

# Inspection system for retaining rings (KIRR)



## Saving time, effort and money with non-destructive testing

The generator is one of the most crucial parts of a power plant, since it is where the mechanical energy is converted into electric energy. It is therefore essential that the generator is always in optimum condition. Among the critical components are the retaining rings at each end of the rotor. These are susceptible to damage as a result of specific chemical influences and mechanical or electrical forces. However, replacing the rings involves substantial costs. The DEKRA inspection system for retaining rings (KIRR) represents a cheaper yet equally effective alternative. The system has already been used to inspect over 1,600 generator retaining rings in 25 countries worldwide.

### Background

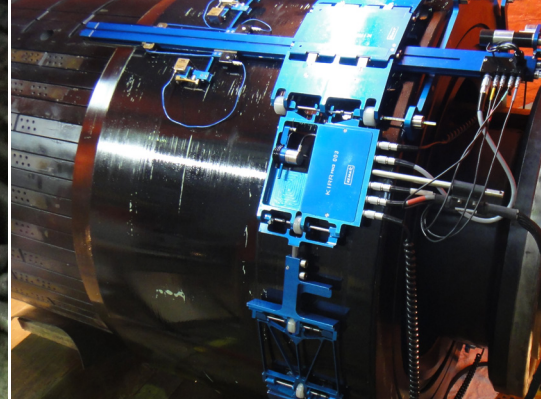
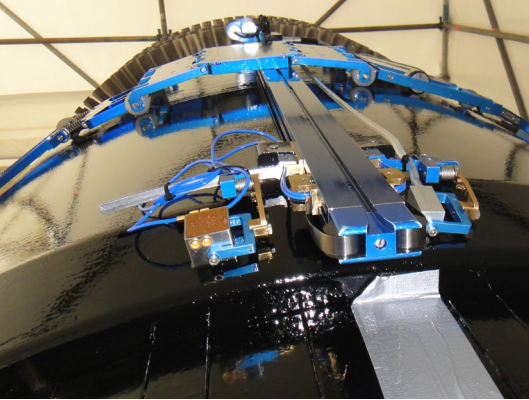
A retaining ring has a long lifespan and often lasts for the entire life of the generator. However, the smallest of cracks in the retaining ring poses a risk to safety and could result in extremely costly damage.

To avoid such disastrous consequences, many manufacturers recommend that the retaining rings are replaced periodically – an expensive exercise which can cost up to a million euros. DEKRA's KIRR offers a cost-effective alternative. The system detects and analyzes flaw indications in the retaining ring, enabling you to determine whether the retaining ring needs to be replaced. Furthermore you can keep a close eye on

newly detected flaw indications in retaining rings which do not yet need replacing and monitor their condition during future operation. One crucial advantage is that it is no longer necessary to disassemble the rotor and the retaining rings for inspection purposes, which in turn yields cost savings of up to EUR 200,000.

### Service

The KIRR system is adjustable to fit virtually all generators and large motors. This flexible system combined with our extensive experience in this field allows us to draw up the inspection plan on site, without detailed information being required beforehand. If required, the inspection can be performed within 24 hours.



Ultrasonic crack detection is focused on the shrink-fit areas and wall thickness steps. Damage, such as stress corrosion cracking and top tooth cracking, is detected. In addition, eddy current scanning is added to accurately map the outer surface. The ring's coating is left in place. If cracks are discovered, ring geometry and flaw data are used in an FEM computer model to calculate the residual lifespan. Furthermore, we establish the inspection interval for monitoring purposes.

### Specifications

The KIRR system can be applied on generators with a ring diameter of 600mm and upwards. In-situ test characteristics:

- > Minimum gap between retaining ring and stator: 8mm
- > Technique: UT-TOFD, UT-TRL and ET scanning
- > Surface: 360° circle and 1-10mm pitch
- > Defect heights of 0,5 mm and upwards are detected
- > Typical test duration for two rings in-situ: 24 hours

### Key Benefits

- > Major savings, since retaining rings will not always have to be replaced
- > Awareness of the condition of the retaining rings; possibilities to identify trends
- > Savings through avoiding disassembly of rotor and retaining rings
- > Quick testing process which minimizes downtime
- > Rapid deployment
- > KIRR can be combined with ARGIS (robotic testing of the generator)
- > Independent testing

### About DEKRA

DEKRA has been active in the field of safety for 90 years. Founded in 1925 in Berlin as Deutscher Kraftfahrzeug-Überwachungs-Verein e.V., it is today one of the world's leading expert organizations. The company currently employs more than 37,000 people in more than 50 countries on all five continents. With qualified and independent expert services, they work for safety on the road, at work and at home. These services range from vehicle inspection and expert appraisals to claims services, industrial and building inspections, safety consultancy, testing and certification of products and systems, as well as training courses and temporary work. The vision for the company's 100th birthday in 2025 is that DEKRA will be the global partner for a safe world.

### About DEKRA Material Testing & Inspections

Material Testing & Inspection (MTI) inspects and tests business-critical installations, systems, and materials for businesses operating in petro chemistry, the processing industry, and the energy sector. The tests and inspections are primarily focused on ensuring the safety of structures and installations, such as storage tanks, pipelines, gas turbines, and pressure vessels. MTI's specialists use highly advanced methods, technologies, and testing equipment, on location and in their own testing laboratories.

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