

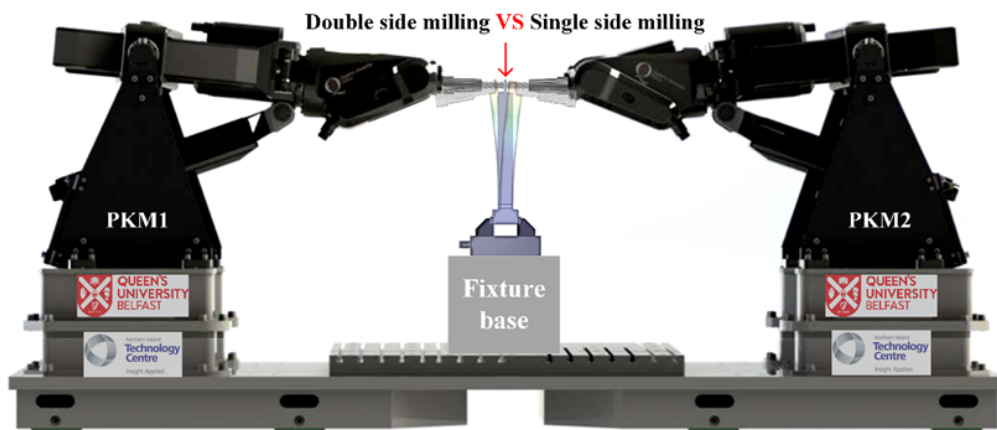
Queen's Doctoral Training Programme on Secure Connected Intelligent Design and Manufacturing

Title: DTP: Adaptive control of high performance machining by collaborative parallel kinematic machines

This project is part of the Queen's Doctoral Training Programme in Secure Connected Intelligent Design and Manufacturing. Many of today's industrial approaches require transformative changes to ensure long term societal, economic and environmental resilience and sustainability. PhD projects in this programme explore the potential of emerging digital technologies, such as artificial intelligence, robotics, and the Internet of Things, to transform the way we design, manufacture and operate products and services.

Project description:

Parallel kinematic machine (PKM) is a new type of machine tool which provides superior dynamic performance and flexibility, and has been identified as an enabler for next generation manufacturing systems. However, the control method of PKM is different from the conventional CNC machines due to its non-linear kinematics and dynamics. Therefore special care has to be taken to look after the control performance during machining. This project is to develop an adaptive control method in milling aerospace structures using PKMs.



Aims and Objectives:

- Understand the position based and force-based control methods for PKMs
- Develop a correlation model between the current forces and machining quality
- Create adaptive control strategy of milling one part with one PKM machine
- Develop adaptive and synchronised control strategy of double-side milling with dual PKM machines

Key skills required for the post:

- A 1st class undergraduate degree in Engineering (Mechanical/Aerospace Engineering, Manufacturing, Mechatronics, Electrical and Electronics, Automation, or relevant).
- Knowledge of machining processes considered as advantage
- Knowledge of robot kinematics and control considered as advantage
- Oral and written communication skills

Key transferable skills that will be developed during the PhD:

The programme offers a bespoke research and training programme that aims to develop students into cross-disciplinary, industry-conscious thinkers and leaders who will influence the roadmaps of future advanced manufacturing technologies and their applications. They will have a balanced understanding of ICT (security, communications and data analytics) in the context of their application to Advanced Manufacturing and High Value Design.

Lead supervisor:

Dr Yan Jin, Reader, School of Mechanical & Aerospace Engineering, email: y.jin@gub.ac.uk, URL: <https://pure.qub.ac.uk/en/persons/yan-jin>

Other supervisor(s):	Dr Mien Van, School of Electronics, Electrical Engineering and Computer Science Prof. Paul Maropoulos, School of Mechanical & Aerospace Engineering Prof. Adrian Murphy, School of Mechanical & Aerospace Engineering
Guaranteed stipend:	This is a 3.5 year funded Queen's DfE DTPs studentship with Training Grant, to commence on 1 October 2020 (N.B. stipend for 20/21 is not yet known, but is likely to exceed £15,000). The studentship covers fees and maintenance and is available for UK residents (see full eligibility criteria - nationality, residency, and academic qualification at: http://go.qub.ac.uk/dfeterms). When applying using the Queen's portal please ensure you include "DTP:" along with the project title.
Conditional top-up available:	£3000 per year top up may be available for exceptional candidate, dependant on the recommendation of the interview panel.
PhD students in the School 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.