Enabling the next step in offshore wind

FLOATING OFFSHORE WIND SUPPORT VESSEL CONCEPT

DAMEN
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Laying the foundation

Introducing the FLOW-SV Concept

Anticipating upcoming large scale floating windfarm installation, Damen has developed the FLOW-SV concept that can accelerate the development of this new maritime segment. The Damen FLOW-SV is specially designed to install ground tackles for offshore turbine floaters. The vessel can load the immense lengths of chain needed to install and secure nine anchors or suction piles. Instead of mooring one floating windmill in a mission, three can be secured. It also applies sufficient proof loading on the anchors in order to make the installation more efficient.

Reason to develop this concept

Given the size of the turbines and the depths of the water in which they will be positioned, these FOWT's (Floating Offshore Wind Turbines) will require chains and anchors of unprecedented sizes. Even just one installation starting to drag an anchor could have serious impact on the output of an entire wind farm. The anchoring systems must leave nothing to chance. While anchoring technologies will remain much the same, the vessels required will need to be much bigger than today's anchor handling vessels. And given the projected demand for their services, they will also have to be exceptionally efficient.

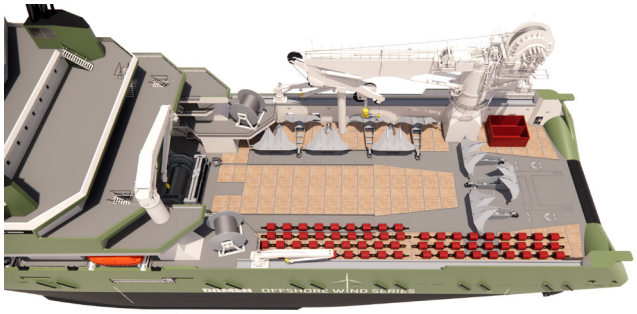
Let's accelerate the the energy transition together!

Analysis of planned installation of Floating Offshore Wind Turbines indicates that this new type of installation vessel is needed. Large anchor handling vessels available today have limited carrying capacity and are booked in other maritime operations. Planned windfarm installation would require some 100 vessels of the FLOW-SV type. That is why Damen started the development of FLOW-SV with valuable input from industry experts like Temporary Works Design (TWD), First Marine Solutions (FMS) and Intermoor. Knowledge about critical mission equipment specifications was provided by Kongsberg and McGregor.

Wijtze van der Leij
Sales Manager
Offshore Wind

"Rapid growth in the offshore wind turbine sector is just around the corner. At Damen we are working hard on solutions that will support that growth in both economical and sustainable ways."

- Unique installation method
- Combination of bollard- and which pull
- 2x ROV with moonpool
- Proof loads up to approx. 1000 tonnes without use of a tensioner
- IMO Tier III and prepared for methanol



Unique installation method

A unique feature of the FLOW-SV is the combination of bollard pull generated by the thrusters and added pulling force from the bow reaction anchor winch. This adds up to 1000 tons of proof load. The FLOW-SV deploys the bow anchor and embeds it by reversed bollard pull. She then moves to the spot where the anchor for the floater needs to be installed. After letting out enough chain length, the anchor for the floater needs to be proof loaded, ensuring a secure seabed connection.

More capacity for more efficiency

Measuring approximately 150 metres in length and a 32-metre beam, the FLOW-SV is a big ship. The size and weight of anchors and chains needed for installing offshore floating wind turbines are so big that a larger vessel is needed than any anchor handling vessel before. As the FLOW-SV will be able to take all the materials and equipment needed to install three floaters, the vessel saves time on transits and loading.

