AVEVA

AVEVA™ Predictive Analytics uses the power of the PI System™ to add predictive maintenance to chemicals operations

How profitably could you run a chemical plant if you combined real-time and historical information from your PI Server with the artificial intelligence (AI) and machine learning-driven predictions found in AVEVA Predictive Analytics? How many critical asset failures could you prevent? How much could you improve the safety, reliability, and sustainability of your operations?

The integration of AVEVA Predictive Analytics with the PI System gives you advanced notice of potential asset failures before they occur, enabling your personnel to proactively assess equipment and schedule maintenance activities during planned downtime. AVEVA Predictive Analytics helps you streamline asset performance, increase reliability, and achieve operational excellence.
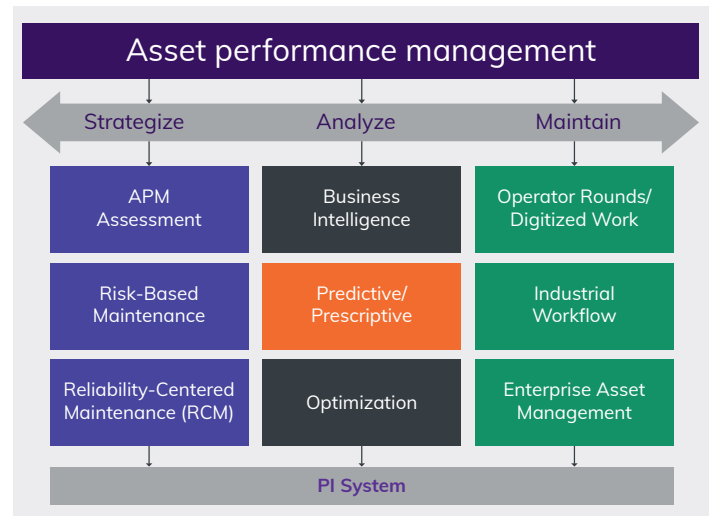
Achieve asset excellence

Improving reliability, performance, and safety are among the top priorities of chemical plants and other asset-intensive organizations. Businesses focus their efforts and resources on controlling costs and maximizing the value of existing investments. AVEVA Predictive Analytics helps organizations gain the highest return on critical assets by supporting predictive maintenance (PdM) programs with early warning and diagnosis of issues before operational alarms occur or assets fail.

When you combine the information stored in your PI Server with prediction-based analytics, sensors communicate ever-increasing amounts of data in real-time to give you contextual information about the health and performance of your equipment. Quickly transform raw data into actionable insights to prevent equipment failure and make smart maintenance decisions. Equipment agnostic, the software can be configured to monitor assets regardless of equipment type, vendor, or asset age, without the need for OEM-specific asset information.

Asset performance management functional view

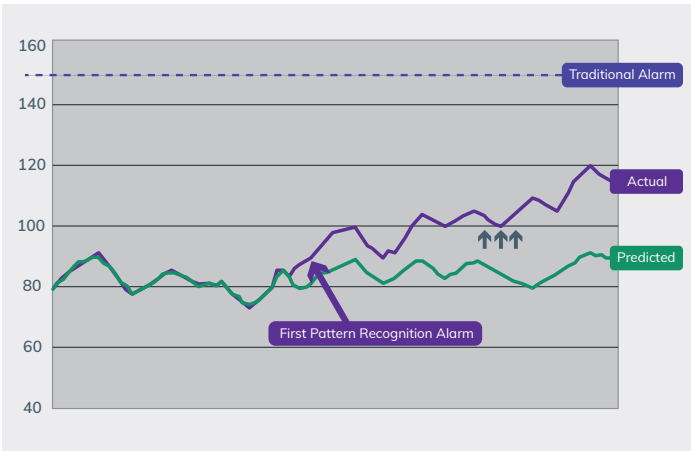| Asset performance management		
Strategize	Analyze	Maintain
APM Assessment	Business Intelligence	Operator Rounds/ Digitized Work
Risk-Based Maintenance	Predictive/ Prescriptive	Industrial Workflow
Reliability-Centered Maintenance (RCM)	Optimization	Enterprise Asset Management
PI System		

AVEVA Predictive Analytics integrates with your existing PI Server for condition-based maintenance to form the industrial analytics toolset for a comprehensive Asset Performance Management program.

