AUTHORITIES & REGULATORS

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‘The biggest challenge is to stay ahead of innovations to allow safe and efficient operations to continue’

Although shipping is one of the safest modes of transport, unfortunately accidents do happen. As an independent institute, MARIN works together with governments, classification societies and shipping companies to make maritime operations safer, smarter, cleaner and more economical. We support them in developing policy, new design rules and regulations.

As an example, the shipping routes in the Dutch part of the North Sea are among the busiest in the world. Sometimes there are incidents such as the loss of containers from the MSC Zoe or the sinking of M/V Baltic Ace. MARIN assists in analysing these incidents and providing proposals for improving the safety of navigation.

Accident investigation Hugo Ammerlaan, Manager of Maritime Operations and coordinating the Authorities and Regulators market, explains that in some cases the investigation consists of a series of model tests to be able to model the hydrodynamic characteristics in our simulation models. MARIN did this in the case of the Korean ferry Sewol. This project included a detailed model of the vessel and its interior, which made it possible to simulate the flooding of the vessel at model scale and to study a number of flooding scenarios.

Another core activity of the Authorities & Regulators Department is to assist governments with spatial planning. Given the push to achieve a carbon neutral society, the governments of the Netherlands, Belgium, Germany, Denmark and the United Kingdom, are planning a

UKC Policy for the Port of Rotterdam

On behalf of the Port of Rotterdam Authority MARIN conducted a study to substantiate guidelines for the minimum Under Keel Clearance (UKC) for ultra large container vessels.

With the dimensions of container vessels continually increasing and given the tendency to visit the port laden to the maximum draught more often, a question arose about whether the current rules for UKC in the inner port are still safe. The study was conducted in cooperation with Deltares and the Dutch Maritime Pilot Association.

Although safety was the most important factor, it was also vital that operations in the port were not restricted unnecessarily. A desk study was performed to determine the minimum keel clearance to maintain manoeuvrability in a narrow basin. Factors such as the ship draught accuracy and observed depth accuracy were evaluated as well. However, most effort went into the allowances related to ship movements. For container vessels, the heel angle contributed considerably to the observed sinkage.

When manoeuvring these large vessels, pilots use the Navigator Marginal Ships (NMS) which provides high accuracy positioning and path prediction, but also records heel angles and antenna height. By studying NMS data, allowances for the experienced heel due to turning and wind could be determined for different sections of the port. It was interesting to observe that increasing engine revolutions and rudder use contributed considerably to the heel angle at certain points. The same NMS data were used to evaluate various squat formulas. The best fitting formula for this type of vessel and situation was then determined and used to calculate the squat allowance for the present and future situation.

With the derived realistic allowances, the gross UKC required per section of the various routes in the inner port was determined. In the end it was possible to come up with a generic rule set that enables a safe but also efficient use of the port.

