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Partner News

Creativity is key

Promoting creativity in education

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Welcome to Partner News

This edition

For any enquiries, please refer to pages 38-39 for contact details.

Creativity is key: promoting creativity in education.

Mark Organ **Head of Membership**

Welcome to this issue of Partner News, for the first time on the IET's new, re-engineered brand. Bringing together everything we offer under one, singular approach, you can read more about how and why we made the change on page 4.

In this edition we mention the success of RAF Chief Technician Peter Wakefield who won the 2017/2018 Churchill Medal Award. VIP guest Rupert Soames OBE spoke at the event and presented the medal alongside Air Marshal Julian Young CB OBE FREng and Vice Admiral Peter Hudson CB CBE who represented BAE Systems.

We also feature a range of projects our Academic Partner community are working on, including the Lancaster University team who have created a concept cup that can alert users if their drink has been spiked. To find out more about the idea that won the team top prize at the university's engineering student entrepreneurship competition, turn to pages 16-17.

Advanced industrial automation company and IET Enterprise Partner Comau has launched the MATE Fit for Workers exoskeleton. Using advanced technologies, it is fully able to replicate any shoulder movement providing consistent and advanced movement assistance during repetitive tasks. Read more on this project on page 22.

Finally, we report on 10-year-old Hannah Donnelly who has won Corporate Partner Leonardo's national Wopsie the Cat aircraft design competition! Part of the RAF100 centenary celebrations, entrants were asked to create an aircraft for the feline's next adventure and the organisation was inundated with 649 entries. Read more on Hannah's winning design and the back story on pages 34-35.

If you have any comments or would like to submit an article, please contact **partnernews@theiet.org** or tweet us **@TheIET** using the hashtag **#IETPartnerships**.

Mark Organ IEng MIET
Head of Membership

News

Introducing our re-engineered brand

We're in the process of introducing a fresh new look across the IET. This is the result of two years' work to create a new brand strategy that's fit for the future.

Research revealed that the perception of the Institution of Engineering and Technology (IET) centres on us being trusted, dependable and reassuring, but it became increasingly apparent that our brand – in particular our visual black and white brand identity and tone of voice – wasn't working for us.

We held a series of focus groups and interviews and conducted a survey to ask members and stakeholders for their views. The feedback we received suggested that change was needed to make the IET more appealing to a wider audience. We worked with a specialist brand agency and have held further focus groups with members and volunteers to test different concepts. Members of our Young Professionals community have played a key role in ensuring the concepts were appealing.

One singular approach

We're still the same organisation – our mission, vision and values are not changing – but our updated branding brings everything we offer together under one single approach. Our new branding will ensure we remain modern and relevant and will help us communicate consistently, particularly in increasingly digital environments such as social media. Central to this is a new look and feel – including a new logo – that better represents the breadth of our activities, the diverse nature of our organisation and the people we're here to support.

We're introducing our re-engineered brand in phases, retiring brochures and printed material at the end of their useful life and then replacing them. We'll also be refreshing the branding on our products and services in the next few months.

You may have already begun to see our new visual identity on letters and printed material, including this edition of *Partner News*. One of the first items to carry our new branding was our new **theiet.org** website, which has been designed to be more user friendly, making it easier for visitors to find the information and resources that matter to them. The website is fully mobile-optimised for tablets and smart phones.

If your organisation features our logo on your website, and you need a copy of our new brand guidelines, please email brandenquiries@theiet.org for more details.

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Our updated branding brings everything we offer together under one, singular approach.

News

Hidden engineering comes out of the shadows

Hidden engineering was the key topic for our 2018 Winter Partnership event. Five speakers from our partnership community discussed their take on the topic, covering everything from cow monitors through to robot strawberry pickers.

Our annual Winter Partnership Event saw guests from over 60 of our academic, enterprise, corporate and MOD partners come together at IET London: Savoy Place.

Held last November, attendees heard five speakers discuss their take on hidden engineering. First, Kevin Conroy from Tesco Maintenance spoke about what it takes to keep Tesco stores running smoothly, safely and within budget. He discussed the commitments Tesco Maintenance has made to carbon reduction and renewable energy and what this means for UK stores and distribution centres in the future.

