

<b>Title of studentship:</b>	Four-year EngD scholarship with the National Composites Centre: "Overmoulding for Butt-Joined Aerostructures (OBStruct)"
<b>Faculty/School/Department(s)</b>	Faculty of Engineering (University of Bristol)
<b>Location</b>	National Composites Centre, Bristol (BS16 7FS)
<b>Salary/stipend</b>	£20,450 p.a.
<b>Hours</b>	Full time
<b>Contract (temp/perm)</b>	Contract/temporary
<b>Closing date</b>	31 <sup>st</sup> August 2019/Once vacancy is filled

**Project Title:**

Overmoulding for Butt-Joined Aerostructures (OBStruct)

**Project Outline:**

The project proposes to investigate the use of composites over-moulding technology to manufacture stringer/stiffener joints for aerospace applications. The current state of art is as shown involves the manufacture and supply of multiple pieces of the butt joint structure and then to assemble these together inside a matched-cavity invar tool and to use an autoclave to generate temperature and pressure for co-consolidation.

The intention of this EngD programme of work is that the developed overmoulding process will be able to combine both the forming of the curved thermoplastic substrates (wing-skin, fuselage panel etc.) and the joining of perpendicular stiffener webs to the inside curved surface in a single manufacturing step by thermoforming the panel and directly injection moulding the filler inside a press tool which is holding the stiffener webs in-situ.

The ambitious target is to design and demonstrate a process which can be completed in a low cycle time (under 5min) thus having commercial viability as a replacement for the current lengthy autoclave consolidation.

This project will initially investigate the use of long fibre CF/PEEK and CF/Low-Melt PAEK laminates combined with short fibre filled injection mould compound, however, the scope of the research activity is open to different material combinations.

In the first 12 months, the research work is likely to include the following activities:

- Design & definition of aerospace demonstrator (butt joined stiffened skin panel) with stiffener run-outs
- Tooling development and procurement
- Thermoplastic composite manufacturing trials, inspection of joint quality, mechanical testing (pull-off shear) investigation of failure modes and improvements

Future work, in the subsequent years, is likely to include investigation of dissimilar material combinations, use of metal inserts, surface pre-treatment aspects, composite/metal interface bonding.

The main technical risks and challenges are likely to be:

1. Secure holding of the LM-PAEK inserts in the mould tool

2. Optimisation of the bonding/welding joint between the stiffener web to the filler across the entire length of the stiffener
3. Identification and evidencing of the specific failure mode of the stiffener joint

**PLEASE NOTE:** Applications are considered as soon as they are received, and the position will be allocated as soon as a suitable candidate is found.

**How to apply:** If you are interested in applying for this EngD project please send your CV, covering letter and academic transcript to [idc-composites@bristol.ac.uk](mailto:idc-composites@bristol.ac.uk)

**About the IDC and the EngD programme:**

For further information about the IDC and the EngD programme please visit:

<http://www.cimcomp.ac.uk/idc>

**Candidate requirements:**

**PLEASE NOTE THAT THIS PROJECT IS NOT AVAILABLE TO INTERNATIONAL STUDENTS DUE TO TIER 4 VISA REQUIREMENTS.**

Applicants with 'home student' status and holding or about to graduate with a first or 2.1 degree in structural or chemical engineering, materials science or physical sciences.

**Funding:**

Stipend: £20,450k p.a.

Standard EPSRC studentship eligibility criteria apply:

<http://www.epsrc.ac.uk/skills/students/help/Pages/eligibility.aspx>

**Contacts:**

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or contact [idc-composites@bristol.ac.uk](mailto:idc-composites@bristol.ac.uk)