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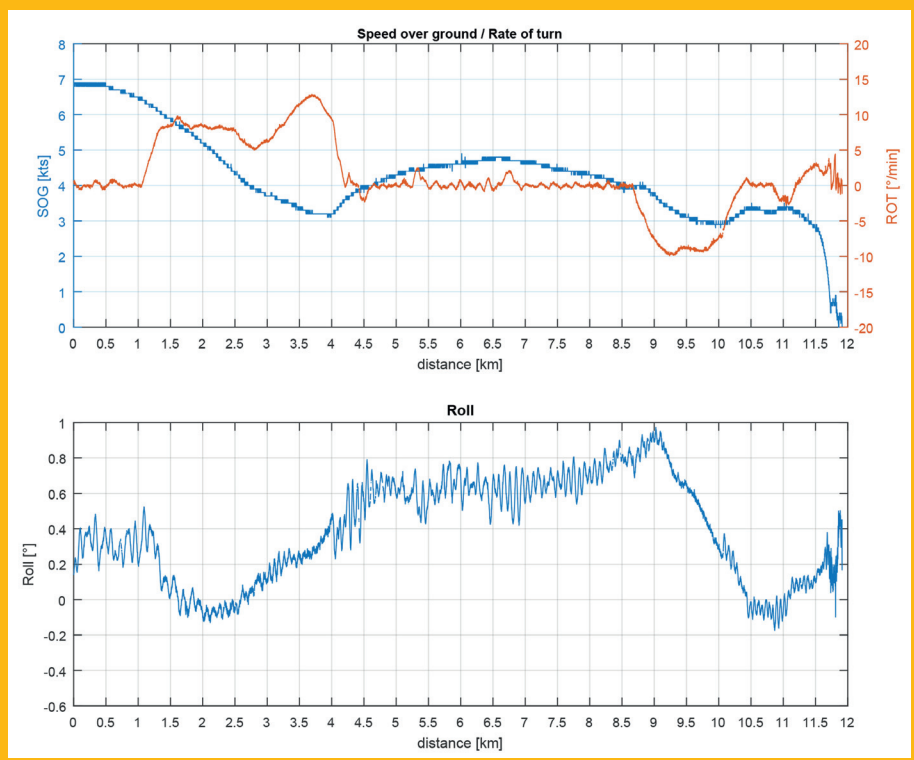


Example of studied voyages and recorded NMS data

large number of wind farms, in combination with other activities such as floating solar panels and seaweed farming, he says. "We assist with the spatial planning of all these activities in relation to the safety of shipping, protection of ecosystems and other activities."

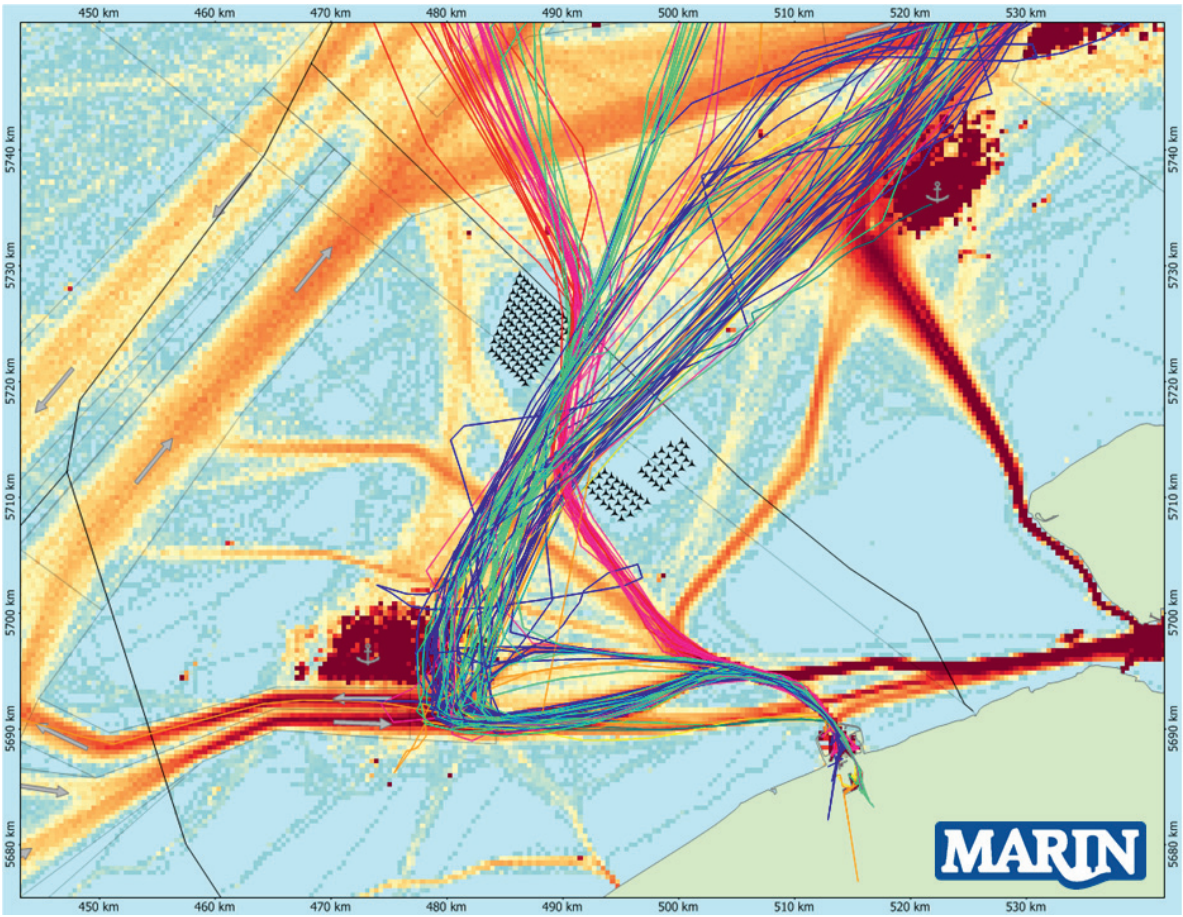
Spatial planning How many ships pass the Dutch coast each day? What is their size and speed? How much CO_2 do they emit? What spills could occur? "These are all typical questions from the government when they have to make decisions regarding the spatial planning of the North Sea or other infrastructural changes," Hugo adds. MARIN provides answers by analysing AIS data. A good example is the bi-annual network evaluation which is an AIS analysis executed for the Directorate-General for Public Works and Water Management (Rijkswaterstaat).

