

## The Teaching Contract Scheme in the Wolfson School of Mechanical and Manufacturing Engineering

**Peter Willmot**, Principal University Teacher,  
 Wolfson School of Mechanical and Manufacturing Engineering,  
 Loughborough University, November 2008

*This case study highlights the partnership between Wolfson School of Mechanical and Manufacturing Engineering and a consortium of companies who provide projects for second year and final year mechanical engineering students. Links to CS1 and CS2.*

### Reasons for engagement

The Teaching Contract Scheme is an integral part of the Mechanical and Manufacturing Engineering degree programme. Since the 1980s and the publication of the Grant<sup>(1)</sup> and Finniston<sup>(2)</sup> reports into training in the engineering profession, universities have placed greater emphasis on the provision of industrial projects; the benefits of which are widely accepted but difficult to quantify. Most institutions set and supervise project work as part of their curriculum and in many cases projects are generated through personal industrial contacts within companies or by speculative approaches from industry on an ad hoc basis.

The Teaching Contract at Loughborough is now well established and ensures continuity of industrial support at points within the curriculum. This scheme guarantees an industrially based design project for all second year mechanical engineering students as well as for M.Eng finalists from both mechanical and manufacturing disciplines. It provides additional well informed tuition and annually gives approximately 15 engineering companies a significant

involvement in mainstream curricular activity at Loughborough. The work is based at the University, and the students are encouraged to make use of the extensive facilities available. The company chooses to work with either second year or final year students depending on the expected difficulty of the project (see Cheung – CS1 and Curtis – CS2).

### The engagement

The Teaching Contract is a consortium of companies who agree to provide the projects and each company will work with approximately 16 students working in small teams of 4 or 5. The industrially based project work is written into the programme structure for second year students and final year masters students and almost 200 students take part each year. The modules involved are Application of Engineering Design (Year 2) and Project Engineering (Year 4). The work continues throughout the academic year after the problems are assigned during an initial factory visit, early in the year. The industrialists take part in tutoring and assessing the project work as it develops through a

programme of scheduled meetings at the University and can exert influence on the practices and procedures used. Companies report frequent positive outcomes and generally welcome the opportunity to work with prospective placement students and graduate recruits. The companies pay a small fee to the University that allows us to fund the necessary industrial visits, hospitality, cover basic project costs and maintain a high standard of report presentation. Over the years the scheme has involved a large number of engineering companies which range from major household names to small local enterprises.

During the summer period the student groupings and academic tutors are assigned to companies who, in turn, prepare an initial statement of their project ideas. Most commonly, a tutor visits the company to discuss the suitability of the project before it is revealed to the teams. For finalists we insist on a different topic for each team but for second years it works just as well when student teams compete on the same topic. In some cases, this is more rewarding for the company as they get a better breadth of concepts and investigations.

The project time-line requires students to visit the company in mid-October, industrialists come to the University in late November and early February and teams make their final presentations to companies and academic tutors in mid-May. At the end of the projects, students prepare a formal written report and deliver an oral presentation to the company. Copies of all the reports and drawings are made available. Academic supervisors are responsible for all aspects of assessment but will normally consult with industrialists in order to set realistic standards. Finalists are also required to mount a design exhibition and with all the teaching contract partners present (together with external examiners) this has evolved into a major annual undertaking.

## Issues

The primary task of the Teaching Contract Director is to ensure that there is sufficient capacity within the scheme for the student numbers. There is a natural turnover of companies and an effort must be made to recruit new companies at every opportunity. Industrialists are usually keen to talk about working with the department but less eager to make a time commitment. An information pack is sent to interested parties but face-to-face discussions are undoubtedly the most effective recruiting sergeant. We also invite any company managers who express interest during the year to the summer exhibition of students work. Much of the recruiting activity takes place during the summer vacation. In the present climate it seems that company recruiters are being very selective and targeting specific universities. The Teaching Contract has proved to be excellent and very cost-effective advertising for companies targeting graduates from Loughborough. Companies express a preference for working with either second year students or finalists. Some prefer second year because of the reduced commitment and the possibility of recruiting future sandwich placement students while other prefer the more advanced level of the final year work.

## Benefits

The benefits for students are that they gain knowledge and understanding of specialist engineering topics, awareness of industry and commercial realism, research techniques, team-working and communication skills, problem solving, written and oral presentational skills, prototyping and model making and structured project management practice. They also study a specific unfamiliar topic area in depth using a student-centred approach.

Many of the ideas put forward by the students have been taken up and developed

by the participating companies. Many more companies have told how they benefit from the unrestrained basic research done with fresh and open minds and how this often leads to novel and otherwise ignored conceptual solutions to longstanding problems. The scheme allows companies to tackle problems that the company would like to solve but which are perhaps not critical to daily production and which they would not usually resource. The scheme also provides excellent publicity for the company amongst the student body in respect of placement students and potential employees and access to University research using tools that may not be available in the company.

Good industry links enhance the department's reputation with potential students and provides a positive and powerful feature at professional accreditation. Contact with industry keeps staff up-to-date and the small income stream covers expenses.

### **Unintended outcomes**

An important consideration in setting up such a scheme is the need to provide meeting space for a large number of teams at the same time. We provide a large studio with separate project areas and have a number of small study rooms for team meetings. Motivation is soon lost if suitable accommodation is not available. Coping with this demand has proved difficult however the income from the scheme has enabled us to gradually bring in additional presentation equipment and other audio visual resources.

### **Academic/Industrialist/Student perspective**

Feedback from graduating students which is now reflected in some ways in the National Student Survey never fails to mention experiences of the 'Teaching Contract' and these are heavily weighted as positive experiences. Reports from students

suggest that prospective employers are impressed by the experience that this scheme gives otherwise inexperienced students and ask extensive questions about the projects at interview, which anecdotally suggests that it improves the employability of the graduates.

### **Reflections**

Industry projects provide an excellent vehicle to apply engineering science in context and practice key transferable skills that are so valuable to employers. Furthermore, industrial companies appear keener than ever to work with universities who they consider will provide them a source of high calibre graduate employees. Universities involved in engineering can only gain from such liaisons but they must weigh the benefits against the administrative complexity and the considerable time and space demands.

### **Context**

Peter Willmot is Principal University Teacher in Wolfson School of Mechanical and Manufacturing Engineering. He gained a BSc in Mechanical Engineering from Nottingham Trent University in 1976 and worked in manufacturing industry for 11 years, initially through an engineering apprenticeship and into various Design, Production Engineering and Project Management roles. Peter joined Loughborough University teaching staff in 1983 and was appointed Lecturer in Engineering Design in 1985 in the Department of Mechanical Engineering. He completed his PhD in Agricultural Machinery/Renewable energy in 1990 at Loughborough.

### **References**

1. The Grant Report, The Formation of Mechanical Engineers, the Institution of Mechanical Engineers: I.Mech.E 1985
2. Finnieston, Sir Montague. Engineering our Future. Report of the Committee of Enquiry into the Engineering Profession, Her Majesty's Stationary Office, 1980

