



Remote Monitoring and Diagnostics



Protect Your Assets

Every day, GE collects more than 30,000 operating hours of data from more than 1,600 globally deployed power generation assets, supplementing a 40 terabyte database representing more than 100 million fleet operating hours.

In our Monitoring & Diagnostics (M&D) Center in Atlanta, Georgia, USA, a team of more than 50 M&D engineers analyzes more than 35,000 operational alarms per year, assisting customers in enhancing their asset reliability and performance 24/7/365. Additional regional support is provided from locations in Scotland, France and India. Using a combination of off-the-shelf and custom analytic tools, the team diagnoses problems ranging from failed sensors to gas turbine compressor damage. Drawing on the experience of hundreds of thousands of alarms resolved, the team has developed dozens of physics-based proprietary algorithms that provide early warning of more than 60 different failure mechanisms.

The wealth of physical understanding combined with intelligent application of statistical methods has enabled the team to

continually improve the algorithms, thereby increasing the probability of detection while reducing false alarms. This depth of expertise, as well as operational excellence in the execution of downstream processes, has generated customer savings estimated at more than \$70 million in 2014.

Decisions Through Data

M&D services from GE provide a number of options for accessing the data that's important to you, along with a selection of decision support tools built on our OEM knowledge, engineering know-how, and depth of fleet experience.

On-Site Monitor (OSM): At your site, OSM automatically collects and processes data through advanced algorithms—trending against fleet-wide historical data—to determine fleet health, develop prognostics and deliver information to you through several reporting options.

Operational Assessments Report: This monthly assessment report provides key asset health and operational metrics to help you manage asset maintenance and plan for outage scope.

Benefits

Risk Mitigation: Improved turbine reliability, availability, maintainability, and performance with the use of advanced analytics to identify root cause and avoid unplanned outages.

Outage Reduction: 24/7 trip recovery support applies GE's extensive turbine knowledge to quickly resolve concerns.

Fact-Based Decision Making: Historical data made available through multiple tools enables GE engineers to assess key performance indicators and provide corrective action steps and improvement evaluations.

Cyber Security: The M&D platform was configured to provide customers with a secured data connection meeting all government and customer regulatory requirements. Highlights of the security program include:

- Electronic Security
- System Security Management
- Personnel and Training
- Physical Security
- Incident Reporting and Response Planning
- Recovery Plans

Combustion Dynamics Monitoring (CDM): Enhanced monitoring for gas turbine combustion systems equipped with dynamic probes. Diagnostic alarms provide added anomaly detection protection.

Remote Dry Low NO_x (DLN) Tuning: Reduces time to respond to tuning requests, essentially eliminating the need for onsite temporary tuning kits and the dispatch of a DLN field engineer.

Optional Services

OnSite Support* Remote Turbine Controls Diagnostics: Real-time diagnostics, 24/7 on-call support. Integrates with existing systems (Mark* V, Mark VI, Mark Ve, Mark VIe, Exciter, LCI). Requires a Remote Services Gateway (RSG) for data viewing, in addition to an Ethernet lock box to allow customer controlled remote access to the control system software.

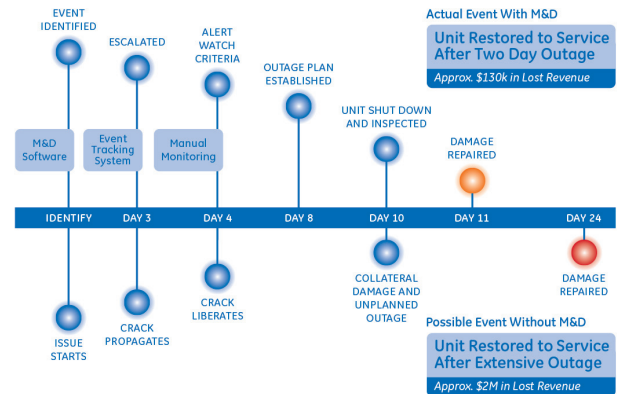
Blade Health Monitoring (BHM): Enhanced monitoring service helps reduce operational risk by measuring compressor blade time-of-arrival and vibration data, providing advanced warning of potential airfoil damage or anomalies, in addition to detecting tip loss and base cracks to help avoid performance degradation and blade liberation.

24/7 Monitoring

Two Day Planned Outage vs. 15 Day Forced Outage

24/7 Monitoring

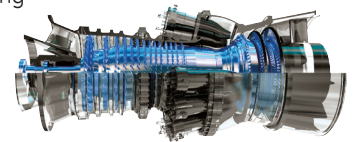
Two Day Planned Outage vs. 15 Day Forced Outage



Applicability

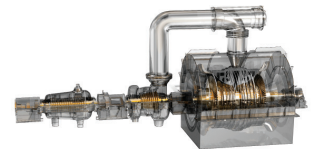
GE Gas Turbines

- Hydraulic Valve/Actuator Wear
- Combustion Profile Monitoring
- Combustion Dynamics
- Turbine Pyrometer Drift
- Load Coupling
- Compressor Protection
- Blade Health Monitoring
- Trip/Failure to Start
- Rotor Dynamics



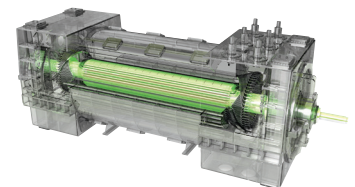
GE Steam Turbines

- HP Steam Conditions
- N2 Packing Head Health
- Axial Expansion
- Rotor Dynamics



GE Generators

- Stator Frame Vibration
- Stator Temp
- Rotor Dynamics



Performance:

- Output and Heat Rate
- Gas Turbine
- Steam Turbine
- Balance of Plant Systems

To learn more about this offering, contact your GE sales representative or visit powergen.gepower.com.