MARIN

BETTER SHIPS, BLUE OCEANS

Wind Propulsion: from Niche to Next

Dr. Bas Buchner, President

MARIN

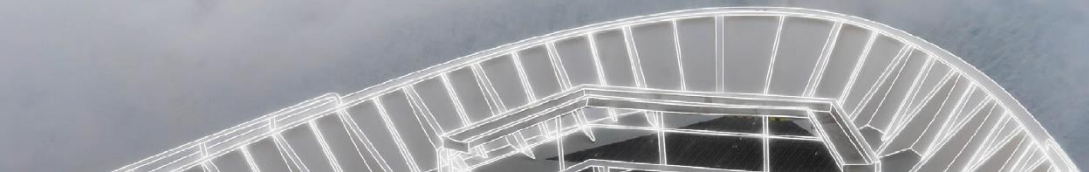
BETTER SHIPS BLUE OCEANS

Beyond the horizon

MARIN STRATEGY PLAN 2022-2025

Clean, safe and smart shipping,

sustainable use of the seas



Better Ships, Blue Oceans

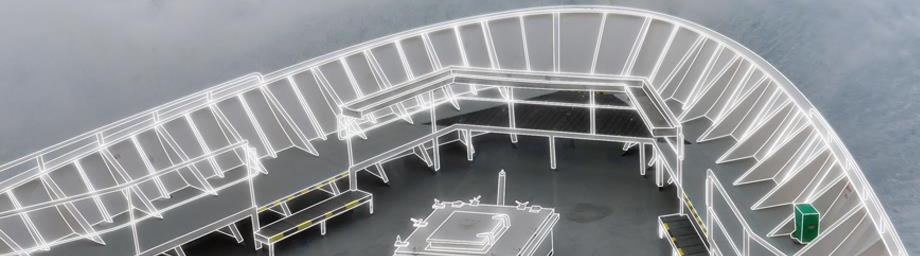
In 2025:

We offer solutions for zero-emission ships and operations

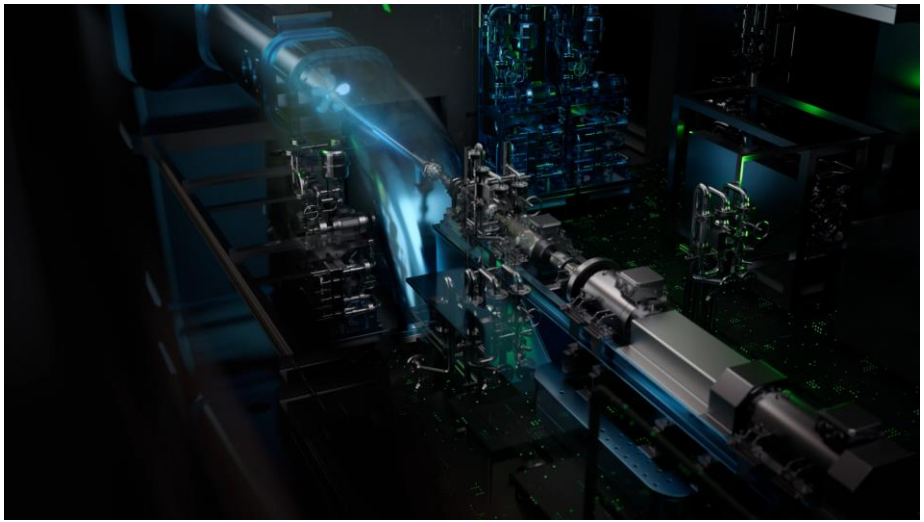
We aim to achieve zero maritime accidents internationally

We focus our integral solutions on operations (and crew-centred ships)

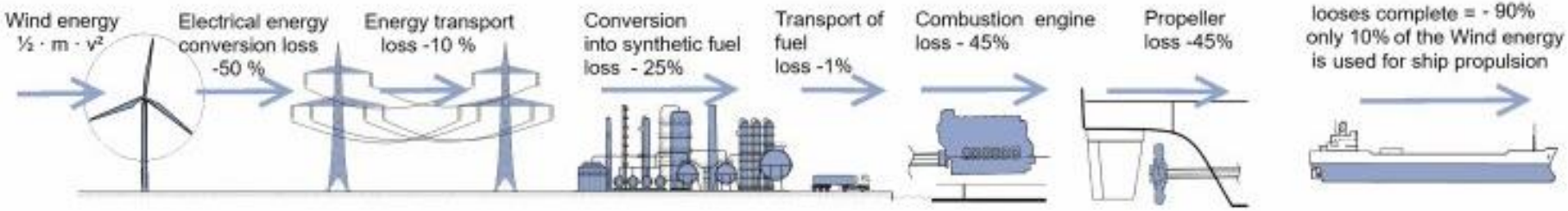
We want to be global leader in maritime AI (with the sea as a digital lab)



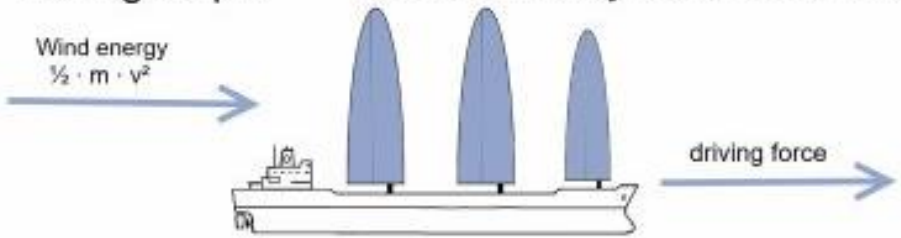
Zero Emission: Future Engine Room and Energy Efficiency



