

A small icon of a document with a circular arrow, representing a brochure or document.

Brochure

Aspen DMC3™





Introduction

Modern industrial processes involve complex, multivariable interactions that directly impact profitability and operational efficiency. Manual control methods or standard PID control often struggle to keep pace with this complexity. Variability in feed quality and unpredictable process disturbances lead to fluctuations in throughput, yield and product quality.

Meanwhile, escalating energy costs and stringent environmental requirements demand a smaller carbon footprint. In these changing market and operational landscapes, where seasoned expertise is also retiring, companies need a smarter, more responsive control technology to stay agile and competitive.

Introducing Aspen DMC3: The Process Industry's Trusted and Most Advanced Multivariable Controller

Aspen DMC3's industry-leading AI-enabled advanced process control (APC) technology enables companies to maximize profitability and achieve sustainability goals by optimizing their processes in real time. Aspen DMC3 employs a predictive model to identify cause-and-effect dynamics within a process, predicting future behavior and optimizing performance by taking into account disturbances that go beyond the limits of operator expertise or standard, PID-based automation.

Aspen DMC3 comes with powerful modeling and maintenance capabilities and employs a sophisticated subspace model identification algorithm to derive high-quality dynamic models from plant test data more reliably than traditional methods. This solution addresses the challenge of having too many interacting variables that complicate decision-making around what and when to adjust to improve process performance. At every execution, Aspen DMC3 solves an optimization problem to keep the process on target (feed rate setpoints, temperatures, pressures, etc.) while respecting constraints such as equipment limits, emission caps and safety margins.

Leading the Way

ARC Advisory Group recognized AspenTech as a leading APC provider in the **2024 Advanced Control & Online Optimization Market Research Study.**



Aspen DMC3 controllers interface with processes directly through a broad range of DCS and PLC systems. Aspen DMC3's versatility allows it to effectively handle the most extensive control challenges, making it a successful solution for nearly any linear or nonlinear control problem across a wide range of industries, including:

- Refining
- Bulk and specialty chemicals
- Upstream and midstream oil and gas
- Polymers
- Metals and mining
- Power
- Pulp and paper
- Food and beverage



Key Benefits

- Maximizes throughput by consistently operating closer to limits
- Reduces specific energy consumption and emissions by up to 10%
- Improves product quality and yield
- Lowers operating costs by minimizing rework and recycling
- Reduces process variability and enhances stability and plant safety
- Minimizes disruptions and downtime by ensuring precise control and excellent disturbance rejection
- Reduces time to value by over 75% compared to traditional APC technologies
- Supports autonomous operations

Figure 1 illustrates how Aspen DMC3 enables processes to run closer to operational limits by reducing variability and shifting setpoints toward constraints. Compared to traditional regulatory control, Aspen DMC3 significantly narrows process fluctuations and improves performance to deliver greater efficiency, stability and margin capture.

