UNIVERSITY OF BIRMINGHAM

THE QUEEN'S ANNIVERSARY PRIZES
FOR HIGHER AND FURTHER EDUCATION
2011

EngD Outreach Report (edited version)

December 2012

EPSRC
Engineering and Physical Sciences Research Council

Introduction

This report seeks to capture all the Outreach activities of the Research Engineers in the Centre for Formulation Engineering at the University of Birmingham. This is the first of such Annual Reports and will hopefully act as a record of activity plus inspire future Research Engineers. The vast majority of the Research Engineers have carried out some degree of outreach activity and the recent recruits are signing up for workshops organized by the School's own Outreach Officer, Emma Carter, so as to plan their activities effectively.

A large number of the Research Engineers that work on Food related projects were involved with the " Brum dine with Me " event in September in Birmingham City Centre, others have given presentations in primary and secondary schools, whilst others have hosted sixth formers in their company laboratories or been involved with undergraduate modules within the University. Several have formally registered as STEM Ambassadors.

A few students have represented their companies via sports teams, playing in local leagues helps promote the company, the EngD Programme and Science / Engineering. Others have been involved with charity work again through their host Company. A couple have even participated in local radio programmes, again promoting the EngD programme and their research.

Special mention must be made to Sam Wilkinson and Peter Clark from Johnson Matthey who have totally embraced the outreach concept and have developed a large portfolio of activities. Thank you to everyone for getting involved and I look forward to hearing about next year's activities. I hope this document gives you food for thought.

RWG October 2012

Brum Dine with Me

Brum Dine with Me took place on Friday 28th September 2012 in Brindley Place in the centre of Birmingham. This was part of a European initiative funded by the EU and events were held across 53 cities over Europe.

Fourteen EngD students took part namely:

Akash Beri
Amir Asghari
Aristodimos Lazidis
Benyamin Asadipour-Farsani
Chrissie Tock
Daniel Kurukji
David Lloyd
Ioanna Zafeiri
Isabel Fernandez-Farres
Jon O'Sullivan
Laudina Duffus
Lucie Villedieu
Olga Mihailova
Robert Osborne

This Event was designed to engage with the general public with regard to their view/opinion of food and included art exhibitions, theatre shows, interpretive dance and the science behind food. The goal of this Event was to increase the awareness of the general public with all aspects of the food chain: from raw material sourcing, ingredient use and manufacturing, through to how we perceive foods and challenges for the future, including social, environmental and economic problems such as chronic illness and food scarcity. There were approximately 400 visitors to the marquee between 9.30 am and 6.00pm mainly people with an interest in food, who had visited the nearby Farmers Market and mothers with young children. As this was a school day there were no visitors between the ages of 5 and 16. Some of the EngDs were responsible for encouraging people to come into the marquee and provide an introduction as to what was on offer, the majority of the EngD students were based in a marquee and their activities were around four themes:

- Ingredients
- Food Design
- Perception of Food
- Future Foods

Activities involved in the various sections were as follows:

Ingredients

- Using a Weekly Food Pyramid to represent and visualise the breakdown of foods forming a healthy diet. The typical amounts of food that are consumed and a breakdown of food types
- Ordering and printing t-shirts.
- Design and production of posters, displays and demonstrations.

Food Design

- Creating a game that looked at the processing steps involved in making foods in industry. Design of leaflets detailing the steps to produce milk, orange juice, crisps and chocolate.
- Emulsion experiment, to see if people could identify which solution contained an emulsifier. Then look at the emulsifier under a microscope.

- Various methods of food preservation for the home. This included a timeline to look at how this has developed over time.

Perception of Food

- Product samples from Kraft. Free tickets to Cadbury World as prize for a quiz and a range of activities to illustrate food sensory including practical demonstrations and hands-on experiments.
- Experiment to demonstrate how sight and smell may affect food perception.
- Demonstration using flavoured sweets to illustrate how the sense of smell enhances the flavour perception through ortho and retronasal olfaction.

Future Foods

- Futuristic trends on future food culture and challenges.
- The scale of the crises of sustainability of food and potential problems for the future, e.g. supply and demand with a poster to demonstrate.
- Potential alternative/replacement foods including edible giant leafcutter ants, flavoured and unflavoured worms, scorpions and water bugs as a source of protein and encouraging the general public to overcome the psychological barriers of eating insects.

Please see below for a few pictures taken during the Event.

In addition to “Brum Dine with me” the EngDs concerned undertook a range of other activities detailed below and some include future plans for the remainder of their EngD.

Akash Beri

Name of Event	**Skirting Science**
Event Description	**Skirting science was an event designed to engage year 9 girls in engineering disciplines. We were responsible for delivering a workshop that demonstrated chemical engineering was a viable option for women.**
Date	**March 9th 2012**
Location	**Light Hall School, Birmingham**
Responsibilities	**Design a 1 hour workshop that could be delivered to 5 different classes** **Present workshop** **Interact with year 9 students and answer their questions.**
Workshop	**Workshop was entitled 'How chemical engineering makes your day?'** **The workshop involved discussing everyday products you would use in the day, including bathroom products, food and drink and make-up. The workshop was interactive and had many demonstrations including the use of a mini tribometer. Students were encouraged to ask questions throughout to optimise the learning experience.**
Audience	**Year 9 girls – 5 workshops each having around 20-30 students**

Amir Asghari

Product Design Module, Second Term, Tutoring (Module Co-ordinator: Dr. Phil Cox)

The students are required to design and market a product in a pre-determined chemical field. The module challenges the students to think objectively about chemical engineering design and allows practice of chemical engineering knowledge alongside marketing, project management and business analysis.
I was required to have weekly meetings with a group of 6 undergraduates and answer any particular questions they might have accumulated.

Future Work

Outreach workshops for post-grad students:

The aim of the workshops will be to help develop skills and confidence in going in to schools to give a talk about your research/career, deliver an 'off-the-shelf' workshop or develop and deliver your own workshop based on your own research. The session will be 3 hours and will require some advance preparation. It will be part theory, part having-a-go and part actual activity planning.

Aristodimos Lazidis

In addition, during the Brum Dine with me event I had the opportunity to give an interview for the University TV explaining what we were there for and all the reasons we like and support public engagement.

Future plans
For the next year I am planning to take part in the "Outreach Workshop" that will be organised in our department by Dr. Emma Carter that will hopefully be very helpful and give ideas and ways of expressing my engagement to the public. Also, I am hoping to get involved in some sort of assistance/supervision of undergraduate students that will help me both practise my soft skills but also give me the opportunity for outreaching. Finally, I am planning to keep my eyes open to any events in either my sponsoring company or the University that I could participate and engage the public.

Benyamin Asadipour-Farsani

Product Design Exercise (2nd year module)
Post-graduate helper, Jan 2012 – Mar 2012
The purpose of this event was to supervise and lead a group of 6 second year chemical engineering students, in order for them to work as a team, towards a final goal. The students had to develop and market a product in a pre-determined chemical engineering field. Students had to use their chemical engineering knowledge alongside marketing, project management and business analysis.
I had weekly meetings with the students and point them in the right direction by answering any questions they might have had.

Future Events
Outreach workshop for Chem Eng post-grad students

The aim of the workshop will be to help develop skills and confidence in going in to schools to give a talk about your research/career, deliver an 'off-the-shelf' workshop or develop and deliver your own workshop based on your own research. The session will be 3 hours and will require some advance preparation. It will be part theory, part having-a-go and part actual activity planning.

Chrissie Tock

Future plans: Attend an outreach workshop for Chem Eng post-grad students with the intention of setting up an activity in the local school. Do a tour at Campden BRI Day, Campden BRI's open day.

