

A man with white hair and glasses is looking at a computer monitor in a control room. The room is filled with multiple monitors displaying data and charts. A white hard hat is on the desk in front of him. The background is slightly blurred, focusing on the man and his workstation.

ENTERPRISE-READY ASSET PERFORMANCE MANAGEMENT SOFTWARE (APM)

Maximize Operational Excellence

By leveraging GE Vernova's APM in the cloud, organizations can gain more value at scale. In collaboration with AWS, GE Vernova provides composable APM to fit your evolving requirements.



GE VERNOVA



BALANCE THE NEED

**Perform today while transforming
for tomorrow's net-zero future.**

You're facing mounting challenges. Employees with thousands of hours of deep expertise are leaving the workforce. Inflation continues to be volatile, and geopolitics heighten concerns around availability and security of energy. The scope of Environmental, Safety and Corporate Governance (ESG) strategy is expanding – and demonstrated action on decarbonization is necessary. Amid all this, the convergence of operational technology (OT) and information technology (IT) is happening, creating both conflict and an opportunity to mitigate these pressures with digital solutions.

Today's challenges in managing assets for reliable, safe, and efficient operations and meeting production and profitability targets will change over time. GE Vernova's industry-leading APM applications are built on a scalable, secure, and powerful platform that allows you the flexibility to deploy individually as separate modules or together, as an integrated enterprise solution. Plus, GE Vernova strategically collaborates with Amazon Web Services (AWS) helping make the OT and IT convergence easier than ever.

GE VERNOVA AND AWS COLLABORATION

GE Vernova's APM applications are built on a flexible, modular platform. This provides energy companies with the ability to scale software efficiently, whether as individual point solutions or as an integrated enterprise suite. Utilizing a microservices-based architecture backed by the elastic scaling nature of AWS, these composable, interoperable applications allow for independent scaling of services to precisely meet demand while ensuring proper monitoring coverage and accurate behavior.

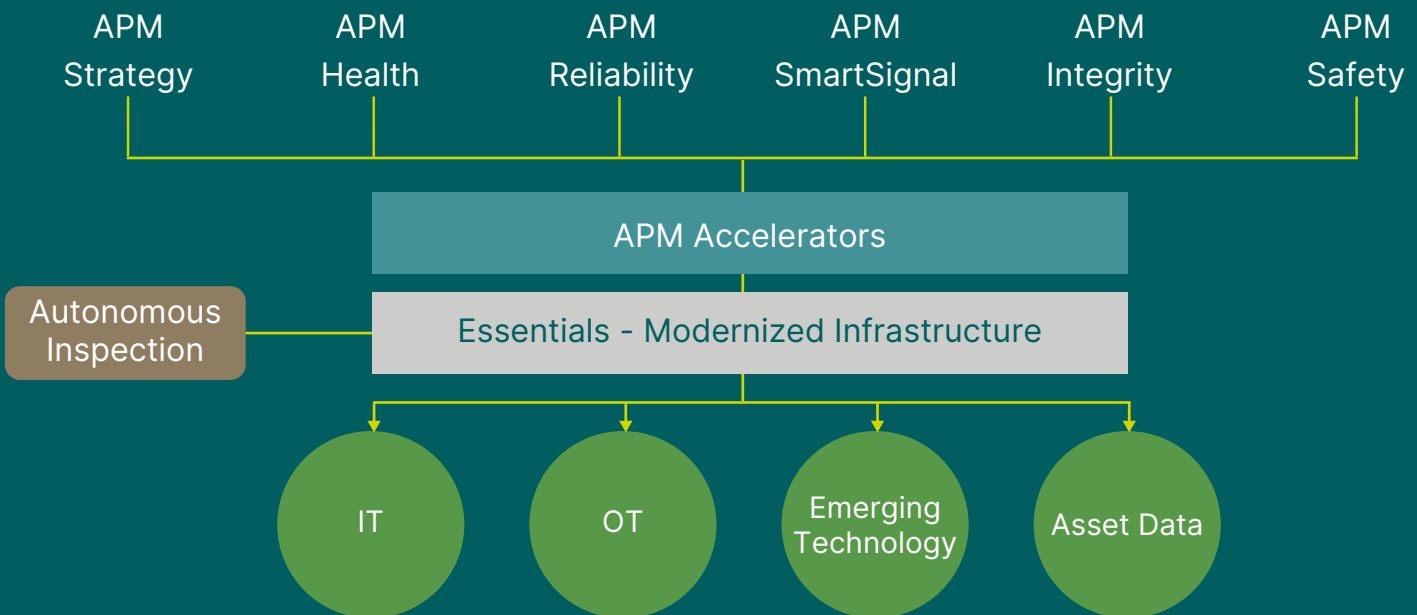
This collaboration combines GE Vernova's 130+ years of energy experience with AWS' advanced and secure cloud services and deep industry expertise across the energy, utilities, and sustainable energy sectors. With a broad energy partner ecosystem, AWS empowers energy leaders to improve performance, accelerate innovation, transform the customer experience, increase safety and security, and reduce their carbon footprint.

HOW GE VERNOVA'S APM SUPPORTS COMPOSABILITY AND INTEROPERABILITY

Driving composability with microservices-based architecture

GE Vernova's Asset Performance Management (APM) suite comprises several APM applications that are focused on different aspects of managing and optimizing assets' performance. The cloud-based APM applications are powered by the Essentials platform³, which employs an Elastic Kubernetes Service (EKS) on AWS Fargate⁴ architecture to support microservice use and delivery. In fact, both the Essentials platform and each APM application use some form of microservice to ensure flexibility, usability, and availability.

CONNECTED. MODERN. COMPOSABLE.



³ GE Vernova's APM on-premises applications are hosted on APM Foundations platform.

⁴ AWS Fargate is a serverless compute engine for running containerized applications.



