



*An Ingenious case study*

# Engineering Masterclasses



### The aim

Using the Royal Institution's (Ri's) established Mathematics Masterclasses format, the Engineering Masterclasses project trained engineers to develop and deliver intensive, hands-on, engineering workshops for 13-15 year olds.

The masterclasses showed the students how relevant, important and fun engineering is and gave the engineers the skills, confidence and motivation to share their expertise with young people.

*"Parents were asking us 'Will you do adult courses as well?'"*

Diane Crann, Project Manager

### About the project

Nine practising engineers from UK companies were recruited to develop and deliver twelve Saturday morning masterclasses, which were grouped into four series of three classes.

The engineers attended meetings at the Ri to discuss their topic and workshop ideas based on their field of work. The sessions were designed to provide training for the engineers, to help them prepare a lesson plan and to learn how to communicate effectively with teenagers.

Shorter practice sessions held in school lesson-time or after-school clubs let the engineers try out their activities and get feedback from students and teachers.

The engineers then delivered their masterclasses, each of

which lasted two and a half hours to an audience of up to 50 school students in London.

Each engineer did at least two practice sessions and two masterclasses, keeping a logbook of their entire experience from their initial meeting with the Ri team to the project's completion.

The school students learned about the latest developments in engineering and, working in groups, took part in 'make and build' activities before discussing the technology's societal and ethical implications.

At the end of the project, students, helpers, families and guests attended a 'Celebration of Engineering' reception event at the Ri where they met other young engineers.

**Grant holder:**  
**Project Manager:**  
**Organisation:**  
**Funding type:**  
**Activity type:**  
**Level of funding:**  
**Project period:**

**Dr Vinay Kathotia**  
**Dr Diane Crann**  
**Royal Institution of Great Britain**  
**Ingenious Public Engagement Grant**  
**Engineering activity workshops for 13-15 year olds**  
**£30,000**  
**April 2008 to August 2009**

### How did it go?

The project presented new opportunities to engage audiences with engineering. Furthermore, the funding was stretched to take on three more engineers, instead of the six as originally intended, meaning that extra masterclasses could be delivered. The engineers were also invited to give other events including a public lecture and a presentation to the 2009 Association of Teachers of Mathematics Conference in Swansea. One of the engineers also delivered an additional masterclass to primary school pupils.

### Best bit?

The enthusiasm from everyone involved was the most rewarding part – from the students and engineers involved to the parents, teachers, and undergraduates who also supported the project:

*“The overall experience for me was brilliant. It allowed me to improve skills in presenting and designing a tutorial / training session which will prove invaluable in my career. I was inspired by the interest and feedback from the students and teachers I met and hope my passion for the field has been passed on to those I worked with.”*

Ingenious Project Engineer

### What next?

The Ri team has stayed in touch with the engineers for future projects and has met teachers across multiple departments within the participating schools. The Ri is exploring how to expand the format and has received further *Ingenious* funding to integrate more engineering into their activities, including primary masterclasses and family fun days for children between 5 and 14.

*“All the engineers really enjoyed it and want to carry on with the scheme. A few have said it’ll help them in their future career – [they said it was] an opportunity they didn’t know existed.”*

Diane Crann, Project Manager



### Masterclasses were:

- 1. An introduction to suspension**  
Ben Kinderman, Mechanical Engineer  
Angel Trains
- 2. Railway track circuits**  
Bart Thomas, Electrical Engineer  
Network Rail
- 3. Loudspeaker design**  
Jon Constable, Mechanical Engineer  
Charles Austen Pumps
- 4. Challenging material properties with silly putty**  
Simon Fahy, Chemical Engineer  
GlaxoSmithKline
- 5. The engineering of vehicle safety**  
Costandinos Visvikis, Mechanical Engineer  
Transport Research Laboratory
- 6. The design of floating bridges**  
Chris Woodfield, Civil Engineer  
Buro Happold
- 7. Fuel cells and hydrogen**  
Gavin Harper, Renewable Energy Engineer  
University of Cardiff
- 8. Designing the hip joint:  
Why don't we fall over when we stand up?**  
Dr Andrew Phillips, Structural Engineer  
Imperial College, London
- 9. Building Bridges**  
Victoria Wood, Structural Engineer,  
Expedition Engineering