Traffic analyses are also input for risk assessment and safety studies. MARIN's software tool SAMSON regularly contributes to safety and environmental risk assessments and also includes impact modules for assessing the consequences of accidents. MARIN has also performed risk studies for other governments and agencies such as Transport Canada.

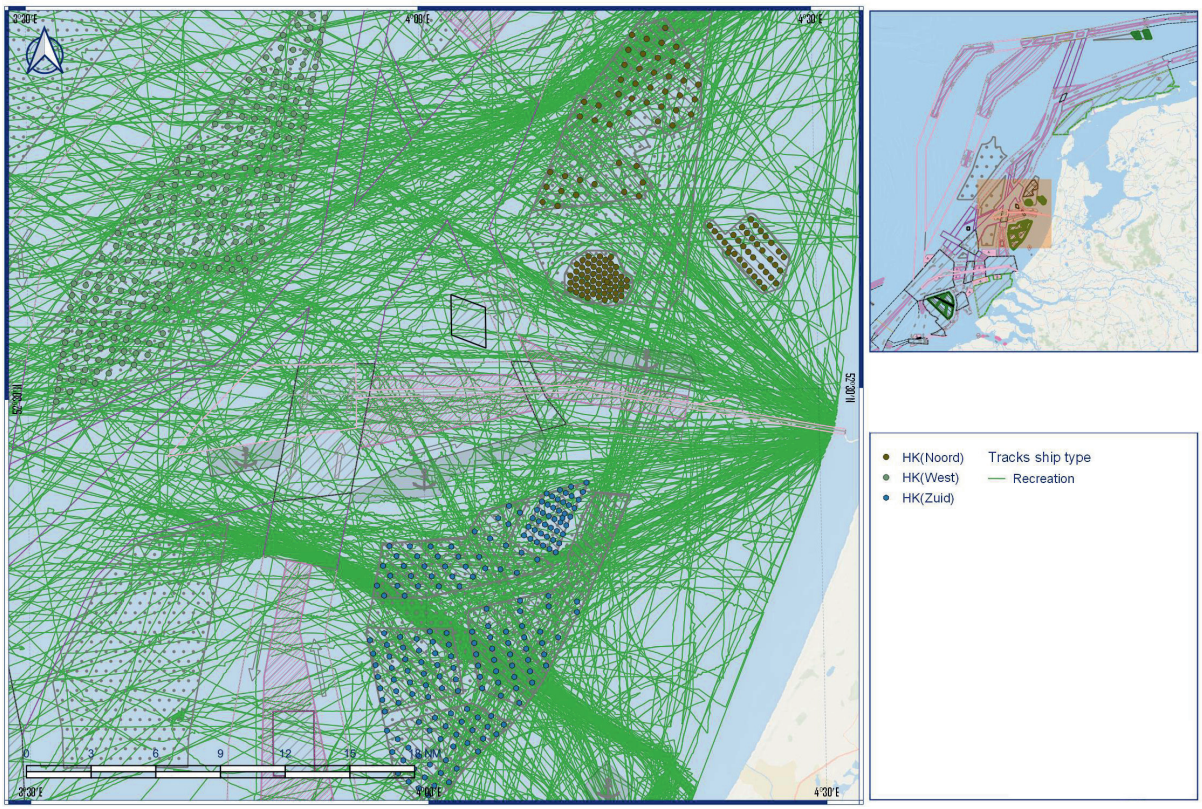
In line with the development of autonomous ships and systems, MARIN is also developing new concepts and processes for Vessel Traffic Services (VTS) and shore control centres (SCC) for both inland and sea environments. Additionally, MARIN develops design rules for inland waterways and rivers for the Dutch government.

