# MachPulse™

Sensing machine pulse

Digital Vibration Analysis and Diagnostic Services to Improve Availability of Rotating Machines

Pumps and motors are crucial for fluid transfer and conveying systems in plants. Studies show that as much as 40% of plant equipment problems result from vibration on rotating equipment. Abnormal vibrations or high temperatures signal potential failures due to imbalance, misalignment, wear, or improper use. Monitoring these deviations increases uptime, extends mean time between failures, and prevents catastrophic failure. Handheld devices are used to measure vibrations in less-critical assets, but this manual process can miss timely detection, leading to unplanned downtime, production loss, and higher energy consumption. Also, conventional, wired condition monitoring solutions come at a high cost to prevent unplanned downtime. Due to long installation and planning times wired monitoring solutions are often used for critical equipment only.

For over 75 years, Forbes Marshall has provided innovative products and services to help industries improve their process and energy efficiency. With over 100,000 sensors and 4,000 customers, we are a trusted provider of vibration monitoring systems. In many plants, the technical know-how of vibration monitoring is limited, leading to frequent failures and decreased productivity. Our Cat III and IV vibration analysts and rotor dynamics experts read high-resolution data to identify emerging issues, perform root cause analysis, and offer real-time actionable insights. This blend of robust solutions, expertise, and customer support ensures >95% uptime and efficient performance of rotating equipment.
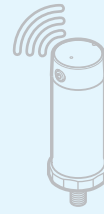
Installation and Data Collection

- A robust wireless sensor that measures tri-axial vibration and surface temperature over ultra-wide bandwidth (upto 6.3 kHz)
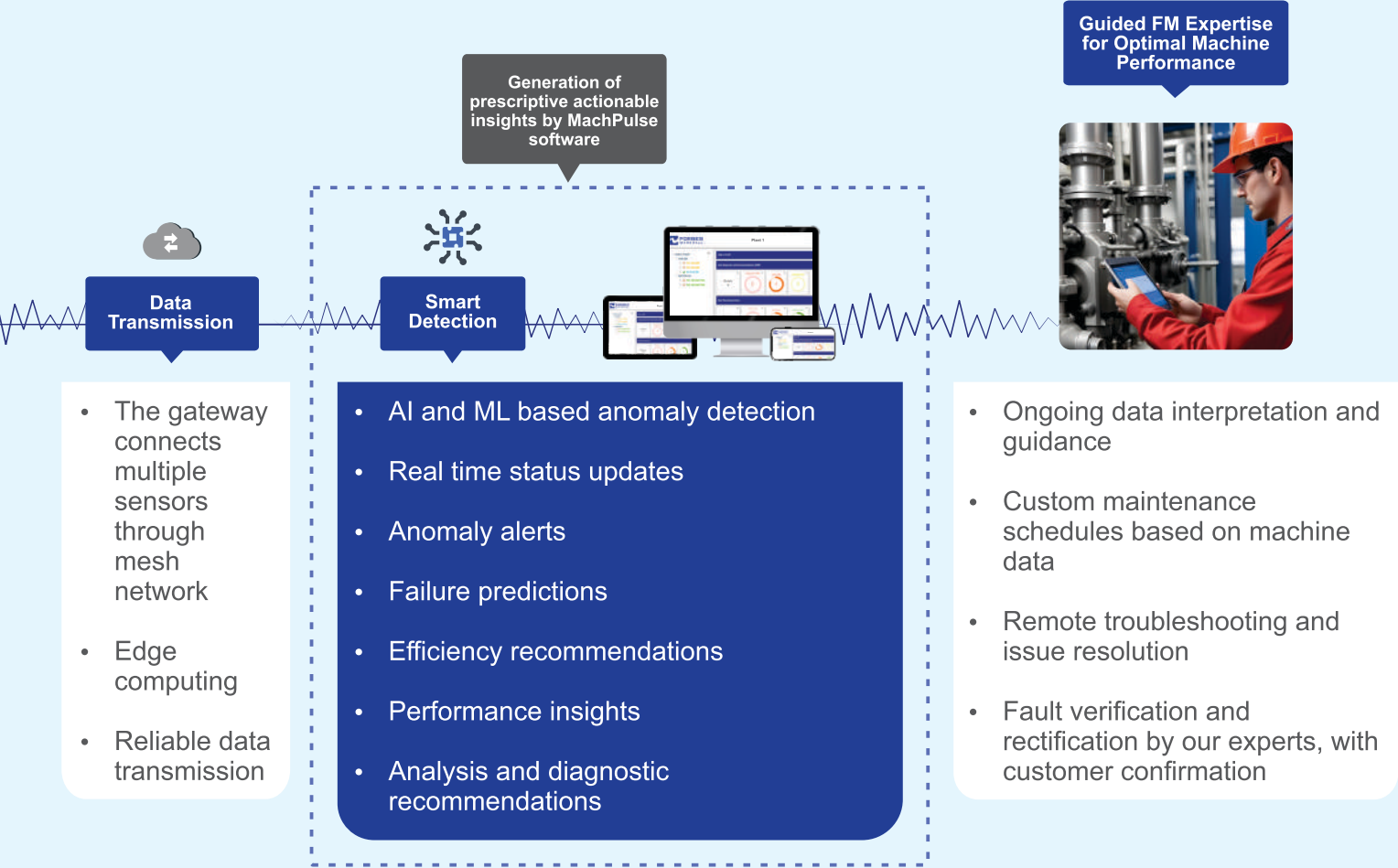
Benefits