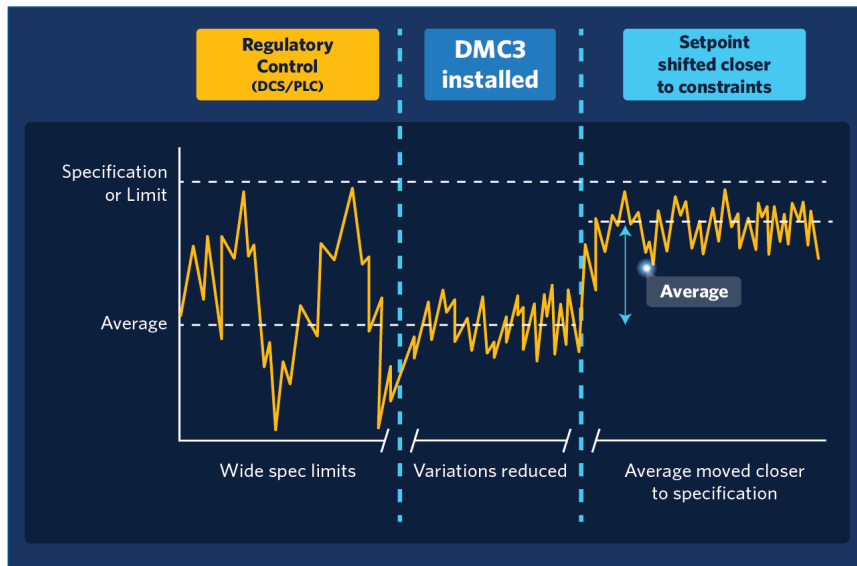


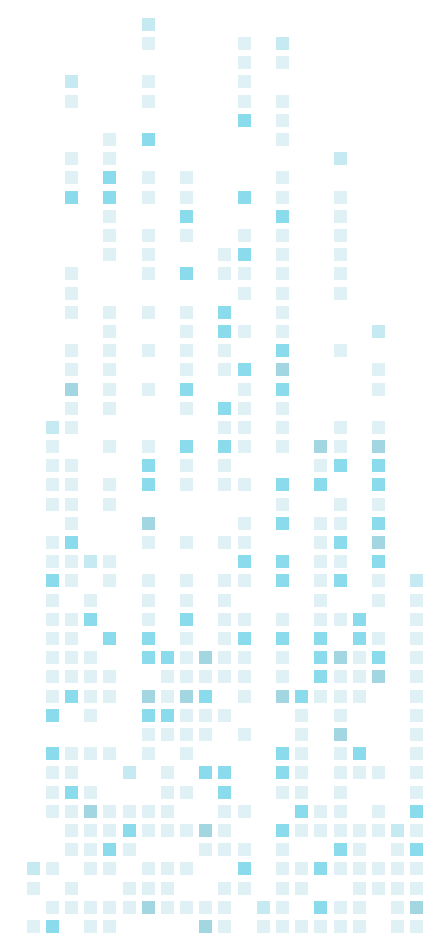
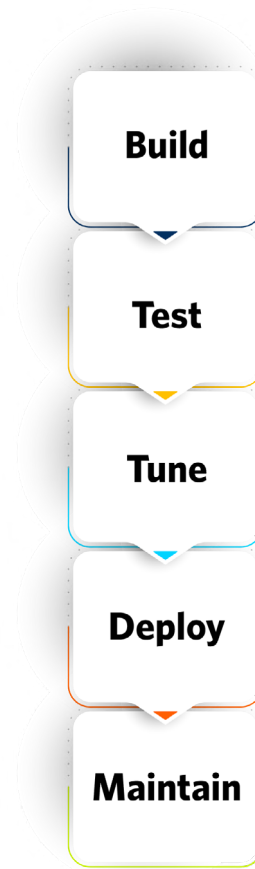
Figure 1. Aspen DMC3 can run processes much closer to operational limits.



Key Features

Aspen DMC3 combines an integrated set of desktop tools (Aspen DMC3 Builder™) for data analysis, modeling, controller simulation, deployment and maintenance with an online system (DMC3 Online) for controller execution and operation.

Aspen DMC3 Builder is an integrated platform with the most powerful and innovative features and a modern interface used to build and deploy DMC3 controllers from start to finish. It supports a broad range of processes, from simple linear to complex nonlinear. Embedded Industrial AI features, like the machine learning-powered modeling workflow of Aspen Maestro™, enable streamlined mining of plant data to generate seed APC models faster.



Constrained Model ID empowers engineers to craft precise APC models using their process knowledge and real-world constraints. This feature preserves mass balances, manages collinear CVs and removes non-causal relationships, all within the DMC3 Builder workflow. Constraints integrate smoothly into the master model, eliminating the need for external calculations while maintaining consistency and insights for future use.

Collinearity Repair eliminates the “numerical fuzziness” of near-identical gains that can confuse optimizers, cause cycling and hurt performance. Even non-experts can fix collinearity issues during offline modeling, ensuring sharper, more profitable optimization decisions.

The **DMC3 Online** system uses the Real-Time Environment (RTE) service to manage and schedule DMC3 controller cycles and IO processing, enabling real-time data exchange, target calculations, control execution and validation. This architecture supports robust and scalable APC deployment.

