Interview with Emily Cummins and Rob Harris

We recently set up interviews with two of the world’s up-and-coming “green” scientists, Emily Cummins and Rob Harris [Figure 1].

The 22-year-old Emily Cummins is the student inventor of the sustainable fridge, which uses dirty water to keep clean, fresh water cool, particularly in developing countries. From a young age, Emily was doing “boyish things” and began to knock about with hammers and other basic tools in her grandfather’s shed. This “ability to be creative” inspired her and she knew early on in her life that she wanted to be an engineer.

An Arkwright scholar, Rob Harris works at Elementa Consulting and is involved in the “green” building technologies, working to develop entirely sustainable buildings. He particularly enjoyed product design, and was sponsored by a company similar to the one he now works for, which is how he became interested in “green” building techniques.

What is the best invention ever?
Emily Cummins: The Internet because the research, resources and contacts available online has opened up a whole new area of study, and without it our lives as we know them would be very different.

Rob Harris: The combustion engine has to be one of the best inventions ever, which has allowed machines and vehicles to operate on the combustion of fuel. Although this has been around for the last 200 years, the true extent of the ability of machines operated by combustion engines is only just coming apparent. Cars are constantly being improved, trains made faster, and new machines to help us humans in
everyday life constantly being designed. The next big invention to come is a way to make this engine 100% carbon neutral.

**Whose ideas did you build on?**
Emily Cummins: If we talk about the water carrier, the inspiration was from Dyson’s Ballbarrow in the sense that he had a product with a ball and that allowed the wheelbarrow to be more stable over a rough terrain. I also was inspired by Trevor Baylis because I loved Trevor Baylis’ theory that you could take a product that you use in the UK and make it suitable for use in developing countries, which is what I did with my fridge. I love looking at what other people have done to try and make things different. With my fridge [Figure 2], I also looked at the way in which our bodies sweat to cool down and the pot-in-pot refrigerator.

**Are there any compromises compared to a normal fridge?**
Emily Cummins: Yes, you have to top it up, you have to add water to it, so it is obviously not as easy as a normal fridge, but the situation is choosing between not using a fridge and using a fridge that you have to top up. I am actually at the moment working on a version that will reuse the water, so it is not a lost system.

**Do you plan to continue in the sustainable field of engineering?**
Emily Cummins: I learn the best by watching other people and seeing how other people work. So, when I finish university, I am going to try and spend some time in developing countries because the people I worked with were so resourceful. They make use of everything and they have had to think over the years about not having life as easy as we do, to have to come up with their own techniques. So, I think that technology lies somewhere between the two, in between us and them. We need to take a step back and developing countries need to take a step forward in terms of technology, and I want to be the facilitator of that.

**What inspired you to enter the sustainable branch of construction?**
Emily Cummins: The reason I got into sustainability was that there was a group that worked with our school, called Practical Action, which wants young people to think about sustainability. Listening to the inspirational teacher who spoke about how big a problem for the world climate change is, and the extreme thought that we would have to start sharing kettles with our neighbors and our TVs with our streets within the next 25 years made me realise that I wanted to do something that would change people’s mindsets and offer them an alternative.

Rob Harris: The Energy Performance in Building Directive that came in a number of years ago has completely changed the construction industry and the way the country is beginning to think about how they use energy. A building services engineer, as I am, must be sustainable if they are going to be a building services engineer of the future. Sustainability is a massive subject now, which in maybe 30, 40 years, will be the norm. Therefore, all businesses need to orientate themselves around that element.

**For everyday people, is being “green” about turning lights off?**
Rob Harris: It could be things like that or using energy-efficient light bulbs or having photovoltaic cells on your roof. What it really comes down to is what is going to be a sustainable home in the future.

Emily Cummins: I think people do not want to change the way they live; they have got their standard of living, and what a designer’s job is is to redesign the products in the homes so that they are energy efficient, but are also the same standard that they were before. It is hard to say to somebody that they cannot have something, even though they had it before. That is what the difficulty is; when people earn money and think therefore that they should have what they want.

