Aspen Mtell®

Boost Efficiency, Reliability and Productivity with Data-Driven Maintenance

Empower Your Teams
with Award-Winning Aspen Mtell

Aspen Mtell, the industry-leading predictive and prescriptive maintenance solution from AspenTech®, is transforming asset performance management for industrial organizations around the world, harnessing the power of data and technology to provide operations, reliability, and maintenance teams with real-time visibility into asset health and actionable insights for faster decision-making.

Minimize Asset Failures, Process Disruptions

The operational and financial success of capital-intensive organizations is often largely dependent on their ability to avoid (or minimize) asset failures and any resulting disruptions to process. Traditional maintenance programs are limited and typically reactive.

While other more modern maintenance approaches have been tried, only Aspen Mtell combines rules-based and condition-based monitoring, first principles modeling, AI, machine learning and custom models from data science teams, to create a comprehensive solution for asset health and performance monitoring. By closely tracking multiple operating parameters and detecting subtle behavioral changes, Aspen Mtell identifies leading indicators and effectively predicts asset risks for greater asset reliability, lower operational costs and enhanced safety and sustainability measures.

Proven, versatile Aspen Mtell combines advanced digital technologies and your existing process data to predict asset failures before they occur—days weeks, if not months, in advance. This early warning enables greater collaboration between Operations, Maintenance, Planning and Scheduling, and Health, Safety, and Environment (HS&E) teams to strategically plan maintenance and successfully minimize the disruptive effects of unplanned downtime and the resulting financial consequences.

Dynamic Agents: Continuously Learning and Adapting for Peak Asset Performance

Integral to Aspen Mtell's success are its innovative agents that combine engineering and data science expertise to monitor data streams. These software elements perform intensive technical and analytical work in real time, continuously learning and adapting to retain acquired knowledge. Aspen Mtell gathers asset data from current Enterprise Asset Management (EAM) systems to build an asset hierarchy. It
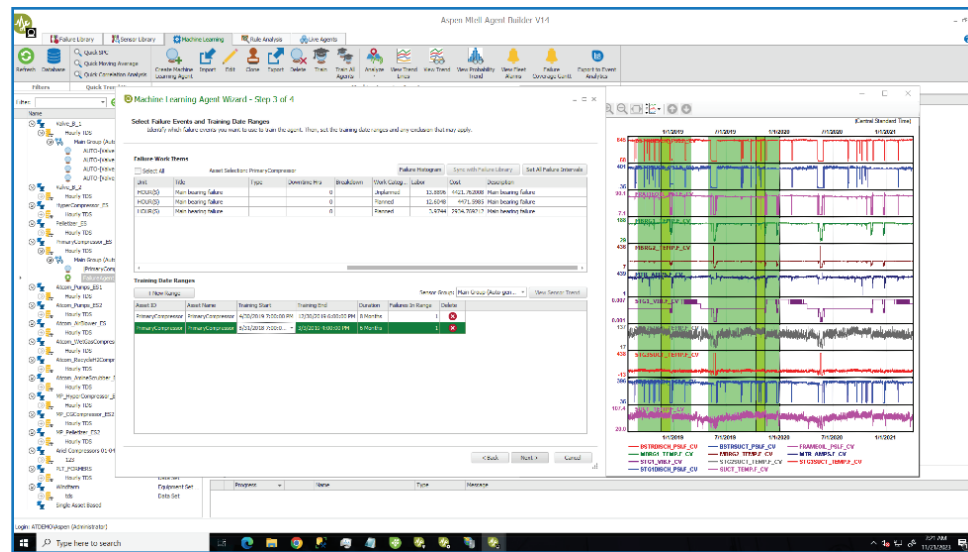

Figure 1. Machine learning agent screen within Aspen Mtell.

collects operational data from various sensors, such as temperature, speed, and vibration, instrumentation systems and distributed control systems, enabling the creation of agents that monitor asset health and its performance. It can also interoperate with management information systems and various business systems.

