

**TURBINE
DIAGNOSTIC
SERVICES INC.**

"The Turbine Doctor"®

Generator Inspection, Repair & High Voltage Testing

Services Publication: TDS-040

Turbine Diagnostic Services, Inc. (TDS) has a staff of experienced turbine mechanical engineers and mechanical service representatives that are knowledgeable in the mechanical assembly of medium (industrial size), large (utility size) steam turbines, gas turbines and generators. TDS has an experienced millwright labor force to support and man contract and forced outage services. To support some of our Customer's requirements our crews have been annually safety trained at the Florida Phosphate Contractor Safety Training and also receive classroom training to meet the requirements of the Mining Safety and Health Administration (MSHA) regulations.

GENERATOR INSPECTION, REPAIR & HIGH VOLTAGE TESTING

The TDS Generator Specialist Engineers have over 40 years of OEM generator experience. They are knowledgeable in both generator stator and field construction and their associated winding support systems. With this knowledge, they understand and recognize the signs of winding and support looseness and can evaluate the winding support system and core wedges for proper tightness and make recommendations where necessary repairs are appropriate.



The TDS generator specialist engineers are knowledgeable in the operation of generators and common modes of failure and indications of excessive electromotive forces applied to the electrical winding. These engineers are familiar with the different types of stator high voltage insulation and proper repair procedures for air, hydrogen or water cooled stator bars.

TDS generator engineers can provide generator field and stator winding insulation testing to determine the condition of the electrical winding insulation. TDS can measure the low resistance of the field and stator windings and test the pole balance of the generator field when accessible.

The field windings are tested with low voltage megger (megohm meter) checks to obtain a polarization index and A/C voltage impedance checks. For problem generator fields, rolling impedance testing can be conducted to inspect for changes in the field impedance with speed, searching for step changes to associate the centrifugal force to a speed at which shorted turns occur. TDS can conduct flux density probe testing and signal evaluation for further evaluation of field shorted turns.

The stator windings are tested with DC high voltage test sets. Initial megger testing is conducted at 2.5kv testing to determine the suitability of a generators winding for high voltage insulation stress testing. Generally, a polarization index of 3.0 is desired for proceeding with higher voltage tests. Each generator phase is tested starting with a 10kv absorption test and that sets the timing of the hold points of the high voltage DC leakage testing. After the DC leakage has been tested, the final minute of testing is a one minute pass/fail High Potential (HiPot) test. This is a high potential test that is potentially destructive. The HiPot test is conducted only after permission is granted by the customer. Failure of a winding during the test is not the responsibility of TDS, rather a failure of the winding to pass the test. This high voltage HiPot test, conducted for one minute, should be seriously considered by the customer with the ramifications of a failure before requesting the test to be conducted.



The TDS generator specialist engineers are also experienced in the start up testing required for new and relocated generators. These engineers can perform synchronizing and phasing check to verify proper phase rotation of the generator leads before the initial closure of the breaker. TDS has engineers that are knowledgeable in the generator protection relay and tripping schemes and can provide troubleshooting and programming functions for the new multi-function electrical protection relays.



TDS has generator engineers that are experienced in all types of excitation systems, from old rotating exciters with Amplidyne control, Alterex, or static exciters. TDS engineers are experienced in the static exciters from bus fed SCT-PPT exciters with analog regulators to the newer digital EX2000 regulator and excitation transformer and P bar winding. TDS has provided start up support for the EX2000/LCI for the static start of the large gas turbine generators.

TDS mechanical services team can disassemble the generator and exciter, inspect the generator mechanical components including bearings, coolers, and seals. Following electrical testing and repairs if required the same



team will reassemble and align the generator. Turbine Diagnostic Services Generator Specialist Engineers can conduct Inspections of the Generator Stator, Generator Field, and the Excitation System.

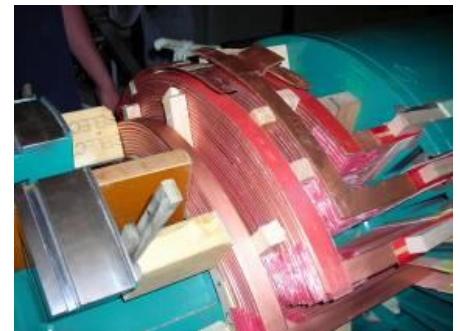


TDS works regularly with AGT Services when deficiencies are discovered and repairs are required. AGT Services is a leader in the field of generator repair and diagnosis. The TDS generator specialists can make small localized repairs as required.

TDS will present all test findings and document any repairs in a concise and easy to understand format.



Along with the generator inspection, repair and high voltage testing capability, Turbine Diagnostic Services, Inc. has knowledge of turbine generator controls; excitation



controls; vibration analysis; multi-plane balancing operation; start-up troubleshooting; oil filtration; and, mechanical maintenance services. This makes **TDS a COMPLETE TURBINE GENERATOR SERVICE COMPANY.**

Turbine Diagnostic Services, Inc. (TDS) is a full service turbine generator field service organization based in Odessa, Florida. We offer full mechanical and electrical service coverage, outage planning and scheduling, parts procurement, site labor, job staffing and management. TDS maintains an expert and experienced workforce of startup engineers, mechanical turbine engineers, mechanical service representatives, generator engineers/specialists, excitation control engineers, turbine control engineers, control and vibration technicians, and turbine millwrights. TDS specializes in conducting steam & gas turbine generator planned & emergency maintenance controls troubleshooting, and vibration analysis & balancing services.

We are available for your planned outages, or immediately to support your emergency assistance with any mechanical or control failure forced outages.

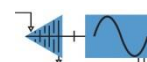
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