IRTC
predictive maintenance

INFRARED - ULTRASOUND

PREDICTIVE MAINTENANCE & CONDITION MONITORING

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MISSION STATEMENT

Our Aim is your Gain, in predictive condition monitoring techniques. Our experienced consultants can help you uncover dangerous situations which may arise with your equipment which the naked eye cannot see. Infrared and Ultrasound is a powerful risk management tool, reducing downtime, loss in production, damage to plant equipment, property or personnel, fewer insurance claims and for insurance coverage purposes. Helping you maintain your equipment and meeting your targets.

INTRODUCTION INTO INFRARED THERMOGRAPHY AND ULTRASOUND

Infrared thermography and ultrasound surveys. You've probably heard about these high-tech tools used to spot problems in electrical systems and equipment. But do you really understand the process, and the possibilities that infrared and ultrasound surveys offer to improve safety, operations and and efficiency?

WHAT MAKES INFRARED AND ULTRASOUND USEFUL

1. **It is non contact**:
Keeps the user out of danger.
Does not intrude upon or affect the target at all.

2. **It is two dimensional:**
The image or sound allows for excellent overview of the target.
Thermal or sound patterns can be visualised for analysis.

3. **It is real time:**
Enables very fast scanning of stationary targets.
Enables capture of fast moving targets.
Enables capture of fast changing thermal patterns.

WHAT THE HUMAN EYE CAN'T SEE

MAINTENANCE

As maintenance departments have become major cost centres within industrial plant organizations, more management attention is being applied to reducing maintenance costs while maintaining operability and reliability. Through the application of best practices and with the use of sound technical expertise, a world class maintenance program can be achieved which can result in significant reductions in maintenance costs and savings associated with unplanned outages and equipment failures. To achieve these cost benefits some basic concepts should be considered:

- Corporate Philosophy
- Asset Management
- Maintenance Planning
- Predictive Maintenance
- Proactive Maintenance
- Performance Measurement and Tracking
- Continuous Improvement

ELECTRICAL SYSTEMS

Infrared - Ultrasound is commonly used for electrical inspections. As electrical connections become loose, corroded or damaged there is a resistance that can cause an increase in temperature and sound. This increased temperature can then cause components to fail, potentially resulting in unplanned shutdowns, costly repairs and often injuries. In addition, the efficiency of an electrical grid becomes low prior to failure, thus energy is spent generating heat, causing unnecessary use of energy increasing emitions and safety hazards. If left unchecked, heat can rise to a point that connections melt and break the circuit. As a result, fires may occur.

Thermal imaging has evolved into one of the most valuable diagnostic tools used for predictive maintenance (PdM). Thermal imaging, also called thermography, is the production of non-contact infrared, or “heat” pictures from which temperature measurements can be made. By detecting anomalies often invisible to the naked eye, thermography allows corrective action before costly system failures occurs. Portable infrared (IR) imaging systems scan equipment and structures, then instantly convert the thermal images to visible pictures for quantitative temperature analysis.

SAVES TIME, MONEY, LIVES AND IMPROVES SAFETY, EFFICIENCY AND PRODUCTION

MECHANICAL

Most people today think of infrared thermography as a tool used to detect problems with electrical connections. But that represents only one segment of the array of applications and potential benefits when this technology is properly conducted by qualified personnel.

Finding the “Hot Spots”

Infrared thermography is a non-destructive technique for detecting “hot spots,” which are temperature differentials that may indicate problems such as excessive friction,out alignment, oil viscosity, or load imbalance in machinery and mechanical systems. Other uses for this technique include finding defective or leaky steam traps and clogged steamed lines, as well as many other conditions which can lead to failure or energy loss.

