Detection of hidden failures

Thermographic survey
The ABB infrared thermographic survey helps to obtain and analyze information from non-contact thermal imaging devices. Basic electrical surveys include high- and low-voltage switchgears, distribution systems, and control or instrumentation equipment. Basic mechanical surveys cover rotating machines, bearing or gear systems, insulation systems, and a wide range of production/chemical processes.

Overheating of mechanical or electrical components of a machine or system often is a symptom of malfunction. These elements can be analyzed by means of a thermographic camera. It receives the infrared wavelength emitted by an object, and transforms this information into an image, thus highlighting problems that cannot be seen in a standard visual inspection.

Because these tests may be performed on an existing rotating plant, or other equipment and may involve close proximity to potential voltage sources, the thermographic survey needs to be performed by a person with certification only to avoid accidents involving personnel and equipment. A medium- and high-voltage switchgear needs to have inspection hatches or windows in place if the inspection is to be completed safely and in line with requirements.

Benefits for the customer
- Minimizing the maintenance and repair costs through proactive condition monitoring
- Easier planning of preventive maintenance operations
- Gaining an excellent overview through the imaging: temperature measurements can be compared between two or a hundred points in the same thermal image.

Equipment that can be inspected
- Cables and connections
- Transformers
- Bus bars
- Switchboards
- Batteries and UPS units
- Converters
- Pumps
- Electric motors
- Shaft couplings

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An ABB LEAP success story

Our ABB LEAP program began in late 2008 and was presented to our key customers in early 2009. Our ABB LEAP program began in late 2008 and was presented to our key customers in early 2009. ABB was able to move from the Ivory Coast to Ghana.

Two fire pumps and two cargo motors. ABB performed the implementation phases and use boroscopes to inspect places with limited access.

Implementation phases

Condition monitoring measures are conducted at the site, also including visual inspection and observation of operation. Boroscopic inspection is a non-destructive inspection method. The inspection work may involve high-voltages and the equipment may have stored electrical mechanical energy. Therefore, the inspection must be performed by a person with certification only, to ensure application of appropriate precautions and safe work methods. 

Benefits for the customer

- Proactive minimization of maintenance and repair costs
- Advanced planning of budgets for upcoming maintenance
- Extended product service life

Equipment that can be inspected

- Electric machinery
- Stator and rotor windings and air gaps
- Transformer windings
- Lubrication conditions
- Electrical machines
- Pumps, valves, and gear
- Insulation conditions, estimate generator and motor lifetime

Condition monitoring is valuable maintenance that can be typically carried out while the equipment is running. Through vibration measurements, electrical measurements, oil analysis, etc., ABB’s Condition monitoring measures were observed trends. This allows ABB to be prepared in advance of the customer’s unexpected shutdown or emergency.

Boroncopic inspection

Boroncopic inspection is a non-destructive inspection method generally applied in oil marine and industrial sectors. This monitoring method is ideal for mechanical equipment that is very expensive to open and disassemble. Inspection takes place when the equipment is not operating. It is performed through orinal holes a few millimeters in diameter by means of a special oriendable probe, which transmits images directly to a LCD monitor and can acquire video as well as still images.

The partial discharge analysis service is a proactive diagnostic approach that uses partial discharge (PD) measurements to evaluate the integrity of the equipment. PD emissions from partial discharge activity occur over the whole voltage equipment used by electrical power utilities. In critical high-voltage equipment, the integrity of the insulation is continuously monitored by PD detection equipment during the manufacturing stage as well as periodically during the equipment’s useful life. PD detection and analysis are essential for ensuring reliable, long-term operation of high-voltage equipment used by electrical power utilities.

The most practical techniques of non-intrusive testing have been developed for testing the condition of the radio frequency part of the acoustic spectra. The ultrasonic part of the acoustic spectra provides several advantages. Instruments are far more sensitive, and are operator-independent. In addition, they are directional and operate above the frequencies audible by humans. ABB MACHsense was developed to address the reliability of cage induction motors, especially for lower capacity motors with a power rating less than 2000kW, in which PD results enable reliable prediction of which motors are based on detection of the radio frequency part of the acoustic spectra. PD results enable reliable prediction of which motors are based on detection of the radio frequency part of the acoustic spectra. The ultrasonic part of the acoustic spectra provides several advantages. Instruments are far more sensitive, and are operator-independent. In addition, they are directional and operate above the frequencies audible by humans.