



Tachyon in Austin Texas



Falcon Force team

## Engaging girls in engineering careers should be at the very top of our agenda says EESW

There is a well documented shortage of engineers in the UK. The Royal Academy of Engineering and Engineering UK, among others, have conducted research that clearly highlights the shortfall.

The UK will require 100,000 new graduates in Science, Technology, Engineering and Mathematics (the 'STEM' subjects) every year until 2020 just to match the current employment pattern.

What is also eye catching is the miniscule percentage of females who are part of the

**Bob Cater**  
CEO EESW

current engineering workforce in the UK: at only 9%, this is the lowest percentage of female engineering professionals in Europe.

Recent research by the Institute of Engineering and Technology in its Engineering a Better World campaign, reveals that a staggering 93% of parents would not encourage a daughter to pursue a career in engineering.

However, 39% of girls who were asked what subjects they enjoyed at school nominated design and technology, computing and information technology.

This research shows a strong interest in STEM areas at school level that is not being translated into the number of females entering the engineering industry.

EESW strives to engage at least as many females as males in its activities and has achieved considerable success with this goal.

At sixth-form level, the barrier to taking up careers in engineering is still the relatively low number of females pursuing maths and science at A-level.

However, lower down the age range, the gender gap is smaller and girls are seen to engage in a range of activities with enthusiasm, commitment and, most strikingly, enjoyment.

The F1 in Schools Challenge is a good example of an engineering-based activity that attracts equal numbers of girls and boys. This is also an activity

where girls show themselves to be high achievers.

In each of the last three years, all-girl teams from Wales have won through to the UK national finals of the F1 Challenge. There, competing against other Welsh challengers, they were selected to represent Wales at the international final.

Tachyon, an all-female team from Denbigh High School, was a finalist in Singapore in 2015 and in Austin, Texas in 2016.

This month, a female team from Brynrefail in Caernarfon

will represent Wales in the international final to be held in Kuala Lumpur, Malaysia. You can read more about these amazing teams on page 6 and 7.

A quote from the Tachyon team captures the impact that EESW interventions can achieve: "The F1 in Schools competition has been a life-changing experience for each and every member of Tachyon. We are all keen to pursue careers in the field of STEM, and we aim to keep motivating people, particularly females, to do so."

### INSIDE



**FUTURE DESIGNERS: 3**  
Sixth-formers get Headstart in product design



**CAEDRAW OUTLAWS 8**  
Merthyr school represents South Wales at national final



**GIRLS INTO STEM: 12**  
Opportunity to fly high at RAF Valley



**LEGO 14**  
Animal Allies and LEGO make winning combination



**BLOODHOUND 16**  
Set to race 20 years after first speed record set



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On behalf of the Engineering Education Scheme in Wales I would like to thank all those who have contributed to Talent. Any suggestions or comments that will help to improve the quality and content of this magazine will be gratefully received.

We are grateful to all the companies, colleges and universities that work with us to provide pupils with a greater understanding of the importance of STEM subjects to the prosperity of Wales and for helping to develop better employability skills.

The Engineering Education Scheme Wales (EESW) has received funding from the European Social Fund through the Welsh Government for the STEM Cymru II Project. This has been awarded for a period of three years, to enable us to continue our work in West Wales and the Valleys. EESW also receives funding from the National Science Academy through the Welsh Government to ensure it can offer activities to schools in other areas of Wales.

Bob Cater, Editor



# Ford steering interest in engineering

The Ford Bridgend Engine Plant (BEP) works with EESW to get more pupils interested in careers in engineering and manufacturing.

One example is the regular visits which are organised to show girls what opportunities are open to them in a modern engineering plant. EESW particularly focuses the visits on control systems that are the heartbeat of modern manufacturing. The girls work on BBC microbit control activities and then see how important control systems are in the Ford plant.

Another EESW activity involves linking teams of sixth-formers to industries across Wales to tackle real engineering challenges. The Bridgend plant helps with this project by offering teams from local schools engineering challenges to tackle over a six-month period.

The May issue of Ford News contained the following comments about the sixth-form project:

Ford engine plants around the world could soon benefit from engaging with this project which they see as a community initiative. A simple idea developed with 16- and 17-year-old students at the local Brynteg Comprehensive School, as part of their Engineering Education Scheme Wales project, is already saving substantial amounts of money on production lines. What's more, it is also improving safety, recycling and reducing the likelihood of expensive



The First Minister with the Brynteg team and engineers from Ford BEP

stoppages in the plant. BEP senior engineer Carl Duckett and colleague Mark Bamford have been working with EESW organisers on the six-month project for the school.

Mark said: "We identified an issue on the production line and challenged the students to come up with a solution which fully met Ford Production System (FPS) requirements, and they had a brilliantly simple answer.

"It was discussed, designed, manufactured and tested very quickly and it proved so good it is being installed on work stations in a rolling

programme.

"Their solution involved designing and fitting a special drip tray to catch surplus lubricating oil used in assembly which would otherwise contaminate components and transfer lines in the production system.

"Previously the spillages were absorbed by special mats which have to go to costly recycling. Now, surplus captured oil is directly sent for recycling and the mats are unnecessary."

Brynteg's design and technology teacher, John Catton, said: "We were lucky

enough to work with Ford on this year's EESW project; we have met some really inspirational engineers in the plant and they have supported us all the way and motivated the boys all the time."

He added that the project team was delighted to think that its idea has worked so well that it could be taken up in other Ford facilities. The Brynteg young engineers exhibited their idea at the annual EESW Big Bang event where the First Minister, Carwyn Jones, met and talked to them about their success.

At the same event BEP

launch manager Andy Price was one of the judges and presented an award for the best engineering design to a team from Haberdashers' Monmouth School for Girls.

The Ford Bridgend Plant also helped with the South Wales Big Bang event, held at the Liberty Stadium in Swansea, where apprentices had a reaction speed test unit which they had designed and made.

The visiting students had great fun with this interesting activity. The apprentices also answered questions about their Ford apprenticeship programme.

## JCB apprentice uses EESW experience to lead her own team

Taking part in the EESW industry programme, as a Year 11 student in Ysgol-Y-Grango, really opened my eyes to how I could accomplish a lot as long as I put my heart into it.

The EESW programme involves linking school or college teams with a local industry to solve a real engineering problem by designing and creating a solution.

Participants then have to present their final design and are judged against other schools or colleges. I learned a lot from having to work with timescales, budgets and much more and got a real feel and understanding of what real life challenges industries have to overcome on a regular basis.

After falling in love with engineering, as a student taking part in the EESW project and Big Bang Fair, my eyes were opened to see and understand how industries work.

I am now on the opposite side of the spectrum where I am leading a Year 12 team – which is amazing. After being a part of the scheme, both as a participant and now as an engineer working with a

Alanis Curran  
JCB apprentice

school, I've learnt so much and I'm still learning now.

Working with the EESW representative and the school has been great fun and I'd recommend it to anyone who's considering taking part.

I was stunned when I was asked to take part in the EESW activity as an engineer – especially to mentor a team from a school.

Taking part in the scheme just a couple years prior really helped me through the process as an engineer leading a team. I had a head start as I knew about EESW and how it works. I knew how important it was to keep a strong communication bond between JCB and the school and also how to present a real working industry problem so that students, who have never worked in industry, understood it.

It was also important for them to get a better appreciation of how industry works. I knew what it was like to be in their position so I helped in as many ways as I could.



Alanis Curran, JCB apprentice





Students with Steve Cox and the student ambassadors outside the Design and Technology Centre at Bangor University's Normal Site

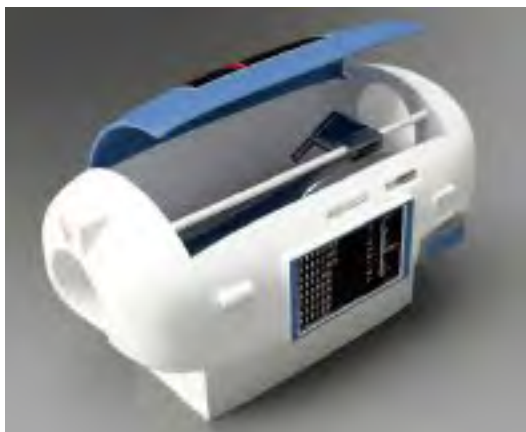
# Future product designers in Wales at Headstart Cymru at Bangor University

**Chris Evans**  
EESW activity deliverer

EESW organised a Headstart Cymru course in Bangor University in July for 15 sixth-form students from Ysgol Eirias, Ysgol Aberconwy, Ysgol John Bright, Ysgol Bryn Elian and Holyhead High School, who participated in the Design Now Challenge hosted by Steve Cox from Autodesk.

The students received Autodesk Fusion 360 training and were tasked with using their newly-acquired skills to complete the 'Design for Medical Innovation Challenge', by designing an innovative piece of medical equipment which would be used in a connected doctor's office.

Steve Cox was extremely impressed with the standard of work by the students, commenting: "If I'm honest,



A CAD drawing of the Autodoc concept designed by students on the course

I'm still buzzing about what went on at Bangor... The following day I was at New Designers17 in London, which

showcases the work of this year's UK product design graduates, and so much of what I saw there wasn't at

the standard of this work, either in terms of research or 3D-modelling. They had all been at it all year too, not just a day and a half!"

The students also enjoyed experiencing university life with a quiz and games followed by a trip to the cinema to watch a recently-released film. They all enjoyed the experience and found it very informative. Several engineers have referred to Headstart Cymru and explained that it helped them to make the right decisions in choosing courses to study in the future.

EESW is grateful to Bangor University and Autodesk for making it possible to run this Headstart Cymru course. We would like to express special gratitude to Steve Cox and the Bangor University product design student ambassadors who played a massive part in making the course such a success.

## North Wales students go sky high with Airbus

Airbus, working in conjunction with EESW, has substantially increased the offering of STEM activities in the North Wales area.

One such example, the Drone Club at St David's High School, has got off to a flying start. Pupils have been able to design, build and test their drones, all under the supervision of professional aerospace engineers from Airbus, while also learning the basic principles of flight and critical drone safety.

First flights were performed on July 20 at Airbus' manufacturing site in Broughton, Flintshire and proved to be a sky-high success.

Helen Lloyd-Kerfoot, Airbus' education partnership manager, said: "Seeing the pupils from St David's fly their own drones has been inspiring. It goes to show what can be achieved with the right partnerships to promote the importance of Science, Technology, Engineering and Maths."

Hosting these events at Airbus has led to the dual

**Helen Lloyd-Kerfoot**  
Education partnership manager,  
Airbus Operations Ltd

benefit of increasing STEM engagement with local students while also providing the opportunity to promote Airbus as an employer of choice in the North Wales region.

