The University Of Sheffield.

About The Job.

Advanced Manufacturing Research Centre (AMRC)

Erasmus Internship Student

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Overview

About the Department

The University of Sheffield AMRC is a cluster of industry-focused manufacturing R&D centres and supporting facilities.

The original Advanced Manufacturing Research Centre with Boeing, established in 2001, is a world-leading centre of advanced machining and materials research for aerospace and other high-value sectors. It has over 70 industrial members, from global giants such as Boeing, Airbus,

Rolls-Royce, BAE Systems and Messier-Bugatti-Dowty to local small businesses, and works with hundreds of other companies on specific projects.

The Nuclear AMRC, established in 2009, applies the same model of collaborative research to the nuclear supply chain. It has over 40 members, and helps UK manufacturers compete at home and worldwide for work in the energy sector.

Both the AMRC with Boeing and Nuclear AMRC are part of the High Value Manufacturing Catapult, a consortium of seven leading manufacturing and process research centres backed by the Technology Strategy Board.

The AMRC Training Centre opened in 2013 to provide the practical and theoretical skills that manufacturing companies need to compete globally, from apprenticeship to higher-level skills. The AMRC group also includes Namtec, which provides training and consultancy to the manufacturing supply chain; Castings Technology International, a leading provider of technology and expertise to the cast metals sector; and the AMRC Knowledge Transfer Centre, a dedicated meeting, conference and training hub.

Recent developments include the new AMRC Design Prototyping and Testing Centre; AMRC
Factory 2050, which will be the UK's first fully reconfigurable assembly and component manufacturing facility for collaborative research; and the Medical AMRC, a dedicated team focusing on healthcare technology.

AMRC is part-funded by the European Regional Development Fund.

Project Description

Robotic milling is an area of research that has become increasingly relevant, due to the need for flexible and reconfigurable manufacturing systems. The key challenges with robotic machining are the static and dynamic deflection of the robotic system, which leads to form errors, poor surface finish and low productivity. Besides, the control system performance, the coolant techniques to be applied are the other key factors to be investigated. The sub projects related to the robotic milling concept are listed as below.

1) **Modelling of kinematic chain:** The objective of this project is modelling the kinematics of a hexapod robot used for milling operations. The solid models and corresponding dimensions for assembly of the kinematic chain are available. The student is expected to derive the kinematic equation of motion for the hexapod system. Then, the derived kinematic chain equations will be used for identification of workspace without any singularity or out of limit conditions.

2) **FEM Modelling of static stiffness and structural dynamics:** The objective of this project is to model the static stiffness and dynamic flexibility of a hexapod robotic system in finite elements environment. The solid models and corresponding information for assembly of the hexapod system is available. The results will be verified through experimental results.

3) **Investigation of coolant techniques:** The objective of this project is to evaluate the coolant techniques applied in robotic milling. The student is expected to generate test matrices based on DOE approaches, evaluate and analyse the results of designed tests.

4) **Evaluation of control system response for milling:** The objective of this project is to evaluate the control system response of the hexapod robotic system for milling operations. The student is expected to design tests and evaluate the generated the data.

5) **Measurement of dynamic response using different sensors:** The objective of this project is to compare the measurement quality and applicability of different sensor for frequency response function measurements. The sensors mainly include accelerometer, vibrometer and laser displacement sensor. The student is expected to design measurement setups and evaluate the measurement quality.

Further Information

Enquiries about Erasmus Internship Mobility: Please contact the Erasmus Office in your University for further information about the Erasmus Internship Mobility application.

Informal enquiries:

For informal enquiries about this post, department and selection process, contact: Lutfi Taner Tunc on taner.tunc@namrc.co.uk

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