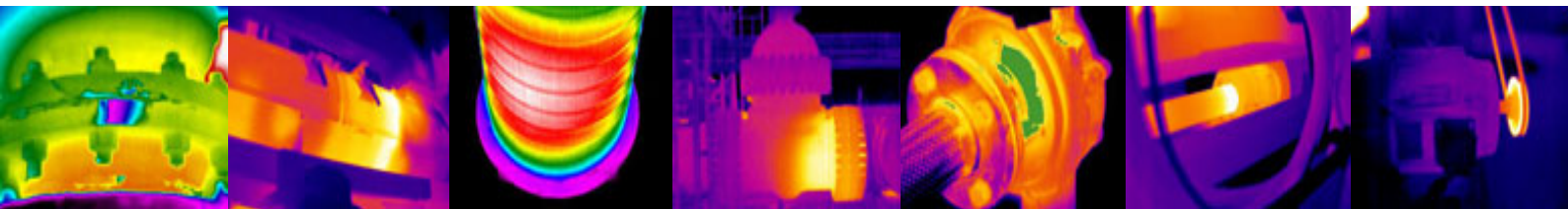
Mechanical

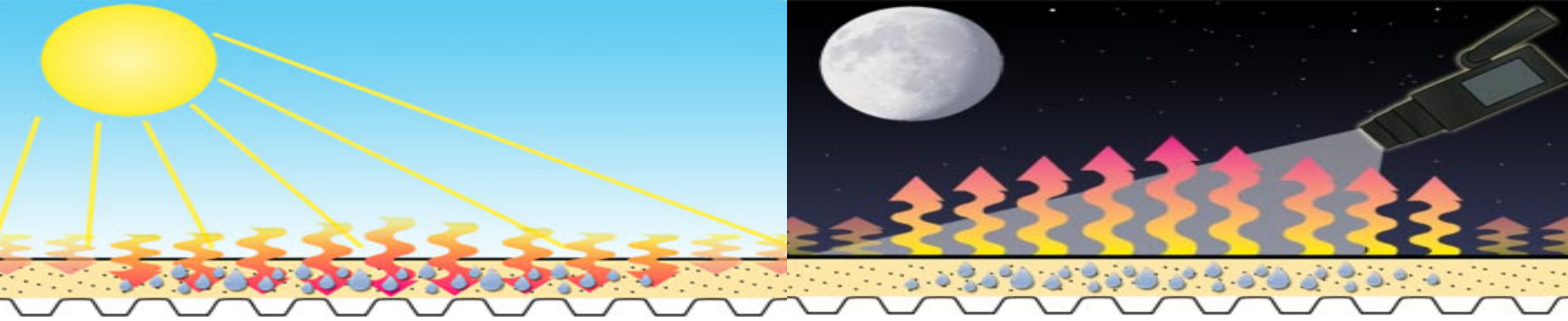
Equipment can face an inherent problem with excessive friction, if not lubricated properly. As one example, a motor is spinning with its rotor in near contact with the bearing surface, of which there is but a thin film of lubricant separating the two surfaces. If the lubrication breaks down, or misalignment takes place, or excessive loads are applied, there will be elevations in the amount of heat generated. Infrared thermography can be used to help detect these conditions. Of course thermography is not limited to just motor bearings. It can also detect problems in gears, couplings, pulleys, conveyors, chain drive and many more systems.

Refractory/Insulation

Infrared an application that is considered as a cost saving. It addresses problem that is often hidden from the daily view of preventive maintenance, and can result in an expensive drain on plant performance. The refractory and/or insulation of boilers, heat treat ovens, refrigerated spaces, driers, and buildings all represent places where the slow and undetected loss of a desired control to the atmosphere can increase operational costs or unscheduled shut downs.