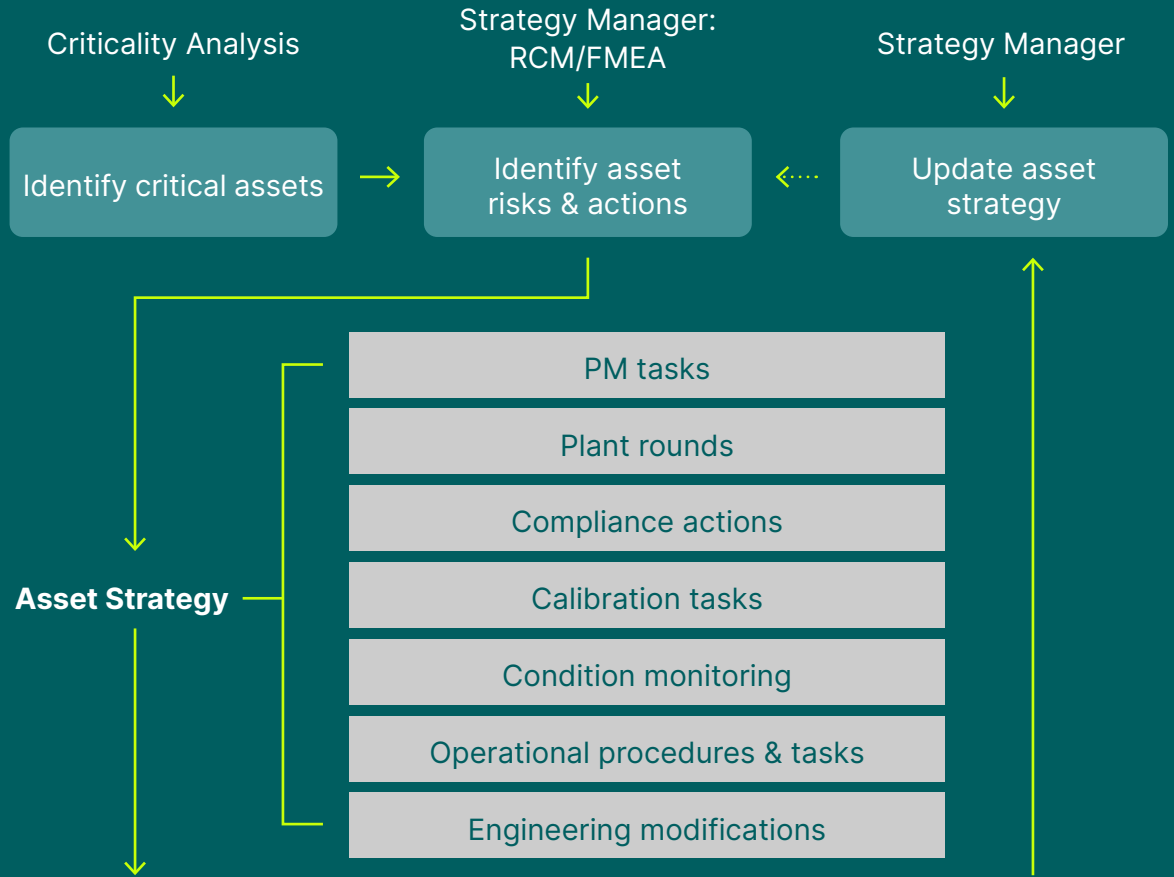
A recent survey of energy and materials industry professionals conducted by Reuters Events and GE Vernova found that they believe the energy transition is not possible without digital transformation. More than 85% of respondents also viewed composable software, which allows users to assemble components as needed, as more or equally valuable than point solutions.

The GE Vernova APM software suite consists of robust data-powered applications including Asset Strategies, Asset Health Monitoring, Reliability & Performance, and Mechanical Integrity, bolstered by Accelerators templates. The applications integrate to optimize asset management practices today and into the future.

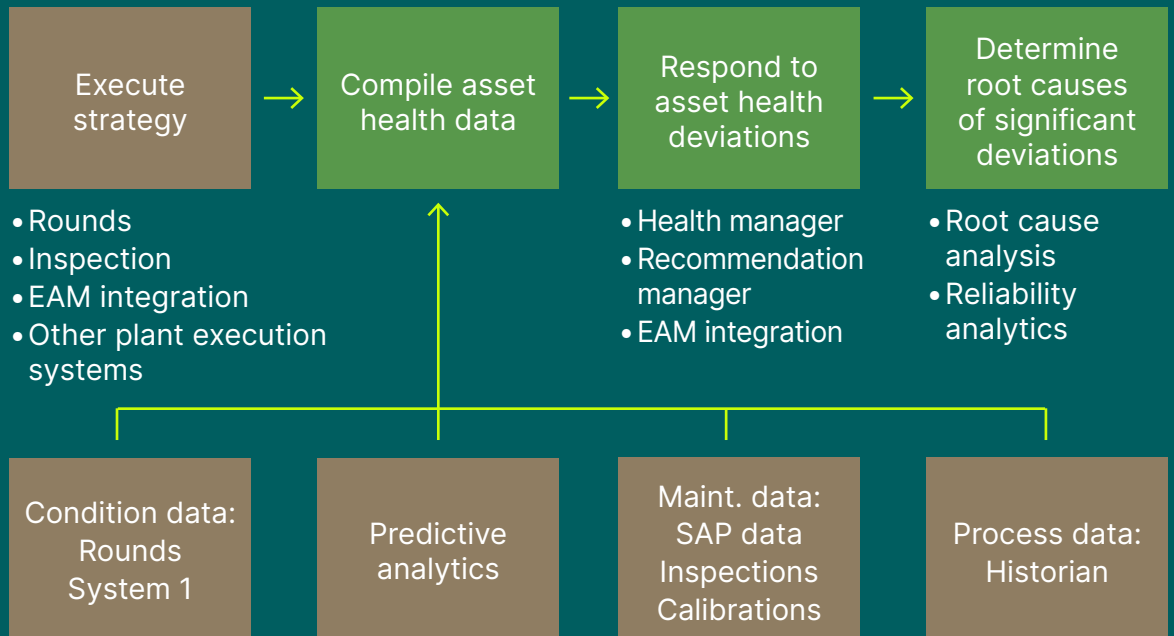
[Read more](#)[Explore APM](#)

CONTINUOUS IMPROVEMENT LOOP

Strategize



Execution & Evaluation



APM STRATEGY

Assets, equipment, and processes in a facility change over the course of time, and that's especially true in today's dynamic operating environment that requires a greater level of standardization and control. In asset-intensive settings, this can include purchasing new assets, retrofitting equipment, or expanding the operation. With periodical production and equipment changes, historical asset strategies become outdated. To meet today's strategic goals, APM Strategy is a foundational component of APM that helps enterprises update strategies to implement and perform proactive maintenance, asset replacement, and continuously optimize operations.