Daniel Kurukji

In terms of future outreach work, I am going to attend an outreach workshop at the University of Birmingham run by the outreach officer here. The aim of this will be to gain additional skills concerning the how to develop workshops for specific target audiences. As a consequence of this experience I will participate in further activities to engage the public.

David Lloyd

In future I would like to become more heavily involved in the organisation of such events to help drive them towards success. For my own development, I found the event and my contribution to be satisfying and rewarding. Being able to explain problems in a straight forward way so that a majority can both understand and relate to is an important skill for researchers. For my future outreach work, I will attend the outreach workshop to further enhance these skills for use during public engagement activities. Also, I will take a more active role in opportunities such as the 'Brum Dine with Me' event should they present themselves during the remainder of my EngD programme.

Ioanna Zafeiri

Apart from the local community's benefit, the event was a huge benefit for me as well. Being open to the community, explaining my technological expertise in the area of food design and sharing a common passion for food were only some of the things I really enjoyed. Through engaging and discussing several topics of the event with the wider public, I got more confident and gained an insight on people's concerns and aspirations in regards to food issues.

Overall, it proved to be a fantastic opportunity to disseminate science to people from all walks of life and I'm glad I contributed in making this event a reality. The theme of food undoubtedly represents an international language that actually has the power to bring people of all ages, nationalities and cultures together.

Future Plans:
In terms of outreach activities in the near future, I am planning to attend an Outreach Workshop with a view to developing both my skills and confidence in going to schools and talking about the work of the University, and my research in particular. I would also like to get involved in any sort of event, i.e. charity event, exhibition, etc, organized by the Department or industrial sponsors. I aim to become more engaged each time, and I am open to any related opportunity that may arise that I can hopefully make the most of, as an individual and as a researcher.

Isabel Fernandez-Farres

For future outreach work, I will attend the outreach workshop to gain additional skills concerning developing workshops for specific target audiences. I will also participate in further activities to engage the public.

Jonathan O'Sullivan

Public Engagement Activity - 2
Type of Event: Outreach work showing secondary students the research that is constructed in the microstructure group
Date of Event: 11th July 2011
Location of Event: School of Chemical Engineering, University of Birmingham
Purpose and benefits of the event: The purpose of the event was to show secondary school students the research which is conducted at the university. For one day I showed two students the research that is conducted in the microstructure group with a focus on emulsion technology.
Audience: Two secondary school students.

Planned Public Engagement Work:

- Be a student ambassador to encourage and promote the work of the University and in particular the School of Chemical Engineering.
- Get involved in any charity events organised through industrial sponsor, department, etc.
- Compete in runs for charity to sponsored by industrial sponsor.

Laudina Duffus

Future plans:
During October/November 2012, I will be attending outreach workshops aimed at Chemical Engineering postgraduate students. The aim of the workshops will be to help develop skills and confidence in going in to schools to give a talk about your research/career, deliver an 'off-the-shelf' workshop or develop and deliver your own workshop based on your own research. The session will be 3 hours and will require some advance preparation. It will be part theory, part having-a-go and part actual activity planning.

Lucie Villedieu

Future Outreach work:
I plan to attend the upcoming Outreach Workshop and will be presenting my project at the next EngD conference held in April.

Olga Mihailova

Event 2
Type of Event: Outreach event demonstrating equipment and talking about research to a group of prospective students during an open day tour.
Date of Event: 9th October 2012
Location of Event: Positron Imaging Lab, School of Physics and Astronomy, University of Birmingham

Purpose and Benefits of the Event: The event was aimed at attracting students to science based degrees and providing a basic idea of the kind of research they could be involved in. For the duration of the day I have explained the research I am personally involved in and the reasons for using the equipment I was working with.
Audience: 10-15 students

Future Public Engagement Plans:

- Become a student ambassador within the University and participate in Open Day s and Outreach programs organised by the University
- Get involved in any Outreach programmes organised by the School of Chemical Engineering
- Participate in charity events organised or supported by the Industrial Sponsor

Robert Osborne

Unilever Vlaardingen Openhuis

This was an open day for employees, their families and friends at Unilever R&D Vlaardingen on the 17th September 2011. The event consisted of the visitors walking around the research centre and participating in hands-on demonstrations prepared by each group about their work.

This event had two underlying objectives. One was to teach their children, friends and family about the work carried out in the centre and why this was important. And second was to educate fellow employees about the work carried out in other research groups.

Approximately half of the Unilever Vlaardingen workforce turned up with their family and/or friends, this was over 1000 people. The age range and knowledge level was very diverse from young toddlers up to senior citizens. Some visitors had a very sound knowledge of the topics presented (typically employees from other departments) and some had no knowledge about food sciences and technology at all.

My role was to showcase the importance and process of food pasteurisation to adult audiences.

Future STEMNET Ambassador

I am in the process of becoming a STEMNET ambassador. STEMNET is an organisation which aims inspire children to pursue an education in the STEM subjects (Sciences, Technology, Engineering and Mathematics) .I am currently undergoing the required CRB check for this and will be taking the training course on the 25th October.

Other EngDs have taken part in a variety of Events across the UK and Europe.

The following reports give the details of these Events and also include the plans for Outreach activities over the next year:

Anthony Kent
Ben Blackham
Borja Roman Corrochano
Chris Hewitt
David Ryan
Helen Brannon
James Champion
Jon Morrison
Martin Riley
Nathan Burrill
Peter Clark and Sam Wilkinson
Raul Perez Mohedano
Steven Hall
Suzanne Pinkney
Tom Avery
Tom Standring
Xabier Legarreta Basabe
Matthew Spencer

Those EngDs who have not yet undertaken any Outreach activities have submitted plans for the next year:

David Bell
Richard Moakes
Victor Francia Garcia

Anthony Kent

School Visits

Primary outreach activities to date have been for the benefit of school pupils. These are pupils taking part in work experience weeks run by Unilever Research and Development Port Sunlight. The aim is to give interested school pupils an insight into the sort of research conducted by scientists and engineers in a consumer goods company. In doing so it is hoped that they are helped in deciding course choices and see career options etc. They run at the end of term or in the school holidays and cover talks from many people around the site on many areas from packaging to formulation to cleaning tests.

The audience was made up of pupils from various schools including:

St. John Plessington Catholic High School
University Academy Birkenhead
Neston High School
St. Anslem's College for Boys, Birkenhead
Ysgol Brynhyfryd School, Ruthin
Wirral Grammar School for Girls
Wirral Grammar School for Boys
Upton Hall Convent for Girls
St. Mary's Catholic College Wallasey

Pupils in the 2012 groups were a mixture of GCSE (years 10/11), AS and A-level. Total group size went from about 5 to 12.

In 2012 was involved in activities on Wednesday mornings, 4th-25th July 2012 inclusive. In the first two weeks I was demonstrating profilometry (a way to capture a 3D image of a surface) and tribology (the interaction of two surfaces including friction and wear) techniques over an hour. In the third week (whilst a colleague was away) I covered an extra hour and also demonstrated methods of mechanical measurement: indentation, nano-indentation and tensile testing. And in the final week I was required to cover the whole morning and included a look at fluid properties: simple flow experiments and rheological measurements.

Similarly, during an insight week starting on the 15th August 2011, I gave demonstrations and a talk to group of 5 students (16/17year olds) discussing profilometry, tribology and rheology.

My involvement in these activities has primarily given me an insight into the skills involved in teaching. One particular skill that I have enjoyed developing is the need to simplify ideas in order to discuss them with a younger audience.

Company research talks

Each year Unilever Research and Development Port Sunlight has a student meeting in which company supported/ sponsored students are invited to present their work either in the form of a poster or a talk. In the past two years I have presented posters to the group.

The events I attended took place on 24th May 2012 and 7th September 2011.

