

1 Secure moorings ensure secure positioning of the ship against unexpected driftings | *Iam_Anupong*

2 Tugboat pulling the ship out of the port | *Grecaud Paul - Fotolia*

SIMULATION-BASED NAVIGATIONAL SAFETY ASSESSMENT AND MOORING ANALYSIS

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Navigational Safety Assessment

Navigational safety assessments comprise the investigation and evaluation of a potential risk of collision or grounding of a vessel under specific circumstances, e.g. in poor weather or in congested traffic situations. Using real-time simulation methods facilitates the assessment of risks without posing a threat to humans and assets.

Key Issue

Is it possible to safely navigate a specific vessel in a specific fairway, port or basin under specific conditions?

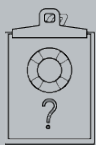
A navigational safety assessment is built around this key issue. In order to thoroughly investigate it, detailed and tangible questions are developed and applied to the following areas:

Strategic Support

- /// How must a planned fairway, port or basin layout be designed and equipped to promote safe navigation?
- /// Can ships of future sizes and characteristics navigate and manoeuvre safely in a specific fairway, port or basin?

Operational Support

- /// How do wind, sea state, navigational aids and traffic conditions affect navigational safety in a specific fairway, port or basin?
- /// What is the most efficient manoeuvre strategy for safely approaching, berthing, unberthing and departing for a specific vessel in a specific fairway, port or basin?



Your need for a navigational safety assessment



Defining assessment scenarios

- Workshop with customers
- General scenario description framework



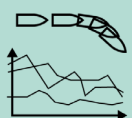
Preparing simulation environment

- Ship modeling tool
- 2D/3D scenario environment modeling tool



Performing real-time simulation runs

- Experienced officers
- Ship handling simulation



Assessing navigational safety

- Recording functionalities
- Data evaluation tools
- Expert rating



Your navigational safety assessment

Project Steps

A navigational safety assessment is conducted in four consecutive project steps:

Defining assessment scenarios

Together with the customer, Fraunhofer CML defines the level of detail and the focus of investigation, e.g. the specification of the simulated ship, fairway, port and basin as well as the environmental and traffic conditions under which the safety aspect shall be assessed.

Preparing simulation environment

According to the scenario specifications, Fraunhofer CML models the ship characteristics and the simulation environment, prepares the scenarios and develops maneuver strategies.

Performing real-time simulation runs

Participation of navigation experts such as pilots and masters is ensured to provide local and/ or ship knowledge for the study. All scenario runs are performed in real-time simulations and all relevant data is stored in a tailor-made data base for later in-depth analysis.

Assessing navigational safety

Based on the data collected, navigational safety is evaluated according to the well-established assessment approach. The defined maneuver strategies are evaluated and safety optimization options are investigated, where required. The results of the quantitative and qualitative assessment which also incorporates expert rating are described and visualized.

At all times Fraunhofer CML maintains close contact with the customer to meet the specific requirements and to elaborate a navigational safety assessment which provides a real client benefit.

Moorings

During planning permit procedures or other construction activities in ports, the safety of the mooring of ships is a significant factor and must be permanently ensured. Using a standardised procedure, Fraunhofer CML has performed mooring analyses for various construction projects. Within the projects, Fraunhofer CML was able to draw on extensive simulation and hydrodynamic expertise in the field of port development studies.

Approach

CMLs mooring analyses are based on the static-equilibrium method according to OCIMF MEG3, whereby a consideration is made in three degrees of freedom (longitudinal force, transverse force, yaw moment).

Assessing environmental conditions

Based on the approach, statements can be derived whether mooring is uncritical under certain environmental conditions, or at which wind force and direction a critical point is exceeded and alternative securing methods become necessary. The results of the environmental condition assessment forms the basis for evaluating alternative safety methods.

Our team supports you in nautical safety and mooring analyses. We use our ship-handling simulators, newest software and own highperformance computers.

¹ *In addition to fairway or turning circle analyses, there are many other possibilities for performing nautical safety analyses | Fraunhofer CML*