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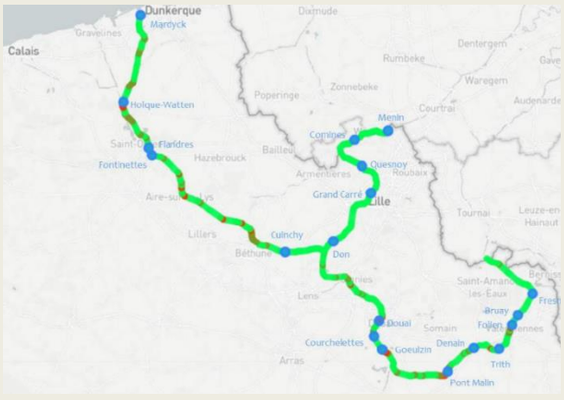
KNOWLEDGE CENTRE MANOEUVRING IN SHALLOW AND CONFINED WATER

This is the 41st newsletter of the *Knowledge Centre Manoeuvring in Shallow and Confined Water*, which aims to consolidate, extend and disseminate knowledge on the behaviour of ships in shallow and confined water. This newsletter presents an item on real time simulations that are being carried out to assess the accessibility of the Nord-Pas-de-Calais ECMT Class V waterway network.

We wish you a peaceful end of the year and all the best for 2020.



The Nord-Pas-de-Calais ECMT Class V waterway network will play a major role in linking the Canal Seine Nord Europe to the ports of Dunkirk, the inland navigation network of Belgium and its connected ports Antwerp and Rotterdam. The existing Nord-Pas-de-Calais Class V network is old and does not fully meet the modern geometrical standards for canal design and construction. In order to prepare the network for the expected increase in traffic, Voies Navigables de France (VNF) has commissioned a comprehensive analysis of the waterway network based on nautical studies. Moreover, the expected increase in traffic may strongly impact the fluidity of the network. In order to better understand and tackle potential bottlenecks, VNF also commissioned a model to study the traffic flow on the Nord-Pas-de-Calais ECMT class V waterway network.

Flanders Hydraulic Research, the Maritime Technology Division of Ghent University and IMDC have developed an approach of combined desktop analysis and real time simulations to characterise the performance of the network for different ship types. The combination of both tools allows to reduce the cost of the nautical analysis of waterway. The desktop study uses existing design guidelines to check section geometry and to determine the accessibility for different ship combinations at ease and safety levels. This allows the identification of stretches allowing ship encounters (of same or different classes) on the one hand, and the identification of stretches allowing alternating traffic only on the other hand. The nautical characteristics and accessibility of sections liable to be upgraded are then checked with real time simulations.

Both the bathymetry and the outside visuals of the entire waterway network, comprising more than 240 km length in total, were modelled for the real time simulations. The former is very important, because the complex mathematical models driving the full mission bridge simulators take ship - bank and ship - ship interaction effects into account, as well as current and wind effects. The simulations are executed by experienced inland navigation pilots. Encounters between two vessels are systematically carried out on two coupled simulators. Each simulation is then extensively analysed, taking several crucial parameters such as the distances to the banks and the under keel clearance into account in order to determine the accessibility level for each simulation.

Overall, the analysis of the executed simulations either leads to a confirmation of the accessibility class, the possibility of a (conditional) upgrade or the deduction of navigation conditions. At this point, a

feedback to the concurrent traffic flow study allows the evaluation of the benefits of potential measures and to effectively decide on their implementation. More information can be found in the short paper that was presented at PIANC SMART Rivers 2019.

Researchers associated with the Knowledge Centre were co-authors of two papers that were presented at the PIANC Smart Rivers Conference, which was held in Lyon, France, from 30 September to 3 October 2019. The short papers "A comprehensive characterization of the nautical accessibility and traffic flow of the ECMT class Va inland waterway network of Nord-Pas-de Calais, France" and "Modelling the traffic capacity of the narrow canal Roeselare-Lys, Flanders (Belgium)" were presented by IMDC.

Guillaume Delefortrie attended the AMT'19 The Sixth International Conference on Advanced Model Measurement Technology for The Maritime Industry, which was held in Rome, Italy from 9 to 11 October 2019. He presented "Coastal & Ocean Basin And Towing Tank For Manoeuvres In Shallow Water At Flanders Maritime Laboratory" and "The Uncertainty Induced by Noise and Filtering on the Results of Captive PMM Tests". He was also co-author of "Investigation of the false bottom effects on ship model test".

Researchers associated with the Knowledge Centre are involved in the new Joint Industry Project WINDLASS. The objective is to better understand 3-D wind fields in exposed ports and waterways and to develop a wind load prediction tool.

Researchers associated with the Knowledge Centre are also involved in the Joint Research Project "Development of an industry recognised benchmark for Ship Energy Efficiency Solutions" (JORES). The objective is to join the industry efforts and gather full sets of ship performance data (model test results, Computational Fluid Dynamics (CFD) calculations and full scale measurements) and increase knowledge on the important propeller - hull interaction effects to better understand the ship efficiency potential.

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