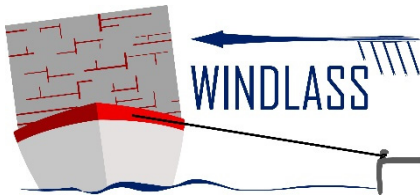


Photograph Dirk Sloop

WINDLASS JIP

Wind Loads and Securing Ships

Container ships, cruise vessels and LNG carriers feature increasingly large windage and have to navigate into ports through waterways and locks, and finally berth safely at terminals which are sometimes exposed to severe wind. Recent incidents indicate that limiting wind conditions are reached earlier than in the past. New technologies will be deployed to increase our understanding of the 3-D wind field encountered which is instrumental to develop a practical wind load prediction tool. The envisaged tool is for operational use on board and in the port as well mooring analysis and in nautical simulators.



What's New?

- Lidar wind measurements in port and waterways
- Wind fine casting in ports
- Practical wind load tool
- Reduction of mooring loads



Background

Current practice to estimate wind loads is based on a wind speed at 10 m height, a vertical velocity profile and a pressure drag coefficient provided by wind tunnel or CFD. Depending on the atmospheric conditions and the landscape, the actual wind field can be quite different resulting in high drift angles, large berthing loads and high mooring line loads for high windage vessels.

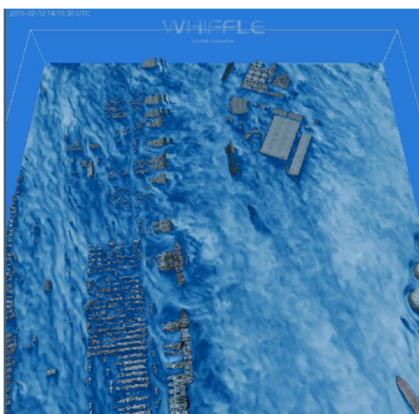
Two technologies have recently emerged:

- Lidar wind scanner for remote measurement of 3-D wind over the complete vessel and her surroundings
- Finecasting; large eddy simulation of 3-D wind taking into account the global weather model and the local landscape with buildings, cranes and other vessels.

These technologies enable us to develop insight and a tool which supports operations in ports as well as engineering analysis and training in simulators.

Objective

Understanding of the 3-D wind field in exposed ports and waterways to develop a practical computer tool to predict wind loads on ships and their response (drift angle, berthing loads and mooring line loads).



Envisaged participants:

- Port Authorities
- Terminal Operators
- Vessel Operators
- Tug operators
- Pilots
- Class Societies
- Port & Mooring Engineers
- Equipment suppliers



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Scope

Lidar Windscanning and Finecasting will be deployed at 4 locations in exposed ports and waterways. The relevant vessel response i.e. drift angle during approach and mooring line loads while berthed will be recorded. The results will be mutually correlated and analysed for the modelling of 3-D wind. Results will be used in dynamic mooring analysis and compared with the current practice.

loads on the vessel in the port environment as well as her response (drift angle, berthing loads, mooring loads). For this purpose we will use and verify the building block method as used in the existing WINDOS model.

Finally the new tool will be verified and guidelines for use of the tool in port operations as well as for simulators and mooring analysis will be drawn up.

Deliverables

- Report with measured and finecasted wind, motion and mooring tension
- Report correlating measured data and mooring analysis
- WINDLASS computational tool for wind loads, drift angle, berthing and mooring loads
- Evaluation including tool verification

Partners

This work will be conducted as a Joint Industry Project to ensure that we have sufficient experience, capabilities and facilities available. Results and costs will be shared. The partners to execute the work are MARIN, KRVE, WHIFFLE and TU-Eindhoven. The project participation is open for all stake holders

Schedule

The full proposal and terms of participation are available on request. The JIP will run for three years. The kick-off meeting where scope and task assignment will be finalised is scheduled on May 22, 2019.

