The road to an international career with a turbomachinery PhD from Queen's University

Combining advanced simulation and manufacturing of turbine housings to achieve aerodynamic efficiency gains

Why is it relevant? Increasing levels of engine boosting are necessary to achieve the engine down-sizing required to meet future vehicle emission/efficiency targets. Soon, the vast majority of new cars in Europe will be turbocharged and the automotive turbocharger business is expanding rapidly (around 55 million units per annum globally). The turbocharger is a critical component of a highly boosted engine, and good efficiency over a broad range of flows and pressures is necessary to deliver the performance and response that drivers expect.

What will I study? The project will study the complex aerodynamic flow within a turbocharger turbine with the following main objectives: 1.) Model and understand the 3D flow structures in the inlet housing of a radial or mixed flow turbine. 2.) Evaluate whether symmetrical or asymmetrical inlet housing concepts can provide a benefit at low speed conditions. 3.) Provide confidence in the results through experimental validation, and detailed insight into the aerodynamics through advanced Computational Fluid Dynamics modelling. 4.) Use Additive Manufacturing methods (AM) to produce prototype housing for performance testing.

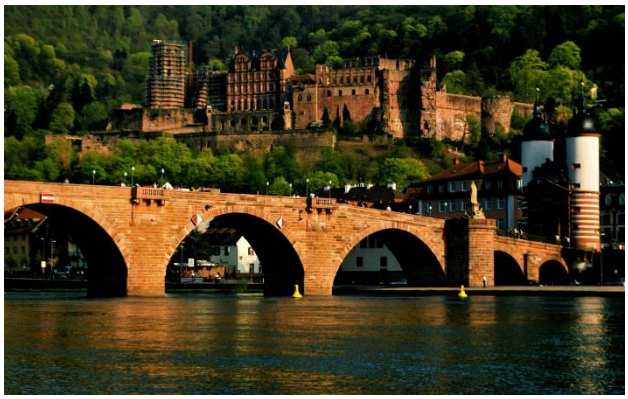
What skills will I develop? Like any best practice work in turbomachinery, the project will use advanced multidisciplinary engineering simulation along with experimental performance testing. 3D aerodynamic and structural modelling work will be carried out using the industry leading ANSYS CFX, Blade-Modeller and Mechanical software suite. Performance testing in the QUB Turbo Lab will use advanced instrumentation, National Instruments data-logging equipment and LabVIEW software. Professional skills will also be developed, including leadership, project management, technical writing and presentation skills. The skill set is not limited to the turbocharger industry and is very transferrable into other turbomachinery and energy industries.

Where will I go? The project is funded by IHI Charging Systems International GmbH, which is a leading manufacturer of turbochargers for Mercedes, BMW, VW/Audi and Ferrari, situated in the picturesque town of Heidelberg on the Neckar River in Germany. The PhD student will work closely with the industry supervisor, undertake a 3 month industrial placement at ICSI in Heidelberg, and also visit the company twice a year for formal project review meetings. (The company uses English as the main working language). The project may also require a visit to the Japanese design centre in Yokohama. Turbomachinery PhD students are expected to participate in the international technical community by attending conferences in North America, Europe and Asia. It is also expected that high quality technical papers will presented by the student at the leading conferences – ASME Turbo Expo, the Global Power and Propulsion Forum, the European Turbomachinery Conference and the IMechE Turbocharger Conference.

Qualifications. Applicants must have a strong 1st class honours degree in mechanical or aerospace engineering, or an equivalent qualification at Masters level. Candidates should be able to demonstrate that they are highly motivated, have excellent communication skills, and be able to undertake challenging tasks under their own initiative. Any experience relevant to turbomachinery would be advantageous, but is not essential.

Studentship. This 3.5 year studentship covers the full university EU fees and includes a tax-free income of £18,500 per annum (comprising a £14,500 basic stipend plus a performance related industrial top-up of up to £4,000, subject to satisfying the company's expectations). There is also the opportunity to undertake teaching and demonstration duties to earn an additional £1,500 per annum. The starting date for this project is flexible.

Applying. Applicants should apply online at http:/go.qub.ac.uk/pgapply. A covering letter and CV should be uploaded as part of the application. Closing date for receipt of applications: **Friday 16th March 2018**.
[NOTE: This studentship is subject to a selection process and the approval of the industrial collaborator.]



Heidelberg, Germany

IHI Turbocharger

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