Generators and motors are vital parts of power generating plants and industrial installations are long lead, high cost items should they need to be replaced. Ramboll can help to:

- minimise this risk
- gain the benefit of preventive maintenance.

Ramboll has more than 15 years’ experience in carrying out conditioning monitoring and our staff is highly trained professionals ready to help.

**Periodic On-Line Partial Discharge Monitoring**

Stator winding insulation problems account for about 40% of all motor and generator forced outages, which result in lost production and revenue. On-line condition monitoring is carried out under normal operational conditions, thus providing a true reflection of the machine condition.

Trending PD data over time allows for the planning of corrective intervention when it is most cost-efficient.

For a unit in good condition, measurements should be taken once a year; where units show signs of deterioration, the number of periodic measurements may be increased to between two and four per year.

**Periodic On-Line Partial Discharge Test Procedure**

With the motor or generator operating under normal service conditions the PD-monitoring instrument is connected to the installed capacitive couplers termination box and the different parameters are recorded, and stored for further analysis.

Ramboll will make a subsequent analysis and interpretation of the recorded data.

**Worldwide Accepted Technique**

The on-line PD monitoring technique was introduced over two decades ago and has since been applied to numerous motors and generators to identify deteriorated stator windings. It is by far the most popular method in the world for measuring motor and generator partial discharge (PD).

The method is non-destructive and based on sound scientific and empirical principles, is recommended by manufacturers and is considered to be the industry standard.
Detection of Partial Discharges
Partial discharges in degrading high voltage stator windings give rise to small voltage pulses which travel through the stator winding. The magnitude and the number of these pulses depend on the degree of insulation deterioration. That is, as the magnitude and number of partial discharge voltage pulses increase, the rate of the electrical insulation deterioration also increases.

Benefits of PD Monitoring
During the past 20 years, on-line Partial Discharge tests have produced thousands of results on motors and generators of all types and sizes.

The benefits are:
- The root cause of stator problems can be identified and often repaired at an earlier stage.
- Monitoring can increase the availability of equipment, and can contribute to the extension of the useful life of the unit windings.
- Most stator winding in-service failures can be avoided.

PERIODIC ON-LINE PARTIAL DISCHARGE TEST PROCEDURE
With the motor or generator operating under normal service conditions, the Ramboll operator connects the PD-monitoring instrument to the installed capacitive couplers termination box. Different parameters such as magnitude, phase position and number of partial discharge pulses detected at each coupler are then recorded, and stored for further analysis.

Ramboll will make a subsequent analysis and interpretation of the recorded data. The results will be presented in a report that would include:
- Graphs depicting the nature and severity of particular insulation aging mechanisms.
- Trend curves highlighting the progression of these mechanisms over time.
- Statistical values which can be compared with historical databases for similar units.
- Recommendations and conclusion.

SELECTED REFERENCES
- DONG Energy, Denmark – Asnæs Power Station (782MW)
- DONG Energy, Denmark – Avedøre Power Station (825MW)
- DONG Energy, Denmark – Ensted Power Station (660MW)
- DONG Energy, Denmark – Kyndby Power Station (260MW)
- DONG Energy, Denmark – Skærbæk Power Station (392MW)
- DONG Energy, Denmark – Studstrup Power Station (714MW)
- Udevalla Kraft AB, Sweden - Lillesjö Power Station (12MW)

CONTACT:
Flemming Stig Pedersen
Head of Department
Tel +45 51613748
FLSP@ramboll.com