

PROJECT SHEET

EAST JAVA GAS PIPELINE FREE SPAN RECTIFICATION PROJECT

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.

PROJECT DESCRIPTION

The existing live 28" East Java Gas Pipeline runs off-shore from the Kangean Block, close to Pagerungan Besar Island, Kangean Islands, Indonesia, through the Madura Strait and onshore via Porong to Surabaya, Indonesia's second largest city. During a survey campaign in 2006 initiated by the owners of the East Java Gas Pipeline, PT. Pertamina Gas and PT. Trans Javagas Pipeline, a large number of critical spans were identified, many of which above the threshold for



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FEATURES

Client	PT. Pertamina Gas
Location	Madura Strait, East Java, Indonesia
Period	October - December 2008
Contractor	PT. Boskalis International Indonesia / Boskalis Offshore



- A** Location map
- B** First stage rock production by means of blasting at the Hocim quarry
- C** Second stage rock production by means of blasting at the Holcim quarry
- D** The DPFV Seahorse moors for loading

vortex induced vibrations. Boskalis Offshore, through its Indonesian entity PT. Boskalis International Indonesia, was contracted to rectify 799 critical spans by means of installing a total of 804 rock berms. These berms reduce span lengths and prevent that the critical span length will be exceeded within the remaining lifetime of the pipeline.

SAFETY, HEALTH AND ENVIRONMENT

During the preparation phase, a great deal of attention was paid to Safety, Health and Environment. Subcontractors were stimulated to assess their



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operations and to carry them out in a safe way, which can be illustrated with the following examples. The rock on the trucks was covered during road transport to prevent rock from falling off, drivers worked in shifts to ensure that enough rest was taken, flagmen were employed at busy intersections, sufficient lighting was ensured and key personnel had to be able to communicate in English.

Regular meetings were held to discuss identified risks and proposed mitigation measures, toolbox meetings were held to emphasize safe operations and at all times operations were supervised by the Project Management Team.

A good follow-up of these preparations and excellent cooperation between subcontractors, suppliers and Boskalis led to an incident free project execution.

SUPPORT BERM INSTALLATION

For the support berm installation works Boskalis deployed its dynamically positioned fallpipe vessel (DPFV) Seahorse. This vessel, with a carrying capacity of 18,000 tons of rock, is able to position its fallpipe directly above the live pipeline, meanwhile ensuring sufficient vertical clearance to compensate for current and swell. The DP Class II capabilities of the vessel allow for accurate dumping with a minimum of losses resulting in a short project execution time.



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One load of 1-5" rock was brought from Norway and additional loads were loaded in Indonesia. Rock was supplied by a quarry operating in the inlands of East Java, delivering rock via the road to a temporary stockpile at the port of Paiton. During loading the 1-5" rock was transported by truck from the temporary stockpile to the feeder and via a conveyor belt into the holds of the DPFV Seahorse. The entire temporary supply chain for rock supply, from quarry to Seahorse, was purposely set up for the execution of this project.

Prior to commencement of the rock dumping operations, a pre-survey was carried out by Seahorse's ROV, equipped with multibeam echosounders. This survey was used to identify the start and end points of the free spans. Subsequently, the design per span location was prepared and the berms were installed. A post-survey was carried out to ensure that the berms were installed as specified. When the results of the post-survey were satisfactory, the vessel moved to the next position.

IN-HOUSE ENGINEERING

Hydronic, the engineering department within the Boskalis Group, provided project support, including preparation of the theoretical design, impact assessment for rock dumping on a live pipeline and reference rock stability calculations.

In addition, a design flowchart was prepared to guarantee maximum efficiency on the seemingly endless number of span locations. As a result of this and by the choice for a dynamically positioned fallpipe vessel to install the support berms vessel time on site was minimized, obviously being very advantageously for the client.

In total, the DPFV Seahorse rectified 799 spans by installing 804 berms, using 1-5" rock. The project was completed to client's full satisfaction, on schedule and within budget.



- E** Continuous rock supply
- F** Overview complete loading set-up at Paiton jetty
- G** Final testing of the loading bridge at the temporary stockpile

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