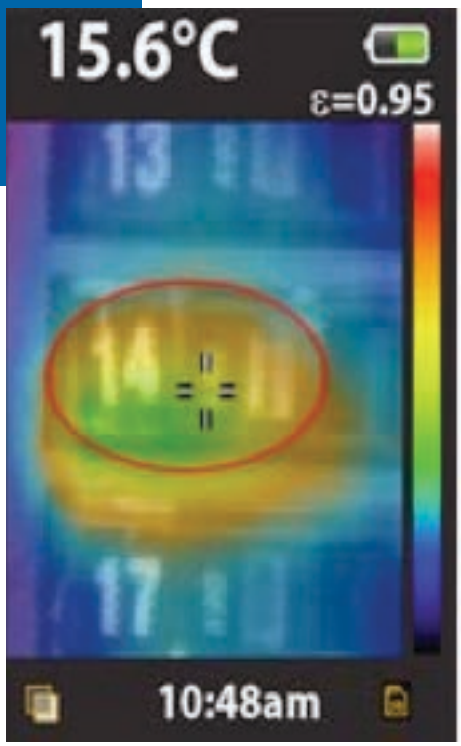
Filling the gap between an infrared thermometer and a thermal imager

Application Note

Just over 200 years ago, British composer and astronomer Sir William Herschel discovered infrared (IR) radiation. Today, test tools using Herschel's infrared discovery enable technicians in many fields to detect and fix problems otherwise invisible.



A new innovation, the Fluke VT02 Visual Thermometer—developed with innovator Infrared Integrated Systems Ltd (Irisys)—is bringing affordable infrared testing to technicians who once had to choose between the limitations of IR thermometers and the cost of thermal imagers.

Your time or your money

Until now, infrared testers were divided into two categories: infrared thermometers (spot radiometers) and thermal imagers. The low-cost answer was the infrared "point and shoot" thermometer, which measures the average surface temperature of a "spot" that varies in size depending on the specification of the thermometer and its distance from the target. Like other infrared testers, these thermometers deliver the advantage of safety (taking readings from a safe distance). They require little or no training to master, and they are inexpensive enough to provide one to nearly every technician. But there are disadvantages.

Taking a detailed temperature profile of a system requires the tech to see and write down multiple temperature readings and record where they were made. In addition, it's hard to know exactly how large an area or "spot" the sensor is "seeing" and measuring.

Thermal imagers provide far more detail and sophistication—at a price. A single image can provide hundreds or thousands of individual temperature readings, one for every pixel in view. These pixels display a "heat map" that makes for rapid identification of hot spot problems. Some imagers make it possible to blend thermal and visible light images, making it easier to locate a problem. These images can be recorded and processed for viewing using software. But it takes considerable training to get the most from a thermal imager, and its cost means most shops will have only one.

A new class of infrared testers

To fill the space between the two infrared technologies, Fluke set out to design a product to provide quick, easy temperature readings in a visual context—one affordable enough that every technician on a team could have one with him.

Traditional thermal imaging technology was not the answer. Thermal imaging is based on the microbolometer, which requires vacuum sealing and very precise manufacturing that makes it too expensive for this type of application.

According to Tim Wheatley, Chief Technical Officer for Irisys, "Basically, the microbolometer works by having a resistance that changes when it's heated. That variable resistance is then read out. The method that we use actually uses a pyroelectric ceramic sensitive to changes in surface temperature. It creates a charge proportional to the change in temperature on the surface of the device. It's the charge, effectively, that we read out."

Pyroelectric technology

Pyroelectric technology costs much less to manufacture than a microbolometer, but getting it to form a thermal image was a challenge.

For the Fluke VT02, Irisys developed a unique hyper-thin film on which it can manufacture an array of elements dense enough to create an image.

Its multiple pyroelectric sensors enable the Fluke VT02 to deliver far more than a single temperature reading. The user sees a thermal map of the test area that shows exactly where the hot and/or cold areas are. In addition, the Fluke VT02 can record a visible light image of the test area. By combining the thermal and visual views, the technician can make it clear exactly where the thermal image is recorded—and where any maintenance issue can be found.

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