Electrical Rotating Machines Diagnostics

The goal of electrical rotating machines diagnostics is to predict the reliability of the machine and suggest necessary repair and service. With precise and good testing strategy, great savings can be accomplished and reliability improved. Usually machine diagnostics is performed using non-destructive methods onsite.

Laboratory for rotating machines as a part of rotating machines department in KONČAR – Electrical Engineering Institute has over thirty years of experience in development, testing and diagnostics of electrical rotating machines with the database of few thousand performed testing. Laboratory is equipped with instruments and tools for onsite testing and diagnostics of rotating machines.

Following diagnostic measurements can be done on all type of LV and HV rotating machines:
- preventive on-line and off-line tests to detect possible failures,
- testing before, during and after the overhaul

Rotating machines diagnostics covers
- visual inspection
- tests and diagnostics
- condition prediction.

Rotating machines diagnostic is based on collecting data about characteristic parameters to check the performance of the machine. Collected data are then compared with previous measurements.

Diagnostic measurements should be performed so that all parts of the machine are covered. Therefore following groups of tests are done:
- stator tests
- rotor tests
- testing of mechanical parts of the machines

In our laboratory we can perform following tests

**On-line testing**
- vibration measurement with FFT analysis
- noise measurement
- shaft current and voltage with FFT analysis
- temperature measurement
- motor current signature analysis
- on-line partial discharge measuring
- measuring of voltage, current, power and speed
- leakage flux measurement

**Off-line testing**
- insulation resistance and polarization index test
- stator and rotor resistance measurement
- rotor and stator capacitance test
- DC hipot test, step voltage test and ramp test
- dissipation (or power) factor test
- dissipation (or power) factor tip-up test
- stator surge comparison test up to 30 kV
- stator core ring flux test and El-Cid
- partial discharge test
- impedance and AC pole drop test
- AC hipot test
- rotor bars test

Rotating machines diagnostics enables
- important measuring values trending
- remaining life time prediction
- reduce unexpected failures
- shutdown and maintenance planning
- increase reliability
- reduce maintenance costs
- reduce insurance costs
- reduce capital overhaul costs
Our most powerful test:

1. Surge test up to 30 kV
   - surge testing is a non-destructive test and detects the early stages of secondary insulation deterioration
   - surge testing will predict motor burn-out due to turn-to-turn or phase-to-phase shorting.
   - extremely small changes in inductance such as shorted turns, incorrect turns count and incorrect turns placement can easily be detected
   - test is performed according to IEEE Std95-2002

2. Ramp test up to 50 kV
   - high direct voltage ramp tests incorporates a continuous record of current versus voltage
   - sensitive indicator of groundwall cracks and fissures

3. Motor current signature analysis
   - proven to be a highly valuable predictive maintenance tool
   - detect the common machine fault such as turn to turn shortcut, cracked/broken rotor bars, bearing deterioration etc.
   - can be used in conjunction with vibration and thermal analysis to confirm key machinery diagnostic decisions