

Thermal Imaging

Improved Technologies Increases Diagnostic Capabilities - Saving Time And Money

Robert Kleckner

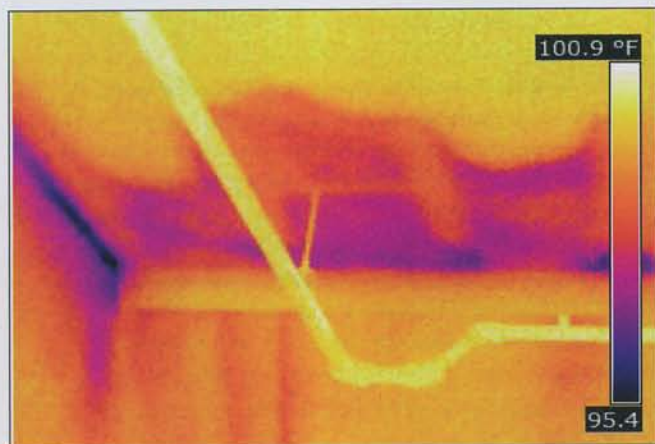
PBS Engineering + Environmental



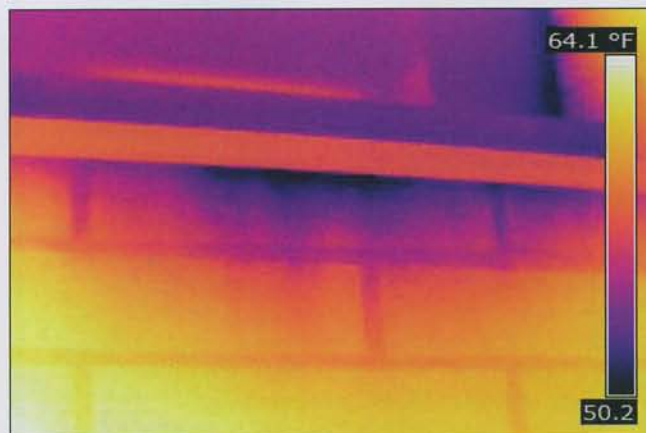
Recent improvements in thermal imaging infrared (IR) cameras have caused this technology to rapidly become an industry standard in the fields of energy management, building science, building forensics, and diagnostics. IR cameras are used in a wide variety of facility operations and maintenance activities. This article describes some of the science behind this technology, how it is currently being used, and the potential benefits to maintenance professionals and operations managers.

THE SCIENCE

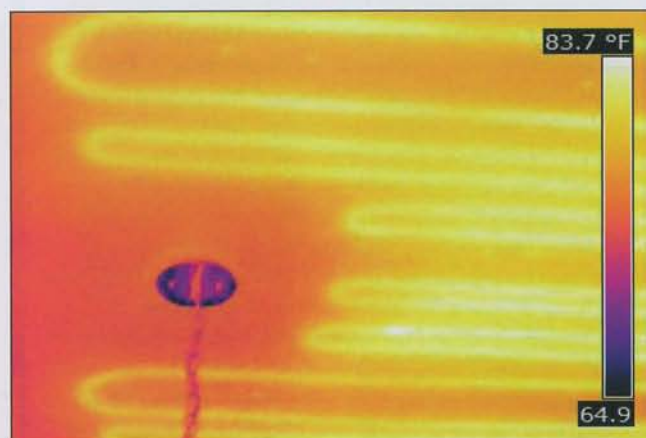
“Thermography” is the science of infrared and thermal imaging. More accurately, it is the use of a thermal imaging device or “IR camera” to view and measure the thermal energy emitted from a given object/surface relative to other objects/surfaces. All objects, regardless of temperature, emit some level of energy. IR cameras have the unique ability to capture this information and display it in a thermal image to be viewed and analyzed. (As shown in the following photos)



Moisture impacted wall and ceiling materials.



Cool air infiltration through opening under window assembly.



Concealed radiant heating coils in ceiling.

TRAINING AND APPLICATIONS

The American Society for Nondestructive Testing (ASNT) provides three levels of certification for thermography – For investigative work a Certified Level 1 Thermographer with experience and training in building science applications is recommended, although not required. Certified thermographers are trained to use IR thermography to identify and interpret what are called “thermal anomalies” or suspect areas of concern. Levels 2 & Level 3 thermographers primarily address IR program implementation and development.

