

Aspen Fidelis™ Applications in Oil & Gas

Make Cost-Effective Decisions to Increase Business Performance and Manage Risk

Challenges for Decision-Makers in the Oil & Gas Industry

The energy industry is facing a complex landscape shaped by growing demand, sustainability goals, energy transition initiatives, technological advancements and geopolitical and macroeconomic factors. Oil and gas companies are dealing with heightened scrutiny from investors and regulators, making bankability a top priority. Supply chain disruptions and cost volatility are also important to consider when making CAPEX and OPEX decisions. Moreover, aging of existing and newly installed infrastructure will have a significant cost impact.

In this context, **leading oil and gas companies are building decision-support systems** to identify the right capital investments and asset strategies that will ensure short- and long-term profitability and robustness. These companies are looking for digital solutions that can enable them to:

- Modernize operations and maintenance
- Improve capital discipline
- Strengthen supply chain resilience
- Navigate regulatory changes proactively
- Balance energy transition with reliability

To achieve that, decision-makers and their support systems must account for:

- Sources of uncertainty and their impact (risk quantification)
- Interactions between the multiple assets and facilities in their value chain

Otherwise, it becomes difficult to prioritize investments, since “local” improvements may not be reflected at the enterprise level or the expected value from an investment is not realized due to the impact of unplanned events.

Aspen Fidelis: Forecast Performance, Cost and Risk

Aspen Fidelis is a **stochastic simulation solution that predicts the business performance** of industrial systems, in design or in operation, providing insights into the **benefits, costs and risks** of different alternatives to improve that performance.

What differentiates Aspen Fidelis is its powerful modeling framework that combines Monte Carlo simulation, flow optimization and execution of custom logic, enabling the assessment of decisions while accounting for uncertainty and its impact across a system network of processing units, facilities, etc.

Some Aspen Fidelis inputs can be specified on available data, but also from other AspenTech products, such as Aspen HYSYS®, Aspen Capital Cost Estimator™ and AspenTech Inmation™ OT Data Fabric.



Aspen Fidelis Use Cases Along the System Lifecycle

Evaluate Greenfield Projects	Design Aid	Improve Operation & Maintenance Strategies	Evaluate Brownfield Projects
Feasibility Study /Conceptual Design	Pre-FEED / FEED	Operations & Maintenance	Revamps and other projects
- Lifecycle cost analysis (CAPEX, OPEX) to compare and rank projects - Compare site configuration alternatives - Sizing of major storage elements - Assess costs and benefits of Green energy and decarbonization projects	- RAM Analysis - Determine required level of equipment redundancy - Sizing buffer tanks - Initial spares provisioning - Assess operational strategies - Evaluate site logistics - Define initial maintenance strategy	- RAM Analysis - Forecast availability - Identify top bad actors - Optimize maintenance strategy: - Adjust frequency of planned maintenance - Adjust stock level of spares - Define turnaround scope - CAPEX justification - Redundancy / Bypasses - Equipment upgrades - Assess logistics changes	- RAM Analysis - Capex justification: - Debottlenecking - Capacity expansion projects - Assess costs and benefits of Green energy and decarbonization projects - Carbon capture - Biofuels - Blue/Green Hydrogen - Solar/Wind energy - And more...

Aspen Fidelis Capabilities

Simulation of planned and unplanned events, including but not limited to:

- Construction of new facilities
- Decommissioning of existing assets
- Delays in supply or product shipping
- Volatility in product demand and prices
- Running out of product inventory
- Preventive and corrective maintenance activities
- Extreme weather events

Simulation of operations and maintenance logic, logistics and seasonal impact, including:

- Multi-objective flow optimization
- Multiple operating modes
- Dynamic product yields and equipment failure rates
- Compensation logic, activation of emergency units
- Different scheduled maintenance frequencies
- Batching in multiproduct pipelines
- Construction sequence of facilities

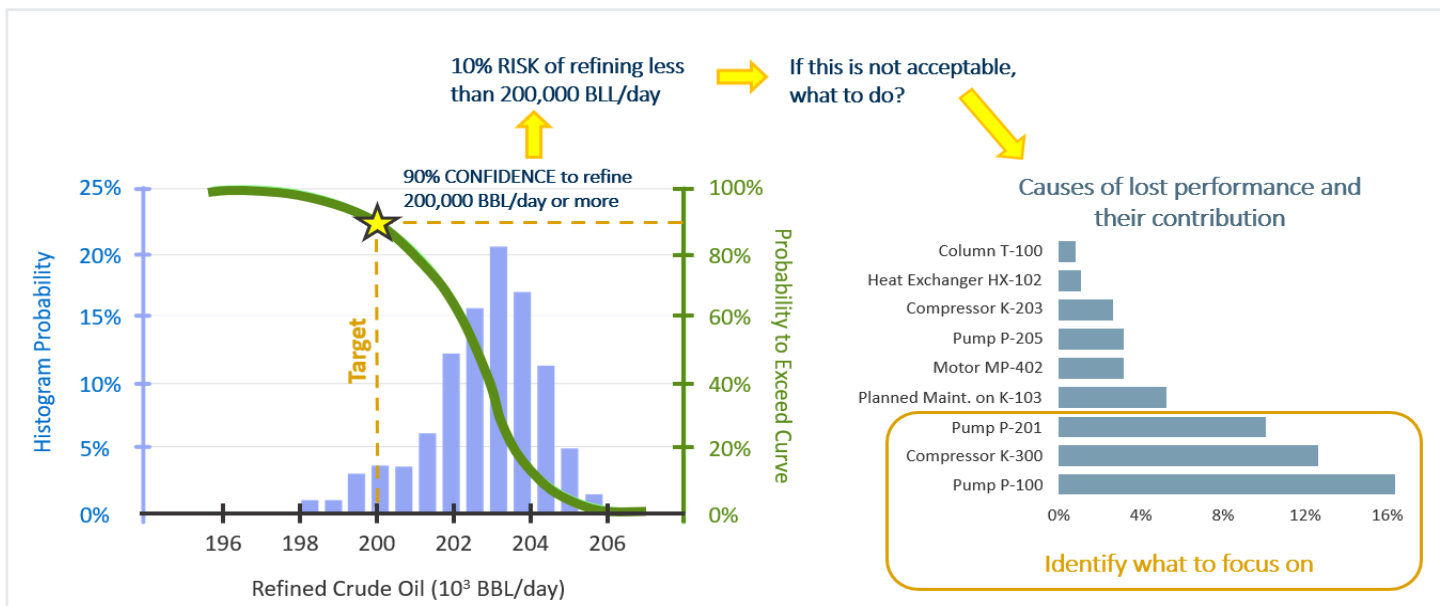
Aspen Fidelis: Faster and Better Decisions

