
KIN-04
OLYMPIC TAURUS

Changing the game in turbine major component exchanges

The industry needs safer, quicker, and lower-cost solutions to keep wind turbines spinning and keep up with the market's demand, at a competitive price level. LiftOff is determined to make this happen. Having proved its competence in providing unique and innovative ways of working, the company is taking significant steps as it continues to deliver the best-in-class services.

Based in the Netherlands and operating globally, LiftOff is an engineering focused contractor providing turnkey major component exchange services and specialised lifting solutions. The company excels in using up-tower cranes to handle the heavy lifting needed for replacing large wind turbine components such as gearboxes, generators, and blades.

Whether onshore or offshore, bringing a traditional large crane to a site involves significant cost and logistical challenges. It addresses this by using the existing turbine tower to achieve the necessary lifting height, eliminating the need for transporting a tall, sturdy crane structure to the site.

Typically, employing an up-tower crane reduces the equipment tonnage required for these operations by at least tenfold, demonstrating that sometimes, less truly is more.

Further advantages of using up-tower cranes include the increased accuracy of the crane movements when lifting inside the confines of the nacelle, as the cranes are short and have very stiff booms. The crane operator controls the crane via a remote from the locations most suitable for the situation, always providing a direct line of sight to the load. This also enables clear communication with the rest of the technicians working to install or remove the major component during this most critical phase.

The risk of heavy lifting is also significantly reduced. Another upside of the fixed foundation and the small cranes is the higher wind limits that apply when compared to conventional methods. Lifting in 12 m/s average speed and 18 m/s gust is something a ground crane typically cannot achieve. Working at higher wind speeds means less waiting on weather and higher production of green energy for our clients.

Fixed-bottom offshore

On the offshore side, the wind industry has been facing similar, if not greater, challenges. The approach to date is to perform major component exchanges using large jack-ups with proportionally large cranes that were originally built to erect wind farms. As wind turbines rapidly grew in size and weight, these units were no longer suitable for wind turbine erection and found their new use in the operation and maintenance of wind farms.

Jack-ups are a proven solution but are well oversized for the maintenance tasks they are often used for. It is not uncommon to see a 1,000 tonne capacity crane lifting a 12 tonne generator. As some of the wind farms have been operating for over a decade, the volume of work continues to increase alongside the escalation in the number of turbines. This has resulted in a decrease in capable crane availability and a significant increase in costs for major component exchanges.

Operators of offshore wind farms have approached LiftOff, asking 'is there a way to exchange a major component offshore without a large jack-up?'

The company has always approached the offshore market using technology similar to that of the onshore market, although these two sectors operate in vastly different environments. For the 2 MW to 4 MW bottom fixed turbines, the existing GenHook™ crane technology is integrated into a solution with small flat-top elevating barges. These barges are widely available and come in different cost levels, as they normally operate in the civil construction industry. They do not require a large crane or expensive propulsion system.

By using tugs to position them next to the turbine and mobilizing the LiftOff crane system, which fits into a few standard containers for heavy lifting, the exchange of major components becomes possible. Several projects have already been completed on fixed-bottom offshore installations, with many more in the pipeline. Both single-component exchanges and larger campaigns across different regions in Europe are scheduled.

The current offer includes solutions from 2 MW and 4 MW up to 9. 5 MW turbines, both as turn-key solutions and lifting services.

A question that often comes up in discussions with clients, which complements the barge solution is 'can we exchange a gearbox without using a jack-up at all?' Based on our extensive experience with offshore operations, cranes, equipment, and vessels, we believe this is possible and we have designed exactly that. More details will be released soon.

Floating wind

The direction in which the company and its technology have developed has led to a groundbreaking project that was executed in the summer of 2024. At the Scottish Kincardine offshore wind farm, located southeast of Aberdeen, a generator exchange was completed while the turbine remained on site. This new, more cost-effective, process was made possible through a collaboration of technologies and expertise from LiftOff, Vestas, Dragados, and Cobra Wind.

The wind energy industry has been seeking technological alternatives to improve processes when generator repairs or replacements are required. The recently completed in-situ generator exchange on a Vestas V164-9.5 MW turbine was a landmark event.

Through the use of the up-tower crane technology and specialised teams from LiftOff and Vestas, it was proven that major component exchanges can be done offshore, without the need for massive offshore cranes, or the need to tow the wind turbine to port. The full project was executed from an offshore support vessel (OSV) and was supported by crew transfer vessels (CTVs).

Applying this groundbreaking process has eliminated the need for tow-to-port operations which had previously been the only way to perform MCEs at floating offshore wind farms. Tow-to-port operations generate a large carbon footprint, involve high costs, and inherently create extended periods of turbine downtime.

To perform the process, a GenHook™ up-tower crane was temporarily installed on top of the turbine. After Vestas prepared the wind turbine and decommissioned the old generator, LiftOff lifted it out from the nacelle and safely lowered it to the deck of the floater, from where it was then transferred to the OSV. Using the same method, the replacement generator was then transferred to the floater and lifted into the nacelle using the same crane.

During this operation, load control mechanisms were installed to control the suspended loads during the lifting activities, as the floating wind turbine is constantly moving due to wind, waves, and currents.

About the company

Based in the Netherlands, LiftOff provides specialised major component exchanges for wind turbines.

The company offers full turnkey exchanges and lifting services that minimise downtime and increase turbine performance.

The team planned the operations with the utmost care, not only analysing several weather forecasts but monitoring real-time motion as well to ensure a safe operation and clear motion windows. The entire execution phase of the project with the OSV was accomplished in about three weeks, including full mobilization and demobilization of all the equipment.

After several years of developing technical solutions for fixed-bottom and floating wind turbines, LiftOff, in collaboration with its partners, was able to demonstrate that the innovative up-tower crane technology is ideal for use on offshore wind turbines. This is a total game-changer, which will transform the industry for the better and will continue to lower the cost of renewable energy.

We are highly confident that together with the wind farm owners, floater designers, and turbine OEMs we will make an in-situ major component exchange with up-tower cranes the gold standard for floating offshore wind.

Outlook

In this exciting industry, it is promising and impressive to see the market accepting new solutions and rapidly adopting the changing energy demand, adapting its landscape accordingly. LiftOff is determined to play a pivotal role in this market and augment its success by continuing to create efficient maintenance solutions that enhance the viability and positive outlook of the renewable energy sector.

www.liftoff-mce.com