

# PROJECT SHEET

## ARMADA INTREPID FPSO

DRY TRANSPORTATION ON THE DOCKWISE VANGUARD  
FROM ROTTERDAM TO BATAM

### BOSKALIS ENERGY SOLUTIONS

Boskalis is a leading global dredging and marine expert. With safety as our core value we provide innovative, sustainable and all-round solutions for our clients in the energy market. Realizing projects in remote locations with a heightened environmental focus is one of our specialties. Under brands such as Boskalis, Dockwise, SMIT, Fairmount, VBMS and Smit Lamnalco we offer more services than any other company in our industry, making us your next one-stop solution provider. We support the development, construction, maintenance and decommissioning of oil and gas import and export facilities, fixed and floating exploration and drilling facilities, pipelines and cables and offshore wind farms.

### ARMADA INTREPID FPSO PROJECT

The Armada Intrepid, which is owned by the Malaysian company Bumi Armada, is an FPSO (Floating Production, Storage and Offloading) vessel which needed to be dry transported from Rotterdam (Netherlands) to Batam (Indonesia) on the Dockwise Vanguard (DWV). The FPSO is 245 m long and weighs 60,000 metric tons. The DWV (275 x 70 m) has a deadweight of 117,000 metric tons.

### OUTFITTING, LOADING AND SEA-FASTENING OPERATION

In early May 2015 the DWV arrived at dolphins 84 in the Caland Canal and preparations began for the deck outfitting. A total of about 4000 m of hard cribbing wood was laid out on the main deck of the DWV in two layers of 300 mm (600 mm

### FEATURES

Client	Bumi Armada Berhad (BA)
Loading location	Caland Canal, Rotterdam, Netherlands
Discharge location	Batam, Indonesia
Period	Preparation August 2014 - May 2015 Execution May 2015 - July 2015
Cargo	Armada Intrepid FPSO, 245 m, 60,000 metric tons
Vessel	Dockwise Vanguard
Contractor	Dockwise



A

**A** Preparing the Dockwise Vanguard for loading the FPSO Armada Intrepid

**B** FPSO Armada Intrepid onboard the Dockwise Vanguard

height in total) to support the longitudinal bulkheads, transverse bulkheads, and web frames of the FPSO. The two layers of cribbing wood were bolted together with lag bolts and angle bars that were welded to the deck to prevent the wood from floating during the submerging of the DWV. In addition to the cribbing wood, three guideposts were installed on the main



B

deck of the DWV to ensure the exact positioning of the FPSO. Outfitting took a total of three days.

Early on 8 May 2015, the DWV shifted from the dolphins to the loading position and the DWV submerged to a draft of 22.0 m. The required loading draft was 23.5 m, but the water depth was inadequate and so the DWV had to wait for a high tide to proceed with submerging to the final loading draft. At about 17.00, the actual float-on of the FPSO commenced and, 2.5 hours later, she reached her final position against the guideposts. De-ballasting started and the main deck was dry after two hours.

During the entire operation the DWV was assisted by harbor tugs of Boskalis subsidiary SMIT Towage Northwest Europe.

After the loading operation fifty transverse sea-fastenings were installed with a capacity of 250 t each, as well as four strongboxes for longitudinal loads with a capacity of 380 t each. The bilge radius of the FPSO meant that adapters were required between the hull of the FPSO and the standard sea-fastenings. These adapters were welded to the hull of the FPSO. The sea-fastening operation took three days.

**TRANSPORTATION**

On 14 May, the DWV, now carrying the Armada Intrepid FPSO, left Rotterdam and headed for Batam. The 51-day transportation route was via the Cape Of Good Hope.

**DISCHARGE OPERATION**

When the DWV arrived at the discharge location, Adroit Marine Services started the cutting and gouging of all sea-fastenings. This took two days. On 6 July, the Armada Intrepid was floated off the DWV with assistance from five tugs supplied by Keppel Smit Towage and the Promarine Tow Master.

**PROJECT CHALLENGES**

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

- The actual data for the FPSO was known at a very late stage of the project, considerably reducing the time available for the engineering phase;
- The hull of the FPSO was stiffer than the hull of the DWV. This difference in the deflection characteristics of the two vessels resulted in high peak loads on the forward and aft ends of the cribbing wood and the FPSO hull when a sagging wave was introduced in the design

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phase. It was a huge engineering challenge to determine the best cribbing layout within a very short time. In the end, the cribbing beams at the bow and stern were reduced in height (by up to -40 mm) to manage the high peak loads exerted on the FPSO structure;

- The water at the loading location was not deep enough to load the FPSO safely. A few days prior to loading, half a meter silt was dredged from the seabed to provide an underkeel clearance of 0.5 m during the submerging operation;
- Access to the discharge location was a challenge in itself because of the shallow patches and wrecks in the approach channel. Good seamanship of the vessel's crew, in combination with additional detailed navigational charts of the area and the early boarding of the pilot, ensured that the DWV arrived safely at the discharge location.

**CONCLUSION**

The Armada Intrepid FPSO was transported successfully from Rotterdam (Netherlands) to Batam (Indonesia). Dockwise provided the required service in time to the Client, dealing with all the given engineering and operational challenges. Evaluating the project preparation and execution, it can be concluded that a combination of operational best practices and engineering analysis was decisive for the safe, controlled and successful execution of the project.



**C** The Dockwise Vanguard submerged  
**D** FPSO Armada Intrepid onboard the Dockwise Vanguard

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