

In-house telephotographic blade inspections reduce repair costs and turbine down time.

AS WE KNOW, WIND TURBINES must be periodically inspected and maintained throughout the twenty plus year life of the turbine. Gearboxes, generators, drive motors, bearings, and electrical components are commonly inspected and maintained on a scheduled basis. Oddly enough, the blades, which are the largest of the operational components and the first critical component that converts wind energy into mechanical energy, tend to be neglected.

Although blade inspection and repair is an integral part of the operations and maintenance schedule, it is commonly overlooked or performed superficially with a quick visual of the blades from the ground or the nacelle top during maintenance using a pair of binoculars or just the naked eye.

The new wind turbines blades are getting longer and more sophisticated and the manufacturers are pushing the limits on engineering design and material capabilities in order to generate more energy out of the same wind. Today's blades are engineering marvels and they rival the complexity of aircraft wings. The blades must be strong enough to handle severe wind conditions, stiff enough not to strike the tower or create dynamic instabilities and have to endure varying dynamic loads 24 hours a day for twenty plus years -- all while maintaining the aerodynamic efficiency to convert as much wind energy into mechanical energy as possible.

For this reason, blade maintenance must be approached in a proactive, rather than reactive manner. Catching small problems early can make a huge difference in the cost of repair and in some cases save a blade from catastrophic failure. By the time an anomaly has grown large enough to be seen from the ground with the naked eye, it may be too late.

A major contributing factor in the lack of blade maintenance is that inspecting the blades has a unique set of difficulties. Being a component that is external of the nacelle, with a surface area of thousands of square feet, and being hundreds of feet above the ground, makes any work on the blades a difficult and time consuming task. External access to the blades is possible via crane basket, rope rappel and cable suspended platform but all of these options may not be cost-effective for full site annual or semiannual inspections.

For scheduled periodic visual inspection, from-ground telephotography inspection is the best great option. A good quality telescope or high power lens with a large aperture and an in-line high resolution digital SLR

camera allows the inspector to quickly scan the surface of the blades and instantly capture high quality images of findings or areas of question. With the ability to accurately inspect multiple turbines per day without all of the up tower access, weather and cost limitations, makes telephotography efficient and cost-effective for full-site rotational inspections, end of warranty inspections, quick checks on suspect blades after a lightning storm or wind event, and inspections of failed components from a safe distance. Purchasing the right equipment, understanding inspection methods, and knowing what to look for is the key to being able to performing effective inspections.

The setup for wind project owners and/or operators to do this type of inspection in-house is fast and cost-effective by simply contacting a blades/composites expert company to both provide the proper equipment and conduct onsite training for the selected technicians to become certified blade inspectors. The training can be done in two to three days and should also include up tower internal blade inspection training. Inspecting the internal structural components of the blades is equally important to the external surface.

The telephotography equipment and detailed inspection methods training is a relatively small cost with a huge return on investment for years to come. With the site operations company having the ability to capture high quality close up images of possible issues on the blades, there is no need to bring in a third party to inspect. The full resolution images can be emailed immediately to the blade/composites expert partner company to evaluate and help decide when or if the blades even need repair. Many times, anomalies found on the blades are not real damage at all but simply grease, oil or dirt. Even if a blade does require repair work to be scheduled, the damage may not be structurally critical and the turbine could be running while until a repair crew can get to the site. These are just a few simple examples of how the right equipment and training can save days or weeks of unscheduled turbine down time on top of reducing third-party contractor costs.

Many wind project owners and operators across the country have found real value in the ability to properly inspect their own blades, reducing the major problem/failure rate and being able to better forecast the blade maintenance costs. Efficient preplanning, a realistic budget to work with, and having the right tools to know the current condition of the blades is imperative to the long term success of any wind project. ✎

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