EESW has played an integral part in the delivery of activity days for students from local schools in 2017. Events include F1 in Schools Challenge days, EESW STEM days and Lego League at Airbus, while also supporting other Airbus community engagement events such as Air Smiles. This initiative gives worthy young people the opportunity to have a day of activities including a flight in a small aircraft, with the aim of engaging young people most in need of support.

EESW, in partnership with Airbus, willingly give their time and resources to support these events and continually engage the students with their friendliness and professionalism.



Jack Skilling from Airbus helping a pupil from St David's High School in Saltney construct the FPV 250 racing drone

## Learning to be an Engineer report – implications for our schools

The Royal Academy of Engineering welcomes this important new report which explains how 'engineering habits of mind' the thinking characteristics, skills and attributes of engineers can be integrated in the real world of busy schools and colleges to engage the next generation of engineers.

This is particularly important now due to the well documented shortage of engineering skills in the UK.

This shortage not only impacts on the engineering profession but the whole economy due to the pervasive nature of engineering skills.

The engineering community is concerned that young people and the wider public do not

understand engineering's valuable contribution to society and the exciting, diverse career opportunities it can offer.

Therefore, in order to address the engineering skills gap, it is essential we ignite young people's interest in this exciting, creative profession.

This report, commissioned by the Royal Academy of Engineering, explores the ways schools can create better and more engaging learning opportunities for would-be engineers.

It builds upon the six 'engineering habits of mind' (EHoM):

1. Systems-thinking
2. Adapting
3. Problem-finding



It is essential for our future that we ignite young people's interest

4. Creative problem-solving
5. Visualising
6. Improving.

Based on the findings of the

report, the Royal Academy of Engineering makes six broad recommendations:

- The need for more extensive

promotion of EHoM as a mechanism for improving science capital in young people, and the provision of more resources for teachers who wish to adopt the pedagogic approaches identified in the report.

■ The enhancement of existing professional learning networks for teachers to encourage collaborative professional learning and ensure the more rapid spread of effective pedagogies and curriculum design for engineering education in schools.

■ The potential synergies between engineering, design and technology (D&T), computing and science, including the use of thematic curricula with real-world

contexts, should be actively explored in all stages of the school curriculum.

■ A more strategic focus on school leadership in driving change in support of engineering education should be developed.

■ More research to understand how progression in EHoM can be measured.

■ Research on how more engineers can best be engaged in schools in the ways described in the report.

**Learning to be an Engineer – Implications for Schools, a report for the Royal Academy of Engineering, March 2017, is available to download from: [www.raeng.org.uk/learningtobeanengineer](http://www.raeng.org.uk/learningtobeanengineer)**



# Introducing EESW Student of the Year finalists

Bob Cater, CEO of the Engineering Education Scheme Wales, introduced the EESW Student of the Year competition in 2012.

Students who have participated in the sixth-form project are invited to submit written applications and a panel of judges selects a shortlist of students who are invited to an interview.

The selected finalists are invited to the Welsh Automotive Forum's annual dinner at which the winner is announced. The four finalists all receive cash awards and trophies kindly funded by Raj Jones, who is the widow of Welsh entrepreneur Dr Tom Parry Jones.

"Each year we are all amazed at the quality of the applicants and their incredible academic achievements.

"The winner of the award in 2016 was Bethan Wilkinson and the three runners up were, Chelsie Walters, Kyle Greenland and Alex Pilkington," said Bob.

## Bethan Wilkinson STUDENT OF THE YEAR

My experiences with EESW have been encouraging and inspiring. Its sixth-form project gave me an incredible opportunity to work with my fellow students and a local engineering company on a fascinating electrical engineering project for the partially deaf.

Our project involved designing a circuit board and programming it to alter the amplitudes of sound frequencies the user couldn't hear.

Many of my team members are now also pursuing engineering careers thanks to the realistic work experience we gained over the six-month project. It has strengthened all of our university applications and been a frequent talking point during interviews.

Being invited to the Welsh Automotive Forum dinner as part of the Student of the Year awards was a privilege and an experience I will not forget.

It was an honour to meet many experts within the automotive industry as well as other students with the same aspirations as myself. The experience of speaking in front of industry experts and hearing their exciting future plans is one I can't thank EESW for enough.

Since the awards I have been studying intensely for my A-levels. I thoroughly enjoyed producing my A-level design and technology coursework, which is a home aid for people with mobility difficulties.

The product was made from recycled oak and provides assistance for those with back and joint pain. It enables them to lift themselves from a chair or bed in order to encourage independent living with less discomfort.

It was also designed as a product which would be a desirable feature in a home without drawing attention to the user's disability. The



From left: Alex Pilkington, Chelsie Walters, Kyle Greenland, Ken Skates, Cabinet Secretary for Economy and Infrastructure, Raj Jones, Tim Williams, CEO of the Welsh Automotive Forum, Bethan Wilkinson and Bob Cater CEO of the Engineering Education Scheme Wales

product has since been nominated for the WJEC Innovation Awards and I was fortunate enough to have my sketch book images published in the Design and Technology Association magazine.

Having finished sixth form, I am now hoping to start studying civil engineering at the University of Edinburgh this month. I am thrilled at the prospect of discovering more about engineering, and I have no doubt that the understanding I gained from the EESW sixth-form project will give me a head start in any similar university activities.

## Chelsie Walters

The months since the awards ceremony were filled with interviews, work experience and a substantial amount of revision. Following the opportunity to take part in the EESW sixth-form challenge, I have decided to pursue a career in medicine.

I hope to study at Cardiff University, but I also received offers from Liverpool and Birmingham for medicine with additional offers from Cardiff and Exeter for medical pharmacology.

The experience of being a part of the Student of the Year award and obtaining the Gold Crest award for my project certainly made my application for university more competitive and became a topic of conversation at each interview. For this I am extremely grateful.

I have met a number of interesting people thanks to the EESW, and have definitely made some friendships that will last a lifetime. Being able to network with like minded

individuals has been extremely beneficial.

During the sixth-form challenge I worked with the National Botanic Gardens of Wales and other team members to devise a solution to prevent the deaths of Soprano Pipistrelle bats at the gardens.

The brief proved challenging; however, we successfully composed an idea and constructed a prototype that was made of recyclable materials, resulting in positive feedback from the gardens. The skills I learnt during the project are invaluable.

Since the awards I have been able to motivate a number of younger students at my school to pursue STEM subjects by hosting a weekly science club, which has proven to be a great hit.

The EESW project inspired me to further explore the field of engineering, and following the satisfaction of seeing an idea come to life during the project, I hope to intercalate in biomedical engineering, which I believe can improve human health through multi-disciplinary work that integrates both the engineering and biomedical sciences with clinical practice.

I am extremely thankful for the array of opportunities presented to me by the EESW, and would encourage every student to take full advantage in the future.

## Alex Pilkington

Since the awards my concentration turned largely towards the looming exams, but my engineering spirit (and revision fatigue) urged me to aim further. After receiving

the title of runner up EESW Student of the Year, I went on to compete in the National Schools Challenge, where I was named one of the top 60 most employable students in the UK.

I was invited to the final in the More London PricewaterhouseCoopers office, which included workshops and networking opportunities, and the task of delivering a competitive pitch.

After this I attended a physical computing and robotics taster course where I used Ratchet, one of the forerunning programming languages for artificial intelligence, and learnt the basics of Arduinos - small programmable computers which can be used in a variety of robotics and electronics projects.

I became inspired and went on to buy a set and learn more about electronics and programming through the Arduino, and then worked on two main projects.

Firstly, a moving robot built with old Lego which could detect how close an object was in front of it and stop accordingly, and secondly a countdown timer which listed the number of seconds left until I turned 60 years old, in order to remind me that life is ticking away and not to waste it!

During this period I heard about a new university programme, the brainchild of James Dyson. The idea was a solution to the rising shortage of engineers in the UK, and aims to combine a high-level degree course with practical work experience, in order to provide a full engineering education.

After a series of challenging stages I was offered a place on the first year of this programme as one of about 30 offer holders, which I am really excited about.

I received offers from Imperial College London, Warwick and Lancaster yet I believe none of these come close to the opportunity that Dyson presents. I really believe that if not for EESW and the opportunities presented to me by the organisation, my application would have been far less complete. I am really grateful for everything the organisation has been able to do for me.

## Kyle Greenland

Being awarded EESW runner-up student of the year was a major honour for me and my school. It has benefited me immensely, especially when applying to university. Currently, I attend Heolddu Comprehensive School sixth form in Bargoed, where I study biology, chemistry, mathematics and the Advanced Welsh Baccalaureate.

Since receiving the award, I have run several in-school assemblies to promote the EESW project and to encourage Year 12 students and lower-school pupils to participate in the wide range of EESW challenge briefs available.

In the next academic year I hope to study medical bioscience at Imperial College London, where I will be able to explore the fundamental principles of human health and disease and their application to global issues on a new level.

My passion for biomedicine stems from my interest in how beautifully the inert

community of somewhat individual constituent parts come together to produce a perfectly-functioning instrument capable of overcoming even the most testing challenges, whether that be the complexity of cell-to-cell communication, conquering the most vicious diseases or adapting to the stresses of modern life.

The human body is truly the most remarkable laboratory. After completing my degree, I hope to pursue a career in immunology or pharmacology, as drug development and design is essential in an ever-growing and ageing population in order to maintain the quality of British health on a national level.

It is also extremely important to understand the effects different medicines have on our bodies and how they may be developed to be more efficient and have less harmful side effects.

Aside from the science of biomedicine, it is also an amazing career option because of its job prospects.

For example, Wales has 5% of the UK population and 10% of its life sciences workforce and BTG Group, a UK market leader is based here in Wales.

After undertaking the EESW project I believe my problem solving and leadership skills have improved dramatically and I now have a new-found appreciation for engineering and the vast array of disciplines it interacts with.

If anyone was considering taking part in one of EESW's projects I would encourage you to do so as the scheme is very beneficial.



# A new curriculum for Wales – The Donaldson Review

A new curriculum for Wales is being developed by education professionals and will be available to schools by September 2018.

There will be six areas of learning of which science and technology will be one. Hopefully, this will create an area of learning to equip our young people with the skills and attitudes necessary to operate in the 21st century.

The whole approach to developing young people aged three to 16 will change. The new curriculum will have more emphasis on equipping young people for life. It will build an ability to learn new skills and apply subject knowledge more positively and creatively.

As the world changes, pupils will be more able to adapt positively. They will also get a deep understanding of how to thrive in an increasingly digital world. A new digital competence framework will introduce skills across the curriculum, preparing young people for the opportunities and risks that an online world presents.

Meanwhile, teachers will have more freedom to teach in

**Bob Cater**  
CEO EESW

ways they feel will have the best outcomes for their learners.

