

# 12

## THINGS TO KNOW BEFORE BUYING AN INFRARED CAMERA

A guide for investing in infrared

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## **12 Things You Should Know Before Buying an Infrared Camera**

Purchasing an infrared camera is exciting, but different for all people. For some, cost is crucial whereas for others, certain key features may be more important. Most of us, however, want a high level of quality and value.

In the mid-1960's, FLIR brought the first commercial infrared camera to market. Today FLIR is a global leader in the field. Having been the world's largest infrared camera manufacturer and having operated the world's largest training organization – the Infrared Training Center or ITC – we've learned a thing or two about infrared. Below we share some of that knowledge in "12 Things" – important advice that will help you find an infrared camera that really suits you specific needs.

Also, please note: We say "infrared camera." We could just as well have said "thermal imager," since they are interchangeable terms.

# 1. Choose an infrared camera that delivers accurate, repeatable results.

Imagine you bought a calculator – and after a month you noticed that sometimes when you added two-plus-two it didn't add up to four! Even worse, imagine that since you assumed that your calculator always would work, you had already used it every day at work without noticing any problem. But then one day, you started getting upset calls from several of your important contacts – concerning strange and severe errors caused by miscalculations from you.

You wouldn't be happy, to say the least. What's more, depending upon the errors made, you would at best have a few apologies to make – or you could be in serious trouble.

Said differently, a basic requirement of your infrared camera is to produce accurate and repeatable results – just like a calculator.

You should always make sure that the camera meets the industry accuracy standard:  $\pm 2\%$  or  $2.2^\circ\text{C}$ , whichever is greater.

So if you are shopping for a camera, and you learn that the accuracy spec is "plus or minus 5 %" or something higher than  $2.2^\circ\text{C}$ , then stop right there and look for another camera instead.

Why? Because an infrared camera that could be 5 % inaccurate could – just like the calculator in the example – get you into serious trouble. Your images and temperature measurements will be wrong.



A basic requirement of your infrared camera is to produce accurate and repeatable results. Well, there are two other aspects to making this work over and over again.

In order to produce accurate and repeatable results, there needs to be “inputs” in your camera for both emissivity and reflected temperature, as shown with the red arrows in this picture.



If you don't know what “emissivity” or “reflected temperature” mean, it's not a problem. This is industry jargon and in the process of buying an infrared camera, you will familiarize yourself with these terms later.

Just know that, as in our example, you wouldn't buy a calculator that is missing the plus (+) sign button – even if it had a really low price.

If you are offered an infrared camera without an onscreen place to input both emissivity and reflected temperature values – then you're buying a calculator that's missing a button!



## 2. Buy an infrared camera with high detector resolution/image quality.

Just like a digital camera, the more the pixels, the better the resolution, the sharper the infrared image.

Let's create another example. Let's say you just bought a High Definition TV – but in your area, you can't receive a HD signal yet. So you say to the salesperson "I need to hook up my new HD TV to my regular (i.e. non-HD) TV-jack. Will that still give me a High Definition picture?"

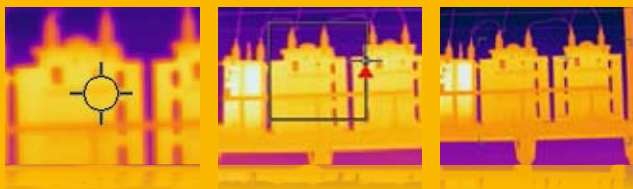
Of course, the answer is "No, it won't work," since the regular TV-jack does not offer the exceedingly high pixel count of HD.

So, even with a TV capable of displaying HD, if there's no High Definition feed, it just won't work no matter how good the display is.

It's the same with infrared cameras.

In our example, let's assume that the "feed" or the "HD cable access" is really the "IR detector pixel resolution" and the TV itself is the "LCD display."

Here you need to be aware: if a salesperson says, we offer "640 x 480 or 307,200 pixel resolution," your next question should be: is that "detector resolution" or "LCD resolution?"