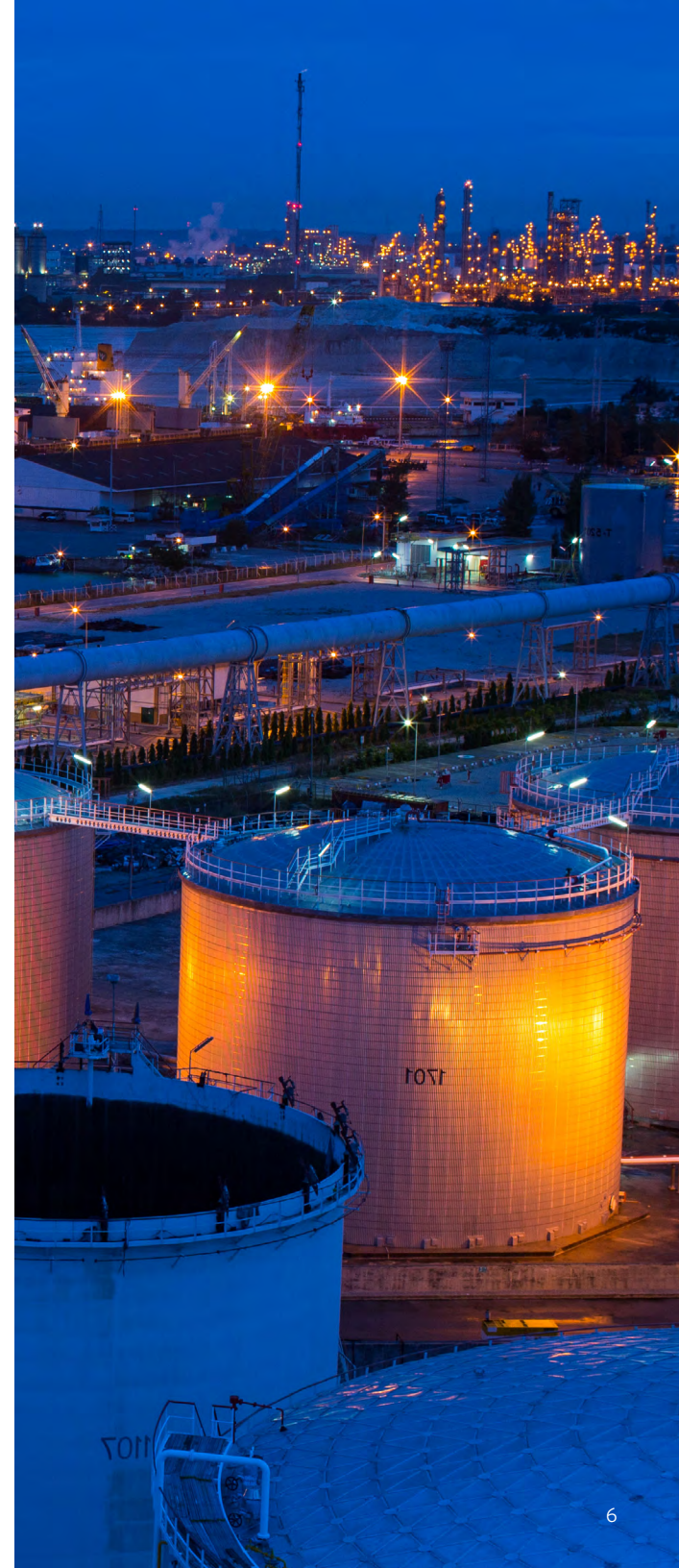
Adaptive Control: Smarter, More Agile APC

Traditional APC technologies struggle to keep up with shifting process and market conditions, requiring time-intensive, costly and disruptive step tests to update models and relying on a shrinking pool of experienced control engineers. **Aspen DMC3’s adaptive control technology** revolutionizes the approach to model updates with a faster and smarter APC solution that adapts to changing operating conditions to sustain benefits effortlessly, without being limited by scarce expert know-how.

By minimizing manual intervention and automating model maintenance, Aspen DMC3 ensures low total cost of ownership and reduced upkeep, while its flexible architecture supports a long and highly agile technology lifecycle.

Calibrate Mode: Deploy Rapidly and Optimize with Ease

Say goodbye to disruptive step testing. Aspen DMC3’s patented Calibrate Mode updates models in closed-loop through non-disruptive background testing, keeping your process optimized while adapting to changes. Its robust algorithm maintains all variables within limits as the model refines itself to keep it accurate despite equipment aging or changing process conditions. This approach minimizes controller downtime from plant-model mismatch, helping to prevent associated loss in profit.



For new controller commissioning, users can start with a seed model created with machine learning-powered algorithms and historical data, and deploy it online to generate benefits instantly, slashing commissioning time from months to weeks. Background model updates using Calibrate Mode can fine-tune the model to ensure precision without upsetting operations.

