Thermal imaging shows latent building issues

'The FLIR B660 is simply the best camera available for building inspections'

Buildings can develop faults which cannot be seen with the naked eye, but with a FLIR thermal imaging camera these problems are relatively easy to identify. Whether you're looking for poor or inadequate insulation, air leakage, heating and plumbing issues, water damages due to leaks or condensation or mold problems, thermal imaging provides an invaluable tool to identify and locate these problems, which is the first step in solving the problem.

Wolfgang Böttcher owner of the thermography consultancy agency Böttcher Infrarot- und Trocknungstechnik, is a specialist in the area of thermal imaging and building diagnostics. "Thermal imaging really is an ideal tool for building diagnostics because you can actually see where the problem is located."

A FLIR thermal imaging camera can identify many things that are invisible to the naked eye:

- patterns of heat loss
- problems related to energy loss
- missing insulation
- inefficient heating systems
- water damage
- mold development

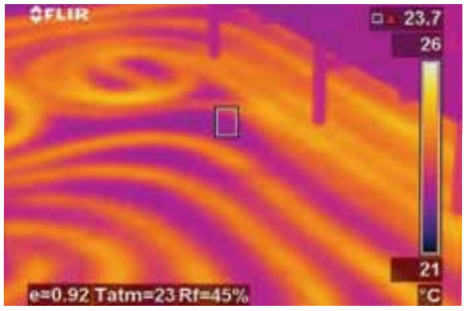
Thermal imaging will quickly indicate in which areas of the property the problems are located and with the supplied software the corresponding temperature measurements can quite easily be compiled into a report.

The main purpose for which Böttcher uses his FLIR thermal imaging camera is to perform energy audits. "With a thermal imaging camera you can see where the building's insulation isn't doing its job properly. With the exact measurements the FLIR thermal cameras you can gather whether the insulation leakage is significant and if so suggest necessary changes."

Wolfgang Böttcher demonstrates the FLIR B660 thermal imaging camera as it is used in an energy audit

Böttcher: "This camera is relatively light and very easy to use."

With the 45° angle lens Böttcher can scan an entire house from a couple of meters distance.



The FLIR B660 is also an excellent tool to test the effectiveness of under floor heating.

This thermal image shows where the warm water pipe has been installed beneath the floor.

Identify air leakage

In older houses, however, it's not just faulty insulation that causes energy loss, explains Böttcher. Small cracks and crevices can cause a draft that's not only annoying, but can also cause energy loss. Such air leakage can account for up to half of the energy consumed. The leakage pathway is often complex and, without thermal imaging, extremely difficult to visualize. "In Germany there's a guideline for the insulation and energy consumption of new buildings, but I'm hoping there will be a guideline for old buildings too, for it is with the older buildings that we still have a lot to gain energy-consumption wise."

Blower Door

To more effectively analyze the air leakage Böttcher often uses a system called a Blower Door. "A Blower Door test consists of a ventilator that's installed in a doorway that sucks air out of the building; this causes an air pressure inside the building that's lower than the air pressure outside. Due to that difference in air pressure the outside air rushes into the building through each available opening. With the thermal imaging camera we localize the spots where the air leakage is the worst. We then use an anemometer to tell how fast the air is blowing through the opening to determine exactly how significant the leakage is at that location. After we've analyzed the entire building in this way we can then advise our client where to take action and fix the problem."

A Blower Door test consists of a ventilator that's installed in a doorway, sucking air out, which causes the outside air to rush into the building through available cracks and crevices.

