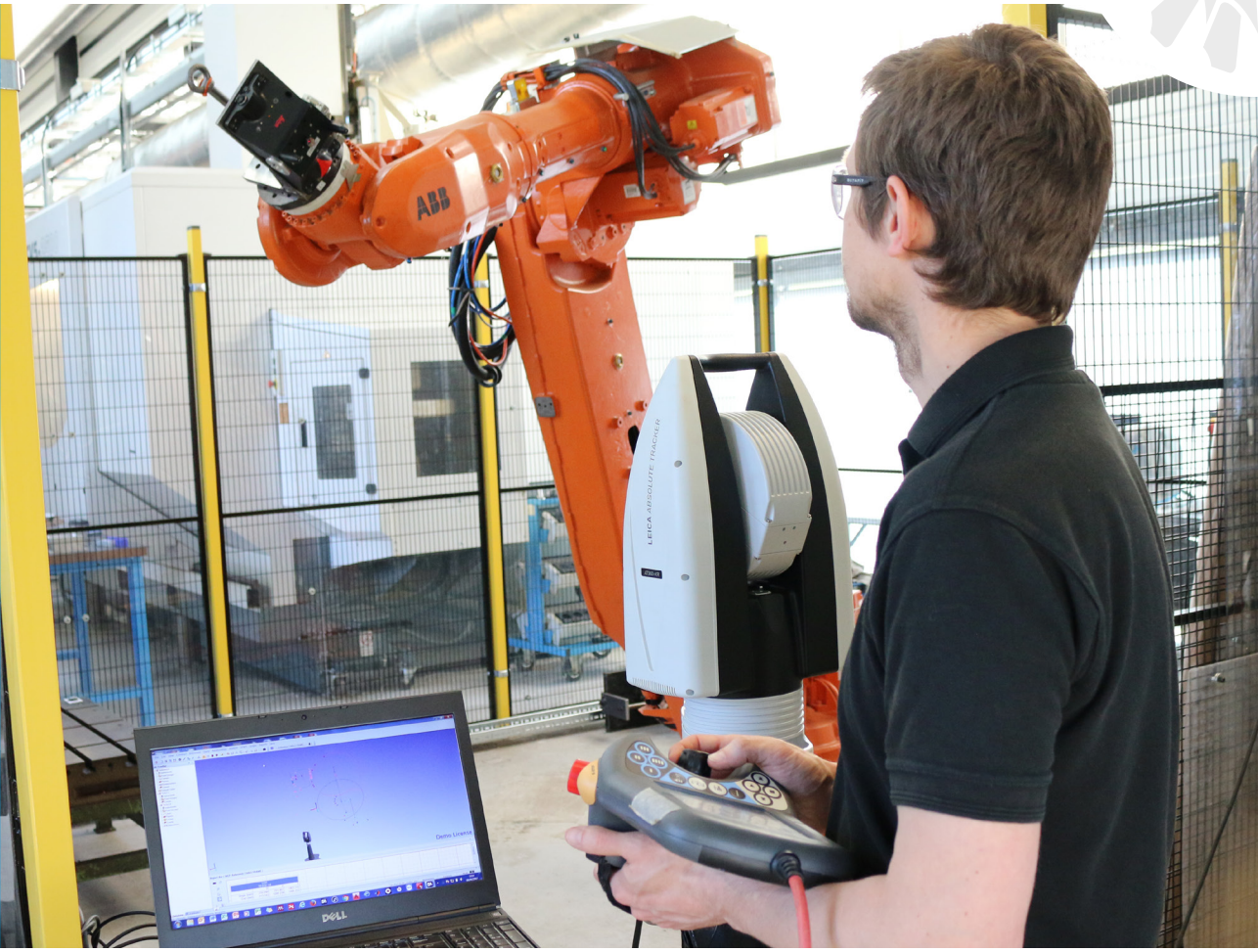
Student prospectus



idc Machining Science.

