

Infrared Thermography - How to Get Started

Written by Rebecca Whitworth, Mine Safety Appliances Co.
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Determine what features are desirable, according to the results you want.

If you are not familiar with infrared thermography and thermal imaging, you may wonder what a thermal image looks like. A thermal image is a black-and-white picture. On a relative scale, it will show hot objects as white and cold objects as black. Temperatures in between are depicted as shades of gray. Some thermal imaging cameras display the images in color that is artificially generated by the camera's video enhancement electronics, based on the thermal patterns seen by the camera.

Several types of infrared sensors are used in thermal imaging cameras today, known as BST and microbolometer focal plane arrays.

BST (barium strontium titanate) is a type of sensor developed by Raytheon Corp. Ceramic-like thermal-energy-sensing material is used to manufacture BST focal plane arrays, which measure heat by storing it as a fixed value (similar to a capacitor) at each pixel. When the grid of pixels, or focal plane array, is monitored simultaneously, a thermal image is generated. Because of their fixed-image properties, BST pixels must be refreshed regularly to maintain the perception of real-time imaging.

A microbolometer is the newest type of thermal imaging focal plane array. Its materials measure heat by changing resistance at each pixel. The most common microbolometer material is vanadium oxide (VOx). Amorphous silicon is a relatively new microbolometer material. There are several manufacturers of this type of infrared sensor.

Match camera to needs

In today's maintenance environment, you will find a need for various levels of thermal imaging capabilities. Several thermal imaging camera manufacturers have taken this into consideration and have developed cameras that fit the bill. Prices for cameras and basic accessories start around \$13,000 and expand as various features are added, to more than \$75,000.

A practical type of thermal imager should match the needs of the user. The more sophisticated imagers have features which may include temperature and analytical analysis. These features may be necessary in some applications because of the level of analysis that is needed.

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To determine the type of thermal imager you need, list the jobs you want your camera to handle, then find the features that meet your needs. You may be surprised to learn that the best thermal imager for your applications comes at a comparably modest cost.

Documenting your findings is an important part of your facility health care records. This can be done in many ways depending on what kind of thermal imaging camera you choose. Thermal images can be saved on a PCMCIA card, 3 in. floppy disk, videotape, and, in some cases, a memory stick. You also may find that recording is not necessary if you are using the thermal imager as a verification tool after a new installation has occurred or after repairs have been made.

Reporting software can enhance the results of thermal imaging. This software offers many features, including colorization of a black-and-white image, temperature measurement, filtering, averaging, isotherm highlighting, and custom report generation.

Many lower-priced thermal imaging cameras that do not have some of the attributes the higher-priced imagers offer can provide the majority of the features through software. Every year management looks at more ways to keep spending to a minimum. It all comes down to the level of sophistication your facility maintenance program requires, what your needs are, and how you choose to accomplish your maintenance goals.

Training is vital

When structuring your facility maintenance program, don't forget training. More and more companies require continuing education and mandate a specific number of hours of training time per year. As budgets are cut for travel and expenses, it becomes harder to fulfill the training time. With many nondestructive testing techniques, training on the equipment and technology is critical so results are accurate and useful.

It is important that users of thermal imaging cameras have training in thermal imaging. Costly mistakes can occur if users are not trained to interpret their findings properly. Is there wet insulation? Is it reflection? Is it the wrong time of day for the inspection? Not enough load? Good trainers in infrared will provide training on imager use, interpretation of images, and include a section on safety while conducting infrared inspections. There are many hazardous environments as well as unknowns in the facility you are inspecting. Remember to make safety a factor as well.

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Training is important, regardless of the difficulty of the application. You can choose from several experienced infrared trainers. They usually conduct a one-week training course in several locations throughout the United States. If you require an in-house training class for a group of individuals, they can tailor a class specific to your needs.

If you are about to purchase one or more thermal imaging cameras, you will need to make a number of decisions about equipment and training. Remember, as with any other tool or instrument, you first need to determine what features are desirable, according to the results you want from the tool. Then you can evaluate the offered features in a more objective way and eliminate those that would bring little or no benefit to your program.

Thermal imaging cameras will continue to play an increasing role in businesses and communities. They save money and time, and contribute greatly to safer and healthier working environments, even saving lives. **MT**

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