



ENGINEERING FOCUS

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INSIDE THIS ISSUE:

Trevithick's Industrial Dartford 2-3

Primary Engineer Regional Finals 4-5

F1 in Schools Jaguar Primary School Challenge 6-7

F1 in Schools Champions at Silverstone 8-9

Bloodhound SSC Rocket Car 10-11

Team Cyclone go to Singapore—Can you help? 12



STEM EVOLUTION

Just as approaches to STEM in research labs and industries around the world are constantly changing, updating and developing , so our approach to STEM activities has evolved during this year.

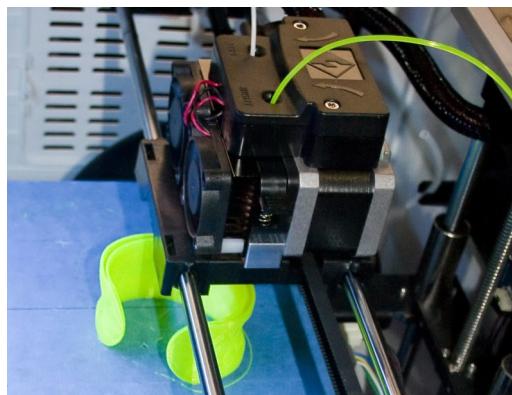
As well as supporting primary schools with their STEM work through rocket and balloon car projects, we have also introduced some big in school projects to give the opportunity to everyone to develop their STEM skills.

Potential science and engineering careers give students a plethora of future pathways, our activities can help students decide whether these challenging careers are suitable for them.

The development in our STEM activities has given students the opportunity to work with Scientist, Technologists, Engineers and Mathematicians as well as giving them the opportunity to develop their problem solving skills applying their STEM knowledge to practical problems.

'What's My Line? Was a great event with year 12 students getting the opportunity to

Our work at Trevithick's Industrial Dartford has evolved from the 1804 loco to the K'nex rocket cars



3D printers are one of the fastest evolving technologies in the world today

quiz STEM Ambassadors about the world of work and the career paths STEM could lead them into.

Technopop's inaugural event invited our year 11 students to focus on considering STEM training and career paths as well as finding out what technological careers are evolving on a daily basis as scientists and engineers push back the boundaries of the technologies we use every day.

Year 9 students designed and built hovercraft to get them thinking about whether they could be interested in any of the hundreds of STEM careers available today.

Years 7&8 had the chance to design and build rocket cars with members of the Bloodhound SSC team setting the WGSB speed record in this class. Details of the event are in this issue.

After this year's evolution, who knows what the future will hold for STEM at WGSB.



Richard Trevithick
pioneer of high pressure steam

"Firing the k'nex cars down the track was extremely thrilling "

Zoe Smith
WGSB Marquee Helper



Vintage and Retro get together in the park



TREVITHICK 2015



Engineering history the foundation of our future



Our annual visit to Dartford Central Park saw us a part of a highly successful and growing event celebrating engineering in all of its forms.

Educational and enjoyable the event gave visitors the opportunity to ride on the 7 inch gauge railway, meet the Steam Punk fans or just learn about the history of Dartford and how it has played a crucial role in the development of different technologies that are key to the world today.

Colin Wheeler, organiser of the Trevithick's Industrial Dartford event, wants to celebrate Dartford's amazing industrial heritage. This vision is supported by the owners of a plethora of vintage vehicles including: Traction engines, both full size and miniature, cars, tractors, buses and lorries.

Our long standing role in the education marquee gives visitors the opportunity to get hands on with our STEM activities and to see what is developing in the future of engineering.

I am, as always, grateful to Mr Knights and the WGSB STEM Ambassadors who give up their Saturday to show people the work we do at WGSB.

It was a quiet start to the day but by the afternoon we were overwhelmed by the number of visitors we had. People of all ages had the chance to make k'nex cars and firing them down our track or making jumping beans to race down our textured board.

Beautiful sunshine in the afternoon encouraging so many people to the park to join us for what proved to be a very successful and enjoyable day.



BIGGER AND BETTER



Trevithick was a pioneer of steam powered road and rail transport.

In 1801 he built a full-size steam road locomotive named the 'Puffing Devil'. This is widely recognised as the first demonstration of steam powered transportation.

During further tests, Trevithick's locomotive broke down after passing over a gully in the road. The vehicle was left under some shelter with the fire still burning whilst the operators retired to a nearby inn for food and drink. Meanwhile the water boiled off, the engine overheated and the machine burned, destroying it. Trevithick did not consider this a serious setback, but rather operator error.

This started a revolution in road and rail transport leading onto the traction engines we see today.



Proud reminders of our engineering heritage



"Trevithick's most significant contribution was the development of the first high-pressure steam engine "

[Wikipedia](#)



PRIMARY ENGINEER REGIONAL FINALS



"Our aim is to encourage young people to consider careers in STEM related professions."

Primary Engineer Vision Statement



From dragonflies to spiders



Teams planned, built and tested their cars



STEM inspires students from all backgrounds and when they are given the chance students of all ages can surprise us with their inventive imaginations and engineering skills.

Sometimes schools can struggle to offer students the chance to get engaged in STEM. At primary level this can be particularly true with all of the conflicting pressures relating to school targets for numeracy and literacy.

