

## **SULZER ZV40/48 ZGODA CRANKSHAFT REPLACEMENT & IN-PLACE MACHINING**

### **DIESEL OVERHAUL, LASER ALIGNMENT, LINE BORING, SURFACE MACHINING**

After a big end bearing failure on one of its Sulzer Z40/48 diesel generators, Tarlac Power Corporation in the Philippines, requested Goltens Singapore to do an inspection of the damage and propose a repair solution for the 18-year-old engine.

#### **ENGINE INSPECTION/DAMAGE ASSESSMENT:**

The inspection revealed that the crankshaft was damaged beyond repair and would need to be replaced. The damaged crankshaft was skidded out from the engine and further inspection of the main bearing showed signs that the crankshaft was not sitting in the center and that the alignment of the engine was not within maker's specifications.

Additional inspection and laser flatness check of the engine block and foundation skids revealed that the skids were too stiff and had developed cracks. An evaluation of the plant layout and engineering was also performed to determine the best way to handle the logistics for the complex job.

#### **THE REPAIR SOLUTION:**

Goltens produced a thorough plan and proposed schedule to the plant and was awarded the job to replace the condemned crankshaft, perform the required machining and rebuild the engine to operational status.

As the plant was under high operational demand, time was critical and Goltens immediately mobilized tools and technicians to dismantle the engine, jack up the engine block and remove the condemned crankshaft while the other required in-place machining tools were mobilized.

Once dismantled, laser checks were performed on the foundation skids, lower engine mating surface to foundation skid and main bearing pockets. The skids, mating surface and main bearing pockets were found to be distorted and the surfaces would require in-place machining and the engine would need to be line bored.

After the in-place machining works were completed and the replacement crankshaft installed, the engine could be rebuilt and the engine realigned properly to the generator using laser alignment tools.

#### **PROJECT FACTS:**

Power Plant Name:  
Equipment maker:  
Model:

TARLAC POWER CORP.

TARLAC POWER PLANT  
SULZER  
ZV 40/48 ZGODA



Rigging of the replacement crankshaft

#### **Cold welding repair on foundation skid**



#### **Preparing to machine the lower block surface**



### **CRANKSHAFT REPLACEMENT AND IN-PLACE MACHINING SCOPE:**

- Disassembly & skidding of condemned crankshaft
- Cut and remove existing holding down bolts to facilitate milling of foundation skid.
- Repair cracks on foundation side by gouging, cold welding and peening to relieve stress.
- Align X-Y-Z milling machine and carry out in-situ milling of foundation skid and underside of engine block to achieve flatness.
- Perform laser alignment for flatness checks on foundation skid top face and engine block underside surface.
- Perform Brush Electroplating on main bearing saddle sides to restore side dimension back to original size.
- Milling of horizontal face of main bearing saddle.
- Perform blue fitting and manual correction of main bearing saddle to the engine block.
- Install saddle and tighten to required torque. Check alignment and calibrate main bearing pockets.
- Lower engine block into place for line boring
- Line boring of main bearing pockets and post-boring calibration and alignment check by laser.
- Remove saddle and jack up engine block to facilitate replacement of crankshaft.
- Receiving & inspection of new crankshaft.
- Skidding of new crankshaft & reassembly of engine
- Flushing, testing & commissioning of engine

### **PROJECT RESULTS:**

After flushing of the engine lubrication system, Goltens' team proceeded with the commissioning of the engine performing satisfactory load tests up to 100% of load.

### **CUSTOMER REMARKS:**

*"We are very pleased with Goltens' performance on this job. Their team's deep technical knowledge and thorough inspection identified the root cause of the failure and resulted in a comprehensive repair of our generator engine which saves us from replacing the engine block. Goltens' technical execution was excellent and their ability to handle all aspects of the work themselves allowed us to deal with a single contractor for the entire job."*

Engr. Gilbert Mar J. Soliman  
Plant Manager  
Tarlac Power Corporation

**Line boring of the engine main bearing pockets**



**Laser alignment of the engine and generator**



**The rebuilt engine back in operation**