This says is all! (Herbert Blümel, Becker Marine Systems)



sailing ship : the short way from wind energy to driving force



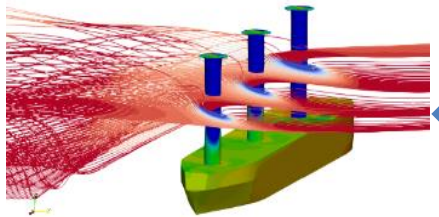
advantages of a sailing ship:

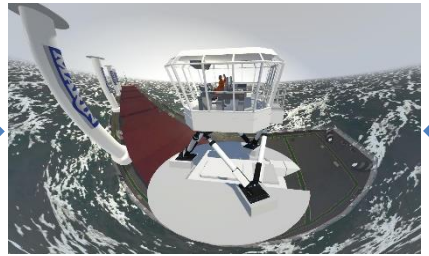
- uses high wind potential on the open sea
- No losses due to energy conversion
- No losses due to energy transport
- No land-based infrastructure necessary
- One sailing ship replaces 10 land based wind power plants
- No fuel costs for the shipping company (wind is for free)
- less dependency of shipowners on fuel producers

Herbert Blümel ,2019

Wind Propulsion from Concept to Operation

CONCEPT ⟷ DESIGN ⟷ OPERATION





Simulation

Computer

Modeltests

Prototype

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Big data / AI

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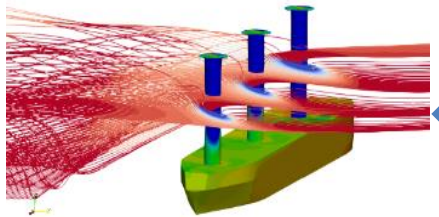

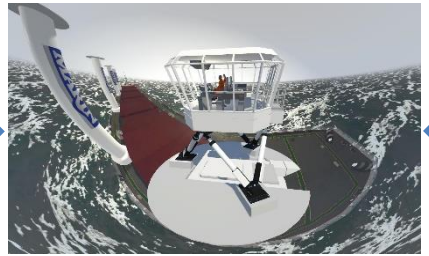

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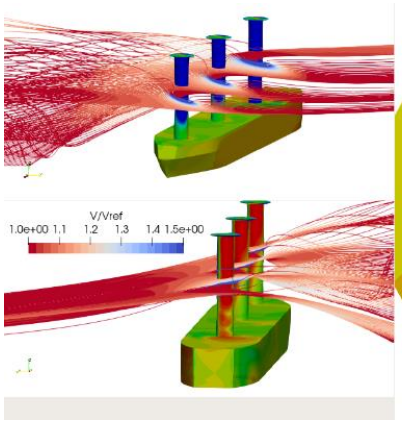
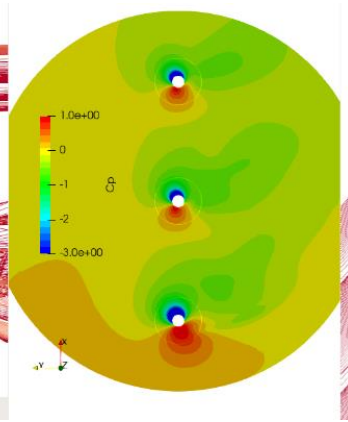
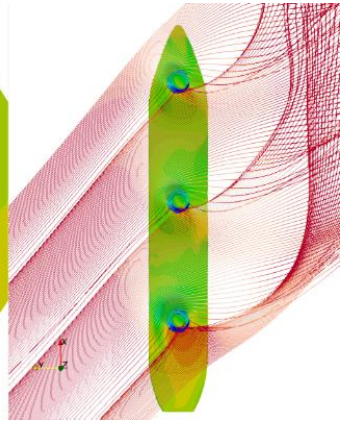
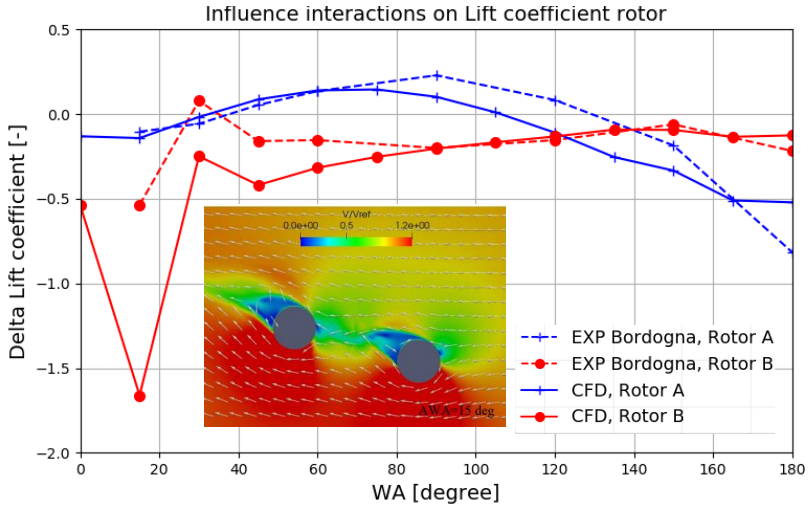
CFD: Hydro/Areodynamics and Interaction effects









Wind Propulsion from Concept to Operation

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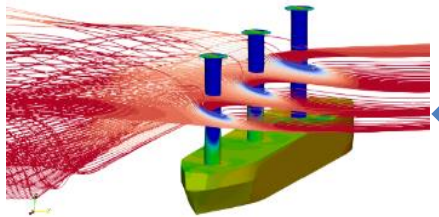