The audience is made up of roughly 40 people from the various expertise groups around sight as well as other students (either year in industry or doctorate level). As such the questions and discussions are more demanding that with the school pupils.

This event aims to share research being conducted with the wider company and inspire new ideas. For me it is a good opportunity for me to develop my ability to stand up to scientific scrutiny/ questioning, and get fresh insights into my work.

Future work

As a minimum the work involved so far is to be repeated in future years, with perhaps a view to present at future company meetings. In 2013 I aim to have some activity with the MerseySTEM

group (which I have already signed up for). The MerseySTEM group takes scientist and engineers into schools to help develop student's maths, science, engineering and technology knowledge and skills, whilst encouraging them towards a career in these industries. This will aid me in developing teaching skills for a wider and larger audience than the groups that have taken part in the work experience weeks. In particular it may present a new challenge in trying to engage pupils who are, perhaps, less interested in science and engineering than those who signed up for the work experience weeks.

Ben Blackham

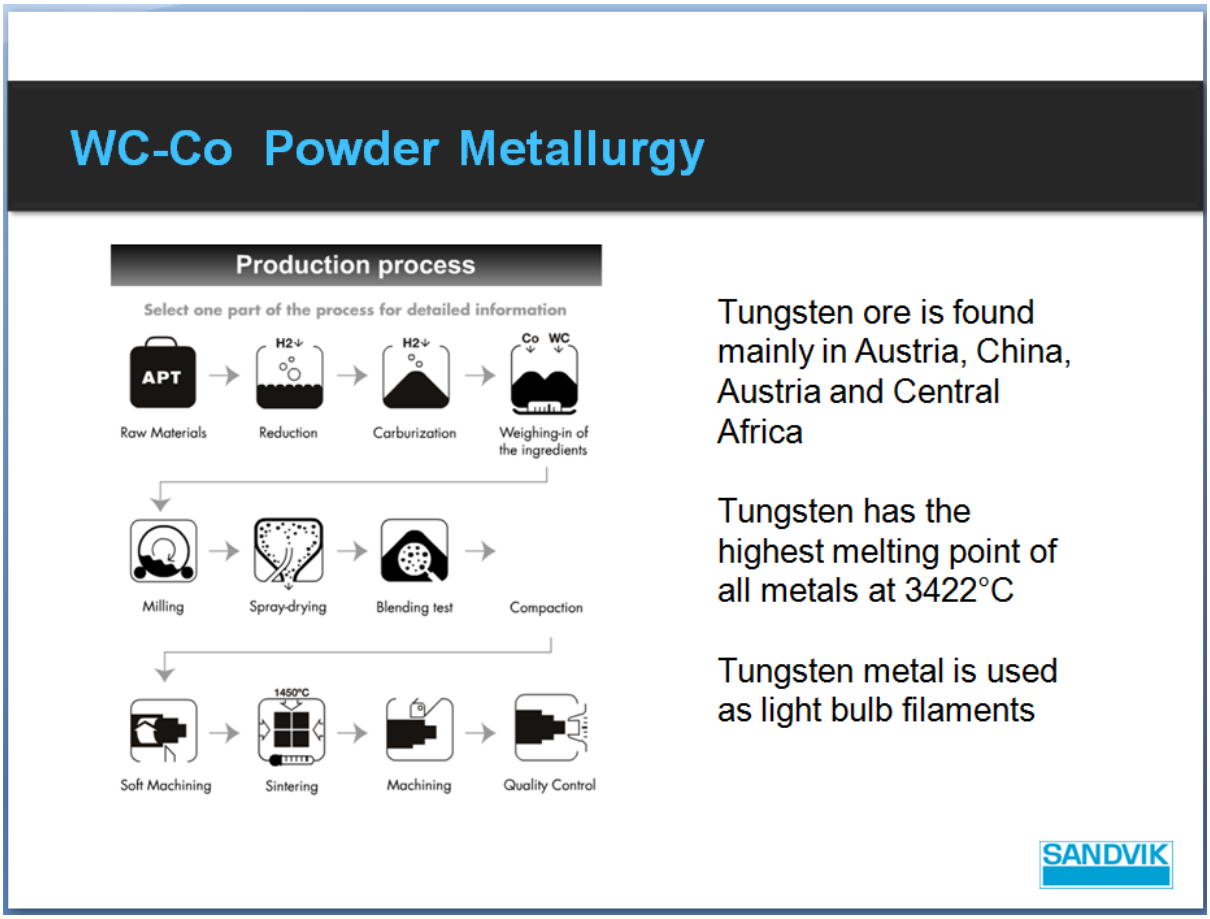
EngD student with Sandvik Hard Materials

Outreach Report

Sandvik hard materials is involved heavily in the community and is becoming more involved with local schools in a bid to encourage teenagers to become more interested in our activities. Presentations have been given to a wide range of age groups to promote what we do and to increase awareness of our work. Generally work has been presented to GCSE level and below as a recognised lack of younger scientists needs to be addressed.

Whilst we are often involved in presentations to the schools, we also have a heavy presence in industrial international conferences such as the European Powder Metallurgy Association (EPMA) which I myself presented work in and also the plansee conference. Both of the mentioned conferences are spread over a wide range of scientific fields encouraging others to become involved in our work.

As well as interacting with local schools we also have a football team set up in which colleagues participated in a local Coventry based league. The R & D team and myself set up a team joined with the production facility. Not only was this successful on the pitch, but also served to promote what Sandvik do with locals of all ages unaware of our activities. This is carried on internally and promotes what the EngD is all about through me, there are always plenty of opportunities to talk about and questions to answer on the EngD program particularly as it is so involved with the industrial activities now. My EngD project is now seen as a link between production teams and engineers and the R & D team which has been missing in the extrusion field for some years.



Borja Roman Corrochano

OUTREACH AND PUBLIC ENGAGEMENT ACTIVITIES

Performed

1) Product design group leader (March-12)

Product design is a module which is part of the 2nd year of BSc. in Chemical Engineering (UoB). The main task of the module is to create an innovative product following a from-idea-to-market approach. As a group leader, my role was to give advice and guidance to my students when appropriate and help them to develop a critical way of thinking when evaluating ideas.

2) Kraft´s student charity committee (Sep 12, Kraft Foods, Banbury)

As part of the student charity committee, my role is to help to organise charity event to raise money for local charity organisations such as McMillan Cancer Support, Katharine House Hospice...
Several activities come up throughout the year.

Planned

1) Master thesis supervisor (Jan-13, UoB)

I will be supervising two master students and helping them to produce their master´s thesis

2) Product design group leader (March-13, UoB)

I will take part in “Product Design” module again.

Chris Hewitt

Outreach Report

1. Earlier this year myself and a number P&G employees spent several hours after work over a period of a week painting a local school’s library. We renewed the existing painting as well as drawing murals on the wall, I personal created an excellent likeness of harry potter. The teachers at the school conveyed there thanks for the work we performed and commented on the children’s appreciation of their new library.

