



GENERATOR & MOTOR SERVICES, LLC.
601 BRADDOCK AVE
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GMS NEWS

Waterford 3 Steam Electric Station's Exciter Band Repair and Complete Overhaul in 19 Days

CONTACT GMS

If you want to eliminate tooth-top cracking on your rotors and/or intend to replace retaining rings contact:

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GMS GENERATOR & EXCITER SERVICES:

- Condition Assessment
- Stator and Rotor Repair
- Exciter Overhaul & Repair
- Positive Pressure Exciter Housing
- Life Extension Programs
- Monitoring and Diagnostics

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A GMS highlight for the Fall 2003 outage season was the successful repair and overhaul of Entergy Operations' Waterford 3 Steam Electric Station's brushless exciter completed within budget and ahead of the station's schedule. The scope included a complete overhaul, partial end-turn re-banding, a high-speed balance and over-speed test.

This project grew from an unscheduled outage at the Waterford 3 Station in February, 2003 during which a large portion of the banding over the inboard end turns on the brushless exciter was unraveled. The OEM recommendation was that the unit be taken off-line for a complete exciter rotor rewind. In



light of the cost and extended down time involved in this option, plant personnel contacted GMS for a second opinion. Since the unit was scheduled for Fall 2003 refueling, plant personnel desired an interim repair to allow continued operation for a period of approximately six months.

GMS responded immediately by mobilizing personnel and material to the Waterford 3 Station. Detailed analysis by GMS engineering indicated that an on-site repair to the affected area of the banding could be made without removing the exciter and that the

strength of the repaired banding would be well within limits of operating speed force loadings on the repaired banding area.

Upon acceptance of the GMS recommendation by Waterford 3 Station project personnel, a formal repair procedure was prepared by GMS and submitted to Entergy. As described in a previous GMS News Letter (Vol. 1, Issue 2), the loose banding was carefully removed by hand, the surface was prepared and cleaned and GMS technicians applied multiple coats of a two-part epoxy to the damaged area while the rotor was on slow roll. Heat dryers were used to cure the resin after each application. When this interim repair was completed, provision was added to allow plant personnel to observe the repaired area from outside the exciter during the start up.

The assessment, analysis, recommendation, and repair were completed within 43 hours of the initial GMS contact by the Waterford 3 Steam Electric Station personnel. The unit ran without incident until it was taken off-line for refueling in Oct. 2003. This repair provided the Waterford 3 Station with at least four months of operation that would have been lost had a full exciter rewind been undertaken or an additional three months if a spare exciter or static excitation system was substituted for the damaged unit.

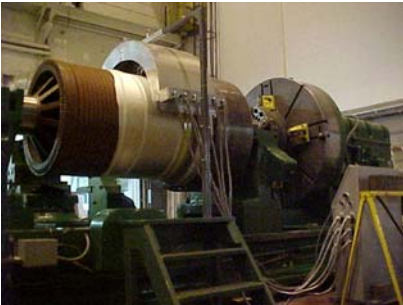
As a result of this action GMS bid on the exciter repair scheduled for the Fall 2003 Refueling Outage. GMS proposed a 19-day (pickup-to-delivery) schedule to perform a full overhaul, replacement of the damaged banding, a high-speed balance and over-speed test. The proposal submission was followed by a technical repair procedure presentation to Waterford 3 Station executive personal and ultimately GMS was awarded the exciter repair contract.

Work scope for the contract included:

- Complete overhaul of the rotor, stator, PMG, bearings and support plates
- End turn band repair
- Bearing seals and pedestal repair
- High Speed Balance with 10% over-speed
- Five point alignment
- Shipping from and to the Waterford 3 Station

Special tooling and engineering for this work included:

- A hydraulic spider to test and qualify the new banding process.
- A novel radiant heater system to cure the new banding tape,



allowing curing to take place while the exciter was in the lathe. This avoided risk and cycle time delay involved in heating the entire exciter.

- A special stub shaft to custom fit the Waterford 3 Station brushless exciter to the high-speed balance test equipment.

GMS conducted a site audit on each GMS vendor chosen for this project to verify that they placed the correct emphasis on quality and schedule for

the work scope to be performed.

GMS provided both mechanical and electrical personnel at the plant to perform some upfront testing and to ensure proper shipping with the GMS supplied heavy hauler. The exciter rotor and base was shipped as a single assembly weighing nearly 80,000 lbs.

The permitted truck arrived at the GMS shop the following day. Unloading and incoming inspections began immediately. The



rotor was removed from the base and installed on V-blocks for incoming testing, stationary base parts were disassembled, bearing and seal brackets were packed in shipping boxes and delivered to the GMS bearing vendor.

Conventional rotor and base overhaul activities were performed as planned, with essentially no divergence from the planned activities and schedules.

The banding repair process involved partial removal of the existing outer banding, inspection and testing of windings, replacement of missing banding, curing of the banding using radiant heat in accordance with the GMS Banding Specification parameters, and outer surface machining and sealing. A final coat of epoxy was applied to provide a smooth surface finish.

After reassembly and testing of all rotor components, bearing journal sur-



face was polished and the stub shaft was mounted, aligned and locked to insure trueness of the bearing journal surface. The rotor was then balanced and over-speed tested in accordance with the GMS specification.

After stub shaft removal, the coupling was inspected and cleaned and the rotor was reassembled into the repaired pedestal base. Final electrical and mechanical tests verified that the unit was ready for return shipment to



the Waterford 3 Station. Even with the heavy-load shipping restrictions, the overhauled and repaired exciter arrived back at the Waterford 3 Steam Electric Station three days before the station's scheduled exciter arrival.

For more information please contact Bob Fuller:

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or

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GMS Provides Expert Overhaul of Your Exciters

During calendar year 2003 GMS performed nine (9) complete overhauls of brushless exciters ranging from 250kw to over 6000kw. We also modified 4 exciter housings so that they will have a positive pressure to minimize the dirty ingress commonly found in power plants. Please contact GMS for all your exciter overhaul needs.