Building comprehensive asset strategies is a central element to your APM program. This creates a single source of truth for your operations and increases collaboration and visibility across teams to tackle rising concerns.



Key features

Asset Criticality Analysis (ACA)

Determine which systems, locations, and pieces of equipment have the highest risk based on pre-defined definitions. In many cases, roughly 20% of the asset population represents 80% of the potential negative consequences.

RCM/FMEA Analysis

Identify risks at both system and equipment level. Reduce the effects of functional failures, which, for some systems, may have a more significant impact on production and costs than simple mechanical failures.

Asset Strategy Optimization (ASO)

Extend qualitative capabilities of Asset Strategy Management through advanced, quantitative strategy modeling and Monte Carlo simulation for assets and systems – resulting in optimized availability, reliability, and cost while managing risk.

Asset Strategy Management (ASM)

Provide a common methodology to define risks and mitigating actions for any asset. Further evaluate your existing plans using basic qualitative risk analysis designed to be both straightforward and easy to use.

Asset Strategy Implementation (ASI)

Build implementation packages containing maintenance plans, maintenance items, task lists, and operations applied to strategy actions linking to your SAP implementation.

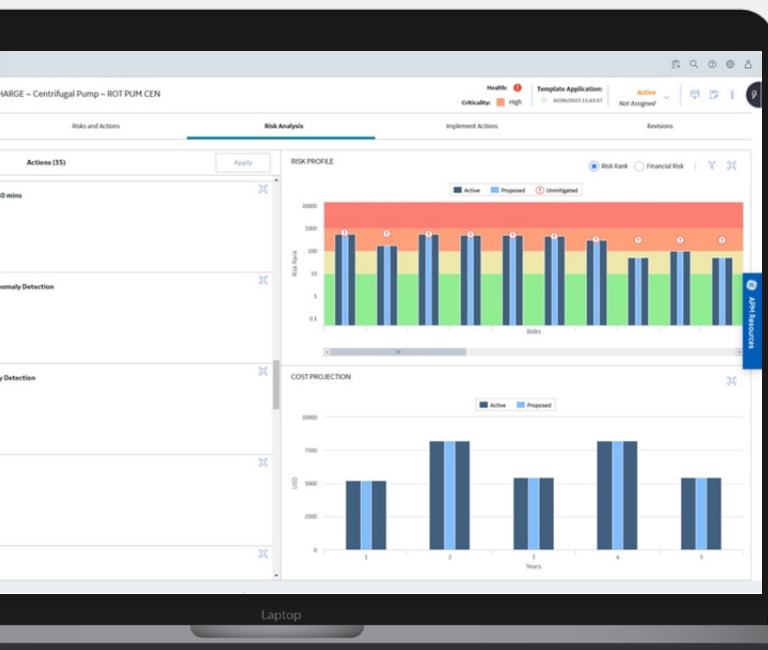


Figure 1: Asset Reliability Manager can review the risk profile and cost projection charts in ASM to understand the impact of modifying an action derived from the FMEA analysis.



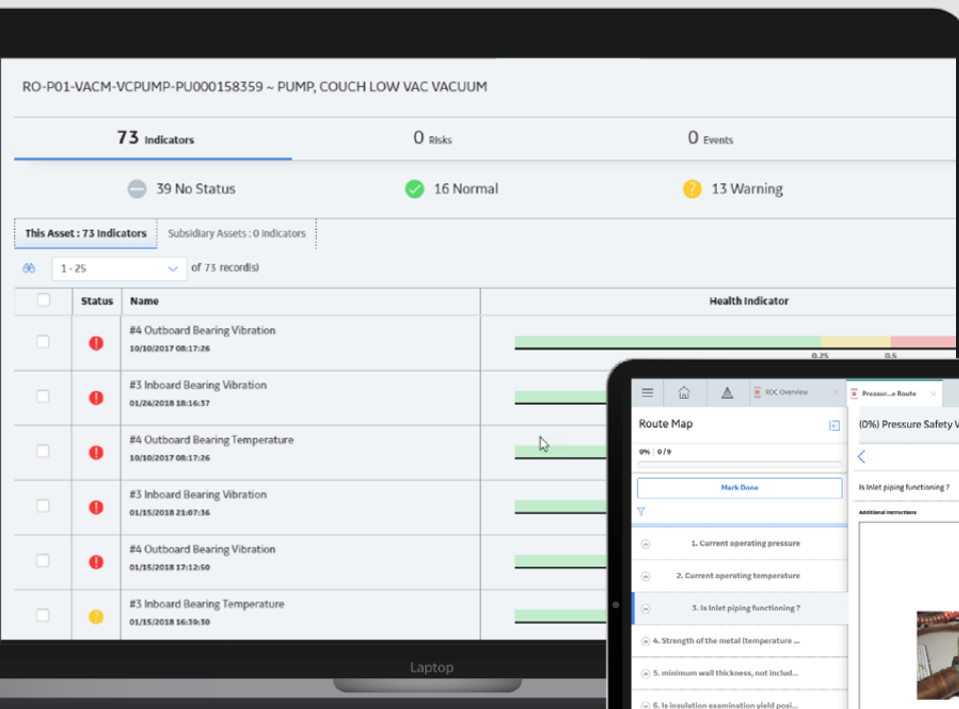
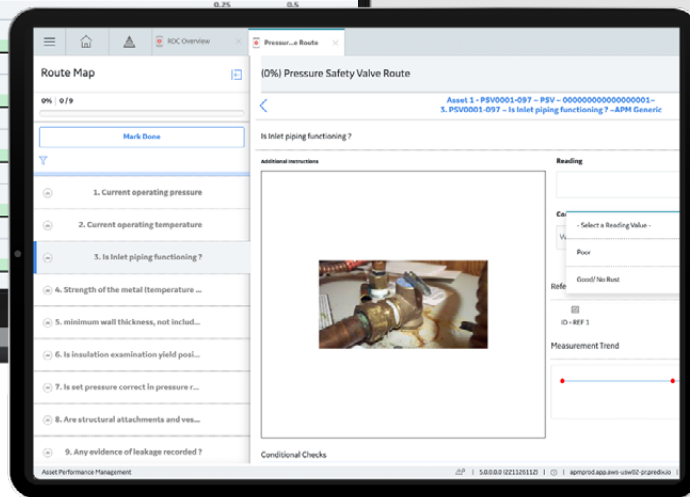