Innovative projects
Next, Dr Steve Chappell and Dr Philippa Clarkson from York Instruments gave an insight into a new view on the brain. Dr Clarkson explained the science and technology behind their Magnetoencephalography (MEG) tool – a reliable and proven imager used in leading hospitals for cases of severe epilepsy and presurgical planning.

Peacock Technology's Dr Andrew Peacock then took to the stage to outline some of his company's innovative projects. He explained the technology behind its cow activity monitors, as well as the potential next step of quantum sensors. He also mentioned the company's involvement in an automated fish vaccination project.

The hidden engineers
The final speaker of the event was Dr Vishuu Mohan from the University of Essex. He discussed the hidden engineers in crows, babies and cognitive robots, as well as the science behind robot strawberry picking.

Sparking debate
These interesting topics sparked a lot of discussion during the Q&A session before our Director of Membership and Professional Development, Michelle Richmond, closed proceedings and invited guests to participate in a networking lunch.

We'd like to thank everyone who attended the Winter Partnership Event and hope to see many more of our partners at future IET engagements.

Please save the date for our Summer event on the 20 June at IET London: Savoy Place. This will celebrate 10 years of IET Academic Partners and the fantastic collaboration we've seen with both our Enterprise and Corporate Partners since its inception in 2009.





Engineers of the Future celebrated at Parliament

School children recognised for award-winning engineering projects at special reception.

News

> This showcase is about giving these children a platform to share their innate creativity, passion and aptitude for STEM with decision makers.

Forty-four budding engineers were the guests of honour at a special IET event in collaboration with The Department for Transport and LEGO® at the House of Commons last December, where they showcased their award-winning engineering projects inspired by LEGO® play.

The students were winners of the Engineers of the Future competition, a robotics and coding challenge which inspired children aged 7-16 across the UK to get hands-on and creative with real engineering projects.

Engineers of the Future has seen us join forces with LEGO® Education and the Government's Year of Engineering campaign to give more children the opportunity to meet engineering role models and take part in engaging STEM activities.

A chance to experience engineering
The engineering profession needs 203,000 skilled people each year until 2024 and has an annual shortage of 20,000 graduates. The Year of Engineering campaign has been working with more than 1,400 partners to give young people in all corners of the UK the chance to experience engineering for themselves.

This has involved everything from meeting engineering role models and taking part in hands-on workshops through to visiting engineering open doors events with their families.

Taking to the road
As part of this campaign, the Engineers of the Future roadshow – led by engineers equipped with LEGO® Education coding and robotic activities – visited primary schools across the UK, particularly those that hadn't previously taken part in engineering activities.

"The hands-on challenge saw teams develop their coding and programming skills and their aptitude for teamwork, problem solving and communication, giving them a real insight into the creative and innovative careers that engineering and technology presents," says IET Chief Executive, Nigel Fine.

The importance of nurturing young engineers
The event held at the House of Commons attended by the winners provided an opportunity for MPs to consider the central role of engineering to society and the importance of direct early experiences for children in inspiring and developing the engineers of tomorrow.

"This showcase is about recognising these children and giving them a platform to share their innate creativity, passion and aptitude for STEM with decision makers. We are delighted to have supported the Government on this initiative and believe it sends a clear message about the importance of investing in the development of key skills from an early age", says Victor Saeijs, Senior Vice President, Western Europe for the LEGO® Group.

For more information on IET Education, visit theiet.org/education.

For more information about Engineers of the Future, visit www.yearofengineering.gov.uk.

News

Inspec launches a dynamic new research intelligence tool

Inspec Analytics unlocks new insights, allowing engineering faculties and researchers to monitor their impact, understand their areas of strength and explore global research trends like never before.

Our Inspec database has been delivering access to essential engineering intelligence since 1969, when it quickly gained a reputation for being one of the most authoritative tools for accessing scientific literature across engineering, physics and computer science.