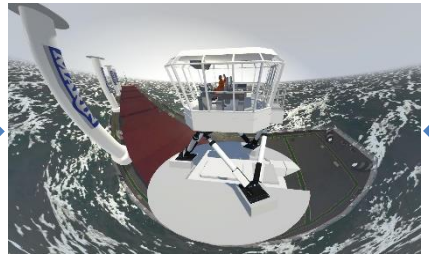

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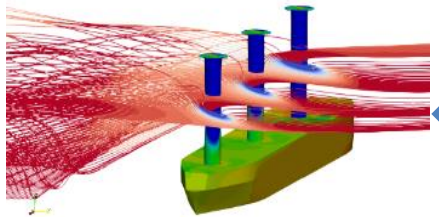

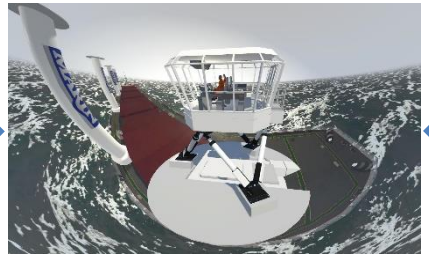

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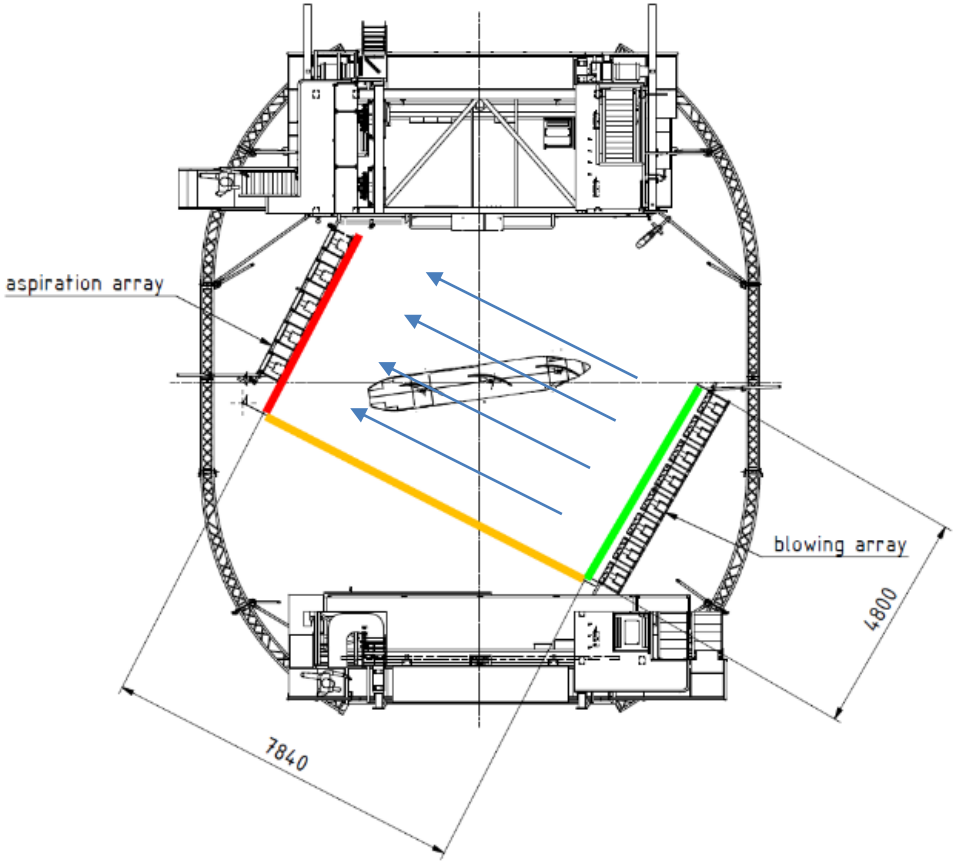
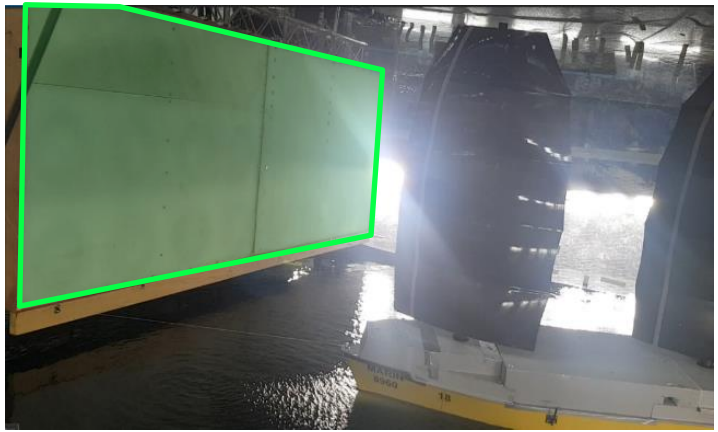
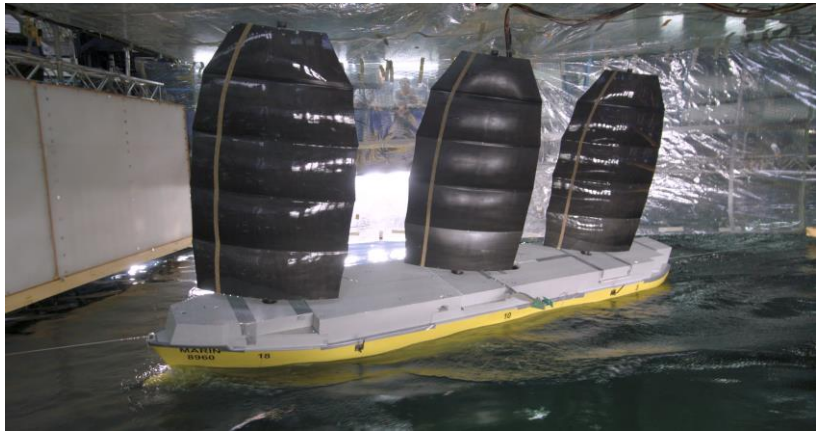
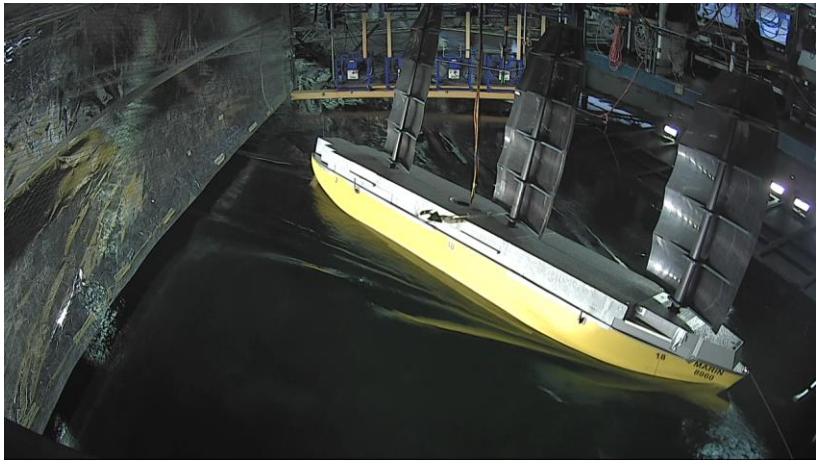
WindLab test set-up