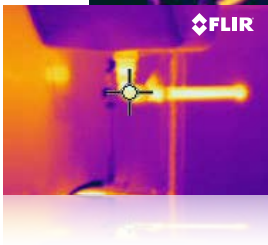


The LCD display resolution may well be 640 x 480, or capable of displaying 307,200 pixels (640 multiplied by 480) of image content. But if the IR detector pixel resolution (the “feed”), is only 160 x 120 or 19,200 pixels, then the display resolution capacity is irrelevant.

Said differently: **you can't get a lower detector resolution to “broadcast” in higher definition, even if the LCD display has the capability to show more pixels.** Or: you can't make your HD TV work with a regular TV-jack!

Always ask: what is the detector resolution, what is the detector pixel count? This is really the true resolution of the camera you are about to buy. If you look at this, then yes, the more [detector] pixels, the sharper the thermal image.

640 x 480 pixel resolution



320 x 240 pixel resolution

# 3

## 3. Look for a product where you yourself can change the battery.

This is one of the most important aspects of usability after you buy your new infrared camera.

If your battery died on your cordless drill and you had to plug a cord into your drill and wait two hours for it to recharge, well, then you would probably want a different drill. It sure is frustrating to start working on something and then have to completely stop because something simple just won't work right!

The same is even truer for infrared cameras. Because if you're using your camera to inspect electrical problems, or to inspect important assets like motors and pumps and production lines in a manufacturing facility, and your IR camera loses power, you could expose yourself and others to risks – particularly in an electrical substation that hasn't been inspected in awhile. At a minimum, you're on the clock, so it is most likely costing you – or your company – valuable time.

Here's the scoop on power management systems for IR cameras:

- Always buy an infrared camera that allows you to “pop-in/pop-out” a new battery as shown in the picture. Whether they call this “field replaceable” or “portable” doesn't matter. Just make sure it's quick and easy to change the battery yourself.
- Be sure that you can get an extra battery and a battery charging station.



Replacable battery



Charging station



Lithium Ion Battery

- Battery technology has come a long way in recent years, so it's reasonable to expect that the infrared camera you're buying uses Lithium Ion battery technology. These will have a clearly longer battery life.
- Finally, some manufacturers offer car/truck chargers allowing you to charge the battery in the camera compartment in a car or truck – a real benefit in certain situations.

# 4

## 4. Get an infrared camera that outputs standard JPEG format.

You shouldn't buy an infrared camera that requires additional software in order to convert proprietary thermal image formats into a standard jpeg. That would be like buying a computer that isn't Microsoft Word compatible.

