

APM Solutions

Asset Performance
& Condition-based Monitoring (CbM)



Leading-edge Industry 4.0 Technology Solutions
Customer-focused Approach for Green Sustainability



ONLINE CONDITION MONITORING SOLUTIONS FOR CRITICAL ASSETS

Monthly inspections and risk assessments may not be sufficient or cost-effective when an asset is critical. Enertics online condition monitoring devices strengthens asset lifecycle. They allow for continuous condition assessments, pre-emptive fault detection, and alert mechanisms for critical assets, reducing unplanned downtime and avoiding substantial maintenance costs and collateral damage.

01 DATA COLLECTION

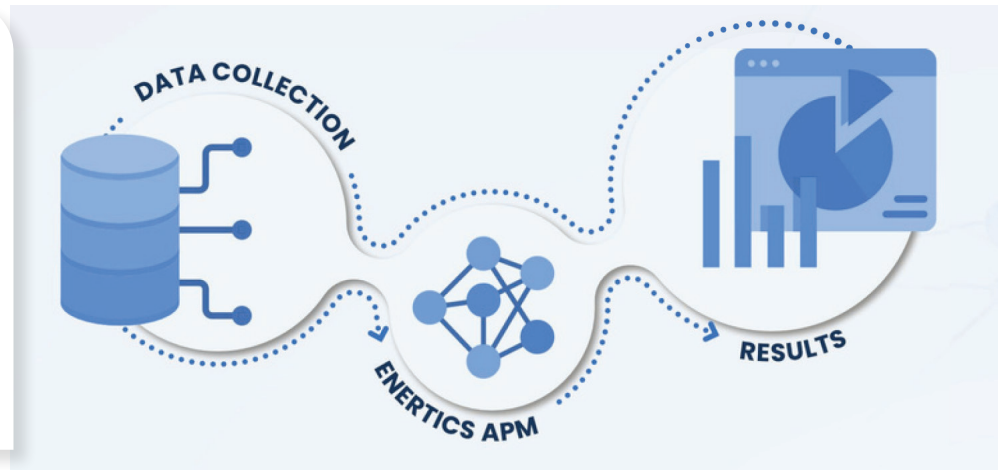
- Remote Monitoring
- Fault Detection
- Operational Analysis
- Advanced Diagnostics

02 ENERTICS APM

- Asset Models
- Advanced Software
- Comprehensive Indices
- Holistic Monitoring
- UI / UX Services

03 RESULTS

- Improved Availability
- Asset Reliability
- Reduced repair costs
- Minimized risks
- Extended asset lifetime
- Effective performances



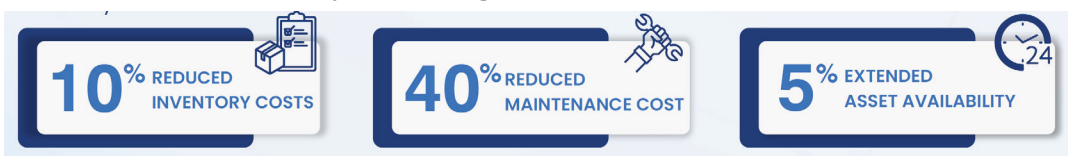
PREDICTIVE MAINTENANCE FOR CRITICAL ASSETS

