



Faster - Smarter - Cheaper

Changing the face of wind turbine blade inspections...

PES met up with WiPoX and ABJ Drones WindVue division to discuss innovative wind turbine blade inspection methods and unique technologies that aim to change the basis of how wind blade inspections are undertaken.

Renewable energy continues to move forward in leaps and bounds showing huge current and future growth potential. In the last 20 years, the wind energy has gathered momentum with no end in sight, especially with the offshore sector's massive potential.

While the progress is dramatic and sustainable, inspection technologies remain way behind. With modern sensor technology, robotics and industry 4.0 being buzzwords everywhere, the common inspection technique for wind blades is still rope access, cherry picker, selective

inspections, and in the main, pen and paper reports.

The claim is strong. 'We are changing the face of blade inspection by being able to see up to 15cm into the blade using specialised drone technology, specialised sensor systems, and a patent protected method,' explains WiPoX CEO, Marius Schroeder.

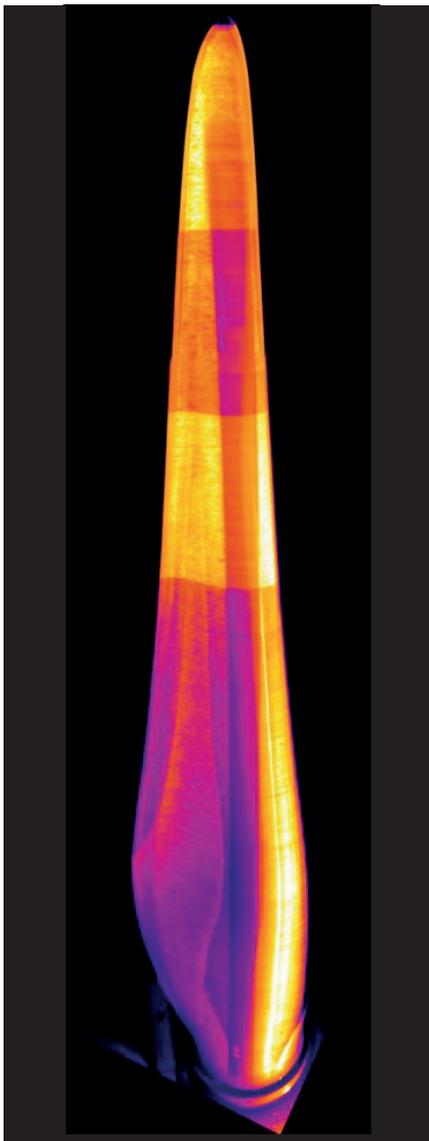
The almost x-ray level of detail is the result of several years of trials, sensor research, software development, and market 'know-how'. While high-resolution pictures

of blade surfaces are starting to become an industry standard, the patented thermal scan technology aims to also track delamination, structural damages, and other defects beyond the surface.

'ABJ WindVue aims to equip the wind industry with an enhanced level of blade inspection technology and reporting in order to address the needs of maturing blades,' adds Vip Jain, CEO of ABJ Drones.

Patent protected

Unknown to many players in the industry, the method of inspecting wind turbine blades with any mobile device or platform is patent protected. The same accounts for many other aspects of this unique technique. Penalties can be enforced by the patent holder if infringed. This puts companies using subcontractors or inhouse teams in an uncomfortable legal position.



Thermal scan overview

WiPoX, being the exclusive patent users, however does not aim to use this protection to scare away competition. Their main goal is to work with qualified, selected, and well-trained partners like ABJ to provide proven, safe, and high-quality means of inspection.

Status quo

Currently, extensive blade inspection is carried out via lifting technicians to the blade, on a platform or via rope access. These methods pose their own safety risks and challenges. To inspect the blade efficiently the technician will need to get close to the blade to inspect it visually and possibly use the ‘tap’ method to gauge any potential structural issues.

This process is still very much accepted in the market, but in the eyes of WiPoX, would never meet the demands and expectations of a standardised and well-developed inspection and reporting method. Especially the fact that only visible damage is recorded and inside damage is far too easily overlooked when using tapping techniques. Already the first court rulings (LG Muenster, 14.04.2015, 025 O 135/13) underline that this method is not a suitable means.

Further challenges

Ongoing maintenance and repair are an essential part of an asset’s lifecycle to maintain operational capability and ensure maximum return on investment – if it’s not turning it’s not earning, and the massive costs of blade replacements are burdening a growing, green, and future-oriented industry.

Typically, rope access or platform teams will not be operating on a turbine in windspeeds of more than 10 meters per

second for safety reasons. This significantly reduces the operational window, exacerbating the problem.