Figure 2: APM Health Manager provides users a centralized location for condition monitoring. Here, users can see the status, severity, and completed tasks of a condition-based program that enables the reduction of risk, O&M costs, and increases production capabilities.

View demo



APM HEALTH

GE Vernova’s APM Health application combines IT and OT data to reveal the current health of an asset and identify anomalies in performance. APM Health supports continuous asset monitoring in conjunction with APM Reliability and supports intermittent monitoring via mobile rounds capability. APM Health uses descriptive analytics for low- and medium-criticality assets making it a natural complement to APM Reliability, which is preferred for monitoring high-criticality assets. Deploying APM Health is foundational to preventing unplanned downtime, increasing asset utilization, and improving data visibility and cross-functional decision making.

APM Health’s configurable user experience gives supervisors, engineers, and inspectors a simplified view of each monitored asset.

APM Health



Key features

Health Manager: Leverages data from various sources to determine and report the current health of assets. By comparing data to operating thresholds set by the user, Health Manager provides interactive health indicators to determine next-best-action. With Health Manager, users can monitor assets 24/7 and perform intermittent monitoring using rounds and calibration management.

Rounds Pro: Provides a mobile worker extension of APM Health delivering digitization of operator rounds activities. With Rounds Pro, supervisors can create routes with a simple drag-and-drop interface, scale rounds design to other similar assets and actively monitor work productivity and completion. Operators are empowered to collect asset data via RFID, image capture or simply using it in online or offline modes. Rounds Pro removes redundancy in data tasks and increases safety for workers.

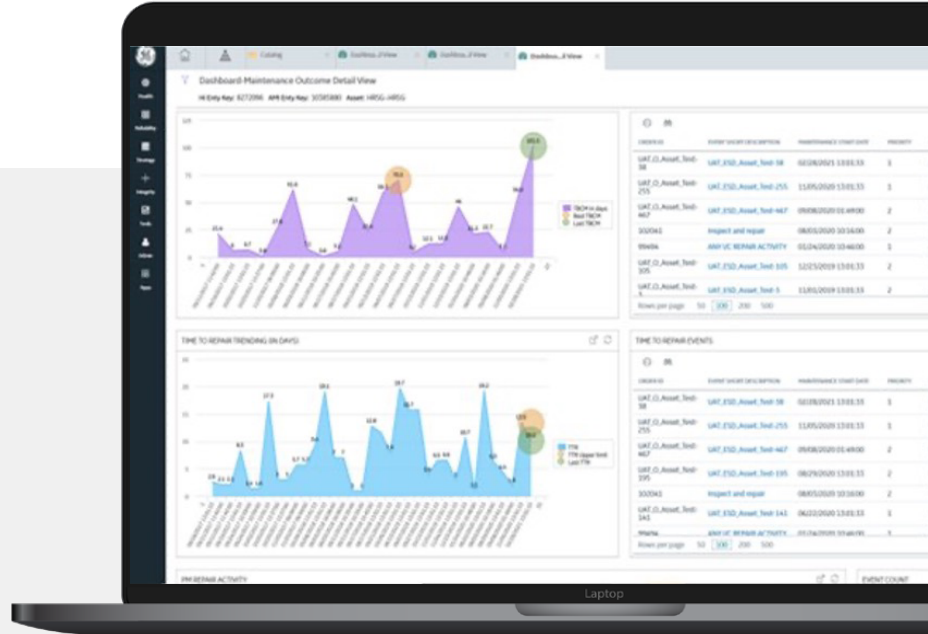
ACCELERATORS: FAST-TRACK OPERATIONAL AND SOFTWARE EXCELLENCE



Energy organizations face increasing pressure to maximize asset performance, reduce downtime, decrease risk and meet enterprise goals. Accelerators, a feature of GE Vernova's Asset Performance Management (APM) software portfolio, helps energy companies unlock faster, effective, and more scalable outcomes.

Accelerators bring together pre-built templates and configurability for the following:

- **Prebuilt Asset Strategies:** Proven approaches to managing energy assets, from compressors & generators to gas turbines, tailored for preventative, condition-based and predictive maintenance.
- **Workflows and Processes:** Ready-to-use, industry-specific workflows to streamline operations and enable proactive decision-making for areas such as maintenance planning.
- **Root Cause Analysis (RCA):** Recommended RCA configurations for assets to allow for more comprehensive, scalable, and compliant RCA process.
- **Asset-Specific Applications:** Custom solutions designed for specific asset types, like digital twins for hydro or CCGTs, ensuring deep insights into performance and reliability.