ALL OF THIS AND MORE





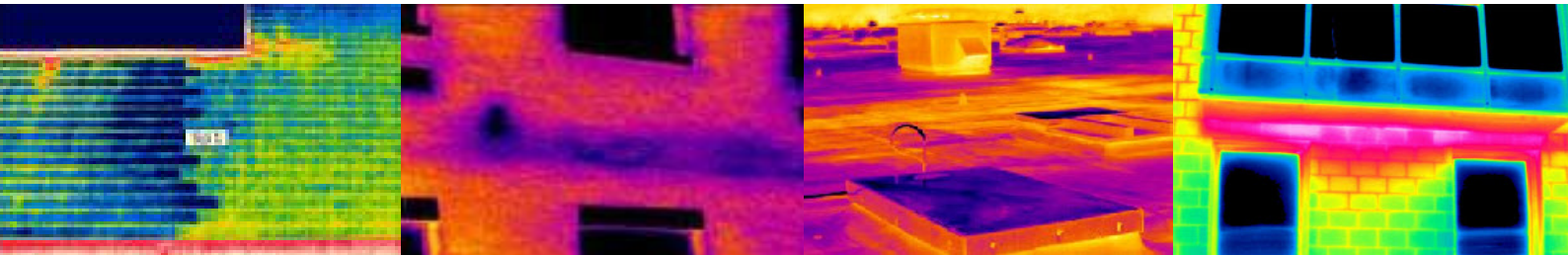
INFRARED AND BUILDING

Inspecting buildings for heat loss was one of the first commercial uses for infrared thermography. In very hot or cold climates, poor insulation can lead to condensation problems and the degradation of the building materials itself. Badly designed, poorly constructed, poorly maintained, leaky buildings are not energy efficient and often have moisture and mould problems leading to brick and mortar integrity. In some cases, damage to the building is caused by insufficient ventilation and/or an under-designed or over-designed HVAC system. Preventive/predictive maintenance in buildings of all types is very uncommon. First, all buildings should be kept dry during the construction process. Then, all buildings should also be surveyed within a few months after construction or major renovations to the structure, the thermal envelope, the moisture envelope, the HVAC system and Electrical systems.

ROOF SURVEY

A well prepared, graphic and accurate map of the infrared signatures of a roof can be of tremendous benefit to a building roof owner at all stages of the roof's limited life. Knowing where the subsurface moisture is located will help the roof owner manage his assets. This form of predictive maintenance works well on many types of flat and low slope roofs. Here are the basics: At night, areas of roof moisture are warmer, because the accumulated heat (from daylight sunshine and heat) in the trapped water mass is greater than in the dry, functioning insulation or roof substrate. After sunset, as the roof's structure cools down, the wet areas of roof insulation and other materials maintain higher temperatures because of their higher mass, allowing the infrared cameras to detect the sources of heat and record them for later analysis. There are two ways to perform IR roof moisture surveys: on-roof and aerial. On-roof thermographers walk from roof to roof looking for subsurface moisture patterns and when found, mark the extremities of these areas on the roof with paint. Aerial IR is used when the owner wants to document the wet areas with straight-down photos. The biggest advantage of aerial infrared is not its use on roofs that have well-defined areas of moisture at all, but those roofs that are the most difficult to image from any distance or angle. I am referring to the roofs that, for instance, have a lot of ballast, are covered with reflective coatings or ones that for whatever reason are impossible to image from the roof. With high resolution aerial imagery, slight nuances of temperature can be seen from far enough away to recognize the pattern of heat.

JUDGE THE BENEFITS FOR YOURSELF



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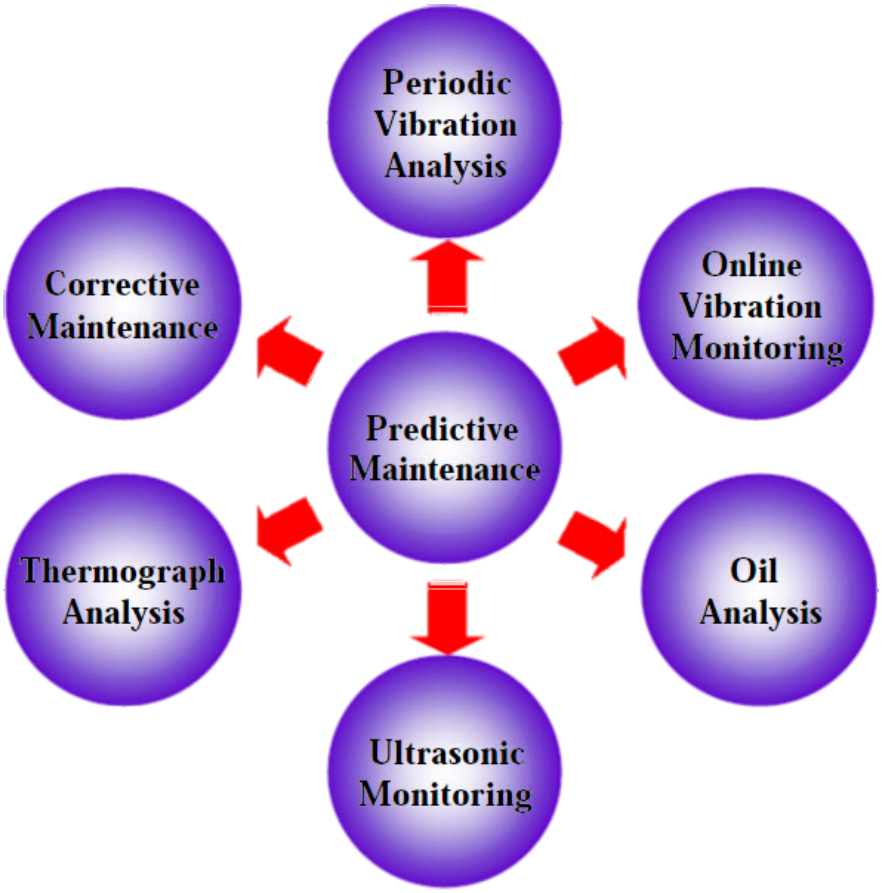
PREDICTIVE MAINTENANCE

