

OPTIMISING THE MARITIME ACCESS TO THE PORT OF ZEEBRUGGE: EXAMPLE OF A LARGE MULTI-TOOL STUDY

Stefaan Ides¹, Arvid Dujardin^{1,2} and Tom De Mulder¹

¹ Flanders Hydraulics Research (Waterbouwkundig Laboratorium)
Berchemlei 115, 2140 Antwerp, Belgium
E-mail: Stefaan.Ides@mow.vlaanderen.be, Tom.Demulder@mow.vlaanderen.be

² Soresma
Poortakkerstraat 41, 9051 Gent, Belgium
E-mail: Arvid.Dujardin@mow.vlaanderen.be

During the previous years a lot of efforts (among which a deepening campaign) were undertaken by the Flemish government to improve the accessibility of the port of Zeebrugge. This has resulted in the current situation in which the port is accessible for ships with a draught up to 16,0 m. However the inbound sailing window for these large container ships is restricted to a couple of hours a day. There are 2 reasons for this rather small sailing window.

The first reason is the flow in front of the harbour mouth of Zeebrugge. Due to the construction of the harbour approximately 3 km into the sea, the flow – which is mainly oriented along the Belgian coastline – is concentrated at this location. As a result of the flow concentration, the ships sailing in the navigation channel Pas van het Zand to the port of Zeebrugge experience a rather strong side current. Around high water – the period of maximum flood flow as well as the period during which the biggest ships could enter the port – the side current is so strong that these ships are not able to enter the port safely. Another reason for the rather small sailing window is the fluid mud layer in the harbour itself. Every tide a huge amount of water containing a concentration of mud enters the harbour. Due to the low flow velocities in the harbour, the biggest amount of the inflowing muddy sediments will settle here. This process has resulted in a fluid mud layer with a thickness of a couple of meters in the harbour itself. It is a daily challenge for the Flemish government, responsible for the dredging works, to carry out the maintenance dredging works in the harbour in an efficient way. As a consequence of this fluid mud layer it is not possible to guarantee the necessary draught at any time and at any location.

The Maritime Access division – division of the Flemish government responsible for the dredging works – asked the researchers of Flanders Hydraulics Research to set up a study on the optimization of the maritime access to the port of Zeebrugge. In order to investigate this difficult issue, a multi-tool approach was suggested including field measurements, a physical scale model, a numerical model as well as the ship manoeuvring simulator of Flanders Hydraulics Research. While the large scale model (approximately 75 m x 30 m) is being built at Flanders Hydraulics Research, the numerical model has been calibrated and validated. Combining the in situ measurements and the numerical model, the water and sediment exchange at the mouth of the harbour of Zeebrugge has been analysed. And last but not least the experience of the pilots will also be included in this study using the ship manoeuvring simulator. The research plan of the study – which will last for a couple of years – involves the combination of all different tools, in order to be able to increase the inbound sailing window of the harbour of Zeebrugge for the very large ships.

References

Dujardin, A. ; Ides, S. ; Schramkowski, G. ; De Mulder, T. ; Mostaert, F. 2009. Haven van Zeebrugge – Optimalisatie maritieme toegankelijkheid – Onderzoek naar de water- en sedimentuitwisseling ter hoogte van de havenmond. WL Rapporten, 843_01. Waterbouwkundig Laboratorium: Antwerpen, België.