

# A compelling strategy for maritime decarbonisation

**ROTOR SAILS** First fitted to a vessel over 100 years ago, rotor sails technology has now been successfully redeveloped as a modern way to help the push towards industry-wide decarbonisation. The cost saving case alone is compelling for shipowners around the globe, writes Joe Baker, Mechanical Engineer at UK-based Anemoi Marine Technologies.



The installed Rotor Sails contribute to a significant cut in fuel consumption



Source: Anemoi

With the aim of reducing greenhouse gas (GHG) emissions as soon as possible, many shipowners are ready to take the plunge and invest in future-proof technologies. Installing wind power systems either as retrofits or on new ships could be the ideal answer for the maritime community, particularly as using rotor sails would lower the consumption and cost of expensive clean fuels.

## Technology

The original technology, then known as Flettner rotors, was developed over a century ago. Rotor sails are tall cylindrical sails that can be installed on the main deck, bow or elsewhere where there is sufficient space. An electric motor is used to rotate the sails in order to har-

ness the renewable power of the wind and propel the ship. The rotor sails make use of the aerodynamic phenomenon known as the 'Magnus Effect'.

As the cylinder rotates within an airflow, a forward thrust force perpendicular to the apparent wind direction is created, which delivers additional thrust to the vessel. The thrust generated can either provide additional vessel speed or maintain vessel speed by reducing power from the main engine. The obvious benefit from this is less fuel burned and reduced emissions.

## Installation

Wholesale changes to the vessel structure, or drydocking, is not necessary when installing Anemoi technology. The

company's Rotor Sails and all associated equipment are transported to the dockside, ready for installation. Anemoi can manage the installation process and supervise onsite work to provide support throughout the process if required.

Each Rotor Sail is installed in a single crane lift and connected to the foundation on the ship's deck. They can be fitted to the deck in less than a day, once the vessel structural, mechanical and electrical integration work is complete.

Before this takes place, a comprehensive feasibility study will have been completed to determine the optimal size, number and position of the Rotor Sails. This is to maximise performance within the vessel's operational con-

straints and to consider if a deployment system (patented equipment which allows the rotors to be moved on the deck of the ship) is necessary for the vessel.

The vessel integration is crucial to the process and Anemoi supports clients by means of design and installation supervision of the structural foundations and the electrical cabling from the vessel's main switchboard to each Rotor Sail. This stage can be completed during the construction phase of a newbuild vessel, or during a survey at a shipyard in a retrofit project. Once the Rotor Sails are installed and all cables are connected, the company completes final commissioning of the system, and crew training, prior to handover.

## Seamless and targeted automation

The Rotor Sails have a control station located on the bridge. This automatically controls the speed and direction of the Rotor Sails, as well as monitoring the performance and status of the system. The control system is designed to maximise performance and minimise crew input with automated speed and direction setting, equipment monitoring, safety features and performance reporting to stakeholders using ship-to-shore data transmission.

The Anemoi Rotor Sail system comprises the Rotor Sail itself, the foundation, deployment system (if required), wind sensors and electrical, control, and automation systems. The main components of the Rotor Sails are the rotor (the cylindrical, rotating part), the tower, up-

per and lower bearings, and the electrical drive system.

The rotor is built from advanced lightweight composite material and the tower is a steel column structure. We use these materials to ensure maximum performance of our Rotor Sails and to withstand all weather conditions. The lightweight materials that are utilised also means that the systems minimise reduction in cargo carrying capacity.

## Award-winning innovation

In conjunction with Tufton Investment Management Ltd, Anemoi has secured the prestigious 'Wind Propulsion Innovation Award for developers of innovative technology and installations'. TR Lady is a CS Marine design 82,000-dwt Kamsarmax bulker, built in 2017 by Yangzijiang Shipbuild-

ing Group, and managed by Tufton.

Andrew Hampson, CEO of Tufton, commented: "Tufton is committed to investing in greenhouse gas emission reduction technologies including energy-saving devices and deployment of digital and other management tools to reduce maritime greenhouse gas emissions.

"The selection of Anemoi Rotor Sails is representative of Tufton's capability to carefully select from a variety of environmentally friendly technologies to achieve commercial as well as environmental targets. I am pleased to work with Anemoi and look forward to a successful installation with the resulting reduction in emissions."

Anemoi estimates that a 330,000-dwt VLOC with five Anemoi Rotor Sails installed and sailing Tubarao, Qingdao, Tubarao round trip would save the following:

- › Fuel and emission reductions per year – 13%
- › Tonnes of fuel saved per year – 1,667t
- › Tonnes of carbon saved per year – 5,184t

Similarly, an 82,000 Kamsarmax with three Anemoi Rotor Sails installed and sailing New York, Rotterdam, New York round trip would save:

- › Fuel and emission reduction per year – 15.6%
- › Tonnes of fuel saved per year – 909t
- › Tonnes of carbon saved per year – 2,827t

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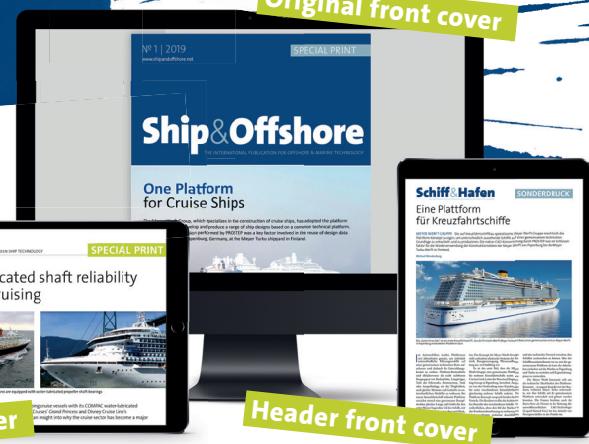
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Your contact: **Martina Hennig**

@ lizenzen@dvmmedia.com | ☎ +49 (0) 40 237 14 139

✉ DVB Media Group GmbH, Heidenkampsweg 73-79, D-20097 Hamburg