



**The EPSRC Centre  
for Doctoral Training  
in Gas Turbine  
Aerodynamics**

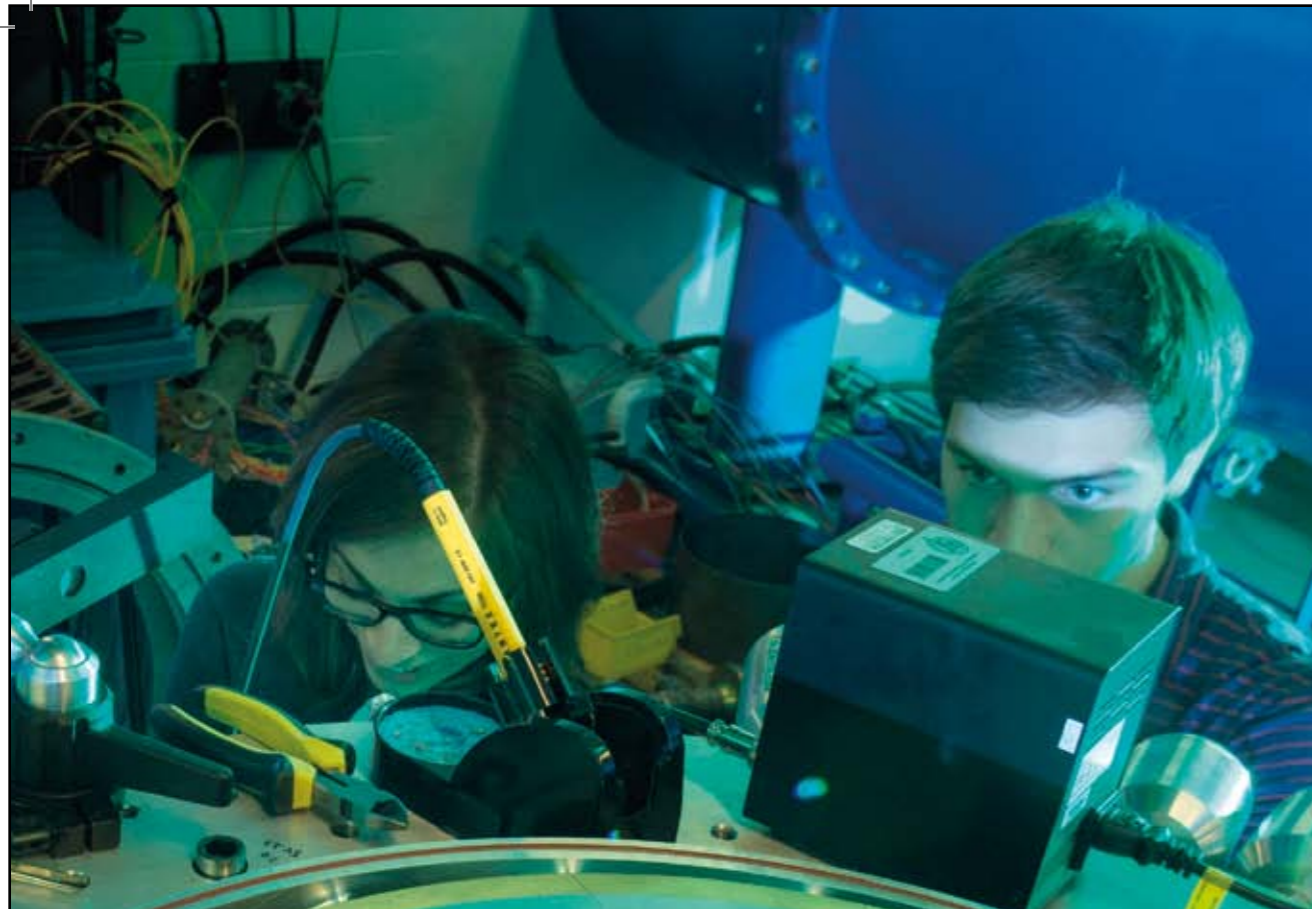


EPSRC  
Centre for Doctoral Training  
in Gas Turbine Aerodynamics

Whittle Laboratory, 1 JJ Thomson Ave, Cambridge CB3 0DY  
[www.cdt-turbo.eng.cam.ac.uk](http://www.cdt-turbo.eng.cam.ac.uk)

University of Cambridge, Department of Engineering





“THIS IS ONE OF THE MOST EXCITING INITIATIVES IN THE INTERNATIONAL FIELD OF GAS TURBINES. BRINGING WORLD CLASS COMPANIES AND RESEARCH LABS TOGETHER AROUND THE DEVELOPMENT OF FUTURE ACADEMIC AND INDUSTRIAL LEADERS PROVIDES VERY SPECIAL OPPORTUNITIES FOR ALL THOSE INVOLVED.”

