

# FAST RESPONSE AND EXPERT REPAIR ON EDBG AVOIDS SHUTDOWN FOR US NUCLEAR PLANT

## NORDBERG FS-1316-HSC EMERGENCY DIESEL BACKUP GENERATOR

A nuclear power plant in the Southeastern United States performed a main journal inspection during a scheduled outage on one of its Nordberg FS-1316-HSC emergency diesel backup generators (EDBG). Plant personnel had been monitoring the engine closely as they had observed rising aluminum levels in lube oil samples.

Plant personnel noted damaged bearings on units 7 & 8. After stone polishing the journals and replacing the bearings, the engine was started once successfully but experienced low lube oil shutdown during the second start.

### THE INSPECTION

Goltens got the call on Sunday and engineers were on site the next day to evaluate the condition of the shaft and identify a repair method for the damage on the EDBG.

Goltens undertook an inspection of main journals 7 and 8 and found the following:

- Bearing material lifted from the bearing surface and reembedded in different area on the surface
- Upper bearing shell on #7 showed signs of hammering by the crankshaft
- Out of tolerance run out readings of 0.010" and .005" on 7 and 8 compared to expected readings of .002".
- Hardness on the journals were within tolerances
- MPI crack tests were performed on both journals and no cracks were found
- Surfaces of main journals showed minor scoring
- Crankpin journals had radial striations on the running surface and bearing material wearing to the surface.
- Signs of ridge wear apparent on both crankpins.

### **MOBILIZATION AND REPAIR**

Goltens provided a summary report of the inspection findings to the plant management along with a recommended repair procedure. To address the urgent requirements and to help the plant avoid a shutdown of the reactor, Goltens deployed its in-situ machining tools and technicians to the site on Thanksgiving Day to effect the repairs.

#### PROJECT FACTS: EDBG CRANKSHAFT REPAIR

Customer: Location: Engine Make/Model: Year of Manufacture: Rated Output: Nuclear Power Plant Southeastern United States Nordberg FS-1316-HSC 1977 4.900 BHP



Scored main bearing running surface





#### **REPAIR SCOPE**

- Machine honing of main journals 6, 7 & 8
- Straightening of the crankshaft at main journal #7 and 8 to remove the bend in the shaft
- Machining of surface irregularities in the fillet radii
- Lapping and blue fitting of all open crankpin journals to remove ridge wear and restore the running surfaces

#### **REACTOR SHUTDOWN AVOIDED**

Once crankshaft work was completed, the plant's personnel rebuilt the engine with all new main bearings and the engine was flushed for an extensive period to ensure no contaminants remained in the system.

The engine was then thoroughly tested and returned to service after a slow break in period due to the installation of the new main bearings. All repairs were completed within required timelines for restoration and a reactor shutdown was avoided.



Machine honing of damaged main journal



Journal near completion of machine honing