HONEYWELL FORGE

ASSET PERFORMANCE MANAGEMENT FOR INDUSTRIALS

OVERVIEW

Honeywell Forge Asset Performance Management for Industrials is a SaaS-based solution combining performance monitoring with machine learning and predictive analytics. This solution is intended to monitor asset and process performance, detect potential impending health issues, and predict potential time to failure. It helps industrial facilities reveal opportunities for performance improvement and expedites analysis to assist in finding the root cause of inefficiencies or impending issues.

Honeywell Forge Asset Performance Management (APM) for Industrials is a solution that is designed to help aggregate data from assets and processes, making the data analyzable to uncover potential failures, provide recommendations on how to solve those hiccups, allowing the opportunity to bring assets and processes back to their established operational states faster.

Powered by Azure IoT Hub
Honeywell Forge APM for Industrials is implemented in the Azure IoT Hub: a scalable Azure IoT SaaS solution. Azure IoT Hub provides the secure and scalable cloud backend for this solution, with built-in analytics and machine learning that are highly configurable; no programming is required.

The Azure IoT Hub securely connects, monitors, authenticates, and aggregates data which is then processed through Azure App Service and Azure Kubernetes (to scale and manage docker containers) and stored in Azure Blob Storage. Powerful analytics are provided through Azure HDInsight. Power BI may be used to provide data visualization and dashboards.

Additional Azure tools may be used to complete the solution with enhanced analytics, real-time monitoring, machine learning, and integrations.

A Modular, Customized Solution
Honeywell Forge APM for Industrials provides a single, industrial-grade user interface to meet the needs of your operations and maintenance teams. It is a modular solution, so you can start small and scale depending on your needs.
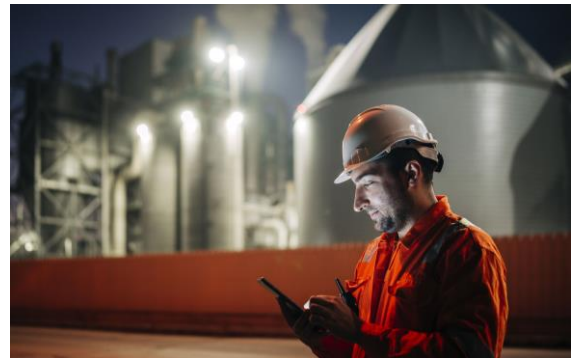
Predictive Asset Health Monitoring: This module is perfect for maintenance and reliability teams and monitors asset and instrument health, and corrosion operating window integrity. A wireless solution can be used to connecting equipment quickly. Near real-time monitoring of asset health is through an overarching dashboard covering the whole plant. It helps identify which assets are causing the most trouble, which assets deserve your attention at that moment based on priority and criticality of the potential failure, and provides intuitive root cause analysis workflows to investigate issues, confirm the causes and best next step recommendations to solve the situation.

It provides real-time monitoring of plant reliability, custom KPIs, and Overall Equipment Effectiveness. This module helps in predicting potential failures that could impact the health of equipment, uncover the main variables driving deviations from normal behavior and actions to take before they occur. Our state-of-the-art deep learning implementation allows us to identify never-before seen patterns, investigate and classify them, and ultimately ingest this new knowledge back into the model to make it smarter over time without needing a seasoned data scientist.

PREDICTIVE ASSET
HEALTH MONITORING
*Machine Learning Modules
& Rule-based diagnostics*

PERFORMANCE
OPTIMIZATION
*Predictive Performance
& Energy Calculations*

MAINTENANCE
STRATEGY
*Risk & Cost
Reduction*

A practical approach to accelerate time to value

Performance Optimization: This module is perfect for process engineers in charge of monitoring and maintaining production levels. They can use asset data to uncover assets that are underperforming either because of design or operational losses. The module allows identification of underlying causes of lower performance to address the situation and bring assets back to established performance goals. This includes identifying assets consuming high energy levels and recommendations on how to fix these events to comply with your energy and emissions standards and regulations.

Maintenance Strategy: Everything comes together by building on the previous modules to implement outcome-based optimizations for maintenance and cost reductions. It is the final step towards APM maturity. Honeywell provides guidance on how to reduce cost by further optimizing maintenance strategies. This includes optimizations using Failure Modes and Effects Analysis, criticality analysis, risk/cost analysis, and analysis of maintenance actions.

Foundational Asset library

Honeywell Forge APM for Industrials draws from a wealth of standard asset libraries and tools to integrate existing plant data sources.

An extensive **Advanced Performance Library** of hundreds of out-of-the-box first-principles asset models and templates quantifies machine efficiency (performance) and gives a leading indicator of process and/or asset health issues. Your teams compare current performance against predicted performance and highlight deviations.

This library is vendor-agnostic and extensible, allowing inclusion of in-house or OEM generated models including custom Python scripts. Engineering teams are empowered to interact and maintain these model

libraries without having to involve subject matter experts or data science teams. A **Standard Performance Library** provides a pre-defined set of performance equations and fault models that can be customized and enhanced for vital assets.

