

AspenTech Performance Engineering: A Key Advantage for EPCs

While the process industries are no strangers to volatility, today's changes are coming faster and more frequently than ever. Shifting energy markets, fluctuating feedstock availability and evolving sustainability requirements are the new reality, and these challenges put greater pressure on engineering, procurement and construction (EPC) firms to deliver projects faster and at lower cost.

Even in this environment, many firms are still relying on engineering tools and workflows that are largely disconnected. Process engineers work in simulation software, and mechanical engineers use their own equipment design applications. Cost estimators maintain independent economic models, while safety specialists conduct analyses in parallel environments. With each discipline focused on its own area, the organization can miss key opportunities to optimize the project as a whole. Disjointed workflows limit how many design alternatives can be evaluated within tight project timelines, often leading to designs that are workable but not fully optimized.

Leading EPC firms are addressing this challenge by leveraging a Performance Engineering environment – that is, a set of integrated software solutions that enables them to **simultaneously evaluate technical, economic, safety and additional tradeoffs throughout the project lifecycle**. By taking this holistic approach to their engineering needs, these firms are utilizing industry-leading process simulation technology with capabilities for equipment design, safety analysis, economic evaluation, energy optimization, deploying digital twins for operations support and leveraging AI-driven engineering tools.

Break Down Silos for Better Outcomes

Modern plant design requires balancing multiple objectives at the same time, even when parameters like capital cost and environmental performance may be in competition. Traditionally, these types of optimization activities are performed in separate tools, so every design change must be manually transferred between systems, which increases the risk of errors and could delay project execution.

A Performance Engineering environment eliminates these barriers by connecting all disciplines around a common digital foundation. As engineers evaluate design alternatives, they can understand impacts on capital investment, operating costs, energy consumption, equipment performance, emissions and safety requirements. The result is a more efficient design process, faster project execution and greater confidence that the final design will meet customer objectives and performance guarantees while staying on schedule and within budget.

Using rigorous process simulation, engineers can create a digital twin, or a virtual representation of a facility, which they can use to evaluate alternatives before construction begins. This allows teams to test operating scenarios, understand process interactions and validate performance under changing conditions without introducing risk to any physical assets. Engineers can assess technical feasibility, safety implications and economic impacts within the digital model to ensure that designs are not only theoretically sound but also operationally practical, safe and profitable throughout the asset lifecycle.

AI is a critical enabler of these sophisticated capabilities. The [AspenTech Performance Engineering](#) environment uniquely combines the capabilities of first-principles models, domain expertise and AI to create *hybrid models*. With this technology, engineers can build and maintain sophisticated models faster, gain visibility into unmeasurable process behavior, adapt to changing plant conditions, extend model value into planning and operations and even bring simulation capabilities to processes that were previously difficult to model.

Real-World Results

AspenTech Performance Engineering is built on proven technology that has been used for decades by companies across the process industries. Leading EPC firms have significantly increased project efficiency while also generating value for owner-operators by using this integrated engineering solution.

[Process Ecology](#) transformed a highly manual pressure-relief analysis and documentation workflow into a fully connected engineering process. By integrating safety analysis, engineering calculations and documentation, the company reduced engineering effort by 55%, cut documentation times by up to 60% and shortened project schedules from roughly 10 weeks to five weeks.

[Johnson Matthey](#) and [Doosan Enerbility](#) used Performance Engineering to evaluate the feasibility of combining an ammonia cracking facility with a hydrogen-fired power generation plant. Drawing on process simulation data, heat-transfer analysis and

economic evaluation, the project team identified a design that reduced ammonia consumption, increased hydrogen yield and boosted power generation output.

Tekfen Engineering implemented a concurrent workflow connecting process simulation, plant layout, cost estimation and economic analysis to evaluate a carbon-capture-based fertilizer project. The company was able to reduce design cycle times by more than 95%, lower engineering effort by 65% and identify an optimized design that reduced projected capital costs by approximately \$32 million.

Performance Engineering: A Key Advantage for EPCs

For EPC firms, success increasingly depends on the ability to quickly evaluate tradeoffs, collaborate across disciplines and deliver optimized projects with confidence. In an environment where cost pressures, project schedules and customer expectations continue to evolve, fragmented engineering workflows are not enough.

Performance Engineering enables a new approach. By bringing process simulation, equipment design, safety analysis, economic evaluation, energy optimization, plant layout and digital twin capabilities together in a single environment, EPCs gain a common engineering foundation that supports better decisions from the earliest phases of design into operations support.

This integrated approach can help engineering firms bridge expertise gaps in areas like equipment design, safety analysis and cost estimation, enabling more complete design evaluation and more confident client recommendations. By reducing manual handoffs, EPCs can prepare reliable quotes faster, execute new jobs more efficiently and pursue more opportunities simultaneously. In addition, intuitive 3D layout views help engineers communicate their proposed designs more clearly to non-technical client stakeholders.

These capabilities are giving engineering firms greater visibility into design impacts, driving faster iteration cycles and improving collaboration. This is the key to delivering projects on time and on budget, even as conditions change. With AspenTech Performance Engineering, firms can spend less time managing disconnected tools and more time creating fully optimized designs that maximize value for their clients.

About Aspen Technology

Aspen Technology (AspenTech), an Emerson business, is a global leader in industrial software. AspenTech's solutions use AI, advanced modeling and optimization, and industrial data management to help asset-intensive organizations design, operate and maintain complex assets more safely, efficiently and sustainably, enabling improved operational performance and accelerated business outcomes.