Renowned for the quality of its indexing, Inspec has become an essential discovery tool for numerous prestigious institutions and serves tens of thousands of users globally.

Now, as Inspec celebrates its 50th anniversary, the innovation that inspired the creation of the original Inspec is still in force. By combining high-spec technology with Inspec's world-renowned indexing capabilities, we have delivered Inspec Analytics, a dynamic new research intelligence solution to meet a wide range of needs for engineering professionals, librarians, faculty, researchers and students.

"Our customers face an evermore complex challenge in extracting actionable information from the huge amount of global research data, being able to understand trends in specific scientific subject areas, comparing themselves with their peers, and identifying newly emerging targets for investment.

"Combining semantic technology with Inspec's high quality indexing has allowed us to create the Inspec knowledge graph, adding relationships between institutions, authors, articles and concepts," says Tim Aitken, Inspec Senior Product Manager.

"Using this unique navigable map of science, Inspec Analytics unlocks new insights and allows engineering faculty and researchers to monitor their impact, understand their areas of strength, and explore global research trends like never before."

Inspec Analytics is included in the Inspec subscription. It's continuously evolving and advancing with new features released regularly to allow users even more insight into Inspec's research intelligence.

Current subscribers may have access to Inspec via vendor platforms including EBSCOHost, Elsevier's Engineering Village, OvidSP, ProQuest and Web of Science.

Find out more at inspec-analytics.theiet.org.

Inspec Analytics Beta is available now and allows institutions to:

- measure research impact
- discover global rankings for particular topic areas
- highlight areas of strength and identify areas for growth
- monitor research output over time
- compare institutions with an intuitive visual display
- explore research trends and find collaborators
- identify the top journals and conferences for a specific subject

MOD

Churchill Medal award winner recognised for remarkable drive

L-R Mark Organ, IET Head of Membership, Chief Technician Peter Wakefield and IET Chief Executive Nigel Fine.

RAF Chief Technician Peter Wakefield, 7 Squadron Mechanical Trade Manager for the Chinook Mk6, has been awarded the 2017/2018 Churchill Medal award.

The Churchill Medal is awarded jointly by the IET, Institute of Marine Engineering, Science and Technology (IMarEST), the Royal Aeronautical Society (RAeS), the Institution of Mechanical Engineers (IMechE), the Institution of Royal Engineers (InstRE), the Institution of Civil Engineers (ICE), the Society of Operations Engineers (SOE) and the British Computer Society (BCS).

This prestigious medal is given to an individual or a small team of MOD staff, either civil service or Armed Forces. It is awarded for achievement in engineering and technical advancement in support of military operations/readiness.

RAF Chief Technician Wakefield was directly responsible for the design and implementation of parts, tooling and policies that have improved capability and aircraft availability on the Chinook Force. His remarkable drive to reduce airframe corrosion saw him introduce an anti-deterioration maintenance policy for pre and post salt-water operations, which greatly enhanced output.

Cost and time savings

Creating a computer aided design drawing and model of a panel cover to protect the auxiliary power unit, Wakefield began the development of a project that could realise savings of up to £1.2m a year.

Working closely with industry, he also identified the root cause of a rescue hoist judder and developed a fix to overcome this long-term capability limitation.

Continually improving maintenance work, he also designed new tooling to overcome the removal of work platform bushes, greatly reducing man-hours and improving availability.

VIP guests

Chf Tech Wakefield received his award at a special ceremony last November at our flagship home IET London: Savoy Place. VIP guest Rupert Soames OBE, Group Chief Executive of Serco and grandson of Sir Winston Churchill, presented the medal to Chf Tech Wakefield, alongside Air Marshal Julian Young CB OBE FREng and Vice Admiral Peter Hudson CB CBE of BAE Systems, who generously sponsored the event.

"To receive such a prestigious award as recognition for my contribution to 7 Squadron and Defence is extremely humbling. I am in awe of the esteemed engineers like Sir Frank Whittle and Sir Christopher Cockerell that I follow," he said at the event.

