

Industrial Doctorate Centre: Formulation Engineering



Introduction to the Centre for Formulation Engineering

The **Engineering Doctorate in Formulation Engineering** ([/postgraduate/courses/combined/chemical-engineering/formulation-engineering-engd.aspx](#)) was established in 2001 with a £ 4.5 million grant from the EPSRC and to date has recruited 79 students (65 EngD students or Research Engineers and 14 MRes students).

In September 2009 the Centre was re-funded with a second EPSRC grant of £ 5.5 million to fund an Industrial Doctorate Centre with a further 50 studentships.

The current level of direct industrial support is over £2.5 million with in-kind industrial contributions of approximately £40,000 p.a. per student. Since Sept 2009 seven new Eng.D. projects have started. The scheme currently has 37

registered Research Engineers and 10 one year M.Res. students (three of whom are supporting themselves).

Research themes

Formulation Engineering is a new approach to the study of materials production whose microstructure is a complex function of process history. It concentrates on research into the physical, chemical and biological processes that create formulated product structure and the maintenance or breakdown of that structure in use. Examples of such products include foods, pharmaceuticals and speciality products such as paints, catalysts, detergents and agrochemicals. The School of Chemical Engineering is divided into four Research Themes:

- **Food, Health and Nutrition** ([/research/activity/chemical-engineering/food-nutrition/index.aspx](#)) led by **Prof Peter Fryer** ([/staff/profiles/chemical-engineering/fryer-peter.aspx](#)) F.R.Eng.
- **Energy and Chemical Industries** ([/research/activity/chemical-engineering/energy-chemical/index.aspx](#)) led by **Prof Kevin Kendall** ([/staff/profiles/chemical-engineering/kendall-kevin.aspx](#)) F.R.S.
- **Speciality Products** ([/research/activity/chemical-engineering/speciality-products/index.aspx](#)) led by **Prof Stuart Blackburn** ([/staff/profiles/chemical-engineering/blackburn-stuart.aspx](#))
- **Bio-engineering** ([/research/activity/chemical-engineering/bioengineering/index.aspx](#)) led by **Prof Owen Thomas** ([/staff/profiles/chemical-engineering/thomas-owen.aspx](#))



Good chocolate, bad chocolate



Formulated food products

Company support

Twenty-three different companies have sponsored projects to date ranging from blue chip multinationals such as Unilever, Rolls Royce, Cargill, Johnson Matthey, Imerys and Procter & Gamble to SMEs such as Green Biodiesel, Tornex and Mast Carbon; see Table 1 for a breakdown of companies involved.

The scheme is now pushing into Europe with projects based in Unilever in the Netherlands and BASF in Germany. Additionally, we are currently in discussions with many other companies to create new projects, in particular Akzo Nobel, Syngenta, Nestle, Pepsico, Kraft and Tarmac.

Table 1: Eng.D Sponsoring companies

Company	No. of projects	Company	No. of projects
Unilever	12	Catalent	1
Rolls Royce	9	S & N (now part of Heineken)	1
P & G	7	Sandvik	1
Imerys	6	Cargill	1
Johnson Matthey	5	Niro Galley	1
Cadbury	3	BioProducts	1
Boots	3	Tornex*	1
CalGavin	2	Green Biodiesel*	1

Dupont Teijin Films	2	Rich Foods	1
Pfizer	1	BASF	1
GSK	1	Mast Carbon*	1
Bristol Myers Squibb	1	(* = SMEs)	

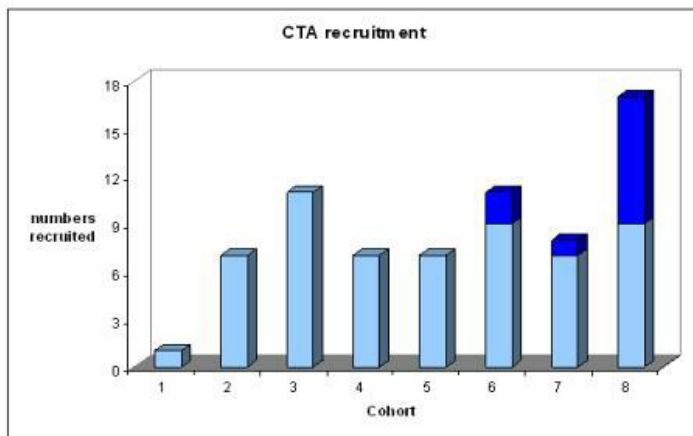
- News item: [Second 1851 Industrial Fellowship awarded to the Centre for Formulation Engineering \(/schools/chemical-engineering/news/archive/industrial-fellowship-awarded-centre-formulation-engineering.aspx\)](http://schools/chemical-engineering/news/archive/industrial-fellowship-awarded-centre-formulation-engineering.aspx).

Research Engineer recruitment

Entry requirement to the scheme is extremely high with over three quarters of the Research Engineers having a Masters qualification on joining the scheme. The programme prides itself on converting scientists into Chemical Engineers; over 50 % of entrants do not hold a first degree in Chemical Engineering. Recruits have entered the programme with undergraduate degrees in Chemistry, Physics, Aeronautical Engineering, Mechanical Engineering and Maths.

Approximately one third of the intake is female and over 60 % graduated from Universities other than Birmingham for their undergraduate degrees. Graduates have joined the scheme from Oxford, Cambridge, Imperial College, Durham, Leeds, UMIST, York, Warwick and Sheffield. Approximately 10 % of the Research Engineers are overseas students from Ireland, Italy, Poland and Spain. A similar percentage have industrial experience before joining. The recruitment profile by cohort is shown in Figure 1.

Figure 1 Recruitment profile by cohort



(Light blue = EngD students and dark blue = MRes students)

Modules

As well as an industry-focused research project the Research Engineers have to complete 120 credits of taught modules. There is a choice of over 35 different modules mostly at the University, but Research Engineers can also select specialised modules at the Universities of Newcastle, Liverpool, Surrey and Delft. The modules cover Science, Engineering, Marketing, Economics, Project Management and transferable skills such as presentation and team building.

- [Module details \(http://cis67.bham.ac.uk:7782/webhandbooks/WebHandbooks-control-servlet?Action=getModuleList&pgProgId=4931&pgProgArea=4931-01&pgProgDept=Eng.D%20Formulation%20Engineering&pgProgText=%20%20%\)](http://cis67.bham.ac.uk:7782/webhandbooks/WebHandbooks-control-servlet?Action=getModuleList&pgProgId=4931&pgProgArea=4931-01&pgProgDept=Eng.D%20Formulation%20Engineering&pgProgText=%20%20%)

Graduate employment

The scheme has a 100 % employment record. A third of the Research Engineers have been recruited by their sponsors, whilst several Research Engineers now work for companies that did not sponsor their project but support the scheme. But more importantly over 70 % are still employed in the field of Formulation Engineering.

Publications

Research Engineers have generated 24 journal papers so far and over 40 conferences papers, plus three book chapters and three patents. The scheme has funding for students to attend at least on national conference per year and one international conference over the four years. This summer Research Engineers attended the World Congress of Chemical Engineering in Montreal, an Atomic Force Microscopy conference in Santa Barbara, California and a ceramic conference in Krakow, Poland

Professional qualifications

The EngD programme has recently been recognised by the I.Chem.E. as counting towards Chartered Engineer status. Dr Iwan Edwards was awarded this status just 14 months after completing the four year programme.