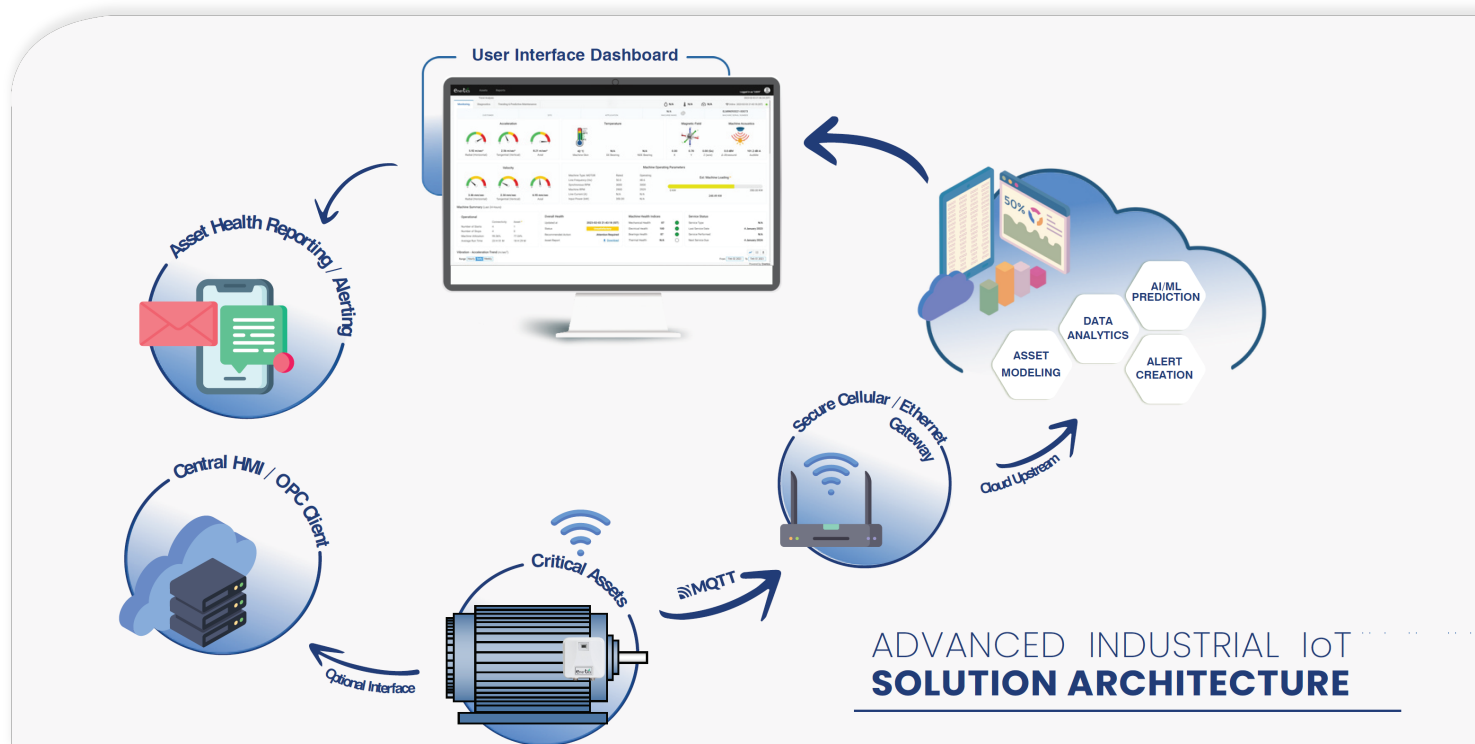
The innovative Enertics solution performs an automatic evaluation of multi-variate sensor data to detect anomalies before they turn into significant issues. These solutions use advanced ML and AI algorithms to predict asset health. With advanced sensors, not only it is possible to forecast individual sensor data, but it is also possible to predict specific machine fault conditions. The advanced devices feature an intuitive web dashboard and mobile phone interface to provide actual and predicted trends and asset behaviors.



OPTIMIZING PRODUCTIVITY & EFFICIENCY OF CRITICAL ASSETS

Enertics Asset Performance Management system optimizes the asset operations and maintenance approach to help company meet their business goals and KPIs. The Enertics Solution is tailored to the customer's preferred level of asset availability, risk management, and maintenance costs while increasing system efficiency.

