Generators and other technical components are in operation in power plants over periods of years. Operating stresses and aging can cause successive damage to various components such as the stator end winding or the high-voltage insulation. Greater flexibility requirements with an increasing number of starts and stops, changes in grid requirements and instabilities can also contribute to increased stresses. If it is possible to detect changes in the components in advance with long-term in-service diagnosis, unscheduled and expensive outages can be prevented and measures to extend service life can be implemented according to schedule. For more than twenty years, Siemens has used systems for monitoring turbogenerators that contribute to early detection of potential damage during operation.

Our solution
The modular GenAdvisor™ platform was developed based on our many years’ experience and provides customized solutions for power plant operators. The following processes can be continuously monitored and localized with the GenAdvisor systems during generator load operation:

- Partial discharges
- Interturn short circuits in the rotor
- Vibrations in the stator end windings
- Voltages in the rotor forging as well as currents via the shaft grounding brushes

The GenAdvisor monitoring systems enable data acquisition, storage and visualization of the sensor data. The GenAdvisor platform server provides remote access as well as extended visualization and analysis possibilities. The server also enables the integration of multiple monitoring units, thus enabling central monitoring of up to twenty generators.

Siemens offers further diagnosis and analysis options with qualified experts in the context of service packages. Measured data can be regularly analyzed and evaluated via secure remote access to determine recommendations for continued plant operation.

Features
GenAdvisor partial discharge monitoring
Imminent stator winding insulation damage can be manifested by continuously increasing partial discharge activity. This can be detected, localized and monitored at an early stage using high-frequency methods, enabling the recommendation of specific measures for further operation.

GenAdvisor stator end winding vibration monitoring
The condition of the generator stator end windings is usually investigated by visual inspection and with tapping tests. Repairs that are not performed in time or not at all can result in the need for complete generator stator rewinding. Monitoring of end winding vibrations is therefore a useful tool for evaluating the condition of generator stator end windings, and can help minimize the need for rewinding.
GenAdvisor rotor interturn short circuit monitoring

Rotor interturn short circuits due to aging-induced damage to the insulation can occur in generators that are older or have been stressed in service. In most cases, an interturn short circuit will not initially result in generator failure, but it can have unfavorable effects on generator operation.

GenAdvisor shaft voltage and shaft grounding current monitoring

A shaft grounding brush on the turbine end generally provides the generator rotor with a defined ground in order to prevent effects on the turbine bearings from the shaft voltage developed in the generator and to discharge static buildup from the turbines. Monitoring of the shaft voltage and grounding current via the grounding brushes can detect insulation defects in the bearings as well as malfunctions of the grounding brushes which can help prevent imminent bearing damage.

Your benefits

With GenAdvisor, Siemens provides you with customized solutions for reliable in-service monitoring of generators and high-voltage equipment. Advance recommendations based on generator condition can enable scheduled outages to be optimized and shortened, as necessary repairs and spare parts ordering can be planned in advance.

GenAdvisor monitoring system benefits can include:

• Lower maintenance costs due to condition-oriented maintenance
• Better estimation of maintenance requirements with trend analyses
• Optimization of maintenance intervals and maintenance measures as well as operating service life of monitored components

References

More than 140 generators are currently being monitored with diagnostic systems from Siemens.