The process of creating agents is straight-forward. Depending on the maintenance strategy for a particular asset, a range of agents can be deployed. They can also be transferred to similar assets, enabling scalability and efficient setup to identify and address potential issues proactively.

Aspen Mtell's agents employ a variety of monitoring techniques:

- **Rules and condition-based agents** alert at the slightest deviation from expected data ranges or execute predefined calculations to notify users of ongoing degradation quickly.

- **First principles-based agents** utilize physics-based calculations guided by fundamental engineering principles to evaluate asset degradation.

- **AI- and machine learning-based agents** leverage work order details to understand the characteristic patterns of both normal and failure modes. They monitor for the recurrence of those patterns, protecting against similar failures and detecting new anomalies that are readily categorized as either new normal conditions or new failure signatures. Aspen Mtell employs a streamlined machine learning approach that readily adjusts to evolving operational modes, ensuring it can adeptly identify emerging failure conditions.

> **Aspen Mtell harnesses the power of data and technology to ensure reliable asset performance and advance sustainability efforts.**

One example of Aspen Mtell's versatility is its **ability to incorporate a range of models** or custom codes developed by data scientists and founded on fundamental principles or machine learning. This "Bring Your Own Model" capability enables the sharing of expertise between data science teams and maintenance/process engineers while empowering users to leverage a variety of modeling methods to boost asset performance management.

Agents alert users of impending issues via email notification and can create work orders with specific failure information in the EAM system. They also recommend the right maintenance action based on how an asset is behaving, which provides operations and maintenance teams with more time to plan and collaborate with other departments, make decisions to fix problems efficiently or adjust production.

Key Features & Applications

Aspen Mtell comes with a host of built-in features and applications designed to support users from deployment to realizing value. These include:

Asset Templates. This feature simplifies the creation of agents with predefined templates and industry-specific subject matter expertise. Users have the flexibility to leverage predefined asset templates, complete with embedded Key Performance Indicators (KPIs) for a wide variety of industries to provide valuable guidance and best practices while accelerating Agent development, deployment and scaling for faster overall implementation and customer ROI.

