

THE HVAC FACILITY CONNECTION

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Predicting the future:

Anticipate equipment failures while reducing system inefficiencies

The benefits of preventative maintenance are widely known throughout the HVAC industry. By having a preventative maintenance agreement, a facility manager can take a proactive approach instead of a reactive approach. Reacting to urgent service needs and repairs wastes time and energy and uses money allocated to the operating budget that could be moved toward more profitable activities.

Regular maintenance will reduce unexpected breakdowns, energy consumption and downtime while lowering repair and maintenance costs.

Two predictive maintenance services that are sometimes overlooked when putting together a preventative maintenance plan are thermal imaging and vibration analysis.

Thermal Imaging Services:

A thermal imaging inspection can locate temperature patterns that show the presence of electrical overloading, high resistance connections and refractory breakdown. Finding and addressing these issues can lead to significant savings and improved reliability for HVAC equipment.

Thermal imaging inspections are done under normal operating conditions by specially trained technicians. The inspection will enable the detection of subtle temperature variations which can lead to failures, lost production and safety hazards.

Vibration Analysis:

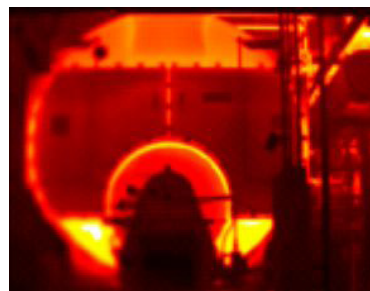
Vibration analysis is another method of predictive maintenance that can help to avoid costly repairs. By having a vibration “signature” for each piece of rotating equipment, subsequent tests can identify impending problems caused by imbalance, wear or misalignment.

Baseline vibration data is recorded at the factory and again after start up at the jobsite. Periodic readings are then taken based on a run-time schedule. These readings are compared with an extensive

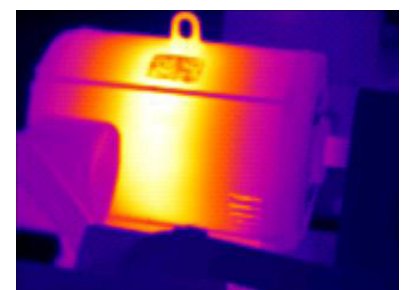
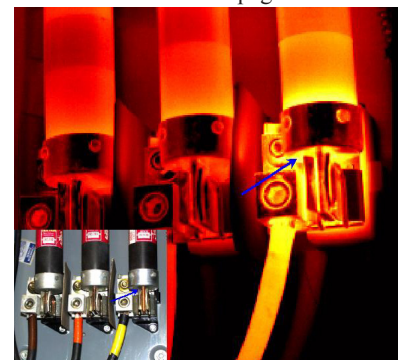
database library for similar machinery. An effective expert system is used to quickly identify possible problem sources.

By having knowledge of acceptable levels of vibration, taking periodic readings of machinery and trending the data from those readings, a trained analyst is able to properly recognize mechanical defects in the early stages. Maintenance personnel are then able to plan in a thoughtful way, instead of allowing the machine to run to failure resulting in high stress and high service expense.

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Thermal Imaging in Practice



UVC Lights Improve IAQ and Provide Unexpected Efficiency Gains

UVC energy, which is relatively new technology for indoor air quality control in HVAC Systems, can provide many advantages beyond improving indoor air quality (IAQ). Thousands of facilities that have installed properly designed UVC systems have gained the benefits of unexpected energy, maintenance and operational benefits.

How UVC Works

Ultraviolet light in the “C” band has been used safely for over 70 years to kill harmful microorganisms in health related applications. As it became clear that the majority of poor IAQ was bioaerosol based and that cooling coils and drain pans were significant contributors, the Heating and Air Conditioning industry sought a possible UVC answer. In the early 1990s the industry responded with a new generation of UVC devices that were specifically engineered to provide peak output under HVAC conditions.

The results from these new devices were significant in the cold and moving air HVAC applications. The UVC devices are able to be installed downstream from the cooling coil which allows UV light to impact the drain pan and other damp locations of the air handling system. The UVC energy zaps the mold and bacteria which eliminates toxins, VOCs, spore production, allergens and general dirt build up.

To explain it another way, UVC acts like the sun on the inside of a building providing regenerative and restorative effects to surfaces and air. By eliminating bacteria that exists in HVAC systems, the lights provide a strategy for reducing the spread of diseases in health care facilities, shelters and other facilities with a high concentration of people.

The response from Indoor Air Quality professionals has been positive as UVC has emerged as a practical cost-effective

solution over alternatives in years past. Previous devices had been difficult to install, costly and at times detrimental to the equipment.

Efficiency Benefits

Facilities that use variable frequency drives (VFDs) often benefit in a shorter time period from the effects of a UVC device, adding this to the long list of benefits from installing a VFD. Users of constant speed fan systems should take care to monitor the fan and damper settings which will allow the facility to revert back to the original specs for energy savings.

The ultimate savings of a UVC device are seen in the capital reductions in power consumption and maintenance. Facilities can realize significant energy savings when they incorporate UVC into their energy saving strategy.

