

## WORTHINGTON CRANKSHAFT REPLACEMENT FOR MIDWEST NUCLEAR PLANT

### IN-SITU CRANKSHAFT INSPECTION LEADS TO COMPLETE CRANKSHAFT REPLACEMENT AND ENGINE REBUILD

A nuclear power plant in the Midwest experienced a bearing failure on one of its four Worthington SWB-VEE-12 backup diesel generators. The plant reported that 3.5MW engine had crankpin journal damage to the #4 crankpin and there was concern that the excessive heat of the failure may have introduced high hardness to the shaft. Goltens was requested to inspect the crankshaft and advise on repair or replacement strategies if the shaft could not be saved.

Goltens' in-situ technicians mobilized immediately to conduct an inspection of the 40 year old engine and determined that the crankpin could be repaired per generally accepted engineering standards. While this would normally be well within acceptable parameters, discussions with the plant and engine OEM revealed that this would be unacceptable as it would prevent the engine from operating at the nuclear plant's required 3.5MW load requirement under the strict nuclear standards.

As the plant had a replacement crankshaft on hand in storage, Goltens was asked to mobilize teams to work around the clock to get the crankshaft replaced and the engine operational as soon as possible.

Goltens mobilized 2 eight man teams (two project managers, four service engineers and ten technicians) to work day and night shift.

#### SCOPE OF WORK PERFORMED:

- Inspection of damaged crankpin #4
- Complete disassembly of engine including ancillary equipment
- Removal and rigging of engine block to facilitate removal of damaged crankshaft
- Replaced engine block and bearing caps to check line bore and adjusted plates as required.
- Removed block and caps
- Cleaned, inspected and prepared replacement crankshaft (including hand filing of high spots on journal surfaces)
- Inspected main bearing saddles for high spots and burs and replaced lower main bearings.

**PROJECT FACTS:** NUCLEAR PLANT  
CRANKSHAFT REPLACEMENT

Engine Make/Model: Worthington SWB-VEE-12  
Engine Output: 3.5MW  
Project Duration: 61 Days



Disassembly and removal of gear train



Rigging of damaged crankshaft from the engine



**WORKSCOPE (CONTINUED):**

- Cleaned all oil passages and prepared engine for crankshaft installation
- Lowered replacement crankshaft into place
- Completed rebuild of the engine
- Performed standard pre-start inspections and verified proper oil flows
- Completed test run of the engine

**CRANKSHAFT REPLACEMENT RESULTS:**

The engine was operationally tested over a period of multiple days until the plant was satisfied with the repair results and effectiveness of the repairs.

The extensive job took longer than Goltens' normal completion timeframe due to the strict regulations and procedures associated with the nuclear plant's working procedures. Working with the plant's technical resources Goltens completed the replacement in 61 days. Plant management commented *"Thanks to the Goltens personnel and all the people who supported them for bringing their expertise to us....We have learned much about diesel work from them, and appreciate their engagement."*



Calibration check on connecting rods



Replacement of bearing caps to check line bore



Replacement of bearing caps to check line bore



Replacement of bearing caps to check line bore





Reassembly of front end of the engine



Rigging flywheel into position



Rigging power pack into place during rebuild