**Some of the recommendations**

The purposes of the curriculum in Wales should be that children and young people develop as:

- ambitious, capable learners, ready to learn throughout their lives
  - enterprising, creative contributors, ready to play a full part in life and work
  - ethical, informed citizens of Wales and the world
  - healthy, confident individuals, ready to lead fulfilling lives as valued members of society.
- The curriculum should be organised into areas of learning and experience that establish the breadth of the curriculum.

The review proposes six areas of learning and experience, as follows:

- Expressive arts
- Health and well-being
- Humanities
- Languages, literacy and communication



There will be six areas of learning in the new curriculum of which science and technology will be one

- Mathematics and numeracy
- Science and technology. Children and young people should have their learning

developed across the curriculum through three cross-curriculum areas that should be the responsibility of

all teachers: literacy; numeracy; and digital competence. A digital competence framework and an

accompanying 'Routes to Learning Digital Competence' should be developed and be included as a cross-curriculum responsibility.

The review also proposes that four other wider skills should be embedded within each area of learning and experience.

**The 'wider skills' in Wales comprise:**

- critical thinking and problem solving – marshalling critical and logical processes to analyse and understand situations and develop responses and solutions;
- planning and organising – implementing solutions and executing ideas and monitoring and reflecting on results;
- creativity and innovation – generating ideas, openness and courage to explore ideas and express opinions;
- personal effectiveness – reflecting on and understanding oneself and others, behaving in effective and appropriate ways; being an effective learner.

The full report is available at: [www.gov.wales/docs/dcells/publications/150225-successful-futures-en.pdf](http://www.gov.wales/docs/dcells/publications/150225-successful-futures-en.pdf)

## F1 in Schools UK champions head to the 2017 world finals in Malaysia!

**Andrew Denford**  
Founder and chairman,  
F1 in Schools

Academy Racing, a team of four 15 to 17 year old students from WMG Academy for Young Engineers in Coventry, were crowned F1 in Schools UK Champions 2017 at Silverstone earlier this year.

Its success won the team a place at this year's F1 in Schools Challenge World Finals, which is being held in Kuala Lumpur, Malaysia; two £5,000-per-year bursaries for a mechanical engineering degree course at UCL; a Denford Router to the value of £10,000 for their school; tickets for the 2017 Formula 1 British Grand Prix courtesy of Silverstone, including an exclusive F1 paddock tour hosted by F1 in Schools.

The UK Champions were joined on the podium by two other winning teams to represent England. The team GB contingent for the world finals is completed with the Scotland champions, Volcan from Aberdeen Grammar School and Wales' champions, Falcon Force, from Ysgol Brynrefail.

Andrew Denford, founder and chairman of F1 in Schools said: "Every year we see the teams raising their game. This year, for the first time, one of the teams, Unity, scored 100% across the board in its verbal presentation, so we've seen the standard reach perfection in that judging element.

"Academy Racing is well-deserved winners, having persevered for a few years and



Academy Racing team being crowned F1 in Schools UK champions

finally making it to the top step of the podium.

"All the students put a tremendous amount of work into the competition and have shown that there is plenty of engineering talent in the UK, ready to be guided into industry careers.

"The competition also gives students life skills and experiences that will always be beneficial for them and we're proud to play a small part in their career paths and future success."

F1 in Schools challenges students to create their own Formula 1 team, which is commissioned to design, construct and race the fastest miniature Formula 1 Car of the Future – a 21cm-long scale model built from a modelling block and powered by a compressed air cylinder.

Each team of between three and six students creates a pit display and showcases its work in developing a race car. At the



national finals each team brings along a pit display, its cars and portfolio, and makes a verbal presentation for the judges.

The cars race on a 20-metre track, with the cars covering the distance in around one second. Visit [www.f1inschools.co.uk](http://www.f1inschools.co.uk) for the very latest news!

Denford Limited is proud founder and sponsor of the F1 in Schools STEM challenge. The company has a comprehensive portfolio of hardware and software used by schools for these engaging educational initiatives which enable students to put their classroom learning into practical, fun and exciting projects.

CNC routers, milling machines, lathes, 3D-printers and laser cutters suitable for use in the education environment are supplied by Denford, as well as the F1 in Schools race tracks and race systems and a host of F1 in Schools consumables.


For further information visit [www.denford.co.uk](http://www.denford.co.uk).





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# F1 in Schools 2017 – The track to success

**Stephen Lane**  
EESW F1 in Schools manager

Just as in Formula 1, this year's F1 in Schools STEM challenge was introduced with a whole new plethora of rules and regulations, including a shake-up of categories to introduce three classes of entry.

Pupils could choose from entry, development or professional classes, depending on age and experience, to develop and learn key skills in STEM, before competing at one of the two regional finals organised by EESW in Wales.

Both new and returning teams started their campaign for F1 in Schools supremacy early in the academic year. This ensured that they had time to design and develop their ideas fully, ahead of the regional finals in both North and South Wales. Teams were competing for a range of awards, including a place at the national finals at Silverstone, where they could ultimately compete to represent Wales at the F1 in Schools World Finals later in the year.

This year saw an influx of schools and teams new to the F1 in Schools STEM challenge, competing side by side with more experienced teams.

Initially, learning takes place in the classroom where pupils adopt a role within their team and develop skills in literacy and numeracy, maths, physics, design and technology (including Computer Aided Design (CAD) and aerodynamics). This is followed by series of presentations and ultimately racing their F1 car on the track.

In South Wales the event took place, for the first time, in the Liberty Stadium Swansea,



having outgrown the previous location.

The teams displayed some excellent work in their pit areas and the enthusiasm and engagement of the pupils demonstrated was fantastic and a credit to all who took part.

As in previous years, the results between competing teams were very close and all results had to be double-checked before any awards were presented. An early start ensured it was a full day, culminating with an awards ceremony finale.

North Wales saw the same

enthusiasm and engagement by pupils, with the regional final taking place at Venue Cymru in Llandudno.

New teams were particularly keen to compete with the more experienced professionals, ensuring they took away new ideas to develop and hone for future competitions.

It was good to see male, female and mixed teams taking part and it was a credit to those involved that they had recognised this competition as an activity for all.

It was also great to hear the many conversations between pupils regarding how teams could make improvements before competing again next year. This demonstrates the commitment of the pupils (young engineers) and their mature approach to the competition and STEM learning.

Winning teams went on to compete at the F1 in Schools UK National Final two-day event where the Ysgol Brynrefail team – Falcon Force – was crowned the winning Welsh team. Congratulations to all who competed at the UK national final and good luck to Team Falcon Force which will now go forward to compete at the F1 in Schools World Final in Malaysia this month.

For the 2017/18 competition, EESW will be continuing its support for teams across Wales. Aerodynamic experiments will be offered, along with new Autodesk Inventor CAD sessions for all levels and abilities.

In-school competitions will also be offered which is a great opportunity for large groups of pupils to participate ahead of the regional finals.

**For more information contact** [chrisharris@eesw.org.uk](mailto:chrisharris@eesw.org.uk)

## F1 IN SCHOOLS WINNERS

Entry class	School and team
<b>NORTH WALES</b>	
Runner up fastest car	Ysgol Emrys Ap Iwan – 6 in a Second
Fastest car	Ysgol Emrys Ap Iwan – Ultimate Aero
Portfolio award	Ysgol Glan Clwyd – Traxion
Presentation award	Conna's Quay High School – G-Force Racing
Future stars award	St David's College – SDC Racing
3rd Place Regional champions award	Ysgol Emrys Ap Iwan – 6 in a Second
2nd Place Regional champions award	Ysgol Glan Clwyd – Traxion
Regional champions award 2017	Ruthin School – Team Patrick

### Development and professional classes

Development class – Fastest car	Ruthin School – Team Blitz
Professional class – Fastest car	Conna's Quay High School – Cerberus
Team sponsorship and marketing	Ysgol Gyfun Llangefni – Drive
Team identity award	Ysgol Brynrefail – Falcon Force
Innovative thinking award	Ysgol Brynrefail – Falcon Force
Research and development award	Blessed Edward Jones – Xceleration
Judges recommendation award	Conna's Quay – Cerberus
Development class – Winners 2017	Ruthin School – Team Blitz
Professional class – 3rd Place	Ysgol Gyfun Llangefni – Drive
Professional class – 2nd Place	Ysgol Brynrefail – Falcon Force
Professional class – Winners 2017	Conna's Quay – Cerberus

### SOUTH WALES

Runner up fastest car	Ysgol Gyfun Ystalyfera – Nemesis
Fastest car	Treorchy Comprehensive School – White Lightning
Portfolio award	Aberdare Community School – Rush
Presentation award	Ysgol Gyfun Ystalyfera – Nemesis
Future stars award	Aberdare Community School – Bullet Speed
Judges recommendation award	Brynteg School – F1 Fireflies
Research and development award	Brynmawr Foundation School – Volare
3rd Place Regional champions award	Ysgol Gyfun Ystalyfera – Nemesis
2nd Place Regional champions award	Treorchy Comprehensive School – White Lightning
Regional Champions award 2017	Ysgol Gyfun Gwent Is Coed – Dragonaires

### Development and professional classes

Development class – Fastest car	Pencoed Comprehensive School – Nemesis Inferno
Professional class – Fastest car	Afon Taf School – Y Ddreigiau Ferrari
Team sponsorship and marketing	Cymer Afan Comprehensive School – Valley Velocity
Team identity award	Afon Taf School – Galactic Phantatoes
Innovative thinking award	St John's College – Vortex
Research and development award	St John's College – Vortex
Judges recommendation award	Whitchurch High School – Alpha
Development class – 3rd Place	Afon Taf School – Galactic Phantatoes
Development class – 2nd Place	Afon Taf School – Lightning Sharks
Development class – Winners 2017	Cymer Afan Comprehensive School – Valley Velocity
Professional class – 3rd Place	Cyfartha High/Merthyr College – Cyfartha/Merthyr 1
Professional class – 2nd Place	Afon Taf School – Y Ddreigiau Ferrari
Professional class – Winners 2017	St John's College – Vortex

## Falcon Force crowned Welsh champions

Following on from our success in the F1 in Schools regional final organised by the Engineering Education Scheme Wales, team Falcon Force Wales went on to be crowned the F1 in Schools Welsh Champions during the UK National Championships in Silverstone.

Our team consisted of six Year 10 students from Ysgol Brynrefail, Llanrug and our success in the nationals means that we have been invited to represent Wales at the F1 in Schools World Championship Finals in Malaysia this month.

In the months leading up to this competition we had a large amount of work to complete. As well as producing the car, as a team we had to produce an engineering design portfolio.

We also worked on a business and enterprise portfolio, where we had to find

**Team Falcon Force**  
Ysgol Brynrefail, Llanrug

possible sponsors to fund our work and participation in the regional and national finals. During the process we worked on our marketing and social media strategy. As a team we designed and promoted our team identity and created a professional pit area that displayed all of our work effectively and professionally.

