Norsepower Rotor Sails are a new solution for the growing need for more sustainable shipping. These rotor sails do not share any similarities with traditional sails you might find on a yacht. Instead, they are a modernised version of the Flettner rotor, which takes advantage of the Magnus effect to generate aerodynamic force and assist in propelling the vessel forward.

A Flettner rotor is a smooth cylinder with disc end plates which is spun around on its long axis. It works to generate aerodynamic force through the effect of the wind. As the wind meets the rotor the airflow accelerates on one side of the rotor sail and decelerates on the opposite side. This change in the speed of airflow creates the Magnus effect which results in a pressure difference. This difference in turn creates a lift force.
perpendicular to the wind flow direction helping to propel the vessel, increasing its fuel efficiency.

**Taking advantage of the Magnus effect**

The Magnus effect can be seen in many sports. For example, in tennis, topspin rotates the ball forward causing the ball to swerve downward; conversely, a slice with backspin causes the ball to lift. Norsepower’s use of the Magnus effect, however, is much more significant with its goal in reducing the shipping industry’s carbon footprint.

**Lightweight composites reviving the Flettner rotor**

The idea of a Flettner rotor on a ship is not new, first being trialled in 1924. The concept was proven viable but back then it took an inefficient amount of energy to turn the 15m tall metal cylinders and was largely discontinued. Today, thanks to the much lower weight of the cylinders due to cutting edge advanced composite materials and technology, Norsepower has revisited this concept, proving successful in reducing fuel costs by 5-30% and CO₂ emissions by the same.

The rotor was produced using Gurit’s environmentally friendly structural PET core, Kerydn™ Green, which is produced using up to 100% recycled materials, as well as PRIME™ 27 epoxy infusion system, Spabond™ 340LV adhesive, and the Ampreg™ 31 epoxy laminating system.

Norsepower’s mission is to reduce the environmental impact of shipping through the commercialisation of innovative and modern sail power. At the time of writing, this technology features on three commercial vessels: a tanker, a cruise ship, and a dry cargo vessel. These three boats have clocked over 45,000 hours combined and show a total fuel saving of over 1,500 tons and reduced CO₂ emissions by over 4,500 tons. This is a fantastic effort and a strong start to reducing the impact of global shipping.

“Our vision is to set the standard in bringing sails back to ocean transportation, and empower shipping towards reaching the goal of zero carbon emission. Our entire team is strongly motivated by our mission to reduce the environmental impact of shipping with our Rotor Sails. The ability to harness the wind as an additional power source is a natural next step for the maritime transport industry as it seeks to remain cost-efficient and meet environmental regulations. We appreciate highly Gurit’s and Comaxel's effort in supporting Norsepower during the last years with the development of the composite rotor, which is the key component in the Rotor Sail system.”

Jarkko Väinämö, COO, Norsepower Oy Ltd

The Norsepower rotor sail lightweight solution has won the 2020 JEC Innovation award in the "Maritime Transportation & Shipbuilding" category. Norsepower, Comaxel and Gurit are proud of this recognition of their successful cooperation and innovative solution to lowering carbon emissions of the maritime transport sector.
How does a Rotor sail work?

When wind conditions are favourable, the Rotor Sails allow the main engines to be throttled back, saving fuel and reducing emissions while providing the power needed to maintain speed and voyage time. A variable electric drive system, which is powered by the ship’s low voltage network, is used for rotating the Rotor Sail.

The Norsepower Rotor Sail technology is around ten times more efficient than a conventional sail, because more lift is produced with a much smaller sail area. Due to its simplicity, it requires no reefing or crew attention when in operation. It is "push-button wind propulsion" from the bridge.

When wind meets the spinning Rotor Sail, the air flow accelerates on one side of the Rotor Sail and decelerates on the opposite side of the Rotor Sail.

The change in the speed of air flow results in a pressure difference, which creates a lift force that is perpendicular to the wind flow direction. The same principle applies to all rotating spheres and cylinders. This can also be observed for example in golf, tennis, or football, where spinning balls curve in flight.

Learn more on youtube:
https://youtu.be/FUCShEXkpL8
“It is great to be involved with this innovative project which provides a commercially viable solution for the shipping industry with tangible fuel savings as well as a significantly reduced environmental impact. Gurit has worked hard to create a range of environmentally friendly materials with properties that respond to our customers’ requirements and it is good to see commitments to our environment growing and spreading across industries.”

Piet Heydorn, Regional Sales Manager, Gurit