HONEYWELL FORGE

ASSET PERFORMANCE MANAGEMENT

PRODUCT INFORMATION NOTE

> A real-time machinery analytics solution that continuously monitors asset and process performance, detects impending health issues, and predicts time to failure. It helps industrial facilities reveal opportunities for performance improvement and expedites analysis toward root cause of inefficiencies or impending issues.

What is Enterprise Performance Management?

EPM is a set of tools that collect, unify, and take action on operational data to optimize performance, sustainability, and safety at the enterprise level.

CHALLENGES

Plant owners are responsible for maintaining the highest standards of safety and productivity at all times; however, they often encounter many other day-to-day challenges such as the need to:

- Increase employee productivity
- Improve communication
- Reduce costs
- Maximized ROI on investments
- Manage skill gaps in the changing workforce

While these concerns aren't new, the focus and urgency has been increasing at an escalated rate. Instability of commodity prices, increasing retirements, tightening of headcount and the continued focus on quarterly results have affected the way we manage our facilities, our people, our technology and our budgets. From digital transformation to the rise of robotic support systems, one thing is clear: innovation and the adoption of technology are the essential building blocks for success.

SOLUTIONS

Honeywell Forge Asset Performance Management is part of the suite of industrial-focused products in Honeywell Forge, an Enterprise Performance Management tool. Honeywell Connected Industrials provides solutions that enable our customers to leverage their investments across multiple domains within their site. Whether it's finding ways to increase production performance or reduce the cost of operations associated with unplanned downtimes and inefficient energy use, Honeywell has a solution.

Honeywell Forge Asset Performance Management goes beyond traditional machine monitoring and data gathering. By merging together decades of machine modeling with modern cloud analytics, Honeywell digital twins predict machinery availability, drill to the root cause of inefficient machine operation, and bring order to reliability and maintenance planning.

FEATURES AND CAPABILITIES

Data Collection & Processing

- OPC, Real-Time Data, Historical Data, and Events
- Relational Data (lab data, oil analysis, transactional)
- Excel Reports
- Data Cleansing and Validation

Performance Models & Data Analytics

- Advanced Thermodynamic Performance Models
- Advanced Patter Recognition & Machine Learning Models
- Fault-Symptom Models
- Process Data Analytics

Contextualization & Visualization

- Comprehensive Plant Health Dashboard
- Tree & Heat Mapping
- Data & KPI trending
- Prediction & RUL Trending
- Asset Performance Curves

Event Management

- Event Monitor & Grid
- Event Fault Tree
- Fault Reports
- E-mail Notifications
- CMMS Connectivity & Work Order Requests
- Operator Alerts/Advisors

Technologies

- HTML 5 Thin Client
- Multi-Browser Compatibility
- Complex Event Processing
- SSL Support
- SDX Secure Data
- Matrikon OPC

Drawing from over a century of patents and technology that underpin the reliable and safe operation of machines and processes operating continuously throughout the world, Honeywell Forge APM software extracts even greater value from machinery by connecting it with the power of cloud computing and data analytic technologies, including:

Integration of Disparate Data Systems:
Honeywell Forge APM enables unification of asset and process data from various sources and organizes it within a cyber-secure cloud environment. From the Honeywell cloud or a client's cloud, machine specific and big data analytics deliver the earliest detection of impending machinery problems, root-causes, and aid prioritization of asset maintenance and corrective actions.

Infinitely Scalable APM Capability:
Scalable from unit, to site, to the extents of the organization's enterprise – anywhere in the world. Cloud-based asset performance management delivers continuous access and insight from a centralized vantage point. This affords collaboration beyond localized APM teams and facilitates global virtual collaboration by all plant equipment stakeholders.

Advanced Performance Models:
An advanced performance library provides predefined first principles models and templates for pumps, compressors, gas and steam turbines, heat exchangers and other common plant process equipment. These models determine variation of predicted performance versus actual performance in real-time.

Performance models are implemented from a broad library of pre-developed templates. Dozens of machine models have been developed by Honeywell machine and process experts. Plant personnel can leverage the standard models, or develop their own, to trigger pre-emptive event detection and drive prescriptive decision workflow.

Data-Driven Analytic Models:
Honeywell Forge APM augments traditional performance analysis with descriptive, predictive and prescriptive analytics. To predict equipment failure, data-driven algorithms analyze the behavior of a group of historical parameters to estimate time to failure – e.g. predict rate of heat exchanger fouling. Honeywell Forge APM automatically cleanses data of corrupt or inaccurate information before application of analytic models.