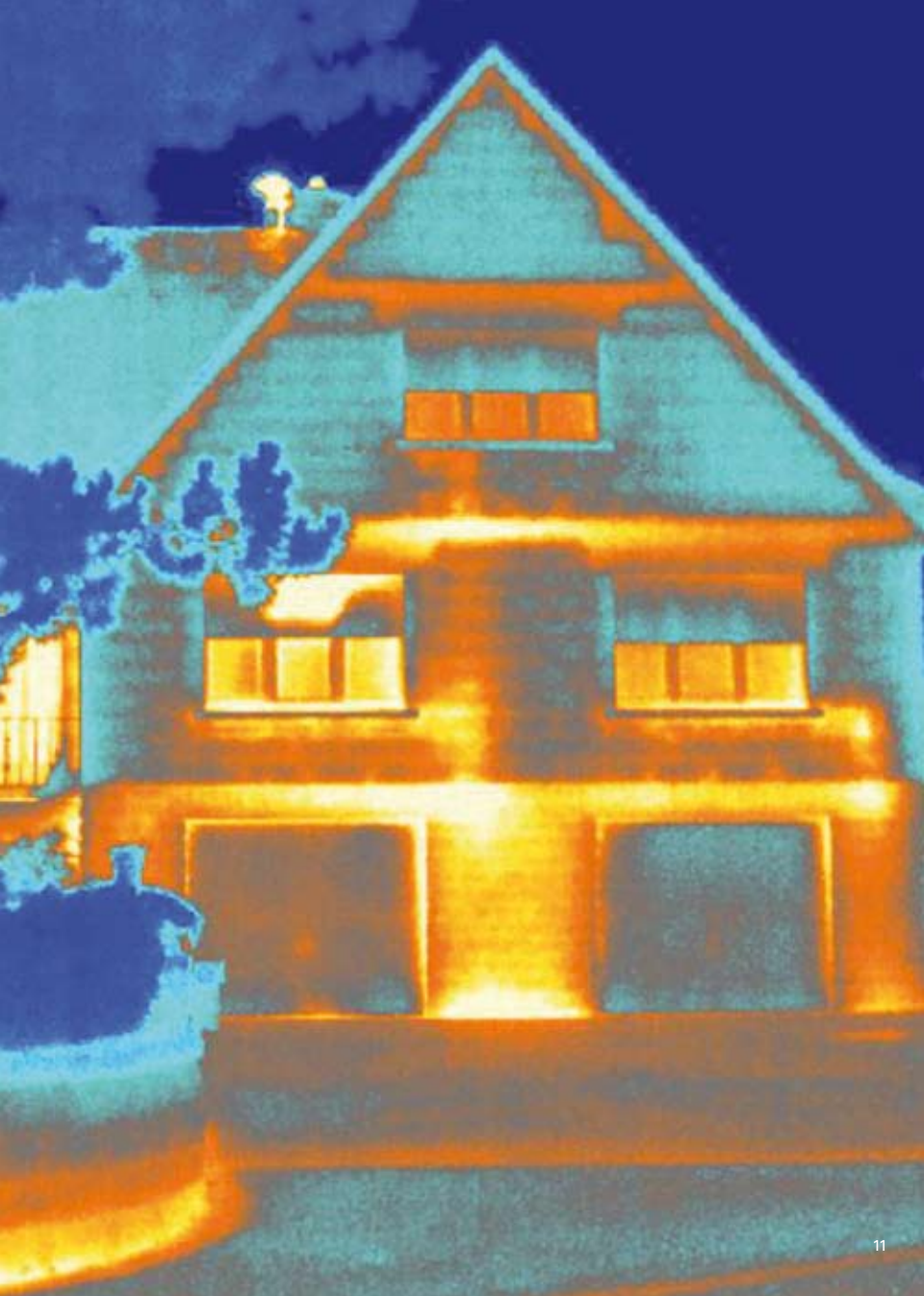
You should demand a demo from any infrared camera manufacturer so they can show you both (1) how many keystrokes or "clicks" it takes to output and image and (2) outputting a standard JPEG right from the camera. Standard JPEG makes it easy to email your images and effortless to place them within Microsoft Word documents.

A FLIR camera delivers a fully radiometric JPEG. This means that all your temperature data stored in the thermal image on your infrared camera is automatically transferred to the industry standard JPEG formats. Said differently, you get to keep all your temperature data stored in the JPEG – even when you email it to a colleague, supervisor, customer, etc.

You buy a camera for the sharp infrared picture and for the temperature measurement data in those images. After all, that's why they call it a "infrared camera". If you took infrared images but then, when you send them over email, it strips out all the temperature data, it's like a mobile phone camera that only transmits in black and white!



**Before you decide which camera to buy, you should really decide whether or not you want the ability to send fully radiometric JPEGs over email.**



# 5

## **5: Look for a lightweight, ergonomic camera for extended or frequent use.**

Weight, pure and simple, is a concern. A camera that weighs even just a pound or two more than another will start to cause back and arm strain within 20 minutes. Lightweight is key, especially if you will use the camera frequently or for extended periods.

The smaller, lighter and more ergonomic the camera, the more likely you will be able to hang it off your work belt in a holster to give you hands-free control. Be careful here, however, because a manufacturer can make a holster any size. Most “toolbox” infrared cameras today should weigh less than 1 kg and feel very easy-to-grasp in your hand.