During the UK final competition we had to give a 10-minute presentation to experts in the field. This included giving details about our car's design/engineering and the skills such as problem-solving and teamwork that we developed during the competition. The car was raced along the 20m-track being powered by a CO<sub>2</sub>



**Falcon Force at Silverstone**

canister. During the race our car managed to complete the 20m distance in 1.28 seconds, inclusive of our reaction time.

Our team was nominated for the 'Women in Motorsport' prize and was successful in designing the fastest car in

Wales along with being the 9th fastest car overall in the UK competition.

We were featured in a number of interviews and also appeared on the national Welsh language S4C TV program 'Heno' where we were

asked to discuss our success.

In order to compete in Malaysia we needed to raise in the region of £15,000 in the form of sponsorship to cover all costs of competing, travel and accommodation for the team.



**Team Tachyon receiving the award**

# Lively and enthusiastic pupils take part in primary challenge

The F1 in schools Jaguar Primary School Challenge championship season concluded in Wales when teams of lively, enthusiastic primary school pupils assembled for regional finals at the National Waterfront Museum in Swansea and Venue Cymru, Llandudno.

A total of 51 teams took part in the events with more than 1,000 students in Wales involved in the challenge.

Significantly this year, most schools delivered the Jaguar challenge as part of their curriculum while developing their literacy, numeracy and digital competence.

It was a delight to see these young pupils, some as young as seven, applying their science, technology, engineering and maths skills to run an F1 team for the championship season.

The pupils demonstrated amazing teamwork and seemed

**Chris Harris**  
EESW Primary F1 in Schools co-ordinator

to relish the opportunity to unleash their enthusiasm on the judges at the regional finals.

The judges gave the students some great compliments and were also full of accolades for the teachers and support staff that prepared the teams.

The high standard Welsh schools showed in their competitions resulted in a total of seven teams being awarded places in the national finals.

Congratulations to all schools, competing students and the teachers that supported them in their magnificent achievements.

A total of seven Welsh schools competed in the UK national finals of the Jaguar Primary School Challenge held at the British Motor Museum in

Gaydon.

Representing South Wales were Ysgol Tycroes, Ammanford, Caedraw Primary, Merthyr, Porthcawl Primary, Porthcawl and Albert Road Primary from Penarth while representing North Wales were, Ysgol Bro Gwyr, Llanrwst, and two teams from Ysgol Escob Morgan, St Asaph.

It is suitably fitting that the British Motor Museum, home to the great motoring engineering achievements of the past, was a showcase for our future engineers and designers.

The teams relished the opportunity to demonstrate and complete their learning.

The Jaguar Challenge, now the only event in the F1 in Schools categories open to primary schools, resulted in an amazingly high standard.

One of the challenges during the day was to design and make an electric car to run down the

F1 track.

One of the Welsh schools, Caedraw Primary from Merthyr, applied its knowledge, acquired from the Jaguar challenge, to design a set of wheels for the electric car using computer aided design (CAD) and then 3D-printed the wheels during the competition!

The team, Outlaws, took the Jaguar logo, extruded it on their CAD programme and then used it as a spoke in the construction of its car wheels - innovation at



its finest.

The teams were brilliantly prepared by their teachers and

supporting staff and were a credit to Wales, their schools and themselves.

## WALES JAGUAR PRIMARY SCHOOL CHALLENGE RESULTS 2017

Award	School	Team
<b>NORTH WALES</b>		
Well made car	Ysgol Tudno	Pro Tudno Racers
Best newcomer	Ysgol BodAlaw	MALC force
Best team image	Ysgol Y Castell	Einstein
Fastest reaction time	Ysgol Bro Gwyr	Lightning Ladies
Best portfolio and pit	Ysgol Esgob Morgan	Blaze
Best verbal presentation	Ysgol Bodafon	Bodafon
Fastest car	Nercwys Primary	Calm Racers
Best engineered car	Ysgol Bro Gwyr	Lightning Ladies
Champions 3rd place	Ysgol Esgob Morgan	Cosmic Titans
Champions 2nd place	Ysgol Esgob Morgan	Armageddon
Champions 1st place	Ysgol Bro Gwyr Primary	Lightning Ladies

<b>SOUTH WALES</b>		
Car build quality	Llanbedr Primary	Team Wolfe.
Car build quality	Llanbedr Primary	Team Whirlwind
Well thought out presentation	Mynydd Cynffig Primary	King Cobras
Best team image	Porthcawl Primary	Porthcawl Power
Fastest reaction time	Caedraw Primary	Outlaws
Best portfolio and pit	Llangewydd Primary	Blue Blitz
Best verbal presentation	Garnteg Primary	Team Lightning Bolt
Fastest car	Ysgol TyCroes Primary	Fusion
Best engineered car	Ysgol TyCroes Primary	Fusion
Champions 4th place	Porthcawl Primary	Porthcawl Power
Champions 3rd place	Albert Road Primary	Rushing Racers
Champions 2nd place	Caedraw Primary	Outlaws
Champions 1st place	Ysgol TyCroes Primary	Fusion

## JAGUAR PRIMARY SCHOOL CHALLENGE WINNERS 2017

Award	Team	School	Town
National champions	Spitfire Speeders	Topcliffe Primary	Birmingham
2nd Place	Outlaws	Caedraw Primary	Merthyr Tydfil
3rd Place	Lightning Ladies	Ysgol Bro Gwyr	Llanrwst
Fastest car	Spitfire Speeders	Topcliffe Primary	Birmingham
Electric car challenge	Spitfire Speeders	Topcliffe Primary	Birmingham
Team identity	LEGO Lightning	Dania School	London
Best engineered car	Outlaws	Caedraw Primary	Merthyr Tydfil
Research and development	Thunder Boltz	Humberstone Cloverfield Academy	Humberstone, Grimsby
Sponsorship and marketing	Flames of Fury	The Castle Primary	Tiverton
Best verbal presentation	ZOOM	Wheatley Lane Methodist Primary	Fence Burnley
Best portfolio and pit display	Spitfire Speeders	Topcliffe Primary	Birmingham
David Barnard recognition of achievement	Armageddon	Ysgol Esgob Morgan	St Asaph



for Best Verbal Presentation from Pirelli

## Team Tachyon adds Wales to the F1 circuit

Following its success at the EESW North Wales Regional Final again, Tachyon, the team from Denbigh High School, travelled to Austin, Texas, in October 2016, in order to, once again, represent Wales at an international level.

This follows its success at the Singapore 2015 World Finals of the Formula 1 in Schools competition

Tachyon is an all-female team of four Year 11 students: Amy Martin, team manager, Holly Roberts, design engineer, Jessica Briody-Hughes, manufacturing engineer and Katie Rowlands, resources manager.

Engineering is widely regarded as a male-dominated profession, and the girls had a definite focus getting more women into engineering, or other STEM-related careers.

Tachyon was able to make a contribution to this important aim through its partnerships with local primary schools.

**Amy Martin**  
Team Tachyon team manager

The team competed last October, going through various rigorous stages of judging and coming away victorious from the World stage with seven nominations and three awards:

- Best Verbal Presentation, sponsored by Pirelli;
- Best Sponsorship and Marketing, sponsored by Manor F1;
- FIA Women in Motorsport Award.

The team is extremely proud of its achievements, particularly as it was the only Welsh team competing at the finals. This was not the only cause for celebration in Texas, however, as team manager, Amy Martin earned a place in the Randstad Williams F1 Engineering Academy, with only nine out of around 300 applicants receiving a place.



Amy Martin on stage in Austin Texas

Another honour bestowed on Tachyon was being given the opportunity, alongside two other competing teams, to hold the American flag on the Circuit of the Americas racetrack during the opening ceremony of the Texas Grand Prix.

In addition to this, the team was granted passes to tour the Manor F1 pit, where the girls were able to gain some insight into how teams prepare for races. Additionally, as a part of the Randstad Academy, Amy was able to visit the Williams F1 team's pit ahead of the race,

where she met the current Formula 1 World Champion, Nico Rosberg.

The F1 in Schools competition has been a life-changing experience for each and every member of Tachyon, as it has allowed them to gain confidence, communication skills and the ability to work as an effective, efficient and organised team.

Because of F1 in Schools, they are all keen to pursue careers in the field of STEM, and aim to keep motivating more people, particularly females, to do so.



# Journey to the national finals for the Caedraw Outlaws team from Merthyr Tydfil

After months of work, the time was finally here for the Outlaws, a team from Caedraw Primary School, Merthyr Tydfil, to go to the South Wales regional final of the Jaguar Primary School Challenge.

It was time to pack up all of our equipment and merchandise and make the journey to the National Waterfront Museum in Swansea.

The work had been tough, but we had tried our very best to produce the fastest car possible and to make a brilliant presentation – now was the time to find out.

Our whole class had worked hard to research, develop and create ideas for a car, write letters to get sponsorship and



The Outlaws with their teacher Jodi Stokes having their photograph taken by David Rees AM at the Science and the Assembly event

## Team Caedraw

design a team logo. We also designed and made wheels and axles.

In order to become part of the competition team we all had to complete a job application.

It would be the first time for any of us to be in a competition like this, and as we arrived in Swansea we were very nervous and excited.

Setting up our pit area we noticed how good some of the other teams looked – we had to compete against 25 other teams and we quickly realised that it was going to be a tough event.

Our driver, Jamil, was a little

nervous before we had to race our car, but he did amazingly well and had the fastest reaction time on the day!

We were a little bit disappointed that our car came second fastest, but we already had ideas about how to improve it.

We waited for the results with all of the other teams – it was nerve wracking. We were delighted to be awarded second place in addition to our prize for the fastest reaction time.

We had qualified to represent South Wales at the UK national finals!

We couldn't believe that we were lucky enough to attend the final at the Jaguar factory – it was amazing.

We were competing against 30 teams from all over the UK. Our verbal presentation went well and we won all of our races, our car went the fastest it had ever been!

After completing all of the challenges on the day we had to wait nervously for the results.

It seemed to take forever for the presenter to announce the results and we were on the edge of our seats.

The prize for the best engineered car was announced and we had won



Caedraw Outlaws receive its prize as second place winners at the national final

it. It then came to the overall podium results. Team Outlaws was called up in second place, we had a place on the podium.

We were delighted. Standing on the podium with our trophies was amazing, we will always remember it.

Taking part in the project was a fantastic experience although it was an awful lot of work.

We are very grateful to the

companies that sponsored us and helped us to compete. However, our biggest sponsor was our own class business – Glass from the Class.

As well as raising money for the Formula 1 competition, Glass from the Class was also entered into the Welsh Government's Enterprise Troopers competition. A team of four was chosen for the regional finals.

We were delighted when our team won the South Wales regional finals and qualified for the Welsh national finals in Cardiff, where we came second.

Through both projects we have developed so many different skills and now have lots of ideas of different jobs that we could do when we grow up. We will certainly remember this year.

