Working in industry

Birmingham Chemical Engineering

Are you in a dilemma about what to do once you have your undergraduate degree ? Should you continue with further study or should you start looking for a job with a company? Then perhaps the Engineering Doctorate scheme is the solution for you.

Instead of working in a University laboratory for three years you could be carrying out industrially relevant research within a host company for four years, whilst gaining your doctorate degree. The scheme attracts some of the best students in the country. A combination of a high tax free bursary, currently £19,400 p.a. and the opportunity to work with a prestigious engineering company enticed seven young Research Engineers to work with Rolls-Royce plc in Derby, whilst continuing their education with Centre for Formulation Engineering at the University of Birmingham.

Stewart Welch was the first student recruited onto the Engineering Doctorate in Formulation Engineering. Stewart graduated from the University of Birmingham with a first degree in Chemical Engineering. He was attracted to the scheme because of the chance to work on research challenges important to industry, gaining the experience of working within a business whilst studying for his doctorate. "Working closely with a team of engineers on real business problems has been a privilege, it has been great to see how my research can help direct the way a project progresses." He is currently writing up his thesis whilst starting a post doctoral position with Rolls-Royce, but back at the University of Birmingham.

The second recruit was also a Chemical Engineer from Birmingham. John Askins is currently working within the Fluids division of Rolls-Royce. Johns work has two main work streams, the first focuses on how a gas turbines oil system behaves

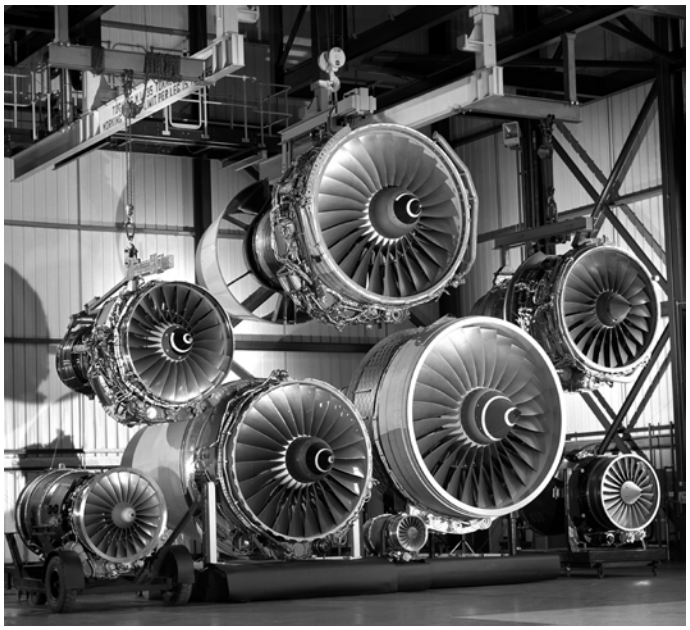
at high temperatures (associated with more efficient engines) and the second focuses on the use of alternative and renewable fuels in aviation, marine and power generation gas turbines. John says "The Engineering Doctorate programme has given me a large amount of industrial experience whilst also requiring the application of chemical engineering fundamentals I learnt at university such as heat transfer, mass transfer and chemistry."

The scheme is also attractive to students of other disciplines. Sam Tulloch, a Chemist from Birmingham University, is working with Rolls-Royce Marine division in conjunction with the Centre for Formulation Engineering and another University Department. Sam is investigating the behaviour of different boiler additives and comparing their performance. This project involves aspects of chemistry and materials science as well as engineering. Sam says "The Engineering Doctorate scheme has enabled me to continue my studies while gaining relevant industrial experience. The strength of my project is that it has allowed me to develop skills in engineering whilst allowing me to apply the knowledge I gained during my degree."

Shortly afterwards Dolapo Shobanjo, a Chemical Engineer from Imperial College, London, also started in Derby as she wanted to gain some industrial experience. Her project concentrates on the lost wax process, where she performs fundamental material studies to determine the influence of specially formulated waxes on the quality of injection moulded parts used for turbine blade manufacture. Her aim is to provide Rolls-Royce with an understanding of the principles which lead to defect formation, so that they can adapt their procedures and minimise costs, estimated at millions, associated with scrap. During her time on the EngD programme, Dolapo has travelled to various places including Naples Italy on both academic (presentations at conferences) and industrial trips (visiting with suppliers and going to different Rolls-Royce facilities). She currently has plans to present a paper at an upcoming conference in Chicago USA.

The Research Engineers are also sponsored by companies owned by Rolls-Royce. Paul Wilson (a Physicist from Birmingham University) is currently working with Ross Ceramics on improvements to the formulation of ceramic materials utilised in the manufacture of turbine blades. The ceramic materials involved are used during the metal casting process to create cooling channels within the turbine blade. The resulting cooling channels reduce the weight of the final blade and allow cooler air to be passed through the blade, reducing operating temperatures. The ceramics require stability at temperatures higher than the melting point of the metal being cast. Strict limits are placed on their properties and deviations can result in increased defect content of the final casted turbine blade. An improved ceramic formulation will result in less casting scrap and a reduction in costs. Improvements in formulation could also allow casting to be performed at higher temperatures, which also has the advantage of reducing other casting related defects.

Oxford University Chemist, Andrew Robinson, joined the scheme over a year ago and has so impressed his sponsors that he will be seconded off the scheme for a few months to help deliver a major internal project for Rolls-Royce. Rolls-Royce submarines, manufactures nuclear reactor cores for the nation's naval submarines. The division spans all areas of physical science, particularly chemistry and chemical engineering. The environment of Rolls-Royce is one for creativity, debate and personal development. Andrew says that "A bonus of the Engineering Doctorate scheme is that you gain confidence in industry while developing in a top UK academic centre."



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The final member of the Eng Doc team is Luke Tarrant, another Birmingham University physicist who is working in the Casting Division of Rolls-Royce and is investigating new formulation technologies relevant to the investment casting process. Rolls-Royce are at the forefront of aerospace engine technology developing powerful, efficient engines utilising next generation superalloys and featuring complex, challenging component geometries. It is the responsibility of the Casting Division to manufacture these components. Developing the manufacturing process relies on in-depth understanding of the rheological nature of the ceramic mould materials and their properties at elevated temperatures. Through investigating and understanding their behaviour we can develop new technologies capable of delivering the next generation of aero engines.

The Engineering Doctorate programme is supported by the U.K. Government via the EPSRC. The School of Chemical Engineering recently secured funding for another fifty studentships ensuring that graduates can be recruited for companies such as Rolls-Royce up to September 2014. To be eligible for the tax free bursary then candidates must have a relevant first degree in a Physical Science, Materials or (Bio) Chemical Engineering plus be a U.K. national. For more information on the programme including new projects visit www.eng.bham.ac.uk/chemical/study/postgrad/engd_projects.shtml or for more information on Rolls-Royce visit www.rolls-royce.com.