The infrared camera’s physical interface – its buttons – is critical to its ease-of-use. Often an extra button or keypad will actually make it easier to use your infrared camera, as opposed to trying to do the same functions with less buttons. Some cameras even have integrated onscreen (even “touch screen”) keypads or sketch-with-a-stylus functionality. These may cost a bit more, but the added functionality is significant and should be seriously considered.

The on-camera buttons should also be easy to use, but more importantly, intuitive to understanding what function each button delivers. In some instances, manufacturers can also make infrared cameras for the military, where the buttons must be literally certified for battlefield conditions.

FLIR has done a good job transferring the ease-of-use and durability it puts into its military-grade infrared cameras into its commercial infrared cameras. In addition to improving ease-of-use, it can also be more relevant in harsh manufacturing or extreme heat/cold weather environments.

It's critical that you get a demo and walk through the various day-to-day activities you will perform: saving an image, downloading to your PC, creating a simple report. Why? Because until you see firsthand how many clicks and steps it will take you with any given infrared camera/software package, you will never know if the system will work well for you. Some infrared cameras require multiple steps to do a simple task, and some simple operations can be buried deep within some difficult-to-use menus.

**Get a demo on the basic functions!**



# 6

## 6. Buy a camera with built-in visual camera and lights to help clearly document your work.



Regular cameras require well-lighted conditions and high resolution to generate clear, sharp pictures. Infrared cameras see in total darkness.

Would you buy a digital camera to take family pictures without a flash? Of course not! Why? Because you know you're

going to run into situations where night is approaching, or the room just isn't well lit. When you're in a commercial environment, you will run into these situations often.

### Take a look at these pictures.



The images are taken with the IR camera's built-in visual camera. The photo on the right is taken with an IR camera that also has LED lights. The visual image on the left is the same target taken with a camera with no LED light. Big difference!



## 7: Choose an infrared camera with a built-in laser pointer.

Safety, convenience and ease-of-use are all good reasons to buy an infrared camera with a built-in laser pointer. These tend to be available on all cameras, except for the real entry-level models.

Safety is always the best reason to spend a little more on the right tool. If you shouldn't be touching the target you're looking at with an infrared camera – say for example, an electrical box, motor, pump or something when viewed from a ladder – then the laser pointer helps you in two ways.



The laser pointer keeps your hands free and clear from danger while allowing you to point to the area of concern to someone nearby. It also allows more than one person to fixate on the problem in front of them.

Secondly, the laser pointer helps you orient yourself in relation to the target. This is particularly true if you are standing more than 3 meters away from the target.

**The laser pointer allows you to see precisely where the infrared camera's lens is focused.** It's ideal in gaining more orientation in dark environments, even if you're standing closer to the target.



# 8

## 8: Buy an infrared camera with software upgrade potential.

Most infrared cameras come with free software to help you analyze your images and create reports. They are a helpful tool made all the more necessary by both the corporate need to document findings, but also increasingly to use infrared images and reports to substantiate or trigger insurance claims. The reports themselves are often sold to commercial and consumer customers for a wide range of inspections: energy audits, electrical inspections, gas detection surveys, building envelope analyses and predictive maintenance surveys.

These entry-level freeware programs are helpful and useful. But many users quickly find that they need more software functions.

**So be sure there is an upgrade path when you buy a new infrared camera.**

**And also: always get a demo for the infrared camera that's one level above what you're thinking about buying.** This way you will know what features and functions you're giving up if you buy the less costly model. If you then decide to buy the less costly, you will know what you're missing and this, in and of itself, is an education in infrared.