Primary Engineer aims to support schools by offering them a challenge that incorporates all aspects of STEM and includes those all important literacy and numeracy skills for students at both Key Stage 1 and Key Stage 2.

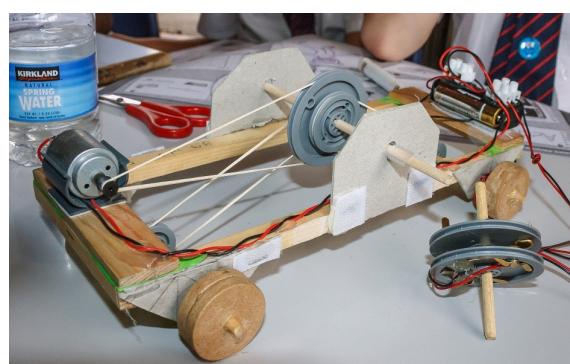
Training is often crucial as there are very few DT



specialists at primary level. This is why part of the project includes providing the schools with training. This gives the teachers the confidence and resources they need to run the project either in lessons or as an extra-curricular activity.

Recent research published by the Royal Academy of Engineering shows that if you wish to encourage young people into engineering primary school students are the key. The natural learning process for a child matches that of adult engineers go through to solve the problems of our age.

Schools from across the south eastern region attend the event and the winning entries are taken back to Primary Engineer HQ to be compared to the regional winners from the South West, the North and East and West Scotland.



AMAZING IMAGINATION IN KS1 & 2



Our congratulations go to all of the teams that attended this event, they are all winners in our view and I think the pictures show it.

Could you make these when you were 7?

Key Stage 1 take part in the Apprentice Level challenge and design and build a vehicle that, when rolled down a ramp goes at least 10 metres in a straight line.

They must safely transport a cuddly toy and the design of the vehicle should be based on a theme.

One of the schools had used the theme of insects and arachnids with memories of the Harry Potter monster book coming through.

Key Stage 2 are working at the Engineering Level challenge, building a vehicle that is powered by a 3V

motor and which can go up a slope as well as go forwards and backwards in a straight line.

Designing and making their own switch that will reverse the direction of the motor, learning about pulleys and pulley ratios and developing a removable shell raise the complexity levels of the task.

Frustrations were high with one team having real trouble with getting grip on the ramp.



"Young children are little engineers. Yet the primary school system almost extinguishes any opportunities for them to flourish as engineers and the teaching of engineering at secondary school is highly variable.!"

Royal Academy of Engineering Report

Thinking like an engineer

Implications for the education system

F1 IN SCHOOLS JAGUAR PRIMARY SCHOOL CHALLENGE



"It was inspirational seeing the young creative minds excelling through the power of STEM"

Matt Watkins
Cyclone
Racing
Manufacturing
Engineer



The reaction to victory



Preparations for our second year as a regional centre for the F1 in Schools Jaguar Primary School Challenge started in October.



Teachers from Stone St Mary, Sutton at Hone and Warren Road Primary school attended training here at WGSB to learn about the project and the software needed to succeed.

Teams at each school needed to develop cars that could be fired down the 20m F1 track using pressurised CO₂ canisters at speeds in excess of 65km/hr.



Along with the cars teams had to produce portfolios, pit displays and a verbal presentation to impress the judges.



The teams first experience of the official F1 track was on the test day when they were amazed by how fast their cars were and they got



the chance to talk about their work with our F1 experts from teams Cyclone, Vortex and Turbocharged.

Inspired by the event and seeing the competition from the others school, the teams were really spurred on and the work they produced for the regional finals was a credit to their dedication.

Competition between the schools at the regional finals was intense. The prize—representing Kent at the National finals at the Ricoh Arena in Coventry just a few weeks later.

All of the teams did well, impressing the judges with their engineering knowledge, design skills and enthusiasm. The scores were extremely close with first, second and third place having only a few points between them.

The crucial announcement – Turbo Types from Sutton at Hone were the Kent Champions!!!

REGIONAL AND NATIONAL RESULTS



With only a few weeks to prepare for the national finals the team had to really examine their work and look at what to improve.

Raising money to cover transport costs, designing a new, faster car, producing a new display and testing their reaction times to see who should be 'driver'. It was full on preparing for this huge event.

Excitement overcame tiredness with a 6.00am start travelling to the finals with Turbo Types eager to impress and desperate to come away with an award.

The judging went well and the scores were collated as the team took on schools from Northern Ireland, Wales and Scotland as well as the other English schools.

Suspense mounted as the awards were made with every team getting a huge cheer for their successes.



Then the announcement...
The Judges Discretionary Award goes to team Turbo Types!

Congratulations to the team, all of that hard work really paid off., impressing the judges throughout. Well Done!!

Finally they came to announcing the new National Champions 2015. A team that had achieved a new speed record with a time of 0.929 seconds—Team Mint!!



**Judges Discretionary Award
Turbo Types**



**National Champions 2015
Team Mint!**



"There are so many tasks that must be mastered, in order to design, manufacture, prepare and finally enter a car for racing, teamwork will be vital to your success. A real F1 team succeeds because all the people learn to work together and support each other. Remember, no one person is more important than other members in the team."

F1 in Schools