Sensor data from your rotating equipment have correlated readings like revolutions per minute (RPM), bearing temperature, vibration and load readings, hot/cold stream outlet temperature, process flow-rate, and heat exchanger temperature.

By combining the data stored in your PI Server with AVEVA Predictive Analytics, you can use built-in artificial intelligence and machine learning to automatically identify anomalous behavior or highlight efficiency loss in assets months before a failure occurs; all without writing a single line of software code. This provides you with advanced warning and early notification to proactively inspect assets and avoid equipment failure that you otherwise might not have identified.

AVEVA Predictive Analytics overview

With native integration to your existing PI Server, AVEVA Predictive Analytics allows users to quickly use the data they already have to develop a predictive and prescriptive maintenance practice within their organization – without the need for a data scientist and software development.

The success of any predictive analytics solution depends on the algorithmic approach, as well as its ability to be operationalized within your business at scale. It's the no-code, purpose-built solution approach that enables companies to deploy and sustain a predictive monitoring program across the enterprise. Use powerful models to learn an asset's unique operating profile during all loading, feed processing modes, ambient, and operational process conditions.

Chart showing values from 40 to 160. Lines labeled "Traditional Alarm" (dashed, at ~150), "Actual" (purple), "Predicted" (green). Labels: "First Pattern Recognition Alarm" with arrow, and three upward arrows ↑↑↑.

AVEVA Predictive Analytics learns an asset's unique operating profile to clearly identify minor changes in its operation before fixed operational alerts are triggered

Existing equipment sensor data is input into the software's advanced modeling process and compared to real-time operating data to determine subtle deviations from expected equipment behavior and give alerts based on the information. Once an issue has been identified, the software can assist in root cause analysis and fault diagnostics, providing prescriptive actions to remedy the problem as quickly as possible.

AVEVA Predictive Analytics uses patented OPTiCS technology based on AI and machine learning to provide early warning identification and diagnosis of equipment reliability and performance problems. For assets and systems that lack the full history for a training data set, KANN artificial neural network technology helps infer behavior so the solution can still be applied across a wide spectrum of assets and use cases.

AVEVA Predictive Analytics is part of a comprehensive portfolio of Asset Performance Management solutions that operationalize improved processes and maintenance strategies.

As your personnel inspect equipment before failure, they may spot other correlations, like a harsh environment, that lead to faster equipment degradation.

The combination of early warning detection and fault diagnostics with prescriptive guidance results in optimized maintenance planning and execution, and more profitable operations.