2. I’m also now considering giving a presentation to some undergraduates on my experience as an EngD.

David Ryan

Events attended

Event: Unilever Presentation of cavitation audio results
Date and Location: January 2012, Unilever Research & Development, Port Sunlight (URDPS)
Purpose: Feeding back to Unilever the findings to do with cavitation in my research project
Audience: 10 employees

Event: Graduate School Images of Research photo competition
Date and Location: 21/02/2012, Great Hall, University of Birmingham
Purpose: Showing an interesting image from my PIV experimentation, to raise awareness of my research project
Audience: 80 attendees

Event: Unilever Poster meeting (Cavitation audio poster used)
Date and Location: 24/05/2012, Unilever Research & Development, Port Sunlight (URDPS)
Purpose: Widening the general awareness of my Sonolator work in Unilever, meet and talk to new people at Unilever who may be interested in it.
Audience: 50 employees

Event: Unilever Presentation of model emulsion results
Date and Location: June 2012, Unilever Research & Development, Port Sunlight (URDPS)
Purpose: Feeding back to Unilever results regarding model emulsions on the Sonolator
Audience: 6 in total (2 remote)

Event: Graduate School Annual Poster Competition (Cavitation audio poster used)
Date and Location: 19/06/2012, Great Hall, University of Birmingham
Purpose: Widening the general awareness of my Sonolator work at university, meet and talk to new people at university who may be interested in it.
Audience: 250 attendees and presenters

Event: BEAR Postgraduate Conference 2012 – Presentation and Poster given
Date and Location: 28/06/2012, University of Birmingham
Purpose: Presenting how my research uses techniques from high performance computing, and meeting with members of that community in order to share ideas and collaborate
Audience: 60 attendees

Event: Future Formulating conference (IChemE Multiphase Flow SIG)
Date and Location: 11/09/2012, Museum of Industry, Manchester
Purpose: Poster was prepared for this, but poster session was cancelled. Mainly a chance to meet people in academia and industry and build links, as well as learn from their presentations in the multiphase flow field
Audience: 20 attendees

Event: Unilever Presentation of Sonolator vs Silverson comparison
Date and Location: September 2012, Unilever Research & Development, Port Sunlight (URDPS)
Purpose: Feeding back to Unilever a comparison study I did on Sonolator vs Silverson, which is of industrial relevance to their planning
Audience: 20 employees (of which 8 in Leeds and USA attended remotely)

Committees participated in

Committee and Position: MATLAB SIG, I was appointed chairman of committee
Date and Location: 2012/13 academic year, University of Birmingham
Purpose: To allow existing MATLAB users to be aware of each other, meet and share ideas; to promote the interests of MATLAB users, to promote wider awareness and usage of MATLAB, and to address any challenges in terms of accessing MATLAB software
Audience: Number of MATLAB users or active SIG members not yet known, since SIG has not been active in the past, but anticipate around 100 MATLAB users university wide, and maybe 20-50 active SIG attendees

School visits

As of Sept 2012 I have joined STEMNET, and am currently undergoing training and CRB clearance for visiting schools. I anticipate several school visits in 2012/13 academic year to promote STEM subjects, especially Chemical Engineering at University of Birmingham.

Exhibitions/Trade Fairs, Open Days (Tour guides), TV and Radio interviews

None as yet, but open to possibilities.

Future Plans

- Keep attending many events and presenting my research
- Keep serving on MATLAB SIG committee, and make the group active for promotion of MATLAB as a useful research tool
- Start visiting schools with STEMNET
- Attend any other events or take any other opportunities as they arise

Helen Brannon

Current Activities:

- I am a volunteer at the BASF 'kids lab' on the Bradford site in the UK, and I will visit in October/November 2012. The former Ciba site in Low Moor was acquired last year by BASF. BASF wants to encourage interest in the natural sciences worldwide at a very early age, and the best way to inspire children about science is by conducting scientific experiments. I am going to visit the lab to help and think of new ideas.
- I am a volunteer for 'Mad Science' in the West Midlands (pending my CRB check). I will work for Mad science when I am back in the UK visiting the University. I will help promote science to children in a fun, innovative and exciting way. Events include shows and workshops. Description of the company: Mad Science offers a large selection of after-school, preschool, summer and vacation programs, workshops, special events and birthday parties. From entertaining educational programs to educational entertainment, Mad Science sparks imaginative learning.
- I help to organise intern activities in my company, BASF (Germany), which are run independently by BASF interns. It is a good for me to practice my German too. I am part of a team of four called the BASF get-together team. Examples of our activities are weekly lunch and evening initiatives, as well as excursions on the weekend. All these activities are comprised under the roof "Get Together @ BASF – from interns for interns". (Reference from BASF is attached).

Example photos:

Taken from our weekly event called 'Stammtisch' – where all interns are invited to meet in a bar each Wednesday, to meet other interns in the company and network. On average we have around 50 students attend each week.

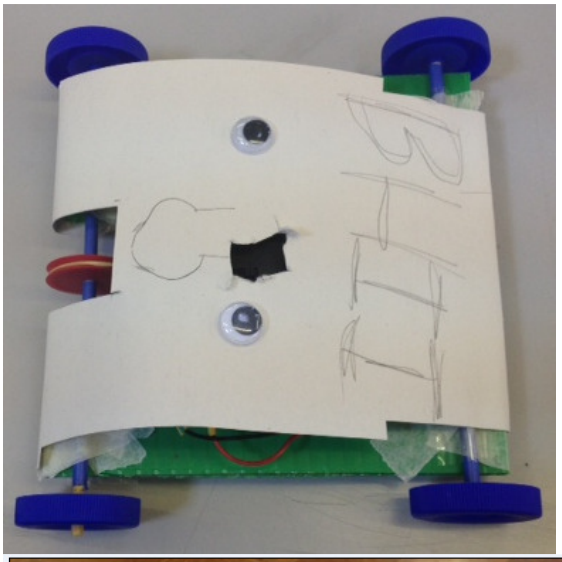
Below I list my future plans which are currently being organised:

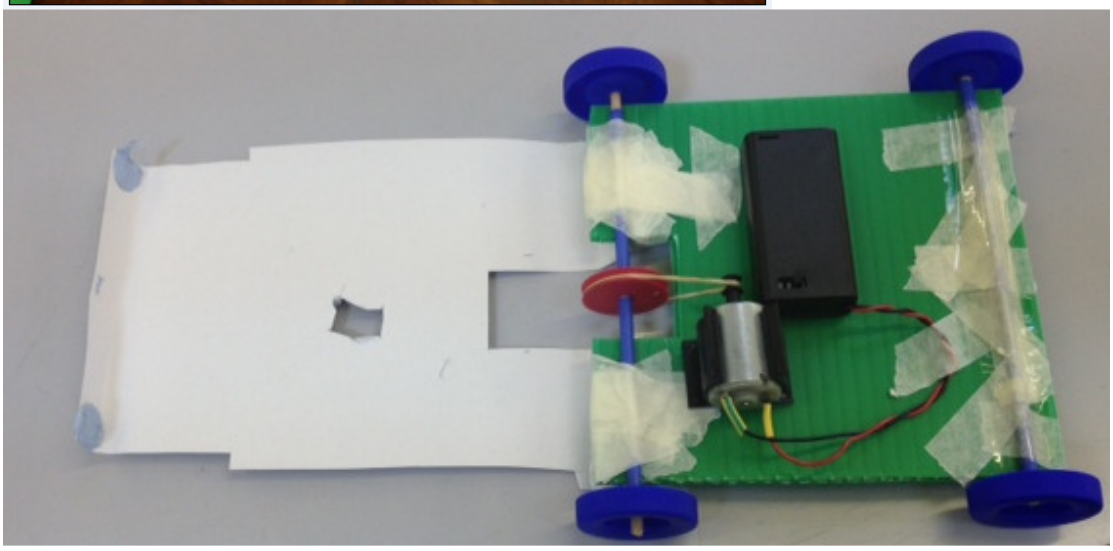
- I have registered as a STEM ambassador (a program to increase young people's choice and chances through science, technology, engineering, and mathematics). It involves volunteering to promote skills to young learners, actively encourage them to enjoy STEM subjects, and inform them about the unique career opportunities that are available to them.
- I am in touch with the Outreach team in the University (of Birmingham) – I am in the process of organising a small tour of schools in the west midlands area, to promote science and encourage students to take up science. I plan to email the other EngD students (some interest has already been expressed) to form a group and together we can form a presentation. We can inform students of the study path we have taken, why we chose this, and a bit about the projects we do now and the companies we work for. I aim for the this presentation to be as interesting as possible! With limited time in the UK (I currently work in Germany), I hope to organise a tour of as many schools as possible within a 1 week/ 10 day time period. This organisation is currently underway.