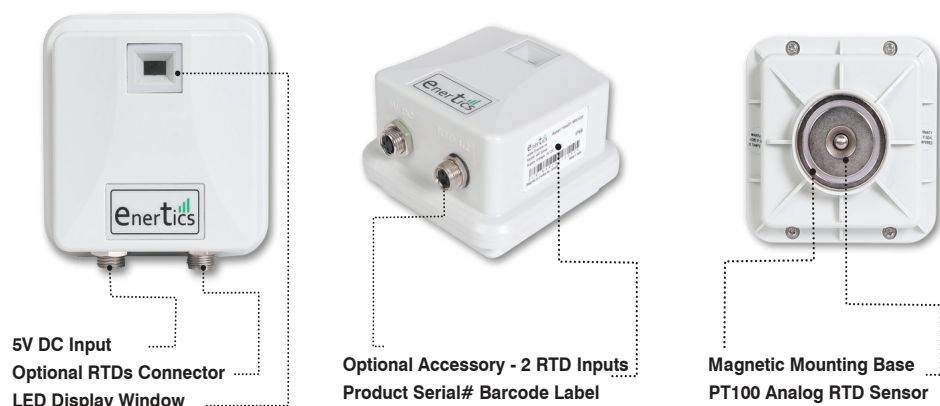




ADVANCED INTEGRATED MULTISENSOR DEVICES

Plug and Play Built-In with Tri-Axial Vibration, Acoustics, Analogue Temperature and Magnetic Field sensors.

eM SAVER



eM SAVER Mini





PROCESS & ENERGY MONITORING SOLUTIONS FOR INDUSTRIAL ASSETS

WAGE (Water, Air, Gas & Energy) Monitoring & Analytics

Efficiency Improvement and Carbon Footprint Reduction



10% REDUCED ENERGY COSTS

30% INCREASED AVAILABILITY

5% INCREASED ENERGY EFFICIENCY



CONTINUOUS ENERGY MONITORING & ANALYTICS



REDUCE ENERGY USAGE BASED ON ACTUAL CONDITIONS



METER OEM AGNOSTIC - SEAMLESS INTEGRATION WITH ANY MAKE

Process Management & AI Analytics

Enhancing safety and operational performance.



CONTINUOUS BOILER MONITORING & ANALYTICS



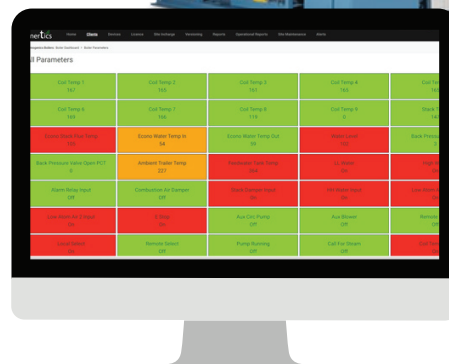
OPTIMIZED MAINTENANCE BASED ON ACTUAL CONDITIONS



CRITICAL BOILER FEED PUMPS, BLOWERS AND PROCESS PARAMETERS



REMOTE MONITORING, CONDITION-BASED ALERTS - ANYTIME, ANYWHERE



ADVANCED O&M ANALYTICS | LEGACY SYSTEM INTEGRATION (DCS/SCADA) | BOILER OEM-AGNOSTIC



TYPICAL APPLICATIONS

Steel Manufacturing Industry

Enertics provides sensor deployment, predictive diagnostics, and data integration for steel manufacturing.

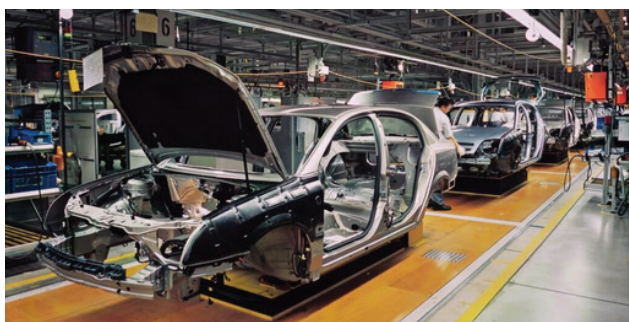
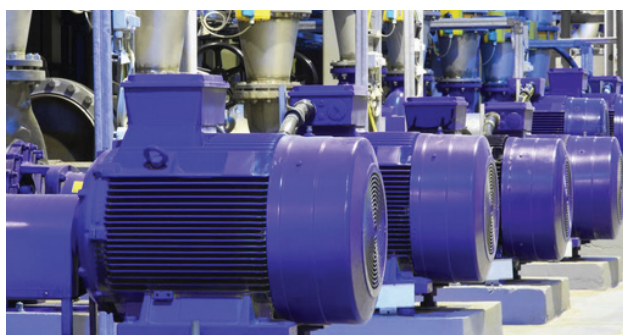


Food & Beverage Industry

Enertics delivers proactive machine health insights to prevent F & B downtime.

