

# Stromag 2in1 supports sea-change towards hybrid yachts

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Maritime emissions regulations are tightening, and even pleasure yachts are not immune. Low emissions zones, designed to improve local air quality by limiting the release of Nitrogen Oxide (NOx) from diesel engines, are being introduced globally. Consequently, shipbuilders are moving to hybrid diesel-electric propulsion systems for new yacht designs, which require specialised power transmission solutions.

*When developing the powertrain for a new pleasure yacht, a global supplier of marine propulsion systems selected innovative Stromag 2in1 clutch/coupling combinations to deliver seamless switching between diesel and electric power.*

## Powers combined

Hybrid yachts provide multiple benefits at sea. By moving under electric power while near port, NOx emissions are decreased, helping to improve local air quality. Furthermore, silent running ensures less noise pollution in built-up areas. Hybrid propulsion systems also boost fuel efficiency and range, as well as generating additional power beyond the requirements of the propeller.

To enable these varied modes of operation, a clutch allows seamless switching between diesel and electric power. A flexible coupling is also required, as marine powertrains are resiliently mounted to protect the hull from diesel engine vibrations. Consequently, the movement generated must be damped in the propulsion system to protect equipment.

### **Choosing a shipshape supplier**

An Italian shipbuilder embarked on a project to build multiple new hybrid pleasure yachts. To source a complete drivetrain, the shipbuilder approached a global marine propulsion system OEM. A key aspect of the project was selecting a suitable clutch/coupling combination for installation between the motor and diesel engine.

However, the previous coupling supplier used by the marine propulsion OEM couldn't provide a solution as it sourced its clutches from a third party. This would compromise interoperability, reliability and extend the project timeline. Furthermore, the OEM was not happy with engineering or aftersales support previously provided. To overcome these challenges, it approached Stromag.

### **A marine propulsion expert**

A leading brand of Altra Industrial Motion with exceptional experience providing power transmissions solutions for ships of all shapes and sizes, Stromag was able to deliver. Furthermore, it had a ready-made solution. Its 2in1 combinations of a clutch and flexible coupling are specialised for

marine applications, with a wide range of options available to meet varying powertrain specifications.

Mustafa Metin, Product Specialist for Flexible Couplings at Stromag, continues: “This project was interesting due to the fact that we were involved very early on in the prototyping phase. In fact, we had to propose several 2in1 combinations, as the motor shaft size hadn’t yet been defined by the OEM. They entrusted us to make a suitable selection and sized the motor shaft based on our 2in1.”

### **Navigating clutch/coupling specification**

The compact 2in1 developed for the yacht is a combination of a PVN 43631 flexible coupling with a MWU 240-600 electromagnetic clutch. PVN couplings are ideal for dampening the torsional vibrations of diesel engines due to elastomer construction, while the MWU is designed specifically for switching power sources in hybrid applications.

In operation, the yacht initially runs on electric power. When switchover to combustion power is required, the control system matches the speed of the diesel engine with the motor. Once synchronised, the MWU carries out a smooth engagement and changeover. This ensures no drop in cruising speed when switching between power sources. With the engagement of the 588 kW diesel engine, the motor can now be used as a generator to provide additional onboard power.

To ensure the correct torsional rigidity for the flexible coupling, Stromag carried out a comprehensive torsional vibration analysis (TVA). Engineers assessed loads and vibrations throughout the powertrain to help eliminate any risks of mechanical resonance. Looking at excitation curves, Stromag ensured that the vibrational frequencies of different powertrain elements were separated from each other. Consequently, in all operating conditions, whether under engine or motor power, and even during misfiring, the PVN has the desired rigidity to protect the powertrain from potentially damaging resonances.

### **Seaworthy solutions**

With its clutch and coupling design and manufacturing expertise, Stromag was able to deliver a complete solution for the new yacht design within the project deadline. Experience developing solutions for marine hybrid powertrains ensured instant familiarity with application requirements too. Furthermore, its global presence means that it can provide responsive engineering and aftersales support – key advantages for the customer.

Mustafa concludes: “The 2in1 is a perfect fit for this application, backed by our extensive engineering analysis of all aspects of the propulsion system. Our ability to offer a combined clutch/coupling combination from a single source is unique and a big advantage for shipbuilders implementing hybrid drives in new yacht designs. The customer definitely thinks so - we’re currently undertaking an additional 2in1 powertrain project for another line for luxury yachts.”

**Image captions:**

**Image 1:** Hybrid yachts provide multiple benefits at sea. By moving under electric power while near port, NOx emissions are decreased, helping to improve local air quality.



**Image 2:** The compact 2in1 developed for the yacht is a combination of a PVN 43631 flexible coupling with a MWU 240-600 electromagnetic clutch.

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## About Stromag

Founded in 1932, Stromag has grown to become a globally recognized leader in the development and manufacture of innovative power transmission components for industrial drivetrain applications. Stromag engineers utilize the latest design technologies and materials to provide creative, energy-efficient solutions that meet their customer's most challenging requirements.

Stromag's extensive product range includes flexible couplings, disc brakes, limit switches, an array of hydraulically, pneumatically, and electrically actuated brakes, and a complete line of electric, hydraulic and pneumatic clutches.

Stromag engineered solutions improve drivetrain performance in a variety of key markets including energy, off-highway, metals, marine, transportation, printing, textiles, and material handling on applications such as wind turbines, conveyor systems, rolling mills, agriculture and construction machinery, municipal vehicles, forklifts, cranes, presses, deck winches, diesel engines, gensets and stage machinery.

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