"Wakefield is much more than a trade manager, he is an inspiring leader and a true deliverer of change," continued nominator Squadron Leader Chris Shone. "The examples highlighted in his nomination only begin to scratch the surface of his outstanding contribution to the Chinook Force."

MOD

Expertise endorsed

The Chinook Support Centre is celebrating getting IEng accreditation for RAF Odiham Squadron and Boeing Defence UK members – a remarkable achievement almost three years in the making.

Incorporated Engineers celebrate achieving registration with a visit to IET London: Savoy Place.

MOD

In 2014, Boeing Defence UK and Defence Equipment & Support formed the Chinook Support Centre to provide engineering support and advice to the Chinook fleet. This team was to be managed by a crown servant holding the appropriate airworthiness authority to act on behalf of the Type Airworthiness Authority (TAA), allowing approved guidance to be issued 'at source' at RAF Odiham, home of the Chinook fleet.

Driving professionalism

Fast-forward to November 2015 and the arrival of Mark Goodger as Officer Commanding (OC) Chinook Support Centre. Mark, a career civil servant with 30 years' experience working in the Military Rotary Wing environment, was awarded a Letter of Airworthiness Authority but was required to attain Incorporated Engineer (IEng) professional accreditation. This was part of the DE&S' drive to assure professionalism.

Mark therefore started investigating how to achieve IEng accreditation. He soon realised that as a career engineer with no supporting degree-level qualification, he was in the same position as the rest of the Chinook Support Centre team – both military and industry. All had a wealth of engineering experience but were without the professional accreditation that recognised their skills. He decided to see if it was possible for all of the team to work towards professional registration together.

Mark invited our MOD Development Manager to present to the team and other interested parties from around RAF Odiham. After this meeting all the attendees decided to join our Group Registration Scheme, designed to help engineers work on career-based applications for professional accreditation.

A team effort

The final group were assigned IET Professional Registration Advisor (PRA), Rod Passingham, who advised them on how to construct robust applications that would meet the exacting requirements of both the IET and the Engineering Council. Professional bodies like ourselves use teams of volunteers such as Rod not only to build credible applications, but also to review them, conduct the necessary technical interviews and ultimately provide guidance to the Engineering Council as to the suitability of the applicant.

In August 2017, two days of interviews were set up at RAF Odiham. A nervous wait ensued but the following month all nine applicants were notified that they'd achieved IEng accreditation. Not long after a further four were interviewed and accredited, resulting in 13 Incorporated Engineers now supporting the Chinook fleet.

"Not only does this give us a great professional platform to work from, but the entire process has also been a huge team mentoring activity," says Mark. "Everyone from both the military and industry sides helped each other develop their applications to the required standard," he says proudly.

> “Not only does this give us a great professional platform to work from, but the entire process has also been a huge team mentoring activity.

Debating engineering issues in the Faraday Centre.

MOD

Petty Officer honoured to receive Bateson Award

Cdr Bamforth (FWEOSM), Barry brooks (IET), PO(WESM) Cartwright, Cdr Pearce (WEOC).

The Bateson prize is awarded to the Weapon Engineer who has made a significant contribution to unit operational capability, innovation, engineering excellence, and/or branch development over the last 12 months.

HMS Astute Petty Officer Engineering Technician (Weapon Engineer Submariner) Simon Cartwright is the latest recipient of the Bateson Award.

Simon's citation impressed Command, FOST and SUBFLOT with the application of his technical knowledge.

It highlighted that when given pan-departmental tasks by his Warrant Officer or line manager, he delivered on time and at a standard that was by far the best amongst his peers.

"During operations a defect with the inertial navigation system threatened Astute's success," the citation states as just one example. "Cartwright's swift defect investigation and repair plan enabled the platform to return to operations quickly. His proactive nature to maintenance and defects, combined with his excellent staff work, singles him out as the department's best engineering technician."

Simon was presented with the award at the End of Term Awards Ceremony at HMS Collingwood.