## Rushing Racers team compete for Wales

We are Rushing Racers from Albert Primary School. The team is made up of Eddie, Jasper, Georgia and Megan, aged between nine and 11.

After our success at the South Wales regional final of the Jaguar Primary Challenge, we went on to the national final at the British Motor Museum in Gaydon.

Jasper, the manufacturing engineer, explained: "We designed our cars using a CAD programme and made them using a Silhouette Studio plotter cutter ready for the challenge.

"Once we arrived we set up

## Rushing Racers Albert Primary School

the pit display with lollipops and Kit Kats, which we had sold in school to help raise sponsorship money."

Eddie, the graphic designer, said: "On our pit display we also had information about our team, such as our roles, our rap and team logo, as well as a wind tunnel.

"The wind tunnel helped us see how aerodynamic our car was – ready for the competition."

Georgia, the manager, said:

"My favourite part of the day was racing the cars, even though we didn't win our round.

"Our electric car (the additional challenge) won the race, which was great. We made the car aerodynamic by making it smooth and making the front sloped to cut through the air."

Megan, the design engineer, explained: "We built the car using Silhouette Studio and put it together with the correct number of staples.

"We had also designed the car to display our logos and team colours. What we could do next time is make the front

more curved to make it more aerodynamic. Or we could try and use lighter materials for the other parts of the chassis (like the wheels).

"My favourite part was the verbal presentations, because, even though we made some mistakes, we could keep going and think on the spot.

"We joined our F1 club because we enjoyed the idea of engineering and working in a team.

"When I am older I would like to do astro-engineering!"

"I have been inspired to be an engineer, just like my mum," said Georgia.



Thorsten Stösser, left, and Huw Jenkins of Cardiff University (engineering and architecture departments) with Rushing Racers team at the wind tunnel

## University of Wales Trinity Saint David's waterfront development on the horizon

Staff and students at UWTS'D's School of Engineering are celebrating another successful year supporting EESW programmes and initiatives.

The three-day residential 'Headstart' programme saw pupils from across the region designing and developing innovative solutions to the challenges presented by sub-aqua and marine habitation.

Participants benefited from access to the university's state-of-the-art product design and engineering facilities over the three days and the event culminated in the team's presenting their high standard

## Richard Morgan Programme director, mechanical and manufacturing engineering, University of Wales Trinity Saint David

of work to lecturers and event organisers.

This gave the participants a real insight into university life and the massive impact that STEM subjects can have on the world around them.

The university welcomes teams to the annual 'Headstart' workshop, supporting pupils with industrial projects.

Engineers from a diverse range of industries attended the workshops, these included representatives from Tata Steel, Tidal Lagoon, Schaeffler UK and Power & Water.

The teams made excellent use of Computer Aided Engineering (CAE) and advanced manufacturing resources.

UWTS'D's School of Engineering also sponsored a team from Bishop Vaughan Comprehensive School which participated in the Big Bang competition.

The university tasked the team with developing an

automated system for the repair of composite wind turbine blades – ordinarily a highly-skilled and labour-intensive operation.

The team developed a portable, computer-controlled scanning and machining system which dramatically reduced the time needed to effect a high quality repair.

The project impressed judges at the regional competition, picking up the Continental Award for 'Project with most Commercial Potential'.

This was a huge credit to the pupils and staff at the school

who worked energetically throughout the year to deliver an outstanding piece of work.

2018 will see the School of Engineering move into a new, purpose-built facility in a vibrant, modern waterfront location.

The multi-million-pound SA1 Swansea Waterfront development will support the university's aim to inspire individuals and to develop dynamic practitioners who can use their knowledge of technology and engineering to make a real difference to society.

The development, which is

due to be completed in May 2018, boasts state-of-the-art technical spaces to support mechanical, manufacturing, motorsport, automotive, energy and environmental and sports equipment engineering. These facilities are accompanied by learning studios designed to support modern approaches to teaching and learning.

We welcome visitors all year round, so if you would like to take a tour of the facilities at the School of Engineering, please telephone 01792 481168 or email [engineering@uwtsd.ac.uk](mailto:engineering@uwtsd.ac.uk).





Dr Ben Evans

## Applying to university? Admissions tutor shares top application tips

The Ucas cycle 2016-2017 will be the last for me as the undergraduate admissions tutor for aerospace engineering at Swansea University. It is a role that I have thoroughly enjoyed over the past eight years and as I move on to new responsibilities it has led me to reflect on my experience.

The first thing that I must confess is that over the years I have worked as an admissions tutor it has become increasingly clear that the process of applying to university can often appear as though it is a bit of a game that applicants (and universities) play.

In the game, the goal of applicants is to get onto their desired course at the best university possible and admissions tutors are trying to fill all the places on their course with the most gifted-and-able students possible.

In any game, understanding the rules is critical. It's therefore worth spending some time familiarising yourself with the Ucas process. The Ucas website is very helpful, chat to students who have recently gone through the process and attend university open days and ask questions.

There are many questions I have been asked by applicants and parents alike. If I had to narrow down to my top three I think they would be:

### What are you looking for in a personal statement?

The key here is in the title. A personal statement should be your personal story. Too often I have read personal statements have clearly been adapted from online templates – admissions tutors read so many that they are easy to spot!

You don't need to try and convince the admissions

**Dr Ben Evans**  
Admissions tutor for Aerospace Engineering,  
College of Engineering,  
Swansea University

tutor that you are bright in the personal statement, your grades will do that. Instead, focus on why you are passionate about the subject and what you hope to gain from your university experience.

### Any tips for doing interviews?

Don't forget that the person interviewing you is almost certainly somebody who will be spending their time teaching you if you are admitted. So, most importantly, try to come across as someone who will be a pleasure to teach. This certainly doesn't mean that you know all the answers but it does mean that you convey that you are willing to learn. Be positive, enthusiastic and willing to try but don't lie!

### What happens if I miss my offer?

Firstly, don't panic. Very often universities will still be willing to accept you if you have only missed your offer by a small margin. The best advice I can give is that on results day you should collect your grades as early as possible and if you have missed your offer, get straight on the phone to the university's admissions hotline and try to speak to the relevant admissions tutor.

Of course, none of this matters if you don't get the necessary grades.

So above all, before any of this, work hard and do the very best you can in your school/college.

Best of luck!

Twitter: @DrBenEvans

# Swansea University working together with EESW

**Tamsyn Protheroe**  
Digital marketing and communications officer, College of Engineering, Swansea

Our relationship with EESW began more than 20 years ago and, ever since, we have been proud to support the work that the organisation does.

Many of our current students, and even staff, have benefited directly from EESW schemes over the years, including aerospace engineering associate professor Dr Ben Evans who participated in a Headstart Cymru summer school while a student at Bishopston Comprehensive School, Swansea.

Each year, we host a Headstart Cymru summer school, sponsored by EESW, at Swansea University.

It is an opportunity for 30 Year 12 students from Welsh schools to participate and engage in engineering topics and projects centred on aerospace, chemical, civil, electronic and electrical, materials, mechanical and medical engineering.

These sessions provide a taste of specific areas within the respective programmes in a hands-on, practical and engaging way, highlighting what obtaining a degree in these programme areas involves, and providing an insight into future careers and research in these fields.

Organised evening social activities also provide a platform for students to make friends and have fun, and the residential element of the summer school provides an insight to a typical



Swansea University/EESW Headstart Cymru summer school – Class of 2016

university experience.

Each year Swansea University sponsors EESW sixth-form project teams which participate in a project over six months in collaboration with academic and industrial partners.

We provide expert guidance from our academic staff, such as Dr Ian Mabbett who has been leading this effort for the university, and from current engineering undergraduate and doctorate students.

The school teams are able to utilise our world-leading research equipment and facilities, such as our design software and programmes and technical workshops, to aid their projects.

EESW sixth-form projects are showcased each year at the Big Bang fairs, and we were proud to host the 2016 South Wales Big Bang Fair at our Swansea University Bay Campus.

More than 70 school teams

from across South Wales attended fun-filled shows, hands-on exhibits and interactive workshops.

We look forward to continuing our relationship and providing as much support as we possibly can to EESW and the fantastic work it does to provide and enhance opportunities for young people in Wales to engage with engineering study and careers.

College of Engineering  
Coleg Peirianng

## Engineering degrees at Swansea University

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- Civil
- Electronic and Electrical
- Materials
- Mechanical
- Medical

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**TOP 10  
ENGINEERING  
COLLEGE**





# Industry Wales' contribution to the challenges of the manufacturing sector

Industry Wales is a Welsh Government-owned company tasked to deliver industrial advice, specifically across all manufacturing, to the Cabinet Secretary and government officials. It is also responsible to government for the governance of the Welsh Automotive Forum, Aerospace Wales Forum and ESTnet, the technology forum.

Industry Wales seeks to identify developments

**Paul Davies**  
CEO, Industry Wales, SDWP Limited

in manufacturing trends across sectors and assist in constructing policies to support Welsh industry.

Currently, Welsh manufacturers face a host of challenges posing as many opportunities as threats. Across society digital

automation will lead to increased pressures on jobs. Many of these challenges have been faced by manufacturers in the past and although many shop-floors are already heavily automated, new digital technologies will deliver greater levels of automation to support functions.

Industry Wales has worked with Welsh academia to map the potential impact of this new level of automation.

Working with Welsh Government it is formulating a programme to increase businesses awareness of the technologies available with the aim of improving business productivity to increase competitiveness.

Industry Wales is also working with the Local Skills Partnerships. The increased dependency on digital technologies is common and manufacturers will be

competing for scarce skills against finance, creative and the civil service, etc. To get the best people, Industry Wales will work with businesses and government to improve the manufacturing image to make it a career ambition for young people. It also recognises the need to improve schools' awareness of the clean and safe environment in modern factories as well as the challenging and rewarding

tasks available. Improving gender diversity, especially in leadership roles is an Industry Wales priority.

Manufacturing is recognised by government as a key industrial sector quality of employment including innovation, well-paid employment and a client base for other sectors and Industry Wales is dedicated to supporting manufacturers with tomorrow's challenges.