AVEVA Predictive Analytics helps chemicals enterprises reduce equipment downtime, increase reliability, and improve performance while reducing operations and maintenance expenditures.
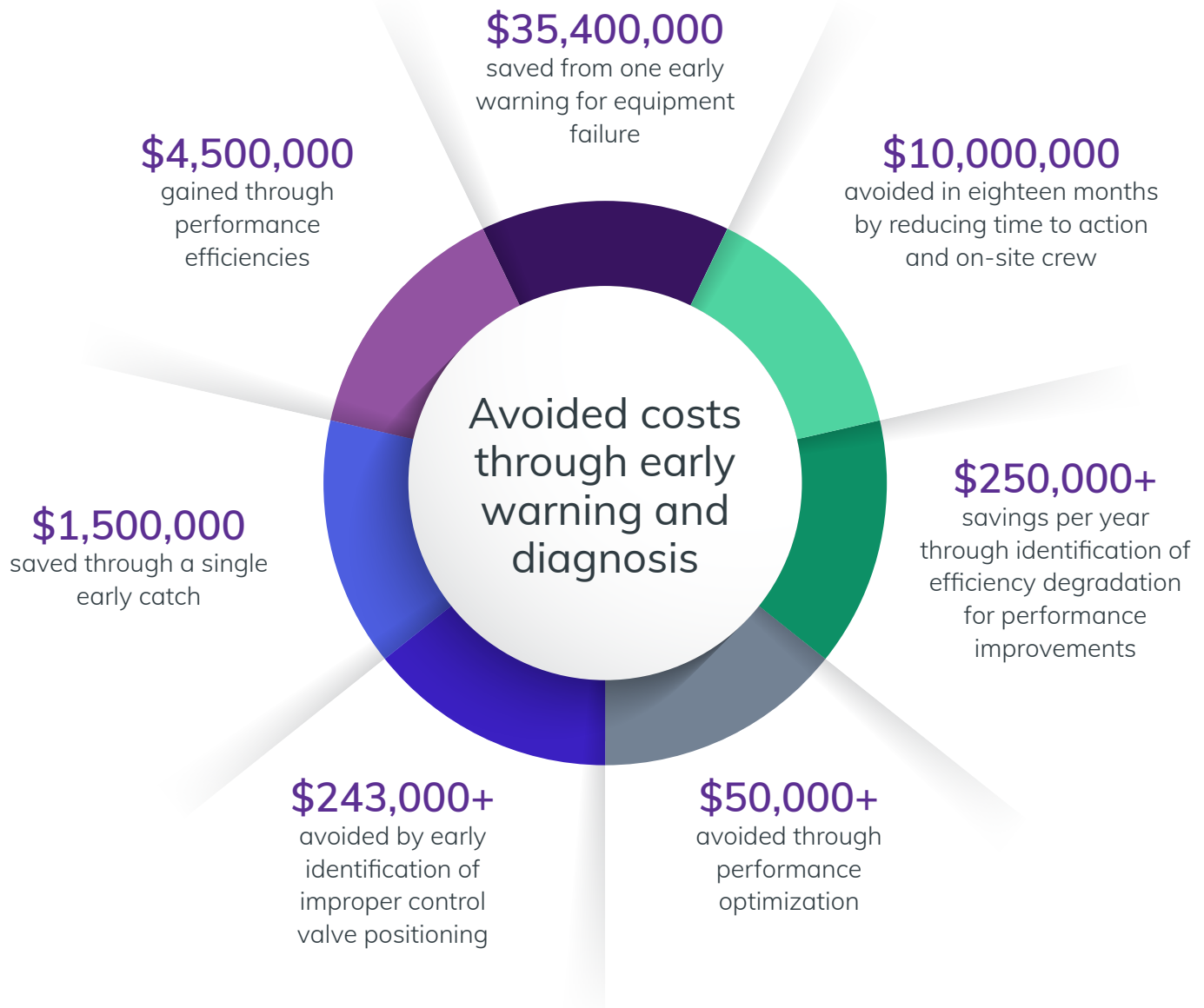
With predictive models, teams know and understand actual and expected performance for an asset's current operational state. They know where to find inefficiencies and what impact they have on financial performance. Teams can use this information to understand the impact of performance deficiencies on current and future operations. This information also helps assess the risks and potential consequences associated with each monitored asset, which is used to better prioritize capital and operational expenditures.

Another increasingly important benefit is knowledge capture and transfer. AVEVA's software helps ensure that maintenance decisions and processes are repeatable even when organizations are faced with transitioning workforces.

The AVEVA Predictive Analytics advantage

1. Reduce unscheduled downtime
2. Prevent equipment failures
3. Reduce maintenance costs
4. Increase asset utilization
5. Extend equipment life
6. Identify underperforming assets
7. Improve safety
8. Optimize maintenance planning and execution

Reduce OPEX by 10-20%

$35,400,000
saved from one early warning for equipment failure

$4,500,000
gained through performance efficiencies

$10,000,000
avoided in eighteen months by reducing time to action and on-site crew

$1,500,000
saved through a single early catch

Avoided costs through early warning and diagnosis

$250,000+
savings per year through identification of efficiency degradation for performance improvements

$243,000+
avoided by early identification of improper control valve positioning

$50,000+
avoided through performance optimization

Software features

AVEVA Predictive Analytics offers native integration to your existing PI Server. The software can be deployed on-premises or in the cloud. The system is highly scalable and can be used to monitor a single asset, a specific plant, or thousands of remote assets across many sites.

