On the fly

Industrial drones, or flying cranes, offer a possible new way to revolutionize wind turbine maintenance, with the potential to save wind farm operators and owners incredible amounts of time, money, and CO_2 emissions. Excited at the possibilities this new technology could hold for the industry, PES was keen to learn more from Mikkel Sørensen, Owner and Chief Executive Officer of Airflight.

PES: Welcome back to PES Mikkel, thanks for taking the time to talk with us. For readers who might not be familiar with the name, can you give some brief background to Airflight and your role in the wind energy industry?

Mikkel Sørensen: Hi and thank you for having me back. I'm excited to be here and to share a little about our company with you. Airflight is a Danish tech company that builds flying cranes, which are large, fully-electric, industrial drones that can fly with payloads up to 200 kg. This model is called the AF200 Flying Crane.

Our flying cranes are specialized for transporting spare parts, tools, and special equipment for wind turbine service and maintenance, which creates faster, cheaper, and greener processes for both onshore and offshore wind farms. Our mission is to optimize wind turbine maintenance operations.

PES: What kind of items do you typically transport?

MS: Our primary focus is on maintenance operations where we intend to transport spare parts, tools, and special equipment. This can be done for both onshore and offshore maintenance operations. Our AF200 is designed to take-off and land on SOVs and even some CTVs for offshore operations.

Another benefit of having the ability to fly directly from a vessel to the nacelle of a wind turbine, is if technicians forget or need any extra spare parts or tools, they can now get it in their hands in 10 minutes instead of causing excess downtime waiting for a vessel to sail back and deliver the item to the bottom of the turbine.

However, our flying cranes can also assist in the installation of wind turbines as well by supplementing the heavy cranes used in these operations. By using an Airflight AF200 Flying Crane to transport payloads of under 200 kg, workers can optimize the use of heavy cranes for the really heavy loads, saving time and money on construction and installation operations.

PES: What is the maximum payload you can fly?

MS: The AF200s can fly with payloads up to 200 kg. This payload capacity includes over 97% of all tools and spare parts required for wind turbine maintenance operations. The last <3% of these tools and spare parts are significantly heavier than 200 kg and usually require a special service crew to install them as well.

Our proprietary pick-and-place payload system can deliver and pick-up payloads anywhere without the need for a technician to be present. Everything is either autonomous or controlled remotely. Our payload system allows us to either hover and winch the payload down to the nacelle or land on the landing platform to deposit the payload, whichever method our customers desire.

PES: You currently fly from vessel to turbine is that right? Have you plans to broaden this approach to include onshore to offshore as the need grows?

MS: Yes, the aim of our first generation AF200 will be to fly most of our operations from vessel to turbine. Our battery powered first generation AF200 will have a total flight range of about 30 km which is optimal for these operations.

However, we are already developing our second generation AF200 which will include a new propulsion system to increase the total flight range up to approximately 250 km. This will unlock onshore to offshore capabilities in most cases and add even more value to our customers.

Mikkel Sørensen

PES: How are you seeing the market for this service developing? Are you surprised at how fast the industry is developing?

MS: Well, this is an exciting question for us. I can see that the heavy-lift drone market in wind is about to explode into rapid growth. It is a brand new market with no companies controlling a significant market share yet. Our goal is to be a market leader in the industry. Wind energy production is growing at a high rate which will continue into the distant future, especially for offshore wind development, and offshore wind is where we add the most value to our customers.

I am impressed at how fast the industry is developing. We have experienced an openness to our new technology that impresses me with some of these massive companies. Openness is something we need as our flying cranes are a disruptive innovation that will call for our customers to rethink their operations to implement. We aren't just selling a small improvement on an old crane, we are selling a way to revolutionize wind turbine maintenance that will save our customers incredible amounts of time, money, and CO_2 emissions.

PES: Can you give one or two examples of your service being used in practice?

MS: At our current stage, we expect to receive our EU approval for flight operations within wind parks later this year. Until we receive this permission, we are performing flight operations at our test facilities in Denmark. We have an indoor test facility which allows us to tune our flight systems in a controlled environment among the many other advantages indoor flight testing can provide.

We also have an outdoor test facility in Europe's largest drone cage. This is a massive area covered by a strong net which allows us to fly in all types of outdoor conditions. The caged area is large enough to include a 1 to 1 scale offshore wind turbine landing platform, a wind turbine blade, and others which allow us to fly training operations until we are granted the approval to fly operations outside of our facilities. These facilities will also be used to train our own future pilots and pilots for our customers.

PES: What are the main benefits of using flying cranes for this kind of logistics?

