

Optimized performance for wind-assisted vessels with Norsepower



The client:

Norsepower

Vaisala provided:

Vaisala WindCube®
Nacelle horizontal
profiling wind lidar



Norsepower has taken a pioneering role in the ongoing quest to decarbonize maritime shipping. Established in late 2012 with a mission to reduce the environmental impact of shipping, Norsepower introduced the revolutionary Norsepower Rotor Sail™ — a radically modernized version of the classic Flettner rotor. The Rotor Sail uses a minimal amount of the ship's electric power to rotate the cylinders on the ship's deck, and the rotating cylinders use the wind to generate powerful thrust. Third-party verified fuel consumption savings in shipping range from 5% to 25%, or even more in good conditions.

The challenge: Optimizing wind-assisted propulsion with accurate wind data

Precise, reliable wind data is essential for the research and development of a modern control system. Ultrasonic wind anemometers typically installed on the vessel's bridge gather data that can be used to optimize the system. However, the ship's structures and sails can significantly influence wind conditions aboard the vessel, making it challenging to accurately measure the undisturbed wind field that directly impacts the wind propulsion system solely with onboard anemometers.

Norsepower wanted to utilize remotely-measured wind data to study the performance of Norsepower Sentient Control™, the Rotor Sail control system. The accurate and undisturbed wind data that remote wind data provides

would help them maximize the environmental benefits of reduced fuel consumption even further.

The solution: Undisturbed wind data through remote wind monitoring

To address this challenge, Vaisala and Norsepower decided to embark on a research and development project along with Sea-Cargo AS to complete a performance validation of SC Connector RoRo vessel's thrust measurement system during sea trials. The group installed Vaisala WindCube Nacelle horizontal profiling wind lidar aboard the SC Connector in November 2022 beside the Norsepower Rotor Sail. Over a span of four months, they diligently collected and analyzed undisturbed wind data which gave them the ability to align Norsepower Rotor Sail thrust with precise measurements of the free stream wind.

“The installation of Vaisala’s WindCube Nacelle wind lidar system on the RoRo vessel SC Connector has been instrumental in providing crucial wind insights, enhancing our comprehension of immediate wind conditions onboard the vessel. This has, in turn, facilitated the validation and optimization of our thrust measurement system performance and helped advancing the development of an improved control system.”

*Roope Savolainen
Automation &
Electrification Design
Manager, Norsepower*

Vaisala provided lidar installation plus comprehensive training in under two days to the vessel’s crew.

WindCube Nacelle uses the Doppler principle to measure wind by emitting a signal into the atmosphere, analyzing the frequency shift of the reflected signal caused by moving particles to derive wind speed. Key features of WindCube Nacelle include:

- Accurate, verified wind data up to 700 meters at 20 simultaneous measurement distances
- Easy deployment, flexible mounting options, and a simple structure
- Rapid data completion through continuous wind direction alignment

**The benefits:
Improved wind insights for
enhanced performance**

By comparing undisturbed wind data from WindCube Nacelle with Norsepower Rotor Sail thrust measurements, Norsepower can further fine-tune its wind power operations, ensuring peak performance and enhanced energy efficiency.

WindCube Nacelle’s precise remote wind information, unaffected by ship structures or the wind propulsion system, can optimize the performance of wind-assisted vessels equipped with Norsepower Rotor Sails. This technology is revolutionizing wind-assisted propulsion, making a significant contribution to the maritime industry’s decarbonization efforts.

Together with Norsepower, Vaisala is driving the maritime industry towards a greener and more sustainable future, fueled by accurate and reliable wind data.



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