

THE END OF THE EFFICIENCY PLATEAU

Dave Denison, Emerson, considers how hydrocarbon organisations can utilise centralised, cloud-enabled engineering tools to replicate best practices across sites, simplify troubleshooting and configuration maintenance workflows, while capturing enterprise-level performance gains.

**HYDROCARBON
ENGINEERING**

The hydrocarbon processing industry faces intense global competition, supply chain disruptions, mounting pressure for sustainable operations, and volatile markets – all conditions demanding maximum operational efficiency. In this challenging environment, companies must find new ways to extract every possible gain in efficiency, both at the plant level and across the enterprise.

Historically, plant personnel and engineering teams have looked to increase operational excellence by innovating on control strategies, process graphics, and enhanced processes to deliver increased production and efficiency. These efforts have generated substantial gains, enabling organisations to achieve higher output safely. However, many companies are discovering that traditional plant-level approaches are



Figure 1. Today’s engineering teams are often more centralised and collaborative, and they need access to cloud technologies that increase visibility of configurations across the entire enterprise.

reaching diminishing returns, signalling the need for more comprehensive, enterprise-wide strategies.

Forward-thinking organisations are now focused on finding more sophisticated approaches to engineering across their enterprises. The key lies in systematically identifying the best-performing plants, teams, control strategies, and practices. Companies must then replicate these successes across all sites. Traditional approaches involving dedicated teams, extensive site visits, and significant investments of time and resources could theoretically accomplish this goal. However, few companies have enough expert engineers to sustain such efforts, and constant change in plant environments can make results short-lived. A more effective and scalable solution uses purpose-built enterprise engineering software, leveraging the latest technologies to deliver comprehensive visibility, while enabling standardisation through a single, centralised platform.

A challenging environment

Gaining visibility of control systems across multiple plants using traditional methods is neither fast nor easy. Conventional control system design has focused on isolating systems to secure mission-critical operations. This architecture makes it difficult to gather data directly from these systems and complicates the task of managing fleets as a cohesive whole.

Today, most centralised engineering teams wanting to gain visibility of the control system’s engineering data across the enterprise must manage exported configuration files manually, which can be complicated to keep organised and up to date. Engineers may also attempt to access configurations by connecting to each site’s systems remotely, but that effort may compromise security to access these systems, and it can be both time-consuming and operationally risky (Figure 1).

Once the engineering team has all its configuration files, they often need to leverage third-party tools to browse, search, or compare data, adding cost and complexity. Moreover, the team is typically working with raw data, which comes with little to no context from the control system, making it difficult to accurately identify key issues.

Modern enterprise engineering software transforms this landscape by addressing these challenges. Purpose-built by the automation supplier, these platforms centralise visibility across multiple control systems, whether distributed throughout an enterprise or within a single complex facility, while maintaining the security integrity that operational teams require. The result is

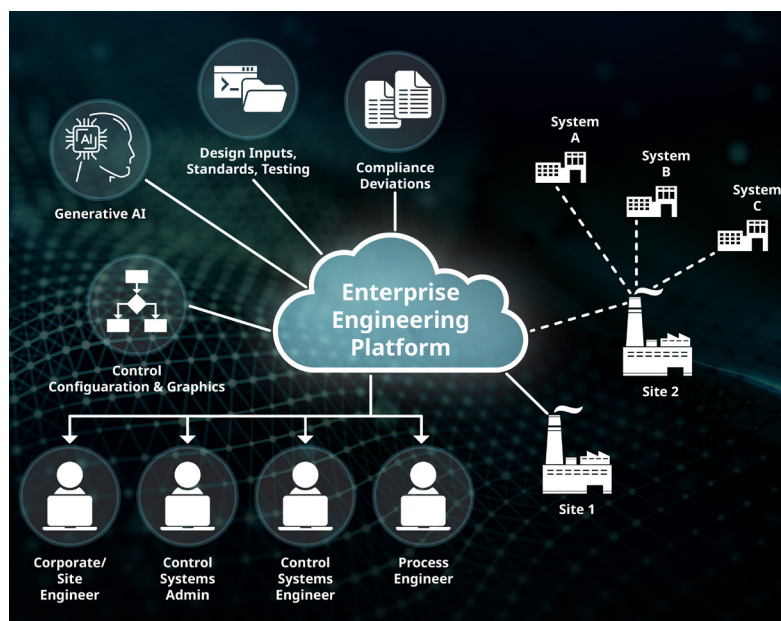


Figure 2. Enterprise engineering software leverages the cloud and edge environments to provide improved visibility into the configuration of every control system across the enterprise.



Figure 3. Enterprise engineering software enables teams to more easily make, test, and implement changes using their digital twin simulation software.

improved visibility, easier standards compliance, and efficient configuration management.