- **Digital Twin Blueprints:** Advanced modeling frameworks for predictive and prescriptive maintenance and continuous performance gains. Blueprints include failure modes, modeling frameworks, and more.
- Accelerators enhance the value of your investment in applications like APM Strategy, APM Health, APM Integrity, APM SmartSignal, APM Reliability, and Essentials, helping you scale your asset performance management initiatives with speed and precision.
- Since every organization requires different strategies, even for similar assets, GE Vernova's Accelerators are designed to be deployed quickly, scaled, and configured for individual use cases or workflows as needed.

Accelerate value



ACCELERATORS: FAST-TRACK OPERATIONAL AND SOFTWARE EXCELLENCE (CONT.)



Why Accelerators Matter for Energy Companies

Reduce Time to Value: Prebuilt strategies, workflows, and digital twins minimize configuration time, letting you see results faster.

Maximize Asset Reliability: Predictive and prescriptive analytics ensure optimized maintenance and fewer unplanned outages.

Improve Decision-Making: Standardized workflows and advanced diagnostics provide actionable insights across diverse assets.

Drive Scalability: Designed to adapt and grow with your operations, Accelerators support enterprise-wide implementation with consistency and ease.

Support Future Goals: GE Vernova continues to expand Accelerators into new asset types, industries and workflows to help make monitoring new assets you on-board easier.

Accelerate your energy transition journey and APM initiatives with speed, scale, and standardization.

With Asset Strategy Accelerators*

Estimated

57%

Faster configuration

Average

60%

In cost savings

With Workflows & Processes Accelerators for Health & Reliability

Estimated

75%

Faster configuration

Estimated

88%

In cost savings

*APM Strategy is required to achieve above outcomes. Also, outcomes realized might vary across customers. With Workflows & Processes Accelerators for Health & Reliability.

*APM Health and/or APM Reliability is required to achieve above outcomes. Also, outcomes realized might vary across customers.

APM RELIABILITY

Reliability programs are critical to any energy organizations. Over the years, the practice has moved from performing only reactive maintenance on breakdowns to incorporating predictive diagnostics proven to generate greater return on investment (ROI). With GE Vernova's APM Reliability, users can perform traditional reactive failure evaluations such as Root Cause Analysis and predictive maintenance all from a single source.

APM Reliability is designed to work across all assets (fixed, rotating, and non-rotating), all equipment types regardless of manufacturer, and all industries. The software is supported by expert-built digital twin blueprints delivering an easier way to set up analytics across assets. These digital twins use pre-built models backed by subject matter expertise that can immediately ingest real asset data to begin the training process. As training progresses, the digital twin evolves with an asset's operating condition giving engineers near real-time insights on performance. Along with more than 340+ assets supported out of the box, GE Vernova also partners with customers to build new digital twins as required.

With digital twins available to make onboarding asset analytics easier, users can focus on core problems such as failure detection and prevention, elimination of bad actors, and reduction of risk.



Figure 3: As an extension of a condition-based approach, APM Reliability provides users the ability to advance towards a predictive maintenance (PdM) strategy. APM Reliability users are able to conduct RCAs, measure production outputs, identify bad actors, and actively predict equipment failures at scale.

[View demo](#)



Key features

SmartSignal Predictive Analytics:

Gain time-to-action forecasting that not only tells you if an asset is operating out of defined parameters, but when that asset could potentially fail. SmartSignal ensures alerting accuracy with Sensor Health Management, a modeling technique suppressing false positives so you can focus on the alerts that really matter.

Root Cause Analysis (RCA):

Performing a root cause analysis is a non-negotiable in reliability programs. With APM Reliability's RCA, users realize the power of data contextualization to perform RCAs even faster. Using a systematic approach to determine the root causes of failures and developing meaningful recommendations, reduces or eliminates the impact of those events. Documenting sequential events, evidence, and faults leading up to a failure, analysts can make asset improvement recommendations, processes and culture to prevent event occurring again in the future.

Descriptive Reliability Analytics:

Provides a comprehensive set of analytical tools to help better understand causes of asset failure patterns and the true cost of specific failures. Understanding the historical costs, failure frequencies, and trends of production assets is a critical component of a complete reliability program.

Production Loss Analysis (PLA):

Allows you to manage production goals, collect actual production values, track production events and impacts and reconcile production targets. With robust analysis and reporting capabilities, PLA makes it easy to visualize production losses and their impacts to accurately measure, analyze and communicate production performance.

APM Reliability



APM PERFORMANCE INTELLIGENCE

Thermal performance monitoring is a fast and economical strategy for power plants to optimize performance and reduce emissions. Equipment degradation is accelerated by the need to operate more flexibly due to the energy transition. APM Performance Intelligence is a thermal advisory solution that provides real-time thermal performance analytics and actionable recommendations. An easy-to-use solution, it is a window into the plant offering near 360-degree view of the priorities that matter most to operate at full potential. Performance Intelligence uses predictive and prescriptive analytics built into physics-based digital twins and integrates seamlessly with Reliability.

Key features

Performance Optimization & Carbon Reduction:

Identifying thermal deviations is critical to optimizing plant performance. Performance Intelligence gives plant teams a strategic software partner to reach plant entitlement. Leverage GE's domain expertise for OEM and non-OEM equipment to manage your operating costs and improve performance across the entire operational load range. Additional features include carbon reduction recommendations and reporting. By gaining visibility to quickly assess degradation issues in one platform, plant teams can reduce fuel and emissions with greater efficiency.

