

HELSINKI, FINLAND, APRIL 2, 2025

MARIN tests verify groundbreaking efficiency of ABB Dynafin™ propulsion

- Leading maritime research institute MARIN (Maritime Research Institute Netherlands) provides independent validation of performance gains for ABB Dynafin™ propulsion
- Tests verify a very high open water efficiency at 0.808 for 18 knots operation for propulsion unit of 3 MW in full scale
- Enhanced efficiency correlates to substantial fuel savings and significantly lower ship emissions

Globally recognized maritime research institute MARIN has verified that efficiency levels modeled for ABB Dynafin™ propulsion concept will convert to real-world ship performance gains, following tests at its Concept Basin in the Netherlands. The enhanced efficiency correlates to substantial fuel savings and significantly lower ship emissions compared to conventional propulsion set-ups.

Launched in May 2023, after a decade of development, ABB Dynafin™ offers a fresh perspective on ship propulsion. Its main electric motor powers the rotation of a large horizontal wheel which supports vertical blades – each controlled by an individual motor to mimic the motion of a whale’s tail. Combined, the motions simultaneously propel and steer the ship to optimize thrust and positioning precision.

In comprehensive open water tests, MARIN’s measurements and data analysts, working together with specialists from ABB Marine & Ports and ABB Corporate Research in Sweden, confirmed the positive effects for efficiency and performance. Tests verified ABB Dynafin™ at 18 knots speed achieves up to 81 percent open water efficiency in full scale.

“At MARIN, we measure hydrodynamic forces and moments, and determine hydrodynamic efficiency. All mechanical and electric losses have been subtracted from the test set-up,” said Jie Dang, Senior Project Manager and Principle Investigator (PI) of MARIN.

“We placed a shaft torque and an RPM transducer, as well as a six-component force frame, which was calibrated here at MARIN, to measure the overall unit forces and moments,” said René Bosman, Senior Specialist Mechanical Measurement, MARIN. “We calibrated also the fin servos with the six-component shaft transducer of our torque motor.”

“ABB Dynafin™ is all about extremely high efficiency, and this model scale testing gives a good platform for our customers to verify its performance,” said Janne Pohjalainen, Global Product Line Manager for ABB Dynafin™, ABB Marine & Ports. “Our testing has been really successful and what we have seen fully aligns with our expectations from computational fluid dynamics (CFD) analysis.”

ABB’s advanced capabilities on robotics control contribute significantly to the dynamic performance of ABB Dynafin™, according to Bin Liu, Senior Principal Scientist, ABB Corporate Research Center. “We have integrated ABB’s leading robotics expertise into the ABB Dynafin™ propulsor and achieved exceptionally strong, fast and accurate motion control performance,” he said.

MARIN’s evidence supplements findings from an earlier independent study of ABB Dynafin™ by OSK-ShipTech A/S, which concluded that a passenger vessel would save 22 percent in propulsion energy consumption using the solution compared to a conventional shaftline¹.

The open water tests verify the readiness of ABB Dynafin™ for market. Initial plans focus on medium-sized and smaller vessels, including ferries for passengers and vehicles, small cargo, offshore support vessels and yachts, in the power range of 1–4 MW per unit.

As the shipping industry is seeking to meet the International Maritime Organization’s targets to phase out fossil fuels by targeting net-zero greenhouse gas emissions around 2050, with milestones to cut emissions by 70-80 percent by 2040, ABB Dynafin™ was recognized in Spain’s Retina ECO Award 2024, as a “technological innovation with a positive impact on sustainability and climate change”².

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¹Comparison of propulsion systems on expedition cruise vessel - by OSK-Ship Tech A/S

² IV Edition of the Retina ECO Awards | Events | Extras | EL PAÍS