Model Quality Analysis (MQA): Stay Ahead

Monitor control performance with MQA. Get real-time insights into model accuracy, spot troubled model curves and diagnose issues fast. This enables a continuous background assessment of model quality, collecting current data and generating new models as the behavior of the plant changes over time, all to keep your APC sharp and reliable.

Industrial AI: Turbocharge Performance

Embedded Industrial AI in Aspen DMC3 unlocks powerful new capabilities by taking advantage of its proven modeling and optimization technology:

Aspen Maestro for DMC3 (included in Aspen DMC3 Builder)

revolutionizes APC model building with machine learning-powered algorithms packaged with an easy-to-use, wizard-like workflow. This combination drastically reduces modeling complexity and time while creating seed models from historical data. Seed models can be refined online using adaptive control, which speeds up controller deployment, improving time to sustained value.

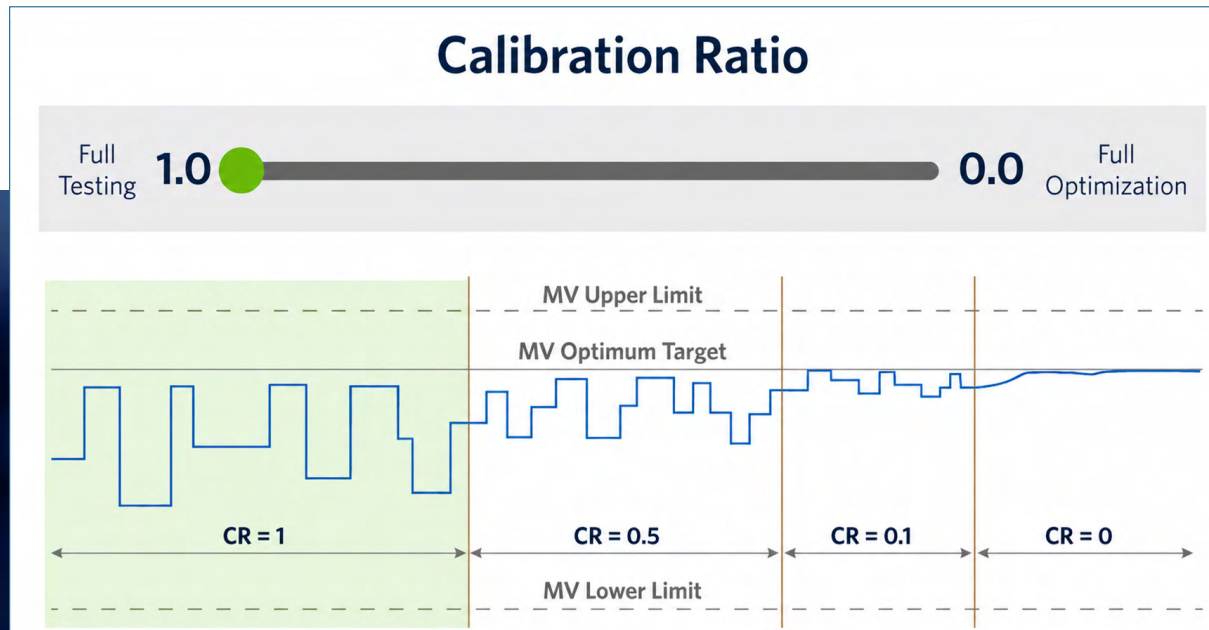


Figure 2. The Calibration Ratio allows users to balance testing intensity with optimization benefits.

Deep learning, integrated with Aspen DMC3's proven linear finite impulse response (FIR) and subspace model identification, delivers full nonlinear models for variables with severe nonlinearities. These nonlinear variables join linear ones in a single DMC3 model matrix. This blend of linear and nonlinear technologies enhances accuracy, model explainability and value, surpassing the capabilities of either approach alone.