Cleaning Reduction

Not only can costs be reduced by installing UVC devices, but maintenance workers are also able to avoid exposure to the biocidal agents found in A/C systems as well as avoid the chemicals that would be needed for partial removal of the biocidal agents.

When combined energy and maintenance savings are taken into account, the typical payback on a UVC light system is further reduced. Noticeable improvements in air quality and operating performance can be observed in some cases after only two days of use.

Selecting the Device

With the vast selection of UVC devices available in the market place, here are some key points to consider before purchasing:

1. **Has the manufacturer commissioned independent testing to prove output claims?** The device should be

tested by a recognized laboratory in accordance with the general provisions of the Illuminating Engineering Society’s 1981 Applications Volume.

2. **What level of output or intensity does the device deliver?** It takes a very high intensity UVC device to work efficiently in A/C applications. Output per inch of arc length should be no less than 10uW/cm² at one meter in a 400-fpm airstream of 45sæ.

3. **What sizes and configurations are available?** Given the spectrum of A/C systems in today’s buildings, UVC selection is not “one-size-fits-all.” Are different tube lengths and mounting configurations available to suit varying application needs? Will the supplier offer help in sizing the system correctly? If a UVC system is under-designed and not equipped with independently tested fixtures, the devices won’t perform as expected; if over-designed, unnecessary expenses occur.

4. **What is the recommended location for installation of the UVC device?** Evaporator (cooling) coils and drain pan areas are the correct locations for UVC installation, since these tend to be the areas of highest contamination.

5. **What are the materials of construction?** Desirable features include stainless steel housings with high spectral aluminum reflectors, electronic power supplies, and thick-wall quartz tubes.

6. **What are the anticipated changeout cycles?** Properly designed high output tubes last 9,000 hours or one year – about four times longer than some conventional UVC tubes.

7. **What certifications does the device carry?** Most importantly, is it UL-approved? Does it carry patents for materials of construction, applications, and/or

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Providing UV products
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installation methodology? Also, does the device have a proven track record? Look for a customer list that is both sizable and recognizable. Ask for references and documentation on results achieved in actual installations. See if the device has earned any industry awards or other accolades.

8. **Does the manufacturer offer comprehensive technical and engineering support to customers?** Seek out a company experienced both in HVAC technology and the microbiological aspects of UVC. This is especially important with health care, food, and other infestation applications.

Excerpts and information for this feature have been reprinted with permission from the article- *Savings Come to Light: UVC Lights Improve IAQ and Provide Unexpected Efficiency Gains* written by Forrest Fencl and Roger Stamper from Today's Facility Manager, The Source for Building Owners and Facility Executives. (www.todaysfacilitymanager.com)



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Predicting the future (continued)

Because each mechanical defect generates vibration in a unique way, the faults can be isolated, identified and scheduled for service well in advance of an impending failure. The expert system can identify about 150 faults.

Characteristics of good vibration analysis:

- Proper identification of points to be read
- Consistent periodic readings based on a run-time schedule
- Knowledge of normal vibration levels based on:
 - Specific equipment and component identification
 - Equipment job-site start-up baseline data
 - Experience in development and service of HVAC equipment
 - OEM vibration analysis experience
 - An extensive database for comparison to similar machinery
 - An effective expert system that can quickly identify the possible problem sources
 - Data storage systems for fast and accurate information retrieval
 - Trained technicians
 - Cross analysis with other PDM technologies

Benefits of a Thermal Analysis or Vibration Analysis Program

Prevention of catastrophic breakdown which is unscheduled and therefore more expensive and stressful for operating personnel

Improved energy performance

Elimination of preventative maintenance teardowns

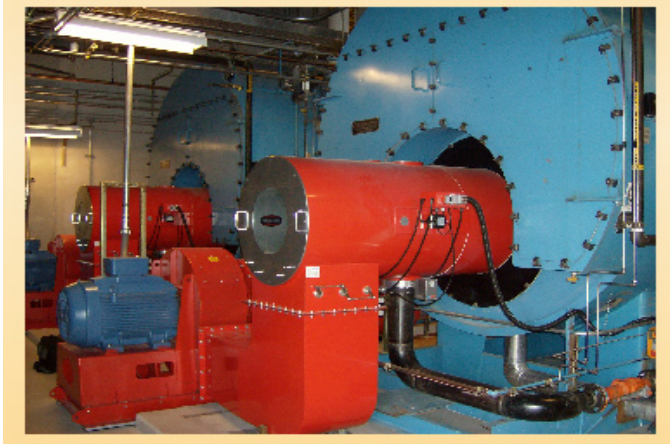
Fast diagnosis of existing mechanical defects to avoid incorrect identification and possible costly unnecessary service

Elimination of standby equipment

Increased machinery safety

Improved equipment quality performance with less downtime and better occupant satisfaction

Prolonged machine life



Guaranteed results

Unequaled performance

**Typical fuel savings
in excess of 10%**

**Can be installed
on most boiler types**

Is your burner protecting your bottom line?

High oxygen levels produced by most burners cool the flame and carry the heat out of your boiler.

What's on your mind?

Concerned about your carbon footprint?

Need to reduce your energy bill?

Rebate opportunities available?

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