Three-Layer Asset Modeling

APM for Industrials is powered by a unique 3-layer, holistic asset modeling approach. The first layer of analytics monitors the health and performance of assets in near real-time. Mechanical health models correlate symptoms with faults in assets and instrumentation exposing causes, consequences, and potential corrective actions. Maintenance teams can quickly assess which assets require immediate attention based on criticality of the asset and severity of the fault. Intuitive root cause analysis workflows accelerate investigation of issues and provide clear next-step actions.

The second layer of analytics uses predictive capabilities to identify potential failures that could impact the health of critical equipment, uncover the main variables driving deviations from normal behavior, and enable informed corrective actions. Based on state-of-the-art machine learning, it allows identification of never-before seen patterns, their labeling, and incorporation back into the model by experts without previous experience in data science.

The third layer of analytics uses asset data to discover equipment that is underperforming either because of design or operational declines. It identifes underlying causes of low performance to address the situation and bring assets back to established KPIs. This includes assets consuming high energy levels and recommendations on improvements to comply with industry standards and regulations.

Combining asset libraries and holistic modeling, APM for Industrials deploys rapidly and detects impending issues earlier.
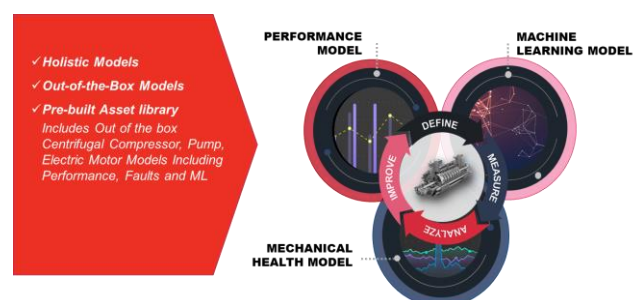
What Does APM for Industrials Deliver?

APM for Industrials is an enterprise-grade, near real-time analytics solution that monitors asset and process performance, detects impending health issues, and helps drive continuous improvement.

First, APM for Industrials provides surveillance over local and remotely located machinery and processes. It unifies plant asset and process data from various sources – including historians, machine condition monitoring and edge systems - and organizes it within a cyber-secure cloud environment or on-premises installation.

It integrates process and asset data into a single, unified dataset, and creates digital twins with advanced predictive analytics. Continuous data feeds the digital twins and drives real-time KPI calculations, event notifications, and on-demand report generation.

Machine learning and big data predictive analytics continuously quantify inefficiencies and detect earlier onset of reliability issues, impending equipment problems, and root-causes. This insight into potential machinery downtime aids planning and prioritization of asset maintenance and corrective actions.

The outcomes are that:

- Personnel stop wrangling raw data and cobbling reports. They are freed to analyze, improve, and control a wider range of asset and process improvement opportunities.

- Integrated process and asset models reveal root causes of bottlenecks, identify new levels of untapped productivity, and uncover potential EHS threats.
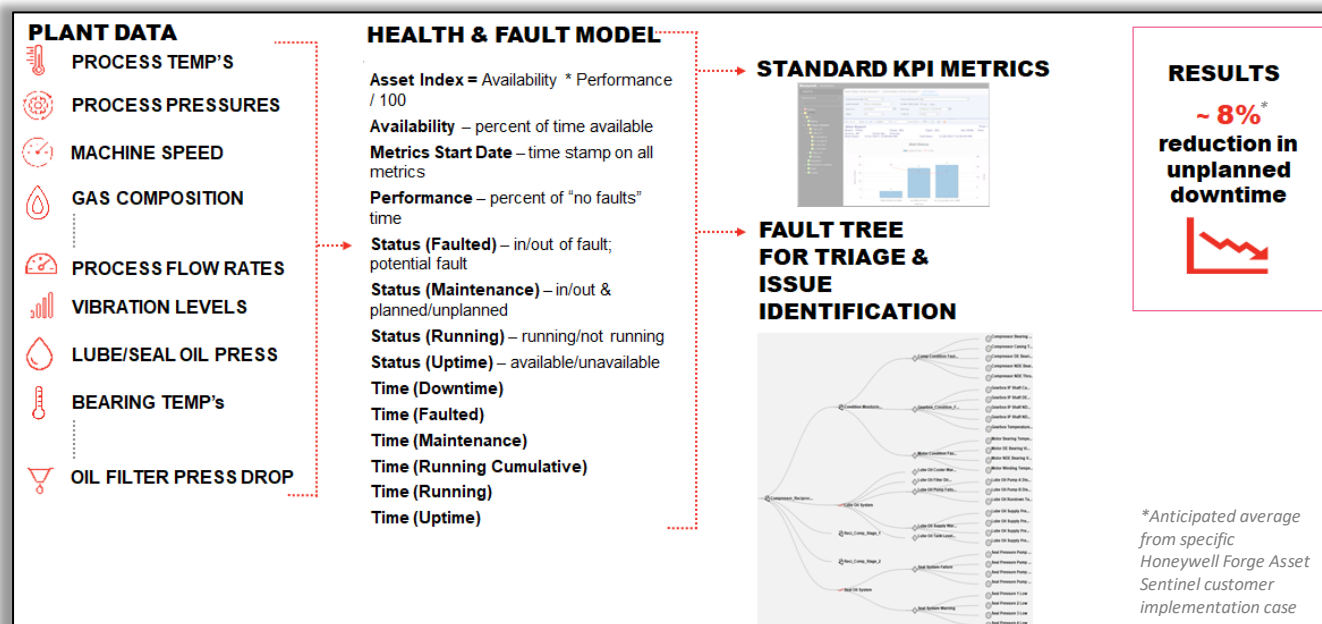
- The unified environment of data and KPI event generation establishes a common source for workflow in applying corrective actions among engineering, maintenance, and operations teams.