When you get the demo, you can always ask to see the software upgrade and its features and functionality. We suggest you use this chart for reference:

ITEM DESCRIPTION	FREE SOFTWARE	UPGRADED SOFTWARE
Word Document		
Image manipulation in word		
Instant report generation		
Movable PIP/Fusion		
Report Customization		
Trending		
Archiving		
Formulas		
ArrowTool		
Digital Zoom		

# 9

## 9. Find an infrared camera with adequate image fusion capabilities.

There's been a lot of buzz about fusion capabilities with infrared cameras. Our thinking on fusion is that the most important thing is to make sure you get the right kind of image fusion functionality that will allow you to carry out your work in the best way. If you have a too "simple" Picture-in-Picture (PiP) functionality when you really would need to be able to do image alterations and move the infrared overlay "box" around, you will soon feel that it's not helping you as much as it should.

Instead, be sure that that you can do basic image alterations, such as being able to move the "infrared box" around or even make it bigger or smaller. More advanced fusion capabilities allow you to stretch and resize the infrared PiP using a stylus pen right onscreen, making it possible to customize your fusion to the exact target. This can be ideal for analyzing the problem and when you need to present documentation to supervisors or customers, this enhanced fusion capability will make a favorable impact.

Some infrared cameras will even allow you to select an interval of temperatures to be displayed as infrared on the visual image into one composite image. This can produce exceptional results and exceedingly smart reports.

Rule of thumb: if you're looking at an infrared camera with built-in fusion capabilities, be sure it is advanced and flexible enough to fit your work related needs.