HIGHLY ADAPTABLE TO SERVE NEEDS ACROSS INDUSTRIES AND APPLICATIONS

	REFINING & PETROCHEMICALS	O&G PRODUCTION	MINING & METALS	POWER GENERATION
CENTRIFUGAL PUMPS	✓	✓	✓	✓
HEAT EXCHANGES	✓	✓	✓	✓
ELECTRIC MOTORS	✓	✓	✓	✓
VALVES	✓	✓	✓	✓
TURBO & RECIPROCATING COMPRESSORS	✓	✓	✓	
FURNACES	✓		✓	✓
GAS & TEAM TURBINES	✓	✓		✓
FANS & BLOWERS	✓	✓	✓	
HAUL TRUCKS, EXCAVATORS, SHOVELS			✓	
CRUSHERS, DRILLS, DOZERS			✓	
REACTOR COLUMNS	✓			
OXIDIZERS	✓			
ESP's (Electric Submersible Pumps)		✓	✓	

How does a traditional equipment condition monitoring system differ from Honeywell Forge APM?

Condition monitoring solutions typically focus solely on an equipment's physical condition. Moreover, many condition monitoring systems are configured to only perform machine protection, which means it is focused on shutting the machine down when high vibration is reached. Many condition monitoring systems do not have diagnostic capability. It may not be available, or it was an expensive option never purchased.

Honeywell Forge APM is primarily focused on early detection and diagnostics of both equipment health and performance (energy efficiency). It uses performance degradation as a leading indicator of potential equipment problems and machine learning analytics to recognize early indicators of physical health degradation.

Honeywell Forge APM can bring data from various systems, including existing condition monitoring systems like a vibration monitoring system, as well as Historians, LIMS, a loop monitoring system and other forms of available plant data.

Interactive Calculation Engine:

From basic to the most complex calculation needs, users can quickly define the signs to look for in detecting problems. Calculations can be scheduled or run in real-time. Likewise, plant personnel or delegates can evolve the system's predictive capabilities through optional data science tools (e.g. Python and SureSense), the standard Honeywell script language, or import their own C# code.

User defined calculations may be entered using the Honeywell scripting language, which is simplified for use by engineers rather than programmers. From basic to the most complex processing, users can quickly embed site knowledge based on known signs to look for in detecting machine or process issues. Calculations can be scheduled or run in real-time for high-resolution tracking as input data changes.

Both simple mathematical operations and advanced functions, like regression analysis and statistical standard deviation, are supported. The practical applications of these functions are wide ranging and provide a highly flexible environment for customizing asset monitoring to meet specific plant needs.

Event Detection:

A flexible rules environment supports FMEA and RCA logic to detect conditions contributing to degraded machine health or performance. Detection rules may be simple thresholds, statistical correlation changes, learned patterns, or predicted model-based deviations.

Data Cleansing:

Honeywell Forge APM automatically compensates for corrupt, inaccurate, or missing data. This ensures monitoring and analysis is performed on reliable data. Likewise, users have the flexibility to modify rules or create their own cleansing routines.

Automatic Unit Conversion:

Ensures engineering units from source systems are converted automatically to suit engineering units in the asset models.

Custom Code:

Allows for embedding equations and logic written in C#. This environment allows OEMs and others to develop content that will not be exposed and supports very complex and specialized applications.

Runtime Engine:

This feature allows for real-time execution of design models to meet dynamic process monitoring needs, including monitoring column flooding or separation efficiencies.

Thermodynamic Property Package:

This extensive database of physical properties, transport properties and phase behaviors enable high-accuracy performance calculations. These support process modeling of distillation, reaction, heat transfer, rotating equipment, and logical operations in both steady state and dynamic environments.

Excel® Add-in:

The Excel add-in may be used to export data, reports or other customized information packets to Excel compatible files. Additionally, the add-in features the ability to execute formulas residing in an Excel file from the runtime engine.