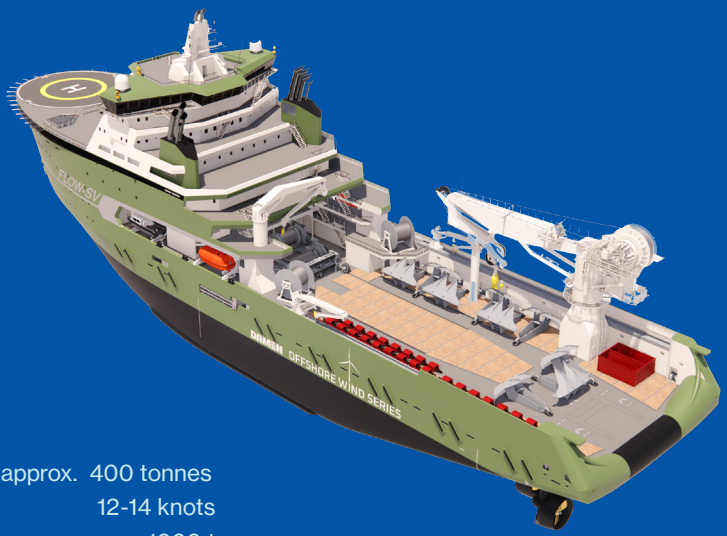
FLOW-SV 400 Concept

The FLOW-SV covers the whole process of attaching mooring lines. This vessel, combining the supply, installation, securing and inspection of the ground tackles for floating turbines in one vessel, introduces a big step forward towards large scale installation of floating windfarms. The concept reflects our expertise in operational demands and efficiency.

400
Bollard pull approx. (t)

150
Length approx. (m)

1000
Max. proof load approx. (t)

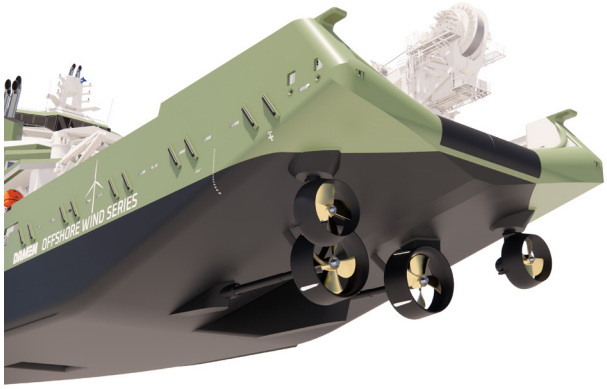


DIMENSIONS

Length	150 metres
Beam	32 metres
Depth at sides	12 metres
Aft working deck	1585 m²
Forward working deck	400 m²
Accomodation	90 persons

PERFORMANCE

Bollard pull ahead approx.	400 tonnes
Speed	12-14 knots
Max. proof load approx.	1000 t



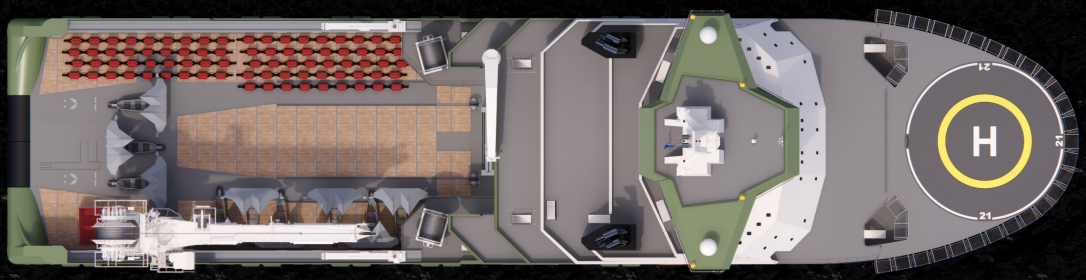
Optimized propulsion layout

Two fixed propellers in nozzles and two azimuthing thrusters at the stern propel the FLOW-SV and provide forward bollard pull. These propellers in nozzles can turn 180 degrees to provide ample reverse bollard pull when the bow anchor is set. The azimuthing thrusters are also engaged for dynamic positioning, together with the retractable azimuthing thruster and tunnel thrusters in the bow section of the vessel.

Future forward thinking

The FLOW-SV complies with IMO tier III today and is ready to be powered by methanol tomorrow. Tanks and piping are in place according to safety regulations for this future fuel. The vessel can even be upgraded with a hybrid battery pack.

Partner with Damen to turn the concept of the FLOW-SV into reality and spearhead the clean energy transition of tomorrow together!



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