There are of course further challenges... When a structure edges toward end of warranty, it will be essential to gather solid technical information to support a claim or support further investment.

Similarly, should a current or potential investor or insurance provider have a stake hold in the turbine – they will also have a healthy appetite for strong technical data regarding the condition or the risk attached to it.

Technology evolution

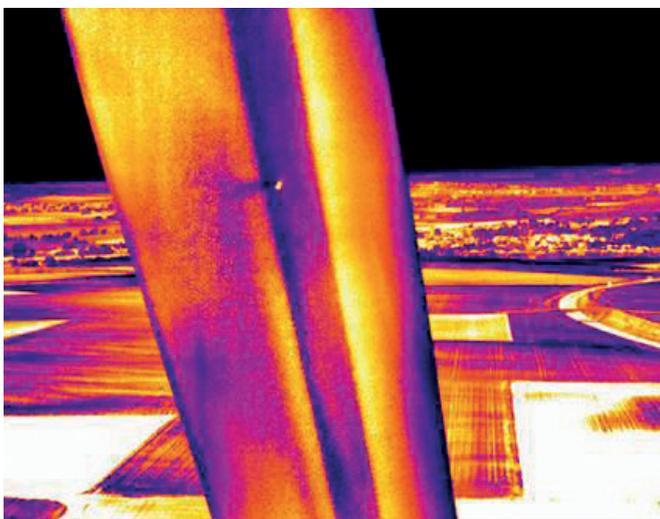
So how is inspection improving and what technology is being used today? Ground based inspection cameras are common, and UAV/drone inspection technology is taking a lead and improving the acquisition of optical data – but that is only half the picture. A thorough, suitable, and sustainable method must meet the plethora of additional challenges.

The challenges include inspecting the blade safely, inspecting the blade thoroughly, keeping downtime to a minimum, providing services at a reasonable price, reporting known issues in early and repairable states, widening the operational window, and being prepared for larger and larger blades.

Drone technology

Technology clearly plays a big part in this story. UAVs, or drones, as the world loves to name them are available in all shapes, sizes and configurations. Some for general purposes and some highly specific.

A professional UAV must be built for the



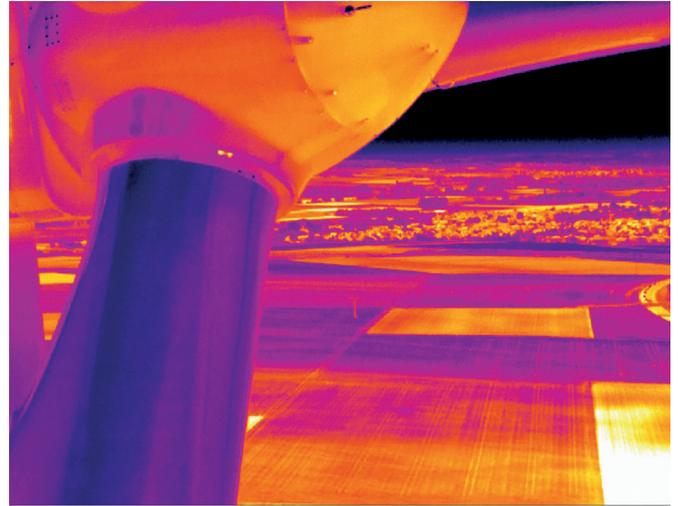
Impact damage thermal scan



Impact damage optical



Infrastructure issues



Infrastructure inspection

specific function. It has to have the right equipment and payload and enough fuel in the tank, with extra just in case. It needs safety features and it needs to be fit for the purpose.

Wind farms are naturally built to capture the energy of the wind and this inherently makes them very windy places. Tough conditions need tough equipment and outstanding capability.

To put this into perspective, the flagship of a well-known UAV manufacturer's aircraft that is designed for commercial inspections has a wind resistance capability of 10 metres per second (22.36 MPH / 36.0 KPH).

Anything much above that and there will be a potential for the aircraft to drift or collide. Complete aircraft loss has been known in these sorts of conditions and often the only solution is to ground the aircraft and chose another time. Time is money and even more so when it comes to inspection processes.

Piloting and operational skills

To be able to inspect safely and efficiently, crew members must understand their subject and be completely confident in their actions. Inspection flight crews are handpicked for their extensive knowledge and experience in aviation and practical flight capability with extensive operational

flight hours logged. They are put through a rigorous training regime that encompasses thermography, flight operations, and technical knowledge of the wind industry. All are 'heavy lift' experienced UAV pilots with a wealth of experience and a 100% safety record.