Seakeeping, Course Keeping and Manoeuvring





Wind Propulsion from Concept to Operation

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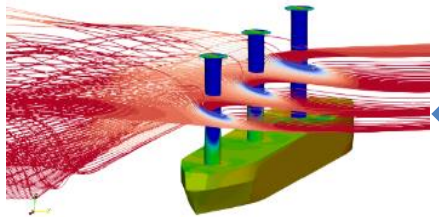

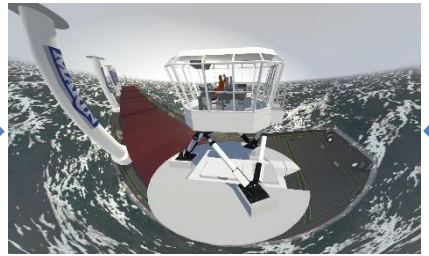

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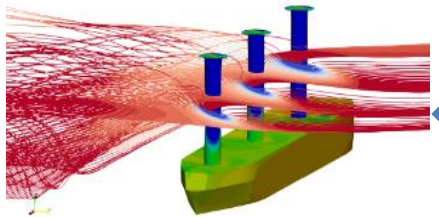

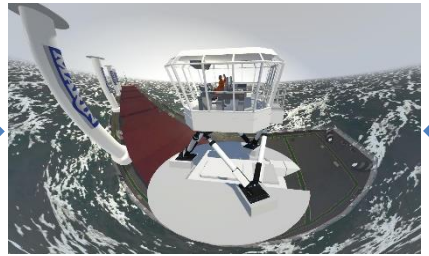

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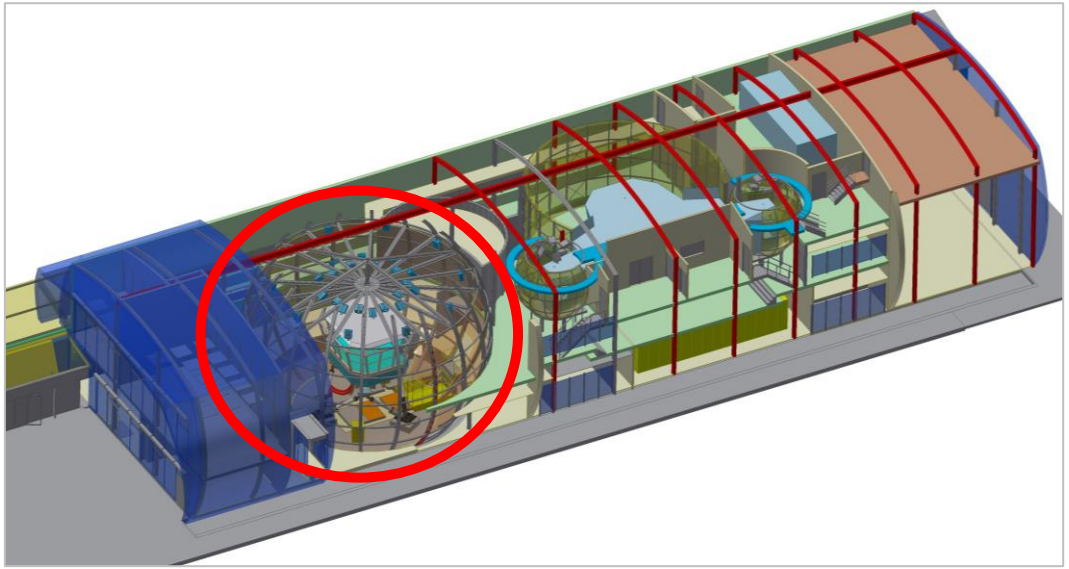
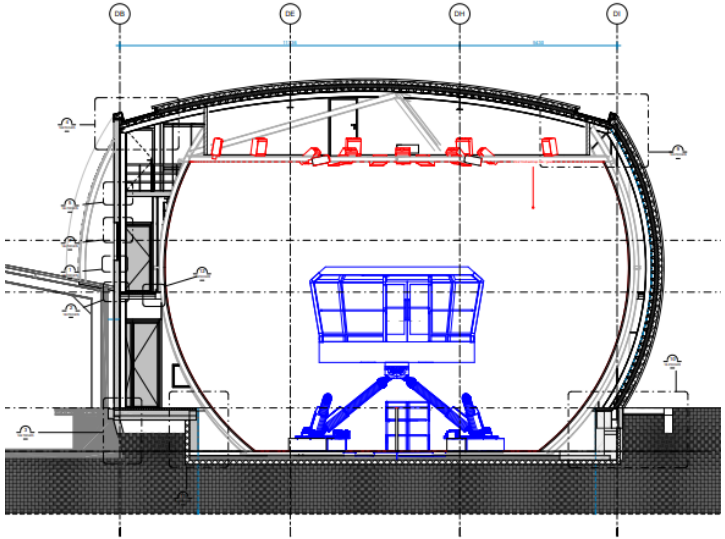
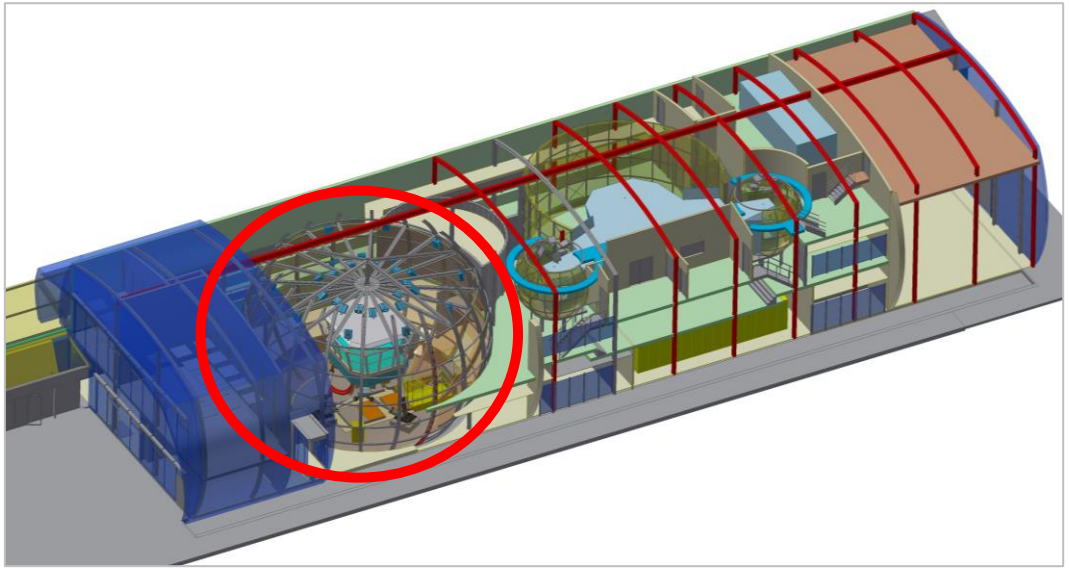
MARIN Seven Oceans Simulator centre (SOSc)

