

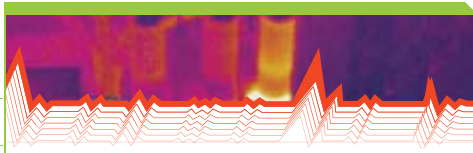
Solutions
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Advanced Technology Solutions™

SERVICE OFFERING

Advanced Technology Solutions, Inc.
416 Creek Side Drive
Fairfax, IA 52228
Voice: **319.845.5177** Fax: 319.845.5166
www.ats-inc.org

Advanced Technology Solutions, Inc.
522 Locust Lane #101
Kansas City, MO 64106
Voice: **866.398.9778** Fax: 816.471.7550
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VIBRATION START-UP:

Taking the time to insure proper set-up will eliminate confusion and errors downstream in the vibration data collection and analysis process.

ATS standard start-up procedures include: review of machine safety and accessibility for data collection, machine database set-up, digital pictures and report template set-up, route determination, data collection intervals, and applicable machine research. This start-up does not include the first collection of vibration data or vibration analysis report.

*One individual from your facility will accompany an ATS technician to review the supplied equipment list

VIBRATION DATA COLLECTION:

Consistent and accurate vibration data collection is the foundation of a successful vibration data collection program. Minimizing variances in collection is critical for accurate data analysis to occur.

ATS vibration data is collected completely from each machine comprising of driving components and driven components. A complete set of data from ATS consists of 3 measurement directions from each bearing location (2 in radial and 1 in axial direction). Based on bearing specific measurements and machine design, multiple measurements are incorporated including but not limited to: Acceleration & Velocity. Data is downloaded and briefly reviewed to ensure data integrity and imminent failures.

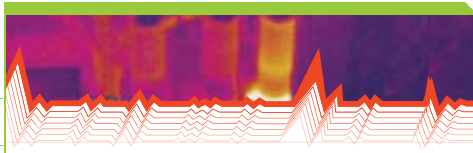


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VIBRATION DATA ANALYSIS:

Accurate vibration data analysis will provide a measure of asset health. This in turn will lead to increased reliability through early detection of machine faults. Trending of the vibration amplitudes allows for the development of a rate of progression, which facilitates the convenient scheduling of repairs prior to failure. Overall maintenance costs and energy consumption are reduced as a result. Vibration analysis will often eliminate reoccurring problems by detecting the conditions that lead to premature failure, such as misalignment or looseness.

Appropriate vibration measurement specifications are paramount in the ATS data analysis process, which are based on expertise in data acquisition and machine design. ATS vibration analysis utilizes all data collection points without the assistance of alarm levels. The final assessment is based on multiple measurements per direction and at each collected location. Severity of the final recommendation will be based not only on the vibration signature, but also on the rate of change observed with respect to historical trending.

Each machine is allotted an entire page consisting of supporting plots, digital image, abbreviated explanation of the analysis, severity assessment and recommended corrective action. Enclosed with each report is a summary which ranks each piece of equipment based on the assessed severity.

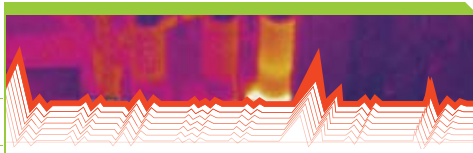


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INFRARED THERMOGRAPHY PROGRAM:

Infrared Analysis is the #1 diagnostic tool to determine premature electrical circuit failure. Utilizing IR within a predictive maintenance program will provide information that will effectively reduce energy consumption, increase equipment reliability, decrease overall maintenance costs and increase safety. The survey may include electrical, mechanical and building applications.

ATS provides accurate and detailed reports by utilizing the latest technology in infrared imaging hardware and software as well as more than 50 years of combined experience.

*We request one technician from your facility to accompany our technician when doing the infrared routes to remove panels and necessary equipment.

STEAM TRAP SURVEY:

A steam system that has not been maintained for a period of time will have a significant number of steam traps that have failed. Approximately twenty percent of the steam leaving a central boiler plant is lost via leaking traps in a typical space heating system without a proper PdM program in place. A routine PdM program should be implemented to detect any waste of energy, efficiency, and dollars. Implementing any type of steam trap maintenance program will be beneficial and the selection of the assessment equipment is of secondary importance.

Using ultrasonic or thermal imaging testing equipment our service technicians can detect plugged, leaking, or blowing steam traps. Thermal imaging is used to identify completely failed traps and traps which perform in a borderline manner. Ultrasonic instruments are used in conjunction with thermal imaging to further define the problem as required. Upon detection, the bad trap location is recorded digitally and with a detailed report.

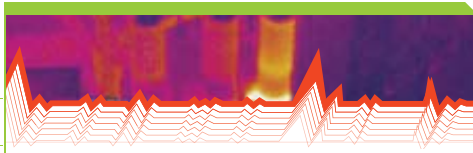


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OIL PROGRAM:

Oil analysis with cooperation from Polaris Labs provides extensive testing and analysis of oils, coolants, fuels and industrial water based fluids. Reports display itemized data and graphs with historical trends for easy observation of changes in the normal pattern. Industrial packages include testing for but not limited to ICP elemental metals, water percentage by Karl Fisher or crackle, viscosity at 40 C or 100 C, total acid number, oxidation and ISO particle count.

