



A surge towards large floating cranes

Suddenly the news is spreading. The installation market is developing so fast that large floating cranes seem to be the answer to the ever-increasing turbine size in the wind industry. Jack-ups have long been the installation vessel of choice in the offshore wind industry; however we are now seeing various contractors using large offshore floating cranes.

Will Conquest Offshore 1400 crane barge follow them into the deep waters or stay within the very shallow waters?

Offshore Wind

Renewable energy is becoming more and more important to the global energy market. Within this renewable market, the offshore wind industry is turning into a significant factor and has been experiencing a rapid growth spurt over the last few years.

As turbines get bigger and heavier and foundations get wider and wider, the

jack-ups probably won't be able to provide the solution. At least that seems to be the idea. It looks like the installation market will move from jack-ups to floating assets and DEME's Orion and Boskalis F-3000 new builds are well underway.

Crane size and capacity

Who would have thought that it would get this big, this fast? What seemed impossible a few years ago has exceeded all expectations. At the moment the foundations are installed mostly by jack-ups or floating vessels. The jack-ups have been challenging each other as the

setups increase in size. But what if the foundations become even bigger than the 1500 ton for an XXL monopile, what if we have a 12 megawatt or an even bigger turbine? As offshore wind farms move to deeper waters and foundations grow exponentially, floating installation vessels could become the more efficient and cost effective solution in the future.

Conquest MB1

What is Conquest MB1's part in this future? It has a reliable 136 x 36 x 8 m crane barge with a 1400 ton crane, 60 pob, 8 anchor mooring spread, 20 ton per m2 and a huge 3500m2 deck space. Conquest is a proven tool in the offshore industry. Derrick barges or crane barges have been around for decades and were developed in the mid-20th century. Then came Heerema and its competitors created large semi-submersibles with massive cranes, which have dominated the scene ever since. However these have not yet been used extensively for offshore wind.

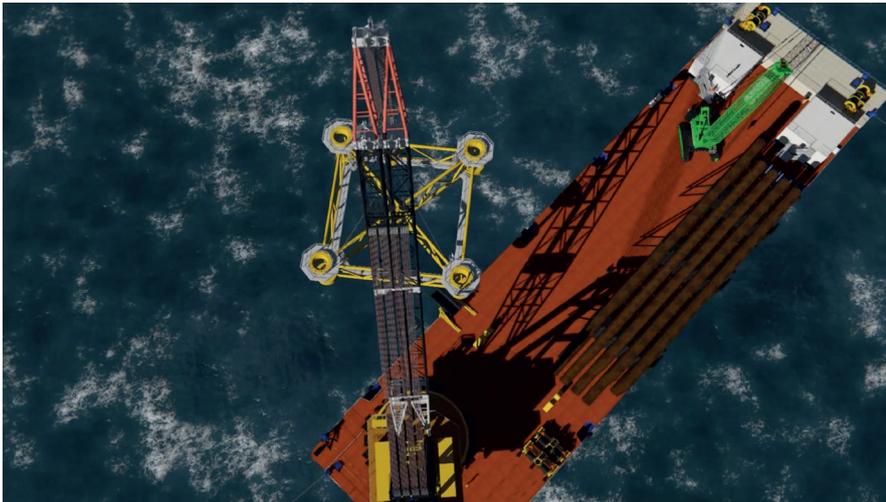
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Conquest Offshore’s track record

Conquest has a track record in civil construction, salvage and wreck-removal. It gained international exposure by successfully playing a key role in the salvage operation of the Italian cruise ship, Costa Concordia, off the Tuscany coast, near the island of Giglio, Italy. Large containers or sponsons, approximately 45m high and 800 tons, were installed on the side of the Costa Concordia for re-floating operations. The key factor in the installation was the shallow draft of less than 3m, the large deck space and the lifting capacity.

Conquest Offshore’s MB-1 heavy lift barge was also the key asset in the largest wreck removal recorded in 2016. The Troll Solution jack-up, weighing approximately 7,000 tons, experienced a





debilitating accident while carrying out maintenance work on the wellhead platform, CAAN-A in 2015, Mexico. The Troll Solution collapsed and sank into the seabed, where the water depth was approximately 30m. After sinking, the Troll Solution came to rest within two meters of the active platform.

The operation used a guided guillotine to dismember the jack-up, instead of cutting, which is a more conventional method. The 6 pieces that made up the deck house and the 31 pieces from the vessel's hull were lifted from the seabed with a non-traditional hoisting technology: a 1000 ton hydraulic salvage grab.