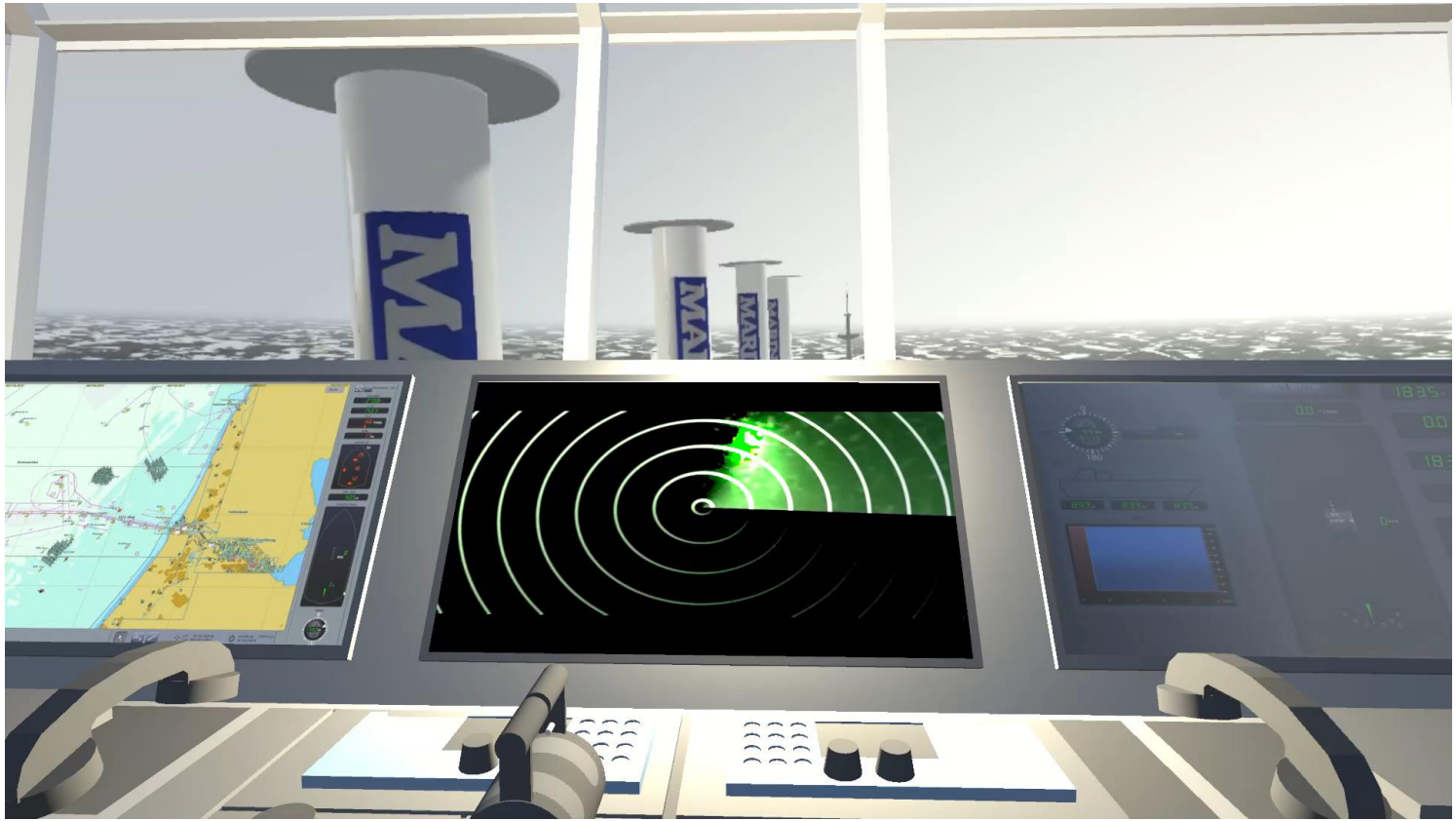


Large Motion Simulator (LMS)





Wind Propulsion in Large Motion Simulator (LMS)



Wind Propulsion from Concept to Operation

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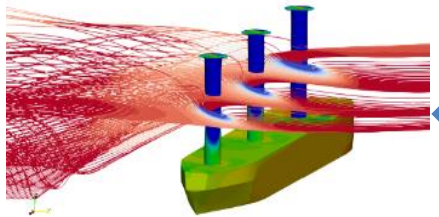

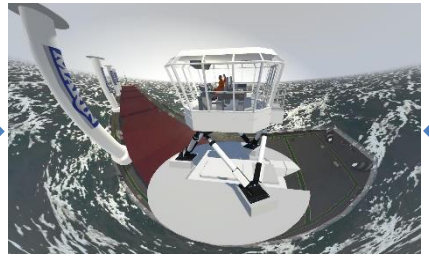