**Professor Dame Ann Dowling**  
CDT Director



The mission of the EPSRC Centre for Doctoral Training in Gas Turbine Aerodynamics is to be an international centre of excellence for the training of the next generation of research and industry leaders. To accomplish this, the CDT has assembled the UK's three leading universities in the field of gas turbine aerodynamics (Cambridge, Oxford and Loughborough) and some of the world's leading gas turbine and turbomachinery manufacturers (Rolls-Royce, Mitsubishi Heavy Industries, Siemens and Dyson). The programme is guided by an Advisory Group of the world's top experts (from NASA, Rolls-Royce and MIT). The resulting partnership of academia and industry enables the CDT to deliver a unique whole engine, whole sector, training experience.

The CDT in Gas Turbine Aerodynamics is a 4 year programme: a 1 year masters course leading to the MRes in Gas Turbine Aerodynamics, followed by a 3 year PhD project sponsored by one of the collaborating companies (Rolls-Royce, MHI, Siemens, Dyson). The training approach taken by the MRes is holistic and incorporates 'hands on' experience of real products as well as access to diverse material previously only available on specialist industry courses. Projects focus both on the detail of key technologies, and also on the integrated nature of the gas turbine as a whole. The CDT will teach the skills, and provide the necessary environment, to develop research questions and projects that deliver both academic excellence and maximum industrial impact.

**Find out more here:** [www.cdt-turbo.eng.cam.ac.uk](http://www.cdt-turbo.eng.cam.ac.uk)



# UNIVERSITY PARTNERS

## University of Cambridge

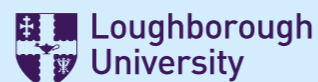
The Whittle Laboratory is a world leading research centre for turbomachinery aerodynamics. For more than 40 years, the Whittle Laboratory has advanced the state-of-the-art in compressor and turbine aerodynamics through a combined experimental and computational approach to research. The lab houses a large number of experimental facilities, both stationary and rotating, and is also at the forefront of CFD for turbomachines. The Department of Engineering, to which the Whittle Laboratory belongs, pursues associated research areas such as fluid mechanics, acoustics and combustion.

## University of Oxford

The Osney Thermo-Fluids Laboratory of the Department of Engineering Science, University of Oxford, is a leading centre for gas turbine heat transfer and aerodynamic research. The Oxford Turbomachinery Group has internationally recognised expertise in high speed rotating machinery experiments, instrumentation and cooling and heat transfer research. The group is based in a new laboratory which houses some of the most advanced turbine research facilities in the world. In recent years, the group has also progressed significantly in the development of novel computational modelling for turbomachinery aerothermal prediction and design optimisation.

## Loughborough University

The Aeronautical and Automotive Engineering Department at Loughborough University has a history of research excellence in the aerodynamics of gas turbine combustion systems. The Rolls-Royce University Technology Centre in Combustion Aerodynamics was originally created in 1991, but in 2011 its name was changed to the University Technology Centre in Combustion System Aerothermal Processes. This reflected an expansion of the UTC remit from the investigation of pure aerodynamic phenomena to one which includes all aerothermal processes occurring in the combustion system (where aerodynamics strongly links and interacts with heat transfer, two phase flows, acoustics etc.). Both experimental and computational approaches are used to study not only processes occurring within the combustor itself, but also the critical aerodynamic interactions with the compressor and turbine.