Results from models can be easily integrated with other business systems using industry-standard integration approaches.

Prescriptive actions

Provide users with prescriptive actions to mitigate a potential failure. When an alert is triggered, prescriptive actions are included to mitigate the potential failure. Prescriptive actions empower the workforce to execute predefined guidance when addressing asset maintenance and performance issues, resulting in improved decision-making and consistency in how issues are investigated, managed, and resolved.

Asset remaining useful life

AVEVA Predictive Analytics uses deep learning to forecast the remaining useful life of assets, providing actionable insight into operations and maintenance risks. Operations and maintenance teams use this information to determine whether it is possible to operate the asset until the next planned maintenance outage, or if an urgent shutdown is required. This enables plant personnel to be more effective in scheduling maintenance and assessing risk to maximize safety and profitability.

Native PI Server integration

AVEVA Predictive Analytics natively integrates with the PI Server data archive, utilizing native tag search and real-time and historical data retrieval. You can write predictive values back to the PI Server for use in calculations – specifically for asset analytics, event frames, and notifications.

Intuitive model building

You don't have to be a data scientist or software developer to develop, validate, and deploy predictive models. The software uses a no-code, intuitive user interface to develop predictive models for your existing assets. Model templates provide fast deployment and simplified maintenance of predictive models for common assets at a site or across the enterprise. Playback provides the ability to fully validate and optimize predictive models before they are deployed.

Alerts and notifications

Alerts are configured to provide early warning indications when an asset's current operation deviates from its learned asset signature. Alerts provide clear indication of the assets that require further investigation and remediation, and quickly links users to diagnostic and prognostic information. Notifications can be configured to proactively notify users of alert conditions.

AVEVA Predictive Analytics is used to monitor 35,000+ assets globally.

Sample assets monitored:

- Kettles
- Tanks
- Vacuum Pans
- Agitators
- High Shear Mixers
- Fluid Transfer
- Mixers
- Blenders
- Compressors
- Distillation Columns
- Reactors
- Turbines
- Heat Exchangers
- Gas Turbines
- Steam Turbines
- Heating Furnaces
- Pumps
- Motors

Data analysis

Add advanced statistical and model-based comparison applications and business intelligence tools that enable users to spend less time searching for potential problems. Users can view raw training data and the results of the model, compare performance of similar assets of the same type, and view the effects of alerts. Statistical applications interpret data using visual representations, so data scientists and equipment experts are not required to interpret the results.

Fault diagnostics

Fault diagnostics provide a clear indication of how well the current condition of the asset matches common failure modes for the asset type. This enables timely, consistent analysis of alert conditions so that problems can be rapidly diagnosed and acted upon. This reduces the likelihood that an engineer will attribute an abnormal operating condition to the wrong cause.

Transient module

The transient module enables online monitoring of abnormal conditions during a transient event such as turbine startups and shutdowns. AVEVA Predictive Analytics automatically identifies previous transient events from historical data, which is useful for comparisons.

Calculation engine

The software includes an advanced calculation engine that provides the ability to develop simple and complex calculations to create virtual points. The results of these calculations are used in the models, allowing greater system flexibility. The calculations automatically back-calculate, making historical data available for the monitoring period before the current calculation was created.

Cybersecurity

The safety and security of your data is our top priority. As an established leader with more than 50 years' experience delivering industrial software solutions, we recognize that your data demands a stringent cybersecurity posture and the highest operational standards.

