



FLIR APPLICATION STORY

e.on | Bayern

The network is the asset: the world's largest private-sector energy services company uses FLIR Systems thermal cameras to inspect and maintain its network in Bavaria, Germany.

The network is the energy supplier's most valuable asset. And this asset has to be maintained. Not only to prevent blackouts to its private and corporate customers, but also to ensure a long-term leading position in a market which has gained momentum and scale after the European Union-wide deregulation and liberalization of energy and power supply.

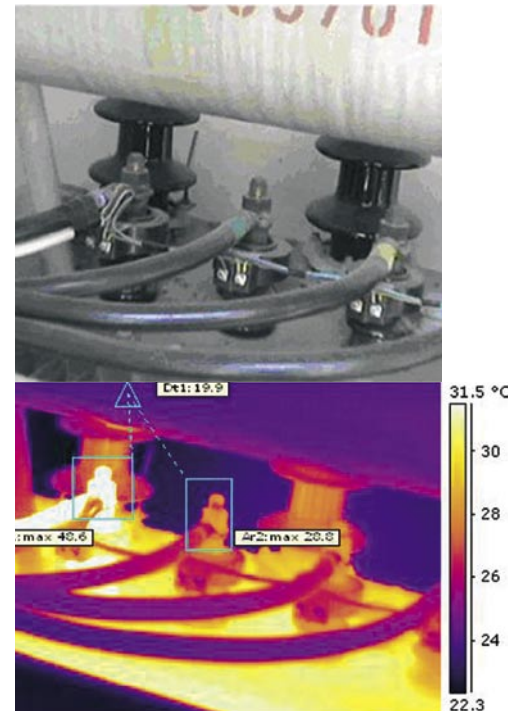
E.ON is a power and gas utility company of German origin, and with all of its stakes combined, the world's largest private-sector energy services company. With annual sales of EUR 49 billion and around 70,000 employees worldwide, E.ON has strong positions in Central, Northern Europe and the US Midwest region. E.ON Bayern, headquartered in Regensburg, Bavaria, is a daughter of E.ON Energie, the main power supplier in Central Europe. E.ON Bayern

employs around 3,700 people and invests some 200 million Euros per year in its power network.

Thermography contributes to preserving and maintaining regional electricity network

"Thermography is not a new issue at E.ON Bayern," says Measurement Engineer Uwe Thomas. "When, some 15 years ago, infrared cameras became handy and affordable, the local Isar-Amperwerke supplier started to use infrared cameras from Agema for inspection purposes." Agema later became FLIR Systems.

The plausibility of thermography has been thoroughly questioned in the wake of the deregulation and subsequent major restructuring at the companies which eventually merged into the Central-European stronghold E.ON Energie. But the conclusion reached has turned out to be positive: thermography was acknowledged as a vital non-contact inspection method.



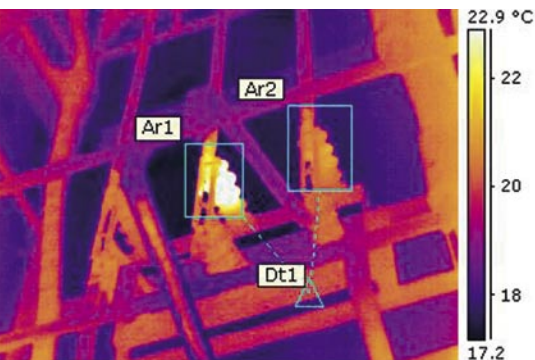
Low voltage transformer hot spot: requires urgent repair

FLIR





Hot spot at substation: urgent repair



Switchgear: no urgent repair

E.ON Bayern's thermographers are hence solidly integrated into the E.ON Bayern Messtechnik (Measurement Engineering) department.

Inspections...

Thermography's task at E.ON Bayern sounds easy: inspection of infrastructure that generates, transmits and distributes electrical power on a middle and low voltage level. The numbers are impressive: 50,000 square km of territory covering three-quarters of the largest German federal state. A 175,000 km long low- and middle voltage network roughly from the outskirts of Frankfurt to the Austrian Alps. A dazzling total of 43,000 objects - transformers, substations, switchgear, terminal blocks, distributors, have to be inspected at a rate of a couple of thousand per year. How do they cope with such figures?

A team of eight thermographers, manned with ThermoCAM P60 and P65 cameras respectively, "all qualified and weathered electricians," as Thomas likes to point out, inspect all installations everywhere, including switchgear in remote Alpine areas.

These thermographers are specialists in using the infrared camera outdoors. They are acquainted to its typical pitfalls such as the distorting effects of reflection, wind speed, and the effect of weather conditions on the measurements. Regarding emissivity levels, E.ON Bayern's thermographers use

the standard settings as provided in the camera's menu, while adapting them for some specific measurements.

The inspection cycles at E.ON Bayern are adapted to the role, type and location of the switchgear. There are inspection cycles every 5, 9, and 12 years. However, installations near busy traffic intersections or dusty industrial environments, which can be affected by pollution such as salt, dust, smoke or soot, are inspected at least once a year, generally in spring.

In addition, the thermography team keeps a 24/7 stand-by service which essentially provides documentation prior to or after repair works at transformers. "We can be called up at anytime for an urgent inspection by an inspector or a technician, who does not like the sound of the transformer in his substation," says Holzapfel.

Result management

The inspection reports are filed into FLIR System's Reporter Pro software. The data are fed into a predictive maintenance module of the German enterprise application integration software giant SAP. The images are kept separately in a database based on FLIR Systems Reporter software.

To organise its maintenance priorities, E.ON Bayern has defined three levels of urgency to maintain its low and middle voltage installations: L1 stipulates a repair at the next inspection, L2 requires a reparation within 6 months, while the L3 level urges repair within one working week.

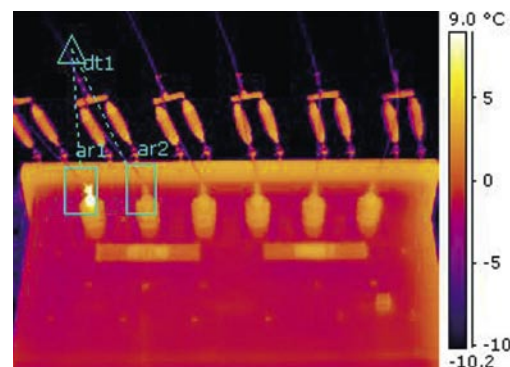
The FLIR Systems cameras used by E.ON Bayern's thermographers contribute to managing the workload: "We use all major features of the ThermoCAM P65 and P60 intensively", says thermographer Helmut Holzapfel. "Its visual camera and detachable LCD screen are a big asset and absolutely indispensable. And, there is another important rule to carrying out our inspections: care comes before speed – as we have large inspection cycles, we inspect our objects very carefully", he adds.

From a collaborative, assisting position within the power supply network maintenance, thermal cameras at E.ON Bayern have grown into a strategically important

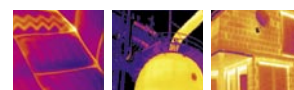


Helmut Holzapfel, thermographer at E.ON Bayern and his FLIR Systems ThermoCAM P65

inspection and reporting tool. Drawing on a consistent long-term measurement policy and the expertise of the camera operators, thermography has established itself as a technique able to support the change process from a monopolizing power supplier to an energy provider caring about its main assets.



Higher temperature level, requires repair within next months



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