Taking the Next Step in your Digital Journey

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• “Quo Vadis?”
• Predictive + Prescriptive Maintenance
• Integration with AVEVA™ PI System™
• Next Steps in your Digital Journey – AI at AVEVA

“AI & ML-based analytics using AVEVA PI System”
“Quo Vadis?”

“OK, I have a great PI implementation, where do I go now?”
Optimize your asset reliability, maintenance and performance

A journey in operational reliability with AVEVA PI System and AVEVA Predictive Analytics

**Failure patterns**

- Age-related failure
- Random failure

82% Predictive technology For early warnings

18% Reactive and Preventive programs

**It’s a journey**

- Reactive Maintenance
- Preventive Maintenance
- Condition-Based Maintenance
- Predictive + Prescriptive Maintenance
- Risk-Based Maintenance
- AVEVA Asset Strategy Optimization
- AVEVA Predictive Analytics
- AVEVA PI System
- EAM/CMMS
- Run to failure

ARC studies show only 18% of asset failure is age-related. Based on these data, preventive maintenance provides a benefit for just 18 percent of assets, and monitoring for predictive maintenance is a recommended option for the rest.


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Predictive + Prescriptive Maintenance

Avoiding downtime and optimizing operating costs
Real AI, real results

Predictive failure detection for business-critical equipment

• No code AI and machine learning
• Advanced alert and case management for knowledge capture and reporting
• Data playback capability for testing models
• Templates accelerate configuration, deployment and scale-up

It’s the way you operationalize and scale AI for industrial operations
Monitoring without predictive analytics
Monitoring approach

Traditional Monitoring

- Constant alert/alarm limits are typical
- Damage accumulates prior to reaching limit

Predictive Asset Monitoring

- Actual minus estimated (residual) signal detects anomaly as-soon-as-possible
Theory underlying predictive analytics

Foundation for AVEVA solutions

- Uses historical data to describe how a piece of equipment normally operates and build a model (*patented AI algorithm for optimized results*)
- Continuously monitors behavior in real-time
- Alerts when the operation differs from the historical norm
- Early warning detection of equipment problems
- Advanced analysis capabilities including problem identification and root cause analysis
Deep and clear predictive analysis

An anomaly was detected. What are the next steps?

- Overall anomaly score trending
- Individual sensor deviations trending
- Sensor contribution score to anomaly
- Diagnostics on sensor deviation signature
- Ranking of potential faults
- Fault match trending
- Prescriptive guidance for remediation
- Forecasting for time until failure
- Case tracking from alert inception until remediation
Best in class fault diagnostics

- Vizualisation and representation of fault diagnostics including fault trees for deeper insights
- Probability on failure modes
- Remediating actions with prescriptive analytics
Fault tree visualization

- Vizualisation and representation of fault diagnostics including fault trees for deeper insights
- Probability on failure modes
- Remediating actions with prescriptive analytics
Time to failure forecast

Data driven decisions

• Determine the risk level of an operating asset and urgency for actioning the predictive alerts

• Estimate time to repair or replacement under current operating conditions
Comprehensive case management

Knowledge management for continuous improvement

• See predictive trends to cases
• Make better and faster decisions with increased access to information
• Highlight relevant cases when investigating fault diagnostics
• Integrate the learnings of past anomalies with user activities
• Visualize trends
• Capture knowledge and best practices
• Track actions (who, what, when)
Bring your own algorithm

Add value to current investments

Data scientists can create and deploy customized predictive algorithms to add value to the pre-built features of AVEVA Predictive Analytics.

• Pre-built model templates
• Automated model building
• Model back testing and validation
• Alert workflow
• Fault diagnostics
• Prescriptive actions
• Case management
• Time to failure forecasting
Operational scale matters

Predictive monitoring at scale

AI/Machine learning is the easy part

Operationalizing at scale is the difference between success or failure
Automated model building

Deployment at scale for fast time to value

- Minimize manual work
- Model templating
- Automatic cleansing of the training data
- Automatically include filters, alert thresholds, and fault diagnostics
- Integration to PI Asset Framework or existing historian

- Minimize errors
- Ensure consistency
- Increase labor productivity
Integration with AVEVA™ PI System™
Deep integration with AVEVA™ PI System™

- Visibility to more people, integration of content to AVEVA PI Vision
- Predictive Analytics results integrated into AVEVA PI System for contextualized insights
- Integration with PI Server’s asset framework enables more efficient model building
Effective enterprise data modelling

Predictive Analytics is integrated with Asset Framework

Weather Conditions
Relative Humidity: 34%
Current Temp: 85 F
High: 92
Low: 57 F
Wind: 8 mph/N

DAILY PRODUCTION
Planned – 112.8 kbbl
Forecast – 119 kbbl

Crude Furnace
Draft Pressure: -0.5 WC
Stack Temp: 316 F
Oxygen: 2.5%
Outlet Temp: 840 F
Cold Oil Velocity: 6 ft/sec

Alert!
Pump needs servicing in next 72 hours
AVEVA™ PI System™ + AVEVA™ Predictive Analytics

Air Liquide
- Air Liquide uses AVEVA for 50% Predict digital transformation program
- Artificial intelligence based predictive analytics for early warning, notification and diagnosis of equipment and process problems

Total
- Total uses AVEVA for centralized predictive asset health and performance monitoring of assets
- Artificial intelligence based predictive analytics for early warning notification and diagnosis of equipment and process problems

BASF
- BASF uses AVEVA for digital transformation initiative
- Artificial intelligence based predictive analytics for early warning notification and diagnosis of equipment and process problems and augmented reality

International Paper
- The Mill of the Future
- Putting data governance to work
- Streamline and improve performance, and accelerate sound and real-time decision making

Duke Energy
- Duke Energy uses AVEVA for predictive fleet asset health and performance monitoring
- Enabling $100M millions saving
- Early warning identification and diagnosis of equipment problems – improved reliability and performance

Rio Tinto
- Provide advanced early warning notification and diagnosis of equipment problems and failures
- Savings of $40M in motor failure cost avoidance $12M (USD)
- $2M in maintenance cost avoidance $234K (USD) in 72 hours of downtime
- Rail mill maintenance cost avoidance $14M (USD)

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Next Steps in your Digital Journey – AI at AVEVA
Artificial intelligence across AVEVA’s portfolio

Predictive Performance
Prescriptive Prognostic Perceptive

17 commercially released AI products

- Automated Analytics
- Guided Analytics
- Predictive Analytics/Maintenance
- Asset Prescriptive Analytics
- Process Optimization
- Predictive Quality/Throughput (batch)
- Remaining Useful Life Estimation (RULE)
- Predictive Asset Optimization (PAO)
- Schedule AI Assistant
- Realtime Crude
- AI-infused Process Simulation
- AI-infused Dynamic Simulation
- E3D Whitespace Optimizer
- E3D Suggestive Design Framework
- Point Cloud Manager
- Advanced Process Control (APC)
- InSight OMI App (native integration with System Platform SCADA)
- AI inferencing
- Vision AI Assistant
- Knowledge Linking
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