



# Remote Monitoring and Diagnostics



## Protect Your Assets

Every day, GE collects more than 60,000 operating hours of data from more than 2,800 globally deployed power generation assets, supplementing a 600-terabyte database representing more than 220 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 60,000 operational alarms per year, assisting customers in enhancing their asset reliability and performance 24/7/365. Additional support is provided on a regional basis, including local language support in more than 100 languages. 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 hundreds of physics-based proprietary algorithms that provide early warning of more than 250 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, generated customer savings estimated at more than \$1 Billion in 2022.

## 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 the combined GE OEM knowledge, engineering know-how, and depth of fleet experience.

**On-Site Monitor (OSM):** At site, an edge device automatically collects and processes data through advanced algorithms—trending against fleet-wide historical data leveraging the GE Digital APM platform—to determine fleet health, develop prognostics, and deliver information to you.

**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.

**M&D Portal:** Data trends, alerts, cases, and benchmarking are available on a secure web portal and mobile applications.

## Benefits

**Risk Mitigation:** Improved turbine reliability, availability, maintainability, and performance with the use of advanced analytics to identify root cause and help 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 NOx (DLN) Tuning:** Reduces time to respond to tuning requests, essentially eliminating the need for on-site temporary tuning kits and the dispatch of a DLN field engineer.

**Connectivity and Edge:** M&D uses the GE Digital APM system to manage outputs and data visualization. Secure and remote administration of edge devices. Configure, deploy, and execute edge analytics.

**\*MyFleet:** Visualize data from the whole fleet. Gives insights into data trends leveraging GE's proven benchmarks.

## Optional Services

**Generator Health Monitoring (GHM):** Enhanced monitoring service that can be installed throughout the lifetime of the generator. GHM consists of the following monitoring modules: Partial Discharge, Rotor Flux, Stator End Winding Vibration, Rotor Shaft Voltage, Stator Temperature, Collector Health, and Stator Leakage Monitoring.

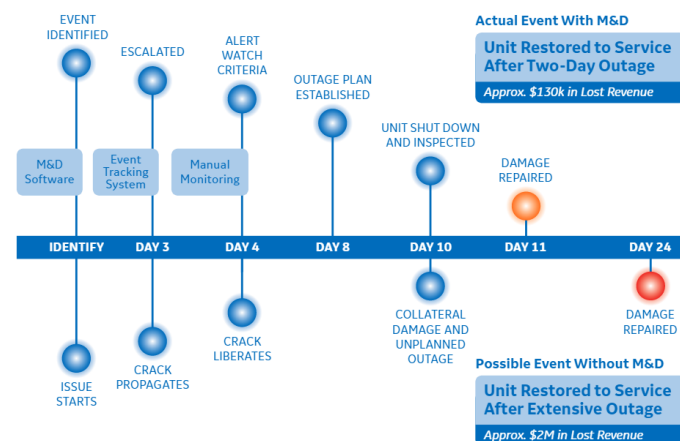
**Blade Health Monitoring (BHM):** Enhanced monitoring service helps reduce operational risk by measuring compressor blade time-of-arrival and vibration data, providing advanced warning of potential airfoil damage or anomalies, in addition to detecting tip loss and base cracks to help avoid performance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

For more information, please contact your GE representative, or call the M&D Center directly at:

Atlanta  
1-800-735-2044  
1-678-844-7000  
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## 24/7 Monitoring

### 2-Day Planned Outage vs. 15-Day Forced Outage



## Applicability

### Gas Turbines

- Valve and Accessories Monitoring
- Combustion Monitoring
- Load Coupling
- Compressor Protection
- Blade Health Monitoring
- Start to Trip Troubleshooting
- Rotor Dynamics



### Steam Turbines

- Valve Monitoring
- Water Induction
- Shaft Steam Seal Monitoring
- Foreign Object Damage
- HP/IP Efficiency
- Rotor Dynamics

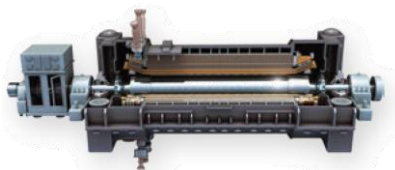


### Generators

- Seal Oil System
- Field Windings
- Stator Temperatures
- Gas Cooling System
- Rotor Dynamics

### Balance of Plant

- HRSGs
- Pumps and Motors
- Water Chemistry
- Steam Turbine
- Balance-of-Plant Systems



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GEA13613L (03/2022)