

PROJECT SHEET

PDET ROCK INSTALLATION PROJECT

BOSKALIS' ENERGY SOLUTIONS

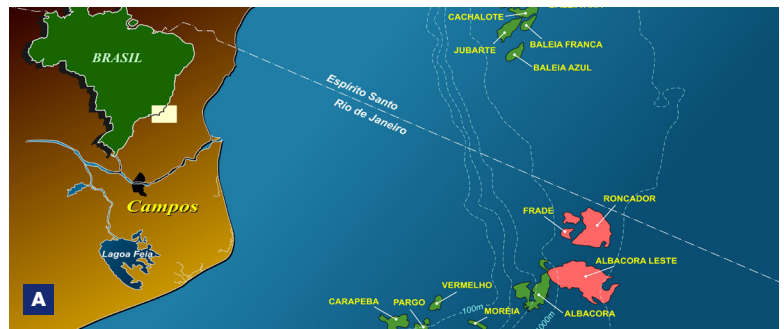
Boskalis is a leading global dredging and marine expert. With safety as our core value we provide innovative, sustainable and all-round solutions for our clients in the energy market. Realizing projects in remote locations with a heightened environmental focus is one of our specialties. Under brands such as Boskalis Offshore, Dockwise, SMIT 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.

PROJECT DESCRIPTION

In 2008 Boskalis was approached by Petrobras to carry out a rock installation project at the oceanic terminal, one of Petrobras' offshore oil production locations. The terminal, situated at Campos Basin offshore Rio de Janeiro, Brazil, is a maritime complex consisting of one Independent Re-pump Platform (PRA-1), two monobuoys and a FSO vessel which links to a 20 inch gas pipeline system. The pipeline network total extension of 25 km consists of three Pipeline End Manifolds (PEM) installed on the seabed at a depth of approximately 100 m.

FEATURES

Client	Petrobras – Petróleo Brasileiro S.A.
Location	Campos Basin offshore Rio de Janeiro, Brazil
Period	November 2010 – April 2011
Contractor	Joint Venture Boskalis International/ Boskalis Offshore and VO Offshore



A Location map

B DPFV Sandpiper accompanied by SMIT tugs on her way to worksite

The terminal, constructed to comply with the Oil Outflow and Handling Master Plan of Campos Basin – PDET, was the solution for the oil outflow produced at platforms P51, P53, P55 and Roncador module.



Petrobras pro-actively initiated this project to ensure the future integrity and safety of the oil production facilities. Petrobras considered specialized accurate rock installation techniques to protect, stabilize and isolate the pipelines and subsea structures and in doing so to protect the environment. For Petrobras, Boskalis and partners it was the first time an IBAMA (Environmental) licensed rock installation project was carried out in Brazil. IBAMA issued this license after a detailed analysis of amongst others the impact on the environment and the proposed measures to mitigate turbidity during the installation process. Also the IBAMA guidelines with regard to the selection of the quarry mining, production of the rock, logistics and actual loading of the vessel, were fully met.

QUALITY AND SAFETY PERFORMANCE

The safety performance on the project was excellent. Before mobilization several safety and quality pre-inspections were carried out by independent auditors and Petrobras representatives; all findings and observations were resolved before arrival in Brazil to guarantee a smooth importation process. During the project preparation phase the Boskalis NINA (No Injuries No Accidents) program was implemented; all truck drivers and other personnel were successfully trained and explained the values and rules of the safety program. Special attention was paid to safe driving, the Boskalis Offshore theme for the year 2011. Thanks to the thorough preparations almost 400,000 accident-free km were driven on the project.

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EXECUTION OF THE PROJECT

The PDET Rock Installation was divided into three main activities:

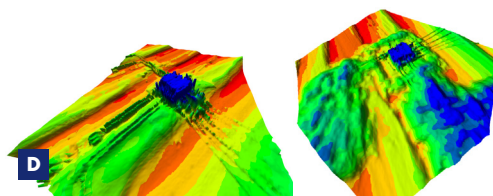
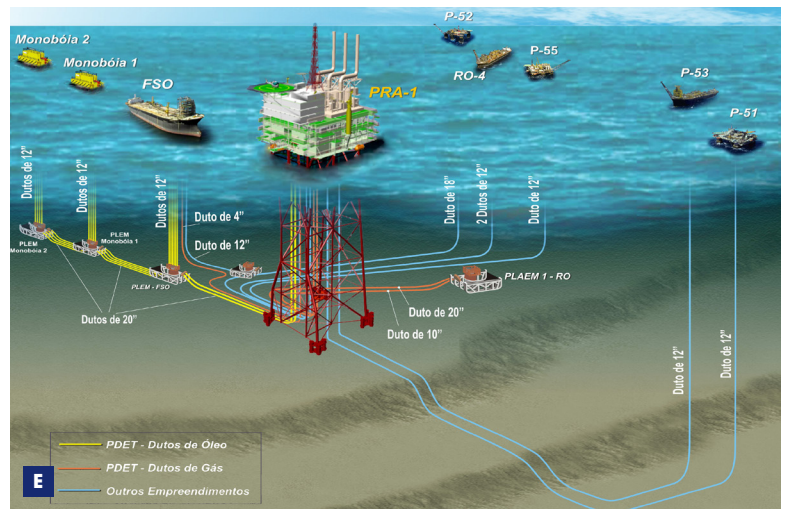
- Rock transportation between the selected quarry Brasitalia, located in the municipality of Cariacica, Espírito Santo and the Port of Capuaba, located in the city of Vila Velha, Espírito Santos over a distance of approximately 20 km;
- Loading of Boskalis' dynamically positioned fallpipe vessel (DPFV) Sandpiper;
- Installation of rock on the 10 pipeline sections and around the PLEM's.

To form a stable rock berm, rock material with a grading of 2 to 5 inch was selected, taking the environmental conditions into account. Every day 3,000 tons of rock was transported by 27 ton capacity dump trucks to the Port storage area. At port Capuaba a storage capacity of 45,000 tons was available.

The three holds of the Sandpiper were loaded simultaneously by a conveyor belt and 20 ton self-discharging carts. During vessel loading trucks were temporarily diverted to unload the material directly on the quayside ensuring sufficient material being available at all times. The vessel was loaded in less than 24 hours.

On arrival at Campos Basin, the vessel positioned itself above the pipelines using the Dynamic Positioning System (DP2). The Sandpiper is equipped with a Free Flying ROV to perform multibeam and video surveys and pipe tracking operations using its TSS440 pipe tracker. The rock was installed with great accuracy by positioning the end of the fallpipe approximately 5-7 m above the pipeline.

The stabilization work took five months. During this period the entire volume of rock required was transported by truck over a total distance of almost 400,000 km; the Sandpiper carried out 19 voyages from the Port to the field and over 270,000 tons of rock were installed, on time, within budget and environmental requirements and without accidents.



C Overview rock loading area (port of Vitoria)
D Subsea structures before (left) and after rock installation
E PRA-1 Marine Terminal Schematic

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