**Scope of supply**

Excited by power system transients, load unbalances and disturbances, turbine-generators are susceptible to torsional vibrations occurring at or near rotor torsional natural frequencies. When torsional vibrations are excessive, the resulting cumulative fatigue damage reduces life in components such as shafts, rotors and blades. If high levels of torsional vibrations continue without corrective action, severe component breakdowns can occur, causing forced or even catastrophic outages.

Siemens pioneered monitoring of torsional vibrations in the 1970s when we introduced our first generation analog monitoring equipment. It utilized signals from magnetic pickups mounted over shaft-mounted toothed wheels. Building on this experience, we are now offering a new advanced monitor – the Siemens Digital Torsion Monitor (DTM) – with state-of-the-art detection hardware and signal processing software. The new monitor features engineering analysis capabilities and customized settings for monitoring the level of torsional vibrations.

The scope of supply of this fully integrated system includes:

- Advanced torsion monitoring software
- Signal processing chassis with specialized torsion detection hardware, integrated computer including 6 inch touch panel display, 2 GB DRAM, 16 GB storage, and 1.91 GHz quad-core processor
- Analog outputs and alarm/relay contact outputs
- Optional magnetic speed sensors.

**Customer benefits**

The Siemens Digital Torsion Monitor can be a cost effective investment that can help reduce outages and improve your unit availability.

Benefits can include:

- Early detection of excessive rotor torsional vibrations
- Reduced component fatigue issues related to torsional responses
- Reduced maintenance costs
- In certain cases, continuous monitoring can save costly testing efforts.

**Features**

**Signal processing chassis**

The signal processing chassis features state-of-the-art torsional demodulation hardware for sensitive detection of torsional responses ranging from 5 Hz to 200 Hz. Compared to analog technology, its digital processing provides more accurate and timely acquisition, display, and storage of torsional response data.

**Torison monitoring software**

As an integral part of the DTM, the torsional monitoring software features:

- Customizable software designed to simultaneously monitor up to two frequencies at up to three shaft locations utilizing toothed wheels or optical stripes. These three locations can be from either the same or different units. Up to four additional locations can be monitored where applications include strain gauges.
- Intuitive display screens featuring both numerical values and color coded bar graphs for at-a-glance interpretation of torsional amplitudes and alarm levels. Both present level and peak level since the last manual reset can be viewed.
- Engineering/analysis capabilities
to view and evaluate the online frequency spectrum of each torsional signal.

- Historical data of recorded torsional amplitudes.
- Multiple customizable configurations.

**Standard features:**

**Analog outputs**
Nine demodulated torsional outputs are provided for engineering analysis. Six 4-20 mA analog outputs of torsional displacement amplitude and eight 4-20 mA outputs of strain gauge amplitude are available as an additional resource for recording or displaying torsional responses on external devices such as a plant computer or chart recorder.

**Alarm/relay outputs**
Three relay outputs are available which can be used as inputs to a plant computer, protection system, or annunciation system to alert the operator if various preset torsional response levels are exceeded.

**References**
The Siemens Digital Torsion Monitor can be applied to all OEM turbine-generator configurations. If magnetic speed sensors are already in place, the installation can generally be performed online, and Siemens engineers will customize and calibrate your system to meet your specific requirements. If magnetic sensors are not yet installed, Siemens can provide guidance and services to install sensors at the appropriate locations. This system is just one the solutions Siemens offers to help you extend the operating life of the unit and reduce unplanned outages.

The DTM display for three toothed wheel and four strain gauge locations monitoring two frequencies with low torsion amplitude.

The DTM display with high torsion amplitudes at two toothed wheel locations.