Process Industry

Enertics provides asset health hardware and software to maximize uptime in industrial production..



Automobile Manufacturing Industry

Prevent \$200K/hr automotive downtime with Enertics' tailored manufacturing solution.

Chemical Industry

Enertics delivers IoT & AI-based health monitoring for critical chemical plant assets to prevent catastrophic failures and losses.



Electric Power Plants

Enertics offers 24/7 IoT & AI monitoring for power plant rotating machinery to prevent costly shutdowns.



TECHNICAL SPECIFICATIONS

SYSTEM PARAMETERS		SPECIFICATION
TRIAXIAL VIBRATION SENSOR		
Sensor Technology		MEMS Sensor
Tri-axial – Radial, Axial & Tangential acceleration		2g - 16g range
Sensor Resolution		16 bit
Sensor Sensitivity		516g 0.488 mg/LSB
Sensor sampling frequency		Configurable
Sensor Bandwidth (+/- 3dB Points)		0.2 to 6300 Hz (Configurable)
Vibration Parameters		Velocity (mm/sec), Acceleration (m/sec ²), Displacement (mm)
Vibration Frequency Resolution		Min 0.15 Hz, Configurable
ULTRASOUND SENSOR (AVAILABLE IN EM SAVER MODEL)		
Sensor Technology		MEMS Ultrasound
Ultrasound Bandwidth		80KHz
Sensor Sensitivity		-38dBV
Signal to Noise Ratio		64dB
Ultrasound Spectrum Lines		512
Spectrum Frequency Resolution		187Hz
MAGNETOMETER SENSOR (OPTIONAL)		
3-axis Magnetic Field		+/- 2 to +/- 16 gauss range
Sensor Sensitivity		516g 1711 LSB/gauss
Sensor Resolution		16 bit
Magnetometer Spectrum Lines		512
Spectrum Frequency Resolution		0.9 Hz
MACHINE TEMPERATURE SENSORS		
Machine Surface Temperature		0 - 200 °C Range
Drive End (DE) or Non-Drive End (NDE) Bearings or Stator Windings temperature - Optional in eM Saver Mode		0 - 200 °C Range
COMMUNICATION (WIFI & RS485 BASED HARD-WIRED CONNECTION)		
Technology		WiFi 2.4GHz b/g/n
WiFi Range		50 - 60m based on LOS and other equipment in the vicinity
Security / Network Protocol		AES / WPA Security / MQTT Protocol
RS485 hardwired data connection		2-wire RS485 Link
GRAPHICAL USER INTERFACE (GUI)		
Cloud based Dashboard and User Interface		Vendor agnostic cloud solution (AWS, Azure, Watson, etc.)
On-prem Application and Data Hosting		Optional, for larger systems
Smartphone User Interface (UI)		Android and iOS Based Application
POWER SUPPLY		
External DC Power Supply		24V/5V DC, 2A
Power Interface		M8 Industrial Grade connector
Internal Battery		Optional, for low-data transfer rate (1-2 yr battery life)
PHYSICAL SPECIFICATIONS		
Enclosure Material		Polycarbonate/Nylon
EmSaver Dimensions (L x W x H)		79mm x 79mm x 56mm
EmSaver Mini Dimensions (L x W x H)		41mm x 41mm x 34mm
EmSaver Weight		Approx. 160 grams
EmSaver Mini Weight		Approx. 70 grams
Design Specifications		IP67, CE, FCC
Operating Temperature Range		-40 °C to 105 °C
Operating Humidity Range		0-95% RH
DEVICE CONFIGURATION		
One-time device configuration		Remote configuration Dashboard UI
Dashboard configuration		Remotely, Dashboard User Interface
Over the Air (OTA)		OTA Firmware Updates