"I was truly honoured to be nominated, let alone to be awarded," he said at the event. "It was humbling to know that my hard work and personal sacrifice had been noticed. I will continue to honour myself and the Submarine Service by maintaining this work ethic in the hopes of instilling it in others."

> I will continue to honour myself and the Submarine Service by maintaining this work ethic in the hopes of instilling it in others.

The Rear Admiral Bateson Award is named after Rear Admiral S L Bateson CB CBE, who was tasked with forming the Electrical Branch in 1946 under the recommendations of the Middleton Report. This branch evolved over time into what is now the Weapon Engineering sub branch.

MOD

Innovation at HMS Collingwood

Eighteen young weapon engineer officers from HMS Collingwood recently finished their 13-week Engineering Principles course, which culminated in presenting their projects to VIPs from around the Royal Navy.

The projects posed were based on current issues or processes that technology could improve. One issue was the amount of time it takes to muster swords and belts at HMS Collingwood, which was resolved by using NFC (Near Field Communication) technology with a Raspberry Pi to control it. This group wrote 5,000 lines of C++, 3D designed and printed a casing to demonstrate a working prototype.

Another team took on the challenge of prototyping one of the modules they were studying onto the Defence Learning Environment, bringing all course documentation, quizzes and presentations online and making them more accessible to the students.

Both the solutions offered ideas that could be easily and rapidly implemented and at minimal cost compared with existing off-the-shelf answers.

The third project was conceived by student Midshipman James Seddon.

"I relished the chance to continue my thesis work in acoustics and actually develop a passive scanning sonar – it proves the concept works and gave some interesting results," he says.

Students had to pitch their ideas in a mock 'Dragon's Den', where VIPs from the Royal Navy scored the projects based on their feasibility and potential.

Cdr Matt Stratton, Staff Weapon Engineering Officer to the Portsmouth Flotilla was one of the 'dragons' the students had to face.

"It is fantastic to see this latest cohort of bright and enthusiastic engineers embracing the concepts of innovation and rapid exploitation. They will shortly return to sea where they will be able to apply these lessons alongside their core training to maintain and sustain our world leading capabilities at reach to deliver operational capability."

"These projects really showcase the potential our engineer officers have. They give fresh perspectives to existing processes and ways of working," adds Cdr Jon Pearce, the Officer in Charge of all Weapon Engineer Training at HMS Collingwood.

Lt Kenyan from Team SABRE demonstrating its 3D printed sword and belt recording equipment to Cdr Stratton

Team SABRE L-R Mid Rose SLt Mehon, SLt Kenyan Slt Wagstaff, bottom SLt Ormston, Slt Marshall

Team Delphin briefing their concept - L-R SLt Timpson, Mid Player, Mid Seddon, SLt Hill, SLt Ball

Academic

Fusing research and education

Wearable tech is helping to bring research into the electrical and electronic engineering (EEE) curriculum, improving learning outcomes reports **Caroline Brogan**, from Imperial College London.

Danilo Mandic/Imperial College London.

More of us are coming to rely on wearable biopresence technologies like smart watches or phones to help lose weight, train for events and even sleep better.

The unsung enabling technology behind the scenes is signal processing – an area that Imperial has been at the forefront in research and teaching for over 50 years.

Traditionally students have used analogue data from radar – a field Imperial helped to pioneer in World War II – and digital data from array processing and communications to learn the basics of signal processing. But in the past few years, research and teaching staff from Imperial's EEE Department have sought to bring the course up to date.

Professor Danilo Mandic and colleagues have tested whether using wearable tech in the classroom would enrich student's intellectual curiosity, engagement and perhaps even performance, especially in maths-heavy modules.

Maths gets personal

The team developed a small device for recording biosignal, the iAmp, which measures students' own ECG traces via small electrodes on the wrist. Since 2014, around 450 undergraduates have been involved in the project as part of their practical signal processing modules.

Students taking part are required to record their own ECG for a period of 12 minutes while being seated. An accompanying computer app gives onscreen instructions on how and when to gather data, before displaying the measurements. The students apply the

Academic

The Apple Watch.

taught complex mathematical concepts of signal estimation to their recorded vital signs and are graded as usual.