Following are a few of the building-related applications:

MOISTURE DETECTION (BUILDING ENVELOPE FAILURE/WATER LOSS EVENT)

- Identify moisture impacted building materials such as walls, ceilings, floors, carpeting, etc.
- Identification of the moisture source
- Building envelope inspections
 - EIFS/stucco
 - Window assembly
 - Construction defect
 - Concrete slab moisture
 - Water loss event
 - Plumbing failure
 - Post flood
 - Fire/water damage

Roofing

- Identify moisture impacted sections of roofing
- Survey flat roofing systems for leaks; perform inspections prior to warranty expiration

Structures

- Identify concealed radiant heating coils, pads or piping in floors and ceilings
- Identify failures or inefficiencies in concealed radiant heating systems
- Locate steam piping concealed in wall and ceiling cavities
- Assist in concrete slab moisture investigations

Energy Audit/Assessment

- Identify potential area of air loss (heated/cooled) or air infiltration
- Used in conjunction with blower door testing to document areas of air infiltration
- Identify areas of missing or damaged wall and ceiling insulation
- Identify failures in gas-filled window assemblies (argon, krypton); perform inspections prior to warranty expiration
- Identifying malfunctioning electrical panels

BENEFITS TO OWNERS AND MAINTENANCE PROFESSIONALS

Today's IR cameras are more portable and user friendly than ever thanks to improvements in IR technology and advancements made to thermal sensors and thermal resolution. As a result, IR thermography has become a very efficient, non-invasive and cost-effective diagnostic tool used in a wide variety of building-related surveys, inspections

and investigations.

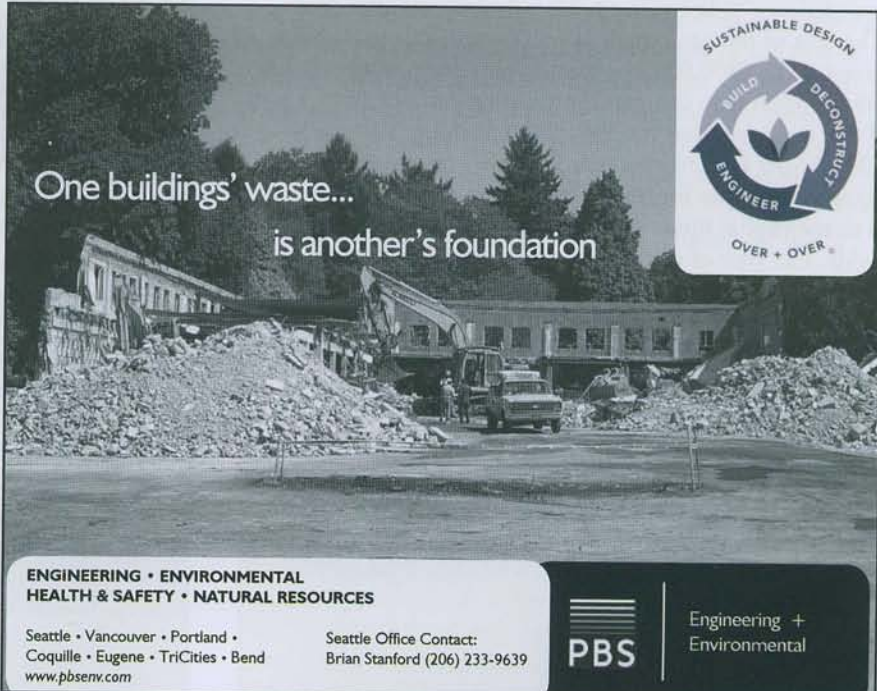
IR cameras provide accurate and real-time information regarding potential moisture intrusion issues in a building/facility. Identifying the full extent and magnitude of moisture impacted materials is critical for successful mitigation. This in turn provides assurance that impacted materials are accounted for. Furthermore, time-lapsed thermal imaging can also provide valuable information on the effectiveness of the drying out process; potentially minimizing the risk of fungal activity.

Proactive roof surveys may detect leaks in the early stages, minimizing widespread damage of the roof and potential impacts to the building interior. Performing a roof survey prior to warranty expirations may provide building/facility owners an opportunity to identify and repair any problems while still under warranty.

Identifying areas of air loss or air infiltration, areas of missing or damaged insulation, or failing gas-filled windows assemblies are all potential energy and cost savings opportunities for the owner.

IR cameras have become a very effective and non-invasive diagnostic tool used in the fields of energy management, moisture detection, building science, building forensics and diagnostics. A few of the drawbacks can be the initial investment of these cameras, which range from around \$4000 to \$20,000, and the ASNT certification training may cost up to \$2000. Therefore, a one-time or smaller facility organization may find it more cost effective to outsource this service.

Robert Kleckner is an ASNT Level 1 Thermographer and a Sr. Project Manager for PBS Engineering + Environmental. He has been with the firm for 15 years and has considerable expertise in Industrial Hygiene and Indoor Air Quality Diagnostics.



One buildings' waste...
is another's foundation

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