Key Features and Benefits at a Glance

| Feature	Customer Benefit
Best-in-Class Failure Predictions	**Industry-leading AI/ML algorithms** for long lead times and highly accurate failure predictions
Comprehensive Agent Methodology	**Combination of monitoring technologies** (rules-based/condition-based monitoring, first principles modeling, AI, machine learning and custom models) for **strategic asset coverage** and faster time to value
Predefined Asset Templates	**Embedded KPIs, industry-specific subject matter expertise** for faster agent creation, deployment and scaling
Aspen Maestro Technology	**Simplified agent creation, data preparation** with automated identification of critical sensors and optimal input parameters
Custom Models	**Shared expertise** between data science teams and maintenance/process engineers for greater collaboration
Real-Time Alert Management	**All active alerts are detailed and prioritized by severity and criticality,** for highly informed collaboration between production and operations
Configurable KPIs & Dashboards	**Centralized real-time visual representation of essential plant and business performance** indicators and metrics for faster decision-making, optimized resource allocation and longer asset life
Platform/Solution Integration	**Easy integration with third-party systems and other AspenTech solutions** for streamlined operations and available on the **cloud** for improved overall operational efficiency and performance
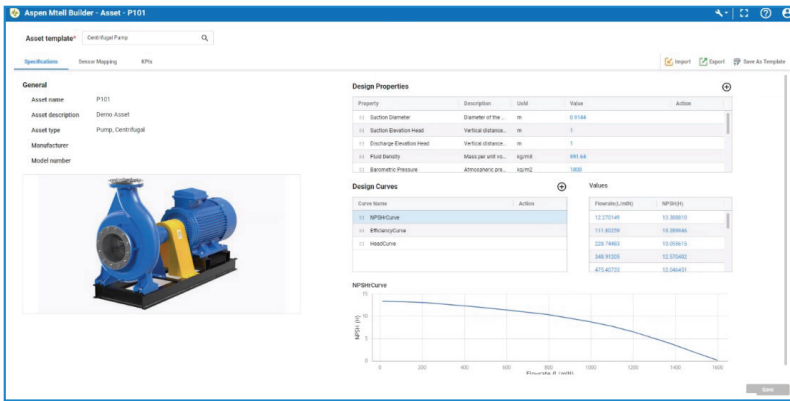
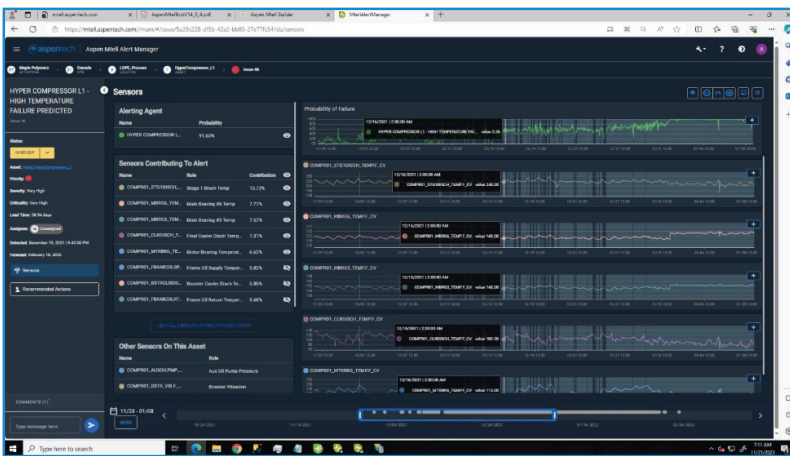*Figure 2. Example of Aspen Mtell asset template (centrifugal pump).*
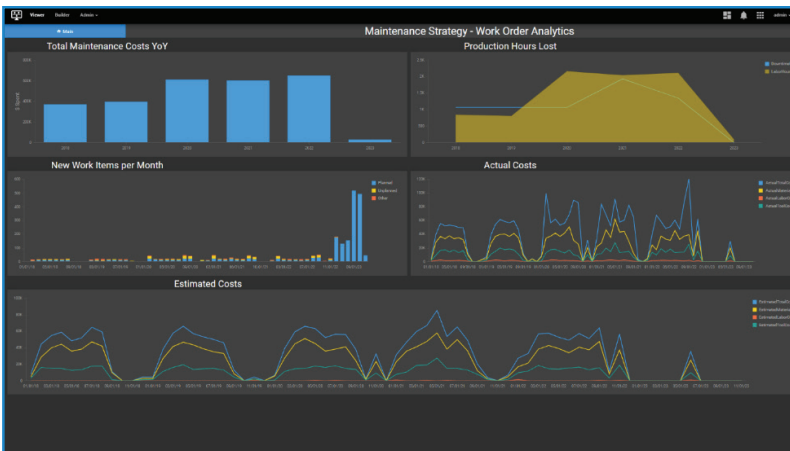

Figure 3. Aspen Mtell Alert Manager.

Figure 4. KPIs and Dashboards for Aspen Mtell.

Aspen Maestro. Aspen Mtell's breakthrough technology aids users in building agents. It effectively addresses the three major challenges in successful agent building: data selection, data cleaning, and the integration of domain expertise. Aspen Maestro's AI-driven capabilities simplify data preparation by automatically identifying critical sensors, the optimal input parameters for creating effective agents, delineating data regions for testing and training, fine-tuning hyperparameters, and determining the required sampling frequency for analysis. Aspen Maestro automates the feature selection process, aiding in the identification of significant features within the data. It recognizes the importance of utilizing data to reinforce engineering principles and relationships in data modeling. Aspen Maestro functionality empowers users to leverage their expertise and tap into the knowledge of other domain experts effectively.