**Olufemi Awe**  
Oxford

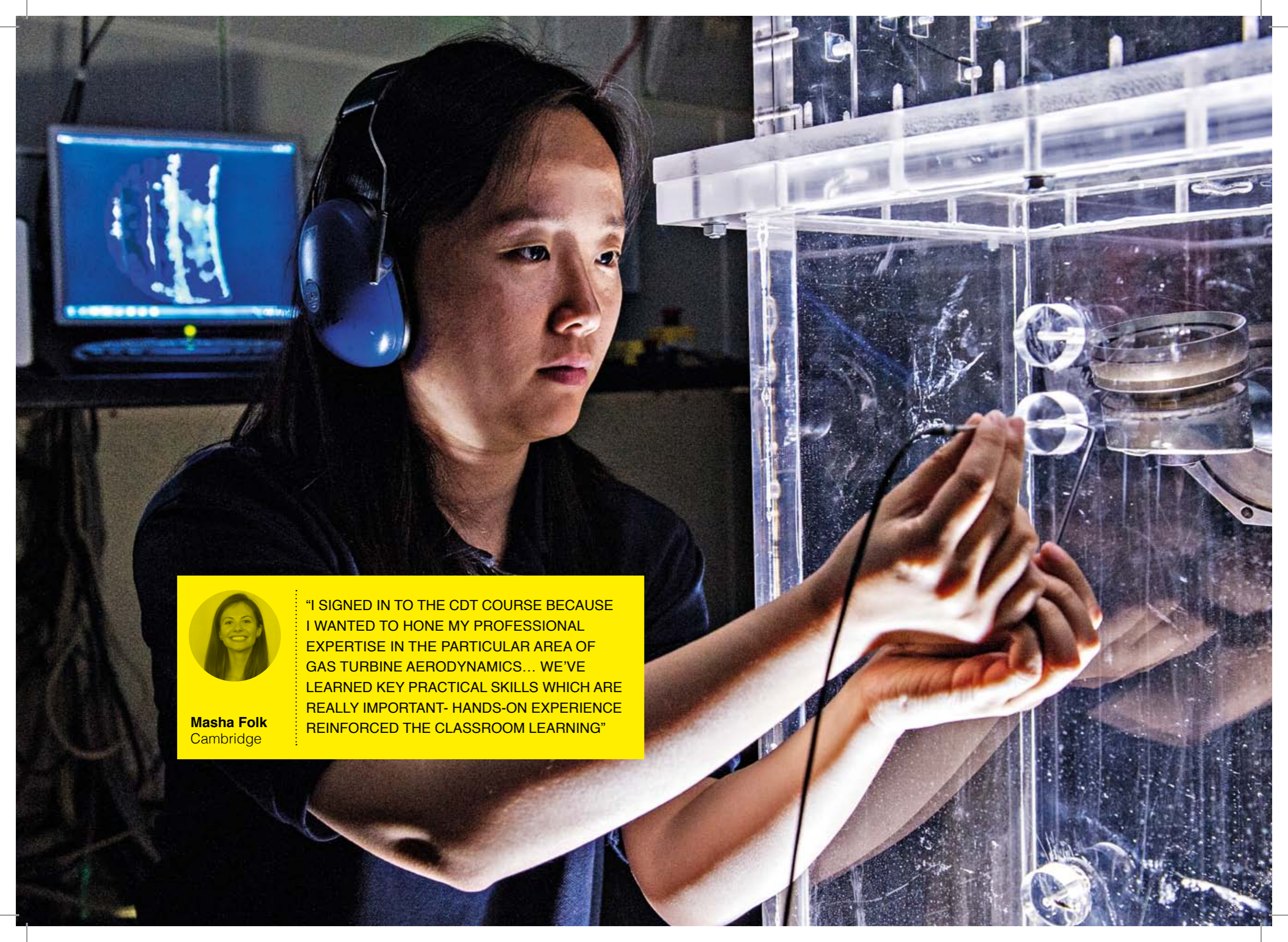
“AFTER THE MRES AT CAMBRIDGE, I FOUND MYSELF BETTER EQUIPPED AND THOROUGHLY PREPARED FOR THE DPHIL HERE AT OXFORD IN COMPARISON TO TAKING THE ‘TRADITIONAL’ ROUTE. YOU GENUINELY FEEL THE IMMENSE INVESTMENT PLACED ON YOU THROUGHOUT THE PROGRAMME.”





