading standard for security and industrial automation.

Defense-in-depth addresses plant security, network security, and system integrity. Implementing a variety of security measures in these areas makes it more difficult for attackers to breach a system.

It is important to recognize that once plant network and security system strategies are implemented at startup, they cannot be forgotten. Organizations must constantly update their cyber security strategies throughout the entire service life of their plants.

> PROCESS CONTROL INNOVATIONS WILL CONTINUE IN THE FUTURE WITH TECHNOLOGIES LIKE DIGITAL ASSISTANTS, AUGMENTED REALITY, CLOUD APPLICATIONS, GEOGRAPHICAL INFORMATION SYSTEMS, MOBILE APPLICATIONS.

Figure 3: Cyber Security & Defense-In-Depth

ABOUT SIEMENS

Siemens Digital Industries (DI) is an innovation leader in automation and digitalization. Closely collaborating with partners and customers, DI drives the digital transformation in the process and discrete industries. With its Digital Enterprise portfolio, DI provides companies of all sizes with an end-to-end set of products, solutions and services to integrate and digitalize the entire value chain. Optimized for the specific needs of each industry, DI's unique portfolio supports customers to achieve greater productivity and flexibility. DI is constantly adding innovations to its portfolio to integrate cutting-edge future technologies. Siemens Digital Industries has its global headquarters in Nuremberg, Germany, and has around 75,000 employees internationally.

Siemens Corporation is a U.S. subsidiary of Siemens AG, a global powerhouse focusing on the areas of power generation and distribution, intelligent infrastructure for buildings and distributed energy systems, and automation and digitalization in the process and manufacturing industries. Through the separately managed company Siemens Mobility, a leading supplier of smart mobility solutions for rail and road transport, Siemens is shaping the world market for passenger and freight services. Due to its majority stakes in the publicly listed companies Siemens Healthineers AG and Siemens Gamesa Renewable Energy, Siemens is also a world-leading supplier of medical technology and digital healthcare services as well as environmentally friendly solutions for onshore and offshore wind power generation. For more than 160 years, the company has innovated and invented technologies to support American industry spanning manufacturing, energy, healthcare and infrastructure. In fiscal 2018, Siemens USA reported revenue of $23.7 billion, including $5.0 billion in exports, and employs approximately 50,000 people throughout all 50 states and Puerto Rico.

TO LEARN MORE

Visit our website: usa.siemens.com/pcsneo