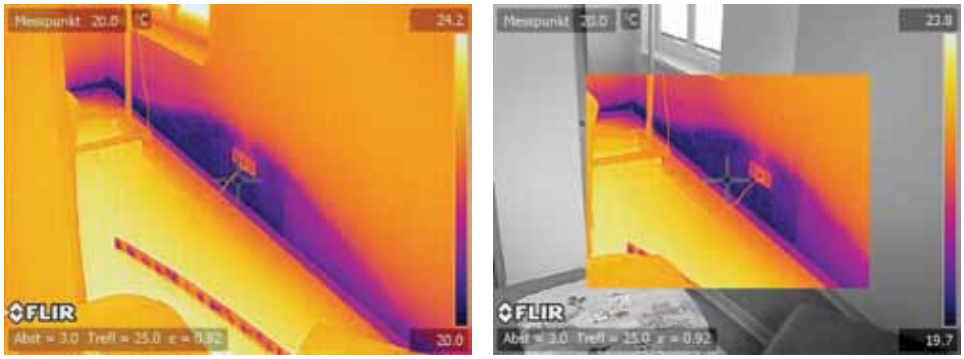
Multitude of purposes

But analyzing energy loss isn't the only way Böttcher uses his FLIR B660 thermal imaging camera. "We use it for a wide multitude of purposes. We use it to estimate the damage to a building caused by water leakage or condensation. When moist gets into the building envelope it can even damage the structural integrity. With our FLIR thermal camera we can spot the moisture and find a solution. Other uses are to find and solve heating and plumbing issues and to locate mold. We can even use the thermal camera to predict whether mold will develop in a building."

'Amazing development'

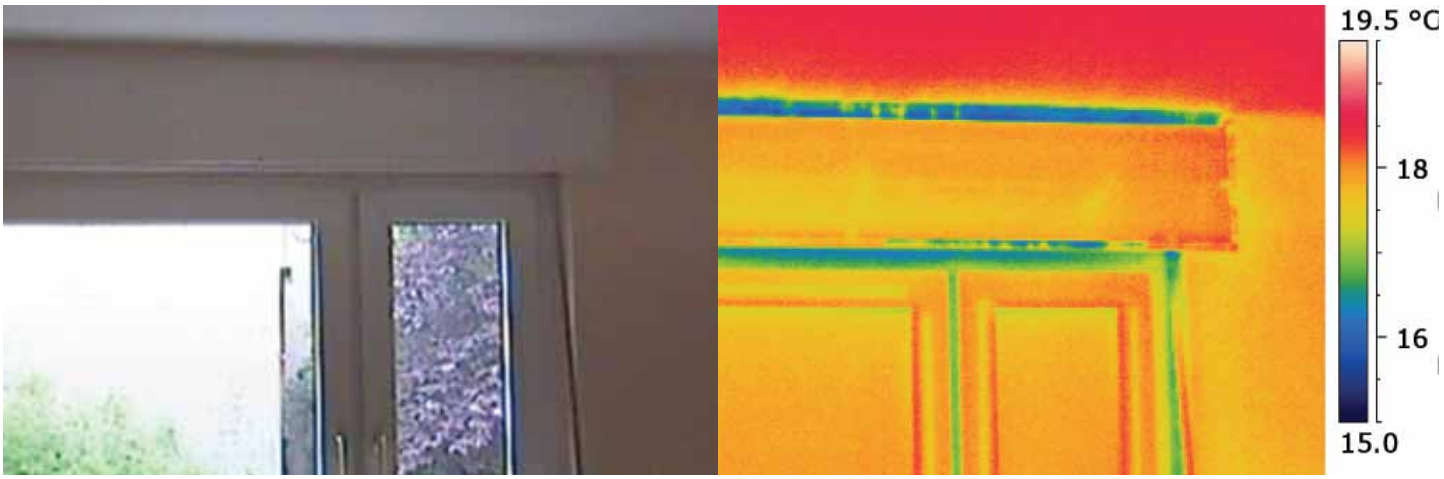
When it comes to thermal imaging cameras, Böttcher is a thermography veteran. "When the thermal imaging cameras entered the commercial market I immediately realized its potential for building diagnostics. The first thermal camera I bought in '96 was the FLIR Agema Thermovision 470, with a black and white viewfinder. It weighed over 6 kilo and with all the added weight of the external equipment I had to lumber about with a cumbersome bulk of 30 kilo. Now I have the FLIR B660 with everything I need already built in weighing about 3 kilo. It's amazing how much the commercial thermal imaging cameras have developed in the past ten to fifteen years."

FLIR Agema Thermovision 470



This case of water damage clearly shows the advantage of the Picture-in-picture feature, since the client can quite easily see where this thermal image is located, while this would be more difficult with only the thermal image.