Data Access:

Data is retrievable from a variety of sources:
- Real-time data from DCS/ PLCs via OPC DA
- Real-time alerts from DCS/PLCs via OPC A&E
- Historical (OPC HDA)
- Relational Data (i.e. lab data, oil analysis)
- Excel
- Other via flexible "plug-in" architecture

Process Data Analytics and Predictive Machine Learning augment traditional thermodynamic first principle models

Asset-Centric Naming Convention:

Asset model templates need only be created once for each equipment type. This asset-centric approach is facilitated by hiding underlying cryptic tag structures in typical DCS's and historians. A tag name like 03F2014.PV is instead referenced in Honeywell Forge APM based on the asset hierarchy, such as Plant1.FCCU.HeatEx100.InFlow. This user-friendly convention eliminates tedious tag-by-tag configuration for each piece of similar equipment and allows for efficient change management on calculations and logic configurations. This naming reference is also visible at the user interface to make attribute selection more intuitive during trending and display.
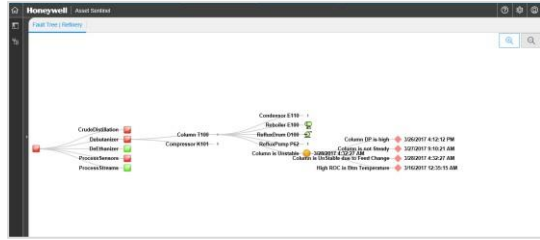
Tree & Heat Maps:

Allows users to rapidly drill-down to identify underlying problems, with troubleshooting displays to see the underlying fault logic. Users also have rapid access to the fault history, trends and graphic displays from the configurable tree and heat-maps.

Event Monitor:

Allows users to monitor and review all new events. From this display users can access the detailed event view for more information, launch event trends, or choose what to do with the event (accept, reject, or close).

Event Investigation:

Allows users to investigate, review, and update all the events that are accepted. Users may also lock the events or add comments to capture conclusion throughout the investigative process.

Fault Tree and Asset Status Heat Maps aid in quick identification of priority issues and aid prompt identification of root cause.

Summary

Honeywell Forge APM is a powerful, scalable cloud solution for managing all industrial assets across an enterprise. Forge APM provides the latest capabilities for serving a company's asset performance management initiatives – whether that initiative is to embark on a new asset management program (e.g. IIoT Digital Transformation and cloud hosted delivery model) or expand and transform an established condition monitoring system.

Forge APM integrates all plant data into a single database. By integrating process, asset and operational data, and constructing digital twins over the unified dataset, Forge APM delivers increased performance and reliability to all processes and assets – not just critical machines.

How does Honeywell Forge APM work with a CMMS?

A CMMS system like SAP® PM or IBM® Maximo helps manage maintenance activity through work orders, scheduling, maintenance reports and spares inventory tracking. However, it does not provide the early detection of maintenance needs.

Honeywell Forge APM continuously monitors for failing equipment health and performance degradation. Likewise, it provides the analysis tools to determine exactly what maintenance is required and within what timeframe. Honeywell Forge APM can link directly to a CMMS, therefore, when a health or performance event occurs, it can trigger the CMMS to start the process of maintenance activity.

In the absence of a dedicated CMMS, Honeywell Forge APM is highly configurable for many traditional CMMS functions.

Honeywell

Honeywell provides the data and analytic foundation needed to enable operational excellence. Honeywell is an industry leader in integrated solutions of Manufacturing Execution, Process Optimization and Asset Management Systems that improve plant profitability by enabling plant staff to work more effectively and make better decisions.

Calculation and Visualization applications help engineers combine process knowledge and plant data to analyze plant efficiency and identify trends.

Advanced Planning and Scheduling tools help planners and schedulers come up with optimal and feasible plans for a unit, plant or group of plants.

Blending and Movement Automation helps plan, control and track manufacturing performance for offsites, control optimum in-line blending and control material movements.

Asset Performance Management tools provide an objective view of machinery performance metrics and calculations.

Production Management tools track, determine and report production, material use and inventory.

Honeywell Forge APM Support Services

This product comes with worldwide, premium support services through our Benefits Guardianship Program (BGP). BGP is designed to help our customers improve and extend the usage of their applications and the benefits they deliver.

Honeywell provides a complete portfolio of service offerings to extend the life of your plant and provide a cost-effective path forward to the latest application technology. Honeywell services include:

- Software installation services
- On-site engineering services
- Migration services
- Scope expansion services
- Assessment services
- Performance baseline & tuning services
- Customized training

For More Information

Learn more about how Honeywell's Asset Performance Management can improve your asset reliability, visit Smarter Asset Performance Management or contact your Honeywell Account Manager.

Honeywell Connected Enterprise

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