## EESW Sixth-form project winners and nominees – South Wales

Sponsor Noddwyr	Award Gwobr	Nominees Enwebeion	Winner and link company Enillydd ac eu Cwmni
	<b>Best Innovative or Adapted Design</b> Y Cynllun Arloesol neu Addasedig Gorau	21 Ysgol Gyfun Gymraeg Plasmawr 24 Whitchurch High School 2 36 Monmouth School	36 Monmouth School and Renishaw 
	<b>Project with the Most Commercial Potential</b> Y Prosiect â'r Potensial Masnachol Mwyaf	17 St Teilois CIW School 30 Ysgol Maes Y Gwendraeth 1 32 Ysgol Y Strade 59 Bishop Vaughan School	59 Bishop Vaughan School and University of Wales Trinity Saint David 
	<b>Best Engineering Design</b> Y Cynllun Peirianeg Gorau	34 Haberdashers' Monmouth School for Girls 74 St Alban's RC High School 1	34 Haberdashers' Monmouth School for Girls and Renishaw 
	<b>Best Overall Team Performance</b> Y Perfformiad Tim Cyffredinol Gorau	37 St Joseph's School & Sixth Form Centre 1 41 Caerleon Comprehensive School 2 59 Bishop Vaughan School 67 Ysgol Gyfun Gŵyr	41 Caerleon Comprehensive School 2 and Zodiac Aerospace 
	<b>Best Chemical/Process Engineering Design</b> Y Cynllun Peirianeg Gemegol / Broses Gorau	37 St Joseph's School and Sixth Form Centre 1 46 Pembrokeshire College 1 48 Pembrokeshire College 3	37 St Joseph's School & Sixth Form Centre and Tata Steel 
	<b>Most Effective Presentation of the Chosen Solution</b> Y Cyflwyniad Mwyaf Effeithiol o'r Ateb	32 Ysgol Y Strade 37 St Joseph's School & Sixth Form Centre 1 43 Rougemont School 2 64 Gowerton School 1	32 Ysgol Y Strade and Schaeffler 
	<b>Best Application of Engineering and Technology</b> Y Defnydd Gorau o Beirianeg a Thechnoleg	46 Pembrokeshire College 1 50 Ysgol Bro Myrddin 59 Bishop Vaughan School 67 Ysgol Gyfun Gŵyr	46 Pembrokeshire College 1 and Valero 
	<b>Best Appreciation of Safety Issues</b> Y Gwerthfawrogiad Gorau o Faterion Diogelwch	21 Ysgol Gyfun Gymraeg Plasmawr 22 St David's Catholic College 36 Monmouth School 66 Gowerton School 3	22 St David's Catholic College and Viridor 
	<b>Best Application of Science</b> Y Defnydd Gorau o Wyddoniaeth	12 Cardiff High School 34 Haberdashers' Monmouth School for Girls 48 Pembrokeshire College 3 69 Ysgol Gyfun Gymraeg Bryn Tawe 2	69 Ysgol Gyfun Gymraeg Bryn Tawe 2 and Tidal Lagoon Swansea Bay 
	<b>Best Energy Appreciation</b> Y Gwerthfawrogiad Gorau o Ynni	11 Cardiff and the Vale College 18 Ysgol Gyfun Gymraeg Glantaf 1 53 Ysgol Maesydderwen 1	11 Cardiff and the Vale College and Arup 
	<b>Best Working Model or Prototype</b> Y Model Gweithio neu'r Prototeip Gorau	21 Ysgol Gyfun Gymraeg Plasmawr 34 Haberdashers' Monmouth School for Girls 41 Caerleon Comprehensive School 2 46 Pembrokeshire College 1	21 Ysgol Gyfun Gymraeg Plasmawr and Aerospace Wales 
	<b>Best Appreciation of Environmental Issues</b> Y Gwerthfawrogiad Gorau o Faterion Amgylcheddol	28 Ysgol Gyfun Emlyn 1 30 Ysgol Maes Y Gwendraeth 1 50 Ysgol Bro Myrddin 69 Ysgol Gyfun Gymraeg Bryn Tawe 2	30 Ysgol Maes Y Gwendraeth 1 and Tata Steel 
	<b>Most Innovative Solution to the Project Set</b> Yr Ateb Mwyaf Arloesol i'r Prosiect	36 Monmouth School 41 Caerleon Comprehensive School 2 42 Rougemont School 1 67 Ysgol Gyfun Gŵyr	42 Rougemont School 1 and Zodiac Aerospace 
	<b>Best Overall Written Report</b> Yr Adroddiad Ysgrifenedig Cyffredinol Gorau	22 St David's Catholic College 30 Ysgol Maes Y Gwendraeth 1 53 Ysgol Maesydderwen 1 55 Aberdare Community School 70 Croesyceiliog Comprehensive School 1	70 Croesyceiliog Comprehensive School 1 and Eastman Solutia 
	<b>Most Innovative Application of an Existing Technology</b> Y Defnydd Mwyaf Arloesol o Dechnoleg Gyfredol	22 St David's Catholic College 42 Rougemont School 1 44 St Joseph's RC High School (Newport) 74 St Alban's RC High School 1	74 St Alban's School 1 and Meritor 
	<b>Big Bang Regional Winners 2017-2018</b> Enillwyr Rhanbarthol Big Bang 2017-2018	3 Cynffig Comprehensive School 22 St David's Catholic College 32 Ysgol Y Strade 50 Ysgol Bro Myrddin 69 Ysgol Gyfun Gymraeg Bryn Tawe 2 74 St Alban's RC High School 1	3 Cynffig Comprehensive School 22 St David's Catholic College 32 Ysgol Y Strade 50 Ysgol Bro Myrddin 69 Ysgol Gyfun Gymraeg Bryn Tawe 2 74 St Alban's RC High School 1





Tomorrow's technology is already here from big data to ultra-fast robots, the digital revolution is already happening

# The fourth industrial revolution – Industry 4

We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before.

The first industrial revolution used water and steam power to mechanise production. The second used electric power to create mass production. The third used electronics and information technology to automate production. Now a fourth industrial revolution (4iR) is building on the third – the digital revolution.

The speed of current breakthroughs has no historical precedent. When

**Bob Cater**  
CEO EESW

compared with previous industrial revolutions, the fourth is evolving at an exponential rather than a linear pace.

The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited.

These possibilities will be multiplied by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3D-printing, nanotechnology,

biotechnology, materials science, energy storage and quantum computing.

The digital revolution is now breaching the walls of manufacturing as it continues to disrupt media, finance, consumer products, healthcare, and other sectors. Indeed, the explosion in data and new computing capabilities is unleashing innovations that will change the nature of manufacturing itself.

On March 23, 2017 – Erica Kochi (Futures lead, Office of Innovation, UNICEF) participated at the opening of the World Economic Forum's "Centre for the Fourth Industrial Revolution" in San Francisco.



During this forum she said: "We need to prepare young people to be able to participate in the 4iR. Our traditional notions of classrooms and curriculums will need rethinking."

"Here, connectivity will also be key for children to be able to participate, and this will

only happen for everyone if governments and the private sector work hand in hand."

The students working with us today will be experience the ever-growing impact of the fourth industrial revolution in their chosen careers. The challenge facing world economies is how to

capitalise on their young and growing populations to create meaningful jobs which add value and drive economic growth and development. This is as applicable to Wales as anywhere else in the World.

Sir Anthony Seldon in his introduction to the recent Edge Foundation report The Digital Revolution – The impact of the Fourth Industrial Revolution, said: "We are sleepwalking – government, schools and universities – into the biggest potential disaster of modern times."

The report emphasises that: "Tomorrow's technology is already here from big data to ultra-fast robots, the digital revolution is already happening."

## EESW Sixth-form project winners and nominees – North Wales

Sponsor Noddwyr	Award Gwobr	Nominees Enwebeion	Winner and link company Enillydd ac eu Cwmni
	<b>Best Application of Engineering and Technology</b> Y Defnydd Gorau o Beirianneg a Thechnoleg	7 Prestatyn High School 10 Alun School 1 19 Ysgol Friars 1 23 Ysgol Uwchradd Caerdybi	19 Ysgol Friars 1 and Photonics Academy 
	<b>Best Energy Appreciation</b> Y Gwerthfawrogiad Gorau o Ynni	9 Ysgol Glan Clwyd 13 Ysgol Maes Garmon	9 Ysgol Glan Clwyd and Bangor University 
	<b>Most Innovative Solution to the Project Set</b> Yr Ateb Mwyaf Arloesol i Brosiect	7 Prestatyn High School 1 19 Ysgol Friars 1 20 Ysgol Friars 2 23 Ysgol Uwchradd Caerdybi	7 Prestatyn High School 1 and Toyota Manufacturing 
	<b>Best Use of Mechanical Engineering Principles</b> Y Defnydd Gorau o Egwyddorion Peirianneg Fecanyddol	13 Ysgol Maes Garmon 21 Ysgol Syr Hugh Owen 1 8 Prestatyn High School 2 10 Alun School 1	21 Ysgol Syr Hugh Owen 1 and SP Energy Networks 
	<b>Project with the Most Commercial Potential</b> Y Prosiect a'r Potensial Masnachol Mwyaf	4 Ysgol Bryn Elian 1 9 Ysgol Glan Clwyd 20 Ysgol Friars 2 23 Ysgol Uwchradd Caerdybi	23 Ysgol Uwchradd Caerdybi and BAE Systems 
	<b>Best Application of Science</b> Y Defnydd Gorau o Wyddoniaeth	19 Ysgol Friars 1 20 Ysgol Friars 2	20 Ysgol Friars 2 and Photonics Academy 
	<b>Best Overall Written Report</b> Yr Adroddiad Ysgrifenedig Cyffredinol Gorau	4 Ysgol Bryn Elian 1 7 Prestatyn High School 1 9 Ysgol Glan Clwyd 10 Alun School 1	10 Alun School 1 and Airbus 
	<b>Big Bang Regional Winners 2017-2018</b> Enillywyr Rhanbarthol Big Bang 2017-2018	4 Ysgol Bryn Elian 1 9 Ysgol Glan Clwyd 10 Alun School 1 13 Ysgol Maes Garmon 19 Ysgol Friars 1 20 Ysgol Friars 2 23 Ysgol Uwchradd Caerdybi	9 Ysgol Glan Clwyd 10 Alun School 1 19 Ysgol Friars 1 23 Ysgol Uwchradd Caerdybi



# Students design and develop a smart sensor for Sony UK Technology Centre

Sony commissioned a team of students from Cynffig Comprehensive to consider the opportunities around collecting and interpreting 'Big Data'.

The project was part of the Engineering Education Scheme Wales (EESW) sixth-form activity. A team of four 16 and 17 year-old students were selected to work with Sony UK Technology Centre, Pencoed.

The team was led by Richard Daniel, teacher at Cynffig Comprehensive and supported by Jessica Leigh Jones, an engineer at Sony.

The students first met with

## Cynffig Comprehensive Sixth-form team

Jessica in September 2016. They were told about Industry 4.0 and how automation and data exchange can be used to create a 'smart factory'.

Data can be used to predict machine failure and optimise processes. Jessica asked the students to consider how they might create a smart sensor which could record environmental data in and around the Raspberry Pi manufacturing line in Sony,



First Minister, Carwyn Jones, talks to the team from Cynffig Comprehensive

Pencoed.

The students were then given the opportunity to visit the factory and see first-hand the Raspberry Pi being manufactured.

Jessica was keen to draw the students' attention to a particular part of the process, the solder bath, which is the source of a considerable amount of process variability.