**At the moment, is sustainable building much more expensive to do?**
Rob Harris: It has been said that adding sustainable issues to a building project can add about 10% onto the cost. With sustainable products, you are generally looking at a payback; if it pays itself back within its lifetime, it has not actually cost you anything more. Over the lifetime of a building, say a 150 years, you might actually save money.

**Is there anything you could suggest to young people about sustainability?**
Rob Harris: Sustainability is a massive sector and there are loads of opportunities out there at the moment to develop different solutions and different ideas within that sector. It is a really interesting sector to be in, and you get the opportunity to meet some really interesting people.
Emily Cummins: My advice for a young person would probably be that although it may not have the “cool factor” as the jobs of the people in the public light, it is the engineers who give the action to the football players and other jobs because without the film crews, without the sound engineers, they would not be in their jobs in the first place. It is also the engineers and the designers who are going to change this world; it is these people who are going to make the difference. Would not that be a much more exciting to think that you could actually change the world, rather than just being known now?

Tips for students wanting to become engineers
The useful subjects to study are product design, Physics and Maths, but Rob advises to do “one you love” as Physics and Maths can be a lot of hard work. They also advise anyone interested to find relevant work experience and enter any competitions that are available; these look great on CVs and are great experiences for life.

Interview with Nick Showen and Andrew Parr

Nick Showen and Andrew Parr are both engineers with a lot of experience in automation. They were interviewed after attending a design and technology exhibition at The King’s School Canterbury [Figure 3].

Nick is the founder of Jali, an automated computer numerically controlled (CNC) company that specializes in making bespoke MDF furniture in a way that can be as efficient as mass production. Customers can design their furniture on his website which then goes into the automated computer system. Items are nested to reduce waste and then sent to CNC routers where they are cut out of MDF. The items are then spray painted and boxed, and the customers receive their flat packed furniture in a matter of days. The design of the company means that it can be run by only a few people as “double handling” of data is minimized.

Andrew is now a technical author who writes engineering books but he used to work for Thamesteel, specialized in electronic controlled steel rolling. They are one of the fastest growing steel manufacturers in the UK, producing over 800,000 tonnes of steel a year.

What is the most exciting thing about your work?
Nick Showen: Engineering is about solving problems and it is the ability to overcome these problems that provides an endless buzz. I am always looking to solve manufacturing and engineering problems within my own business and the priorities of problems shift with the commercial world. Because of this, there are always projects going on that are parts of a continual development.

Andrew Parr: When I was working for Thamesteel, I would be involved in projects that lasted between 18 months and 2 years from the concept to completion. The feeling when the whole thing would come together and suddenly all worked was like having ten balls in the air at once and then having them all land on the ground at the same time. It is a tremendous feeling of pride that you have when something that you have worked on for 2 years actually works and does what it was supposed to do.

What inspired you to become an engineer?
Nick Showen: From a very young age, I was always interested in how things worked and had a fascination with making things.

Andrew Parr: For me, it was very similar; I used to have a big number eight Meccano set and used to love building things with it. In fact, when I was working at British Steel, the engineers in the technical office had big Meccano sets and would actually build their ideas as a way of exploring an idea.

How did you get into engineering?
Nick Showen: I studied Chemistry at university and was always interested in the idea of design. I was probably more interested in electronics but decided to do Chemistry because I thought that it was a more fundamental subject. I began working
for myself and started by filling a shed with bits of machinery. When I started, I would usually get a job and then try and figure out how I was actually going to do it afterward.

Andrew Parr: After leaving university, I went to work for English Electric which was one of the classic British engineering companies. From there, I went to British Steel and worked in the steel industry for 20 years.

What is your prediction for the next big invention?
Nick Showen: I think that the next big step will be in artificial intelligence. It will take automation to the next level as it will allow machines to do the thinking as well as follow mechanical processes. I believe that it will make the invention of the Internet seem to fade into insignificance.