MS: The short and simple answer is that Airflight Flying Cranes will save our customers, time, money, and CO_2 emissions while simultaneously increasing safety for technicians.

I'll break it down a little further here. When a vessel is near the target wind turbine, our flying cranes can get the technicians their tools and spare parts over 3X faster than current operations.

When a vessel is not near the target turbine, our flying cranes cut even more time off of these logistic operations. This reduces the amount of time current operations spend on turbine downtime, vessel sailing, and tool and spare parts winching and craning operations. This especially includes cases where technicians forget or need any extra tools or spare parts. With Airflight Flying Cranes, they can now get it in their hands in 10 minutes instead of causing excess downtime waiting for a vessel to sail back and deliver the item to the bottom of the turbine as mentioned earlier.

These time savings translate directly into money savings as well. Airflight Flying Cranes save customers money on wind turbine downtime losses, operational work hours, and vessel fuel costs. In fact, we have calculated with our customers that each AF200 flying crane can save our customers up to €1.8 million per year. This will surely revolutionize the industry and hopefully play a part in making renewable energy even more affordable.

Using flying cranes to reduce the amount of time the offshore vessels, SOVs and CTVs, need to be sailing under way, and instead, be sitting at idle out in the wind parks, each AF200 flying crane can save our customers up to 1,800 metric tonnes of CO_2 emissions per year. This will help make wind energy even greener than it already is today.

Finally, Airflight Flying Cranes will increase safety for technicians in maintenance operations. The AF200 will fly tools and spare parts to the turbine nacelle without the need for a technician to be present. This both reduces the amount of time CTVs and SOVs

need to be connected to the wind turbines and eliminates the need for technicians to be near or underneath a crane or winch to lift tools and spare parts off of or onto vessels or up to or down from the turbine nacelles.

PES: One of the main advantages is of course that this method helps the green energy sector keep its own operations green, would you agree?

MS: Yes exactly, this is one of the most exciting parts of our solution. The wind industry does an excellent job at minimizing emissions and maximizing green energy production and we hope to improve these processes even further. Our 100% electric AF200 flying cranes will help to reduce vessel sailing time significantly while not producing emissions directly themselves.

As mentioned above, each AF200 flying crane can save our customers up to 1,800 metric tonnes of CO_2 emissions per year as a starting point. I believe that as our flying cranes are integrated into wind turbine maintenance operations, we discover many more ways to save even more emissions. The sky is literally the limit here.

PES: How important is the green agenda to those involved in the sector do you think? Is this changing and the issue becoming more front of mind?

MS: This is a great question, and of course I can only give my opinion here based on my experience, but I believe that the green agenda is extremely important in this sector. It allows all of us involved to work for a higher purpose than just creating a good business. It allows us the opportunity to leave the world better than we found it and start to reduce some of the negative impact humans have had on the climate and environment.

I believe that this is at the front of the minds of the decision makers in the industry, including myself. It is our duty as people to minimize the effect of humans on the environment and maximize the potential of a great life for future generations.

This is a value that drives us at Airflight. We are certainly not perfect, but we strive to be better every day.

PES: How do you think the market for this kind of technology and the service you provide will develop over the next few years?

MS: This market and using flying cranes to service wind turbines is only going in one direction and that is up. The market is brand new today, but in the coming years it will be common to have 'Flying Crane Operators' as an everyday part of the industry. There will be a rise in the number of companies like Airflight and new, creative solutions each year to serve the wind industry. Within the next five years, it will be common to see flying cranes in wind parks throughout the entire world.

PES: Can you reveal any plans you have for new products?

MS: The best I can do is provide a small teaser. At Airflight, we are constantly hiring some of the best talent in Europe and from around the world. We are relentlessly developing and innovating the solutions that we can provide for the industry and others.

As far as new developments in our offerings, our main development areas are around increasing flight time and increasing payload size. The rest you will have to see and we launch our newest solutions.

PES: And for the wind energy industry as a whole, what do you think the future will look like?

MS: All indications from wind developers around the world point to a huge increase in global wind installations and development. This industry is growing at a rapid rate and this has only accelerated given current global events. An interesting development, especially for the use of flying cranes, is that wind turbines themselves are being built bigger than ever before which seems to be a global trend with no limit in sight. This increases both turbine efficiency and total energy produced, but also presents new logistical challenges for hoisting solutions stuck on the ground or sea.

Offshore wind is growing at a high rate now, and it will also be interesting to follow the development of floating wind parks. I believe Airflight will add critical amounts of value here as the innovations of floating wind add new value to the world, but also have new challenges that we would love to help solve.

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