VOITH

Voith Schneider Propeller in Offshore Construction Vessels

Case Study

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North Sea Giant builds foundation for Voith marine tidal current turbine

Advantages of the Voith Schneider Propeller:

+ Reliable and safe
+ Maximum maneuverability
+ Suitable for different power classes
+ Versatile use for offshore supply vessels and workboats

The North Sea Giant is the largest and most powerful vessel using Voith Schneider Propellers (VSP) as the main propulsion system. On this offshore construction vessel (OCV) with a length of 161 meters and a width of 30 meters, a total of five of these propulsion systems ensure safe working conditions out at sea – even in adverse weather. Norwegian operator North Sea Shipping AS uses his state-of-the-art heavy cargo vessel for subsea construction work.

Offshore construction vessels are multi-purpose offshore vessels, used particularly by the oil and gas industry. They are at home on all oceans of the world and are equipped for long-term operation out at sea. OCVs are used for the installation of ever-bigger platforms and extraction units as well as for pipe laying. Another area of application is the construction of foundations; the most recent example being the installation of a Voith marine tidal current turbine off the Scottish Orkney Islands.

Monopile with a diameter of 2 meters drilled into the seabed

A 200 ton turbine with a blade diameter of initially 13 and later 16 meters was to be anchored safely to the seabed. To do this, a monopile with a length of just under 24 meters and a diameter of 2 meters was drilled into the rocky seabed 11 meters below sea level. It will be used as a foundation for the one-megawatt Voith marine tidal current turbine for the duration of a two-year trial operation. The electricity produced by the trial turbine with its 13 meter rotor will be feeded into the public grid of the Orkney Islands.

To build the foundation, the North Sea Giant was used. This giant vessel is propelled by five Voith Schneider Propellers, three of which are in the stern and two in the bow of the vessel. Each of these propulsion systems has a capacity of 3 800 kW (= 5 160 hp).

1 The North Sea Giant out at sea.

2 Clearly visible on the working deck: one of the two cranes with lifting capacities of 400 and 50 tons.

The sophisticated equipment, the high load carrying capacity of the vessel of 14200 tons as well as two cranes with lifting capacities of 400 and 50 tons make the North Sea Giant stand out. During this operation, the Voith Schneider Propellers proved once again, that they are the propulsion technology of choice whenever installation work must be carried out under adverse conditions at sea. Their fast and precise control allows the vessel to safely and accurately maintain its position. These supreme characteristics are achieved by means of a redundant dynamic positioning system (DP3) as well as by the Voith Roll Stabilization (VRS). It reduces the rolling motion of the vessel in rough seas.

Accommodation for up to 199 crew members

The maximum speed of this OCV is 16 knots which corresponds to well over 18 miles per hour. North Sea Giant can accommodate 120 crew members and has the potential to increase accommodation capacity to 199 individuals. Such equipment and space capacities are required as the search for new oil and gas fields extends more and more into the open sea and into ever increasing depths.

North Sea Giant has been in service since early June. Platforms and extraction units are being installed and serviced in water depths of up to 3000 meters, cables and pipelines are being laid, excavation work is being carried out and remotely operated vehicles are being supported. To carry out these tasks, the OCV is not only equipped with the two cranes with heave compensation but also features a 2900 square meter outer deck and a helipad. The latter permits the delivery of supplies for vessel and crew while out at sea.

Over 85 years ago, a new vessel propulsion system, the only one of its kind in the world was developed by Voith from an idea by the Austrian engineer Ernst Schneider. It allows thrust of any magnitude to be generated in any direction quickly, precisely and in a continuously variable manner. It combines propulsion and steering in a single unit. On the Voith Schneider Propeller, a rotor casing which ends flush with the vessel‘s bottom is fitted with a number of axially parallel blades and rotates around a vertical axis. To generate thrust, each of the propeller blades performs an oscillating motion around its own axis. This is superimposed on the uniform rotary motion. Blade excursion determines the amount of thrust, while the phase angle of between 0° and 360° determines its direction.

Further information on the North Sea Giant can be found in the video (6.25 min) of the owner North Sea Shipping.

Voith Turbo, the specialist for hydrodynamic drive, coupling and braking systems for road, rail and industrial applications, as well as for ship propulsion systems, is a Group Division of Voith GmbH.

Voith sets standards in the markets energy, oil & gas, paper, raw materials and transportation & automotive. Founded in 1867, Voith employs more than 40 000 people, generates € 5.6 billion in sales, operates in over 50 countries around the world and is today one of the biggest family-owned companies in Europe.

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