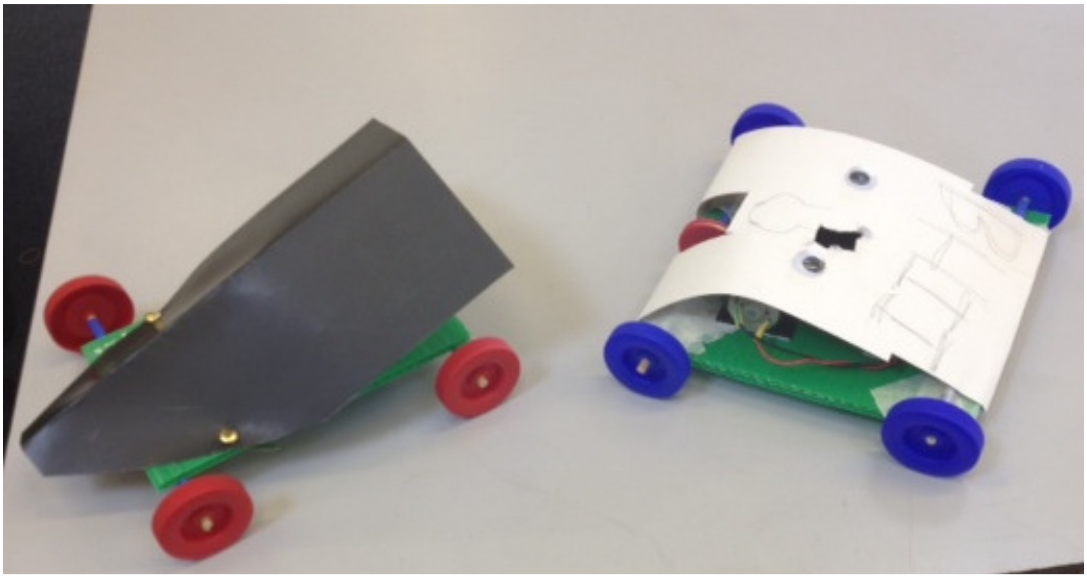
James Champion

Name: James Champion
Sponsoring company: DuPont Teijin Films (DTF), Redcar, TS10
Date started EngD program: 01/02/11
This report contains an overview of some of the public engagement activities either completed or planned in the future for broadening the EngD program to a wider audience. It is split into past and future planned events.
Past public engagement:
Event: Krazy Racers
Location: The Ian Ramsey C of E School, Stockton, TS18
Date: 26/09/12
Description: Recently I became a STEM Ambassador on the recommendation of fellow EngD students Peter Clark and Sam Wilkinson. This event was the first STEM event I have attended. The event itself involved the whole of Year 9 (~ 240 pupils) being split into groups of 4. Each group was given basic materials like small wheels, a motor and pulleys and had to build a battery driven small car. Once the base was complete, the groups designed 2 covers: one aerodynamic and the other as crazy as possible. The aim of the day was to show the year group that engineering can be a fun and rewarding career, and to eliminate misconceptions on what an engineer does. My role on the day was to circulate the rooms and offer advice and encouragement to the groups. After a few teething problems in the first hour, the pupils seemed engaged and enjoying the day. When I spoke to certain students, I was asked about what I do for a career and possible routes into engineering. I explained that there are many routes into engineering and also that it is possible to study whilst working to further ones career.

The main attraction of the day for the pupils was Dave Robson (Jenson Button's F1 race engineer at McLaren – who went to the school - being present). In a break between design phases, Dave gave a speech to the year and they were noticeably engaged, asking many questions on his route into engineering. After lunch, each aerodynamically designed car was raced against each other in heats before the grand finale with the fastest 4 cars. The winning team received Jenson Button signed McLaren t-shirts and caps, a fantastic prize. To groups I had seen work hard; I gave out DTF branded pens and badges. I also brought a DTF poster for display, hence advertising the presence of world class organisations less than half an hour from the school. The day was very productive and I made a few good contacts within the school. The mathematics department are just about to start a weekly Young Engineers program and I hope to take part when I can. There is definitely potential for me to build up networks and opportunities for this and other local schools. The photographs below show a selection of completed cars from the day.







I have also attended 2 poster based conferences; 1 internal DTF innovation event and the other a Graduate School poster competition. At both of these events I spoke with many interested parties who were keen to learn more about the EngD program as a whole. More and more staff at DTF are showing an interest in my work, particularly those with children interested in an engineering type career. At The Wilton Centre, there are many yearly undergraduate placement students from a chemistry and chemical engineering background. Some of these students are interested in postgraduate study and I have been promoting the EngD wherever possible. A particular example of this is Dmytro Stratiychuk-Dear from Bath University, who is potentially starting an EngD in 2013 thanks partly to my advice.

Future public engagement

I am hoping to carry on with doing STEM type work in schools in the local area. I have already built up connections with Ian Ramsey School and would like to visit more in the area to promote the EngD and DTF. I have emailed the whole of DTF Wilton regarding STEM and hopefully a few of us will be able to run a DTF themed day with a few local schools involved. There are a number of EngD's based in the north east and it would be good to run a joint event. Once I become more involved with STEM I should be able to expand my portfolio and run my own event.

As well as school visits, I am planning on attending 2 academic global conferences next year – writing a paper for one of them. My presence there would promote knowledge on links between industry and academia. I could potentially give a talk to Birmingham based undergraduates on the benefits of the EngD scheme.

Jon Morrison, Rolls-Royce, Outreach Work

I have taken part in several outreach events over the time I have been working on the EngD scheme. These have included two company conferences and a radio interview.

The company conferences are organised to showcase the range of projects that the Nuclear Materials and Chemistry Support group are sponsoring and to encourage every participant and their associated academic and industrial supervisors to attempt to understand the very broad range of interests that the group is pursuing.

During September of both 2011 and 2012 I have been asked to attend and present my work during a 25 minute talk to members of the NMCS, academic supervisors, students and several other interested parties whom Rolls-Royce has invited to attend, an audience totalling approximately one hundred people. The conference is held at Rolls-Royce's Learning and Development Centre in Derby. The event has provided me with the opportunity to present my work to an array of interested

parties who have been able to provide constructive criticism and advice on the continuation of my project and the various challenges that have been encountered along the way.

I have also been able to take part in a radio interview with the "Naked Scientist" radio program. The interviewer had come to the University in an effort to speak to a small number of students regarding their projects and the effect of their work on the industry for which the work was being performed. I had previously attended the Royal Societies media training course, which attempts to prepare scientists with no previous experience of the media for interviews of varying difficulty.

I was given the chance to speak about my project and its aims to the interviewer, as well as the eventual effect that my work may have on both current generation reactors and any future designs of water cooled reactors.

Martin Riley

I assisted with Looe Academy's Engineering Challenge on 18th July. Teams of year 10 students, around 20 in total, made a bridge, rocket powered car and aeroplane.
Next week I will be helping STEM day at poltair school October 16th where we will be helping year 9 students make slime and have a competition to see who can make the bounciest of bouncy balls.
I am planning to help deliver a more in-depth after school club in the coming months.

Nathan Burrill

Summary

This report gives a brief summary of outreach, and other, activities in which I have participated so far, in addition to detailing my future plans of such events in order further my outreach work.
Unfortunately, I was unable to attend the "*Brum Dine With Me*" event due to work commitments.

