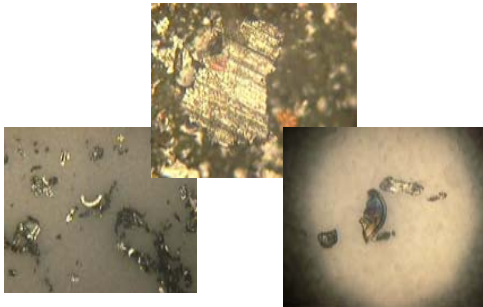


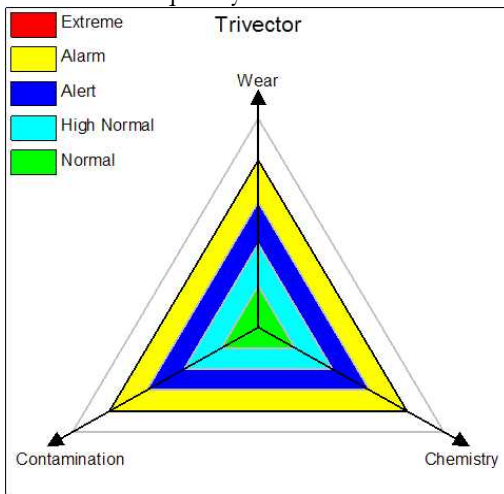
Oil Analysis

Oil sampling and analysis is a great tool for identifying the condition of machinery lubrication. Wear, chemistry and contamination are the health indicators of oil. Changes in any of the three conditions will shorten the life of the machine and, in some cases, lead to immediate failure.



Metal that belongs somewhere else, not in your oil!

Viscosity breakdown, ph unbalance and metal generation all lead to shortened machinery life. By monitoring and trending multiple oil parameters an accurate assessment of machine health and oil conditions is quickly established.



Services

- ✚ Vibration Data Collection and Analysis
- ✚ Infrared Data Collection and Analysis
- ✚ Airborne Ultrasonics Data Collection and Analysis
- ✚ Oil Sampling and Analysis
- ✚ Portable Dynamic Balancing

Onsite Customer Training:

- ✚ Infrared
- ✚ Vibration Analysis
- ✚ Airborne Ultrasonics

Consulting Services:

- ✚ Customer Assistance in Data Analysis and Collection for Infrared, Vibration Analysis, Airborne Ultrasonics, Oil Analysis, Motor Current Analysis
- ✚ Electric Motors Failures
- ✚ Root Cause Failure Analysis
- ✚ Remote Sensor Installation and Testing
- ✚ Visual Inspections

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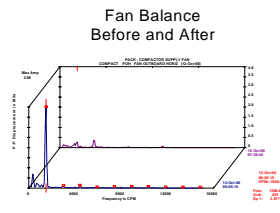
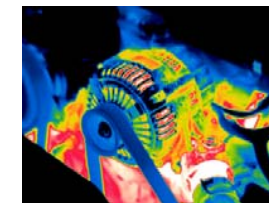
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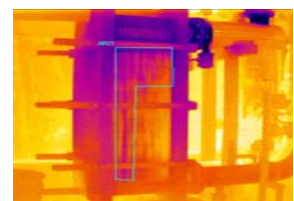
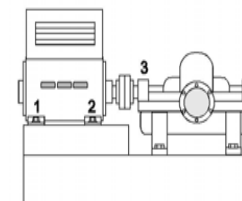
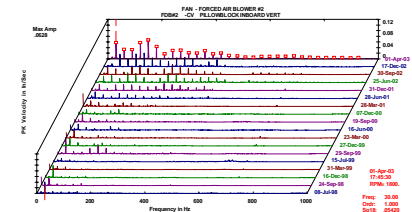
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Excessive Bearing Housing Clearances




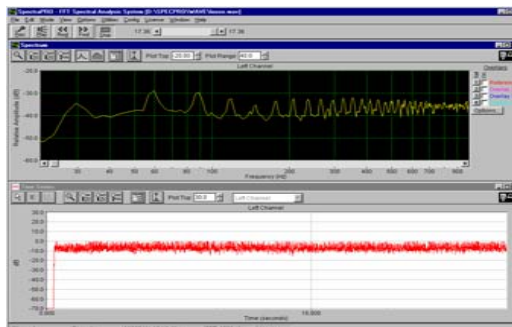
Airborne Ultrasound

Used to identify airborne leaks of:

- ✚ Compressed air/gas
- ✚ Steam
- ✚ Vacuum
- ✚ Valve seating verification

Most air and steam systems are critical to plant operations. They are not money-generating production equipment, but can a plant run without air or steam? A single air leak 1/4" in size @ 100 psi costs \$12,000/year to leak into space!

