

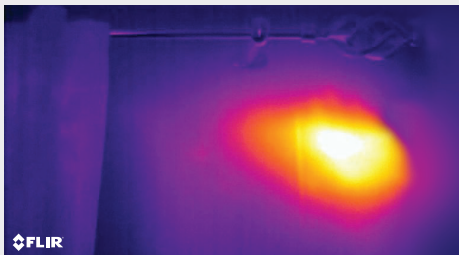
3 Costly and Embarrassing Mistakes that Novice Thermal Camera Users Make and How to Avoid Them

If you are thinking about adding thermal imaging to your inspection program, be sure to avoid these common mistakes. We asked Scott Harris, an ITC certified infrared expert and home inspector with 35 years of experience what to watch out for when getting started.

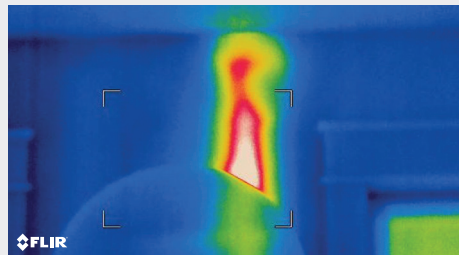
FLIR thermal imaging cameras are amazing tools that help you to see things that are invisible to the eye, and reveal many problems that just can't be detected with other technologies. But learning to understand your world thermally requires some training, even for those of us with subject matter expertise in building inspection, HVAC or electrical systems. So here are a few tips from an expert on how to succeed.

#1 Mistake: Misinterpreting Images

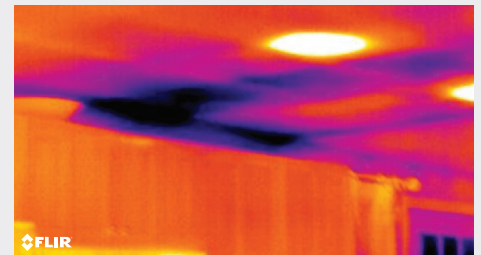
When you are getting started with your first inspection with a FLIR camera, you are going to find lots of interesting anomalies as you walk around a home. There will be cold spots, warm spots, and patterns that might not make sense. The worst thing that can happen is to misdiagnose a problem that is, or isn't there. It could make or break a deal on a home sale, or induce costly destructive measures that could prove you were wrong. Not all cold or hot spots are problems, and even someone with extensive building science expertise can make the wrong call without a baseline understanding of the physics behind thermal imaging and experience interpreting images.



Is this an HVAC leak? An HVAC duct that's in contact with a wall? Is it an insect nest? A light fixture on the outside wall?



Is this an overheated circuit in a wall? Is it a hot water leak? A normal hot water line signature?



This looks like a pretty serious water leak from the roof or second floor of this house? Or is that cold air? Or is it a leaking HVAC vent?

Here are a few practical tips from Scott to help you get started on the right path:

"Learning to interpret thermal images and to identify wet areas, air leaks, potential mold problems, water leaks, termites and other pest infestation, missing insulation and other problems just takes practice. Getting some formal infrared training will help you speed up the learning process and it can lend credibility to your service and give your customers confidence. You will still need some time in the field to develop your skill, and experience is the only teacher. An ITC certification is a good place to start, and there's a lot of free online training available for those just getting started." <http://www.infraredtraining.com/r?>

- "There is a community of infrared trainers and experts in the field that can help you if you find something that doesn't look right or you aren't sure of." http://forum.infraredtraining.com/?_ga=1.185691886.690079860.1428679689

- "Don't make snap decisions on site. If you aren't sure about something, particularly as you get started, take your imagery back to your office and get the image on a big screen before you make the final call and put something in a report. You can always seek the help of one of the ITC instructors or a forum colleague for help."
- "Don't charge extra or advertise that you will include thermal imaging analysis in your reports until you feel confident. You will add value by including a few observations on the issues you are sure of."

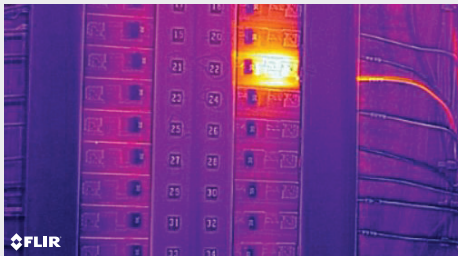
#2 Mistake: Temperature Measurement Error

Fortunately, there aren't too many opportunities for absolute temperature measurement problems in residential real estate inspections, but it's easy to make mistakes when it comes to getting an accurate temperature reading. So how do you avoid making a bad call in a situation where you are relying on a temperature measurement?

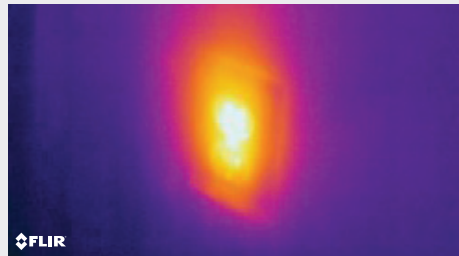
All the products that are designed for home inspection offer some form of temperature measurement. The stated accuracy of these measurements is normally in the +/- 2% range, but that's only part of the story. What the object you are trying to measure is made of can wildly influence the temperature your camera shows. Without an understanding of emissivity and how to adjust for

it, you should not rely on your measurements. This is also true of the distance you are from the hot spot. Cameras with a wide field of view are optimized for home inspections where objects are close. In situations where you might want to measure a small target at a distance, we might recommend a different camera. You should understand your spot size ratio limitation as you consider your camera choice. The low cost, wide angle cameras are a great choice to start with, but understand their limitations.