The team was set a strict budget and provided with a Raspberry Pi.

After conducting some initial research, the students decided to utilise a Raspberry Pi Sense Hat to record a range of environmental data from the solder bath.

They were able to refine their prototype with the support of Swansea University, during

a three-day EESW practical workshop held earlier this year.

The team presented its findings to Sony and prepared a project report in preparation for the Big Bang Fair at the Liberty Stadium in April.

After a gruelling round of judging by the assessors, the Cynffig Comprehensive team was delighted to win a place in the National Big Bang final.

The team enjoyed taking part in the project with Sony and is looking forward to competing at the national Big Bang.

One of the students summed up their experience: "The team really appreciated the opportunity to take part in this challenge with Sony. We all really got a taste of what it would be like to pursue a STEM career in the future."

# Girls into STEM visit to RAF Valley

## June Strydhurst BAE Systems, RAF Valley

Twenty Year 8 girls from Ysgol Syr Hugh Owen Caernarvon spent a day at RAF Valley Anglesey as part of EESW/STEM Cymru's program to encourage girls to appreciate the opportunities that exist in careers in engineering.

The girls were given an introduction to the base by members of the RAF staff and visited the various departments. The first of these was the department where all the safety flying equipment is serviced and assembled.

The pupils were given the opportunity to try the latest flying helmets and flying suits, study the contents of the survival packs contained in the ejector seats and learn how the parachutes are packed.

The next visit was to the huge hangers where the new Hawk T2 aircraft are housed and serviced by Babcock engineers and technicians.



A senior Babcock technician showing the girls the Hawk T2 jets

The girls were shown the consequences of a bird strike on one of the aircraft, shown the cockpit interiors and how the various controls were operated.

A Babcock senior female technician led the party and explained how interesting

and challenging the work was servicing the jets.

The group even saw one of the famous Red Arrow aircraft being serviced.

The next stop was the edge of the runway, where ear protection was necessary. Here they saw the various Hawk

jets returning from training exercises.

After lunch, students were given the task of constructing a seating arrangement out of drinking straws. Emphasising that relatively light structures, when assembled correctly, can be very strong and resilient – an

important feature in aircraft design.

The group were divided into four teams competing against one another. The engineers who introduced the topic were very pleased with the results and complimented all students on their effort and

commitment.

Dr Huw Williams, teacher responsible for the girls, thanked June Strydhurst of BAE Systems, Squadron Leader Tony McLaughlin and all Babcock staff for a very successful and informative visit.



# Building Wales' STEM capabilities – vital for growth

Nurturing and capturing science, technology, engineering, and maths (STEM) talent to help build Wales' already impressive research and development capabilities remains a key priority for the Welsh Government.

Over the last 12 months, with strong input and support from Professor Julie Williams, Wales' chief scientific adviser, concerted efforts have been made to introduce new policies and measures to help promote growth across this vitally important area and encourage more people, particularly women and girls, to pursue STEM opportunities and careers.

Our Sêr Cymru – Stars Wales – programme continues to go from strength to strength in attracting world-class scientific talent and research funding into Wales.

Although the original phase of the programme

**Julie James**  
Wales' Skills and Science Minister

is now nearing its planned completion date by the end of 2018, latest figures show it has succeeded in attracting some additional £66.5m of grant research income into Wales and helped to leverage a further £50m of UK funding to support the development of a new compound semiconductor catapult facility, which is due to open at Cardiff University's Innovation Campus in 2018.

The second phase of the programme, Sêr Cymru II, is also showing early promise, with more than 100 fellowship awards, including COFUND, Recapturing Talent and Rising Stars, already offered to date with a total value in the region of £25m.

An additional £19m in research chair packages has also been offered, helping to bolster Swansea University

and Bangor University's research capabilities across the energy and nuclear sectors respectively.

Efforts to encourage more people to pursue STEM opportunities and careers also moved a step forward earlier this year when the Welsh Government published its new apprenticeship policy, Aligning Apprenticeships to the needs of the Welsh Economy, which places a greater emphasis on addressing skills shortages in growth areas including engineering and construction.

The Welsh Government also accepted all 33 recommendations outlined in Talented Women for a Successful Wales, an independent report commissioned by the Welsh Government and led by Professor Julie Williams.

The report examined the education, recruitment,

retention and promotion of women and girls in STEM in Wales and put forward solutions to help break down existing barriers and create the skilled workforce needed to support the country's future economic growth.

Changes to the Welsh schools' curriculum, including the prioritisation of girls' progression in maths, physics and computing and gender balance in STEM education conditions of grant funding, are also beginning to bed in and will have a positive affect at GCSE and A-level.

The National Science Academy is also playing an invaluable role by funding programmes across Wales to help enthuse children and young people in STEM-related subjects and encouraging them to pursue career opportunities within these fields.

While it is recognised there is still more that needs to



Welsh Government recognises the need to encourage and support more girls and women in entering the engineering industry

be done by government, the academic and private sectors to ensure STEM talent is fully nurtured and captured across Wales, the programmes that have been put in place so

far are certainly helping to provide a step change in the way research is developed in Wales, helping to put it firmly on the map as a centre of scientific discovery.



The Ford Saturday Club students with the Control 2K staff and Julie Williams, chief scientific adviser for Wales, with Gash Bhullar, managing director of Control 2K

## Ford/Control 2K Saturday Club – Driving forward engineering skills

The Ford Saturday Club gives Welsh students a grounding in automotive engineering and it is gearing up to welcome the latest group in September 2017 when it celebrates its 19th anniversary.

The club is one of the longest established of its kind and attracts hundreds of pupils from more than 80 schools across South Wales. The club is supported by Ford Motor Company Ltd, the Welsh Government, Welsh Automotive Forum, Aerospace Forum and run by Control 2K Ltd. It has gone from strength to strength – always being oversubscribed.

Based at the Waterton Technology Centre, Bridgend, the programme offers a unique opportunity to develop valuable skills working alongside professional engineers in a £4m purpose-built training facility next to the Ford engine plant.

**Simon Osborne**  
Control 2K

Two clubs are run during the school year (autumn and spring) for students aged 14-16, who give up their Saturday mornings to learn a variety of skills and gain hands-on experience over a 12-week period. The students rotate through four modules studying electrical installation, engine build, pneumatics and PLC Systems. Students who complete the programme can qualify for the CREST bronze or silver awards.

This year, thanks to increased funding from Welsh Government and Ford Motor Company Ltd, the club has been extended for another three years. The number of places has been increased from 24 to 32 with the number of girls

taking part increasing steadily. Students who are interested in pursuing a career in either electrical or mechanical engineering at any level, either vocational or academic, are encouraged to apply by visiting [www.control2k.co.uk/satclub](http://www.control2k.co.uk/satclub). **Some success stories to date:**

- Ashley Gulwell – First year Saturday clubber, now a senior engineer at RWE Aberthaw.
- Rhodri George – 2007 student, apprentice with The Royal Mint.

More recently:

- Melanie Goss – Engineering technician apprentice at BMW MINI plant, Oxford
- Hazel Schurer – Five-year apprenticeship at Jacobs Cardiff, structures dept, civil engineering. Studying HNC/HND and degree course at University of South Wales. Hazel also participated in the EESW sixth-form project.



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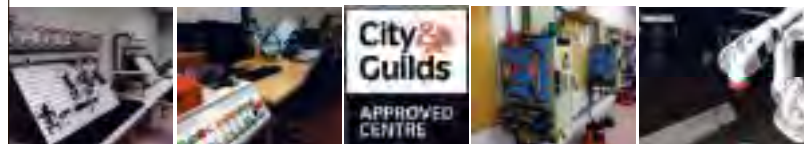
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# Animal Allies and LEGO make a winning combination

Hello! We are Team Egni, the Year 9 robotics team from Glan Clwyd school in St Asaph. Over the past 7 months, we have been working hard to compete in the first Lego League international robotics competition.

This is a worldwide event in which teams of children aged nine to 16 undertake a variety of programming and robotics, design, business and teamwork challenges based on a different theme each year.

This year's theme was Animal Allies. The teams were

**Team Egni**  
Ysgol Glan Clwyd

required to design, build and program a LEGO Mindstorms EV3 robot to solve a series of missions based on the theme of making children think and develop coding skills.

In addition, teams must produce a project based on an animal that helps us.

After doing extensive research into various different animals which help humans, we decided to focus our



Ysgol Glan Clwyd's Team Egni

project on a very small and under-appreciated animal which we believe plays an incredibly important part in our day-to-day lives: honeybees.

As a team, we discussed what we could do to support honeybees, and to find out, we got in touch with multiple different bee farms and honey companies.

Eventually, we decided what honeybees need more than anything is more attention and recognition, so we began to develop a mobile game aimed towards

children and teenagers that is fun and exciting, but also informs players of some of the threats honeybees face and how we can help them overcome said threats.

We are currently working to get our game up and running on the Google Play and the Apple App Stores.

In keeping with our chosen subject, we decided to name our robot "Honeycomb".

We won our North Wales regional tournament in Llandudno on January 11 and as a result, we were awarded a place in the UK and Ireland finals in Bristol on February 26. We worked very hard to

improve our standard for the UK and Ireland final, and that hard work was rewarded as we won the judges' award for overall excellence.

With this award came an invitation to compete in the First Lego League European Open Championship in Denmark.

Taking part in the European Championships was a fantastic experience and once again, we were very successful.

Our robot had the highest score out of all the British teams and we were also among the top quarter of all the teams taking part.

A superb achievement and a



very valuable experience for all our participating pupils. Follow our progress on our Twitter: Follow @YgcEgni

## Amazing experience in St Louis, USA, for the regional finalists – team Ysgol Gyfun Emlyn

Three Year 11 pupils from Ysgol Gyfun Emlyn won the regional final of the First Lego League by beating 13 other teams at the Waterfront Museum, Swansea last December. Following this they continued to develop the design of their robot and other aspects of the challenge.

Judging is based on an interview about robot design, project presentation, core values and the robot challenges.

The pupils went on to the First Lego League UK and Ireland final at the University of West of England Exhibition and Conference Centre in Bristol on February 26 where they hoped to make it to the World Festival in St Louis, USA.

They were up against tough opposition, but with the hours they had put in at lunchtimes and after school over several months they deserved to do well. Although they did not win the overall competition they did win the robot design award, and a few days later they received an invitation to represent Wales at the World

Festival in St Louis.

With just over a month to get ready and find funding for the visit it was a very busy time.

The team flew to St Louis on Tuesday, April 25. After a long flight the team got to experience the American lifestyle and the area of St Louis. The competition started the following day with teams from across the globe setting up their stalls with information on their robots, project development and core values.

The first judging was on Thursday with the team getting the project, robot design and teamwork skills assessed by six judges. They spent the rest of the day preparing and carrying out official practice runs.