Company/Industrial Events

Although not strictly an outreach event, I attended and presented my work at a Unilever *mini-conference* in May this year. It allowed me an opportunity to expose my work to a number of Unilever employees, other industrialists and other postgraduate researchers who were interested, with around one hundred people in attendance. This was a good opportunity due to the nature of my work being very different to the majority of what Unilever does.

Future Plans

I am in the process of applying for the opportunity to attend an Outreach Workshop at the university. Since I have yet to complete any significant outreach activities, I feel that this would be a useful programme to attend as it aims to improve the skills associated with these activities, in addition to providing assistance in the set up and preparing of these events.
This course will hopefully aid me in setting up some events for outreach such as speaking at a school or after school clubs to which engineering may be of interest, or possibly just to expose the idea to those who otherwise might not have been interested.
I am particularly interested in the sustainability aspect of processing, in addition to such related topics as process intensification. Therefore, if possible, I will try to arrange opportunities to expose these otherwise lesser-known areas to people who may otherwise just think of the *typical* chemical engineering areas such as the petroleum industry.
Additionally, I intend to take part in the *Presentation Skills* course this year which should further improve my ability in this area.

Peter Clark, Sam Wilkinson

1. Mission Statement

The aim for our outreach program is simple: *'to maximise exposure and understanding of chemical engineering, industry and other STEM subjects to the wider community'*.

At the centre of these activities is our work with schools. It is critical that the next generation are encouraged and given the means to get involved in science and engineering, beyond the textbook-classroom learning environment. Alongside this, we are taking a broader approach, with activities at chemical engineering degree, industry-graduate and post-graduate (EngD promotion) level. Professional involvement is also on our list of objectives and we are currently active in the local Teesside IChemE committee.

Our overall aim branches out into a range of areas and this report will provide an overview of our portfolio, current activities and plans for the future.

2. Outreach Portfolio Overview

Arising from this rather broad aim for our chemical engineering outreach activities is a more focussed portfolio, detailing the key target areas of our work. As shown in fig. 1, the portfolio has been chiefly divided into four areas.

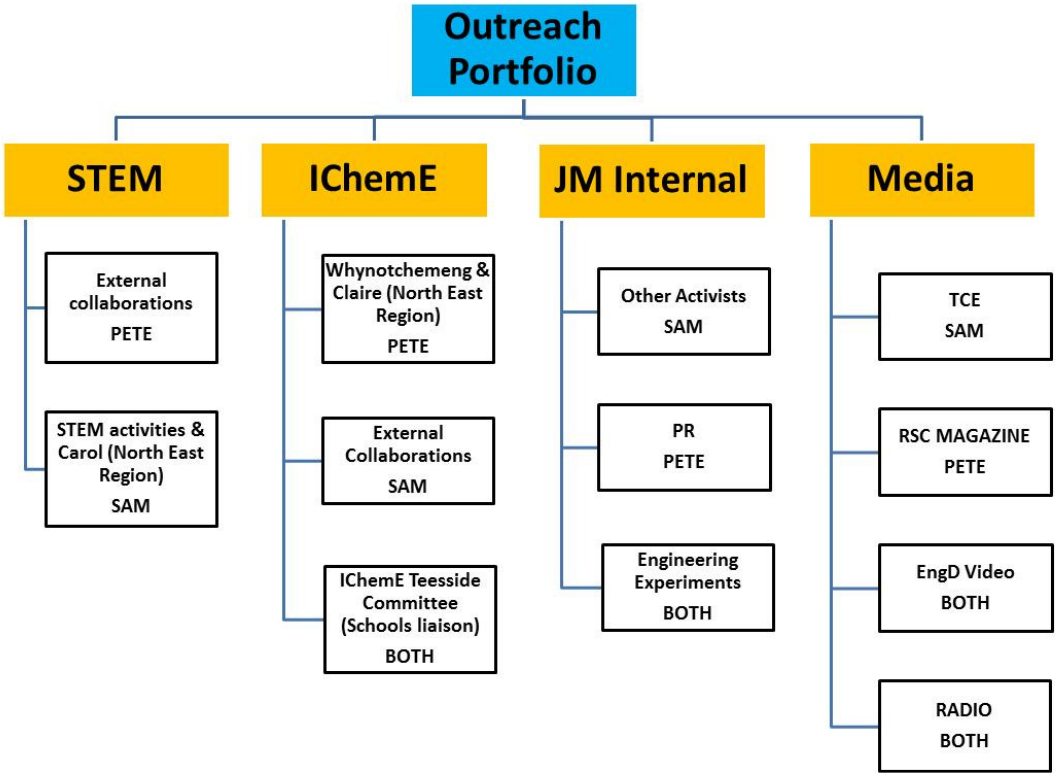


Fig. 1: Outreach portfolio schematic

As Science, Technology, Engineering and Maths (STEM) ambassadors and Institute of Chemical Engineers (IChemE) associate members, we are given two key routes to spreading our outreach plan and building a network with others for future chemical engineering activities. Johnson Matthey (JM), our company of work, is a strong advocate of engaging with the community (in particular, schools) via outreach work and provides another area for our work, particularly around building experimental programmes and providing a hub for employee collaborations on the subject. The media area of the portfolio covers a much broader area of interaction, with current pursuits in magazine publications, radio and video releases.

Whilst both of us are active in all of the areas listed in Fig. 1, we have found it very effective to nominate one of ourselves as the key 'port of call' for each particular area. This has allowed us to run

our outreach activities with greater efficiency. In following sections, we will discuss these areas of work.

3. STEM activities

3.1. Activities in the local area

STEM in the Teesside area is governed by an external contracting company that send requests for ambassadors to attend events within schools, universities and communities. When an event arises that is of relevance to both our present knowledge base and the company direction we are able to attend.

The events we attend can be anything from a careers evening to a Saturday afternoon science fair. So far, due to the short time we have been members of the scheme, we have only attended careers talks and some classroom events. The best example is shown in Fig. 2 where Mr.Wilkinson delivered a lesson in the use of mathematics in chemical engineering to a year 8 class.

diverse. This one here is to a year 8 maths set discussing real life use of maths. Chemical engineering was a perfect fit for such a theme.

3.2. STEM collaborations further afield

As part of our vision, we want to expand the network of engineering activities to more schools, to achieve this we need more volunteers who have a similar knowledge base and mindset as ourselves. As such we are currently encouraging fellow EngD students in Dupont-Teijin Films in Teesside to become STEM ambassadors and join our network.

The University of Birmingham recently employed a part-time outreach officer whose role is to encourage post-graduate involvement in the community. We have incorporated the officer into our network and plan to share both ideas and inspirations with her for future events. The most current example is the on-going experiments design, once they are finalised and risk assessed we will pass copies of the plans and risk assessments to the officer so that the University can use the same experiments. Clearly due to geographical location, a working collaboration is difficult with the University but so long as the two factions keep a connection, they can learn off each other.

4. Institute of Chemical Engineers (IChemE) activities

4.1. 'Whynotchemeng'

'Whynotchemeng' is a scheme run by the IChemE whereby chemical engineers are attached to local schools and should attend careers events or give presentations to classrooms when requested to do so. Of course, being voluntary work the attendance level is at the discretion of the engineer. We have attended a number of schools both in the local area and further afield under the umbrella of whynotchemeng, where we have delivered presentations to classrooms/assemblies detailing the life of a chemical engineer, what we do, what grades you need etc.

So what makes 'whynotchemeng' different to STEM? The roles we play are similar in promoting engineering, however, STEM aims to improve scientific understanding and involvement in engineering at a young age whereas 'Whynotchemeng' aims to promote a career in chemical engineering at increase awareness of this profession at a young age.

So far, we have attended Whynotchemeng events at St.Michaels School - Billingham (see section 4.3 – Activities in the local area), Hymers College - Hull, Whitley Bay High School – Newcastle. We are the local representatives for St.Michaels School, Billingham.

