Boskalis
Dredging & Marine Experts

PROJECT SHEET

MAASVLAKTE 2, THE NETHERLANDS
THE LARGEST DUTCH HYDRAULIC ENGINEERING PROJECT SINCE THE DELTA WORKS

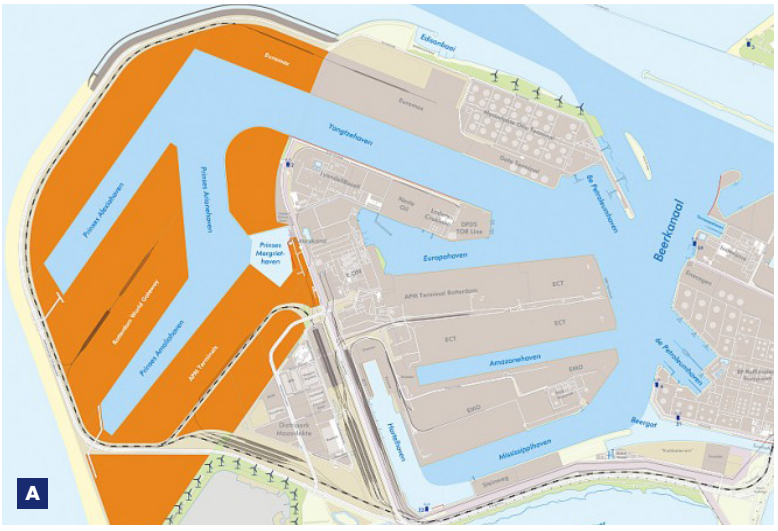
INTRODUCTION

PUMA, the Project Organization for the Extension of the Maasvlakte, is a 50/50 joint venture between dredging and marine contractors Boskalis and Van Oord. The consortium has been contracted by the Rotterdam Port Authority to construct the first phase of the Maasvlakte 2 Project – the extension of the Port of Rotterdam – between 2008 and 2013. The new zone will encompass 2,000 hectares of new land, roughly the same size as the total surface area of Schiphol airport. Half of the area will become land for a future business park.

The first phase of Maasvlakte 2 comprises an industrial site area measuring 700 hectares. The port basins are dredged to –20 m NAP (Normal Amsterdam Water Level), so that even the largest (next generation) container vessels can dock.
An important component of the project is the construction of the overall sea defenses. The outer contour bordering the sea is about 11 kilometers long, and includes a hard (rocks) and a soft (dunes) section. The 3.5 km hard section requires 20,000 concrete blocks, each weighing approximately 40,000 kg and 7 million tons of broken rock, of which 1.5 million tons is recycled from the existing sea defenses, from Maasvlakte 1, and 5.5 million tons is imported from quarries in North-West Europe (mainly from Norway). PUMA is also managing the construction of the quaywalls, railways and roads for the Maasvlakte 2 project. About 140.000 tons of asphalt, 110.000 tons of mixed aggregate and 112.000 m2 of sandcement stabilisation will be used for the construction of the roads.

FEATURES

Client	Rotterdam Port Authority.
Location	Port of Rotterdam, The Netherlands
Period	2008 - 2013
Contractor	PUMA, a joint venture between Boskalis and Van Oord



A

A Location map
B Start of the reclamation works
C TSHD 'Oranje'
D Aeroview 2011


B


C

EQUIPMENT

Multi-purpose and high-tech equipment is deployed. An extensive fleet of trailing suction hopper dredgers (TSHDs), cutter-suction dredgers (CSDs), backhoes (BHDs), side stone dumping vessels, support vessels, dry earth moving equipment and auxiliary equipment is used. In total 23 TSHDs have carried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210 million m³ of sand from the offshore borrow area (located at some 12 km away) to the project site. Four CSDs have been used to dredge the entrance to Maasvlakte 2 from the YangtzeHarbour, to deepen the Yangtze- Harbour and to deepen the new port basins to – 20 m and to pump the 30 million m³ of sand involved to the new harbor areas. The new land is raised to 5 m above NAP.

A novelty (innovation) on this project is a revolutionary item of equipment: one of the largest construction cranes ever built, weighing 1,200 tons. The 'Blockbuster'crane, which was specially designed for this project, is able to lift the 20,000 concrete blocks (weighing on average 40 ton each) and to position them very accurate at a distance of up to 50 m from the shore.

DESIGN, CONSTRUCT & MAINTENANCE CONTRACT

During tender stage PUMA has spent more than two years on the design. The Design, Construct & Maintenance responsibility gives PUMA a certain amount of latitude in how it carries out the project. The ultimate goal was to build a safe and sustainable port area, with minimum damage to the environment and disruption to shipping during construction. Within those wide parameters, PUMA had the freedom to change the approach of working methods in the course of the project. In fact, improvements to designs and efficient solutions, always in close consultation with the Client, have been made a number of times during the project. One example is the final design for the hard sea defence. Together with the Client through a "partnering construction", PUMA has developed a new, innovative design the so called "cobble beach and concrete cube reef breakwater", resulting in a more effective use of different types of rock and more efficient deployment of equipment. For PUMA to guarantee the quality of the different aspects of the works, Systems Engineering was used, which was based on a large number of set conditions and requirements which were checked by means of a verification matrix.

E


F

ROCK IN STOCK

Prior to the construction of the hard sea defense PUMA had stockpiled around 1.2 million tons of rock, so that the rocks were in sufficient quantity available prior to construction. Every 2 week bulk carriers transported a cargo from the quarry in Norway, each carrying 90,000 tons of rock. Three temporary mooring piles, a large chute and a conveyor belt were installed in the YangtzeHarbour for the discharging process.

QUAY WALLS

The project encompasses the construction of two deep sea quay walls, constructed to 40 m below NAP and dredged to 20 m below NAP, and two barge feeder quay walls (berth dredged to 13 m below NAP). Two connecting quay walls are built for the Rotterdam World Gateway (RWG) container terminal: a 1,250 m deep sea quay wall (for the large container ships) adjoining the Princess Amalia harbor and a 650 m barge/feeder quay wall (for inland shipping and smaller container ships). For APM Terminals a 1,100 m deep sea quay wall and 500 m barge/feeder quay wall has been constructed. PUMA is managing these works and has subcontracted them to BAVO (a joint venture between the Dutch civil contractors BAM and Volker Wessels).

CONCLUSION

The construction of Maasvlakte 2 is one of the most high-profile projects in the history of hydraulic engineering. The complexity and the enormous dimensions of the project are unrivalled. The project is carried out according to the highest quality and safety standards, resulting in the lowest Lost Time Injury Frequency (LTIF) figures ever achieved in The Netherlands. The project is on schedule for delivery in april 2013. PUMA will remain responsible for the maintenance of the sea defense for another five years after the project is completed in 2013. The Maasvlakte 2 area will ultimately encompass a total of 1,000 ha (nett) of industrial complex located directly on deep and navigable water.

FACTS AND FIGURES

Area of Maasvlakte 2	2,000 hectares
Area of industrial areas (total)	1,000 hectares
Deep sea quay wall (20 m deep)	2.35 km
Barge/feerder quay wall (11-13 m deep)	1.15 km
Roads (partly 2x2 lanes/ cycle paths)	13 km
Rail (twin track)	14 km
Hard sea defenses (stone dune and block dam)	3.5 km
Soft sea defenses (beaches and dunes)	7.3 km
Sand needed for 1st phase of the project	240 million m³

E Blockbuster - E Crane
F Bulkcarrier discharging rock filter material on site

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