Motion compensation solutions enable floating blade maintenance and repair

The E5000 system, with its full motion compensation, is able to transfer people and up to 5 tonnes of cargo in rough waters. © Jorrit van de Eerenbeemt

The challenge of launching and returning a drone offshore, particularly in high sea states, cannot be underestimated, while Blade Access Platforms are also not without their difficulties. Fortunately, new opportunities are arising in terms of technology and practical solutions to make blade maintenance and repair an easier task.

At least 5,000 wind turbines will be fully commissioned by the end of 2021 in Europe alone. Another 1,500 turbines have been granted approval to be built in the future. In addition, new markets are emerging, with Taiwan and the USA being among the main ones.

Each turbine carries three blades and although the newer ones are becoming better and better, the majority of old ones do require steady maintenance and repair. The tip of each blade can reach speeds of up to 300 km/h and anything that comes in their way can damage it.

Lightning strikes, hail or bigger impacts can damage the blade heavily. Also, over time, smaller particles like sand or salt can damage the leading edge of the blade. Besides the normal maintenance, this requires repairs. Currently, those repairs are done by the use of drones, rope access, jack-up vessels or Blade Access Platforms.

Current blade inspection methods

Regardless of which inspection method is used, the goal is always to make sure that the process is as safe, time and cost efficient as possible.

In one of its contributions to this market segment, Ampelmann, the Dutch offshore access provider, has developed a means to increase the workability of drones offshore.

Drones, especially those used for offshore inspections, are expensive pieces of equipment that need to be handled with caution. Launching and returning a drone offshore is particularly

With its wide range of motion compensated gangway systems, Ampelmann is able to support floating blade maintenance and repair campaigns

tricky in high sea states, which is why a solution is being developed to counter this challenge.

By using a downsized electric hexapod, the company is able to compensate for the vessel's motions and keep the landing area of the drone stable. This increases the workability of the drone and makes the landing operation, in particular, a lot safer and more efficient. Additionally, the landing platform will be easily transportable and can be carried without heavy machinery.

Rope access, in turn, is highly constrained by wind speeds, yet it is less costly compared to the use of a jack-up vessel. The jack-up can take down the full blade and repair it on the vessel in a safe environment with the most appropriate temperature. However, the jacking process can take time, and jack-ups are usually quite expensive to run. Nevertheless, for a full blade repair campaign, they are still the go-to solution.

Blade Access Platforms are another way to perform inspections and are currently launched by the use of a Crew Transfer Vessel and the davit crane located on the transition piece. The launch and recovery procedure of this is very dependent on the weather as a Crew Transfer Vessel has a limited workability. The speed of davit cranes is also rather low, which puts the Blade Access Platforms and Crew Transfer Vessel at risk of clashing when lifting is being done.

In 2019, Ampelmann trialled the use of one of its E-type systems to enhance the workability of the launch and recovery of a Blade Access Platform. The company increased the lifting capacity of one of its E1000 systems to be able to lift a platform from an Offshore Support Vessel or Construction Vessel onto the transition piece.

The idea was to increase the number of Blade Access Platforms that are deployed in a wind farm in order to scale up the installation campaign, using several Blade Access Platforms on several turbines. The Blade Access Platforms would then be lifted from the vessel's deck to the transition piece and the team could start their work while the vessel moves to the next transition piece to lift another Blade Access Platform onto the turbine. The workability is, thus, increased by the use of an E-type.

Since the weight of the Blade Access Platforms does vary and can be higher than what the E1000 can lift, Ampelmann has developed a larger system, with a cargo lifting capacity of up to five tonnes, while compensating for all six degrees of freedom of the vessel. The E5000, delivered in 2021, is the ideal tool to scale the use of Blade Access Platforms for bigger repair campaigns in offshore wind farms.

Greater cargo capacity, greater opportunities

Ampelmann holds a stellar track record in the offshore access industry, having enabled the safe transfer of more than seven million people and close to 18 million kilogrammes of cargo to and from offshore platforms.

The E5000 system was a move by the company to further strengthen its position in the market. Based on the technology of the E1000 and with the ability to lift up to five tonnes, it helps increase the work scope clients can deliver and improve the efficiency of W2W operations.

This system turns any vessel into an all-round offshore tool and as a result, clients benefit from shorter campaign durations, increased logistical efficiency and a broader scope of work. Supporting blade repair projects is one of its key capabilities.

The E5000 fits well in Ampelmann's strategy to offer a variety of different line products that can carry cargo next to enabling personnel transfers. Applying the system's technology enables blade repair campaigns at offshore wind farms that do not need to have boat landings or davit cranes. The vessel would position itself next to the turbine with the help of a dynamic positioning system so the E5000 could lift the Blade Access Platform to the turbine.

Between its flagship A-type system, the E1000 and the E5000, Ampelmann serves the needs of its clients throughout any scope in the offshore wind farm lifecycle.

The A-type, Ampelmann's first commercial product, can transfer personnel to and from an offshore platform in high sea states and operates according to the highest safety standards in the industry. After successful testing in 2020, the company launched the A-hoist add-on, which enables clients to lift up to 300kg with the existing A-type fleet.

The E1000 is a heavier system, with a wider range, allowing it to operate in even rougher waters, while ensuring the safe and efficient access of both personnel and cargo. On the market for over five years already, it is an adaptable access system that can transform from a gangway into a crane boom to provide full logistical requirements.

The system is fully automated and employs remote-controlled hydraulic pin pushers to fixate the gangway booms in less than one minute with a single push of a button. The system can safely transfer personnel and up to 1,000 kilograms of cargo in rough waters.

The E5000, in turn, is the next step in increasing its cargo lifting capacity and its ability to enable larger work scopes, including the lifting of Blade Access Platforms.

While the system can improve the workability of launching and recovering Blade Access Platforms it does need a basis to operate on. Day rates for OSVs are expected to rise in the future, so the overall set-up will still need to prove itself as being able to operate competitively and effectively. Previous offshore trials have offered a very positive outlook that the scaled solution is a good alternative to the use of jack-ups or rope access.

On-site blade repairs are still sensitive to the outer environment, as they can only be performed in certain wind speeds, temperatures and humidity. A closed Blade Access Platform that can regulate these is desirable. There are a few solutions that provide Blade Access Platforms, but only the minority of those have a closed-off platform, which naturally increases in weight.

With different blade manufacturers and different turbine dimensions, the size of the blade does vary a lot as well. A system that is scalable to certain blade types and can cover most of the blade enhances the ability to undertake repairs of the leading edge of the blade, Ampelmann is looking into future possibilities to deliver a new type of Blade Access Platform that enables the repair on older and newer type of blades and that can offer a closed-off environment for an increase in efficiency and easily launchable from various types of vessels, too.

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