

# MAINTENANCE

Operations • Service & Repair • Inspection • Safety • Equipment • Condition Monitoring • Lubrication

## PREVENTATIVE MEASURES COULD SAVE LIVES AND TURBINES IN THE EVENT OF A NACELLE FIRE



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Wind turbine fires scare the heck out of me and should scare you, too.

Since modern turbines don't have ladders both inside and outside the turbine, there is only one way in and out of the nacelles. If you are caught up tower when there is a fire, you had best be prepared. That means that you should have your climbing gear on, and are able to self-rescue yourself off the nacelle.

I hear that techs today regularly leave their climbing gear on the yaw deck of the tower and continue work in the nacelle space without it. In the event of an emergency descent off the top of the tower, these techs will have to access the yaw deck, don their gear, climb back up to the nacelle, then leave the nacelle with their rescue device.

That seems improbable to me. Given an emergency in which I was able to make it to the yaw deck, I think I would continue to climb down the turbine's tower ladder. I don't think I would go

down and then back up and over the edge. The only way I would go over the edge with a self-rescue device would be during an emergency in which I couldn't access the yaw deck. If techs are removing their fall protection when working in the nacelle, they should at the very least place the gear near the tower rescue device. Me? I'll just leave my gear on and keep my rescue device near me.

It's kind of like playing baseball. You have to plan in advance what you will do if the ball is hit your way. On turbines, you have to plan for the worst. Don't get stuck in a horrible situation and then make it worse by not being prepared.

Turbine fires in wind turbines are one of the most terrifying scenarios a wind tech could face. A fire extinguisher might help in this situation; then again, it might not. Probably the most fire-safe turbines today are manufactured by Siemens. This is because most of its nacelles are made of steel. Most all other manufactures use fiberglass composites. For those of you who don't know, fiberglass composite nacelles consist of glass fiber and usually a polyester or vinyl ester resin. (This composite material is used quite extensively in wind, with most blades built today using some variant during the manufacturing process.)

I imagine that most turbine nacelle fires start with an electrical problem in which an arc flash occurs. The temperature of an arc flash can be over 19,000 C (35,000 F)—almost 3.5 times as hot as the surface of the sun. This

high temperature is able to vaporize metals and everything else nearby instantaneously. When an arc flash happens in a steel nacelle, it can burn a hole through the nacelle, but the metal typically will not support continued combustion and would burn out.

This is not the case in a fiberglass composite nacelle. When an arc flash happens in a fiberglass nacelle, the resin in the fiberglass nacelle can start to burn. Once the resin in the fiberglass catches fire, the resin typically can support continued combustion. The resin will continue to burn as a fuel. This is probably why when a wind turbine catches fire it continues to burn until almost all of the nacelles resin is burnt up. You will find piles of ash and unconsumed fiberglass material left over.

This is why you see photos of complete nacelles burned away. The resin is so good at burning that parts of the rotating rotor also catch fire. The heat is so intense that metal components melt. You can burn the blades away too. The glass may melt at the point of the arc flash but it typically doesn't burn.

However, a fire in the nacelle doesn't have to mean the end of the turbine. There are ways to make composite nacelles more fire-resistant. This could be done at the turbine manufacturing plant, but so far manufacturers have not made this a priority. This means that you must plan ahead and take these preventative actions on site.

In the past, I have used intumescent coatings on the interior

of blades containing electrical equipment. This intumescent coating helps prevent the resin component in the fiberglass from igniting, and also helps extinguish any fire that may be in progress.

Many independent service providers (such as my employer) offer solutions in which they coat the inside and outside of your composite nacelles and blades with a fire resistant coating.

There are many of these types of specialized coatings available today. A little research will help you understand the differences among the available coatings, and can guide you in selecting the best option(s) for your wind turbine fleet.

Compared to the potential loss of life and considerable monetary losses (damaged or destroyed nacelle, blades, and other components) resulting from a turbine

fire, these coatings are not that expensive. Using these coatings would help contain the nacelle damage to the fire's point of origin, and would allow an area damaged by arc flash to be repaired.

I hope you consider this information for the health and safety of your turbines and your technicians. As always, work as safely as possible, and work to prevent surprises. ✎

## HEADLINES

### Gamesa launches center to support O&M services in India and Sri Lanka

Gamesa recently inaugurated a services center in Chennai, India that will accommodate the performance of all wind farm operations and maintenance-related services for its customers in India and Sri Lanka.

The facility will also serve as a logistics center, enabling part storage and repair work as well as the provision of training to Gamesa employees and customer staff. It is also equipped with a remote control center from which turbine operations can be monitored in real time, facilitating rapid response times with a view to maximizing availability.

The addition of the services center allows Gamesa to efficiently respond to the growing turbine availability demands of its customer base—increasingly consisting of independent power producers—in the region. Gamesa has already installed more than 830 turbines in India and Sri Lanka.

### Vestas secures service contract extension in Scotland

Vestas has secured a two-year service agreement from ScottishPower Renewables for five Vestas installed wind power plants in Scotland with a total capacity of 120 MW, which includes 162 units of V47-660 kW and V52-850 kW wind turbines.

The service contract extension includes Vestas' Active Output Management (AOM) 3000 service option. The service contract extension is a two-year agreement, with an option for one additional year.

"We look forward to continuing our relationship with Vestas, who we have worked closely with for a number of years," said Lee Callaghan, head of site operations at ScottishPower Renewables. "This contract extension is testament to the quality of service and performance we have received from Vestas, and we are pleased to have reached this agreement which will provide a foundation for us to continue working closely with Vestas to drive further operational performance improvements going forward."

Vestas applies its proactive maintenance approach to more than 25,000 wind turbines worldwide.

### AeroTorque and Frontier Pro Services form sales partnership

AeroTorque Corp., a U.S. manufacturing and engineering firm for torsional control products and torque monitoring for wind turbines, is pleased to announce a new partnership with Frontier Pro Services.

The sales partnership serves to further introduce AeroTorque's innovative WindTC, asymmetric torsional control, and their WindTM, torque monitoring services, to a broader audience in the U.S. wind market.

"It was a natural fit, to bring the market's top experts in drive train inspection and analysis, and our unique offering together. Their experience with gearbox fleets and contacts in the industry are a win-win for us and for our customers," said Doug Herr, General Manager of AeroTorque Corporation.

"The Frontier Pro group continues to focus on delivering long-term reliability centered solutions," said Paul Baker, VP business development of Frontier Pro Services. "This is the first solution I've seen come to market, that eliminates a cause of failures, rather than mitigating them."

Together, the two companies expect to see good synergies between Frontier Pro's service offerings and AeroTorque's products. AeroTorque's WindTC is designed to retrofit on turbines from 600 kW to 1.5 MW and reduces the effects of torsional reversals to 40% of nominal torque. It further reduces both the magnitude of the impact loads in the gearboxes and the strain rate and speed of the impact. They have field experience on turbines up to 2 MW and can monitor the torque on any size turbine above 600 kW.