GOLTENS REMOVES 36 METRIC TONS OF STEEL ON-SITE WITH SELF-LEVELING RADIAL MILLING MACHINE

FPSO KAOMBO – SEMBAWANG SHIPYARD

FPSO KAOMBO is a part of a $484M USD project undertaken by Sembawang Shipyard to convert 2 Very Large Crude Carriers (VLCC) into turret moored Floating Production Storage & Offloading vessel's (FPSO) for work off the Angolan coast.

Sembawang approached Goltens to inquire on capability to on-site machine a chamfer on two turrets with a diameter of 17 meters. The machining had to be done for weld preparations in 4 locations on each casing ring on the top and bottom inside diameters (ID) and top and bottom outside diameters (OD).

The primary challenge, beyond the diameter, was the requirement to remove 36 metric tons of material from the 170mm thick rings with the chamfer machined at specific angles (5.2° for the OD and 8° for the ID). The 170mm thick rings would have to be machined down to 30 mm for to weld the turret rings with rings number 1 and 3 of the structures. Goltens made a proposal to complete the challenging project and was awarded the job.

CAREFUL PLANNING FOR PERFECT RESULTS

The start of a job like this is very critical; after many meetings with the shipyard, turret designer, operator and the owners all parties were on the same track to ensure the project was executed to expectations. Careful considerations such as the distortion/expansion effect of solar heat were all carefully considered as well as the complex logistics associated with the staging and set up of the work site.

THE PREPARATIONS

The rings were positioned in the yard and welded into an elevated position with sufficient clearance for the self-leveling milling machine. They were then carefully measured using total station instruments and the reference point was given for Goltens to align the radial milling machine to.

PROJECT FACTS:	FPSO KAOMBO
Turret Casings:	Two
Location:	Sembawang shipyard
Diameter of casing:	17 meter
Material to be removed:	36 Metric Tons
Total height of turret structure:	85 meter

Milling machine installation on running rail

Machining lower outside diameter at 5.2° chamfer

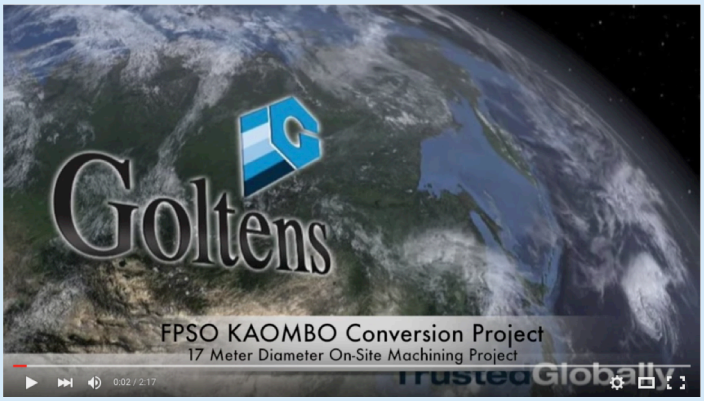
Machining lower inside diameter at 8.0° chamfer

To machine the bottom of the rings, support rails had to be installed to support the wheels of the buggy on the machine during machining. For the top machining the turret ring itself was used as support for the buggy wheels.

MILLING 36 TONS OF STEEL

The machining was done working around the clock shifts to keep to the project timeline. With the work location so close to the equator thermal distortion from the solar heat had to be taken into consideration. Extra care was taken to eliminate these effects by completing all final machine cuts at night when the affects of the sun expanding the ring could be controlled to ensure the results were well within the finite tolerances required. Each stage was checked and approved by Total (Operator), Saipem (Owner), Bluewater (Designer) and the shipyard.

PROJECT VIDEO: https://youtu.be/x_jt8afazA0



Machining top outside diameter at 5.2°

Quality checks on top OD machining

Machining top inside diameter at 5.2°