Deep Learning Nonlinear Variable

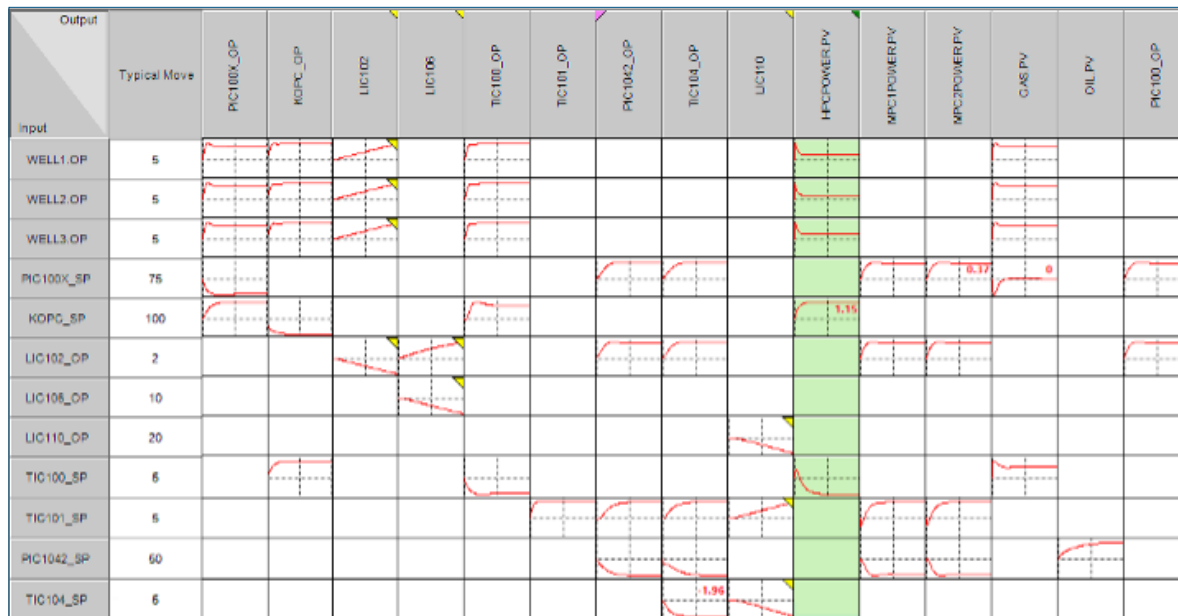
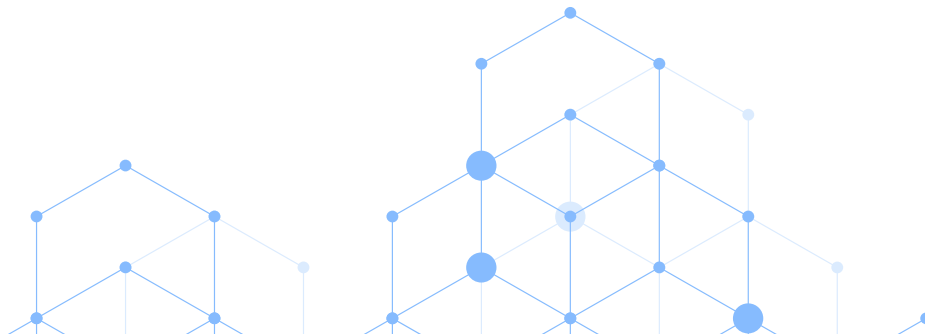


Figure 3. DMC3 model matrix combining linear, linearized (via transforms) and full nonlinear deep learning variables.



AVA™ activated in DMC3 is a 24/7 AI-powered virtual APC advisor that improves operational efficiency by empowering operators and engineers with real-time insights, answers to common process control questions and actionable guidance in 10 global languages.

Aspen Hybrid Models™ seamlessly combines first-principle models with AI and domain expertise to deliver robust control and inferential APC solutions to enhance prediction accuracy, especially in scenarios when process data is limited or nonlinearities are hard to capture empirically.

Smart Tune: Precision Tuning, Simplified for Agile Control

Smart Tune, embedded in Aspen DMC3, revolutionizes controller tuning by allowing engineers to define variable priorities and optimization directions on the go. Instead of trial-and-error adjustments, users specify objectives (like maximizing output within

fuel cost constraints or minimizing heat rate while maintaining emissions limits) and Smart Tune configures the controller accordingly, making it more agile to shifting economic goals.

Robust Control with Economic Relaxation: Resilient, Stable and Effective

The Robust Control feature in Aspen DMC3 enhances controller resilience, tackling model quality challenges and unmeasured process disturbances with ease. Engineers can fine-tune the controller's personality using a customizable Robustness Factor, striking a balance between controller aggressiveness and stability during optimizing control mode. The Robust Control algorithm prevents controller oscillatory behavior and ensures stability and constraint adherence even when model mismatch and unknown disturbances threaten performance.