Böttcher acquired the new FLIR B660 only recently. With a resolution of 640 x 480, a sensitivity of less than 30 mK and the best features modern technology has to offer, this camera is the best thermal camera on the market. "Here at Böttcher Infrarot- und Trocknungstechnik we always strive to give our clients the best service possible. In this area the best way to get new clients is by word of mouth, so we want every



If you look at it, this window seems pretty airtight, but during a Blower Door test with a FLIR thermal imaging camera the draft clearly shows on the thermal image. Tests with the anemometer showed air flow of 6.44 m/s, which is extremely high, considering that everything above 2 m/s is considered to be a strong air flow.

customer to be as happy with our service as possible. To do that, we need to have the best thermal imaging camera available. This camera is just that. I've had this camera for two months now and I'm very pleased with it. With its high resolution of 640x480 pixels it really is the best camera on the market. It's extremely accurate and very easy to use."

FLIR: an obvious choice

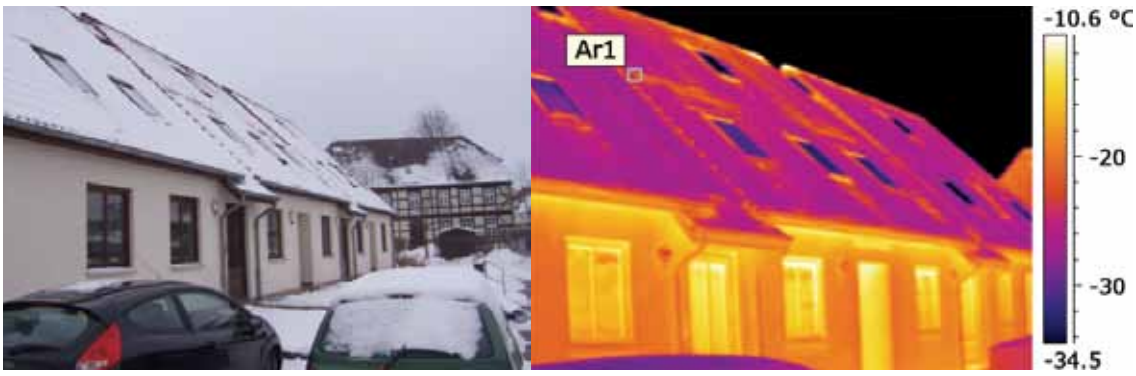
According to Böttcher the choice for the FLIR B660 was an obvious one. "I ordered this camera with a 45° angle lens so it has a very wide field of view. That allows me to cover an entire building even though I'm standing quite close. That's extremely useful when you're performing energy audits, for instance, because other buildings in the vicinity sometimes stand in the way so you can't look at the house from a distance. With this lens I don't really have that problem. But I also have a telephoto lens, so I can work out small details better. That can also be very important. FLIR is the only thermal camera producer that delivers this good a camera with these kinds of lenses. If you need a good quality camera and a good quality lens, there really isn't another option than the FLIR B600 series."

After sales

Another important reason why Böttcher chose for FLIR is the after sales service. "FLIR has the best service in Europe by far. With other producers you have to send the cameras all the way to China or America and that takes a lot of time. Since I'm dependant on my thermal imaging camera to earn my living it's a disaster to be without it for a long time. With FLIR I know it'll be back immediately. That's also an important reason for me to choose a thermal imaging camera by FLIR."

Useful features

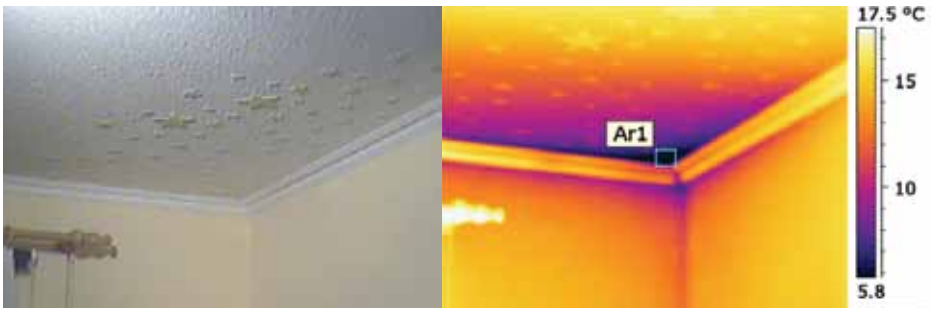
Böttcher has been using FLIR cameras for years. "I started with the FLIR Agema Thermovision 470. After that I bought the FLIR ThermaCAM 545. Two years ago I purchased the FLIR ThermaCAM B20HS. All of these cameras were very good for their time period. I still have them in my possession and they're all still operational. I've used these cameras for years and I was very pleased with them, but when the B660 became available I immediately bought it to replace my old FLIR B20 HS.



