



## Case Study

### Phased Array Wind Turbine Survey

**Project** Blade to hub connection points

**Scope** Phased Array inspection on hub connection points bolts and bolt holes. The inspection was to assess the integrity of the wind turbine hub to ensure no fatigue cracking is present in high stress areas.

**Challenges** This project had it's own set of challenges, the main challenge being to successfully achieve 100% coverage of the requested areas due to the complex geometry of the parts and access to the hub.

**Solution** Phased Array scan plans were created using ES Beamtool software to determine the percentage of possible coverage. Without a site visit and trials, this coverage was only an estimate. A small footprint probe was selected for this task to be able to obtain maximum probe contact and coverage in small scanning areas.

Once the technician had access to the hub it was clear that the provided drawings differed to the actual geometry. Scans were possible on the exterior circumferential surface giving extra coverage on the bolt hole areas. However the majority of coverage was obtained from the internal surface. For access to be possible extra safety measures were put into place securing all moving parts.



External circumference scan.



Access inside Hub.

### Benefits

There are many advantages of Phased Array inspection for the detection of fatigue cracking in high stress areas where the blades are connected to the main hub.

1. No surface preparation or coating removal required
2. Testing is performed without the need for bolt removal. Reducing potential down time on wind turbine production
3. Completed in-service
4. Real time test results
5. Easy crack detection
6. Permanent data records for monitoring on repeat inspections
7. Battery operation Phased Array units, no requirement for a power source



Internal Bolt hole scan.

### Result

The use of Phased Array for the detection of fatigue cracking on the wind turbines gives the client the assurance that they can run safely with high probability of crack detection. Reducing non productivity due to fast inspection turn around times. They can be repeatedly inspected for monitoring purposes as they come to their end of turbine design life.

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