



Bigger and bigger wind turbine installation cranes: what next?

For a long time we at PES have been saying that components in the wind industry are getting bigger and bigger and obviously this includes the tools of the trade. How much more increase can there be in size and how does this affect the weight?



Crane nacelle installation

Huisman from the beginning

Before looking at the developments in the wind industry, let's take a closer look at Huisman, one of the manufacturers of offshore wind tools and cranes, and start at the beginning. Huisman, founded in 1929 and was originally a construction company for steel structures and derricks.

In 1987 Huisman joined forces with engineering company ITREC to develop steel construction projects entirely under its own management. In 1983, during the early ITREC days, the mast crane concept was developed: a compact and innovative crane design for heavy offshore lifts: the Heavy Lift Mast Crane. Another important development from the early days is Active Heave compensation. Currently, this system is also delivered in an electric version, with frequency controlled motors. Unlike in the second half of the eighties, when everyone considered 300m water depth to be extremely deep, indeed nowadays, we consider this to be shallow water. With innovation being at the heart of the company, Huisman kept on developing crane designs towards the foreseen future applications, in deeper water. Good examples are the newly designed Hybrid Boom Crane, which won the OSJ innovation of the Year Award in 2015 and the set of two 10,000mt cranes which are currently under construction for Heerema's

Sleipnir, the world's largest to date.

Building on the successful operation of the existing Huisman cranes, for the installation of offshore wind turbines, such as the crane on board the Rambiz, the company introduced a range of cranes and tools tailored toward wind turbine installation and maintenance. These cranes and tools are a result of many years of research, design and operational experience, based on the company's determination to design and deliver new solutions, which add value to the market's existing technologies.

In addition to cranes, Huisman entered the market for Pipelay systems in 1996, with a Rigid-lay system for the Acergy Falcon. This was the take-off for an impressive number of Flex-lay, S-lay, J-lay and Reel-lay systems and combinations of these: Multi-lay systems.

Huisman has delivered many different pipelay systems over the years, with the most complicated of these being in 2012, a Multi-lay tower combining an 800mt Reel-lay, including 3,000mt portable reels and a 2,000mt J-lay System. The offshore drilling market followed in 1998.

Today, the company is known for its advanced and pioneering pipelay solutions and its ground-breaking Multi-Purpose Tower (MPT). In 2012 the Huisman MPT received the Dutch Maritime Innovation

Award. The design of the MPT has been further developed, resulting in the full scale, 90m high, 1,630mt rated load, full robotics, test tower located at the quayside of Huisman Schiedam and capable of handling 180ft stands and 150ft risers. Any and all newly developed drilling technology is thoroughly tested on this test tower, also known as the Huisman Innovation Tower (HIT).

Since the turn of the century Huisman has grown into a major provider of pace changing technical solutions to the world's leading companies in the oil & gas, renewables, leisure and civil industries. With innovation, product development, quality, reliability, safety and sustainable growth as key company values, the company continuously searches for technical solutions to improve efficiency, safety and to also diminish any negative impact on the environment.

The present and looking forwards

Recently, Huisman delivered the world's largest Leg Encircling Crane to one of its clients. With the installation of the crane on this vessel it now has the strongest crane on a jack-up vessel ever built. The crane is capable of lifting 1600ton and was ordered to keep up with the increasing dimensions of offshore wind turbines.

Huisman's design philosophy is to minimise



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Foldable Offshore Crane nacelle installation side view

the crane's impact on a jack-up vessel. One of the most important issues with a jack-up vessel is the jacking capacity and the maximum allowable load on the legs. In order to get the maximum deck load available, attention is given to some severe weight reduction. This ensured that the existing 900mt crane could be taken off and replaced by a lightweight Huisman 1600t crane, with only a minor weight increase to the vessel.

Cees van Veluw, Huisman's Product Manager Cranes: 'In our engineering process, we pay a lot of attention to weight control. All steel and components we put into the crane must be as lightweight as possible. As the total weight is important, we sometimes need to actually spend money to reduce the crane's weight. Like Colin Chapman from Lotus says, we add some 'lightness' to the crane.'

Being in the renewables sector, a lot of attention is paid to the energy consumption of the crane as well. These cranes are always equipped with full electric drive systems. This type of drive system uses variable frequency drives, thus enabling much better energy efficiency for the total crane.

During lifting operations, the crane is on stand-by for a long period and the actual time that the crane is fully functional is

relatively short. A crane, with a traditional electro-hydraulic drive system, typically consumes quite a substantial amount of power just to keep the crane on stand-by. This stand-by power consumption is brought back to a minimum level by using a full electric variable frequency drive system.

Additionally, the full electric drive system ensures a very high accuracy during operations. As these full electric drive systems have direct control on the winch motor, instead of on some non-direct valves that come with hydraulic systems, the control of the hook is much more direct, which is very useful when positioning the objects that need to be installed with the wind turbine.

The slew bearing of the crane was produced in-house. The Huisman segmented slew bearing design, developed in 2007, means the issue of the vessel's flexibility to the loads in the slew bearing has been resolved. This leads to a much longer lifetime of the slew bearing, compared to traditional designs. While this crane has a slew bearing diameter of 14 meters, this segmented set up can be produced in other diameters as well. The largest one produced so far is the 30metre diameter slew bearing for Heerema's Sleipnir 10,000mt cranes.

While the crane is today's biggest Leg

Encircling Crane with its 1600ton SWL, even larger crane designs are on the drawing board. With some trends looking into 15MW to 20MW turbines, suitable cranes for these sizes are available. Not only will the SWL increase, also other features may become available in this segment. With a drive for long booms for the turbines themselves, the SWL increase is mainly driven by the foundation work, which may not require such a long boom.

With this in mind, the Huisman Foldable Offshore Crane is also available as a Leg Encircling Crane. This is suitable for foundation installations, with a relatively short configuration, whilst having a long configuration option available for turbine installation. However, it does not require any telescoping mechanism and thus adds to the reliability and lightness of the crane.

More and more attention is being paid to digitisation. Digital assistance, with the upending of components, is just one example of what is seen as the near future trends and is expected to be one of the improvements that will further contribute to the reduction in installation time. This a constant drive in the wind turbine installation industry and Huisman is ready to take up any future challenges.

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