Hugo comments: "The biggest challenge for authorities and regulators is to stay ahead of all the ongoing innovations, whilst developing new regulations and measures to allow safe and efficient operations to continue. The daunting task is stimulating innovation and trying not to hamper it. New tools to measure whether the imposed policies are effective or not have to be developed too. The complexity of the market doesn't make things easier as the initially dominant players from the shipping, oil & gas and cruise markets are now joined by renewables, life at sea and the infrastructure sectors."

"We assist with the spatial planning of wind farms, floating solar panels and seaweed farming in relation to safety of shipping and protection of ecosystems."



AIS traffic analysis for a marine spatial planning study into the collision risks for new wind farms offshore the Belgian North Sea coast.



Track of recreational vessels through future wind farm areas HK (Zuid), HK (Noord) and HK (West), based on AIS data for May-July 2019

Balancing offshore wind farms and the safety of shipping

The energy transition increases demand for alternative energy solutions and some of these include using space in the North Sea for developing offshore wind farms. However, a consequence of developing these wind farms is the impact on maritime safety. As the density of traffic in the North Sea is one of the highest on the planet, the balance between safety and the new offshore wind farms is a significant challenge.

MARIN has performed several Formal Safety Assessments (FSA) to investigate the impact of future wind farms. A recent FSA focused on the effect of using predefined passages to sail through wind farm areas, rather than free passages.

The quantitative part of the FSA consisted of an analysis of the traffic pattern in the North Sea based on AIS data and calculations made with our in-house programme SAMSON. The traffic analysis provides a good insight into the current traffic flows in the planned wind farm areas and into how future shipping patterns will evolve if predefined passages are used. In most cases, the locations of the proposed passages were in line with current traffic patterns.

Based on the SAMSON analysis it was concluded that the total number of expected collisions with wind turbines would decrease when using designated passages instead of free routes. However, for some turbines next to the passage the collision risk increased.

In a (virtual) expert session all the possible hazards were identified and rated, both in terms of probability of occurrence and the impact for humans, the environment and economy. The conclusion of the qualitative analysis was in line with the quantitative analysis. One of the outcomes was that experts stated that using designated passages increases the predictability of traffic which in turn, decreases the risk of ship-ship collisions.

Overall it was deemed safer to sail along designated passages. Some hotspots were identified where the risk of an incident will increase. And one of the recommendations was to monitor vessels in and around the wind farm closely to prevent accidents occurring, and at the same time to make it possible to react swiftly in the event of an incident.

This approach has also been applied to investigate the change of the routes to Skagerrak and the cumulative effects of all the planned wind farms to 2030 and beyond.

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