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“One notable reason that the offshore marine sector has come to appreciate the Volvo Penta IPS is its enhanced operational safety and its ability to operate in higher sea states.”

▸ Tell us about the collaboration between Volvo Penta, MHO-Co, and Danfoss Drives. How did it come about?

The collaboration between the three companies started with our desire to validate new hybrid propulsion drivelines for our Volvo Penta Inboard Performance System (Volvo Penta IPS).

As a company deeply embedded in the future of propulsion design, we saw the need for hybrid solutions and sought a partner with expertise in electric machines and control systems. This led to our initial collaboration with Danfoss Drives. Danfoss brings invaluable knowledge in electric machines and energy management, which goes hand-in-hand with our experience of propulsion systems and marine gensets.

The next step was partnering with the right operator and vessel, which is where MHO-Co comes in — they are the perfect fit for this collaboration. The company is open to innovation and has the ideal vessels for hybrid technology. The partnership started in 2021 and has since evolved, leading to the successful launch of the MHO-Balder and MHO-Boreas this year. The two vessels showcase a fully integrated hybrid system that sets a new standard for marine efficiency and innovation.

▸ What makes the new CTVs — the Boreas and the Balder — the next step in electric mobility?

The MHO-Boreas and MHO-Balder represent a significant leap in electromobility. They are serial hybrid vessels, which means that, unlike traditionally powered vessels, there is no direct diesel propulsion. Instead, the propulsion is electric with the electric power coming from multiple sources.

They utilize a combination of battery power and marine gensets, which allow the vessels to switch between power sources depending on operational needs. The ability to run

only the necessary number of gensets helps to optimize fuel consumption.

As you know, CTVs operate in challenging environments, having to maintain steady positions in often rough seas and high winds. This means they require advanced propulsion systems that offer precise maneuverability and adaptable power based on whether they are travelling at high-speed for long distances or low speed whilst positioning alongside a turbine or platform. A serial hybrid system is ideal for a CTV.

▸ What involvement did Danfoss have with the design and construction of these vessels?

We worked hand-in-hand with Danfoss to develop a fully integrated hybrid propulsion system. Danfoss was responsible for providing key components such as the DC-grid and the energy management system — essential for controlling the energy flow around the vessels. Their expertise in electric machines and control systems was instrumental in integrating the electric system with our Volvo Penta IPS. This collaboration means that the MHO-Co vessels can operate with maximum efficiency, flexibility, and reliability whilst being adaptable to future marine power advancements.

▸ How does Volvo Penta IPS function? How does it work?

Volvo Penta IPS is a sophisticated propulsion technology that is designed to enhance maneuverability and efficiency. At its core, the technology features twin forward-facing counter-rotating propellers, which are mounted at the aft of a vessel, beneath the hull. This pushes water directly backwards, creating a powerful thrust and reduced torque, leading to smoother operation. The counter-rotating action also contributes to more precise and controlled maneuverability as the technology can efficiently direct thrust in multiple



The MHO-Boreas and MHO-Balder represent a significant leap in electromobility. (Courtesy: MHO-Co)

directions, including sideways. This advanced capability enables vessels to move sideways and perform precise maneuvers. Volvo Penta IPS technology ultimately leads to a more responsive, agile, and efficient vessel that allows for tight turns, improved docking and precise positioning, all critical in offshore operations.

▣ **Is that what makes it unique or are there more elements that make it that?**

It's a standout technology due to the unique combination of features that blend excellent propulsion efficiency with exceptional maneuverability. It's distinguished by its ability to integrate these two critical requirements into a single system. Unlike other systems on the market that may excel in one or the other, Volvo Penta achieves both, making it a unique, versatile and operationally excellent choice for CTVs.

▣ **What gives the Volvo Penta IPS the ability to offer energy consumption levels below that of a traditional drive train?**

There are several factors that contribute to its propulsion efficiency. For one, the forward-facing counter-rotating propellers reduce drag and enhance thrust, which directly translates to lower energy consumption vs. the traditional propeller setup. The hydrodynamic shape of the complete Volvo Penta IPS also plays a critical role, reducing resistance and drag in the water. In diesel applications, the exhaust system is integrated within the drive leg. Overall, we designed the Volvo Penta IPS with efficiency in mind.

▣ **Can you describe your power-of-plenty model?**

It's essentially an advanced approach to optimizing power

usage and redundancy. The philosophy revolves around an intelligent energy management system, making sure only the necessary number of generators are active at any given time, running at energy efficient load points. The generators not needed are off and thereby saving running hours. The gensets onboard are variable-speed since the high-voltage grid is DC.

There's also a battery bank that stores energy for propulsion and onboard systems during low-energy-demand periods. The vessels can operate in fully electric mode for short durations using stored energy.

During nighttime, hotel loads can run on stored energy in the battery banks, thus providing a silent vessel.

▣ **Is there anything else you would like to add that we didn't talk about?**

One notable reason that the offshore marine sector has come to appreciate the Volvo Penta IPS is its enhanced operational safety and its ability to operate in higher sea states. Unlike waterjets, which can experience thrust breakdowns when big waves pass, Volvo Penta IPS propellers are deeper in the water and thrust breakdowns are less likely. The Volvo Penta IPS uses its thrust for precise steering, which is available also at zero speed through the water, reducing the risk of accidents, particularly when pushing on a wind turbine. CTV operators rely on dependable and efficient systems to perform critical support roles.

Overall, the Volvo Penta IPS is the ideal solution for this ever-growing industry. ✌

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