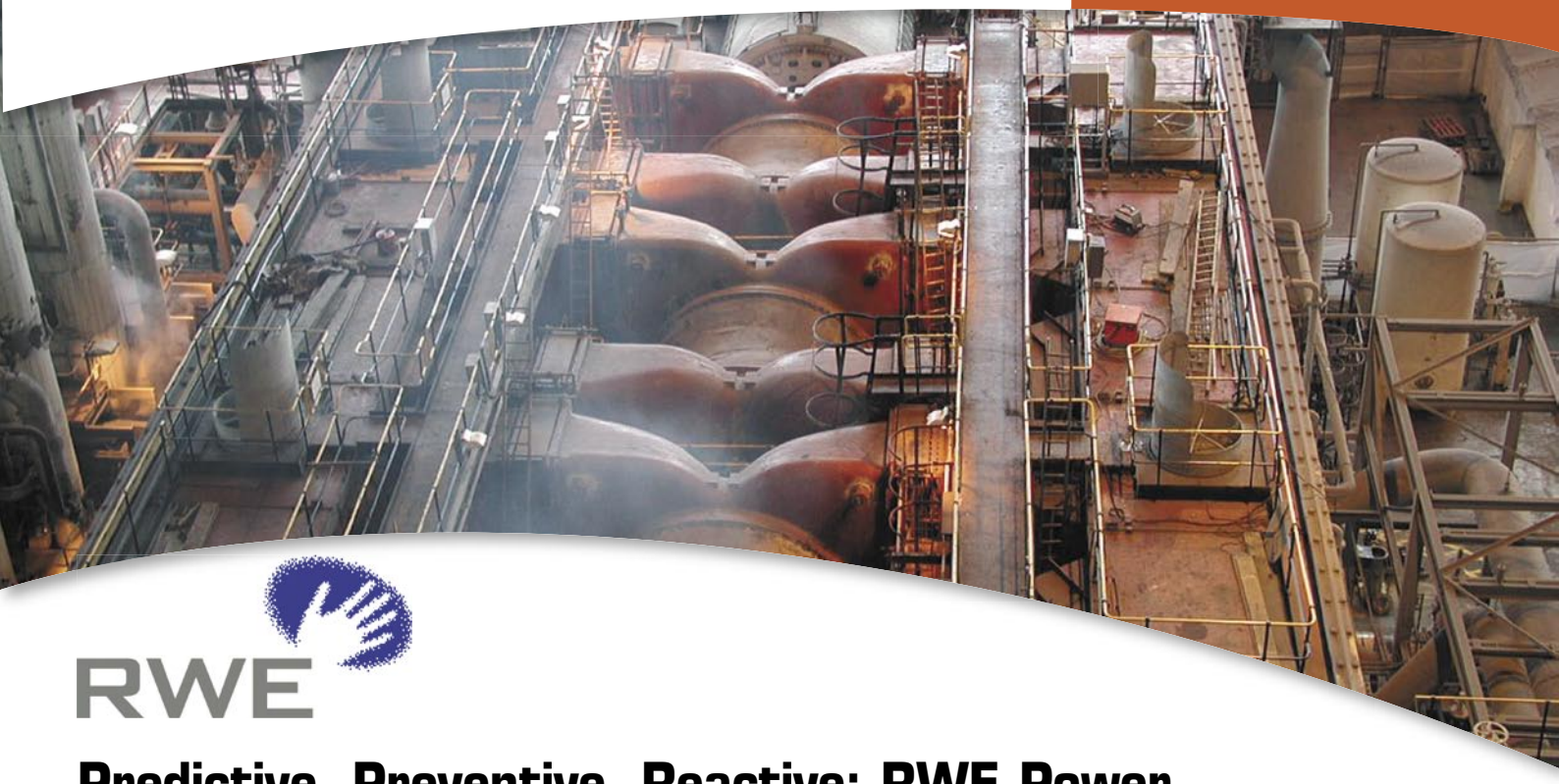
FLIR APPLICATION STORY

FLIR SYSTEMS



RWE

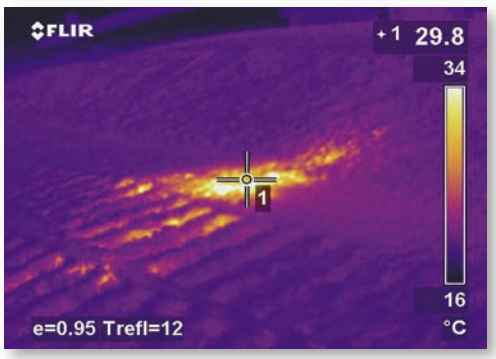
Predictive, Preventive, Reactive: RWE Power International Applies Thermal Imaging for Inspection Solutions of its UK Power Stations

RWE Power International is one of the largest European power producers and part of RWE, a leading European utility group providing services in electricity, gas and water. RWE Power International provides engineering support to power plant operators, extensively and creatively applying infrared technology and utilizing FLIR Systems ThermaCAM™ S-series infrared cameras for non-destructive evaluation and examination (NDE) applications.

RWE Power International is a collaboration between "RWE npower", which supplies gas and electricity to 6.2 million customers in Britain, and RWE Power's consulting subsidiary RE GmbH (the former Rheinraun Engineering). As an in-house consultancy, RWE Power International supports npower's portfolio of low-cost coal, oil and gas-fired power stations and renewable energy production with operation and maintenance support. In addition, RWE Power International offers its extensive support and consultancy services to external customers operating power plants across the world. With a 100,000 man-years project experience for over 200 customers, the organization's knowledge spans every aspect of owning and operating fossil fuel, gas and renewable energy power plants.