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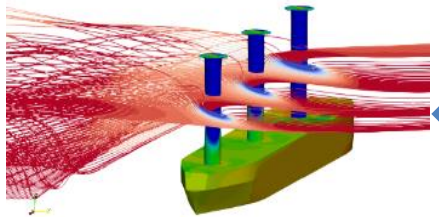

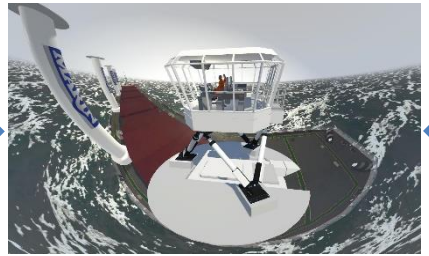

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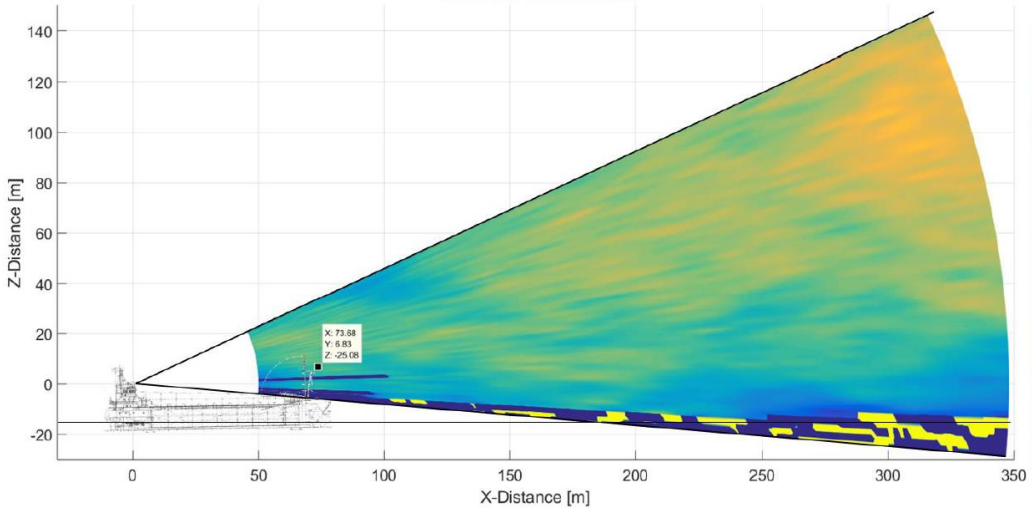
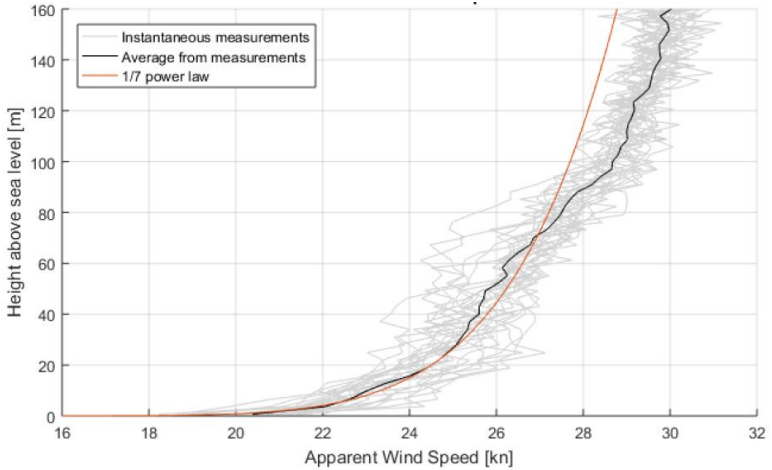
Wind Propulsion trials: loads and wind fields