Economic Advisory:

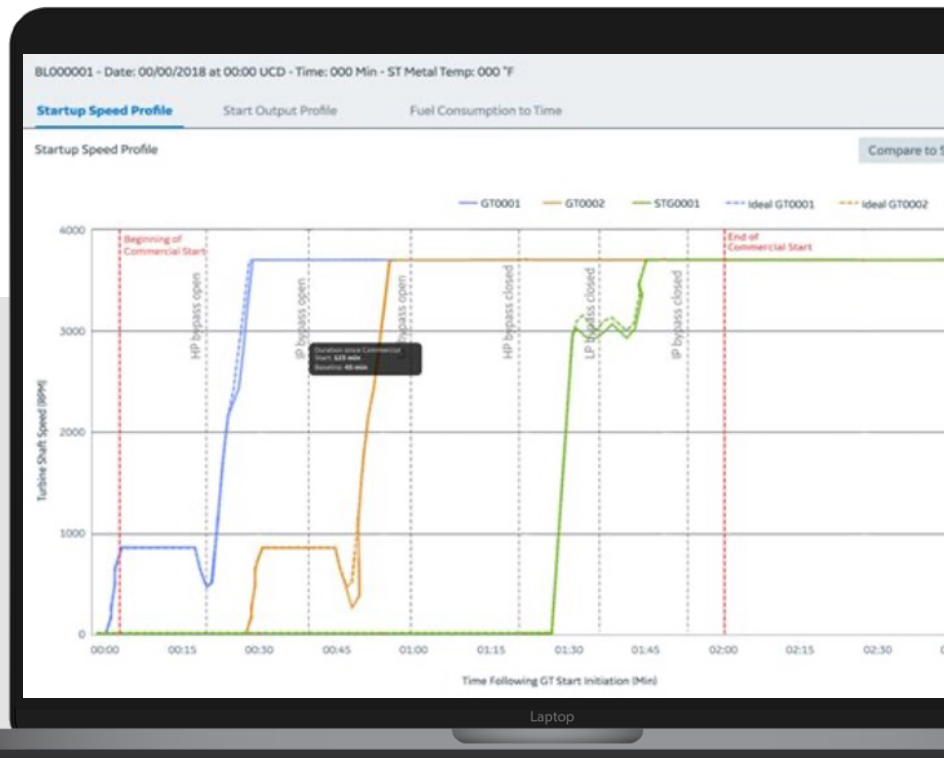
Although reliability and availability of assets is extremely important, producing high margins for the operation is a constant goal. With Performance Intelligence, users gain access to economic trade-off predictions giving monetary estimations of running an asset at less-than-optimal performance level. This allows the operation to determine the right times to take downtime.

APM Performance Intelligence



Figure 4: APM Performance Intelligence helps power operators reduce fuel use, manage heat rate, and identify plant maintenance priorities.

View demo



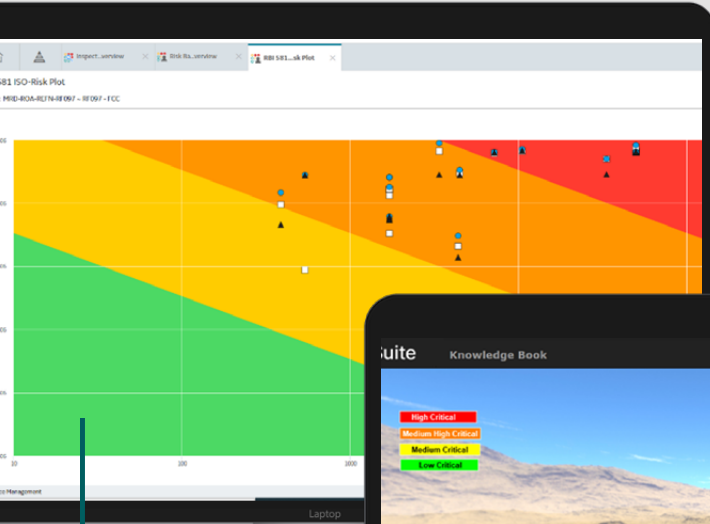
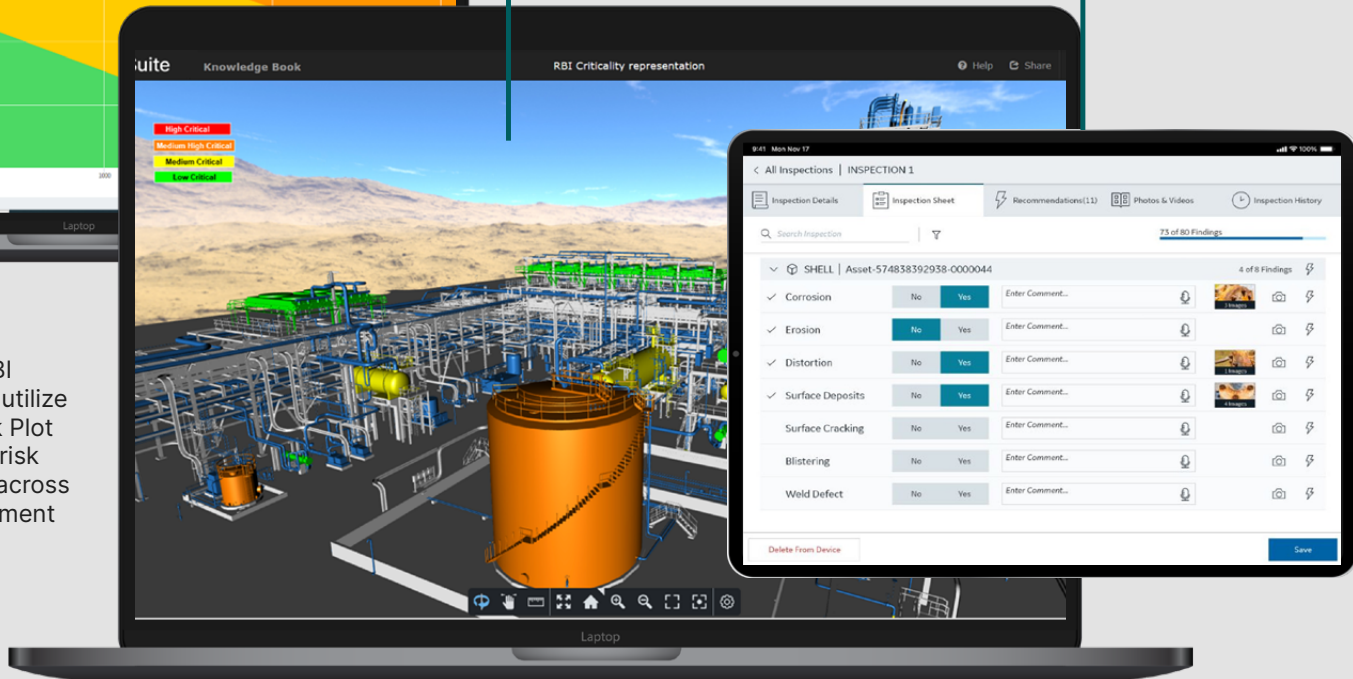


Figure 5: RBI analyst can utilize the ISO Risk Plot to visualize risk distributed across static equipment in the plant.