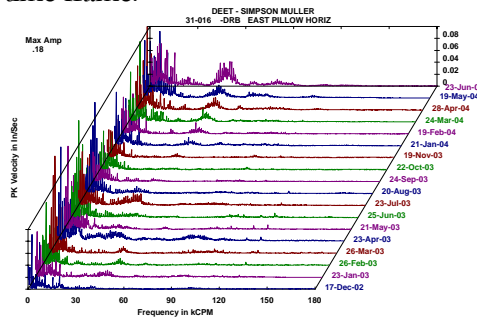
Department	XYZ Customer
Tag #:	0001
Leak Type:	Vacuum
WO#:	456
Comments:	Gasket leaking at flange connection, inlet side of blower

The raw signal from an Ultrasonic gun can be analyzed for frequency content to determine if electrical or mechanical faults exist within the system under analysis.

Vibration

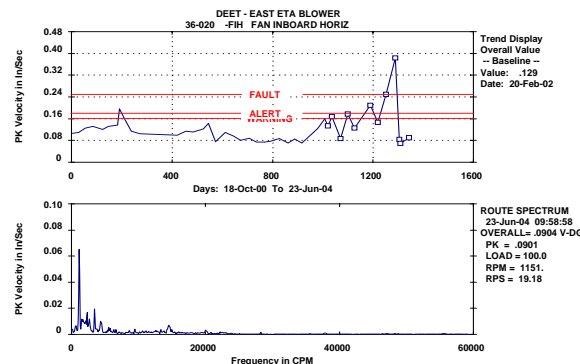
All machines vibrate; how strong the vibration is and the rate at which it repeats itself determines the severity of the fault. The history waterfall below shows developing bearing fault over a two-year time frame.



Vibration Analysis can identify:

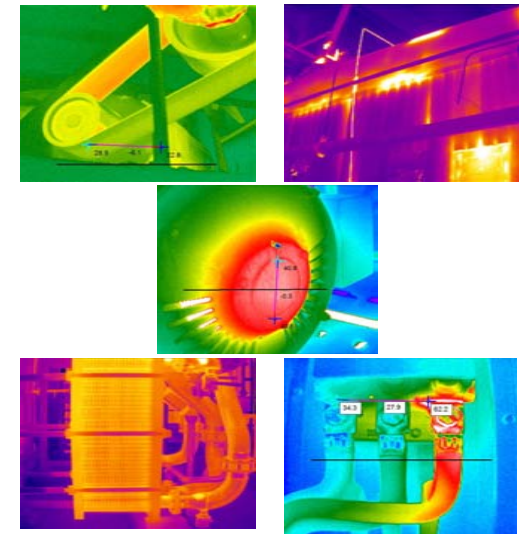
- ✚ Rolling Element Bearing Defects
- ✚ Loose Bearing Mountings
- ✚ Resonance
- ✚ Gear Misalignment
- ✚ Belt Wear and Looseness
- ✚ Sheave Run-Out
- ✚ Fluid and Airflow Problems
- ✚ Misalignment
- ✚ Bent Shaft
- ✚ Bearing Looseness
- ✚ Structural Looseness
- ✚ Gear Wear
- ✚ Cracked or Broken Gear Teeth
- ✚ Chain Wear & Looseness
- ✚ Cavitation
- ✚ Sleeve Bearing Wear and Looseness

Trending a machine's vibration over a period of time warns of impending failure before the machine fails unexpectedly.



Thermography

Infrared can warn of impending failures by identifying excessive spot temperatures or by temperature difference between two common points of interest. Mechanical, Electrical, Rotating Equipment, Stationary Equipment, Buildings, Processes and Lubrication are just a few of the applications for this technology.



Infrared can be used to identify a wide variety of problems including:

- ✚ Electric Motor Inspection
- ✚ HVAC Equipment Evaluation
- ✚ Plate & Frame Heat Exchangers
- ✚ Dry & Fluid-filled Transformers
- ✚ Steam Systems and Traps
- ✚ Flat Roof Leak Inspections
- ✚ Rolling Element & Sleeve Bearings
- ✚ Uninterruptible Power Service (UPS)
- ✚ Cold Storage Cooling Losses
- ✚ Belt Drive Systems
- ✚ Home/Commercial Building Inspections
- ✚ Temperature Verification
- ✚ Tank Level Verification
- ✚ Variable Frequency Drives (VFD)
- ✚ Boiler Refractory
- ✚ Improper Lubrication