



Innovation Challenge 1

A solution for the reliable detection, monitoring and capture of evidence of damage and flaws in the top layer of composite structures, performed internally within a restricted environment with minimal human intervention

Background

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

The proposed solutions for this challenge must be deployable without requiring changes to existing manufacturing, installation, design and materials used in the inspected composite structure. Whilst not limiting the technologies from solution providers, it is expected that solutions would consider innovations from some of the following areas:

- Robotics (crawling, flying etc.)
- Unmanned aerial vehicles (UAVs)
- Sensors and advanced imaging
- Spectroscopic / Sonic inspection
- Non-destructive inspection techniques
- Data processing and analysis
- Artificial intelligence
- Smart autonomous systems
- High accuracy positioning
- High penetration inspection
- Wide area laser scanning
- Smart coatings and lubricants
- Real time computer graphics
- Virtual cinematography

To meet the desired timescale and risks, it is preferred that the proposed solution, or the key part(s) of the solution, has been commercially proven in other sectors.

Solution Requirements

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| Functional Requirements | <ul style="list-style-type: none">• Solutions should be capable of detecting, monitoring and acquiring data concerning the physical internal condition of a large complex glass fibre reinforced composite structure.• Solutions must be deployed safely and ideally remotely to reduced human intervention.• Inspection must be undertaken in-situ with the structure held stationary at various radial angles.• Solutions should reach restricted spaces for inspection beyond what can be achieved by a human operator. |
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Technical Characteristics	<ul style="list-style-type: none"> • Solutions should be capable of detecting a minimum physical flaw/defect of 2mm, ideally to a depth of 20mm. The flaws may include a cracks or defects. • Structural defect data, such as measurements and images must be provided in three dimensions to an accuracy of $\pm 10\text{cm}$. • Solutions deployed when needed will need to fit through an access hole of 50cm by 50cm. • Solutions should be able to inspect a cross-sectional area of 150m^2 in 20 minutes or less. • Solutions that are permanently mounted to the structure, will need to operate while experiencing motion fatigue and at G-force.
Deployment Timescale	<ul style="list-style-type: none"> • Validation of solution: within 6 months • Field trials: within 1 year • Commercial implementation: within 1-2 years
Operating Conditions	<ul style="list-style-type: none"> • Solutions must be able to be operated safely and reliably in offshore conditions of: <ul style="list-style-type: none"> ○ An ambient temperature -10 to 50°C (but to a minimum temperature of -30C is preferred) ○ Heights of 100-200m from sea level ○ Distances up to 100km from shore • Solutions will be able to access a 120V electrical supply and WiFi or LAN connections. • Device failure or loss within the blade must be minimised or eliminated.
Cost Requirement	<ul style="list-style-type: none"> • New solutions must offer faster inspection rate at a lower overall cost. Current industry practice delivers inspection of 100m^2 within 20 minutes at a cost of £7,500 per 3 structures. • An ideal solution should aim to cost approximately £10,000 or less and offer a speed improvement of at least 50%. • The current estimated UK market for retrofit of a successful solution will be in the region of £54m with a significant additional growth in domestic and export markets.
IP and Potential Commercial Route	<ul style="list-style-type: none"> • 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. • 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. • 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. • Innovate UK and KTN do not take any share of IP ownership or enter into commercial venture through the OWiX programme.