Figure 6: Inspectors can log inspections, manage inspection tasks, complete inspection reports, capture & annotate images, and create recommendations on a tablet/ mobile phone.

Figure 7: Users can contextualize risk, corrosion & thickness data on a 3D model using V-Suite Starter.



APM MECHANICAL INTEGRITY

APM Mechanical Integrity application is designed for fixed plant assets including pipelines, piping, vessels, exchangers, tanks, and boilers. The overabundance of data generated makes it increasingly difficult to understand current risk levels, optimize mechanical integrity, and deploy large-scale inspection programs. APM Mechanical Integrity equips organizations with an integrated set of tools to calculate risk and asset lifetimes to generate, implement and execute optimized inspection strategies, as well as streamline auditability and compliance governance.

Key features

Risk Based Inspection (RBI):

Assesses the likelihood and consequences of failure to optimize inspection rigor based on overall risk. Users can define corrosion loops and integrity operating windows (IOWs), assign potential degradation mechanisms (PDMs), and rank equipment based on risk.

Thickness Monitoring (TM):

Corrosion analysts can calculate the minimum thickness required to safely operate the equipment, corrosion rate analysis, as well as next inspection and retirement-date calculations.

Inspection Management (IM):

In support of inspection programs, organizations can manage inspection plans on a variety of asset classes, document condition of each asset, track inspection recommendations to closure and interface with EAM systems.

Compliance Management:

Tracks when equipment needs inspected to comply with global standards.

[APM Mechanical Integrity](#)



Our Mechanical Integrity application offers enhanced functionality such as:

- A mobile Inspection app that digitizes and streamlines data collection in the field
- 2D & 3D visualization capabilities that provide better situational awareness & improve decision making
- Integrity Operating Windows (IOWs) that help users plan for dynamic risk

[View demo](#)



AUTONOMOUS INSPECTION

Traditional manual inspection processes used by industrial firms are highly resource-intensive, prone to safety risks and errors, and difficult to scale and sustain. Autonomous Inspection is a cloud-based computer vision software solution designed to automate the manual inspection and monitoring processes by utilizing image capture devices and artificial intelligence/machine learning (AI/ML) algorithms. Its integration with select GE Vernova APM applications helps users access visual data and insights within APM to accomplish faster, safer, and more cost-effective inspections and monitoring.

Key features

Asset identification and data extraction:

Automatically recognize assets and extract select data such as gauge or valve positions, temperature changes, corroded areas, and more.

Defect detection and classification:

In certain use cases like corrosion, Autonomous Inspection can not only detect corrosion but can also classify it based on severity levels.

APM integration and alerting:

Currently integrates with APM Reliability Plus, and integration with additional APM applications is part of the product roadmap.¹ Users receive actionable alerts when their defined thresholds are crossed enabling proactive actions to minimize downtime or other losses.

Data management and analyses:

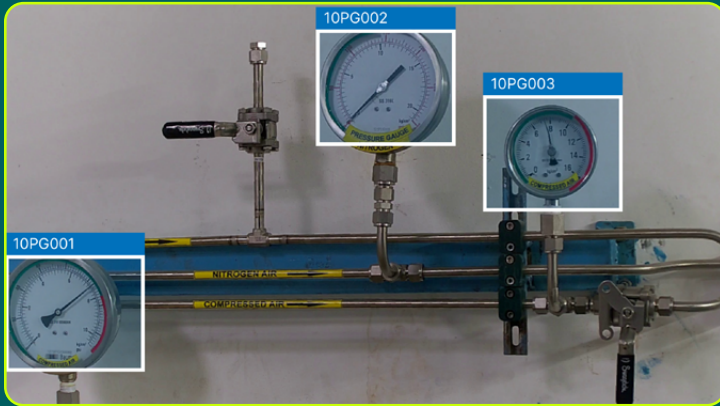
Enables automated storage and management of image data. Further, Autonomous Inspection helps users identify and analyze trends and receive AI/ML-based recommendations to initiate needed interventions.

The centralized management of Autonomous Inspection's deep learning algorithms is implemented using AWS SageMaker, which comes with an Autonomous Inspection subscription.

[Explore Autonomous Inspection](#)

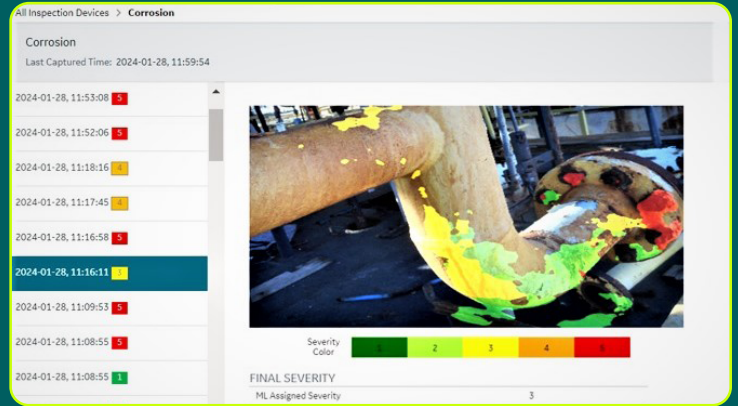


¹ Timing or future availability of integrations cannot be guaranteed; APM Reliability requires separate license to use



Gauge Detection & Reading

- Automatic detection of circular and square gauges.
- Automatically extract values (e.g., pressure) from gauges using images and AI/ML models.



