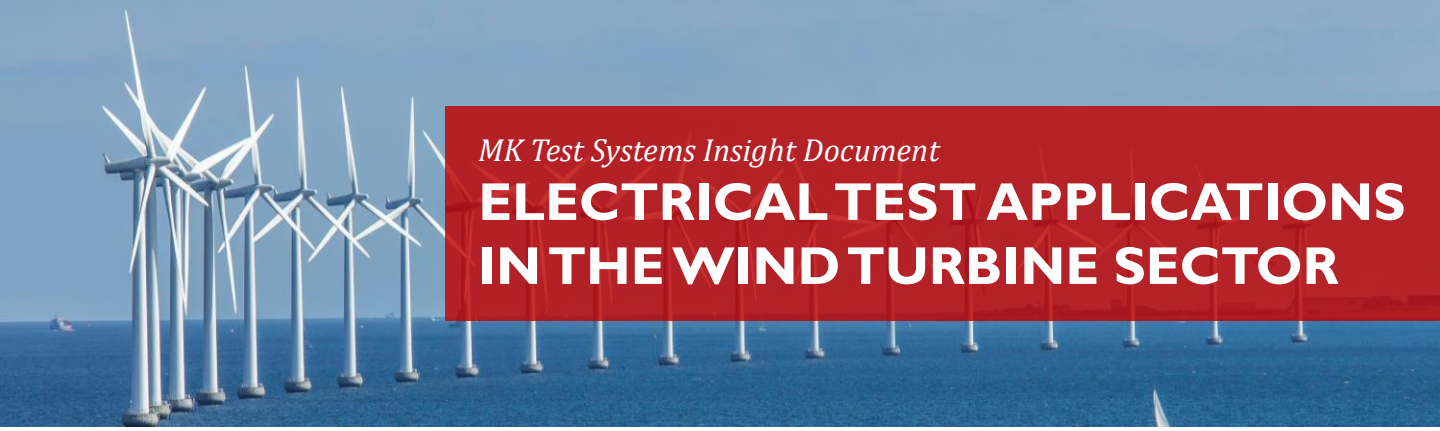

MK Test Systems Insight Document

ELECTRICAL TEST APPLICATIONS IN THE WIND TURBINE SECTOR

MARKET BACKGROUND

The global wind turbine market was valued at >$50bn in 2017, and is expected to reach >$80bn by 2024 [1]. In the UK, the wind turbine market was valued at $1.7bn in 2017 [2].

Reasons for growth are numerous. Beyond the clear environmental advantage, they also include the declining cost of wind power generation, technology advances, declining prices of turbine components, supportive government regulations, stakeholder incentives, and increasing demand for electricity.

Whilst most global wind turbines are onshore – the global share of onshore locations is expected to reach 83% in 2022 [2] – the EMEA region has principally adopted offshore deployment. The UK represents the largest market for offshore wind turbines, driven by opposition to onshore from local communities and lapse of onshore wind subsidies [2].

APPLICATIONS FOR MK TEST SYSTEMS

Slip ring testing

Slip rings are devices which enable electric current and data signals to be transmitted across rotating elements where fixed wires can't be used. Wind turbines are an obvious use for slip rings, along with satellites, turreted vehicles, MRI scanners and many more varied applications.

Due to the unique nature of slip ring construction, it's not as straight-forward to test these compared to other wired electrical elements. The contact between the rotating elements, stator and rotator, creates what's known as resistive noise, which distorts signal transmission. Whilst MK Test Systems have a slip ring testing solution which is used by some of the largest slip ring manufacturers, manufacturers often develop their own system; there are no sector-wide testing standards or specifications.

Bond testing

Lightning damage is the single largest cause of unplanned downtime in wind turbines, and that downtime is responsible for the loss of countless megawatts of power generation. Due to the height of the structures, and being inherently located in exposed areas, wind turbines are exposed to lightning strikes as often as 10 times a year [3].

Wind turbines are built with various methods of lightning strike protection, and commonly create a safe conductive path for lightning current to travel from the blades down to the ground without causing damage. MK Test Systems' bond and loop resistance testers check that turbines and structures have been built correctly and that there aren't any areas of poor bonding or miss-wires which may result in lightning damage.

Preventative maintenance

Whilst both slipring testing and bond testing are useful during the manufacture of wind turbines, it is in the area of preventive maintenance that wind farm owners will see the real benefit. When a wind turbine breaks down, the loss of profit is vast. Vestas, a wind turbine manufacturer, reported warranty payouts of €175m just for a single quarter in 2020 [4].

Annual bonding checks can ensure the lightning protection systems are still working correctly, saving hundreds of thousands of pounds preventable downtime.

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