



Rijkswaterstaat, Witteveen+Bos and Systems Navigator analyze the lock complex IJmuiden using SIVAK

DELFT; Feb. 16, 2022 – Rijkswaterstaat, Witteveen+Bos and Systems Navigator have worked together to perform an analysis for the lock complex IJmuiden, in order to determine the optimal lock arrangement until 2050. SIVAK, the simulation package for traffic management at waterway objects, was used to simulate possible future configurations.

The goal of the project is to determine the optimal lock arrangements (combination of locks) with a horizon of 30 years (2050). The optimum lock arrangement is characterized by low waiting times for shipping traffic and acceptable hindrance for road traffic. The lock complex consists currently of five locks, four of those have reached the end of their technical life span. We simulated several lock renovation combinations in order to realize an optimal lock complex in 2050. Besides an optimal solution for shipping traffic in 2050, we also investigated the impact of the renovation works on the shipping traffic and estimated the salt intrusion for the different lock arrangements.

The project was divided into 3 steps. Witteveen+Bos was responsible for steps 1 and 3. Systems Navigator was in the lead for step 2.

The first step in achieving this goal is to analyze the shipping passages of the lock complex based on recorded data and to forecast the shipping passages for the years 2030 and 2050 for recreational craft, inland barges and seagoing vessels.

Step 2 consisted of improving the SIVAK software with two new modules, which are the module for road traffic and the module to simulate a lock with three doors (two on either side and one door more or less in the middle) to allow for greater flexibility in the locking process. Systems Navigator developed these new modules and Witteveen+Bos performed the tests to ensure the quality of the new modules. Witteveen+Bos calibrated and validated the new model setup based on historic data.

Step 3 consisted of running simulations using the new modules to simulate the predicted shipping traffic for different scenarios and lock arrangements.

After careful evaluation of the competing consortia, Witteveen+Bos and Systems Navigator were selected as the preferred partner for the SIVAK analysis for the lock complex IJmuiden.

On Witteveen+Bos and Systems Navigator side: “We are proud to work on the iconic lock complex in IJmuiden. Systems Navigator and Witteveen+Bos complement each other very well. Together we have made this project a success.” - Lex de Boom, Nautical Expert Witteveen+Bos and Rienk Bijlsma, Simulation expert.



About SIVAK

SIVAK is a state-of-the-art simulator which is used to analyze ship handling of traffic at locks, narrow waterways and other waterway infrastructures. The system takes into account the effects of the traffic composition and traffic flow, operating strategy and traffic control, etc. Typical results from this model are visualizations on waiting times, utilization of waterways, waiting costs for different ship types per section of the waterway. The model calculations form an important basis for the MIRT (Dutch Multi-Year Plan for Infrastructure, Spatial Planning and Transport) in order to identify and prevent future bottlenecks, while also being applied when developing a new infrastructure.

About Rijkswaterstaat

Rijkswaterstaat is part of the Dutch Ministry of Infrastructure and Water Management and responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands. This includes the main road network, the main waterway network and water systems. A special program called “Vervanging en Renovatie” was set up to ensure infrastructure is adequate for safe use and to ensure that older objects are no longer compliant are replaced or renovated.

About Witteveen+Bos

Witteveen+Bos advises and helps clients all over the world in resolving today’s complex challenges. With a network of 21 offices in 11 countries and around 1,200 engineers and consultants, Witteveen+Bos works on improving the human environment for everyone, today and for future generations. Together with their stakeholders, they contribute to social, ecological and economic progress, with the sustainable development goals of the United Nations serving as an inspirational guideline.

Every year, Witteveen+Bos completes around 4,000 projects in the fields of infrastructure, water, the environment and construction. In these projects, the aim is to maximize value creation. That means sustainable solutions for society, maximum value for clients, and opportunities for talent development for their employees.

About Systems Navigator

Systems Navigator is an independent consultancy company based in Delft, The Netherlands. Systems Navigator specializes in the design, development and implementation of planning, decision support and digital twin solutions based on operations research technology. Our expertise relies on the use of both discrete event simulation, as well as optimization for decision support models that can predict future system performance. Additionally, digital twin systems can be used for operational decision making and/or planning and/or scheduling. Systems Navigator successfully delivered over 250 simulation projects specializing in capacity studies in port operations and waterways.

To learn more about this project or Systems Navigator, please contact our office at +31 (0) 15 750 1030, [email us](mailto:info@systemsnavigator.com) or visit the website at www.systemsnavigator.com.



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