

DOBLE CONSULTING & TESTING SERVICES

# GENERATOR AND MOTOR TESTING

with EMI Diagnostics<sup>SM</sup>



An Electromagnetic Interference (EMI) Diagnostics survey from Doble is an on-line, non-invasive test that can detect a wide variety of defects in generators, motors and associated electrical system components. Trending data is not required and maintenance recommendations can be provided on the very first test. EMI data collection follows the international standard CISPR 16. The test equipment is very sensitive and measurement accuracy is traceable to national standards.

Electric generators are usually reliable pieces of equipment, however, a large portion of the existing generating fleet is approaching or has exceeded their design life. EMI Diagnostics has been successfully performed on electric power systems since 1980. It has been proven with over 8,000 successful field tests on more than 500 different designs with over 70 types of defects and conditions identified, catalogued and verified.

Electromagnetic interference is the precise frequency domain measurement and identification of radio frequency energy that results from electrical partial discharge and arcing at defects. EMI data is collected from the temporary placement of a single split core radio frequency current transformer around the power conduit, safety ground or neutral lead of the component being tested. No hot connection is required to any energized conductor, and no hardware installation modifications are required.

The acquired radio frequency spectrum, or EMI signature, is unique for each physical location and defect present within the electrical system. EMI Diagnostics can detect a wide variety of electrical and mechanical system component defects in:

- Generators
- Motors
- Transformers
- Iso-phase bus
- Cables
- Switchgear
- Associated electrical system components

## BENEFITS OF EMI DIAGNOSTICS

- Provides broader view of system defects including partial discharge
- Enables limited maintenance budgets to be targeted toward critical and/or problematic units
- Empowers improved condition assessment and optimized preventative maintenance programs

## GAIN A SYSTEM-WIDE VIEW OF YOUR PLANT AND EQUIPMENT

Partial discharges and arcing generate light (visible and UV), chemical changes (ozone), audible noise (sound), heat (IR) and electromagnetic interference (EMI). EMI Diagnostics detects the radio frequency emissions resulting from partial discharges and arcing. EMI Diagnostics can be used to identify the following:

### Generator conditions

- Stator bar slot discharges from conductive coating erosion
- Stator slot side-packing erosion
- Stator bar stress grading system deterioration
- Loose stator wedging (stator bars)
- Loose end winding ties
- Blocking and circuit rings
- Loose or broken stator sub conductors
- Winding contamination (dirt, oil or water)

### Motor conditions

- Stator coil partial discharges
- Deterioration in slots and on end
- Winding contamination (dirt, oil, carbon black or coal dust)
- Defective bolted or crimped stator lead connections
- Broken induction motor rotor bars
- Bearing problems
- Misalignment
- Shaft oil seal rub

## OPTIMIZE CONDITION BASED MAINTENANCE PROGRAMS

Doble's experience has shown that 80% of the equipment tested does not require maintenance during the next outage. However, 15% are in the process of developing a problem and 5% need immediate attention to prevent premature equipment failure. Identifying the 80% is extremely important since it releases maintenance resources to the 5% that require immediate attention. Additional inspections or tests can be scheduled to confirm the existence of these conditions and condition based maintenance can be scheduled before a failure occurs.

## About Doble Power Services

Doble has been a trusted name in electric power diagnostic solutions for over 90 years. Doble's unique business proposition combines three elements—diagnostic test instruments, expert consulting and testing services, and the world's largest resource library of related knowledge—into complete diagnostic solutions. Doble Power Services leverages the resources of Doble's extensive library and experienced team of engineers to deliver the highest level of consulting services and knowledge-based solutions.

## Why Doble Power Services?

### Extensive Global Experience

Doble has more than 40 consulting engineers each with extensive experience in power systems engineering applications.

### Independent Expert Opinion

Trust Doble's expert consulting & testing services for unbiased diagnosis and assessment of critical assets.

### Doble Peer Review Process

When you hire Doble, you are hiring the shared experience of our entire engineering team. Each Doble field service report is reviewed by at least one other consulting engineer.

### Doble KnowledgeBase

Provides valuable benchmark data for use in evaluating test results on your equipment.



### Doble Engineering Company

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