

PROJECT SHEET

MV25 TEN FPSO TURRET INTEGRATION SINGAPORE

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MV25 TEN FPSO TURRET INTEGRATION

MODEC, on behalf of its client Tullow Ghana, a wholly-owned subsidiary of Tullow Oil, has been contracted for the supply, charter and lease, operation and maintenance of a Floating Production, Storage and Offloading (FPSO) vessel for the Tweneboa, Enyenra, and Ntomme (TEN) fields in the deepwater Tano contract area. The FPSO will host multiple subsea tiebacks from three reservoirs (Tweneboa, Enyenra, Ntomme) in the deepwater Tano block offshore Ghana.

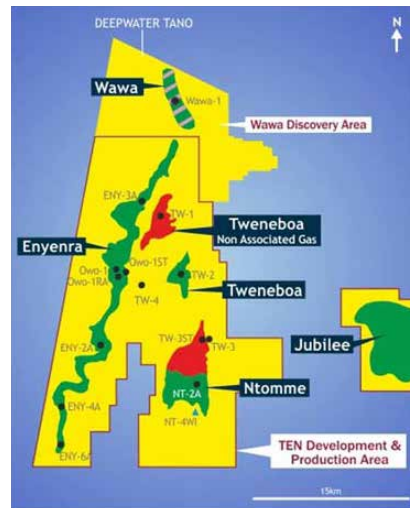
The TEN FPSO is currently under construction in the Jurong Shipyard (JSL) in Singapore and the turret is one of the most significant modules to be



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FEATURES

Company	Tullow Oil
Location	Jurong Shipyard, Singapore
Period	Lift campaign commenced on 9 May 2015 and completed on 13 May 2015
Contractor	MODEC
Sub-contractor	Asian Lift Pte Ltd
Equipment deployed	Asian Hercules III



A

- A Location map
- B TEN Turret

installed. Weighing approximately 3,055 tonnes, the turret is currently the biggest external turret in the world today. When completed by Jurong Shipyard in the fourth quarter of 2015, it will have the capacity to produce and process 80,000 barrels of crude oil per day, 65,000 barrels of produced water per day and 180 million standard cubic feet of gas per day. The vessel will also be equipped to store 1.7 million barrels of crude oil and deliver 132,000 barrels per day of filtered, de-aerated seawater. Upon deployment to the TEN project offshore West Africa, the FPSO will be external turret-moored in water 3,281 to 5,905 feet (1,000 to 1,800 meters) deep.

The FPSO will be installed in the TEN field and is designed to remain operational in the field for up to twenty years. This is the second vessel MODEC will provide and operate in Ghana following the FPSO Kwame Nkrumah MV21 for the Jubilee Field development, which was awarded in 2008. MODEC is currently operating the FPSO Kwame Nkrumah MV21 for Tullow as the operator of the Jubilee Field.

The TEN fields cover an area of more than 800 square kilometers, and they are located approximately 20 kilometers west of Tullow's Jubilee field.

SHEERLEGS CRANE SERVICES

MODEC has selected Asian Lift Pte Ltd to lift and install the world's largest external turret in May 2015. Asian Lift will provide sheerlegs crane services for the integration of the MV25 TEN FPSO Turret, which will be carried out

using the lift and go method from Keppel Shipyard to Jurong Shipyard with the 5000 mt Asian Hercules III.

The MV25 TEN Turret is located at South Quay, Keppel Shipyard Tuas and the integration will be carried out at Tanjong Kling South Quay, Jurong Shipyard, where the FPSO is berthed. Heavy-lift operations are to be carried out within the yard confines at several locations, as specified in the lift concepts.

LIFTING OPERATION

The lift and go operation consists of three stages: lifting, transportation by crane hooks and installation.

During the lifting stage, a floating crane is used to lift the modules/structures from the fabrication yard. These modules/structures are then transported on the crane hooks to the installation yard where the FPSO is located. Finally, these modules/structures will be installed on the FPSO at the designated positions.

The lifting operation for this project started on 09 May 2015 and it was completed on 13 May 2015. The Asian Hercules III (AH-III) was deployed in this operation.

ASIAN HERCULES III

The propulsion-assisted sheerlegs "Asian Hercules III" is an ABS-Class floating crane. She is equipped with 4 X 2000 KW Azimuth propulsion systems. The AH-III has a maximum lift capacity of 5000 mt on the main frame from 4 x 1250 mt blocks. She has a "Fly Jib" with a maximum lift capacity of 2500 mt from 2 x 1250 mt blocks. For this operation, the AH-III will execute the lift by using 2 x 1250 mt blocks from main frame and 2 x 1250 mt blocks from fly jib.

In addition to the main lifting hooks she has 3x20 mt auxiliary blocks used for rigging purposes.

ENVIRONMENTAL REQUIREMENTS AND COMPLIANCE

The following weather criteria were used for the AH-III during the entire operation.



Wind:	Max 15 knots
Tide:	Minimum 0.5 m clearance to keel - (1.1 m tide for lift and go movement @ Tuas Bay) - (1.2m tide for approach to FPSO @ JSL) - (1.0m tide for lowering down @ JSL) (100% Load)
Sea:	Max Swell 0 m. (Harbor Condition)
Daylight Hrs:	No restriction so long as visibility not impaired
Sunset Hrs:	Any lifts after sunset: both parties to agree on the activities

SAFETY

Several safety features were needed for this operation:

- No working under suspended load at all times
- Hooked up double lanyard (for safety harness) for all work above 2 m
- Life jacket to be worn by all personnel onshore and onboard whenever working near water
- Gloves to be worn at all times in operations area

PROJECT CHALLENGES

The main challenges, which were effectively dealt with during project preparation and execution, were:

- During the final execution phase of the turret lifting operation, Asian Lift had to brainstorm and propose lifting concepts and rigging arrangements that would be appropriate for the Asian Hercules III and the TEN Turret to avoid minimal modifications and the removal of turret structures.
- Due to the water depth in the sailing passage and integration area, the lift and go operation had to be planned carefully to maintain safety. One of the key challenges was to avoid the unnecessary grounding of the crane barge. The entire operational area involved was therefore thoroughly checked and various parties were involved in coordination to ensure a smooth operation.

CONCLUSION

Asian Lift worked closely with MODEC, the yards and marine warranty surveyors to provide solutions to engineering challenges and operational difficulties for the successful lifting and integration of the FPSO TEN Turret in line with the client's requirements and budget. The water depth requirement was solved by working in line with the tides for the load-out, transit and integration in order to minimize the cost impact.



C Turret Load out
D Turret Integration

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