BigLift's Happy River loading a 179 mt transition piece

Ocean transportation of wind farm equipment

Long standing heavy lift specialist company BigLift Shipping, member of the Netherlands-based Spliethoff Group, is more and more engaged with developments in the renewable energy markets in Europe, and also in the US and Asia. Where wind turbines used to be relatively small, new generation turbine parts, particularly monopiles, are now so heavy and large that a state-of-the art heavy lift vessel is required for their transportation.

Loading of the bottom section of the tower structure of a Hywind wind turbine

BigLift has a track record when it comes to the transportation of wind-turbine related cargo, such as monopiles, transition pieces, jackets, nacelles, and wind blades.

The new generation wind turbine is increasing in size and weight and brings with it a growing need for heavy lift vessels to transport the, also, growing turbine-pieces. BigLift's Happy S-types and MC-Class Heavy transport vessels – the latter added to the BigLift fleet in January – are eminently suitable for such cargoes.

Nacelles and tower sections for Merkur wind farm

Starting in 2017, BigLift has made eight voyages for the construction-ready Merkur wind farm, located approximately 45 km north of the island of Borkum, Germany, in the North Sea. The wind farm will consist of 66 wind turbines and once complete will generate approximately 1,750 GWh annually, enough clean energy to power around 500,000 homes.

In 2017, heavy-lift vessel mv Happy Sky took the main part of the voyages for our client GE Wind, with four shipments of nacelles and two shipments of tower sections.

In total 24 nacelles, weighing 400mt a piece, where shipped in four voyages from Montoir, France, to Eemshaven, the Netherlands. All pieces were loaded in single lift operations, with either of the two 900mt heavy lift mast cranes on board the vessel, making use of a specially developed lifting frame, supplied by the client. Happy Sky's lifting curves range from 1,800mt at 21 metres, 1,600mt at 25 metres to 1,000mt at 32 metres, with a lifting height of 41 metres above the main deck.

Additionally, Happy Sky transported a total of 21 tower sections from Cuxhaven, Germany, to Eemshaven in two voyages. The tower sections have a diameter of six metres and vary in length and size – the smallest was 30.7 metres long, weighing 100mt, the largest was 35.8 metres, weighing 165mt The first shipment consisted of twelve tower sections, the remaining nine went in the next voyage.

Early 2018, BigLift's mv Happy River transported an additional twelve tower sections from Cuxhaven to Eemshaven. At the time of writing this article mv Happy Dover is on her way to Eemshaven from Taicang, China, carrying a further sixteen tower sections. More shipments for the same project are in the pipeline.

Transition pieces for East Anglia ONE wind farm

Last February, mv Happy River transported twelve 179mt transition pieces for the East Anglia ONE Wind farm, for client Lamprell Energy Ltd. The wind farm will be located approximately 43 km off the Suffolk Coast, in the southern part of the North Sea, UK. The project is part of the larger East Anglia Offshore Wind Zone, where 7.2GW of renewable power capacity is scheduled to be installed, in an area of 6,000km^2 off the coast of East Anglia.

The onshore construction works of East Anglia ONE started early in 2017 and were followed by the offshore construction works in 2018. The wind farm is anticipated to generate first power in 2019 and be fully operational by 2020.

Particular challenges in this shipment were the tight stowage of the twelve transition pieces in the hold and on deck of the vessel and the very detailed and complicated compliance to strict offshore requirements, as had been set out in the latest DNVGL-ST-N001 Marine Operations standards.

Upper sections for Hywind Pilot Park

BigLift Shipping has executed three voyages for the Hywind Pilot Park – which is a unique, floating offshore wind project off Peterhead, Scotland, developed by Statoil.

Hywind Pilot Park is the world's first floating wind farm and has a capacity of 30 MW. As a pilot project, five enormous wind turbines were installed to provide power for some 20,000 households from the end of 2017. After six years of testing a prototype in the North Sea in Norway, this was the next step.

The very large wind turbines, with blades of 75 metres, are not resting on the seafloor, but float by way of a buoyancy section below the surface, which is kept in place by an anchoring system. In this way, they can be positioned in much deeper waters.

BigLift was responsible for the transportation of the upper sections of the five wind turbines from Bilbao in Spain to Stord in Norway. The sections were taken in three shipments by BigLift's Tra-type vessels.

The cargo comprised five top sections of 191.4mt, which were 41.5m long; five upper middle sections of 184.1mt, at 22.14m long, five lower middle sections of 203.3mt which were 16.6m long and the bottom sections which weighed 150mt, and were shaped like a giant washer of 13.5 x12.5 x 8.6 metres.

At Stord, the tower sections were discharged by the vessel's cranes. From there, Mammoet took over and assembled the wind turbines on shore. Then these sections were picked off the quay by the crane vessel Saipem 7000 which 'mated' the wind turbines with their underwater sections further out in the bay. By that time the total height of the turbines' construction was 162 metres!

After the mating process, each wind turbine was towed on its own buoyancy to its ultimate mooring place, 25 km off Peterhead.

Happy S-type vessels

The Happy S-type vessels are equipped with two heavy lift mast cranes of 900mt, which can be combined to achieve a lifting capacity of 1,800mt The forward position of the S-type's superstructure means that the vessels have a single, large cargo hold and a wide, open deck area. The S-type vessels have a notation for open sailing, which provides flexibility for large and high cargoes, such as container cranes and unloaders, but also transition pieces. Furthermore, the vessels also have Finnish Ice Class notation 1A.

A key factor in the safe and reliable operations of these super heavy lifters is that the design allows cargo operations to be performed without the use of stability pontoons during the lifting operation.

BigLift's Happy River loading transition pieces

BigLift's Happy Sky loading nacelles for Merkur wind farm

'BigLift Shipping offers a suitable vessel for every project.'

BigLift's Happy Sky loading nacelles for Merkur wind farm

Additionally, in response to requests from the market, the vessels' cranes have been built for unmatched lifting height and outreach, offering superior lifting capabilities. The cranes on both vessels have already been prepared for the mounting of a flyjib, which extends lifting height and outreach even further.

MC-Class vessels

The Heavy Transport vessels BigLift Barentsz and BigLift Baffin are two identical, state of the art Module Carriers. With their 125 x 42 metre deck they offer capabilities for ro-ro cargoes up to about 16.000mt a piece. The deck is completely flush, without any air heads or overflow pipes and the high ballast capacity significantly reduces the loading and discharging times of the vessel.

Their slender bow shape and PSMR Class notation have proved to be greatly advantageous by ensuring excellent service speed due to low resistance and less wave impacts. This makes for shorter transit times and greater reliability. Also, the bow shape leads to lower accelerations in longitudinal direction and, because of the redundancy in machinery, heading control can be applied to reduce design accelerations.

The vessels have Finnish 1A Ice class and are prepared for dynamic positioning, which provides unique opportunities for offshore transportation and installation services.

BigLift Shipping

BigLift Shipping, member of Spliethoff Group, is a world leading heavy lift shipping company with a history dating back to 1973. BigLift's fleet consists of 14 modern heavy lift vessels with lifting capacities up to 1,800mt, and two state-of-the-art Heavy Module Carriers, the so-called MC-Class vessels, which with their large 125 x 42 metre deck increase BigLift's shipping capabilities for ro-ro cargoes up to about 16.000mt a piece.

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