4.2. IChemE Teesside Group – Schools Liaison Committee Role

In May 2012, both of us were admitted onto the local IChemE committee (Teesside Group) in the role of schools liaison officers with a mandate to improve the connections between IChemE and local schools/academies/colleges. As part of this ambition, a network of contacts has to be built of engineers in the local area that will communicate with each other to enable us to launch some multi-school events that we wish to run.

As part of our presence on the committee we also contribute to the group activities such as industrial lectures, careers and university liaison events. Currently we are helping to organise an industrial talk for the local IChemE members and Teesside University Chemical Engineering School. We have enlisted Johnson Matthey's Sustainability Leader Sean Axon to give a talk and workshop session on 'Product Innovation and Sustainability' in November. Further to this, we are assisting Sean and the IChemE committee in venue selection and acquiring necessary props and setups for the talk.

4.3. IChemE collaborations further afield

Further afield we have recently been in contact with the Hull and Humber IChemE group to share ideas around designing engineering experiments for schools. From this came some discussions around running local 'bucket chemistry' and 'chemical engineering' competitions. Two members in particular were able to provide information on competitions run in the Hull and Humber area and these may act as a cornerstone to designing a competition in our local Teesside area.

By its very nature this is a considerable task and a long term aim – key areas to build first will include interacting with a range of schools; building an experimental portfolio with a range of possible 'project topics' for the competition; enlisting a number of extra people (either within JM or externally) who will be willing to help set up and run such a competition. Our role in the IChemE committee and continued school visits in the next year should help make some headway towards this goal.

4.4. Activities in the local area

The local area is currently saturated with 'whynotchemeng' volunteers with most schools already assigned an engineer. However, St.Michaels in Billingham has become the school we most often frequent, chiefly via Johnson Matthey's long term outreach partnership with them. Another local school, Northfield, is also on the agenda for a couple of talks in 2012-13.

So far we have delivered 3 talks at St. Michaels to range of ages (year 7-8s at a science club and year 10s during lessons). In future visits we are looking to expand our approach, with some engineering experiments and videos to add an interactive element to the talk.

Fig. 3: Paper aeroplane competition time! ... After a Whynotchemeng talk to year 7 and 8 children at St. Michael's School, Billingham

5. Internal planning and work at Johnson Matthey

The JM site at Billingham, Teesside is an excellent base for our activities. With a strong history in outreach work, established collaborations with schools and good relations with the local community, the company have been very receptive to our desire to develop a chemical engineering outreach program and implement it into their setup. Broadly, we have 6 key focuses at the moment within our JM activities:

JM Internal Outreach Schemes: Our outreach activities have integrated into current schemes at JM, chiefly the Future Scientist scheme, which promotes and encourages science in schools. In effect we are championing the (chemical) engineering wing of this. This has allowed us to carry out external school talks (e.g. at St. Michaels, Billingham) and get involved with school visits to the JM site. A example of the latter was a talk on chemical engineering that we gave to a group of 15-17 year olds as part of the 'Generating Genius' scheme. This scheme aims to encourage and provide learning to children from disadvantaged backgrounds. The talk was very well received with some very astute questions asked about our field.

The JM outreach schemes are also in collaboration with Peter Hoare, from Newcastle University, who is a dedicated outreach officer in the North-East.

Public Relations: We are in contact with JM public relations officers. Currently we are working on a short report which will be circulated as part of a company-wide 'Update' which should increase outreach programme exposure.

Enlisting individuals: Expansion of employee outreach involvement within JM ultimately accelerates the driving force of the program. So far we have recruited two employees from within JMTC-North to get involved in 'Whynotchemeng', STEM and JM's activities. We have also been in touch with other sites to share information on our outreach programmes and encourage further involvement.

Building school experiments: JM are highly supportive of this and will invest some capital in helping build experiments for schools. The infrastructure for designing and building such experiments at JM is excellent. A work colleague, who has an accredited NEBOSH certificate (National Examination Board of Occupational Safety and Health) will assist us in making sure the experiments are safe and appropriate for school demonstration.

Integrating talks into the school curriculum: A different approach will be used to setting up talks for the 2012-13 academic year. JM, including ourselves for chemical engineering talks and demonstrations, will offer a set number of talks to our collaboration schools (St. Michaels and Northfield, Billingham) which will be built into various parts of the school year. There are two key benefits to this approach:

- Greater integration with the school curriculum. Themes for talks can be built into different stages of the curriculum. In the past, a talk may be sorted out close to the delivery date and could often end up being seen as an 'industrial visit' or 'careers talk'. This new approach aims to add applied understanding the current learning of school pupils – for example a year 10 class may be learning some chemistry principles and then a JM visit could be structured around this to show how the things they learn in the class room are applied in the real world. This should increase the 'added value' of the talks to both pupils and the teachers.
- The approach is more professional. JM outreach and school teachers have a much more structured goal for the outreach talks. For example, JM employees can plan more effectively when to devote time to organising these talks and do so in a more focussed manner.

Graduate Scheme Development: We have been working with areas of the business, particularly Process Technologies, in development of their graduate programmes. This includes advising on target universities and getting the most out of graduate talks for JM. In the near future we are meeting with a range of JM graduates to further discuss best practise and approach to maximising JM's impact on graduate scheme visits to universities. We are also likely to be taking part in the 2013 Frank Morton in Newcastle, as part of a JM team, which will further JM exposure.

6. Media activity

Our media activities got off to a flying start in Mar 2012 with the publication of our article, 'Why not EngD' in the TCE magazine. The article gave an overview of the EngD scheme, what it involves and who should seriously consider it. We are currently looking to continue this exposure for the EngD by contacting other magazines and see if they wish to publish something similar (such as the EPSRC and RSC).

For the next year, two media activities are currently planned. The first is a video which will promote the EngD scheme that we are enrolled but will look at chemical engineering in general and of as an employer & company. The second activity is a radio talk with a station in the local area designed to promote the outreach work to local schools and hopefully they will get in touch with us, and also to engage both parents and children with the programme.

7. Vision for the future

Our vision for the future involves attempting to establish a platform from which to liaise with the appropriate organisations to encourage both inter and intra company activity. Through the Teesside IChemE committee, contacts have been made within other companies that will allow for industrial collaboration that will hopefully be able to deliver to local schools a wide-ranging portfolio satisfying both academic and company interests. Of course this vision relies upon the participation of like-minded employees both within JM and other companies to deliver presentations and workshops to schools in the area.

Of course these activities require certain amounts of time, as such an ambition is to begin to include more JM permanent staff that have similar ambitions that can begin to take over certain areas of the portfolio and do more of the contact work allowing us to spend our allotted outreach time on liaising and improving the established network. As such the overall aim is to create a platform that links STEM, industry, IChemE and schools with the objective being to improve the awareness, understanding and acceptability of chemical engineering within both youth and adult populations.

Raul Perez Mohedano

ACTIVITIES DONE

1.- The Naked Scientists – BBC Radio interview

Date: 17-08-2011

The aim of this event was the realisation of an interview for the BBC radio program “The Naked Scientist”. The program is based at the University of Cambridge and broadcast on BBC radio to the Eastern Regions. Its content features interviews, experiments, listener questions and science news.

The interview was recorded in one of the rooms at the University of Birmingham and involved a general talk about the research project I work. It lasted for around 15 minutes.

2.- Lord Staffordshire Awards

Date: 28-09-2011

This event involved the visit of Lord Staffordshire to the Chemical Engineering Department as part of the tour included for meeting the candidates of the Awards promoted by him. The first part of the visit consisted on a poster presentation in which around 10 Eng.D. students presented our work and talked directly to them.