The University Of Sheffield.
Advanced Manufacturing Research Centre
BOEING

EPSRC
Pioneering research and skills

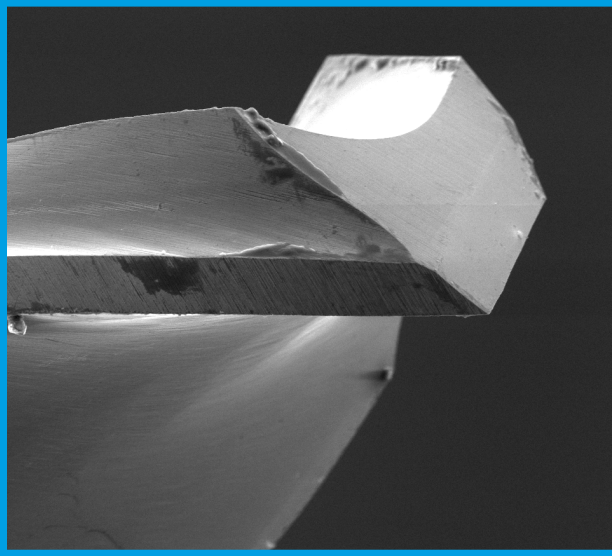
Funded Engineering Doctorate and PhD schemes

Fully-funded doctoral research opportunities

The Industrial Doctorate Centre (IDC) in Machining Science is a unique collaboration between industry, the University of Sheffield's Advanced Manufacturing Research Centre (AMRC) and the Faculty of Engineering offering sponsored four-year Engineering Doctorate (EngD) and fully-funded PhD research projects.

Our close links with industry will give you a solid foundation for your career and the opportunity to gain work experience on real problems in exciting sectors.

Our research focus is on improving the machining of high performance metals, alloys and composite materials in a wide range of operations where material is removed as part of the production process (e.g. hole generation, turning and finishing).



Machining Science in the High Value Manufacturing (HVM) sector

What is Machining Science?

Machining Science is the application of engineering theories to improve the machining of metals, alloys and composite materials. It covers a wide range of operations where material is removed as part of the production process (e.g. hole generation, turning and finishing), and crosses many engineering disciplines including dynamics, tribology, materials science, control systems, drive and actuation systems, and robotics.

A vital research area

Machining Science research is a critical area for companies in the HVM sector (e.g. automotive, aerospace, medical engineering) where at least 25 per cent of the process time for components arises from machining. The sector faces huge challenges, such as the difficulty of machining complex components from high performance (hence difficult to machine) materials, the cost of energy and raw materials, environmental sustainability, and the threat of international competition.

Who is involved?

The IDC is dedicated to developing the next generation of postgraduate researchers in this crucial area of the UK economy. Our industry sponsors represent all parts of the HVM supply chain from materials suppliers through to aircraft manufacturers. Our current sponsors include: Rolls-Royce, Boeing, Safran Landing Systems, ITP Engines, Metrology Software Products, Sandvik Coromant, Element Six, Seco, Bremont, Timet, Hexagon Metrology, Ricardo and Carpenter Technology.

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The University of Sheffield Faculty of Engineering and the AMRC

The Faculty of Engineering is one of the biggest and best providers of engineering research and education in the UK, with over 5,000 students and, combined with the AMRC, an annual research income of over £65 million.

The faculty provides research-led learning and teaching across the breadth of engineering subjects including aerospace, automatic control and systems engineering, bioengineering, civil and structural engineering, chemical and biological engineering, computer science, mechanical engineering and materials science and engineering.

We ensure we have the world's experts undertaking research and teaching our students and 93 per cent of all research is listed as 'world leading' or 'internationally excellent' (REF 2014).

The AMRC is the University of Sheffield's world-class centre for research into advanced manufacturing technologies used in the aerospace, automotive, medical and other high-value manufacturing sectors.

The AMRC has a global reputation for helping companies overcome manufacturing problems and is a model for collaborative research involving universities, academics and industry worldwide.

Combining state of the art technologies with the AMRC's expertise in design and prototyping, machining, welding, additive manufacturing, casting, composites and structural testing, has created a manufacturing resource far beyond anything previously available in the UK.

PhD or Engineering Doctorate - what's the difference?

The EngD and PhD are of equal academic status and both give you the right to use the title "Dr".

Both an EngD and PhD require a distinct "contribution to knowledge" which is tested in the traditional manner of academic thesis.

PhD

The PhD is the more familiar route providing training for researchers to work in academia or become industry based experts in their topic area. It usually has a more fundamental engineering science academic focus than an EngD.

In the IDC, PhD students will typically spend 75 per cent of their time working at the University, and 25 per cent at the AMRC or in industry.