- APM for Industrials provides supplemental support to Safety, QMS, environmental and regulatory agendas.

The solution closes the loop between operations and management teams through the integration with CMMS and other ancillary enterprise systems. This automates work orders to trigger field inspections to investigate issues or start recommended maintenance activities.

The result is increased performance and reliability from both your assets and the processes the assets serve.

General value gained includes the following[2]:

- **Plant Availability / Reliability Improvement:**
  1-4% per year

- **Recurring Annual Savings:**
  $2-3M+ for small deployments.
  $7-10M+ for large deployments

- **People Productivity:**
  Waste elimination by up to 30% per week

- **Operation and Maintenance:**
  Cost reduction up to 10%

- **Efficiency Improvement:**
  Energy savings cost reduction by up to 5%

- **Increased Safety:**
  - Minimized risks by ensuring normal and stable operations,
  - Eliminated production stops for safety system verification

Anticipated average from specific Honeywell Forge Asset Sentinel customer implementation case

Features and Capabilities

Unlike traditional equipment condition monitoring systems, APM for Industrials focuses on early detection and diagnostics of both equipment health and performance. It uses performance degradation as a leading indicator of potential equipment problems and machine learning analytics to recognize early indicators of physical health degradation.

Infinitely Scalable APM Capability: Scalable from unit, to site, to the extents of the organization's enterprise – anywhere in the world. 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.

Data Access: APM for Industrials aggregates data variety of sources:
- Real-time data from DCS/ PLCs via OPC DA
- Real-time alerts from DCS/PLCs via OPC A&E
- Historical Data via OPC HDA
- Relational Data (i.e. lab data, oil analysis)
- CMMS, MEM, and other enterprise systems
- Excel
- Other via flexible "plug-in" architecture

Data Cleansing: Honeywell's APM for Industrials automatically compensates for corrupt, inaccurate, or missing data. This ensures monitoring and analysis are 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.

Persona-based Dashboards: APM for Industrials exposes the right level of relevant information depending on the user. Visualization dashboards are customized to serve the needs of operations and maintenance teams and are available on any computer or mobile device. The solution closes the loop between O&M teams through the integration with CMMS systems. This automates the generation of work orders to trigger field inspections to aid in the investigation of issues or start the process of recommended maintenance activities.

How Does APM Work with a CMMS?

A CMMS system such as 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.

APM for Industrials 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. APM for Industrials 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 for Industrials' highly configurable for many traditional CMMS functions.

End-To-End Visibility of Operations

1 Asset Hierarchy
APM for Industrials provides a holistic view of operations including geographically distributed sites and assets. Users can drill down through the different levels of the hierarchy to get detail information on the state of assets and components.

2 Plant Performance KPIs
APM for Industrials provides continuously tracked plant or site KPIs such as Overall Equipment Effectiveness or Uptime. This dashboard allows quick visualization of historical values and trends of plant performance.

3 Real-Time Event Visualization
Ongoing events are categorized based on the criticality of the asset and the severity of the failure. This visualization helps O&M teams prioritize activities based on the assets that require their attention the most and identify recurrent bad actors.

4 Prioritized Alarms and Events
APM for Industrials automatically prioritizes ongoing events identifying the causes, consequences, and recommended corrective actions. These automated workflows expedite the investigation of issues and trigger the required actions to bring assets back to optimal performance faster.

SUMMARY

APM for Industrials is practical APM at your fingertips. We can provide accelerated deployment of our solutions thanks to our embedded library of pre-built models that can be configured and validated in an accelerated fashion.

This allows you to extract value faster and in combination with our persona-centered user experience, the learning curve gets accelerated as well. Our intuitive, productive user interface shows what matters to the final users based on their role, but at the same time allows them to collaborate with the rest of the organization.

Under the hood, our patented, out-of-the-box modeling approach can extend lead times weeks in advance with a very low rate of false positives. It is also flexible enough to allow the incorporation of third-party models from OEMs or your own custom models.

- **25% Earlier Detection***
- **3 Layers of Analytics**
- **50% Fewer False Positives***

*Average results based on over 100 Honeywell Forge Asset Sentinel installations and over 50, 000 assets monitored globally across Honeywell Industrial customers for 2018-2019

Finally, our approach to APM allows us to close the loop with other parts of the organization. This includes not only integration with work order systems, but also with people in the field for the accelerated resolution of problems.

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.

For More Information

To learn more about Honeywell Forge APM, visit Asset Performance Management or contact your Honeywell Account Manager.

Honeywell Connected Enterprise

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