

MOTORS | SWITCHGEAR

THE CHALLENGE

Continuous reliable supply of electrical power is affected by the operation of generators, transformers and switchgear. Their perfect operating condition is highly dependent on the state of insulation, which must withstand the high voltage stresses. It is therefore crucial to verify the insulation condition throughout their life cycle. 85% of switchgear related failures are suspected to be related to PD. Stator insulation faults are responsible to about 40% of motor failures. The integrity of the insulation of high voltage equipment should be confirmed during manufacturing, commissioning and lifetime so that safety and good condition are maintained.

THE SOLUTION

Corona PD is a key element in the degradation failure of high & medium voltage apparatuses. Corona is a localized surface partial discharge of ionized air surrounding a conductor or a dielectric. The insulating air becomes conductive, but only locally, due to an unplanned outstandingly high local electrical stress. It is caused by geometry, inductance, cracks, along the boundary between different insulation materials, contamination etc. Corona PD is a repetitive localized phenomenon causing mechanical, chemical, and thermal cumulative damage, and if unattended may lead progressively to complete electrical breakdown.

DayCor® UV cameras detect aging of stator winding insulation in motors and generators rated 6kV and above. Motors manufacturers for electric cars use Ofil's cameras as a means of Quality Assurance (QA) tests for new coils and windings. Rotating machine workshops use Ofil's cameras to assess the condition of the stator winding insulation in order to determine if maintenance is needed. Problems such as loose coils in the stator slots, contamination leading to electrical tracking and thermal aging of the insulation are easily detected during offline corona PD testing.

Electric motors are designed for specific conditions as found on their name plates, including voltage and current. Overloading a motor during testing can quickly reduce the motor lifetime. With Ofil's NDT cameras tests are run when the motors are disconnected from the AC power source eliminating the danger of destruction.

ABB offers onsite maintenance services for motors. We are using the corona camera to detect Partial Discharges (PD) on 6,6KV and higher motors. During tests we are stepping up the voltage while looking for discharges to appear. Once a discharge is seen and pinpointed it is being and attended. This helps us repair the motors efficiently and reliably and build a reputation.

J.V.G. Motors & Generators Service, ABB

DayCor®

SCALAR



SEE



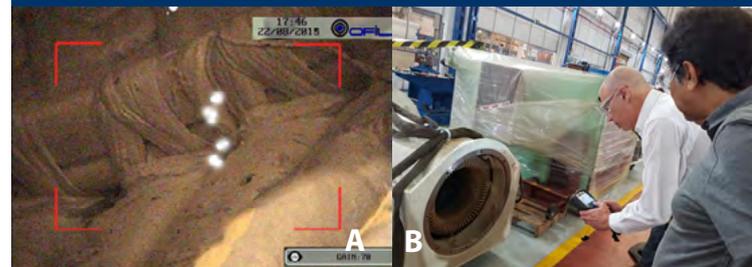
PINPOINT



FIX



EFFICIENCY

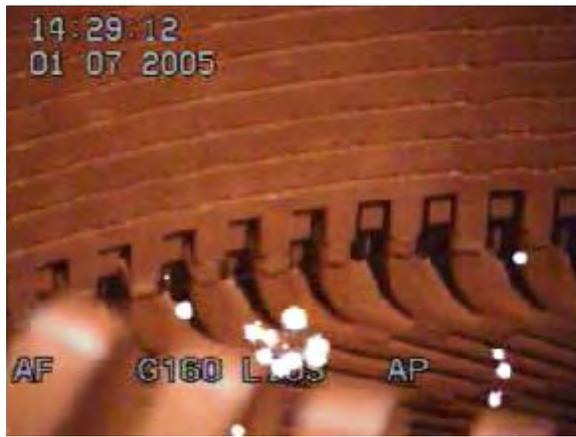


- A. Turn-to-Turn fault
- B. Offline NDT inspection
- C. Checking switchgear
- D. Electrical vehicles motors





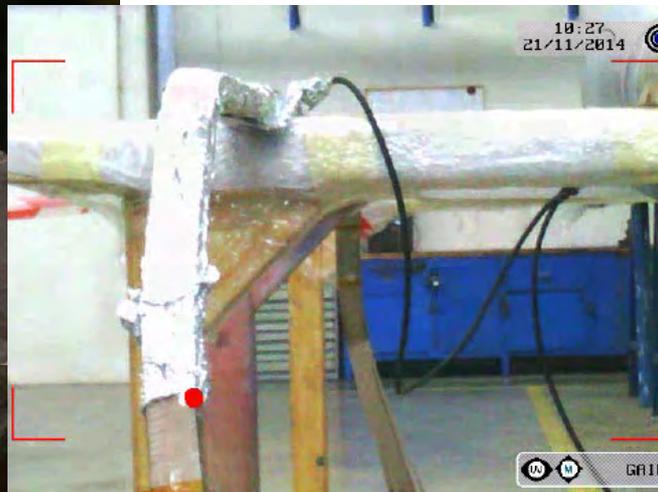
Left: Visual inspection
Right: UV inspection, PD in end windings



Left: Visual inspection
Right: UV inspection, PD where the bar exits the slot



Left: visual inspection; Right: UV inspection, PD on the interface between semi-conducting and gradient coating



BENEFITS: Ofil camera are useful for finding widespread insulation problems

- » WINDING AGING
- » PD IN SLOTS
- » DETERIORATION OF SEMI-CONDUCTING COATING
- » INADEQUATE SPACING IN END WINDINGS
- » LOOSE WINDINGS
- » DETERIORATION OF INTERFACE BETWEEN SEMI-CONDUCTIVE AND GRADIENT COATING