EngD

The EngD was created over 20 years ago to meet the demand from the engineering industry for more applied postgraduate research, and provide a pipeline of highly qualified application-focused "research engineers" for their businesses.

EngD research projects have a more immediate link to the industry sponsors business needs than a PhD would, and EngD research engineers work closely with their sponsor.

After the initial training year, our EngD research engineers typically spend 75 per cent of their time at AMRC or their industry sponsors and 25 per cent at the University.

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Programme structure

The IDC is one of a small number of EPSRC Centres for Doctoral Training to offer both PhD and EngD study routes.

PhD and EngD students join as a single cohort in early September and broadly follow the same structure.

Both the EngD and PhD share the same format during the first year of the course. Most structured teaching and training happens in this first year, with a tailored programme of personal and professional skills development and taught courses in appropriate advanced engineering, science and technical disciplines.

This training underpins three mini research projects where students explore the scope of their main research problem and develop skills to become an effective researcher. They use this time to formulate their individual research questions, which will then be addressed in year's two and four of their study and culminating with the presentation of their thesis.

All students are placed in a research group in the Faculty of Engineering as well as having access to world-class research teams at the AMRC.

Key benefits

For candidates we offer:

- Four year fully-funded postgraduate research degree.
- Competitive tax-free stipend of £18,000 per year, with all academic fees paid, including expenses for the research engineer such as travel and food.
- Individually tailored training covering personal and professional development, science and technical training, plus skill building mini research projects.
- All research engineers enrolled in the programme are supported towards chartership.
- Access to a range of industry and academic contacts through the AMRC to raise the profile of your research and the chance to attend international conferences, with expenses paid.
- A qualification that is the launch pad for a rewarding career in high value manufacturing or academic research.

Cohort activities

Students can take part in a number of group activities such as organising an IDC conference, take part in team building activities days and submit images for group competitions.

Entry requirements

The PhD and EngD programmes are demanding degrees and we require a first, good 2:1 or Masters in mechanical engineering, materials science, applied mathematics, physics, aerospace, automatic control and systems engineering (ACSE) or other relevant discipline (depending on the specific project requirements).

Please note that there are residency eligibility criteria for EPSRC projects - for further information about whether you are eligible to apply, please see the IDC website at **www.ms-idc.co.uk/entry-requirements**

How to apply

Projects are advertised on the IDC website at **www.ms-idc.co.uk/vacancies** and on **FindaPhD.com** as they become available. You should apply directly for the project that interests you.

The main recruitment window is late autumn to early spring, but vacancies can arise at any time, so we recommend that you join our email list – email your details to: **idc-machining-science@sheffield.ac.uk** or follow us on Twitter **@IDCMachSci**

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Profile: Nathan Ray

Third year EngD Research Engineer
Industry sponsor: Safran Landing Systems

What are you researching?

My work focuses on the finish machining of Ti-5553 for safety-critical landing gear components manufactured by my industry sponsor Safran Landing Systems. The aim is to correlate in-process monitoring signals with process outputs such as tool wear and material surface finish, ideally allowing intelligent decisions and predictions to be made about the process without the intervention of an operator. This in turn will increase process efficiency and lead to immediate, tangible results and savings for my sponsor.

Why did you choose the EngD programme?

I researched the EngD and discovered how it's possible to work towards a doctoral qualification whilst getting involved in industrial projects which have immediate real-world benefits. With an EngD you gain the same high-level technical knowledge and skills as you would with a standard PhD. However you also get the valuable experience of working within a world-class engineering company and all of the benefits this brings including further on-the-job training and an industrial understanding that you simply wouldn't get without visiting a working shop-floor yourself.

Where do you spend your time?

I spend roughly 60% of my time at the Advanced Manufacturing Research Centre, 25% in University, and 15% at Safran Landing Systems in Gloucester. I find that by immersing myself in the industrial world, it's possible to build strong relationships with a range of important individuals who can offer help, support, and provide great exposure to other industrial partners; something which is very valuable for career progression.

Want more information?

For more information and a list of our latest PhD and EngD opportunities, please see the IDC website at **www.ms-idc.co.uk**

Join our email list - email your details to **idc-machining-science@sheffield.ac.uk**

Follow us **@IDCMachSci**

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AEngD