Improved Uptime with Early Detection

Reduces risks of unplanned production shutdown by taking a proactive approach

An Innovative And Improved Approach

The Forbes Marshall AI and ML based condition monitoring is a unique solution that, in combination with Forbes Marshall cloud service, allows you to remotely view the operating status of all the pumps and other rotating equipment at your facility. Wireless sensors attached to the pump measure temperature and vibration in three axes and allow to optimise preventive maintenance and enable troubleshooting.

Guided FM Expertise for Optimal Machine Performance

Generation of prescriptive actionable insights by MachPulse software

Data Transmission

Smart Detection

- The gateway connects multiple sensors through mesh network
- Edge computing
- Reliable data transmission

- AI and ML based anomaly detection
- Real time status updates
- Anomaly alerts
- Failure predictions
- Efficiency recommendations
- Performance insights
- Analysis and diagnostic recommendations

- Ongoing data interpretation and guidance
- Custom maintenance schedules based on machine data
- Remote troubleshooting and issue resolution
- Fault verification and rectification by our experts, with customer confirmation

Increased Energy Efficiency

Monitoring various parameters can indicate situations in which machines are not running at their highest efficiency.

Reduced Total Maintenance Cost

Advance diagnostics reveal the causes and areas of anomalies and detailed analysis helps users practice optimum, efficient maintenance thus ensuring cost savings and operational efficiency
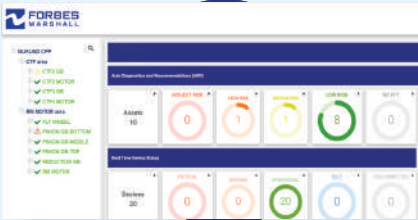
Minimised Safety Environmental Risks

Added safety to the equipment enhances energy efficiency and promotes an environmentally conscious, cost-effective approach

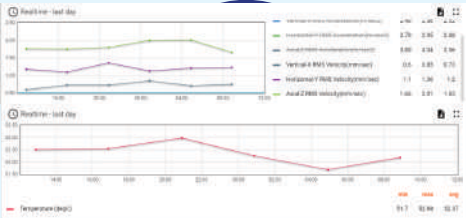# Real-time Insights
For Enhanced Uptime

Asset-wise machine health summary

It visualises real-time machine health, enabling informed decisions and proactive performance management.


Machine Diagnostics (Trend & FFT)

Trend and FFT analysis provides diagnostics for predictive maintenance, early fault detection, and optimised machinery performance.


Auto Diagnostics and Recommendations (ADR)

ADR reports use sensor data to monitor performance, detect issues, and predict maintenance needs. This boosts efficiency, reduces downtime, and maximises uptime.
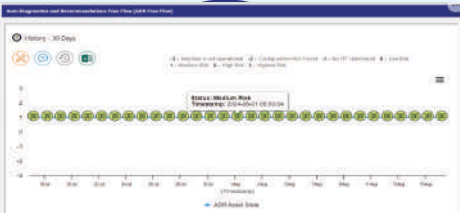
Machine Health Score

The timeline offers a historical view of machine health, aiding in tracking conditions, identifying issues, and planning proactive maintenance.
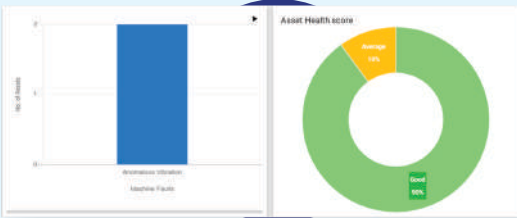
- Continuous monitoring

- Identification of recurring issues

- Informed decision-making

- Proactive management

- Enhanced operational efficiency

Asset Wise Alarms

Asset Wise Alarms generate notifications for individual assets, guiding maintenance teams to prioritize actions promptly.
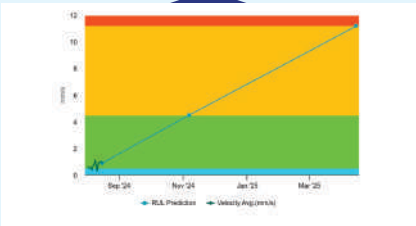

Remaining Useful Life Measuring Point (RUL)

RUL estimates how long machinery can operate before failure, optimising maintenance and preventing downtime. RUL estimates how long machinery can operate before failure, optimising maintenance and preventing downtime.