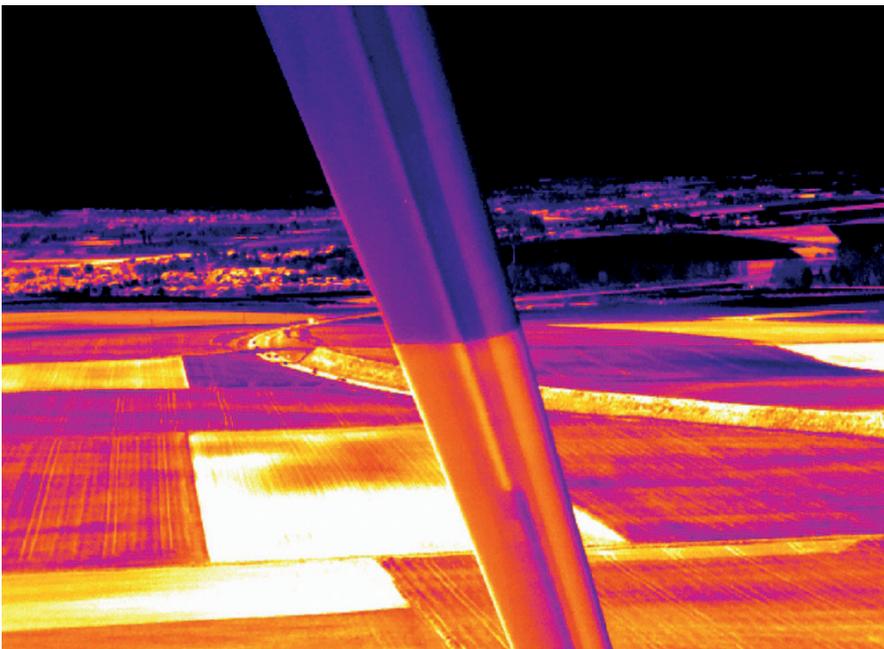
Advanced sensor technology

WiPoX has developed systems and flight platforms that offer a distinct technical advantage when inspecting turbine blades. The system uses a specialised aircraft designed and developed to conduct inspections in adverse conditions.

The aircraft can handle wind up to 15 M/S and beyond (33.5 MPH+ / 54.0 KPH+) with full stability. The use of RTK systems allow for absolute holding precision down to 5cm. This combined with multiple redundancies such as motor/rotor and battery failure, alongside data link redundancy and collision avoidance, make for an extremely safe and capable platform.

The magic really starts to happen with the payload. Using multiple payloads to capture high-resolution optical data and enhanced thermal data make the system unique in its capability of being able to see into the blade structure up to 15cm whilst in situ on the turbine.

The system is revealing faults beneath the surface of the blade that simply cannot be seen with the naked eye or pure optical inspection. Faults such as internal damage, delamination, bad bonding, and foreign objects are common discoveries alongside lightning strike damage where the lightening has not been accurate enough to hit the conductor. When linked with the equivalent optical images and the reporting structure, stakeholders and engineers are



Low to medium severity issues



able to fully assess the condition of the asset and prepare a necessary course of action in minimal time, thus increasing efficiencies and cost savings.

A typical full inspection requires the turbine to be stopped for less than 1 hour, vastly reducing downtime and maximising data intelligence.

Climbing the data mountain

Inspection processes by nature produce a huge amount of data. In this case, the volume of data is doubled, taking in both external and internal analysis to give the full picture.

The question is how to manage, analyse, and report back on this data in a timely fashion so that engineers and technicians can act on the findings. Here is where efficiency savings are to be gained.

Once the data has been captured, ABJ's specialist data labs begin the process of turning the mountain of data into a coherent data set.

Internal and external data is cross examined and the findings are put forward into a secure data warehouse. At this point, in-house engineers and blade experts are able to annotate the findings and put forward recommended actions to remedy the issues found.

Flexibility is the name of the game, as some clients prefer to receive data only and conduct their own reports with their own resources.

All data is available via a secure portal that allows the client to drill down and inspect the images and annotations together with the ability to further annotate and generate

reports/instruction without having to leave the desk.

Discover more...

WiPoX and ABJ WindVue are revolutionising wind turbine blade inspections using advanced, disruptive technology.

ABJ WindVue offers thermal blade inspections as a global service and can deploy its specialist teams around the world. The approach is consultative, flexible, and above all workable.

If you are interested in learning more about this disruptive wind turbine blade inspection technology, contact ABJ today at +44 330 223 4555 or by email at info.europe@abj.global.

www.abjdrones.com

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