Aspen Fidelis simulation results include **histograms** and **"probability to exceed"** curves for revenue, production throughput, availability and utilization of processing units. Results also include costs and contribution of events to performance losses.

Decision-makers can use Aspen Fidelis to estimate the probability of achieving a performance target for a given alternative, thus guiding them in their process to determine cost-effective decisions and manage risk.

The full range of benefits depends on the scope of the decision, or decisions, it is used to support. These are some of the improvements reported by companies that have used Aspen Fidelis:

- \$20M-\$1B USD** in value from improved capital decisions
- \$1M-\$50M USD** in operational and maintenance savings
- \$3M-\$500M USD** in performance and reliability gains



Aspen Fidelis Benefits

Predict Value Before You Invest

Quantify the financial and operational impact of projects before capital is committed, including uncertainty in technology performance, markets, regulations, weather and renewable energy supply.

Invest at the Right Level—No More, No Less

Evaluate system design alternatives such as redundancy, spares, bypasses, storage capacities and transportation options based on expected lifecycle cost and performance.

Maximize Uptime and Reduce Production Losses

Forecast system availability, quantify asset criticality and assess the risk of equipment outages, maintenance strategies and different turnaround scopes.

Get an Integrated Business View

Analyze how assets, system configuration, events, operations, maintenance and supply chain logistics impact your business KPIs; identify system constraints and assess debottlenecking options.

Speed Up Decision-Making

Replace complex and ad-hoc spreadsheets with a systematic modeling approach that provides required flexibility and reusability.

Aspen Fidelis Applications in Oil & Gas

These are examples of how Aspen Fidelis is creating real-world impact for companies around the world.

Full Hydrocarbon Value Chain

Supported justification, or rejection, of individual site project proposals by assessing their value at the enterprise level. This included capacity expansions, equipment replacement and new processing facilities, pipelines and storage tanks in the context of the latest oil, water and gas production profiles and demand forecasts for refined fuels and sales gas. Aspen Fidelis also helped reduce the effort and time required to perform robustness analysis of the entire value chain. The Aspen Fidelis model included logic to activate emergency units and transportation routes when needed.

Gas Processing Facilities

Quantified asset criticality in terms of production impact and forecasted availability of different equipment. This information was used by production planning and maintenance teams to identify when their plans need to be adjusted, as well as to justify equipment replacements and spares inventory needs.

Oil Pipelines and Terminals

Increased CAPEX benefits by assessing different tank sizes and pump configurations during a revamp, with the objective of maintaining the flow throughput. The Aspen Fidelis model included equipment failure events, planned maintenance and batching sequencing for different demand destinations.

LNG Facilities

Gained greater availability and production of existing LNG sites by assessing changes to planned maintenance frequency and different redundancy options for dehydration units, liquefaction process trains and gas pipelines. The Aspen Fidelis model included LNG storage tanks and shipping logistics, seasonal temperature impact to compressors and aimed to minimize flaring.

Oil Refineries

Assessed risk of deferring the FCC turnaround by one year, while considering the market volatility and different operating modes, each with its own set of product yields, equipment failure rates and material degradation rates. In another refinery, CAPEX savings were identified by repurposing equipment and storage tanks during a project to incorporate a sustainable aviation fuel unit.

Aspen Fidelis Applications in Decarbonization & Energy Transition

Green Hydrogen \ Green Ammonia

Improved NPV of large-scale green-hydrogen-to-ammonia project at the conceptual design stage by identifying batteries and hydrogen storage needs based on stochastic profiles of ammonia demand, solar and wind power. The Aspen Fidelis model included logic for minimum capacity turndowns (electrolyzers and ammonia plant), minimum battery charge level and the possibility to draw electricity from the grid when there is a lack of renewable energy.

Carbon Capture

CAPEX savings were achieved in a carbon capture project at the FEED stage by determining equipment redundancy (primarily pumps and compressors) that meets availability targets. The Aspen Fidelis model included impact of the electrical system.

Unlock the Full Potential of your Assets and Investments With Aspen Fidelis

See how leading owner-operators achieve millions—even billions—of dollars in measurable value. Contact us at info@aspentech.com to:

- ✓ Request a demo
- ✓ Talk to an expert
- ✓ Explore customer success stories

Learn More at [aspentech.com](https://www.aspentech.com).

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