

PhD Project Proposal

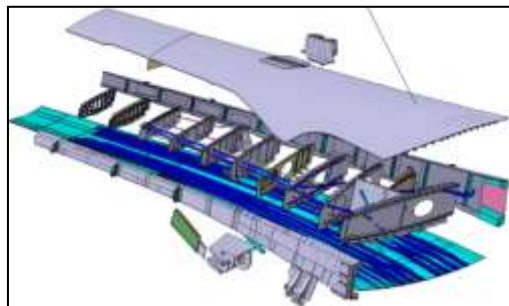
ECIT Interdisciplinary PhD Programme

Proposed Project Title: Supporting high value design and analysis through Artificial Intelligence

Principal Supervisor(s): Dr T Robinson (SMAE)

Project Description:

Within high value engineering the Digital Mock-Up (DMU) is the virtual representation of the product. It is used for design, validation, manufacturing and manufacturing planning. The DMU is comprised of Computer-Aided Design (CAD) models which represent the geometry of the components in the product, and it includes additional information relevant for manufacture and assembly (e.g. material properties, manufacturing tolerances etc). While the primary application of these models is primarily manufacturing, industry is now trying to use these models to support the computational analysis of the design, by using the geometry in the DMU as the basis for their analysis models. However, the conversion of the DMU into an analysis models requires a number of repetitive operations carried out by highly skilled engineers. These tasks are extremely time consuming and the conversion of a DMU into a meshed model ready for analysis can take many man years of effort. This project will investigate which aspects of the DMU to analysis model conversion process can be aided by applying Artificial Intelligence (including high-performance data analytics). Particular challenges exist around the representation of the 3D geometry in the DMU, which is typically a Boundary representation with analysis attributes applied, and how this will be represented for AI.



A DMU for an aircraft wing¹

¹<http://www.muelaner.com/part-to-part-assembly/a-new-paradigm-in-large-scale-assembly-research-priorities-in-measurement-assisted-assembly/>

Objectives:

Academic Requirements:

Students entering the programme will normally be required to have a 2.1 BSc/BEng in Computer Science, Electrical and Electronic Engineering, or a maths based engineering or physical science degree, or equivalent qualification recognised by the University. Students holding an appropriate MEng or MSc (Software conversion) will normally be

required to have a 2.1 or commendation (distinction) respectively. Furthermore, additional criteria may be applied. All applicants must have significant mathematical and programming experience.

GENERAL INFORMATION:

This 4 year PhD studentship, potentially funded by the Department for Employment and Learning (DEL), commences on 1 October 2019.

Eligibility for both fees and maintenance depends on the applicants being either an ordinary UK resident or those EU residents who have lived permanently in the UK for the 3 years immediately preceding the start of the studentship. Non UK residents who hold EU residency may also apply but if successful may receive fees only.

Applicants should apply electronically through the Queen's online application portal at: <https://dap.qub.ac.uk/portal/>

Deadline for applications: Friday 1 March 2019

Contact details:

Supervisor Name:
QUB Address:

Tel: +44 (0)28 9097
Email: