

UNIVERSITY OF BRIGHTON

RAEng VISITING PROFESSOR WORKSHOP

**"Recognition of ten years of achievement of the Visiting Professors in the Principles of Engineering Design scheme".**

1. **Background.** Design had been a central theme within most of the engineering courses at the (then) Brighton Polytechnic from the mid 1970s onwards. This was reflected in some of the first BEng courses being established at Brighton post the Finniston Report, and national recognition gained for the Engineering Applications work developed at this time. It was thus a natural progression for the University of Brighton to be in the first tranche of Visiting Professors (VP) in Engineering Design.
2. **Strategy.** The strategic decision was taken at the start of the programme to work collaboratively between all the three disciplines involved - Civil, Electrical and Mechanical Engineering - in order to both maximise the benefits to be obtained by each of the (then) departments by sharing good practise, and also to demonstrate that a common approach to design could be developed between the three disciplines thus facilitating more inter-disciplinary working to mirror real engineering practice in industry. (The Departments of Electrical and Mechanical Engineering have since been merged to form a single School of Engineering, and the Department of Civil Engineering has expanded to form the School of the Environment.) The Faculty-wide MEng programme running at this time provided an ideal vehicle for inter-disciplinary projects, thus enabling design concepts and approaches to be applied in realistic settings.

It was also decided from the outset that the VPs would not be used primarily to deliver lectures to undergraduates; this role was already being filled by Visiting Lecturers from industry. Rather, the VPs would be used to work with academic staff to develop a more design-oriented curriculum and introduce innovations to enhance the students experience of design.

3. **The VPs.** The three full-time equivalent VP posts awarded - one per discipline - were actually used to employ five VPs. Care was taken to select senior industrialists who had substantial experience of 'real' design activity at a professional level, who exhibited enthusiasm to work with students, and who were relatively local to the University thus enabling visits to be made at other than scheduled times. A list of the five VPs is given at appendix 1.
4. **Implementation.** All five VPs were invited to join the appropriate discipline-specific Industrial Advisory Board to ensure that the profile of Design was raised within each area. A 'Design Forum' was established, chaired by

the Dean of Faculty, including the three relevant Heads of School together with colleagues from the Faculty of Art and involving invited industrialists in addition to the VPs to ensure that best practice was shared as widely as possible and new developments recognised. The Design Forum approach and Three Year Plan is given at appendix 2. (With the merger of the departments, much of the activity transferred to the Engineering Industrial Advisory Board.)

In response to a request from the RAEng, early consideration was given to identifying how to measure the success of the scheme. Appendix 3 shows the eight criteria agreed (at the Design Forum) to be the most appropriate measures to employ. An attempt was made to review each of these criteria for each discipline at the end of each session.

5. **Outcome.**

5.1 **The Design Process.** An early challenge set in the Design Forum was to articulate a model of 'The Design Process' which was acceptable to all three disciplines. This was achieved eventually - after many iterations! - and was used in wall chart form in the drawing offices in each of the three Schools. The process model is given at appendix 4. It remains on display and is referred to by students particularly in the early stages of their degree studies.

Notwithstanding this formalisation of the design process, a 'low bureaucracy' design approach was pioneered by one VP (taken from his own industrial experience) and employed successfully in early student design studies.

5.2 **Curriculum changes.** All the engineering courses in the Faculty contain more design-related activities than hitherto, and the syllabus content in many areas has been enhanced via the involvement of the VPs. For example, thermodynamics modules now contain more reference to the practical constraints of designing IC engines, and materials modules now contain more work on material selection for design purposes. Identifying user needs, appreciating cost constraints and managing the design process are topics which now figure more overtly in many courses.

5.3 **Student activity.** Students are involved in more realistic, open-ended design work which encourages more creative thinking. All the main engineering courses now include group design work concentrated into 'Design Weeks' scheduled during term time to focus attention on projects of a more realistic scale than possible with short, weekly sessions of one or two hours. This has raised the students enthusiasm for the design activity while highlighting weaknesses in their abilities.

An increasing number of final year undergraduate projects contain a significant design element, and the use of CAD is becoming routine in many areas.

5.4 **Portfolio approach.** Students are increasingly required to maintain a record of all their design activity in a 'portfolio'. This, coupled with a number of display periods (or 'crits' as Architects call them) when students show the state their design has reached, enables the objective and professional criticism of the VPs to be fed back to students during the course of their work. Justifying the selection of materials and components is a common focus during such periods. It is this 'hands on' engagement of the VPs with students which gives the work at Brighton its particular flavour.

5.5 **Specialist lectures.** VPs also give some relatively formal presentations to students, largely based on case studies drawn from their personal experience. These could range from the design of a motorway bridge (for the Civil Engineers) to the design of a new configuration of lightweight IC Engine (for the Mechanical Engineers). These case studies are usually tailored to suit the projects being undertaken by the students and are thus more directly relevant than visiting lectures delivered by industrialists less engaged with the University. They tend to be concentrated into early years of the courses.

5.6 **Graduate employment.** The University of Brighton has always enjoyed a very high graduate employment rate. Indications are that the number of engineering graduates entering design-related jobs is increasing, thus helping to maintain this tradition.

5.7 **New Courses.** A number of new courses have been launched successfully within the Faculty as a direct result of the growth in design interest, including:

BSc Product Design  
BSc Design and Technology  
and MSc Product Innovation and Development

Growth in recruitment to the first two of these has countered the decline in applications to the BEng Civil, Electrical and Mechanical Engineering degrees, thus enabling the Faculty to sustain its overall student and staff base.

5.8 **TCS Activity.** The Faculty houses the very successful TCS (Teaching Company Scheme) Centre for the South East. There has been a significant growth in design-related TCS schemes over recent years, no doubt partly as a result of the increase in design activity throughout the Faculty.

5.9 **University Design Centre.** The growth in interest in design has resulted in a proposal to establish a University Design Centre as a component of the Sussex Academic Corridor (a joint initiative involving the University of Brighton, University of Sussex, City College Brighton and Hove and the Local Authority). This is in the early stages of development, having been delayed by difficulties over acquiring an appropriate site, but in the meantime, a Design Suite has been established in the

School of Engineering and acts as the focus for the growing design course portfolio.

6. **Present situation.** Although until recently three of the five VPs had retained their involvement with the University after their formal contracts had ended - a clear indication of their enthusiasm - the reduced time available has resulted in some reduction in activity. This, coupled with the relentless increase in pressure on staff time, has meant that some momentum has been lost. For example, the Design Forum has not met for some while. However, the parallel Sustainability VP activity now operating very successfully in the School of the Environment is maintaining a strong focus on design activity. In addition, the scheduled internal review of the Product Design course taking place in the summer of 2002 will provide the opportunity to explore how to re-energise the Design Forum.
  
7. **The future.** The Engineering Design VPs initiative has led to a wealth of benefits to the students, staff, the University and local and regional industry. It has created an awareness of the importance of design that is infiltrating the culture of both the engineering schools in the Faculty. However, continued vigilance is required to ensure that the progress made is not halted as a result of the many other pressures on teaching staff; open-ended design work is time-consuming to plan, facilitate and assess. 'Permanent embedment' is the ultimate target, but is yet to be achieved.

It has just been agreed that the Sustainability VP will formally extend his brief beyond the School of the Environment to introduce an in-depth understanding of the importance of sustainability into the School of Engineering, thus maintaining the cross-faculty inter-disciplinary cooperation which, together with the Design Weeks, form the most significant achievements to date of the Engineering Design VP initiative at Brighton.

FJM.sm.Revised 28.3.02

Royal Academy of Engineering Visiting Professors in the  
Principles of Engineering Design

Professor John Bergg OBE  
Council

Surrey County

Professor Alan Crouch  
Consulting Engineers

Ricardo

Professor Paul Wesley

Hitachi Seiki

Professor Lionel Lake

Mott MacDonald

Professor Jack Izatt

Consultant

FACULTY OF ENGINEERING AND ENVIRONMENTAL STUDIES

VISITING PROFESSORS IN ENGINEERING DESIGN

**DESIGN FORUM - THREE YEAR PLAN**

The Forum explores the principles and practice of design across a range of disciplines, and seeks to raise awareness and enhance the overall standard of design in the University

**1. Approach to be employed:**

The Design Forum will:

- 1.1 meet in different venues of relevance to design practice.
- 1.2 focus each meeting on a particular theme via a scene-setting paper in advance and a presentation and discussion on the day.
- 1.3 provide the opportunity for members to relate the discussion to their own experience and current area(s) of activity.
- 1.4 invite colleagues from elsewhere in the University and from local industry to attend when appropriate.
- 1.5 provide the opportunity to explore the University student design experience and assess the outcomes in order to raise the overall standard of design.

These activities will be complementary to the ongoing school - specific activities of the Visiting Professors in Engineering Design.

**2. Three year plan targets:**

- 2.1 **Regular Meetings.** Average two per year (say April and October) each in a different venue, including company premises, design studios, near-completed major design projects, etc. Each meeting should have a focus linked to the venue, with a scene - setting paper distributed in advance to encourage discussion on the day.
- 2.2 **Special Events.** Organise a 'Prestige Lecture' by a distinguished Designer in the second year, and establish this as an annual event thereafter.
- 2.3 **Attendees.** All Visiting Professors, all Heads of School in the Faculty, the Dean of Faculty, and all teaching staff directly involved in Design. A minimum of (say) six staff from the Faculty of Arts and Architecture, and a similar number of external industrial Designers should be regular attendees by the end of the three years.
- 2.4 **Student Design work.** Monitor student work by ensuring that some Forum members attend all student

presentations. Continue to criticise constructively the outcomes. Encourage entry into external, high profile Design Competitions with a view to being short listed in two in the second year, and winning at least one in the third year.

#### 2.5 **Design Tools.**

Continue to explore the similarities and differences between the approach to design used in each of the Engineering Disciplines with a view to publishing a major paper in the second year, and attracting external funding to appoint a Research Student in the third year to initiate an ongoing research programme.

FJM/(Revised 15.4.98)

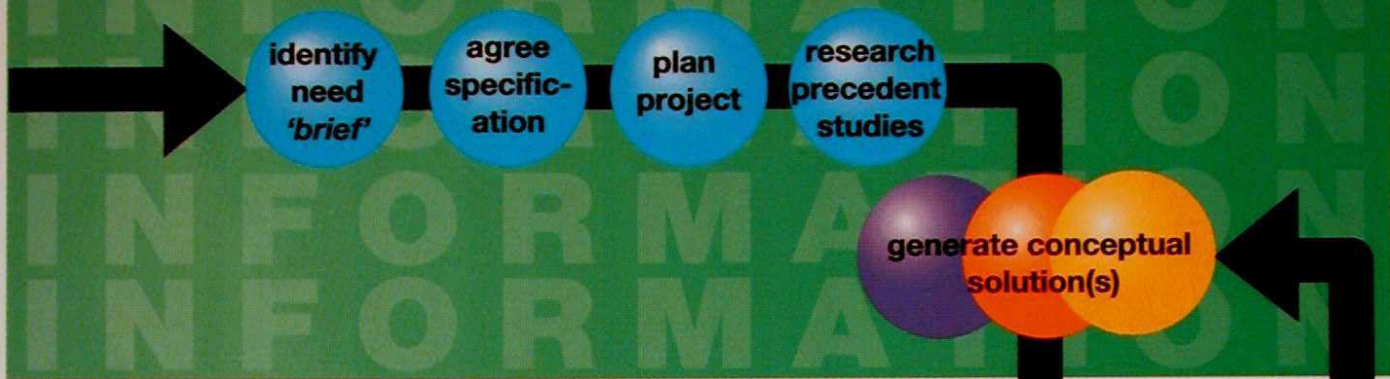
**RAE Visiting Professors in Engineering Design**

**Assessment of Success of the Scheme**

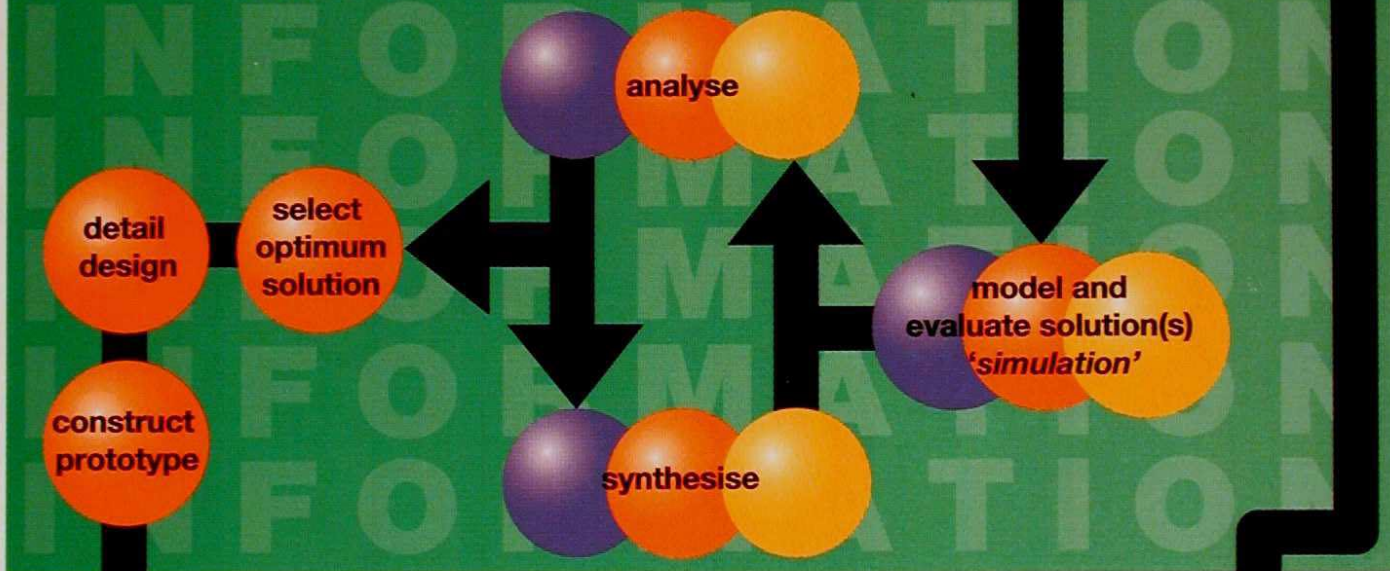
**Criteria of Success:**

1. Course curriculum and syllabus reflect a significant design content.
2. Students select free-choice design courses.
3. Student projects involve significant open-ended design activity.
4. Teaching philosophy reflects a design approach in most subjects.
5. Student feedback on design activity is positive and enthusiastic.
6. Graduates find ready employment in design-related jobs.
7. Staff have experience of design activity in industry.
8. Departmental research activity includes design-related projects funded by external agencies.

## CONCEPT STAGE



## DETAIL DESIGN STAGE



## DEVELOPMENT STAGE