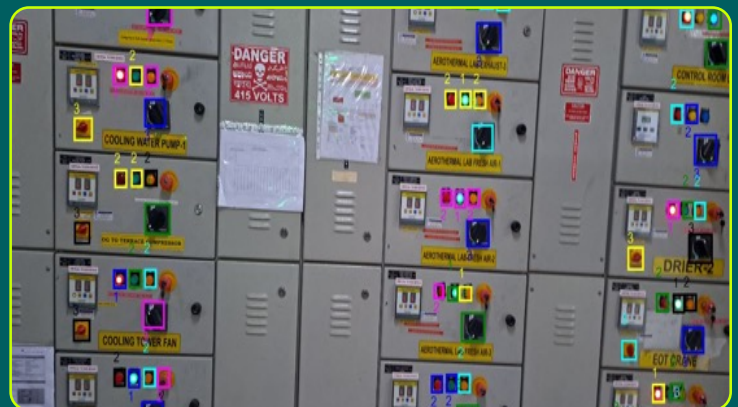
Corrosion Detection and Quantification

- Identify damage modes (external corrosion, cracking, or others).
- Detect corrosion and estimate severity. Classify severity per chosen corrosion standard(s).
- Send alerts and recommended maintenance actions based on customer-trained model(s).



Thermal Profiling

- Monitor user-defined regions on asset images for hot spot and cold spot thermal activities.
- Identify and get alerted on overheating assets from thermal images.



MCC/Panel Monitoring

- Digital panel reading.
- Monitor status indicators, such as LEDs or warning lights to check operational status (on/off, error codes, etc.).

APM ASSET OPTIMIZATION

Closed-loop optimization systems for an affordable and fast way to significantly reduce emissions, fuel, and O&M costs.

Autonomous Tuning

Manual gas turbine tuning is costly and only temporarily improves emission and fuel efficiency. To keep up with variable weather and rising fuel costs, utilizes equipment models and artificial intelligence / machine learning (AI/ML) to continuously find optimal flame temperatures and fuel splits for gas turbines.

Up to
1%

Reduction in fuel consumption and carbon dioxide emissions

Up to
14%

Reduction in carbon monoxide emissions

Up to
12%

Reduction in NOx emissions

Learn more



BoilerOpt

Real-time combustion and soot optimization for steam plants. Utilizes closed loop supervisory controls to improve boiler process conditions to optimize for best-achievable fuel efficiency. BoilerOpt works within existing plant technology to automatically improve boiler productivity and air-fuel ratios. Boiler control settings and events include fuel/air settings and soot-blowing.

Up to
1%

Reduction in heat rate and CO2

Approximately
1%

Availability improvement

Up to
15%

Reduction in NOx emissions

Up to
30%

In soot blowing

Learn more

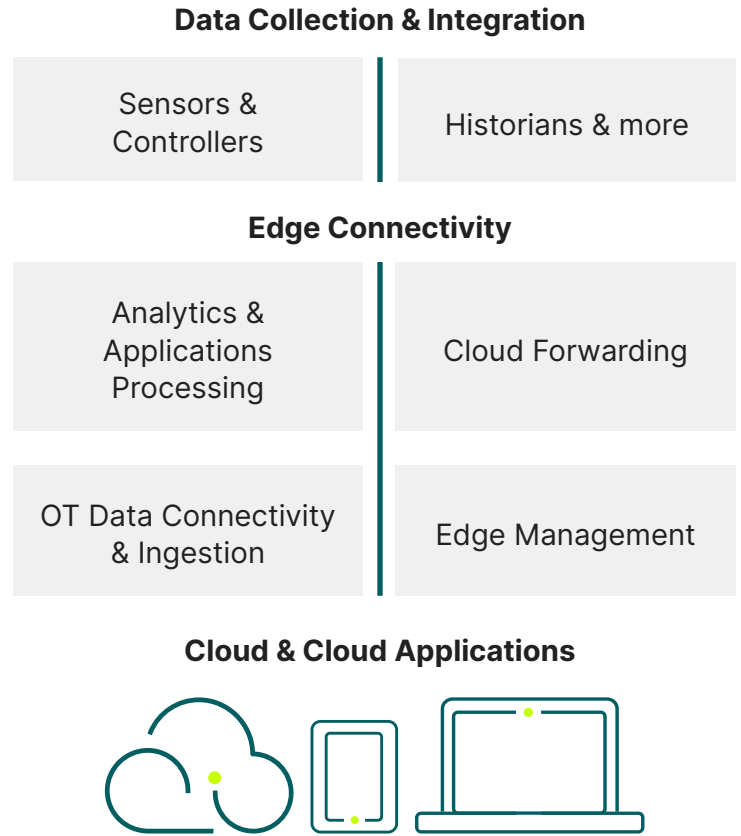


MODERNIZED INFRASTRUCTURE

To support performance and scale

To ensure that APM applications provide you the right insights at the right time and openly communicate with each other, GE Vernova provides a modernized platform empowering end-to-end data management. Available on-premises or in the cloud, GE Vernova's APM software connects to EAM/CMMS applications and timeseries data along with IT/OT data from assets, sensors, and other business applications.

The ability to integrate, analyze, visualize, and act all from a single system leads to increased speed to make the right decisions, decreased risk due to potential unawareness, and ultimately helps you save on O&M activities. With a modernized platform, users can scale GE Vernova's APM solutions from 1,000 to 1,000,000 assets with assurance that the deployment is secure and highly available. With built-in analytic frameworks, users can bring their own models to further increase flexibility.



CONCLUSION

GE Vernova's APM software is uniquely positioned to provide a composable and interoperable software that can meet the needs of asset-intensive organizations. In collaboration with AWS, GE Vernova is excited to announce the listing of our SmartSignal predictive analytics, an integral part of our APM Reliability application, on AWS Marketplace to help cloud-ready energy organizations leverage credits to deploy powerful asset analytics.



OPTIMIZE O&M. EMPOWER YOUR WORKFORCE. DELIVER ROI.

Contact us to start your APM journey.

Contact us 