



Tug manoeuvre of a cruise ship in port

REMOTE-CONTROLLED TUGBOATS AHEAD SAFE AND OPTIMIZED PORT MANOEUVRES

FernSAMS is the German name for the „use of remote-controlled tugs in handling manoeuvres of large ships“. Together with five other partners under the coordinator Voith, CML launched a project funded by the BMWi (German Federal Ministry for Economic Affairs and Energy), whose aim is to design a remote-controlled tug and all the components required for its operation. These range from automated line handover to communication and training programs.

The task of CML is to develop and validate the nautical assistance

system. The assistance system builds the interface to the people involved in the manoeuvres. The requirements for the system will be analysed and determined based on typical manoeuvring situations.

The tug's remote control is designed as an innovative control console. The use of this console will be tested and optimized at the CML by means of extensive simulations. At a later stage of the project, the remote control system will be used from a real harbour tugboat.

The successful implementation of

the project is expected to increase the efficiency of manoeuvres, reduce time and energy consumption and increase the safety of manoeuvres. The project also holds potential in terms of further development into a (partially) autonomous system.

The scientists at CML are therefore delighted to receive funding: "The project conducts previous CML research work and enables us to further expand our expertise in the development and testing of autonomous technologies," says Laura Walther, project manager at CML.

LARGE SHIP BERTH AT THE SEAPORT OF EMDEN CML SUPPORTS PORT PLANNING

Emden is one of the most important Northern European ports for vehicle transshipment. 1.3 million were transhipped here in 2016, and forecasts point to further growth.

This is one of the reasons why the port operator is planning to build a large ship berth. The CML and the Sellhorn engineering company have carried out a nautical survey and an analysis of economic needs.

For the needs analysis, the development of transshipment volumes was examined and a forecast of the expected demand for transport in Emden was made. The main result of this analysis is that new capacity needs to be created in order to meet the projected turnover growth.

The new construction of the berth also ensures that ships, which are still growing in size in the long term, can continue to call at the port and be handled there. In addition, the new berth can temporarily serve as a transshipment alternative for companies in the inland port if the capacity of the inland port is fully utilised.

In the nautical survey, ship handling simulations were carried out at the CML, accompanied by pilots from Emden. The simulation runs have shown that ships with expected future size profiles can already enter and leave the outer port of Emden today.

Other important results of the nautical survey include recommendations on manoeuvring procedures, towing and mooring dur-

ing the construction and operation phase of the new large ship berth.

Overall, the CML investigations confirm the high benefit of the planned measure and the technical feasibility of a new berth between Emspier and Emskai.

FOREWORD



Dear readers,

the digitalisation of our entire environment opens up more opportunities for society, business and science than we are already aware of today. This is good for us researchers, because we can develop a wide range of exciting questions. And it is of course good for our customers, because we help them with innovative solutions to optimize processes, improve safety in maritime shipping and ports, save energy and much more.

And we can always tell you about exciting projects!

Read here about the development of a remote-controlled tugboat and the development of the maritime safety indicator MSI as an early warning system for ship collisions or strandings. In addition, we report on the next upcoming simulation runs in the European Maritime Simulator Network EMSN.

Enjoy reading!

*Yours, Prof. Carlos Jahn
Head Fraunhofer CML*



Control and monitoring systems on the navigating bridge

WORLD'S LARGEST CIVILIAN SHIP SIMULATION NETWORK: SEA TRAFFIC MANAGEMENT BECOMES REALITY

The European research project to improve the exchange of information and the optimisation of route guidance in maritime transport STM Validation has reached the middle of its duration. Occasion at the Midterm Conference in September to take a look at what has been achieved so far.



The Fraunhofer CML is the technical coordinator of the European Ship Simulator Network and is involved in a large number of developments in the project. The aim of STM Validation is to make international maritime transport more ecological, economical and efficient.

MARITIME SAFETY MEASUREMENTS

In order to improve maritime safety, different approaches to the regulation, management and monitoring of ship movements are being implemented today. These include the introduction of traffic separation systems, radar surveillance and traffic management concepts. The impact of these solutions as well as their influence on the behavior of the ships is missing reliable data bases so far. Due to this backdrop, the CML and its partners in the STM Validation research project carried out an expert survey in which around 350 nautical officers assessed different maritime traffic situations with regard to their collision risk.

The results are used to develop the Maritime Safety Index (MSI). The MSI is an indicator of the risk of ship collision or stranding. Using different fuzzy logic models, the index can be determined for each individual ship at any point along its route.

Real-time data from the automatic identification system AIS are used as input variables for the evaluation of current or past traffic situations and to determine the respective safety level. In addition to the established navigation variables, such as the Closest Point of Approach and the course, many other input parameters are used. The different fuzzy logic models required to determine the MSI are implemented and further validated by navigation experts. The MSI can assume sizes between 0 and 10, where 0 indicates an unsafe, and 10 indicates a safe situation. Due to the model consolidation, the index does not indicate what kind of risk potential exists. However, it can serve as a first indication of a worsening situation, which can be perceived by a moni-

toring station, so that third parties also become aware of a dangerous situation at an early stage.

FURTHER SIMULATION RUNS

In November, the next test runs will be carried out within the framework of STM in the European Maritime Simulator Network EMSN. In the EMSN, more than 30 bridges at 13 locations are now interconnected. The aim of the simulation is to test the newly developed systems for the secure and effective exchange of information between seagoing ships, e.g. the course and the planned route. In addition, improved coordination of maritime transport, improved monitoring of critical situations and manoeuvres, as well as the reduction of port layovers and waiting times will be achieved.

In November, the next simulation runs will take place in the southern Baltic Sea and the English Channel.

IN BRIEF

Johannes Schlingmeier, PhD student at the Fraunhofer CML, presents in his dissertation *Cooperation in maritime empty container logistics* an insight into potentials for optimizing empty container processes through the cooperation of shipping companies. Empty container logistics causes costs of 30-40 billion US dollars per year. Cooperations have the potential to save approximately 2.7 of 35 million empty container transports worldwide per year. The publication can be obtained from Fraunhofer-Verlag at www.verlag.fraunhofer.de.

The *Night of Knowledge* will take place in Hamburg on November 4th, at which the CML will also participate. We introduce our visitors to the digital planning environment in which the processes of a container terminal are simulated. In addition, our three ship simulators offer the possibility to steer into Hamburg's port on a large containership. Large screens show the view from the ship's bridge, allowing visitors to put themselves in the position of a helmsman.

+++DATES+++

- **HICL - Hamburg International Conference of Logistics**, 12.-13.10.2017, Hamburg
- **Night of Knowledge**, 04.11.2017, Hamburg
- **VESTVIND - Forecast for the maritime transport of large shipping**, lecture event, 29.11.2017, Hamburg

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Sea traffic management improves information security in critical situations