

# Engineering Update

July 2010

The benefits and challenges of working together have provided the overarching theme of this term's activities.

Year 7 students have developed an understanding of the roles and responsibilities within design teams in their Journeys of a Lifetime: Space Exploration and Discovery thematic project.

Participants of the Go4SET and Engineering Education Schemes have experienced the importance of individual commitment and specialist expertise in their work and the Shell Eco-marathon team have tasted the joys of success resulting from the strength, motivation and dedication and effectiveness of their members.

Please enjoy our engineering successes as much as we have.

*Jenny Wright: Head of Engineering*

## PRIMARY SCHOOLS COME TO NEWSTEAD

This term has, once again, seen year 5 & 6 pupils from local primary schools engage in activities in Newstead's Design Technology and Science departments to strengthen and enhance engineering skills.

Assisted by Newstead year 9 students, various projects were embarked upon by pupils, including design and construction of a motorised buggy, manufacture of a cam based pop-up mechanical toy, a science energy investigation and a Ready, Steady, Cook type food technology challenge.

These projects introduce pupils to basic workshop techniques, computer aided design and manufacture, as well as giving access to many other items of laboratory / workshop equipment not usually found in primary schools.



Pupils from Tubbenden Primary School show off their pop-up toys

Perry Hall Primary School student makes her buggy



Farnborough Primary School pupils carry out an energy investigation



*"My favourite thing was designing our cars on the computers."*

Mitchell B. Year 6  
Red Hill Primary School

## IN THIS EDITION



PRIMARY SCHOOLS GET NEWSTEAD SUPPORT



SUCCESS IN SHELL ECO-MARATHON



VENICE ENGINEERING TRIP



YEAR 7 JOURNEY INTO SPACE



EES TEAMS CELEBRATE THEIR ACHIEVEMENTS

AND MORE...

## SUCCESS FOR SHELL ECO-MARATHON TEAM

A REPORT BY THE SHELL ECO-MARATHON TEAM

### Forget MPH. It's All About MPG.

The Shell Eco-marathon is an annual competition that takes place in various locations across the world on three different continents. Amongst these venues is Rockingham Motor Speedway, in Northamptonshire, where the 2010 UK event recently took place.

The competition challenges secondary school and college student teams to design, build and test energy efficient vehicles, with the team that goes the furthest using the least amount of fuel becoming the eventual winner. We took part in the schools initiative of the UK Youth Challenge, where competitors are provided with a standard Honda engine and have to build an energy efficient vehicle to house it.

### The Girls' Story

Our project, in all honesty, had a slow start. However, our first hurdle was funding. Fortunately £500 was provided by the school's engineering budget to get us started, and shortly after that we had the pleasure of meeting Mr Cliff Hardcastle OBE, an experienced engineer, who generously gave £1000 towards our project. The final contribution came from the school's Parent's Association, with another charitable donation of £500.

# 375 mpg !



*"The idea of designing and manufacturing our own car from scratch instantly captured our imagination and we were eager to participate."*

With a total budget of £2000 the project finally started to gain momentum, and ideas began to flow, including the discussion of suitable materials and designs. After many hours debating the pros and cons of potential chassis materials, we eventually agreed on the concept of a 'plywood sandwich' thanks to the valued input of Chris Knight, who has extensive experience in the automotive industry.

Of course, as true engineers, we had to test the idea by constructing a prototype, and having proved the idea viable, we eagerly began constructing the chassis, incorporating the new design ideas of our expert engineer, Peter Fagg, a Science and Engineering Ambassador from Network Rail, who contributed a great deal to the design and fabrication of the car.

## NEWSTEAD ENGINEERING SOCIETY VISIT VENICE

A REPORT BY LILY WEBB 12/7

From the 25<sup>th</sup> to 27<sup>th</sup> March, five members of the Engineering Society, alongside students from three other schools, visited Venice on an Engineering trip. There were three main visits on our trip; to Telecom Italia, the MOSE Project and to the Murano Glass Factory.