Companies use predictive maintenance programs to identify potential failure of components before the components have actually failed. The program allows the maintenance staff to repair components during a scheduled repair window by knowing that a piece of equipment is approaching its failure point this allows the maintenance staff to be proactive instead of being in a reactive mode of fixing equipment only when it fails. By using this method, the maintenance staff can have the proper tools and replacement parts on hand to repair a piece of equipment without the equipment having to be out of service for extended periods of time. Depending on the type of equipment being analyzed the equipment may require different types of testing. Thermographic surveys can improve the predictive nature of maintenance programs by showing where the equipment is generating hot or even cold spots that are not normal in the operation of the equipment. A Thermographic survey using a non-evasive testing routine allows the equipment to remain on line in an operational mode. Once a potential problem has been identified, further testing by other means may be required to pinpoint the cause of the failure. This allows the maintenance staff to make a better informed decisions and ensure that potential problems are addressed in a timely manner.



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COST BENEFIT

The cost of having a thermographic survey preformed can easily be out weighed by the potential failure that can be identified and corrected. A good thermographic survey can identify problems that could lead to overloaded equipment tripping offline or causing a fire. Motors and pumps can have potential bearing problems or shaft alignment problems identified before a motor burns up and has to be totally replaced instead of a minor repair preformed on the motor. In most cases when a single problem is identified the potential loss if that equipment was to fail would easily cost more than the thermographic survey plus the remedial maintenance.

CONCLUSION

This is a reminder to help remind managers and maintenance staff of the importance of performing a thermographic survey. It should also help to remind them to evaluate there therographic program if any or include a predictive thermographic program into there maintenance program and keep it updated at all times.

Not all equipment needs to be included in the thermographic survey. Companies need to continually evaluate what equipment is included in there thermographic survey and to update the thermographic program for new equipment that has been added to the facility since the last survey was taken. Older equipment may not be as critical and used less so longer be required to be scanned and should be removed from the program. A thermographic survey needs to be continually updated and reviewed to insure that it is providing the best data possible.

By having an active thermographic predictive program as part of the maintenance program, the findings can help save companies money and time by helping to eliminate unplanned equipment outages and costly repair costs, not to mention business disruptions.

In these day of 24/7 continuous operations, performing a non-evasive thermographic survey under normal operation will help eliminate potential problems and help maintain the uptime level of the facility.

See How Much Infrared Thermography and Ultrasound Can Save Your Company

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IRTC INSPECTION PROCESS

START

Perform Equipment Scan

Under Adequate Conditions? (Load, Weather, etc.)

No

Yes

Abnormality Found?

Yes

No

Follow Normal Scan Schedule

Problem Identified?

Yes

No

Inspect with Other Technologies?

No

Yes

Schedule Vibration, Ultrasonic, Oil Testing, MCE, etc.

Immediate Attention Warranted

Yes

No

Ad To Thermographers Watch List (IR parking list)

Schedule for Re Scan

Thermographer Writes IR Report and Submits to PM Planner

PM Planner Writes Corrective Work Order, Attaches IR Report and Schedules

Investigate and Repair PM Planner Writes