

Energy Expertise

// Turbomachinery

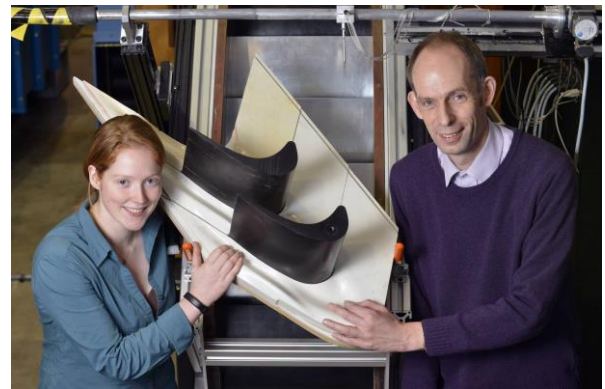
Main expertise areas

- Aerodynamics of turbomachinery blades and advanced 3-D design using state-of-the-art computational tools.
- Diffuser/exhaust hoods of low pressure steam and gas turbines.
- Sealing technology.
- Instrumentation development.
- Novel cycle design, assessment and testing.
- Flexible operating requirements for future power stations which will operate with intermittent renewable sources of energy.

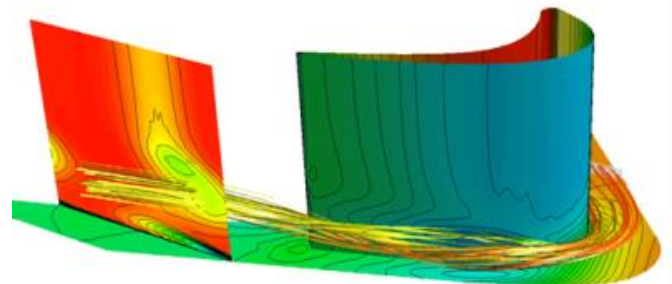
Background

Turbomachinery research at Durham has two strands: (i) improving the efficiency and flexibility of conventional power plant for electricity systems with high penetrations of generation from renewable energy sources and (ii) improving the efficiency of aeroengines.

Turbomachinery research has been a particular area of specialisation at Durham since the 1960s, led successively by Harry Marsh, David Gregory-Smith, Li He and currently by Prof Simon Hogg. Work in recent years includes pioneering development of computational fluid dynamics methods for fluid-structure interaction. This includes codes for flutter prediction in turbine blade rows used widely by industry, and award winning work by Ingram and Gregory-Smith on 3-D turbine blade passage end-wall design in collaboration with Rolls-Royce.



Alison Auld and Simon Hogg with a model of turbine blades designed at Durham University



Turbomachinery simulation

Recent projects

- EPSRC Future Conventional Power Plant Consortium
- Innovative seals development with the development of the “aerostatic gland” for steam turbines and “fluidic sealing” technology.
- Improved Modelling of the Exhaust Hood Flow in Low Pressure Steam Turbine Cylinders
- Design of Profiled Endwalls for Axial Flow Turbines
- Use of advanced image processing to measure surface flows on turbine blade models

Research team

Durham staff have extensive turbomachinery experience running research projects for industry (including Rolls-Royce, Alstom, Siemens and GE) and the majority of Durham staff in this area have previously been directly employed by turbomachinery manufacturers or by operators.

Prof Hogg has a long history of turbomachinery research gained whilst working in Universities and in Industry for ALSTOM Power. He is the Executive Director of the Durham Energy Institute.

Dr Ingram is the winner of the 2008 PE Publishing Award for best paper in the Journal of Power and Energy and is a member of the IGTI Turbomachinery Committee. He has also published an introductory text about turbomachinery.

Dr Sims-Williams, who has previously undertaken blade design and the development of steam-path design tools for ALSTOM Power.



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