After that, the expedition moved to the labs were all the capabilities were shown and some demonstrations done.

3.- IChemE Innovation and Excellence Awards

Date: 03-11-2011

This is the annual event for the “IChemE Innovation and Excellence Awards” that took place in Birmingham in 2011. All the guests belonged to the Chemical Engineering field, so the opportunity was great to meet many people and to share concerns and information about this industrial area.

The event included the dinner while they were presenting the different awards for that day.

Steven Hall

EngD Student:	Steven Hall
Academic Supervisor:	Professor Andrzej W. Pacek
Industrial Supervisor:	Professor Adam J. Kowalski (Unilever)
Date:	October 2012

The outreach and public engagement activities that I have undertaken during my EngD course include the following:

- Open day guide: Explained research work on a weekly basis and gave tours of laboratory facilities to prospective undergraduate students, in small groups numbering 10 to 15. The purpose was to encourage students to study chemical engineering at The University of Manchester.
- Project supervisor: Helped Erasmus students (six), Nuffield bursary students (two) and international students (two) undertake short term research placements at The University of Manchester. The broad aim in all cases was to provide engineering students with hands-on experience of research in the form of small projects of 1 to 3 months duration, and in the case of the Nuffield bursary students who were sixth-form students, to promote engineering.
- Foreign Excursion Tour: Explained research work to international students touring the UK. This event was held on 28th April 2011 in Unilever Port Sunlight and was designed to showcase research work to about 30 engineering students from Delft University (The Netherlands).
- Hair Buzz Day: Presented research work on hair product manufacturing within Unilever. This event was held on 15th September 2010 in Port Sunlight and involved poster presentations and demonstrations on hair manufacture to roughly 60 to 80 non-engineers who work in Unilever.

Suzanne Pinkney

On 12th July 2012 I was a judge at the Robotic Olympics at Callington Community College as part of STEMnet in Devon and Cornwall. Several local primary and secondary schools were involved, totalling around 50 children and 10 teachers, and there were three other judges, also STEM ambassadors. The children had to programme Lego robots to perform several Olympic tasks: flag parade, shot put, archery and race around a track. The judges' roles were to score and/or oversee the events and to award the medals and certificates to the teams that scored the most points overall (in which there were several categories) and to the teams that performed best in each event. The aim of the event was to introduce the children to computer programming and robotics.

All the children and teachers seemed to really enjoy the day. The task involved working in teams and explaining to the judges in front of an audience what their robot was supposed to do for the flag parade. Some teams demonstrated innovative programming such as sound detection to complete the tasks. The children really wanted to do well and were disappointed if their robot did not perform as they had hoped. Link to (some) photographs: http://www.ppauk.com/roboticsolympics120712.

I am planning to give a talk to 50 students at St Joseph's School in Launceston about Chemical Engineering as part of the IChemE's whynotchemeng initiative in September/October 2012. I am hoping to also plan a day activity for year 8 students as part of STEMnet at a local school sometime in the next few months but details are yet to be confirmed.

Tom Avery

Public Outreach/Engagement
Planned Activities

- Outreach workshop with Emma Carter. This will be done first so I can effectively plan and deliver other outreach activities
- STEM (Science, Technology, Engineering and Maths) Clubs are held at most secondary schools in the Berkshire area. While the clubs are open to all pupils, they are typically attended by the younger children (years 7 and 8) who are most interested in science and maths.
    - I plan to go to some of these clubs and lead a session or two where the students learn about and build a cosmic ray detector. The device is simple to build and operate. The detector is simply a cloud chamber that shows the passage of cosmic rays as trails of condensate. Depending on where funding was sourced, the detector would either be left at the school permanently or loaned out for a fixed term as a teaching aid.
    - MAST Carbon develop activated carbon technology which is used in a wide variety of environmental applications. If this kind of material could be worked into a talk which is the right level for secondary age children, I also plan to go into either a STEM club or during a science lesson and give a kind of 'what a scientist does' talk. I will work with secondary science teachers to help pitch the right level.

Tom Standring

Outreach Activities Report

On Thursday 30th August 2012, I participated in a 'Year 11 futures convention' taking place at King Edward VI Five Ways school.

The event involved a number of delegates representing a breath of professions and careers. The aim of the event was to outline ones professional role, including detailing the intricacies of your job, your career entry profile as well as the benefits and challenges of your profession. The aim was to give the students a flavour of future options available to them.

I looked at addressing the benefits of considering undertaking engineering as both a university degree and future career, with the discussion highlighting on my experiences of chemical engineering to date. Further discussion touched on my current work and the exciting challenges of research. A short question and answer session followed my discussion.

I was involved in a total of six sessions, each of twenty minute duration. Each session was attended by 10 pupils, 15 -16 years old, entering their final year of GCSE.

In regards to future work, I have requested to attend an outreach workshop to improve and develop my skills needed to participate in further outreach activities. In the new year I will look to pass on some more of my experiences by attending similar outreach events.

Xabier Legarreta Basabe

COMPLETED ACTIVITIES

- Supervision of two MEng Chemical Engineering final year projects, one in the 2010/2011 academic year and the other in 2011/2012. Each project involved two students working as a team in a short piece of research related to my work. My role consisted in facilitating access to industrial equipment to do experimental work, supervising their progress and generally making sure they enjoyed and got the most of their first industrial experience.

PLANNED ACTIVITIES

- Volunteer as an STEM Ambassador during my fourth year. This will probably consist on visiting schools, since my project is focused on chocolate production it is probably ideal to link careers in science and engineering with something all kids can relate to.
- I am pre-registered to attend the Communication Skills course, delivered by The Royal Society in London on the 30th of September 2013, which would help improve skills relevant to any public engagement activities.

Matt Spencer

Rolls-Royce Recruitment and Sports Day
I attended a Rolls-Royce recruitment sports day at Nottingham University (Summer 2011). This event was attended by ~70 engineering students and involved a number of sporting activities whilst at the same time allowing students to gain further information on engineering and further study. I therefore had the opportunity to discuss with undergraduate students the EngD programme.

Planned:

- Engage with Rolls-Royce team about further events

David Bell

Future plans:

Outreach workshops for Chem Eng post-grad students:

The aim of the workshops will be to help develop skills and confidence in going in to schools to give a talk about your research/career, deliver an 'off-the-shelf' workshop or develop and deliver your own workshop based on your own research. The session will be 3 hours and will require some advance preparation. I propose running it either in the morning (9.30 – 12.30) or afternoon (2 – 5pm). It will be part theory, part having-a-go and part actual activity planning.

Register interest as STEM ambassador

Richard Moakes

<u>Future Outreach</u>

I plan to:

Attend a conference where I can produce a poster showing the research undertaken, this will promote the research.

Find opportunities within Kerry Group PLC, my industrial partner, to undertake activities that stretch out and involve the public to raise awareness of the industry and food.

Involve myself within the department in numerous activities such as open days and going into schools. I will also involve myself with other opportunities that arise within the department.

I will also undertake public sporting events such as runs and cycles promoting awareness of my industrial partner etc.

Victor Francia Garcia

Future plan:

During 2013 I will start collaborating in building up a website in conjunction with EngD students from the University of Newcastle.

It will be dedicated to provide information for youngsters about what chemical engineers do during their pass though the university and what this typically leads them to work in later in industry or academia after graduating. It will pay special attention to show case the EngD programme including surveys and questionnaires that will give an overview of the situation of old EngD students with and without a chemical engineering background.

The main purpose is to provide information for younger generations to help them understand what a career in engineering in industry and academia entails, and what to expect out of the engineering doctorate programme.

Depending on how it develops, it might include a section for international students and also series of EngD student histories from different universities which are now scattered across different industries like chemical or material engineering to consumer goods… etc.