Conquest and Offshore wind

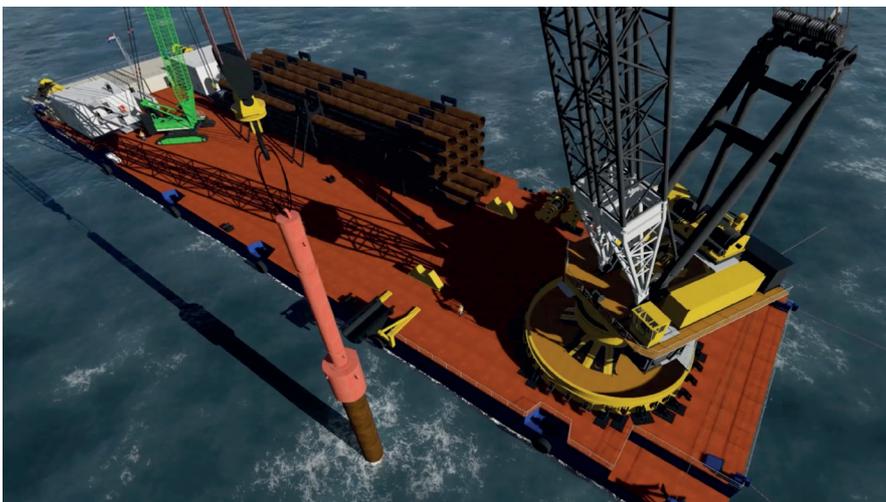
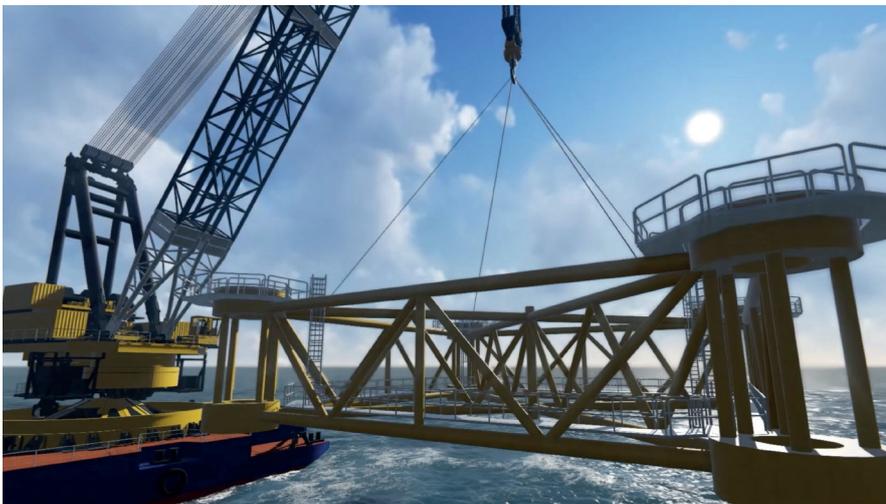
Can the barge follow into the deeper waters, with the larger structures and increasing capacity, or must it stay in the shallower water niche, with smaller structures and just enough capacity, or can it service in both deep and shallow waters. Each of these needs a specific approach and dedicated engineering.

Monopile and transition piece installation

In 2015 Conquest Offshore presented an advanced system for monopile and transition piece installation for offshore wind. The barge is capable of working with 3 monopiles, and 3 transition Pieces, or up to 16 transition Pieces in each shipment. Upending can be done on deck, with an upending tool or the monopiles could be transported and upended floating during these operations.

The challenge is working with wave and swell motion during the floating installation of the MP's, as you work from a floating barge. The specially designed motion compensated pile gripper (MCPG) is the key to the success. While hammering the pile, the gripper's hydraulic cylinders actively compensate the surge, sway and heave motions of the barge to ensure the vertical installation of the MP's within set limits.

However, monopile sizes are growing fast and exceed the 1000 tons capacity window of Conquest, especially when adding the Dynamic Amplification Factors (DAF). The future for Conquest's MB1 monopile and transition piece installation points towards very shallow water. There are a few offshore wind locations, either in the planning early development, where water depth is very





limited. Conquest MB1 is the perfect tool for this line of work and can become the most efficient and cost effective solution for very shallow water.

Deeper waters

A large part of the foundations of offshore wind turbines are monopiles, which are large diameter steel pipes and the jackets, which are smaller. Both jackets and XXL monopiles compete with each other in deeper waters.

Which one will win? Each have their own benefits, both can bear the amount of weight and stress exerted upon them. The other solutions loom in their slipstream: such as gravity base foundations or floating turbines in the deeper water.

Deeper water jackets (30-60m) and pre-piling

The maximum depth for a finished project is about 45m. Beatrice is an example of this. Other projects in the planning pipeline that use jackets are going towards water depths of up to 60-70m, but we have to wait and see when this will materialise.

A jacket might be the answer for the deeper offshore wind farm locations.

Jackets are able to cover water depths up to 60m or more, in most cases. Great, though who will be providing the service of pre-piling? Jack-ups aren't able to cover these areas and the large installation vessels are too expensive for the piling job.

Pre-piling

The Conquest barge is similar to Boskalis' new Giant 7 barge, which was involved in pre-piling operations on the Wikingier offshore windfarm in the Baltic waters of Germany during 2016. Of course there are a few differences: the crane is 1000 ton, with a 600t hook and is placed mid starboard side, in contrast to Conquest's portside aft location. But in general, the Conquest barge can perform similar pre-piling operations to those performed by Giant 7 in Wikingier.

During pre-piling, subsea templates are used to ensure the correct positions of the piles, including the angle. Both weights of the template and the pin piles are well within the main crane's 1400 ton capacity. Once the piles are inserted into the seabed, the jacket is lowered and fitted into the piles.

There are a few advantages to pre-piling as (source: 4COffshore):

- Pile sleeves and mud mats are eliminated on the jacket
- Piles can be installed well in advance of the jacket and wind turbine generator installation
- Fabrication of jacket can be conducted in parallel with piling operations
- Seabed variations can be levelled by varying pile stick-up

- Seabed levelling

Cost effective solution

The Conquest barge can be the ideal cost effective solution for floating piling operations. And while the offshore wind industry is screaming for cost effective and innovative solutions for optimising the installation process, this floating installation concept is ready to launch. Additionally, the floating installation concept is completely independent of the soil conditions and water depth. Conquest MB1, a proven method, added with the right innovative solutions, could be the ultimate cost effective tool.

Close cooperation and service

As the offshore wind sector is expanding at a fast pace and wind farms of increasing proportions will be installed over the coming decades, Conquest Offshore supports the growth of its customers by delivering a combination of reliable equipment and innovative solutions, together with the 'can do' mentality of a dedicated workforce.

Through the integrated and pro-active approach, Conquest provides an efficient and cost-effective service based on a proven track record. Added value and maximum utilisation of the equipment is ensured, by working closely together with customers and all others involved, while controlling risk during the project and beyond.

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