



Innovation Challenge 3

Improving NDT capabilities for enhanced defect identification during production of large composite structures

Background

The OWiX initiative is supporting an innovation challenge owner in the offshore wind industry to identify transferable solutions to its innovation needs.

Currently wind turbine blades are subject to cutting out and repair of unqualified manufacturing defects while in the factory. It is estimated that c.90% of these repairs could be avoided with an improved non-destructive testing technique for better understanding the laminate characteristic in detail prior to making the repair. Avoiding these repairs would improve tact time and increase efficiency of the factory.

The proposed solutions for this challenge must be deployable without affecting existing manufacturing, installation, design and materials used in the composite structure.

X-Ray Backscatter technology currently appears to be the best suited technology to the challenge. While not limiting the technologies from solution providers, it is expected that solutions would consider innovations from some of the following areas:

- Xray (Principally back scatter technology)
- Sensors and advanced imaging
- Shearography
- Thermography
- Ultrasonic Sound
- Radiography
- Rail
- Aerospace
- Automotive
- Composites
- Medical scanning
- Oil and Gas
- Robotics
- Biotech (Cell identification)

Out of scope:

- Machine learning and artificial intelligence

To meet the desired timescale and risks, ideally the proposed solution, or the key part(s) of the solution should be 'off the shelf' and already demonstrated in an industrial environment. The solution should be in line with health and safety requirements and regulations.

Solution Requirements

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| Functional Requirements | <ul style="list-style-type: none">• <i>A solution must be capable of detecting, monitoring and acquiring data concerning the sub-surface condition of a large complex 3-dimensional glass fibre reinforced composite structure</i>• <i>A solution must be able to detect wrinkles in thick glass fibre laminate and to</i> |
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	<p><i>detect pools of resin with a desirable output being a view of the size and shape so qualitative decisions can be made.</i></p> <ul style="list-style-type: none"> • <i>A Solution must be deployed in a factory environment and would ideally reduce human intervention</i> • <i>Inspection must be undertaken ideally without the need to move the composite structure</i> • <i>The acquired data, such as measurements, images, logging time and ambient conditions, must be available for further analysis after inspection</i>
Technical Characteristics	<ul style="list-style-type: none"> • <i>Solution must be capable of non-destructive/non-intrusive inspection, detecting a minimum physical flaw/defect of 6 mm at a resolution of 2mm/pixel, to a depth of 100mm. The flaws may include a surface/subsurface crack, voids, debonding, delamination, wrinkles etc.</i> • <i>Solutions must be able to operate within the environmental limits of a normal factory building</i> • <i>Solutions must be able to scan the suspected area of damage in 10 minutes or less</i> • <i>For reference purposes, the inspected area is usually approximately 400mm by 1100mm in size</i>
Deployment Timescale	<ul style="list-style-type: none"> • <i>Validation of solution: by mid 2018</i> • <i>Field trials: by end 2018</i> • <i>Commercial implementation: by mid 2019</i>
Operating Conditions	<ul style="list-style-type: none"> • <i>Solutions must be able to be operated safely and reliably in the following production parameters:</i> <ul style="list-style-type: none"> ○ <i>An ambient temperature 20°C</i> ○ <i>Humidity 55 % RH</i> ○ <i>Atmosphere containing glass fibre dust particles</i>
Market opportunity	<ul style="list-style-type: none"> • <i>Improving the tact time for production of a single structure is where the market opportunity lies.</i> • <i>The current estimated UK market for a successful solution will be in the region of £1.5m p.a. with a significant additional export market and in other sectors.</i>
IP and Potential Commercial Route	<ul style="list-style-type: none"> • <i>Existing background IP associated with a potential solution will remain with Solution Provider(s). Where any new IP generation is envisaged, it will be subject to the mutual IP agreement of the Solution Provider(s) and Innovation Challenge Owner.</i> • <i>Any commercial deployment of transferred solution or newly developed solution, through licensing, joint venture, partnership or direct investment, will be subject to the commercial agreement between the Solution Provider(s) and Innovation Challenge Owner.</i> • <i>Where necessary, a non-disclosure agreement (NDA) may be signed to uphold confidentiality in the engagement between the Solution Provider(s) and Innovation Challenge Owner.</i> • <i>Innovate UK and KTN do not take any share of IP ownership or enter into commercial venture through the OWiX programme.</i>