Visual image

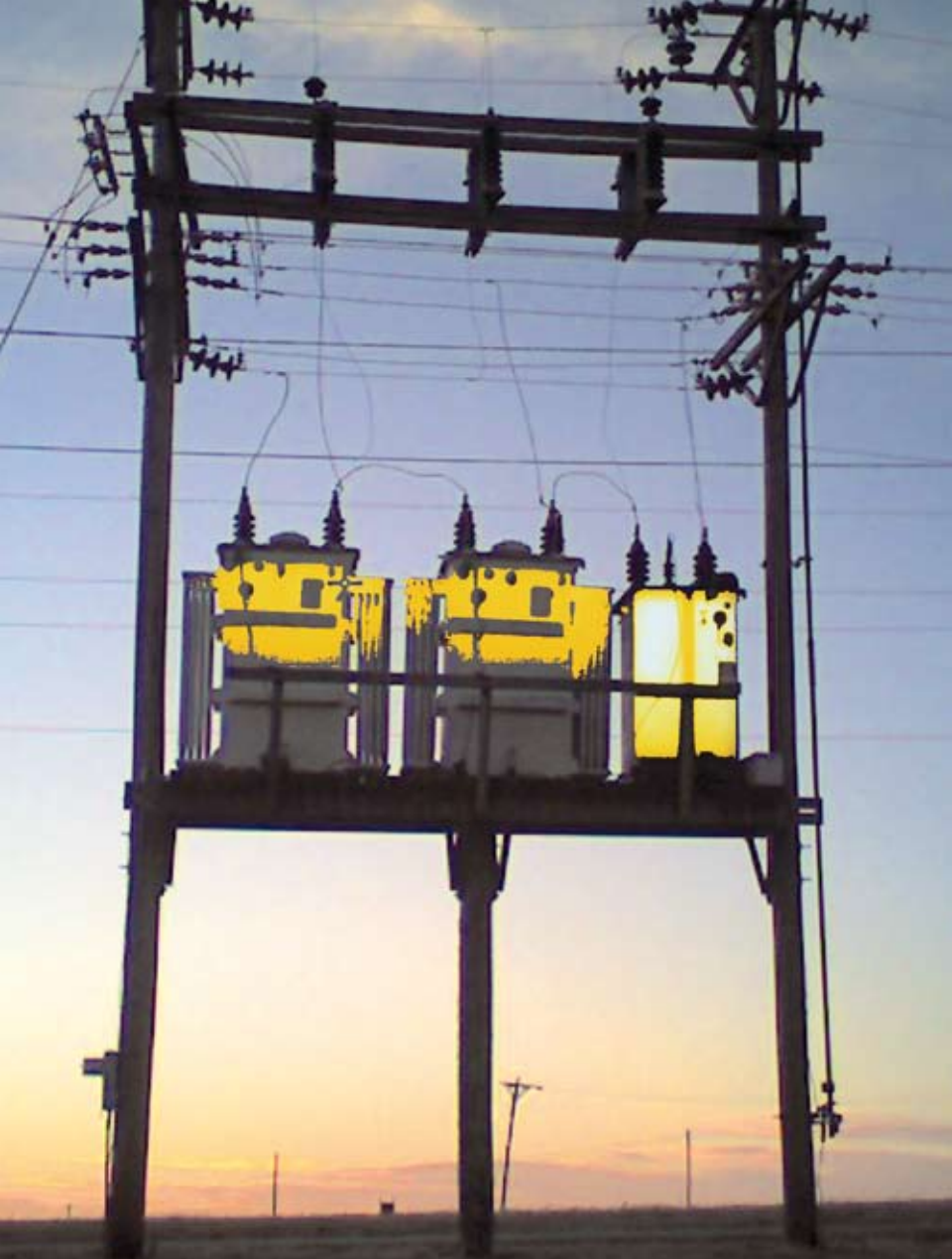


Thermal image



Thermal Fusion image





## **10. Get a camera with a wide temperature range.**

Here's an easy one. When you buy an infrared camera, be sure that the temperature range it operates in is sufficient with the temperatures of the targets you will be viewing.

You do want an infrared camera that can measure the temperatures you want!

## **11: Go for a product that can be upgraded.**

Some type of formal trade-in/trade-up program is an advantage for owners of an array of advanced products.

However, in the world of infrared cameras, it is not always possible. The engineering of the infrared detector, robotic manufacturing techniques or specialty optics mean that some cameras can be easily upgraded whereas other can not.

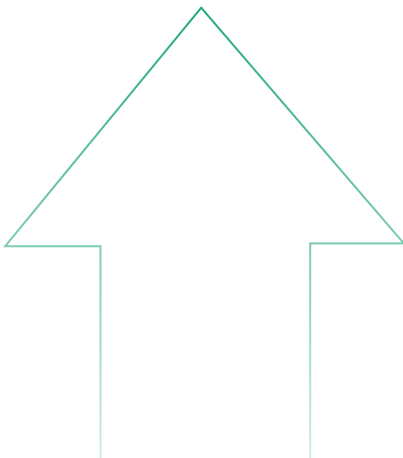
Many infrared cameras will allow you to upgrade the firmware to increase pixel counts and infrared resolution, as well as all sorts of in-camera features and functionality. If you can buy an infrared camera that allows you to upgrade in this fashion, that's a key value to you.

If there isn't an upgrade path, ask if the manufacturer routinely buys back used cameras in exchange for credit toward a new infrared camera purchase.

This becomes more important when you see a feature that would substantially increase your productivity or safety – or, even help you lock-in a competitive advantage. These might be features such as buying a high definition infrared camera, with an embedded global positioning system (GPS), or one with a wireless remote.

There are also infrared cameras capable of detecting gas leaks, such as volatile organic compounds (VOCs), methane, carbon monoxide and dozens of other types of gases that need to be monitored. And there are fixed-mount, auto-alarm activated cameras that are ideal for seeing through smoke, fog or complete darkness. Today, fixed-mount infrared cameras are ideal for fire-safety applications in for example warehouses, coal piles or even waste sites, anywhere spontaneous combustion is a potential problem.

**The bottom line is if you're buying from a manufacturer that has offered formal trade-in/trade-up programs, and makes all types of infrared cameras, then you have a partner that can continue to service all your infrared camera needs.** Find a company you can grow with – or at least an infrared expert watching your back!



# 12: Buy an infrared camera from a manufacturer with strong post-sale technical support and certified training.

If you are new to the field of infrared cameras, you will obviously want to think about customer service and technical support after you've purchased.

In addition to FLIR being the world's oldest and largest manufacturer of infrared cameras for commercial applications, FLIR also owns and runs the world's largest student training organization – the Infrared Training Center or ITC.

