

PROJECT SHEET

LE HAVRE, FRANCE
EXTENSION OF LE HAVRE CONTAINER PORT 2ND STAGE

INTRODUCTION

The Port Maritime du Havre reviewed the challenges generated by expanding container transportation. The result was the emergence in 1995 of a development plan, 'Port 2000', which focuses exclusively on container operations. The plan was discussed intensively during the very first public debate about an investment of this kind. Actual development started in late 2001 to the south of the current port and, ultimately, twelve quay berths will be built for containerships over a distance of 4 km. The entire structure will be protected against the Atlantic Ocean and the Seine by two breakwaters. After the completion of the work, Super-post-panamax container vessels (>12,000 TEU) will be able to access the port and maneuver in it without being limited by tides or locks. The infra-structure will make it possible, among other things, to load complete trains in the immediate vicinity of the quays. The area will be exploited by joint ventures involving French and international container operators

PROJECT SPECIFICATION

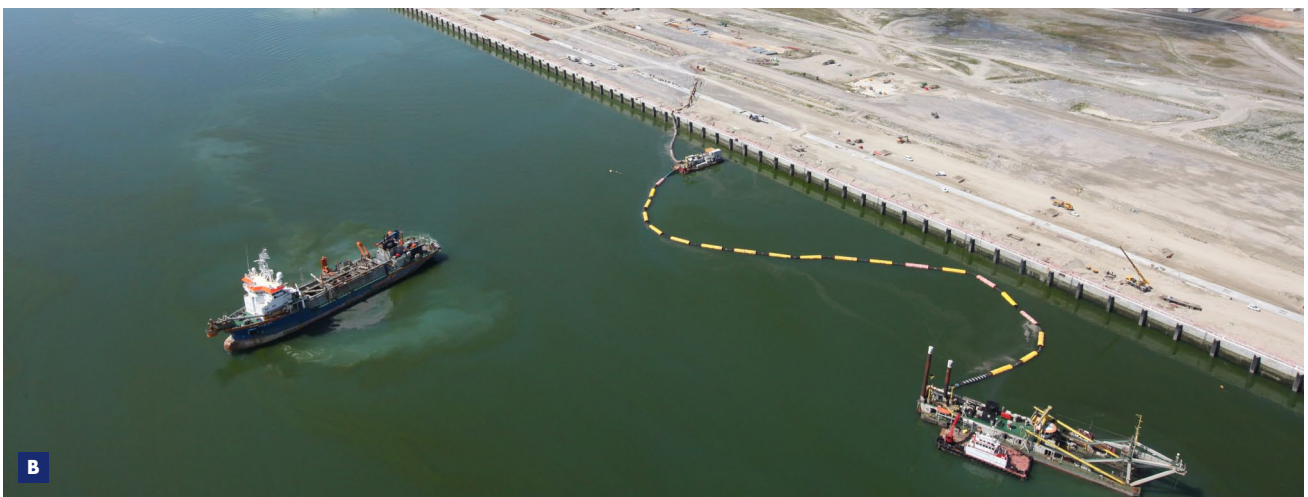
This sheet describes the second stage: the construction of a total of 2,100 m of quay wall for 2-4 berths which are required to be completely operational in 2011/2012. Work includes the deepwall construction with the associated civil works, dry excavation, ordnance detection, shore protection and dredging works. Within the Joint Venture Soletanche Bachy was responsible for the civil works; Boskalis' subsidiary Atlantique Dragage executed all dredging and dredging related works. The project is worth 217 million Euros, with the sole dredging work accounting for 40 million Euros. The construction of the quay walls was a 'dry' operation, in the

FEATURES

Client	Grand Port Maritime du Havre
Period	July 2007 - July 2010
Location	Le Havre, France
Main Contractor	JV Soletanche Bachy Atlantique Dragage Boskalis International bv
Dredging Contractor	Atlantique Dragage



- A** Location map
- B** Dredging in progress by TSHD and CSD



course of which a trench was dug for the concrete quay walls. The walls were finished using top links and fenders. The tidal difference of 8 meters means these structures have to be extremely high. Once these quay walls were in place, the upper layer of fine silty sand (4 million m³) was dredged out using medium-size TSHDs, including the Boskalis TSHD Crestway and Barent Zanen, which took the sand out to sea. In locations that the hoppers couldn't reach, CSD Jokra dredged up the sand and pumped it via the bow couplings into two large TSHDs, which then transported the sand. The result was extremely high efficiency. CSD Jokra pumped the second layer of coarse/very coarse material (1.3 million m³) ashore for reuse. This material causes high wear levels. The berth pockets will be between -15,50 and -17 m CMH (local tidal measurement unit).

HIGHLIGHTS

- The tide presented an exceptional challenge: profiles measuring 16 m had to be dredged and so breaching of the material was always a possibility. That meant that stepped slopes had to be dredged, interfering with access for the CSD at low tide. Sophisticated operational sequences were deployed by Atlantique Dragage to meet this challenge while maintaining efficiency.

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- The toe of the quay wall had to be dredged out without damaging the structure. To do this, CSD Jokra dredged out a series of half moons along the entire length of the quay wall, resulting in a half-straight line up to 60 cm from the toe. Of course, all this was done in the tidal conditions mentioned here. And there was also a contractual limit of 50 cm – covered by a penalty clause – for over-dredging in order to protect the stability of the structure. Atlantique Dragage / Boskalis responded to this challenge by recalibrating all the measurement equipment before the work started and by making clever use of the ladder and the spud carrier during the dredging. The cutter head didn't hit the quay wall once!
- The Port Maritime du Havre has a deliberate sustainability policy, as evidenced not only by an investment of € 46 million in the environmental part of the project, but also in continuous measures relating to air and water quality. For example, the turbidity limit for the dredging work was 100 mg/l. This limit was met without exceedances by making the reclamation area as large as possible and splitting it up into sections using water boxes and by making the outflow travel a large distance so that the suspended sand had the time to settle.

PORT OF LE HAVRE EXPANSION : PROJECT SUMMARY

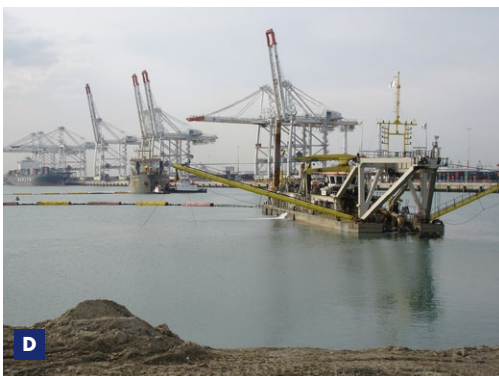
Dredging works:

Fine silty sand: 4,00,000 m³ offloaded at sea.

Coarse material: 1,300,000 m³ pumped ashore.

Equipment used:

- CSD Jokra & Booster station Nieuwe Merwede.
- Medium-class TSHDs with a total capacity of 17,000 m³, including the Barent Zanen and the Crestway.
- Multicat, survey vessel and plowing vessel.



C Dredging close to the quay wall

D The CSD at work in the port of Le Havre

E Aerial view of the TSHD and CSD at work

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