

PROJECT SHEET

OSX3, CAMPOS BASIN BRAZIL
MOORING INSTALLATION AND HOOK-UP

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 Offshore, Dockwise, Fairmount 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.

OSX3 PROJECT

OGX - OSX is a Brazilian oil and gas company owning and operating several floating facilities in Brazil. MODEC secured the FPSO purchase contract and subsequently awarded Boskalis the Mooring Installation & Hook-up contract. The FPSO had to be installed in the Tubarão Martelo Field, located in the Campos Basin, Brazil, in 105 meters water depth.

The FPSO OSX-3 is permanently moored by means of a 360 degrees weathervaning external turret mooring system. The mooring system consists of a total of twelve mooring legs in a 3-by-4 arrangement, where the centerline of each group is 120 degrees apart. Each mooring chain is held by a driven pile and consists of a connector shackle and 120mm stud-less chain up to the hang off point on the turret.

MOORING INSTALLATION AND HOOK-UP

Boskalis was responsible for the planning and administration of the project, the development

FEATURES

Company	OGX – OSX (currently OGPPar)
Location	Tubarão Martelo Field, Campos Basin, Brazil
Period	Preparation August 2012 - May 2013. Execution June 2013 to September 2013
Contractor	MODEC
Sub-contractor	Boskalis



- A** Location map
- B** Mooring installation
- C** Union Sovereign with ROV spread

of detailed installation procedures and the execution of the mooring installation (phase 1) followed by the FPSO Hook-up (phase 2).

Upon arrival and importation of equipment and mooring components in Rio de Janeiro it was loaded on board the installation vessel (Construction Support Vessel (CSV) Boa Deep C) directly from the transportation vessel. After receiving the Installation License from the Company the CSV sailed to site and after an ROV pre-survey the installation of the anchor piles started. The mooring chains were connected to the mooring piles on deck of the CSV and installed at designated location within specified tolerances. Upon installation of the piles the mooring chains were



pre-tensioned with the CSV to a tension of 200 ton and laid in a pre-determined pattern on the seabed; wet stored until hook-up operation commenced. This phase was completed end of August 2013.

For the hook-up of the FPSO four anchor handling tugs (AHTs) were mobilized of which three are nowadays owned and operated by Boskalis, i.e. Fairmount Glacier, Fairmount Expedition and Union Princess. Boskalis' DP2 AHT Union Sovereign was mobilized including two suitable ROVs to pick-up the pre-installed mooring system and hand it over to the rigging team on board the FPSO. The FPSO was connected to the four other tugs to maintain position during the hook-up. Particular attention was given to reduce chains twists to meet the tight contractual tolerances. Once all the chains were engaged into the chain stoppers the chains were tensioned one by one to the required tension and angle. In September 2013 the installation was finalized with a rotation test of the FPSO, which was to the complete satisfaction of Contractor.

SAFETY

With all Boskalis' projects safety is an essential part. The project was executed with a good safety performance. All third party vessels were inspected beforehand to identify and close any gaps between the various applicable requirements. Due to the short execution period the vessel's own system was leading completed with the additional items to cover both MODEC's and Boskalis' requirements.



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MOORING INSTALLATION AND HOOK-UP



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PROJECT CHALLENGES

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

- Workability offshore: deck layouts and pile handling procedures were developed to optimize workability e.g. reduce offshore lifts; the piles were stowed transversally on the CSV.
- Importation processes in Brazil: these processes were carefully planned and carried out with the support of the Boskalis office in Brazil based on previous experiences locally.
- Local authorities and permissions: continuous and open communication with Contractor and local authorities assured fulfilling all requirements.
- Requirement for twist chains: a detailed procedure was prepared to manage the chain handling from the handover in Singapore until the hook-up offshore Brazil.

CONCLUSION

The FPSO OSX-3 was installed effectively given the weather and operational limitations. Boskalis provided the required service in time to Client and Contractor, dealing with all the given engineering and operational challenges. Evaluating the project preparation and execution it can be concluded that the integration of operational best practices with engineering analysis was decisive for the safe, controlled and successful execution of this offshore installation project.



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- D Hook-up
- E Chain handling on board Union Sovereign, handover to FPSO
- F Completion hook-up

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