The ITC provides training regardless of what type of infrared camera you have – and train students in all types of industries with a wide variation in applications.

As for those really unsure as to whether or not to buy an infrared camera, many have decided to enroll in training first, before they buy. It's always better to have a camera and bring it to class, but if you are really unsure, this is a great option.

The ITC prepared this "Top Ten List" of why you should choose ITC as your infrared training organization.

1. **ISO 9001 registered**

No other infrared training organization in the world has this credential – the ITC is the only one.

2. **The best infrared training** - no matter where you are

Whether you train at our in-house facilities in Boston or Sweden or at one of our many satellite locations throughout the world, you'll have access to our premier personnel, resources, and technology. We offer instructor led web-based training, as well as self-service web-based training.

3. **Highest qualified instructors**  
With more ASNT Level III and BINDT Category 3 certified thermographers on staff than any other training organization in the world; you'll have the opportunity to learn from instructors who have the highest credentials in infrared thermography.
4. **Over 50 years experience**  
Together, our ITC instructors bring more than five decades of practical thermography experience along with an in-depth knowledge of infrared theory.
5. **Guaranteed FLIR factory-authorized training**  
If you have invested in your career by purchasing a FLIR infrared camera, enroll for training courses with the only factory-authorized training organization for FLIR thermography products.
6. **Full color course materials**  
Our full color training manuals help to reinforce your learning and provide an excellent resource after you leave the classroom.
7. **We speak your language**  
Our ITC staff provides training in more than 15 different languages.
8. **Hands-on software training on our computers**  
Along with comprehensive software training for your FLIR infrared camera, we provide computers for you to use at our state-of-the-art Boston and Sweden training locations.
9. **Simulation-based training**  
We bring the field into our in-house applications labs at both of our Boston and Sweden training locations. You will gain practical experience that you can apply in the real world.
10. **InfraMation, the world's largest IR applications conference**  
Our annual event is jam-packed with learning opportunities designed to keep you up-to-date on the latest application innovations in the fast-moving world of thermography.  
Register here for InfraMation!

Class sizes are purposely kept small to guarantee your access to FLIR's expert staff and research labs.

**Register online at [www.infraredtraining.com](http://www.infraredtraining.com)**

## SUMMARY

On behalf of the entire FLIR organization, we hope this booklet has been informative.

We have tried our best to give you our best knowledge and helpful hints as you seek to purchase an infrared camera.

While we of course hope you will choose to buy a FLIR, we also know that as more and more manufacturers enter the market, the choice of what to buy can become harder, if not more confusing, to make.

Like most things in life, the best decision is made when you've done your homework. This booklet gives you some straightforward ways to think about the field of infrared, how it relates to our everyday lives and what we do – but more to the point, please always ask for a demo. Get a demo in the type of application environment in which you work – not just in a conference room. Why? Because sometimes it's easy to fudge a demo in a “non-real” conference room-like environment. Lots of infrared cameras do accurate measurements in an air conditioned conference room, but will they maintain their accuracy when they are exposed to hotter or colder temperature differences in actual working conditions?

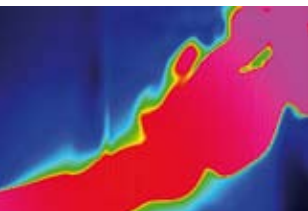
Ask for a demo, and see firsthand how an infrared camera operates. Then you will have done your homework and you'll make the right buying decision.

FLIR have a ready staff of internal experts, software and technical support technicians, direct sales engineers and application specialists, and a growing base of excellent distribution partners. We all stand by ready to answer any question you might have. So, please take advantage of what we have to offer. It's a free call and we are happy to talk to you.



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[www.flir.com/thg](http://www.flir.com/thg)



What's your application?

What kind of infrared camera  
is best for your needs?

To speak to an infrared camera expert,  
please contact:

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BSRIA Instrument Solutions

Tel No. 01344 459314

[www.bis.fm](http://www.bis.fm)

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