



**QUEEN'S
UNIVERSITY
BELFAST**



Ultra-lightweight smart composites aerostructures for high altitude long endurance aircraft

Process and Assembly



Project Aim:

Spirit AeroSystems is interested in developing the capability for the design, analysis and manufacture of ultra-lightweight composite aerostructures to enable high altitude long endurance flight of large unmanned aerial vehicles with a wingspan approaching that of a large widebody passenger aircraft (50m – 70m). These UAVs will serve the function of high-altitude 5G communication platforms with the aim of providing 5G capability in remote areas. They are likely to be powered by hydrogen fuel cells where the hydrogen will be stored cryogenically in liquid form. The scale of this research programme requires two PhD students at a minimum and both will further contribute to the development of a digital twin.

Aims and Objectives:

- Identify and further develop state of the art manufacturing processes for ultra-light carbon-fibre composites
- Review and develop options for assembly, integration and test, for the new designs of aerostructures
- Explore process capability definition and modelling, with integrated design to process verification and validation, for part manufacture and assembly
- Build a digital twin of the manufacturing processes and the assembly integration and test, with embedded data analytics capability
- Build a scaled wing demonstrator for physical testing, with data analytics and link to the digital twin.

Advanced Composites Research Group



Key skills required for the post:

Candidate should demonstrate knowledge/experience/skills in at least one of the following areas:

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| <ul style="list-style-type: none"> • Computational modelling • Basic material characterisation/testing | <ul style="list-style-type: none"> • Basic material selection • Structural design |
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Key transferable skills that will be developed during the PhD:

These will include an ability to effectively communicate research outcomes to academic peers and industry, independent analytical thinking and problem solving, time management, and leadership.

Lead supervisor:

Prof Paul Maropoulos
Professor of Advanced Manufacturing
AMIC Director, p.maropoulos@qub.ac.uk

Other supervisors:

Dr Arfauz Rahman
arfauz.arahman@qub.ac.uk

Funding mechanism:

UK nationals only.

Application closing date:

31st July 2021

Guaranteed stipend

£15,285 tax free.

PhD students in the School may have the opportunity to apply to be demonstrators on undergraduate modules. Compensation for this can amount to in excess of £2,400 per year.

Queens University Belfast is a diverse and international institution which is strongly committed to equality and diversity, and to selection on merit. Currently women are under-represented in research positions in the School and accordingly applications from women are particularly welcome.