Inspection Management, Plant Life & Integrity

RWE Power International's Inspection Management group (IM), offers Non Destructive Testing, Evaluation and Examination (NDE) services. Its experts not only choose and determine the validation technologies needed to inspect or assess plant condition but also advise



Heating, self-combustion monitoring in power station coal stock

engineers on the application and capabilities of NDE methods and techniques.

Infrared thermography is a key tool to inspect and assess power plant condition. Thermography inspections are conducted to safeguard thermal efficiency of vital plant areas; from monitoring the coal stock on self-combustion to complex applications such as turbine assessment. Given its experience with plant and operational regimes, IM consistently develops and fine-tunes its thermography techniques and applications. "Our approach is that of an end user, not a manufacturer and this difference influences everything that we do for clients," says Richard Day, NDT Engineer with responsibility for thermographic applications at the IM group.

Assessing Pipework Systems

A typical application would be the monitoring of a plant's elaborate piping system in general and the high-energy pipework systems in particular. These pipes carry the superheated steam to the turbine. At a typical wall thickness of 6 to 9 cm, they have to be able to withstand steam heated over 500 °C at a pressure of 158 bar. Regular thermography inspections are carried out to check the insulation and identify excessive temperature gradients.

"Good pipework insulation not only improves thermal insulation but also substantially reduces risks of thermal fatigue which can cause cracks in the pipes" says Richard Day.

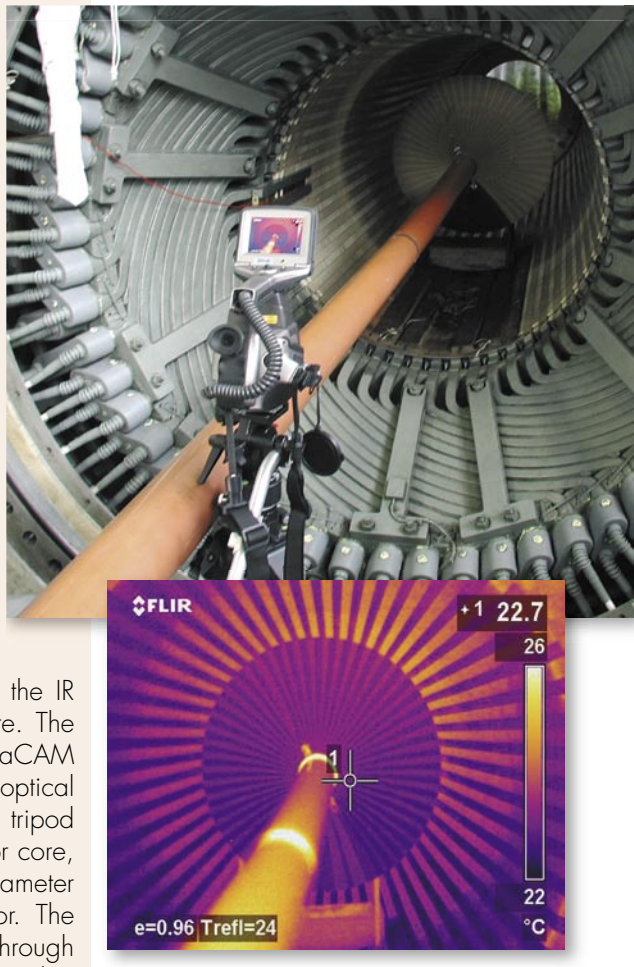
Improving Turbine Efficiency

The steam turbine/generator is at the heart of electricity generation. It consists of a combination of high pressure, intermediate pressure and low pressure rotors directly coupled to a generator rotor. The rotating mass of this arrangement can exceed 200 tonnes on large units which rotate at 3000rpm. The generator rotor rotates within a fixed stator. The stator core is constructed of insulated thin steel plates to prevent large circulating currents/ core losses. If sufficient accidental contacts between adjacent plates occur in service, currents can start to flow, which can cause potentially dangerous local hot spots within the core.
Coupling infrared technology with an innovative and a sound approach, RWE International has set up an efficient technique to detect the integrity of the stator core plates. IM specialists constructed a 90° conical infrared reflector from polished stainless steel, a highly infrared reflective material, and placed it on a plastic guide tube positioned centrally within the stator core to allow a perpendicular view of the stator core surfaces. The guide tube is hollow to allow energizing cables to pass through its core.

An insulated 16mm single core cable is then threaded through the guide tube to achieve 12 turns and the core energized up to 3.3 kV to produce the rated flux levels within the stator core. After a period of time, (to allow any induced heating within the stator core to manifest itself at the core surface through conduction), the IR reflector is drawn through the core. The IR camera, a FLIR Systems ThermaCAM S60 infrared camera with an optical 12° zoom lens, positioned on a tripod approximately 2.5m from the stator core, monitors the image of the core diameter reflected onto the conical reflector. The captured images are passed through the FLIR System ThermaCAM Researcher Processing software and then submitted for analysis to the electrical engineering staff. This original stator core flux test technique can prove the integrity of the stator core plates both at the manufacturing stage and during its service life.

While pointing to the importance of reporting in a professional and responsible manner and conducting trial and validation tests, Richard Day stresses the need to engage in dialogue with customers, explaining that they can assist in the right interpretation of the images due to specific knowledge of their plant and operational processes. "It's important to listen and recognize what the customer needs, not what you think he wants", he says.

Only then infrared thermography can become a powerful and efficient non-contact and non destructive inspection tool able to provide a clear picture of what's happening thermally to boilers, turbines and feed system components and allowing engineering staff to make judgments and corrective action before equipment failure.



Generator stator core flux test; ThermaCAM™ S60 proves integrity of stator core plates

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