RUL Prediction

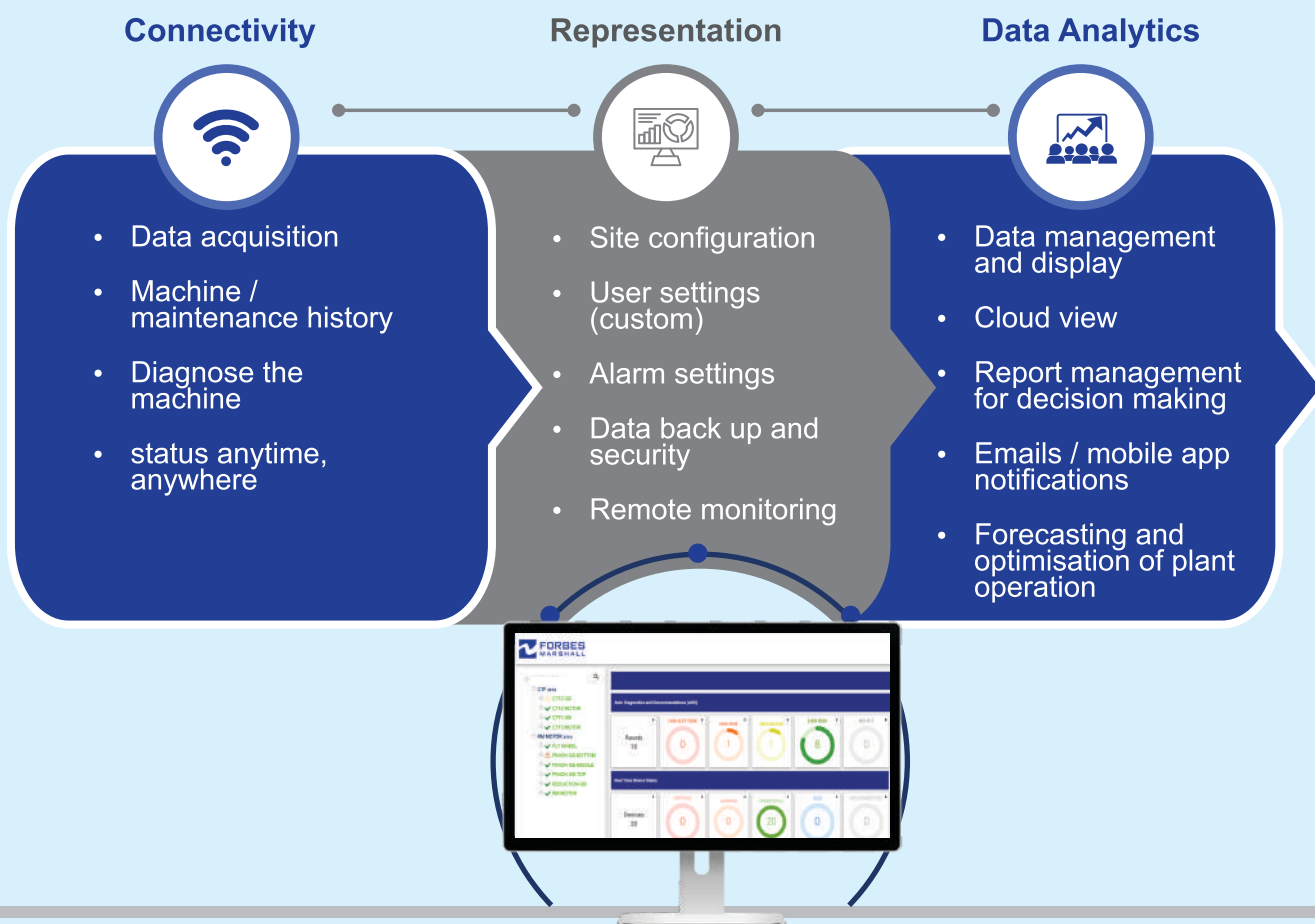| Feature	Time to Warning	Time to Critical	Probability
Horizontal	82 Days	241 Days	65.49 %
Vertical	No Trend To Failure	No Trend To Failure	...
Axial	18 Days	73 Days	53.1 %

