



Thermal imaging inspections of roof-mounted solar panels

FLIR T640 mounted on retractable pole allows to inspect hard to reach areas

As solar panels are becoming increasingly affordable, and therefore increasingly profitable, many residential homes have been fitted with solar panels in recent years. Mounting solar panels on the roof has advantages in avoiding shadows and maximizing the amount of sunlight that falls upon them, but there's a downside as well. The high location makes it difficult to reach for thermal imaging maintenance inspections. One company came up with a creative solution to this problem: mounting the camera on a retractable mast.

Visiotherm, a Belgium company based in Esneux, concluded after performing a feasibility study that a retractable pole would be a good solution. "The result is very satisfactory", says the company's director and founder Patrick Robe about their own created pole mounted thermal imaging solution.

Very useful for solar panel inspections

"We've been using thermal imaging cameras to detect faults in solar installations for quite some time now", says Patrick Robe. "In our experience FLIR thermal imaging cameras in general and

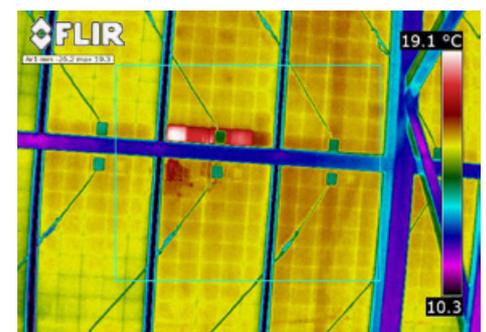
the FLIR T640 thermal imaging camera in particular are very useful for solar panel inspections. Defects in solar panels usually generate heat, so a defect can be detected with a thermal imaging camera in an early stage."

Choosing the right angle

But the reflective top layer of solar panels poses a problem. "If you choose the wrong viewing angle you will be looking at the infrared radiation emitted by the overhead sky, which is reflected by the glass surface, instead of the infrared radiation emitted by the panel itself," explains Patrick Robe.



The FLIR T640 thermal imaging camera is the perfect tool for solar panel inspections.



Overheating cells impede the performance of the entire photovoltaic system. This thermal image shows some defective cells within a solar panel.

"This can be solved by carefully choosing the right angle or if the panel can be accessed from behind you can circumvent this problem entirely by inspecting the back of the panel instead of the front."

Inspecting roof mounted solar panels can be quite challenging, according to





With the FLIR thermal imaging camera mounted on a pole, the wireless connection is perfect for this application. The thermal images can be viewed on the tablet PC and the camera can be controlled remotely using the FLIR app

Patrick Robe. "Most roof mounted solar panels can usually not be inspected from the back so the inspector must choose the viewing angle carefully. Sometimes assuming a good viewing angle is not possible due to the limited availability of vantage points. If you are lucky there are buildings nearby that allow you to inspect the solar panels from a good vantage point, but for that situation to occur you have to be very lucky indeed. That is why we decided to find a solution to this problem."

Retractable pole system

"At first we tried using industrial platform lifts, but these require a lot of free space to be set up and they can also be quite expensive", continues Patrick Robe. "Our retractable pole system is much more affordable and requires only 3 square feet of bare ground to be set up. This means that it can be used almost everywhere. When extended to maximum reach the aluminum pole is approximately 12 meters high, allowing it to inspect the roofs of most residential homes."

"On top of the retractable pole a remote controlled pan and tilt unit is used to point the camera towards the intended target", explains Patrick Robe. The thermal

imaging camera is then controlled through a wireless connection with a tablet PC that runs the FLIR Tools app. "The wireless connection is just perfect for this application, we can change emissivity settings, adjust level and span, add temperature measurement points and boxes and such, and all of this can be done from ground level."

According to Patrick Robe the weight of the entire system is 34 kilos, allowing it to be set up on most flat roofs as well. "If the roof is too high to reach it from the ground level we can mount our pole on a flat roof, to give an overview of the roof and to allow us to choose a good viewing angle." Roof mounted solar panels are not the only inspections currently executed with the retractable pole. "We also inspect roofs for insulation defects and water intrusion."

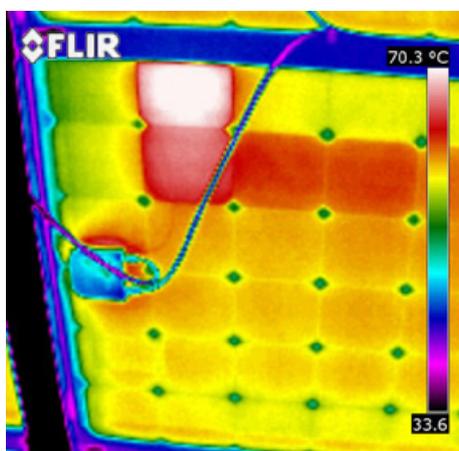
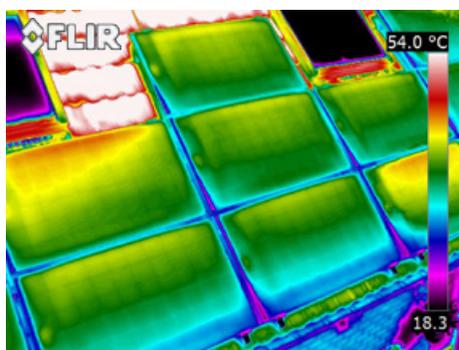
FLIR T640 thermal imaging camera

The thermal imaging camera used for these inspections is the FLIR T640 thermal imaging camera. It has an uncooled microbolometer detector that produces crisp thermal images with a resolution of

640 x 480 pixels. It can accurately measure temperatures from -40°C to +2000°C with a thermal sensitivity of less than 35 mK. The FLIR T640 thermal imaging camera is very practical, combining ergonomic design and light weight with ease-of-use. Apart from its powerful imaging and temperature measurement capabilities it also contains several interesting additional features such as the ability to automatically embed GPS coordinates in each thermal image, facilitating easy filing in the image archive.

FLIR: an obvious choice

For Patrick Robe the choice for a thermal imaging camera from FLIR was an obvious one. "I have worked with thermal cameras from FLIR and its predecessors since 25 years now and the quality of their cameras has been much better than the competitors throughout this period. Combined with their excellent after sales support this makes FLIR the best thermal imaging camera supplier on the market today."



With thermal imaging complete panels can be inspected in one view. Anomalies in the solar panels clearly show up in these thermal images.



The aluminum pole is approximately 12 meters high, allowing it to inspect the roofs of most residential homes.

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

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