Each machine is allotted an entire page consisting of supporting plots, abbreviated explanation of the analysis, severity assessment and recommended corrective action. Enclosed with each report is a summary which ranks each piece of equipment based on the assessed severity.

*Contact ATS for specific customized test packages.

Start-up/Oil Assessment: Includes a review of your current equipment list, collection points, and collection procedures. Recommendations will be given on collection frequencies and proper intervals and tests for analysis. First oil collection will be taken at this time.

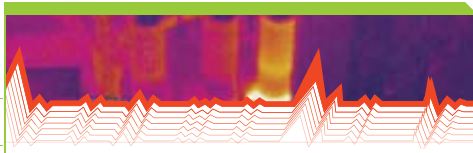


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MOTOR & CIRCUIT ANALYSIS:

Dynamic (online) monitoring combined with comprehensive static (offline) testing enhances motor condition awareness. Both dynamic and static testing are non-destructive methods. Online monitoring of power circuit, overall motor health, load and performance issues can be achieved with the computer controlled portable Explorer II instrument. The offline testing of electrical insulation and circuitry is performed with a computer controlled portable AWA instruments. Static testing includes: winding resistance balance, insulation resistance (IR/MegOhm), polarization index (PI), DC high potential (HiPot), and surge testing (exclusive to Baker Instruments). Surge testing is the only way to detect turn-to-turn, phase-to-phase, and coil-to-coil insulation problems. Dynamic testing includes, but not limited to: voltage level, voltage unbalance, voltage distortion, service factor, overcurrent, efficiency, rotor bar, operating point, torque ripple, load history, haystack, and operating condition test.

ATS will perform non-destructive online and offline testing from the motor control center to the motor, anomalies will be documented and addressed in a detailed report.

ULTRASONIC LEAK DETECTION:

Utilizing Ultrasonic Leak Detection within a predictive maintenance program will keep your system running more efficiently. Whether it's a part of an energy conservation program or as fugitive emissions; leaks cost money, affect product quality and can wreak havoc with the environment. Ultrasonic Leak Detection can often locate the problem, whether the leakage occurred in a liquid or gas system.

ATS will provide the labor and technology required to survey your facility and identify each leak. Identification will consist of tagging each leak and documenting each location through digital imaging and summary report.

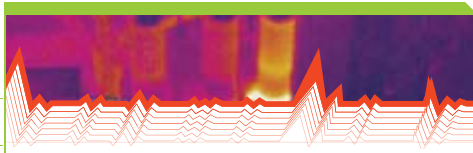


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BALLBAR ANALYSIS:

Ballbar measures contouring errors in machine centers that are only apparent when the machine is in motion by converting data into a plot, which displays the true movement of the machine. From this recorded movement, the actual tolerance of the machine can be calculated and compared to the acceptable part tolerance. This value will drive appropriate corrective action plans.

Ballbar data will quantify faults in the machine center such as; servo mismatch, stick-slip error, straightness of the axes, lateral play, backlash, reversal spikes, circularity error, scale and machine geometry. Each of the above conditions can be trended over time.

ATS report will include a plot of the machine's true movement, table listing of quantifiable errors, and recommendation on how to improve the machine performance. Severity assignments are based on the difference between the actual machine performance and the required part tolerance.

LASER MEASUREMENT:

Before you begin cutting or processing material, you need to know that your machine center or system can perform the task at hand. With Laser Measuring you can gain a picture of how each characteristic of a machine's positioning performance is varying over time. Laser measurement equipment can actually improve machine performance through targeted maintenance and error compensation. You will be able to predict when maintenance work is required prior to producing inaccurate parts.

Your customers need confidence that you are producing a consistent quality part, this measurement might give you a competitive advantage over other suppliers whom might not perform such tests.

ATS will perform the laser measurement testing and the inconsistencies will be documented and addressed in a detailed report.

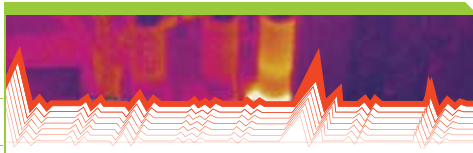


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PREDICTIVE MAINTENANCE TRAINING:

Introduction to Predictive Maintenance and Vibration Analysis

Course Description: Key components in implementing a successful predictive maintenance program, real life case studies of several ATS client's PdM programs, introduction to concepts of force and vectors, fundamentals of data acquisition, basics of analog to digital conversion, characteristics of vibration in machinery, diagnostic of common faults in machinery and instruments for vibration detection. Class can be conducted on-site or at ATS training facility. Class size will be limited to ten attendees.

Advanced Vibration Analysis

Course Description: Advanced studies of vibration analysis and instrumentation, signal filtering techniques, machine fault diagnostic, understanding and setting effective alarms, advanced measurement techniques, case studies. Class can be conducted on-site or located at ATS training facility. Class size will be limited to five attendees.

***Prerequisite:** Introduction to Predictive Maintenance and Vibration Analysis Course & Minimum of 6 Months of Field Experience

Recommended In-house Vibration Program Training Schedule

ATS will assist and train with vibration equipment, collection and analysis. This will include: Identifying critical pieces of equipment, establishing collection routes on equipment, identifying appropriate bearing points, creating a machine database, overseeing route collection, downloading of files into database, overview of data collector, and on-site assistance with vibration analysis.

*Contact your ATS representative for Customized Training Program.



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