Improved enterprise visibility

Enterprise engineering software empowers centralised engineering teams by providing far greater visibility into the configuration of every control system across the enterprise. Leveraging edge compute environments, enterprise engineering tools transfer system configurations to a cloud environment via secure connections. Engineers can remotely access the cloud system from any location, with role-based access control providing a customised experience that displays configurations of all authorised systems within their scope of responsibility (Figure 2).

This type of centralised cloud repository transforms traditional workflows by eliminating the need for engineers to manually collect configuration files. Real-time synchronisation with on-premises control systems ensures that the configuration data remains current and accurate, with changes automatically reflected as soon as they are implemented at an individual site. This continuous synchronisation provides engineering teams with confidence that they are working with the most recent system information when making critical decisions.

Beyond current configurations, the platform also maintains historical archives, enabling engineers to track configuration changes and trend performance over time. This historical perspective proves invaluable for root cause analysis, particularly when investigating issues that may stem from control system modifications.

Simpler standards compliance

Whether verifying deployment of uniform control strategies enterprise-wide, confirming that operations teams utilise appropriate graphics at each location, or enforcing recipe standards across specialty chemical manufacturing sites, central engineering groups promote standardised control module and graphics libraries to ensure consistent, proven operations.

Organisations approach standardisation through various strategies. Some rely primarily on automation supplier-provided libraries as their foundation. Others develop comprehensive custom corporate libraries tailored to their specific processes, while many adopt hybrid approaches that combine vendor standards with proprietary modifications to optimise both consistency and operational effectiveness.

Typically, the goal of a standardised engineering library is to ensure all sites across the enterprise are pulling control elements from the libraries to create a single source of truth across the organisation. When the engineering team knows it has a single source of truth for all sites, modifications, updates, upgrades, and maintenance are all much easier to perform.

Over time, however, many sites tend to customise control strategies, graphics, and more. With each deviation across the enterprise, it becomes more difficult for engineers and maintenance personnel to perform critical tasks like troubleshooting. In addition, each change runs the risk of causing problems. If a process is not running, or is running sub-optimally due to a change, engineers need a way to quickly identify and understand the change so they can troubleshoot more efficiently.

With enterprise engineering software, the central engineering team can log into the cloud application and immediately see what configuration elements a site is currently using and compare those with the corporate standard elements. Using historical data, engineers can quickly identify when changes were made and correlate these modifications with changes in performance and functionality of the process.

Teams can also use enterprise engineering software to perform benchmarking across the enterprise. If the company has similar processes or units across different sites, or even the same large facility, they can track and trend how modifications have improved or degraded operations over time and across geographic boundaries.

Comprehensive configuration management

When an organisation needs to manage multiple control systems, they can dramatically increase efficiency by having a single central location to access their engineering data. While this has always been true, it has become increasingly valuable in recent years, where shortages of expert engineering personnel have made it difficult to allocate staff effectively across wide areas.

Comparing configurations has always been possible by using third-party tools, but with limitations. These tools are often complex to use, and identifying differences in configuration required both expertise in

the software and many hours of manually manipulating data.

With purpose-built enterprise engineering software, engineers can view multiple control system configurations side-by-side in a single dashboard. This allows them to instantly and intuitively see what is different between two or more systems. The team can also run regular reports from the enterprise engineering software to alert them when changes are made to systems anywhere across the enterprise.

After the engineer has identified an issue, they can recommend configuration changes and send those recommendations to the sites where they should be implemented. Or, in the case of greenfield engineering, a user can create corporate templates and roll out working configurations across multiple sites quickly and easily, helping the company replicate its best practices to lock in operational excellence.

Enterprise engineering software can also be used to compare a site's digital twin simulation with its associated production system. The engineering team can make and test configuration changes in the digital twin, exploring a wide range of options with no risk to plant productivity and safety. When they have a solution that meets their needs, the team can merge the changes into the production server (Figure 3).

Support for the tools driving the future of automation

The most advanced enterprise engineering software is also designed to leverage AI tools to help improve engineers' efficiency. Using natural language, users can ask critical questions of the software without the need to develop complex query statements. For example, users can simply ask the software to show everywhere across the enterprise where a specific standard is being used, or where it has been changed. They can even ask questions about the configuration itself, such as tracing references between control logic components, or identifying all the areas where the production system differs from the simulation environment.

Capturing competitive advantage

Thriving in today's complex hydrocarbon industry means capitalising on every opportunity to increase efficiency and operational excellence. For most organisations, this demands a shift toward comprehensive enterprise-wide optimisation that transcends individual plant improvements. Modern software solutions, particularly enterprise engineering platforms, not only help teams identify opportunities to drive more value, they also provide a streamlined solution to execute them faster and easier than with traditional methods. 