Boskalis
Dredging & Marine Experts

PROJECT SHEET

DE RUYTER DEVELOPMENT AREA
PLATFORM INSTALLATION

BOSKALIS OFFSHORE: SKILLS, RESOURCES, EXPERIENCE

Boskalis Offshore brings together the offshore skills, resources and experience of Royal Boskalis Westminster. The group's offshore capabilities include seabed rectification works for pipeline/cable and platform installation, construction of pipeline shore approaches and landfalls, offshore mineral mining, offshore supply and support services and decommissioning services. Boskalis provides clients with tailored, project-specific solutions for above dredge related offshore services, as illustrated by the following project summary.

DE RUYTER DEVELOPMENT

The De Ruyter field, discovered in 1996, straddles Blocks P10a and P11b in the North Sea, which are both operated by Petro-Canada. The development consists of a Gravity Base Structure (GBS) with wellhead and lattice towers supporting an Integrated Production Deck (IPD). De Ruyter joins Hanze as Petro-Canada's second operated offshore field in the Dutch North Sea. Heerema Zwijndrecht was awarded the fabrication, installation and hook-up of the GBS and IPD. The transportation, installation and stabilisation of the GBS was subcontracted to a consortium between Smit Marine Projects and Boskalis Offshore.

Crucial in the design was a proper foundation of the platform, which was complicated by the presence of a silty clay layer a few metres below the seabed, overlying silty sands with silt sub-layers. To provide a suitable base on which to position the GBS, sea bed improvements were necessary, which consisted of the removal of 5 metres of material below existing seabed level.

FEATURES

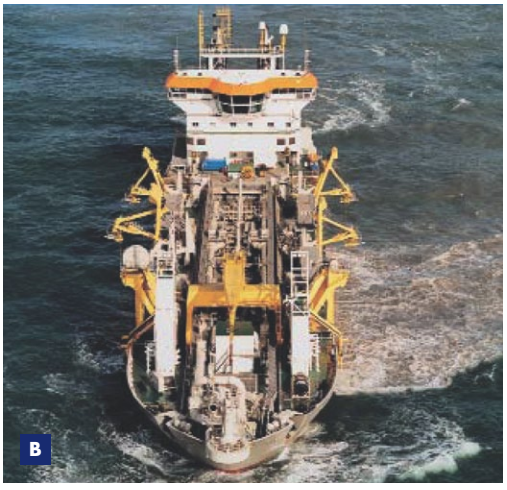
Client	Petro-Canada Netherlands B.V.
Location	North Sea block P10/P11, 60 km north west of The Hague, The Netherlands
Period	2006
Main Contractor	Heerema Zwijndrecht B.V.
Contractor	Boskalis Offshore B.V. in consortium with Smit Marine Projects B.V.

A Location map
B Trailing suction hopper dredger "Oranje"
C Rock installation near wellhead tower

After installation the GBS and surrounding soils required further ballasting and stabilisation with rock.

SEABED EXCAVATION

To accommodate the installation of the GBS the top 5 metres of the seabed were excavated by TSHD "Oranje" creating a pit with a footprint of approximately 74 metre by 86 metre at 40 metre water depth. During excavation the side slopes of the pit were kept as steep as possible to



minimise the amount of rock required to backfill the pit after installation of the GBS. Lastly, the bottom of the pit was levelled.

Boskalis Offshore has dredged the site in 2 phases, the bulk 40,000 m^3 early March 2006 followed later that same month by the levelling during a good weather window to achieve the tight tolerances. To control the dredging operations and verify the bottom levels the trailing suction hopper dredger "Oranje" was equipped with a Kongsberg EM3002 multibeam echosounder and C-Nav GcGPS positioning system.

BALLASTING, STABILISATION AND SCOUR PROTECTION

Shortly after completion of the seabed excavation the De Ruyter GBS was towed out and installed in the dredged pit by Smit Marine Projects. Immediately after the installation of the GBS, Boskalis Offshore's dynamically positioned fallpipe vessel "Sandpiper" started ballasting the 12 "open cells" of the GBS with gravel. Subsequently, the pit around the GBS was backfilled with gravel and for further stabilisation and scour protection a 3 metre high rockberm was erected around the GBS.

A ramp was built to bridge the 7.5 metres height difference between the export oil and gas pipelines at seabed level and the tie-in points at GBS deck level. A further 5 embankments were constructed as level platforms for the spud cans of the drill rig and the accommodation jack-up.

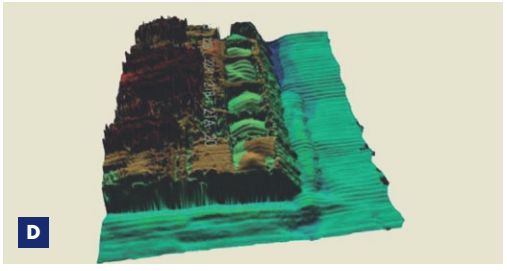
MEETING THE SCHEDULE

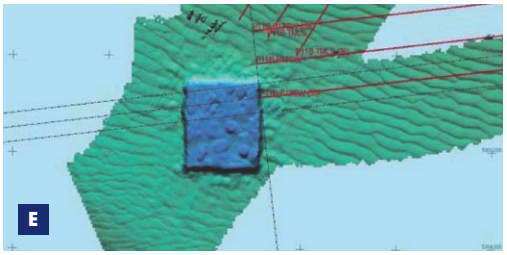
The stabilisation design required the use of a high density rock, for which eclogite (3.15~3.20 t/m^3) from a Norwegian quarry was proposed. This is one of the very few quarries in the region that is not only capable of timely delivering the high density rock in sufficient quantities but is also not limited with regards to navigational access and mooring facilities to receive the larger size vessels common in the industry.

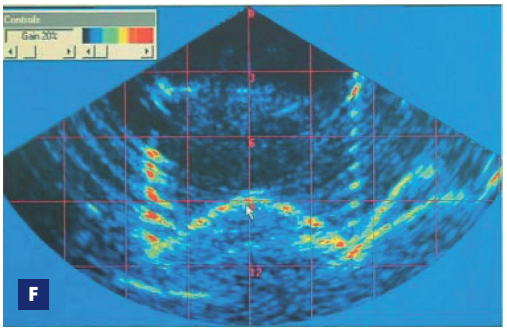
Due to the northerly location of the quarry and the associated sailing distance to the project site, the execution period would have become too long for the tight schedule of the De Ruyter project. To accelerate the programme the rock was hauled to the port of Amsterdam by bulk carriers, where it was stockpiled and later re-loaded into the "Sandpiper", thus cutting over 40% off the execution time.

Furthermore, by dredging the pit as steeply as possible, less rock was required for the backfill and, consequently, the actual schedule could be reduced by a further week and a significant cost saving was achieved for the project.

After 7 weeks of operations some 60,000 tonnes of gravel and 37,000 tonnes of armour rock were installed in and directly around the platform. With the stability of the GBS now ensured, the topside could be installed and the platform commissioned, achieving production of first oil on schedule.







D 3D survey image of filled open cells
E 3D survey image of dredged platform pit
F Sonar image of rock in open cell
G Rock installation using side belt. Inset: Rock stockpile at port of Amsterdam

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