Application Areas

- Draft fans
- Forced draft fans
- Primary air fans
- Coal mills
- Coal crushers
- Condensate extraction pump
- Cooling water pump
- Boiler feed pump
- Auxiliary cooling water pump
- Raw Water Pump
- Make up water pump
- Blowers
- Gear Boxes
- Crusher
- Ball mill
- Centrifuges
- HT Motors
- Conveyors
- Air compressors
- Paper mill

Condition Monitoring with _MachPulse™_ Analysis and Diagnostic Software

The MachPulse software gives an insight into the health of the rotating machinery. Once the condition is known, the user can have the faults diagnosed. The possible reasons for failure or malfunction are displayed, in order of severity, which can be further evaluated and corrective action planned.

Possible causes of malfunction could include unbalance, permanent bow, misalignment, rotor crack, oil whirl, oil whip, gear tooth failure, looseness and bearing damage.

Connectivity

- Data acquisition
- Machine / maintenance history
- Diagnose the machine
- status anytime, anywhere

Representation

- Site configuration
- User settings (custom)
- Alarm settings
- Data back up and security
- Remote monitoring

Data Analytics

- Data management and display
- Cloud view
- Report management for decision making
- Emails / mobile app notifications
- Forecasting and optimisation of plant operation

What We Do

Hardware and Software

- Supply and installation of wireless sensors, gateway
- Initial setup service including equipment registration, email setting for alarm notifications and customisation of Monthly report templates
- One-year subscription to MachPulse

Prescriptive Insights

- Specialised assistance from subject matter experts (Cat III and IV vibration analysts)
- Root cause analysis report based on real time data and trends for timely action
- Monthly plant machine health assessment report

Expert Services

Forbes Marshall's **MachPulse**™ not only enhances machine reliability, and reduces downtime but also empowers your team with the tools and knowledge to maintain peak performance across your operations

Remote Monitoring and Diagnostics
Continuous monitoring of machinery health through wireless sensors. Operators can access real-time data from anywhere, enabling immediate action when issues arise.

Data Analytics and Reporting
Trend Analysis and Reporting
Utilise data analytics to identify long-term machinery performance trends. This aids in proactive decision-making and optimising equipment reliability.

Automated Diagnostics
Generate automated diagnostics reports, customisable for various stakeholders. This streamlines maintenance planning and ensures consistency in issue detection and resolution.

Alarm and Notification Systems
Configurable alarms deliver real-time alerts, allowing proactive issue resolution before problems escalate, ensuring smooth and uninterrupted operations.

Expert Services
Our Level III and IV experts offer in-depth analysis and recommendations, helping you optimise machine performance and extend equipment lifespan.

Training and Support
Remote technical support to troubleshoot issues quickly and efficiently.

Customised Solutions
MachPulse offers tailored solutions to fit your specific operational needs, providing customised sensor setups, reporting features, and expert services.

Customer Speak

The Forbes Marshall MachPulse with its Smart Wireless sensors and A&D software has revolutionised our maintenance, allowing early issue detection and preventing costly downtime. Their proactive training and protocols ensure seamless and efficient operation.

- Thermal Power Plant in Western India

Forbes Marshall's MachPulse has made our operations smoother by reducing downtime and significantly boosting machine reliability. We've experienced a noticeable improvement in overall plant performance.

- Steel Plant In South India

Energising Businesses and Communities Worldwide

CANADA
UK
USA
TURKEY
SAUDI ARABIA
EGYPT
UAE
INDIA
BANGLADESH
MYANMAR
THAILAND
VIETNAM
MALAYSIA
SINGAPORE
INDONESIA
NIGERIA
KENYA
SRI LANKA
COLOMBIA

● SALES AND SERVICE OFFICE
● MANUFACTURING, SALES AND SERVICE OFFICE

A Multinational with indian Roots

18 Countries

37 Offices Worldwide

18 Distribution Centres

500 Sales and Sevices Engineers

8,000 Customers Worldwide

World Class Technology from World Class Facilities
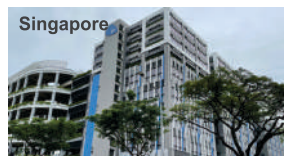
Chakan, India

Pimpri, India

Hyderabad, India

United Kingdom

Singapore

Enabling Results

Process Efficiency

Energy Efficiency

Optimum Productivity

Improved Asset Uptime
95%

Environmental Responsibility

Safety and Regulatory Compliance

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Codel International

Krohne Marshall

Forbes Vyncke

Forbes Marshall Steam Systems

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