Energetics CbM Offerings for Rotating Machines

ITEMS	MODEL #	Order Code	Description
SENSOR HARDWARE OPTIONS	eM Saver Mini Sensor	eMS- MINI - XXX-XXX	3-in-1 Integrated Smart Sensor, featuring: <ul style="list-style-type: none"> • Wideband Triaxial Vibration • Machine Surface Temperature • Wi-Fi enabled (2.4GHz - b/g/n) • Nylon Enclosure, IP67 rated, Powered using • 24VDC Magnetic mounting, Translucent LED display
	Optional Feature 1	eMS- MINI - MAG-XXX	Add-on: Leakage Magnetic Flux Sensor (for Electrical Machines)
	Optional Feature 2	eMS- MINI - XXX-DO1	Add-on: 1 digital output (relay or alarm)
	eM Saver sensor	eMS- ADV- XXX- XXX- XXX	6-in-1 Integrated Smart Sensor, featuring: <ul style="list-style-type: none"> • Wideband Triaxial Vibration • Ultra wideband Ultrasound Acoustics • Machine Surface Temperature • Wi-Fi Communication (2.4GHz - b/g/n); optional RS 485 Nylon • Enclosure, IP 66/67 rated, Powered using 24/5VDC Magnet • Mounting, Translucent LED Display
	Optional Feature 1	eMS- ADV- MAG-X XX-XXX	Add-on: Leakage Magnetic Flux Sensor (for Electrical Machines)
	Optional Feature 2	eMS- ADV- XXX- RTD- XXX	Add-on: 2 channels for external RTDs (can be spare DE/NDE BTDs or Stator RTD for Motors)
	Optional Feature 3	eMS- ADV- XXX- XXX- ANA	Add-on: 3 Analog channels for CTs, Piezo Sensors, Flow, Pressure, or any other 4-20mA or 0-10V Industrial Sensors)
SOFTWARE OPTIONS	Essential Software Module (eM MoNA) Mandatory	eM MonA - XXX* XXX* stands for Subscription Years (001, 002 003 etc.)	Cloud based Machine Monitoring software <ul style="list-style-type: none"> • Real time sensor data monitoring • Sensor Trend Charts • Android / iOS App • Daily Summary Report • Dashboard, email and App Notification Alerts to up to 5 users • Remote Monitoring of Customer assets by Energetics remote
	Diagnostics Software (eM DiA) (Software Add-on Option 1)	eM DiA1- XXX* XXX* stands for Subscription Years (001, 002 003 etc.)	<ul style="list-style-type: none"> • Real time diagnostics analysis of Machine Health • FFT Spectrum analysis of all sensor data • Automatic fault diagnostics (~30 faults types) • Detailed upon fault and/or on-demand machine health report generation • Configurable alert system (user hierarchy based) • Alerts to up to 20 Users • Remote Monitoring of Customer assets by Energetics remote team
	Advanced Diagnostics & Predictions Module (eM PreA) Software Add-on Option 2	eM PreA - XXX* XXX* stands for Subscription Years (001, 002 003 etc.)	<ul style="list-style-type: none"> • Advanced Powertrain Dashboard (Comparative view of all sensors in the Powertrain Dashboard) • Advanced Early Stage Bearing Health Analysis (Kurtosis Analysis) • Advanced Broken-Tooth Gear Box analysis (Cepstrum Analysis) • 3D Waterfall analysis for Vibration, Acoustics and Magnetic Flux • Machine Health Alerts to unlimited # of Users • Powertrain Reports • Sensor Predictions Algorithm (Future Prediction Trends)



ENERTICS ADVANTAGE

SIMPLICITY

Plug 'n Play
Wireless Sensing Technology
Modular Hardware Solution
No Field Configuration Required

DEFINITIVE & HOLISTIC SOLUTION PLATFORM

End to End APM Solution
Asset Health Monitoring
Inventory Management
Advanced Diagnostics

VENDOR AGNOSTIC SOLUTION

Universal Modular Solution
Integrating Multi-Vendor Technologies
Multi-Industry Applications
Custom Made Solutions

OUR PROMISE IS OUR COLLABORATIVE

GROWTH•OPPORTUNITY•MOTIVATION
TRUST•SYNERGY EMPOWERMENT
TRANSPARENCY•INNOVATION
PURSUIT OF KNOWLEDGE•INNOVATION
NURTURING•COMPETITIVE ADVANTAGE

STRATEGY



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