- WindCube 200S: Lidar
- Remote wind field measurements with moving scan head
- Typical range ~2-6 km (@resolution 50 m)
- Radial wind speeds measured → reconstruction of speed & direction

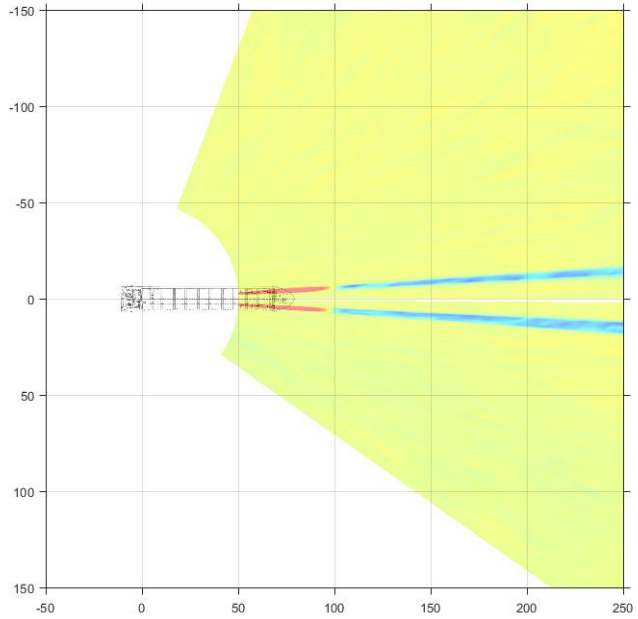
Wind Propulsion trials: incoming windfields (vertical scan)



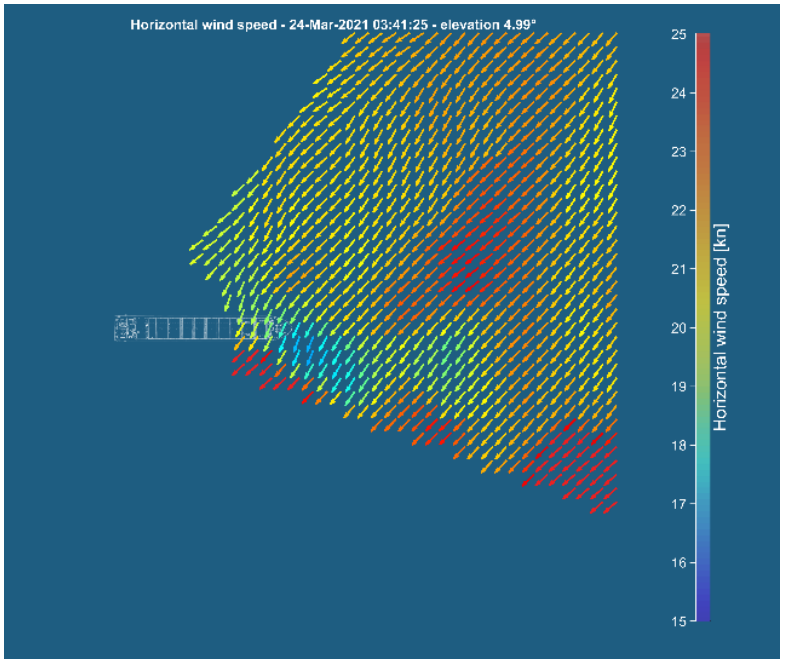


Wind Propulsion trials: incoming windfields (horizontal scan)

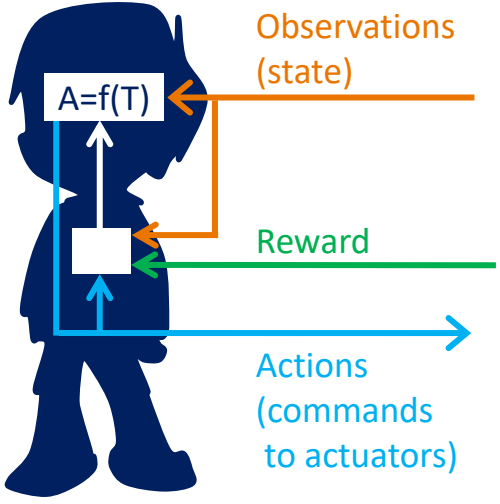
Radial measurements

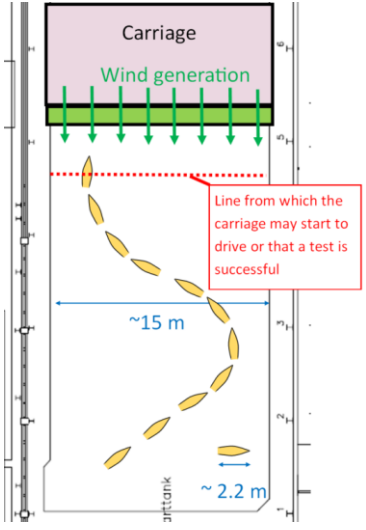


Processed horizontal wind speed



Experiments with Machine Learning





Wind Propulsion from Concept to Operation

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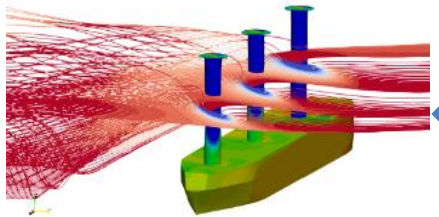

