

# Preventive Maintenance Systems Applications

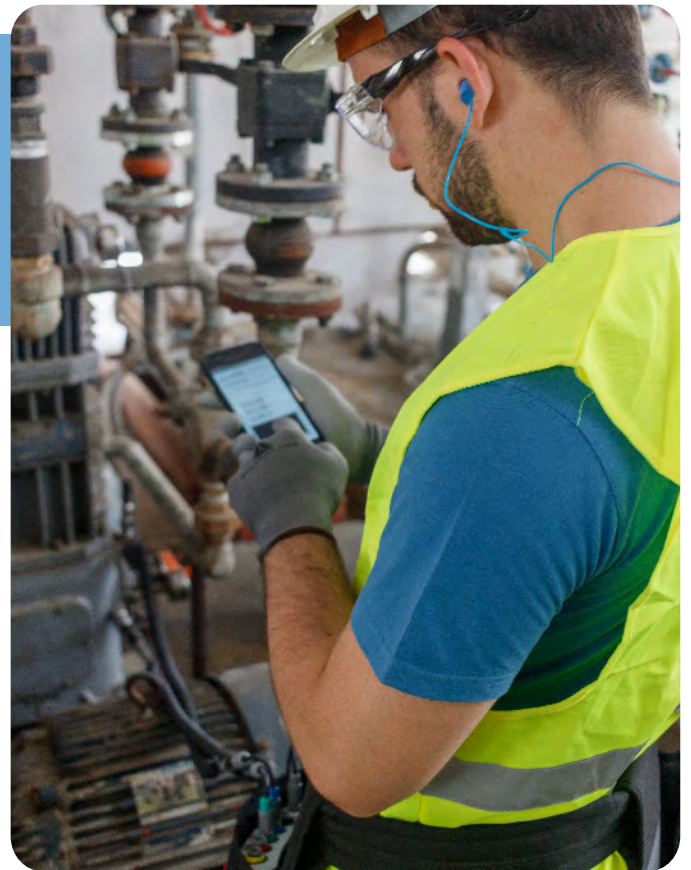
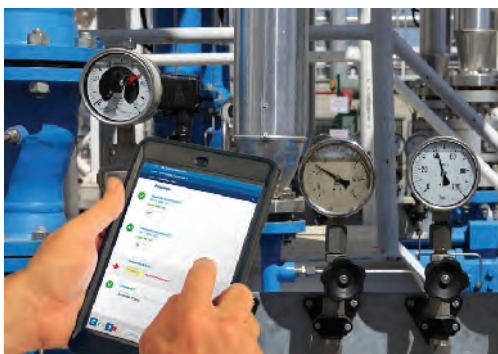
## General purpose industrial data collection

These platforms combined with a PC, a smart phone/tablet, offer the capacity for storage and high speed analysis, or real-time FFT analysis of any dynamic analog signal source. Applications include measurement of acceleration, acoustic emissions, airborne/structure borne ultrasounds, strain, torque, pressure, temperature, thermography, humidity, voltage, current. They can meet the demands of the various data acquisition applications:

- Electronic forms/asset Management
- Data Collection and management
- Remote Control

Measurement types: Overall, Spectrum, Time waveform, Phase, Spectral Band Alarm

Identify by: Plant, Train, Machine and point ID, Point description, Units, Alarm Levels, Previous Measurements, Alarm Types. Conformity with international classification and hierarchy standards.



## Vibration Analysis

Vibration analysis is one of the most common predictive maintenance technologies for rotating equipment in the industry today. Through the utilization of instrumentation, equipment condition is monitored and internal component faults are identified, measured, and quantified. Through this process, critical failure of mechanical equipment can be avoided while extending the life cycle of monitored equipment.

### Route based vibration analysis application

The utilization of vibration analysis for rotating equipment can cover a broad base in today's modern industrial environment. The scope of component coverage would include motors, gearboxes, agitators, compressors, pumps, fans, blowers, bearings, grinders, hammer mills, presses, extruders, etc. If it "turns on a shaft", your component of equipment can effectively be monitored under a proactive vibration analysis program.

## Cost benefits of vibration analysis

### Component only replacement reduces equipment costs

Instead of replacement of the entire piece of equipment due to critical failure, the repair is made prior to failure and the cost is minimized to the price of the component and the labor needed for the repair.

### Component only replacement reduces labor costs

Repairs are scheduled and the amount of time for the repair is reduced because of component replacement instead of equipment replacement. Also, the frequency of repair for critical failure of equipment will be reduced and the amount of “critical callouts” will be greatly reduced.