Our first visit was to the Telecom Italia National Centre in central Venice. We were given a tour of the building and were also presented with a history of Venice – providing an excellent introduction to Venice itself. We were also privileged to visit a new fibre-optics centre, which at the time was not yet open to the public.



On the second day, we visited the tourist hotspot of St Mark's Square and then were given a presentation on the pioneering MOSE flood defence system that aims to prevent flooding in Venice. It consists of barriers at the main inlets, which are able to isolate the Venetian Lagoon as the tide rises. The presentation aided our understanding of some of the technical aspects of the project and also highlighted the importance of engineering in protecting the future of Venice.

On the final day we visited Murano Island and the famous Murano Glass Factory. We were given the opportunity to watch a glass Master make a glass horse. This was a unique experience and gave us an appreciation of the skills required to make glass sculptures. Over the three days we also had time to explore the beautiful city of Venice and overall the trip was a thoroughly rewarding experience.

## Development and Manufacture

The basic manufacture of components that made up the main structure of the car, such as the roll bar and rear chassis, involved learning new manufacturing skills, such as brazing, tapping and perfecting the undervalued art that is filing. This was perhaps one of the most rewarding parts of the project, as the car's development became more visible and a sense of achievement spurred us on, eclipsed only by actually participating in the race.

With regular sessions every Tuesday night, and overtime on weekends, the car finally took shape. Despite the limited manufacturing capability available to us in the school's DT block, and the distraction of exams, the team was able to manufacture a vehicle with a steel roll bar, working steering system and even an aerodynamic shell constructed from shrink form plastic sheeting, complete with a batman style Newstead logo.



The team with finished vehicle, l-r, Victoria Luck, Sorcha Stokvis, Kate McAleer and Jessica Salisbury



Our unexpected trophy for joint third place in the Honda Engine Schools Class

### Setbacks and Obstacles

It was only one day before the event when we were able to test-drive the vehicle and identify any necessary final adjustments. However, due to a rush of enthusiasm on the part of our designated driver our pride and joy was crashed into a fence causing substantial damage to the front end of the vehicle. The rest of the afternoon was spent frantically endeavouring to fix this.

The next day saw us with a repaired vehicle at Rockingham Motor Speedway for the first day (the practice day) of the two day event, where our car would really be put to the test. Safety is paramount at this event and before being allowed on the track all vehicles and drivers must pass scrutineering.

### Evidence of our first qualifying run

Shell Eco Marathon 2010 Rockingham - 30 June 2010	
20 NEWSTEAD WOOD SCHOOL	
Attempt: 1 Qualified	
Start Time:	09:45:24.90
End Time:	10:22:11.32
Time for Run:	00:36:46.42
Laps:	7
Lap Times	
1)	00:04:36.51
2)	00:05:15.39
3)	00:05:03.74
4)	00:05:26.77
5)	00:05:27.51
6)	00:05:23.62
7)	00:05:32.88

Unfortunately, our rear brake proved insufficient to hold the vehicle on a 20 degree slope, demanding more frantic activity into the evening to rectify this dilemma so that we could compete the next day. The following morning, we got the go ahead and recorded our first run. This in itself was an achievement as many schools in their first year fail to complete a single 7 lap, 10 mile qualifying run.

### The Results

Experimenting with different drivers, acceleration techniques and car set ups led us to achieve an impressive 375mpg, which, to our surprise, placed us joint third out of the 12 schools in our class.



On the track with other competitors

During this project we have learnt the value of teamwork and good communication, and the fact that we relied on each other to complete the work, meant the importance of responsibility became apparent.

We hope to continue our involvement in next year's event and pass on our knowledge to the younger years. We are therefore looking for more funding and sponsorship, as well as any expertise available, which will enable us to improve. The reasoning behind this is whilst astonished with 3<sup>rd</sup> place, we would like to improve this position and will attempt to double our fuel efficiency for next year.