**Masha Folk**  
Cambridge

“I SIGNED IN TO THE CDT COURSE BECAUSE I WANTED TO HONE MY PROFESSIONAL EXPERTISE IN THE PARTICULAR AREA OF GAS TURBINE AERODYNAMICS... WE’VE LEARNED KEY PRACTICAL SKILLS WHICH ARE REALLY IMPORTANT- HANDS-ON EXPERIENCE REINFORCED THE CLASSROOM LEARNING”







**Nick Treleaven**  
Loughborough

“THIS TRAINING MAKES ME  
STAND OUT IN THE JOB MARKET...  
IT GIVES ME A BROAD TRAINING  
WHICH I CAN USE AS A SELLING  
POINT IN THE FUTURE”

## INDUSTRY PARTNERS

The CDT has been developed with the active support and assistance of a group of companies which span the entire gas turbine product range:

### Rolls-Royce

Rolls-Royce designs, develops, manufactures and services integrated power systems for use in the air, on land and at sea. Rolls-Royce are one of the world's leading producers of aero engines for large civil aircraft and corporate jets. They are the second largest provider of defence aero engines and services in the world.

### Mitsubishi Heavy Industries

MHI is a global leader in energy and aerospace and energy technologies. MHI provides a wide range of gas turbines, from 6MW class to 300MW class, to meet various requirements from customers all over the world.

### Siemens Energy

Siemens Industrial Turbomachinery Ltd is part of the Siemens Energy Sector and sits within the Oil and Gas Division. The Oil and Gas Division supply gas turbines in the 5-50MW power range for power generation and mechanical drive applications.

### Dyson

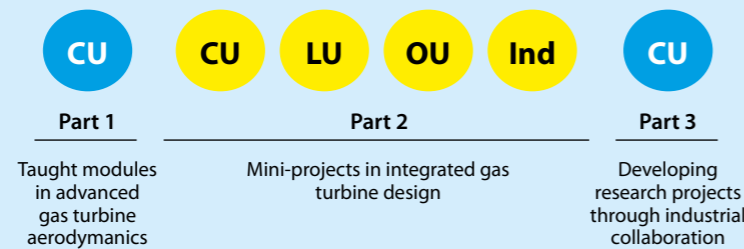
Dyson Ltd is a British technology company, founded in 1992 by Sir James Dyson, which designs and manufactures vacuum cleaners, hand dryers and bladeless fans and heaters. Dyson is a major developer of turbomachinery for domestic appliances.



# MRES PROGRAMME

In their first year at the CDT, all students study for the MRes in Gas Turbine Aerodynamics. During the MRes year, students are based in Cambridge (the MRes is a University of Cambridge degree) but make full use of the unique partnership between academia and industry that is at the heart of the CDT. This training provides a springboard to the PhD phase of the CDT in years 2, 3 and 4 (at either Cambridge, Oxford or Loughborough) and enables students to make an accelerated start in their PhD project.

During Part 1 of the MRes (October-December) students undertake a combination of core and elective modules. These modules, taught by experts from the three CDT universities, form an advanced-level graduate course in gas turbine aerodynamics, and also provide hands-on experience of both experimental and computational methods. In Part 2 (January-April), students experience working in the research laboratories of each of the three participating universities and also in industry. For the final part of the MRes (May-September), students work with an individual supervisor, and a broader team of experts drawn from the CDT partners, to develop a detailed project proposal dissertation for the PhD phase.



## Applications

### Eligibility

Entry into this exciting programme is competitive and will take account of qualifications, aspirations and experience. Successful applicants are likely to have an engineering background with some specialisation in fluid mechanics and thermodynamics; students from related fields will also be considered. Students are normally expected to have a 2.1 or 1st class honours degree from a UK university or an equivalent standard from an overseas university. The majority of successful applicants must be eligible for EPSRC funding but a number of places are also available to those who fall outside this category.

### Deadline

The final deadline by which applications must be submitted to the online system is 30 June in the year of entry for an October start. However, applications are continuously reviewed and prospective students are encouraged to apply as soon as possible.

Further details about how to apply can be found here: [www.cdt-turbo.eng.cam.ac.uk/Applications](http://www.cdt-turbo.eng.cam.ac.uk/Applications)



“THE MRES IN GAS TURBINE AERODYNAMICS IS A UNIQUE COURSE THAT COMBINES THE EXPERTISE AND FACILITIES OF THE THREE UNIVERSITIES, AND THE APPLICATION RANGE OF OUR INDUSTRY PARTNERS, TO PROVIDE A REAL SPRINGBOARD INTO YOUR PHD”.

**Dr Graham Pullan**  
MRes Director