### Component only replacement reduces lost production time

Component only replacement is scheduled with production to take place during scheduled downtime. Unscheduled downtime may cost thousands of Euros per hour. A proactive maintenance department can head off critical failure downtime by scheduling repair during non-productive times.



Offered by technology implementation:

- Detect and Track progressing stages of Bearing Failure.
- Identify Imbalance and Misalignment.
- Identify/correct Resonance.
- Identify Mechanical Wear in couplings, bearings, support structures, etc.
- Detect other defects such as: Lube failure, soft foot, broken rotor bars, pump cavitation and many more...

## Common Uses of Airborne and Structure borne Ultrasound Technology

### Valves & stems

Valve activity such as leakage or blockage can be accurately checked while the valve is on line. Properly seated valves are relatively quiet while leaking valves produce a turbulent flow as the fluid moves from the high pressure side through the leak to the low pressure side. Due to a wide sensitivity and ultrasonic frequency selection range, all types of valves even in noisy environments can be accurately tested. Valve stems may be quickly tested for leaks to atmosphere.

### Pressure/vacuum leaks

As any gas (air, oxygen, nitrogen, etc.) passes through a leak orifice, it generates a turbulent flow with detectable high frequency components. By scanning the test area with, a leak can be heard through the headset as a rushing sound or noted on the display/meter. The closer the instrument is to the leak, the louder the rushing sound and the higher the reading.



### Steam Trap Inspection

Major steam trap manufacturers have recommended ultra-sound inspection of steam traps as one of the most reliable methods available. By converting the ultrasonic elements of a working steam trap into the audible range, allows users to hear through headphones and see on a display/meter the exact condition of a steam trap while it is on line. Blow-by, machine gunning, oversized traps or line blockage are all easily detected.

### Reciprocating Compressor Valve

**Analysis** has become so successful, with many engine analyzer companies now offer instruments with an ultrasonic input port.

## Bearing Inspection/Monitoring

Bearing inspection is easy. Requiring only one test point and very little training, users will learn to test bearings within minutes.



## Prevent over-lubrication

By simply lubricating only until the meter reaches a specified level. Over lubrication is one of the most common causes of bearing failure.

## General Mechanical Inspection

of pumps, motors, compressors, gears & gear boxes: All types of operating equipment may be inspected. Since instrument works in a high frequency, short wave environment, problems such as cavitation in pumps, compressor valve leakage or missing gear teeth may be heard and isolated.



## Electrical Inspection

Arcing, tracking, & corona discharge produce ultrasound at the site of emission. These electrical discharges can be located quickly by scanning an area. The signal is heard as a frying or buzzing sound in the headset. Test: switchgear, transformers, circuitbreakers, busbars, relays, insulators, and other electrical gear.

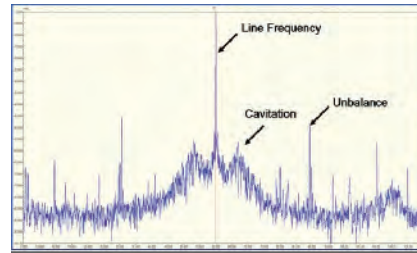
**Vacuum.** The tube sheet is scanned for the tell-tale rushing sound produced as the leak draws air into the tube.

**Pressure.** Additional testing may be performed when the system is off-line utilizing air pressure around the tube bundle and scanning for the rushing sound produced from the leaking tube.

## Motor current signature analysis

Motor Current Signature Analysis (MCSA) is a technology used for analyzing or trending dynamic, energized systems. Proper analysis of MCSA results assists in identifying:

- Stator/rotor winding health
- Rotor Health
- Air gap static and dynamic eccentricity
- Transmission health, including direct, belted and geared systems
- Load issues and efficiency
- Bearing health



## Industrial & marine Diesel engines thermodynamic analysis

- Estimate power produced per cylinder
- Determine peak cylinder combustion and compression pressure for each cylinder
- Conduct heat release rate analysis and determine the heat release rate diagram per cylinder
- Diagnosis of cylinder-piston wear
- Determination of fuel injection timing (static and dynamic)
- Determination of ignition delay per cylinder
- Condition monitoring of fuel injectors, nozzles and fuel pump
- Determine the fuel consumption per cylinder.
- Condition monitoring of turbocharger
- Condition monitoring of charge air cooler
- Offer the basis for Diesel engine condition based maintenance
- Optimization of engine operation. Balancing of power produced per engine cylinder, reduction of engine bsfc (break specific fuel consumption)