## JOURNEYS OF A LIFETIME

A REPORT BY YASMIN ISLAM 7F

Year 7 has done a lot in Journeys of a Lifetime this year and our final project was Space Exploration and Discovery. Year 7 were split into seven groups: Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune. Then we were split into sub-groups: A, B, C, D, E and F (Mercury A, Mercury B etc.) of three or four.

Each group was given a different mission or task, related to their planet, like designing a vehicle or building to land or work on the planet or its moon (some groups had to design a space-suit). Each sub-group had to make a presentation to present to their group – the presentation had to include a model of their idea, a written report and a PowerPoint presentation which had to include a creative arts element (a piece of music, art or a poem), photos of your model and about what you did over the past few days. All of the sub-groups were divided into three jobs – concept designer, product designer and engineer.

On Friday, one sub-group from each planet group was chosen to represent their planet to the 'dragons'. The presentations, models and display boards were judged and the planet with the best presentation won (we are still awaiting results as we were running late that day!). The standards were extremely high and overall it was a successful five days. Many thanks to Mrs Shilling and Mr Lewis for making this possible.



**Venus exploration vehicles developed by year 7 Journeys of a Lifetime teams**

## CELEBRATION DAY FOR EES TEAMS

Two teams, each of five students successfully completed the Engineering Education Scheme (EES) by presenting their projects at the event Celebration and Assessment Day at the University of Kent in April. This presentation consisted of a range of forms, including a formal written report, a team presentation to an assessment panel of engineers and a display stand.

Assessors praised the students for their work with particular comments on the strength of their teamwork and the ability to respond confidently in response to technical questions.



**Gym lighting system project team with their certificates**

The two project briefs, "an extendable lift with an overweight warning" and "an environmentally and user-friendly lighting system for a gym" were set by DSTL, who sponsor us for the scheme. Students thoroughly enjoyed working with the DSTL Engineers throughout their projects.

We would like to thank Derren Crome and Martin Eady for their support again this year and Natalie Dyer who was new to the engineering team and provided valued support with the programming aspects of the projects.



**Extendable Safety Lift project team with their certificates**

## IN BRIEF

### Arkwright Scholarships

Newstead is delighted to announce the success of Jessica Salisbury, Ginny Shooter and Shibanee Sivanayagam in their applications for Arkrwright Scholarships. Winning an Arkrwright Scholarship is a great achievement and our congratulations go to all three girls. The aim of the Arkrwright Scholarships Trust is to encourage the most talented of our young people to consider a career in the field of design and engineering and lead ultimately to their becoming the much needed young engineers of the future. The trust has a reputation for identifying talented and committed 15/16 year old students and scholars must pass a rigorous selection process.

### Lloyds Register Educational Trust Engineering Experience

We are delighted to announce that Newstead year 12 student Rachel Lee-Warren has won a place on the Lloyd's Register Educational Trust Engineering Experience. This is a competition open to 16 to 19 year olds and is an intensive engineering, social and cultural experience visiting international industrial facilities. The trip had 240 applicants for six places. A judging panel first reviewed personal statements and short-listed finalists for a telephone interview, after which another interview took place to decide the final six.

### Go4SET

A team of six year 9 students will be presenting their work at the Go4set Celebration and Assessment day at Littlebrook Power Station later in July. The team, sponsored by RWE npower, has spent the last three months researching, designing and modelling a new environmentally friendly sports hall for our school. Their design includes a piezo-electric floor so that electricity can be generated as students exercise. It also makes extensive use of glass to minimise the use of electrically powered internal lighting.

### Eggs Factor Challenge

Project Eggs Factor, run by the Young Engineers organisation, challenges teams of students to design and build a system that will allow two raw hen's eggs to cross a 'bottomless' 1.5 metre wide chasm at an angle and climb a cliff without damaging the eggs. The eggs must be moved from one side of the chasm to a way point on a cliff then cross the rest of the chasm and climb another cliff! As we go to press, our team of three year 8 students have successfully manufactured their system, submitted a video of an actual egg crossing and are awaiting the results on the Young Engineers competition leaderboard. Cash prizes of up to £375 are up for grabs, so we wish them luck.