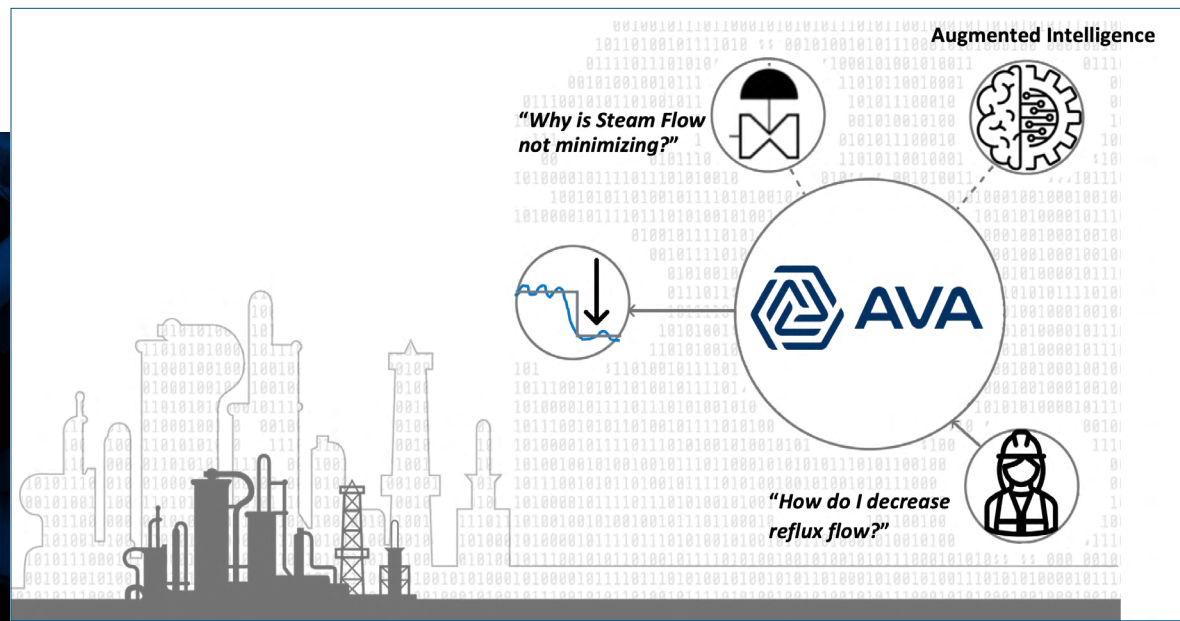


Figure 4. AVA improves APC performance with 24/7 guidance from a virtual AI advisor.

Aspen APC Viewer™: Enhanced Web-Based Visualization

Aspen DMC3 includes **Aspen APC Viewer**, a modern HTML-based web interface designed to visualize, manage, plot and report on all AspenTech APC controllers. It includes an intelligent model viewer, interactive flowsheets, and builds on existing role-based, multi-level security, delivering a seamless, powerful experience for monitoring and managing APC performance.

Aspen Watch Performance Monitor™: Improved Profits Through Greater Visibility

Included in Aspen DMC3, **Aspen Watch Performance Monitor** provides robust performance monitoring with standard and custom KPIs, provides insights to operators based on expert rules, and offers engineers detailed oversight of PID control loops.

Aspen APC Remote Monitoring Relay enhances visibility for DMC3 and IQ applications, improving APC uptime by securely making these applications accessible on the business network (L4) or the cloud. This innovative feature won a **2025 Breakthrough Product Award** from *Processing* magazine.

Aspen DMC3 Composite Linear Program (CLP) combines multiple DMC3 controller LPs into a single, unified optimization structure to cover a wide process scope, allowing engineers to manage both slow and fast process dynamics while scaling across broader plant sections. By linking individual controller LPs, CLP captures a wider range of active constraints, enabling more coordinated and efficient control.

AVA further enhances composite applications by providing system-level insights that span the entire CLP, beyond individual DMC3 controllers, helping users optimize performance across the full solution.