Alert Manager. Alert Manager empowers maintenance personnel to efficiently prioritize alerts and access detailed information for a consistent and effective response to asset health issues, ensuring that the most critical problems are addressed promptly. Additionally, users can access detailed information on impending failures, including sensor contributions to specific asset issues. In cases of known failures, users can benefit from embedded recommendations that expedite issue resolution and provide accessible information and guidance.

Users also have the option to import existing Failure Mode Effects and Analysis (FMEA) libraries, enhancing informed decision-making and facilitating efficient problem resolution. For unforeseen issues, Aspen Mtell enables personnel to document their learnings, enabling swift and confident action on future alerts. This structured and collaborative approach streamlines maintenance work orders, ensuring timely review, prioritization and tracking.

> **Aspen Mtell is easy to implement, integrates with current maintenance strategies and can be deployed at scale using existing resources.**

KPIs & Dashboards. KPIs and dashboards provide a quick, visual representation of essential performance indicators and metrics, unifying the perspective on both plant and business performance. Users can easily access comprehensive data related to overall plant performance, maintenance costs, and the health of maintenance program, empowering informed decision-making based on factors like agent health, total protected assets, and year-over-year maintenance costs.

Aspen Mtell is the only solution in the market wherein users can also tailor their experience to specific monitoring needs with the flexibility to create customized interactive layouts, whether its fleet views or interactive piping and instrumentation diagrams. These context-rich views offer a deeper understanding of the repercussions of cascading asset issues. User-friendly and configurable KPIs and dashboards cater to diverse user profiles, delivering valuable insights for optimized workflows and resource allocation thereby unlocking operational excellence.

Enterprise System Interoperability. Aspen Mtell integrates easily with different historians, EAM & CMMS systems, ERP systems including SAP—as well as other AspenTech solutions—

creating a comprehensive ecosystem for streamlined operations. Seamless integration with AspenTech Inmation™ eliminates data silos. AspenTech Inmation further enhances Aspen Mtell's performance by efficiently processing extensive data volumes, providing customers with the flexibility and scalability that unlock additional value.

Integration with Aspen Fidelis™ provides users with the ability to simulate financial outcomes for active alerts and various mitigation strategies, guiding optimal decision-making in uncertain conditions. Aspen Mtell also integrates with Aspen Plant Scheduler™ to pinpoint the ideal maintenance scheduling times, factoring in spares availability and other planned activities while ensuring production schedules are met.

Integration with AspenTech Performance Engineering solutions like Aspen HYSYS® or Aspen Plus® enhances energy efficiency, reduces emissions and predicts process failures through an online digital twin. Aspen Mtell is also available on the cloud via AWS and Microsoft Azure, enabling improved overall operational efficiency and performance.

Selected Aspen Mtell Customer Successes

Bangkok Industrial Gas Company (BIG) achieved asset runtimes of 99.8% and improved maintenance lead times from one week to one month using Aspen Mtell and other AspenTech solutions on Amazon Web Services (AWS).

LG Chem adopted Aspen Mtell sitewide, realizing $3.6M USD in benefits in a single year from avoided production losses.

Wind farm operator **Sardeolica** leveraged Aspen Mtell to transform its maintenance program, scheduling service within low-wind periods resulting in easier repairs, increased production and a 10% reduction in yearly maintenance costs.

Drive Asset Efficiency, Reduce Costs and Fast-Track Progress to a Smarter, Greener Future

For organizations still using traditional asset maintenance strategies, versatile, powerful, data-driven Aspen Mtell can play a key role in enhancing asset reliability and sustainability in a cost-efficient manner.

Aspen Mtell empowers organizations to take a proactive approach, minimizing disruptions, ensuring a safer work environment, and delivering a rapid return on investment for diverse industries.

Implement Aspen Mtell in your organization today to transform asset management and drive operational excellence with confidence.

Contact us to speak with an AspenTech representative.

About AspenTech

Aspen Technology, Inc. (NASDAQ:AZPN) 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 capital-intensive industries can run their assets safer, greener, longer and faster to improve their profitability and operational excellence.

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