At the most basic level of calculations, ECG traces can be used to measure average heart rate. In addition, the activity of the autonomic nervous system, which is related to stress, can be estimated from heart rate variability. With a little more mathematical legwork, an ECG trace can be used to obtain the breathing rate of a person through a phenomenon known as respiratory sinus arrhythmia (RSA). The overall strength of RSA in an individual can be used to assess cardiovascular health and psychological stress.

The body as a unique dataset

"You feel like you have ownership over the work as you're not just given generic data to analyse – it feels more personal because it's your own data," says PhD student Ahmad Moniri, who took the modules as an undergraduate. "Also, on a practical level, since you've done the acquisition yourself, if there's something unusual with the data, you can easily relate it to some event and explain it – say if I moved or my friend was distracting me."

Feedback on this project has shown that students enjoyed the work because it was taught in a physically meaningful and fun way. As an additional benefit, the team says the approach could help keep the curriculum current by syncing it to technological and educational developments.

Co-lead Professor Anthony Constantinides says engaging students in curiosity-driven learning helps to broaden their perspective on next-generation healthcare.

"We continue to bring research into the classroom, which is now not only feasible but could potentially trigger a paradigm shift in teaching," he says.

"We hope to inspire students and educators to further enhance the curriculum with relevant real-world examples like wearable health," adds Professor Mandic.

> You feel like you have ownership over the work as you're not just given generic data to analyse – it feels more personal because it's your own data.

Academic

Spike Free Cup clinches engineering business competition

A cup that can alert users if their drink has been spiked with drugs or excess alcohol has claimed the top prize in an engineering student entrepreneurship competition.

> This is a great example of weaving entrepreneurial learning opportunities into the curriculum.

The Quench Spike Free Cup was chosen as the top business idea as part of the Engineers in Business Fellowship competition. The Quench concept would use coloured detection strips within transparent plastic cups so people could easily see if their drinks have been tampered with.

Over 100 second-year engineering students competing in 14 teams took part in the competition, organised by Lancaster University's Dr Allan Rennie, Senior Lecturer of the Engineering Department. The competition formed part of the students' business development project, an undergraduate module Dr Rennie teaches.

"Undergraduate engineering students naturally shy away from business and management type modules, preferring the more numerate and technical subjects. However, this particular module, which embeds entrepreneurship and innovation within the curriculum, has gained in popularity in recent years," he says.

Bringing entrepreneurship into the curriculum

"Having taught this module for a number of years, and seeing the diverse range of ideas and skills that the students work hard to develop – skills that they will find invaluable as they progress towards careers as professional engineers – I was keen to provide an opportunity to take these ideas beyond just an academic exercise.

"We were pleased that the Engineers in Business Fellowship also saw the potential in this module, and awarded £3,000 to invest in some of the best business ideas that emerged from the student teams. Real money, to do real things."

The winning team has been awarded £1,750 in prize money. This was provided by Sainsbury Management Fellows in the form of an Engineers in Business Fellowship, to be used to further develop their business idea with additional support from the University's Enterprise Centre.