Prediction & Inferential Measurements

Aspen Inferential Qualities™ (IQ) delivers precise, real-time estimates of unmeasured process properties, enabling tighter quality control and more responsive operations. Designed to supplement infrequent lab measurements or compensate for critical sensor limitations, it supports both linear and nonlinear inferential models for online deployment.

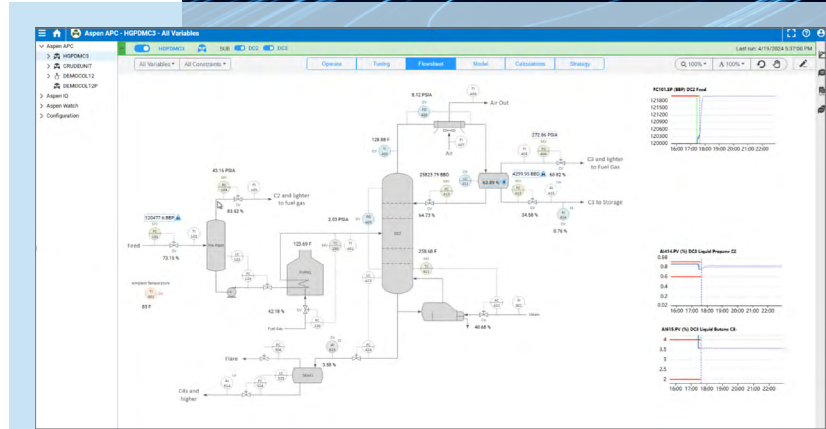


Figure 5. Modern web interface for operations with interactive flowsheets and role-based security features.

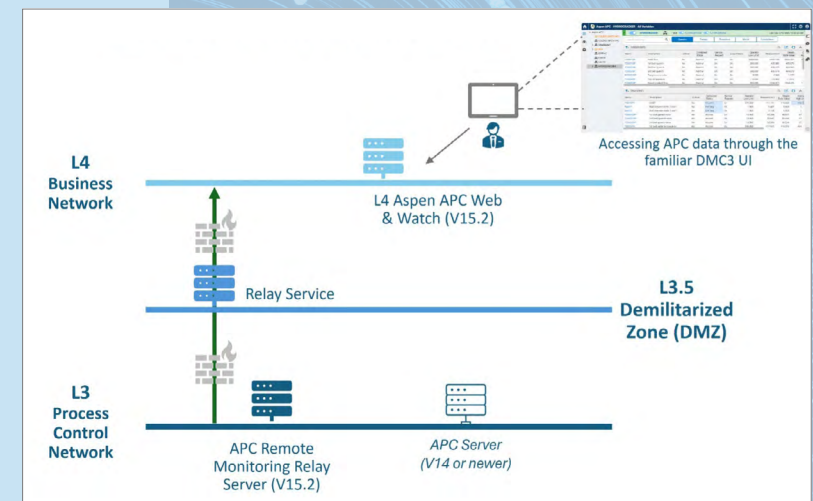


Figure 6. Secure, streamlined access to APC applications in multi-layered control architectures from business and cloud networks.

Exceptional Support, Every Step of the Way

Get the most from Aspen DMC3 with our award-winning support team. Combining deep APC expertise with a commitment to world-class service, our specialists are always available by phone, email or live chat. Learn more at support.aspentech.com.

AspenTech's Expert-Led Training: Learn. Apply. Succeed.

AspenTech offers flexible Aspen DMC3 training—virtual, in-person, or on-demand. Learn from domain experts or build skills at your own pace with eLearning and flexClass options. Visit the AspenTech Training Center at training.aspentech.com.

Four Decades of Successful APC Implementations

Accelerate time-to-value with tailored engagement plans delivered on-site or remotely by AspenTech experts and certified partners.

Conclusion

Aspen DMC3 builds on decades of APC leadership with breakthrough innovations that unlock greater value from your existing process infrastructure. By combining better software and advanced control logic with agile economic optimization, Aspen DMC3 keeps your operations tightly aligned with business objectives, rapidly delivering measurable ROI and maximizing profitability beyond expectations.





About Aspen Technology

Aspen Technology, now part of Emerson, is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle. Through our unique combination of deep domain expertise and innovation, customers in asset-intensive industries can run their assets safer, greener, longer and faster to improve their operational excellence.

www.aspentech.com

© 2026 Aspen Technology. All rights reserved. AT-4210