AVEVA Predictive Analytics software integrates with existing enterprise security systems. The system supports single sign-on authentication, and administrators can limit user access rights and editing privileges at a granular level.

Case management

Provide an integrated case management solution to actively manage and track predictive machine alerts from inception to resolution for the entire lifecycle of an asset. Cases can be assigned to responsible team members and compared with previous cases for the same or similar assets to aid in root cause analysis and remediation. The case management solution enables knowledge transfer through the structured capture of problem analysis and resolution by your most experienced team members to accelerate knowledge transition to the next-generation workforce.

Operational scale

Operationalizing and scaling AI and machine learning projects can be the difference between the success and failure of a monitoring and diagnostic center. AVEVA Predictive Analytics has all the built-in and ready-to-deploy features that accelerate your time to value, including:

- Model templates and validation
- Alert management
- Fault diagnostics
- Prescriptive analytics
- Known failure modes and remediation steps
- Asset comparison and reporting
- Remaining useful life
- Integrated alert workflow

Additional products

AVEVA offers a comprehensive portfolio of software solutions that integrate with AVEVA Predictive Analytics, including mobile applications, condition management systems, reliability-centered maintenance software, and more.

AVEVA™ Asset Strategy Library

By combining PI System data and predefined asset templates, an asset performance management strategy can be deployed up to 90% faster. The AVEVA Asset Strategy Library contains known failure mode data and preventive maintenance procedures for the most commonly found asset types, including:

- 1,000 components
- 1,500 known failure causes with failure conditions
- 2,000 preventive maintenance tasks
- 5,000 prescriptive tasks
- 20 years and 22,000 person-years of experience

AVEVA™ Asset Information Management

AVEVA Asset Information Management turns data from multiple information sources and systems into trusted, actionable insights, identifying and cross-referencing all the relationships between equipment, documents, drawings, and various data formats to create a 360-degree digital twin of physical assets.

AVEVA™ Unified Operations Center

AVEVA Unified Operations Center empowers your team with a centralized view to help make informed decisions quickly. Out-of-the-box industry solution templates, reports, dashboards, and operational key performance indicators seamlessly unify your functional teams, departments, and sites under one platform. Organizations can expect faster time-to-value with AVEVA Unified Operations Center.

AVEVA™ Mobile Operator

AVEVA Mobile Operator equips field workers with the information they need to make tough decisions on the spot using ruggedized handhelds or commercially available off-the-shelf mobile devices. Operators are provided access to details such as operations and maintenance procedures, equipment diagrams, and operating history. This helps decrease asset failures, improve plant productivity, increase safety and situational awareness, and improve visibility into regulatory compliance.

AVEVA™ Insight

AVEVA Insight simplifies the complex. It makes asset performance, overall equipment effectiveness reporting, big data, and analytics easy. AVEVA Insight is a cloud-based solution that provides contextual information to enable your team to easily manage your operations and assets from anywhere, any time.

Monitoring and Diagnostic Service Center

Reduce maintenance costs and capital expenditures with our Monitoring and Diagnostics Services Center for remote monitoring of your industrial assets as a service.

AVEVA™ Asset Strategy Optimization

AVEVA Asset Strategy Optimization maximizes return on investment by generating optimized maintenance and spare parts strategies. To accomplish this, it analyzes business strategy, then prioritizes actions down to an individual asset level.

AVEVA™ APM Assessment

AVEVA APM Assessment offers clear understanding of the current status of the business and where improvement opportunities will provide the quickest financial return, resulting in a comprehensive action plan to execute against.

AVEVA™ Operational Safety Management

Plan and perform safe, compliant work on complex engineering assets. AVEVA Operational Safety Management eliminates, minimizes, or mitigates operational risk while optimizing asset performance. AVEVA Operational Safety Management provides risk assessment, work permitting management, work activity plotting, isolation planning and execution, safe job analysis, and lessons- learned reporting to reduce operating risk and maximize workforce safety.

For more information, visit: aveva.com/en/products/predictive-analytics

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