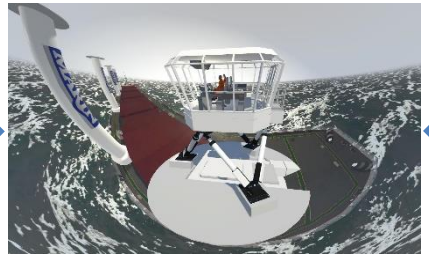

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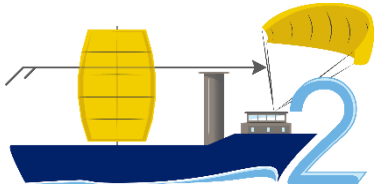
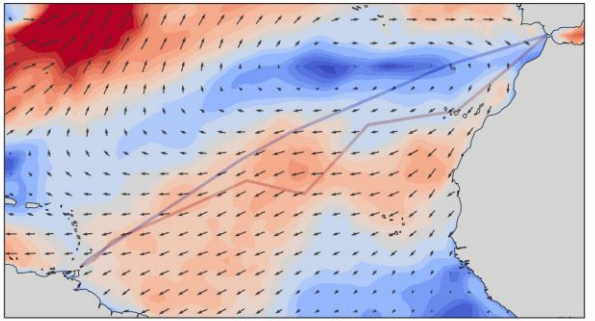
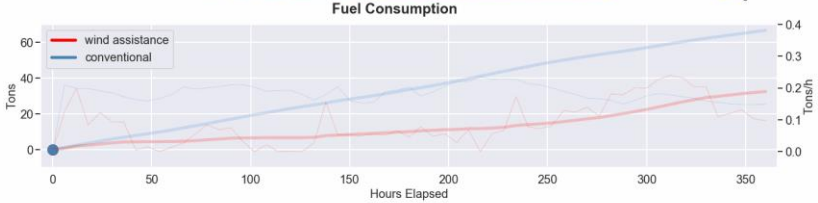
Wind Propulsion with the Sector: WISP JIP and Blue Route







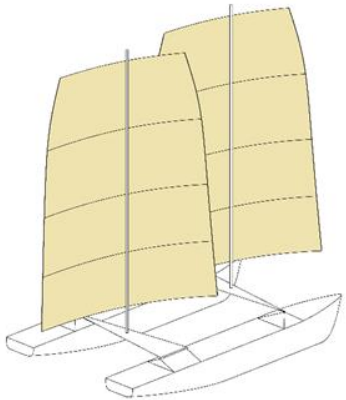
Marshall Islands

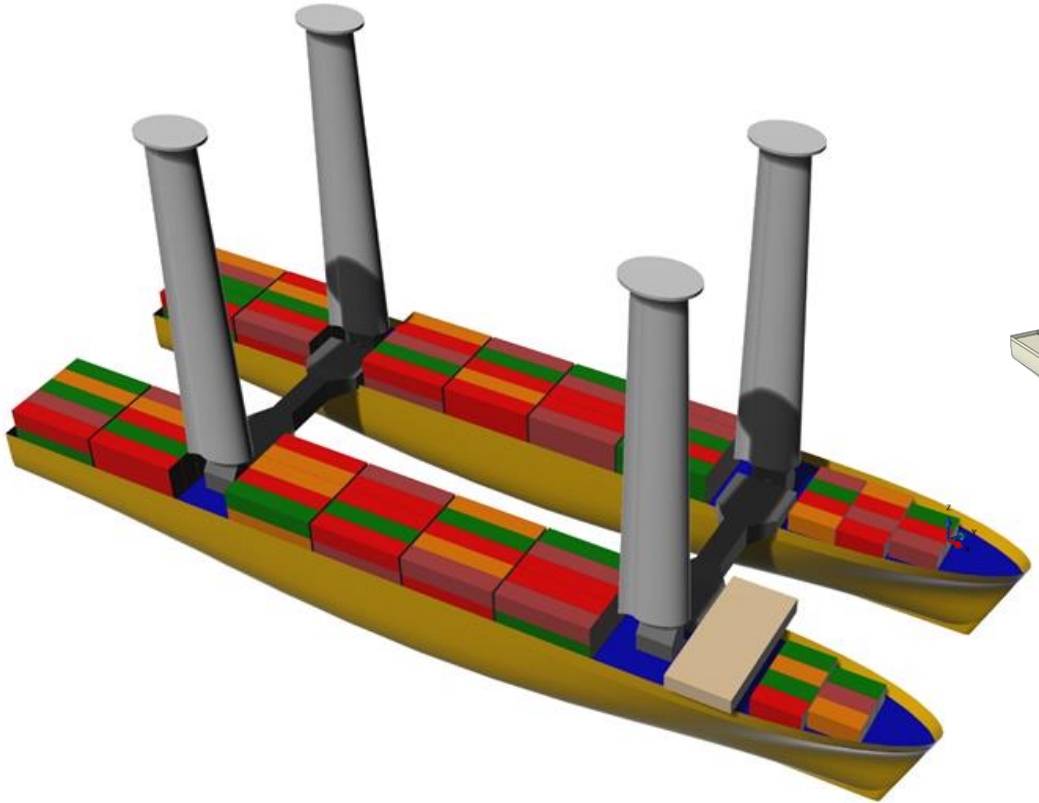
Azolla

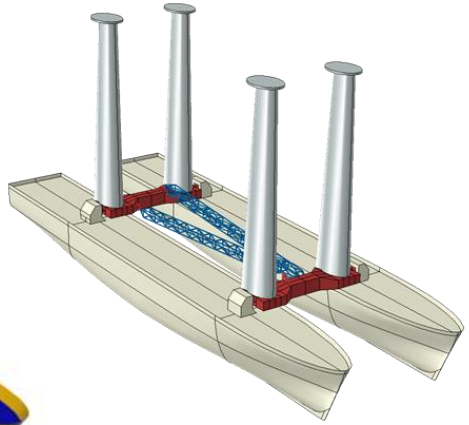
Network partner: International Windship Association

blueroute.application.marin.nl

CATAMARIN ☺: fully wind propelled (large sails)!







Wind Propulsion Royal Netherlands Navy?