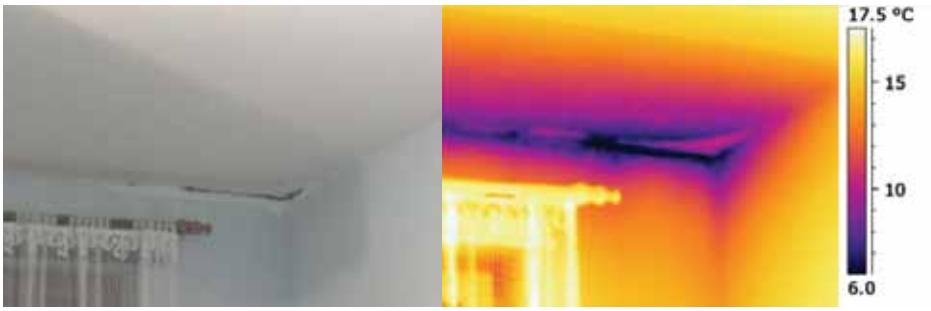
This thermal image shows that the roofs of these houses aren't isolated properly.

In this example it is clear that the rightmost skylight is leaking warmth at the frame and there are several locations where the roof insulation isn't very effective.

This Blower Door test clearly shows that there's air leakage at the windowframe.



In this children's bedroom a lot of warmth is leaking away at the corners of the room.



This corner of the room has been damaged due to water leakage. If nothing is done the water damage might threaten the structural integrity of the building.

And I must say the FLIR B660 really is much better. I especially like the contrast optimizing feature; it allows you to bring out even the smallest of details."

With the Contrast Optimization feature even the smallest of details show up clearly in the thermal image.

Contrast optimization is a special feature that was up until recently reserved for military use only. The thermal imaging camera automatically optimizes the brightness and contrast settings to bring out the detail in the thermal image. It has been used by the military for years, but the new FLIR cameras are the first commercial thermal imaging cameras that use this technology.

Picture-in-picture

Another useful aspect of the B660 is the Picture-in-picture feature, according to Böttcher. With this feature you can create a visual picture with a moveable and resizable thermal picture inside it. "I've used the Picture-in-picture feature and it's a really useful way to show a customer where a problem is located in the building, for some customers find it hard to recognize what part of the building they're looking at when I just show them the thermal images. And though I haven't really used them yet I expect the built-in GPS and voice recorder features will come in handy as well."

That doesn't mean other – smaller – thermal imaging cameras cannot be useful as well, Böttcher emphasizes. "Other cameras with a smaller resolution can be quite effective to find out if there is a problem, but if you really want to accurately localize problems and you need good, accurate readings then you really need a camera like this one. Many of my colleagues use one of those smaller resolution cameras, but it quite often occurs that one of those colleagues stumbles upon a problem he or she cannot solve. Whether it's a case of damage estimation or an energy audit, with the higher accuracy, sensitivity and resolution my FLIR thermal imaging camera often succeeds where the other cameras fail. The smaller and cheaper cameras are fine for a first inspection, but if you want to know exactly what's wrong you need a camera like the FLIR B660."

Reporter software

To produce his reports, Böttcher uses FLIR Reporter software. "This software program is very easy to use and it allows you to quickly and efficiently draw up a building inspection report that's comprehensive for the client." It is compatible with the latest Microsoft operating system and also with the latest version of Microsoft Word. With the exciting and powerful new triple fusion and Picture-in-picture features, FLIR Reporter software allows you to use the FLIR thermal imaging camera to its full potential.

For more information about thermal imaging cameras or about this application, please contact:

FLIR Commercial Systems B.V.
Charles Petitweg 21
4847 NW Breda - Netherlands
Phone : +31 (0) 765 79 41 94
Fax : +31 (0) 765 79 41 99
e-mail : flir@flir.com
www.flir.com

T820175 [EN_uk]_A