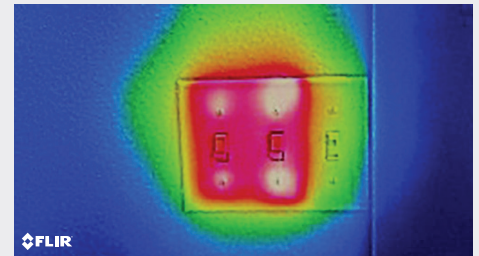
There is a science to identifying electrical problems. Most electrical equipment under load will get hot. So how do you know when something is too hot? And what kind of electrical equipment shouldn't get hot?



Wow, this breaker looks hot. Is this a problem?



Why is this outlet hot when there is nothing plugged into it?



Why is this X-10 dimming light switch so hot? Why are screws over 135°F?

Here are a few practical tips from Scott to help you get started on the right path:

"Use common sense when it comes to absolute temperature measurements and electrical equipment. It's fascinating to see hot electrical gear with your eyes for the first time. In home inspection, it's important to remember that many of the circuits might not be loaded at all unless the family is there running laundry, AC, washers and dryers, lighting, vacuums, and loading up all the other circuits at once. That said, overloaded circuits are easy to find and they are easy to investigate and measure. In the case of the sample images above, the breaker is not overloaded. The wall outlet that seems to be heating up mysteriously was in a circuit that was overloaded after a remodel. The homeowner just tapped into an existing circuit and extended it too far. The strange overheating of the X-10 wireless ceiling dimmer switch proved to be a situation where the homeowner underamped the switch by having too many lights on the circuit."

- "Take the time to learn about emissivity and spot size ratio. It will only take you an hour of training to understand the basics, and it could keep you from making a mistake. The ITC can help with this, or you could read the manual that comes with your camera. It's all in there for those who take the time to read such things."
- "If something can't be explained, get help from the community to be sure. Thermal inspections are performed in most factories and commercial buildings for this very purpose, and most insurance companies demand a thermal inspection to protect against fires before they will insure a large commercial property."

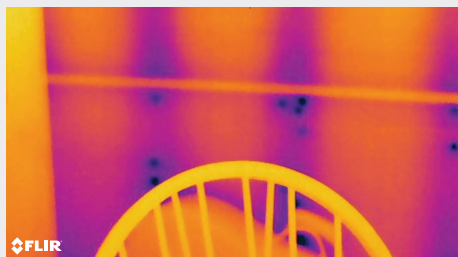
#3 Mistake: Know the limitations of your tool

You are going to be very excited about what you will see and the power you will now possess with any new Infrared camera. But understand that like most tools, expertise takes time, and some of the expert applications may require a high-performance camera. Thermal cameras work differently than visible light cameras. Thermal sensitivity, lens size, detector resolution, and image

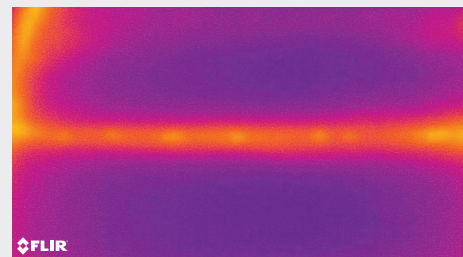
processing all work together to provide a useful image. Some applications require higher sensitivity and resolution than is commonly found in low cost cameras. But in general, most home inspections can be accomplished with entry level cameras.



This image of termite infestation requires high sensitivity and resolution. Low cost cameras will detect about a 1.5°C difference in surface temperature on a painted wall. Expert cameras will resolve as low as 0.02°C.



Drywall screws and studs appear clearly in this high sensitivity image (no problem here), but the ability to detect studs and drywall screws is a function of sensitivity. Under the right circumstances, even a low-cost camera will reveal subtle anomalies.



This stud in an exterior wall is overheated for some unknown reason. You can clearly see the drywall screws. In this case, the low-cost cameras could not detect this problem.

Here are a few practical tips from Scott to help you get started on the right path:

“Expect to buy a camera that will satisfy your need in the longer run if you can. It’s Ok to start out with a low cost camera. A FLIR One PRO or a FLIR C2 or C3 are a fine way to start. You can still use FLIR Tools post analysis software that comes with them. But in the longer term a cell phone camera is pretty fragile (actually, it’s just the cell phone that’s fragile). But the FLIR One pro has a damn good image for the money, and it’s easy to share images and it takes video. The C2 or C3 is a more rugged option and you can pass it around to other folks in your group (if need be) without worrying about what kind of phone they carry. Over time, you can always move up. Just remember that there are some things you probably won’t detect with the entry level cameras. There are some tricks you

can learn to optimize how and when problems show up. You can learn about these tips in the ITC classes.”

“You can always rent a higher performance camera if you need one. Opportunities will present themselves to you if you develop a skill with the technology.”

So what’s next?

Talk to Scott TalktoScott@FLIR.COM.

All emails to this address go directly to Scott

Talk to one of our ITC trainers at 1 866 TRAINIR

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