

## TURNING UP THE HEAT IN CAMEROON

### IN-SITU ANNEALING AND MACHINING SAVES WARTSILA 18V50DF GENERATOR CRANKSHAFT FOR KRIBI POWER PLANT

The Kribi Power Plant in Cameroon was commissioned in 2013 and operates 13 Wartsila 18V50DF natural gas generating sets supplying 216MW of power to the grid. During normal operation it experienced a bearing casualty on one of its generators taking it out of service.

#### INSPECTION AND REPAIR PLANNING

Goltens diesel experts were asked to inspect the damage and determined that the crankshaft could be salvaged within the rated diameter with in-situ machining and annealing. Crankpin journal number 7 (450mm diameter) and main journals number 7 and 8 (450mm diameter) all had damage but the most significant was to crankpin number 7. As in most cases of excessive journal hardness, the engine experienced a bearing failure and a large amount of heat was absorbed into the journal and emergency stopping of the generator introduced uncontrolled cooling which changed the metallurgical characteristics. In this case the hardness was exceptionally high measuring 653 Brinell (HB) and covered a large section at the bottom of the crankpin.

#### EXECUTION

With downtime and lost power production major factors for the plant, Goltens was asked to work 24 hours a day to rectify the casualty. Two teams from Dubai and Rotterdam were mobilized to Cameroon along with single point cutting tooling and annealing equipment to begin the project.

As the radius of the journal on number 7 had been damaged, Goltens machined a new radius to ensure the running surface for the journal machining was true. The crankpin journal was then pre-machined to -3.50mm to remove all surface cracks prior to annealing.

Once the heating pads, control equipment and insulation had been installed, the computer controlled heating and cooling process was executed to return the hardness to acceptable levels. Once the crankshaft returned to a normal temperature, Goltens measured the hardness and found that it had been successfully returned to a safe operating range around 300 HB.

#### PROJECT FACTS: KRIBI POWER PLANT

Engine Type:	Wartsila 18V50DF
Location:	Cameroon
Crankpin Diameter:	450mm
Final Crankpin Diameter:	445mm (-5.00mm)
Hardness Pre/Post Annealing:	653HB/~300HB



Kribi Power Plant - Cameroon



Crack tests performed on Crankpin #7



Hardness map showing extent of damage



The in-situ teams then finish machined the radii and machined and super polished the crankpin to  $-5.00\text{mm}$  at  $0.03\text{ Ra}$ . The minor damage to the main journals was rectified by hand polishing.

## RESULTS

The machining and annealing work was completed over an 11-day onsite period and avoided the potential for a costly and long duration crankshaft replacement. Goltens finished the job with two five-man diesel teams to rebuild and operationally test the engine prior to returning it to service.



Pre-machining to remove cracks before annealing



Connecting annealing equipment



Installing fillet radius cutter post annealing



Machining new fillet radii



Crankpin diameter check during finish machining



Repaired crankpin after polishing