

# APPLICATION NOTE

## FLIR Thermal Imaging Improves Substation Surveys for California Utility

*During a routine inspection at a PG&E substation in the San Joaquin Valley, an electrician felt heat blast his face as he passed within five feet of an energized transformer bank. While one would expect a transformer bank to give off some heat, the intensity of it alarmed him. He immediately grabbed a handheld thermal camera from his truck, and within seconds verified that there was a major issue.*

### PREVENT A SERIOUS OUTAGE

The electrician immediately informed his supervisor, and they shut down the system to investigate. They discovered that there was no oil flow in the transformer. Fortunately, detecting the problem early helped the utility company and its customers avoid the impact of a serious outage and safety issue. "By catching it in time, we spent only about \$300,000 to repair that transformer bank. That's a major savings compared to the roughly \$3 million to replace it, which we would have had to do if it had completely failed and been destroyed," said Ray Friend, supervisor of the substation's maintenance and construction.

The repair took about one week with a crew of six – about one-sixth of the time it

would have taken waiting for a replacement. Sometimes delivery of this equipment can take months to arrive.

### SAFETY IS #1

It's cases such as this that prompted PG&E to add more than 200 new mid-range, pistol-grip FLIR thermal imagers to their collection of inspection tools. Friend explained that the purchase was simply a matter of common sense.

Providing each PG&E crew with a thermal imaging camera allows them to immediately see heat anomalies that signal potential danger. "Safety is always the first thing we want to think about," explains Friend. "The crew wants to know if something is operating [within safety parameters] the way we expect

FLIR E95

*This style of handheld thermal imager costs less than the high-definition models needed for intensive inspection work, allowing companies to supply more crews with cameras.*

it to, whether it's oil-filled equipment or an air switch under load."

An infrared camera allows them to have confidence that the equipment they are working on is safe. PG&E crews now routinely do a quick scan to look for unusual hotspots on a variety of components that may need maintenance. "If you're required to stand at the end of a 16-foot disconnect stick, ready to rip a switch open, you want to be able to trust that the switch is properly adjusted and going to do what it's supposed to. That's what the camera gives us," Friend says.



## EFFICIENCY IS A FACTOR

Inspections go much faster with thermal imagers than they do with more traditional equipment, such as IR thermometer guns. That's because temperature guns require scans to be performed close to the target for accuracy, only providing one reading at a time. Plus, they don't produce a picture, making surveys of the many electrical components in a substation a painstaking process.

Compare that to the instantaneous images and thousands of detailed measurements you can capture from a safer distance with a thermal camera, and the potential for increased productivity becomes obvious.

While PG&E continues to use high-performance FLIR cameras for their more intensive and detailed IR inspections, Friend says the mid-range handhelds make it possible for his team to use thermal imaging more frequently on their rounds and on a moment's notice.

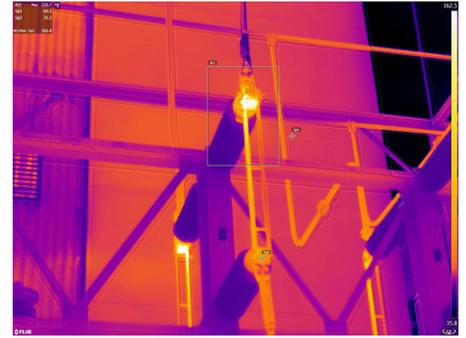
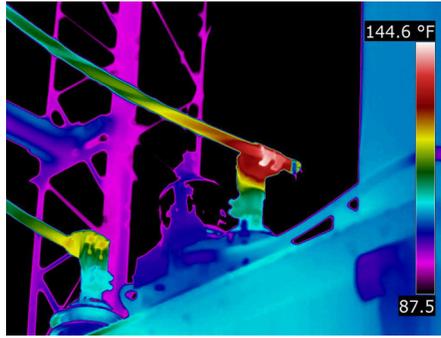
"It's simple to operate, there's no rocket science involved, and you can interpret things easily on the screen – all you need to have are a [few] instructions as to what to look for," he says. "And it's portable and seems to be very rugged. We have them in trucks bouncing around and have had no issues."

## THE BOTTOM LINE

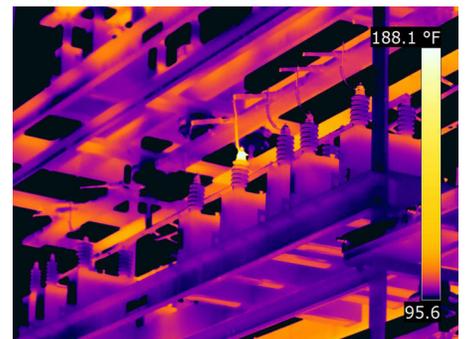
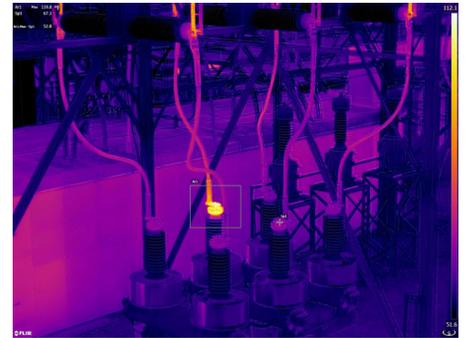
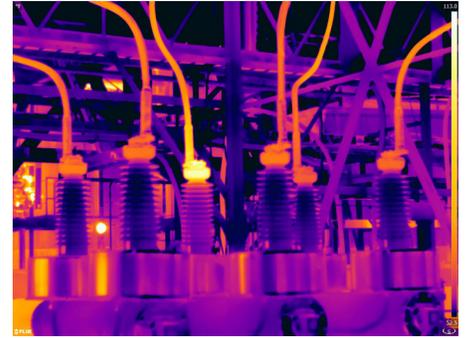
Across the board, thermal cameras have allowed PG&E inspectors to find issues early. "Normally what they're finding are loose connections, switches out of adjustment, or regulators and breakers that are running too hot. They're also finding oil-filled bushings and other equipment with abnormal temperature differences that indicate a lack of cooling," says Friend. "We're catching them a lot sooner—in time to deal with it properly and safely—long before it fails."

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For more information on thermal imaging or this specific application, please visit [www.flir.com](http://www.flir.com)



This gives PG&E much better control over a situation, allowing them to more effectively target and plan repairs that help prevent expensive emergencies and shutdowns. With the ability to uncover hidden problems well in advance when they can still be repaired instead of being replaced, Friend feels affordable point-and-shoot IR cameras pay for themselves in no time. He says, "If you can spend a nickel today rather than ten dollars tomorrow, why wouldn't you want to spend it now? It just makes sense operationally and safety-wise."



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