FLUKE®

Reviewer gives Fluke 568 Infrared two thumbs up for maintenance and system monitoring

Application Note

Testing Functions
Case Study

Tool: Fluke 568 Infrared/Contact Thermometer

Tester: Todd Woelk, Electrical and Instrumentation Supervisor, Equa-Chlor

Tests: Electrical and mechanical component operational temperature checks and temperature comparison over time

This is a 700 hp motor used to run the Equa-Chlor hydrogen compressor. Woelk has had typical readings around 75 °F to 80 °F. He is measuring the external surface of the motor, compressor, and gearbox.

Infrared, non-contact thermometers are mainstays for checking equipment temperatures to spot emerging problems before they lead to shutdowns. When a new Fluke infrared thermometer appears that's more capable, rugged, and easier to use, that's good news to FlukePlus members. Hundreds of members entered a contest to be first to put the new Fluke 568 Thermometer through its paces, as official beta-testers. This story describes how one of the winning testers used the tool.

Test points

Fluke engineers designed the Fluke 568 to set a new standard among hand-held infrared thermometers as a highly accurate, rugged tool with advanced features that people can easily understand how to use.

By using a dot-matrix display for the thermometer's screen, designers were able to match the tool's three buttons to intuitive on-screen menus. They hoped that beta testers would be able to use the menus without help and adapt the tool's settings for specific measurement scenarios.

For example, infrared readings are essentially a measurement of surface temperature, and their accuracy depends on the type of surface being measured, a phenomenon called emissivity. Users of earlier infrared thermometers had complained that they didn't know the different emissivity values for different surface materials, such as aluminum or copper. Even if they did know, users couldn't figure out how to change the values in the thermometer. So, the new Fluke 568 contains an on-board table

This is the 13.8 KV feeder connections to the 30 MW dc rectifier. These temperatures vary greatly, depending on ambient air and plant load.

of common values and the new menus should make them easy to find—but this would be the true test. (Users that know the emissitivity of the materials they want to measure can still enter an exact value numerically.)

In addition to adjustable emissivity, to get an accurate reading, an infrared thermometer needs a high distance-to-spot ratio. An infrared thermometer doesn't measure just the temperature at the laser pointer; it actually measures within a circle around that point. The weaker the distance to spot, the larger that circle is and the larger the area that will be averaged into the reading that you see. At a 50:1 distance-to-spot ratio, the Fluke 568 measures only a 1 inch circle from 50 inches away—an impressive achievement for an infrared thermometer.

The Fluke 568 is also compatible with standard type-K thermocouples (and comes with a bead probe), for direct contact measurement, and measures a wide infrared temperature range (-40 °C to 800 °C /-40 °F to 1472 °F).

Lastly, the 568 is drop tested to a standard of 1.5 meters, has two kinds of built-in alarms, and can data log up to 99 data points and download via USB to a computer for analysis and reporting. It even has a built-in tripod mount for hands-free, stationary measurement applications, allowing real-time monitoring via a PC and the included FlukeView® Forms graphing software.

This is a motor starter bucket for a 60 hp motor. Woelk is checking fuses and terminations. He usually sees about 120 °F to 130 °F on components in the MCCs.

Meet the tester

Experience taught FlukePlus member Todd Woelk how important heat readings can be in maintaining a production facility, so he jumped on the opportunity to test the Fluke 568. Thermal testing has made a big difference at the Equa-Chlor, LLC chlor-alkali production facility in Longview, Washington, where Woelk serves as Electrical and Instrumentation Supervisor. A better infrared themometer? He wanted to try it.

The $85 million plant came on line in February, 2006, the first of its type built in the U.S. in 12 years. It's located on long-term leased property within the fence line of Weyerhaeuser's Longview Fiber Plant. The operation produces 220 tons a day of chlorine, caustic soda, sodium hypochlorite, and hydrogen. These are the chemical building blocks for hundreds of industries, used to produce plastics, polyvinyl chloride (PVC), vinyl, bleaches and paper. Weyerhaeuser uses many of them in the paper-making process.

Woelk calls it "a small to medium-sized facility," but, at full-tilt, the operation uses 27 megawatts of power—that's enough to power 31,000 homes for a year. Much of that energy is transformed down to 11,500 volts, then rectified to 320 V dc. Then, 100,000 amps of 320 volt current is sent through a huge aluminum bus to 66 processing cells filled with brine and caustic soda. When the production line is running, it produces a magnetic field powerful enough to stop a wristwatch. Current moving through the cells causes an electrochemical reaction that produces caustic soda, hydrogen and chlorine.

This is the plant's harmonic filter bank. Woelk is checking capacitors, insulators, and terminations. The temperatures of these connections varies with ambient air and plant load.

Fluke was curious whether the intense electromagnetic field would affect the thermometer's firmware, and Woelk was likewise interested in finding a tool that could withstand it. Woelk saved that part of the plant until the end of his tests, just to be sure, but the 568 performed just fine.

The processing cells are interconnected through 60 flexible copper lines to each anode and cathode. In all, there are more than 4000 electrical connections on the cell lines and maintenance is an issue. When the plant was new, Woelk had a thermal scan done with a Fluke Ti30™ Thermal Imager to check for hot spots at the cells and on a harmonic filter bank that might indicate loose connections. He found several, did the repairs, and gained 2 percent in rectifier output. That, in turn, increased total plant production.

A matrix of data points

Now, Woelk plans to keep those connections working properly by scanning with the Fluke 568. He was impressed with the tool when he tested it. "I found it really simple to use," he said. "I could navigate through the menu on the 568 without even referring to the manual. It's really straightforward to understand."

"It's very easy to save all your data with just a one-hand operation, by pushing your save button a couple of times. I downloaded data into my computer and created a couple of rough spreadsheets to see how things functioned. So far I've been pretty pleased with it."

Regarding the contact probe, Woelk said it wouldn't help in his environment. "Typically the places that we're shooting, we don't really want to contact them with any metal objects. We try to isolate ourselves from the actual current going through our cell rooms," he said. "That's why we want a tester that's non-contact." All the more reason for that 50:1 distance to spot accuracy.

Woelk is already planning a use for the Fluke 568's logging capability, creating a spreadsheet matrix to use consistently recorded readings taken in multiple locations. "With a matrix laid out, I know that what I'm saving in location 1 is going to be this piece of equipment, so I can just go ahead and take my data points according to my matrix. When I put it on a spreadsheet, I know what memory location represents which physical location."

Suggestions? "An infrared tester able to read through plastic would be handy," Woelk said. Plexiglas® safety windows separate workers from Equa-Chlor's high voltage equipment. The Fluke 568, like all infrared devices, can't penetrate the plastic and just reads the infrared radiation from the surface.

The bright yellow Fluke 568 will coordinate nicely with the color scheme in Woelk's toolbox. "Pretty much all my meters are Flukes," he said, "I've also got a Fluke 85 that I've had for about 15 years or so. The only thing I've done to that is I did upgrade the display with a kit. It's definitely been worth the money."

Todd Woelk in front of the 2 kA aluminum bus at Equa-Chlor.

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