Friday consisted of an early morning phone call back to Ysgol Gyfun Emlyn. This gave the team the opportunity to share their experience so far and help get more pupils interested in extracurricular robotics and programming.

In the afternoon the team competed in its official rounds for the robot game. The team



The team getting to grips with the challenge

scored its highest marks yet – 192 points, making it 44th out of 105 teams in that section. That evening the team went to see a baseball game at the nearby Busch Ballpark.

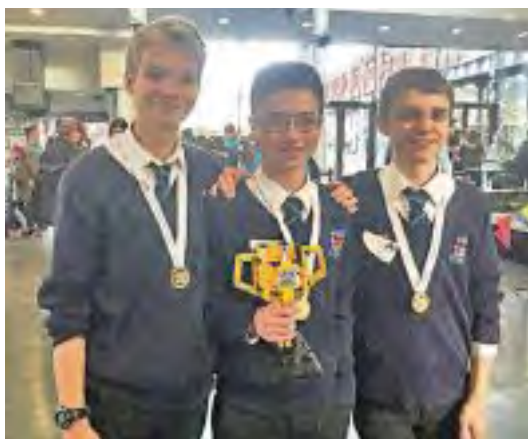
On Saturday morning, the team explored St Louis by going to the arch (the biggest metal monument in the world) and relaxing after the busy week.

In the afternoon, the team went to two closing ceremonies, one for the FLL

and one for the whole FIRST event in which many different competitions were taking place.

This whole experience was amazing for the team and the pupils enjoyed meeting people with similar interests.

The team's new goal is to keep the momentum of robotics in the school by continuing to participate in new competitions and encouraging younger pupils to take part.



Ysgol Gyfun Emlyn with the trophy



# Girls lead the way at Ysgol Glan-Y-Môr

**Sue Quirk**  
Head of design and technology,  
Ysgol Glan-Y-Môr

Ysgol Glan-Y-Môr's STEM enrichment programme has had yet another very successful year and this time it is the girls leading the way, winning two national STEM competitions.

While the school, in Burry Port, Carmarthenshire, provides a range of science, technology, engineering and maths opportunities for all its pupils, it also runs a Girls Into STEM project which focuses on encouraging more girls to follow STEM career paths.

Currently just 9% of women make up the UK's engineering and technology workforce, highlighted in the Institute for Engineering and Technology (IET) campaign 9PercentIsNotEnough.

Among the opportunities the school provides for its female pupils are Girls into STEM workshop days provided with the help of EESW and visits to industry where there are strong female role models.

This term the school is also hosting a Sky's Her Limit workshop run jointly by Dark Sky Wales and Chwarae Teg for girls in Years 7, 8 and 9. The workshop involves a series of interactive activities to engage and inspire the next generation of female scientists and engineers.

This focus on inspiring more girls to take up STEM career paths has been rewarded with two teams of girls winning national STEM competitions in 2017.



**Alupro D&T Challenge award winners: Laila Francis, Amber Treharne, Sofie Jenkins and Teagan Horsley**

In January four Year 9 pupils, Laila Francis, Amber Treharne, Sofie Jenkins and Teagan Horsley won the Innovative Packaging category of the D&T Alu Challenge run by Alupro; the aluminium packaging recycling organisation with their "Cereal to Go" aluminium packaging idea.

Then, in June, three Year 8 pupils, Rebecca Lewis, Mollie Dunning and Sophia Morgan

won a TeenTech Award for their innovative work in developing an advanced scanning system to aid supermarket shopping.

These three pupils will now attend a celebration event at Buckingham Palace, where they will meet with TeenTech's President, HRH The Duke of York.

The school's STEM programme is headed up by two staff: head of design technology

Mrs Sue Quirk and science teacher Miss Nicola Morgan.

Their work has also been recognised this year with Mrs Quirk winning the STEM Learning UK Leadership Award as well as being named runner up in the Professional Teacher Awards for the "Collaborative Work to Improve Learning Experience" that the STEM programme has provided.

The success stories have

not been confined completely to girls, however, with STEM ambassador and future engineer Shaughn Poulter securing one of the eight places awarded to students from across Wales for Welsh Government's "London Week 2017" competition.

The life changing, week-long work experience sets out to give hardworking, determined and aspirational students a rare insight into working life.



**TeenTech award winners: Rebecca Lewis, Mollie Dunning and Sophia Morgan**



## Interactive Big Bang@Wales arrives at rally village next month

The thrilling FIA World Rally Championship (WRC) returns to Wales next month and, once again, the presence of such a major international sporting event is being maximised to inspire thousands of students in the region.

With a new generation of more powerful four-wheel drive and turbocharged cars, this season's stunning WRC is turning out to be one of the most exciting and fiercely fought for many seasons.

As the championship's penultimate round, Dayinsure Wales Rally GB (October 26-29) could be a title-decider and is certainly all set to be a huge attraction... plus the perfect backdrop to enthuse those of

all ages.

To that end, for the fifth successive year a special interactive Big Bang@Wales Rally GB will be based right at the heart of the event's buzzing rally village, located alongside the Toyota UK engine manufacturing plant in Deeside, Flintshire.

A far-reaching partnership between Welsh Government, Toyota, Flintshire County Council, Conwy County Council, the Engineering Education Scheme Wales (EESW) and rally organiser International Motor Sports (IMS) will be building on previous successes.

In previous years Big Bang has attracted more than 1,300

students studying STEM subjects at local schools and colleges. All these visitors have been hugely inspired by a number of great interactive displays provided by contributing businesses plus, of course, the chance to see the high-tech rally cars being readied for action in the adjoining WRC pits and paddock.

Working closely with IMS, EESW is running a competition giving students in the region a brilliant opportunity to see their own livery design applied to a real rally car.

Winners of all four categories - open for Key Stages 2, 3, 4 and 5 - will



**Pupils at the EESW stand in a previous Big Bang@Wales Rally**

be invited to the rally village to be presented with rally merchandise goody-bags (prizes courtesy of Performance Clothing) and to enjoy a special behind-the-scenes insight into one of the world's most rousing and technologically advanced sports.

The overall winning design

will be applied to a Toyota GT86 sports car, kindly provided by Toyota GB, and then unveiled by a WRC rally star on the eve of the event.

Public admission to the rally village is free for all comers. What's more, accompanied children aged under 16 are also admitted free to all the exciting competitive time

sections - including Saturday's family-friendly RallyFest at Cholmondeley Castle - where this year's dramatic Dayinsure Wales Rally GB will be won and lost.

Full details of the competition can be found on the event's official website: [www.walesrallygb.com](http://www.walesrallygb.com) and at [www.stemcymru.org.uk](http://www.stemcymru.org.uk)



# Jet engine-powered BLOODHOUND set to be driven 20 years after current speed record set

**Richard Noble**  
Bloodhound project director

The world's most advanced straight-line racing car, BLOODHOUND SSC, will be driven for the first time at Cornwall Airport, Newquay this October, 20 years after the current record of 763.035 mph was set.

Wing Commander Andy Green steered Thrust SSC to victory on October 15, 1997 and will be at the wheel of BLOODHOUND SSC as it is put through its paces this autumn.

Runway trials will mark the culmination of a month of tests to prove the car's steering, brakes, suspension, data systems, and so on, as well as the EJ200 jet engine, sourced from a Eurofighter Typhoon.

Thousands of visitors are expected to come and see history being made as BLOODHOUND SSC is driven at speeds of up to 200mph on the 1.7-mile (2.7km) runway.

The Newquay trials will also be Andy Green's first

## Engineering facts

■ BLOODHOUND's wheels spin at 10,200rpm – that's 170 times per second. They generate 50,000 radial G. At this speed, a 1kg bag of sugar would weigh 50 tonnes or, the equivalent of a fully-laden articulated lorry.

■ BLOODHOUND will run on the Hakskeen Pan, South Africa. This is an alkali playa which is essentially a dried up lake bed.

■ A team of 317 members of the local community were employed to clear the desert. They shifted 15,800 tonnes of stones by hand from an area of 22 million square metres, the equivalent of clearing three lanes of the motorway from Bristol to Moscow.

■ For the 1,000mph (1,600km/h) runs in 2018, BLOODHOUND SSC will

be fitted with three hybrid rockets, which, when combined with the EJ200 jet engine from a Eurofighter Typhoon plane, will produce 135,000 thrust horsepower – equal to 180 Formula 1® cars.

■ BLOODHOUND will decelerate from 1,000mph (1,600km/h) at 3G, equivalent to slowing from 60mph (100km/h) to standstill in one second.

■ BLOODHOUND will go from zero to 1,000mph (1,600 km/h) in 55 seconds and back to zero again in a further 65 seconds, during which time it will cover 12 miles.

■ The EJ200 jet engine consumes 65,000 litres of air per second, sufficient to suck the air out of an average-sized house in just three seconds.

opportunity to drive the car and experience the steering

feel, throttle and brake action, noise and vibration – things that can't be simulated.

During tests the car will be powered by the jet engine alone and use wheels shod with pneumatic tyres 84cm in diameter.

Richard Noble, project director, said: "The runway trials at Cornwall Airport, Newquay will be the biggest milestone in the history of the project so far.

"We are proud to be waving a flag for British skills and innovation on a world stage but, most of all, this is about inspiring young people."



BLOODHOUND SSC to make first-ever public run on October 26, 2017 Aerohub Enterprise Zone, Cornwall Airport, Newquay



## Girls visit Warwick Chemicals

**Jenny Wilkinson**  
Warwick Chemicals

On June 8, 13 female pupils and two teaching staff from St Richard Gwyn's Catholic school in Flint, and Graham Nutt from EESW visited Warwick Chemicals, Mostyn, Flintshire to take part in a Girls into STEM event.

For more than 30 years, Warwick Chemicals has manufactured Mykon grades of TAED, an activator which produces the powerful oxygen-based bleach, peracetic acid. It is the world's largest producer of this energy saving additive.

The products are now an essential element in washing powders and automatic dishwashing products produced across five continents and in more than 50 countries.

Warwick leads the world in



Workshops at Warwick Chemicals

TAED manufacture and supply for the detergent and biocides industries, ensuring that clothes and dishes are not just visibly clean, but hygienically clean, too.

TAED (tetraacetythyle

nediamine) is a bleach activator that reacts with a source of hydrogen peroxide to produce peracetic acid. Peracetic acid is a powerful stain remover for stains such as tea, coffee, fruit juices and red wine.

The day's visit consisted of a presentation about Warwick Chemicals followed by an introduction to engineering.

By far the most enjoyable presentation was given by a work experience student Talha



Navaid who talked about the benefits of engineering student placements.

After a site tour and some lunch, the girls enjoyed exploring the differences between batch and continuous

processing using Lego.

Finally, pupils had an enormous amount of fun trying out the team challenge games which were the Tower of Hanoi, the Maze Game and the dreaded Buzz Wire.