Interview with Brian Blandford, Mike Percival, Kirti Rajwani and Chris Billinge [Figure 4]

Dr. Brian Blandford designs night-vision goggles, head-up displays and has written textbooks on optics. He became an engineer due to a curiosity about how things work and what things comprise, and from his early years took things apart and fixed machinery. His advice to people wanting to become an engineer is to read books and journals and join clubs, developing their interests whilst also becoming familiar with the trade.

Mike Percival, who is an “aero engineer” for “Rolls Royce”, was rather sucked into becoming an engineer, as both of his parents were in the profession. He tried to escape the career path by studying Geology, but with prior knowledge and a good understanding of Maths and Physics, he found himself heading toward the future that he at first was not keen on. He then found that his distaste in the theory of science did not matter, as engineering was a practical science, and therefore suited him far better. He is involved in recruitment and requires people to have relevant work experience if they want a job or to become an apprentice. Engineering requires a range of skills including physical, practical, mental and social, but to really succeed, you must be passionate about your work.

Kirti Rajwani is an engineer for the “Euro fighter”. She is extremely successful to have such a job, as she is also in work placement at “Amphenol” and has only just finished her degree. She is far happier working, as at University her course was theory based, but now she can develop more practical skills. As a young child, she had a thirst for knowledge; she wanted to discover how things worked and how they were going to work. She was not interested in dolls; she was more interested in cars, and in her dreams of discovery she saw flying cars, demonstrating her aspirations even as a young girl. She chose to come to England (from India) so that she could study more, as in India the only real course in engineering-related matters is mechanics. She believes that passion, enthusiasm, dedication and devotion are all keys to succeeding in any career, but to become an engineer one must get involved in projects and use gap years to get experience.

Chris Billinge also works for Amphenol Ltd. Like others, he became interested in engineering at a young age. He loved “fiddling with bits” and finding out what made them and how they work. He became an engineer because he disliked the way the country was heading, turning from a practical, industry-led place into a finance and money-juggling regime. To him, the main thing is experience and qualification. Amphenol are good at nurturing talent, but formal training and experience must be balanced to get a job. To get involved in industry, Chris has started a project for teenagers called “Young Dragons” which gives commercial and practical experience.
About the Authors

**Will Goldsmith:** (Age 17 yrs.) William Goldsmith is currently in his last year of A levels, studying Physics, Maths and Design Technology. Next year, he hopes to study electromechanical engineering at Southampton University, with the view to go on to work in the power industry and promote sustainable energy. He has many hobbies but particularly enjoys sailing.

**E-mail:** 06whg@kings-school.co.uk

**Sam Gearing:** (Age 17 yrs.) Samuel James Leonard Gearing is in the Lower Sixth at The King’s School Canterbury. He is studying AS level courses in Design and Technology, Mandarin Chinese, Theater Studies, Politics and Photography. He enjoys going to theme parks, the cinema and theaters, as well as acting and directing. His future aspirations are to go to drama school and to pursue a career in the entertainment industry, either acting or directing.

**E-mail:** 07slg@kings-school.co.uk

**Kim Dunn:** (Age 17 yrs.) Kim Dunn is in the Upper Sixth of The King's School Canterbury studying Biology, Geology, English and Photography and hopes to do Geology at university, focusing on Palaeontology. She enjoys sport, especially hockey and cross-country.

**E-mail:** 06kld@kings-school.co.uk

**George Harvey:** (Age 16 yrs.) George Harvey is doing Physics, Biology, Chemistry, Further Maths and Photography at AS Level at The King’s School Canterbury. He hopes to be a Doctor in the future.

**E-mail:** 07ghjh@kings-school.co.uk

**Cleodie Swire:** (Age 16 yrs.) Cleodie Swire is doing Biology, Chemistry, Physics, Further Maths and Spanish at AS Level, and has already taken French. She is currently at The King's School Canterbury and hopes to do Biology at University. She enjoys doing sport, especially hockey, and traveling.

**E-mail:** 07ccs@kings-school.co.uk