Academic

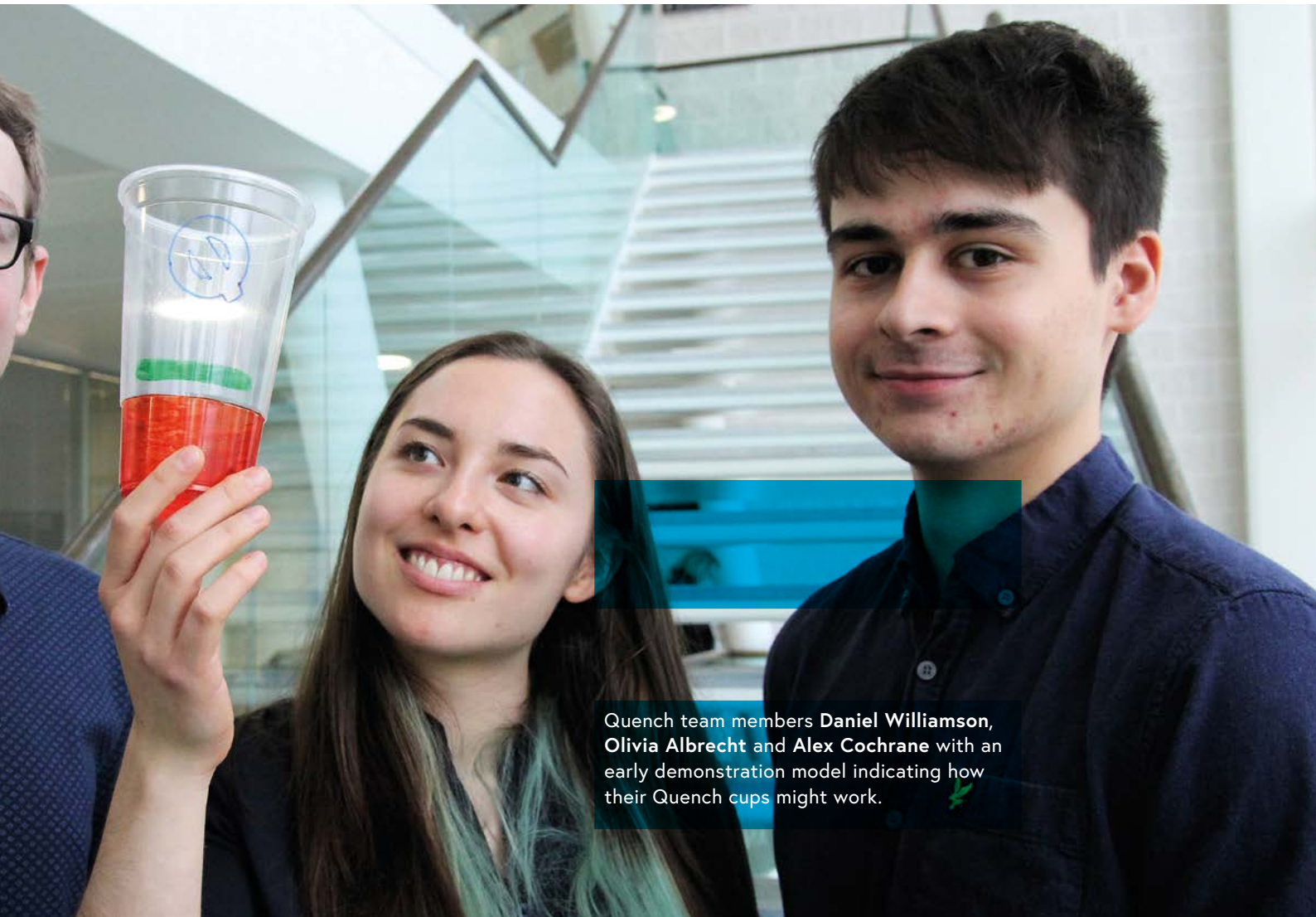
A competitive edge
"The investment rewards gave the module a competitive edge, encouraging greater group engagement and making setting up a business a more appealing route for engineers who hadn't even considered it. Receiving the money enables our group to gain hands-on experience around starting up a business," says Quench team member Daniel Williamson.

Second place, and a prize of £750, went to Buddyup, an idea for a sports app that would allow users to find sports companions at similar levels of skill and ability within a chosen geographic location. Third place, and a £500 prize, was awarded to Tech Test, a technology trial service where users can test new technology over short trial periods before committing to buy their own devices.

The final business presentations were judged by an independent panel, with winners selected based on their business pitches, the viability of the concepts, as well as consideration of low start-up capital requirements.

Linking technical and business skills
"Some of the most important global challenges we face in the world today require the ability to link technologies to an understanding of the market mechanism, business skills and entrepreneurial commercial thinking," says David Falzani MBE, President of Engineers in Business Fellowship. "The EIB prize fund supports universities that give students the opportunity to get a flavour of how business skills and engineering know-how can solve world problems and create wealth for economies."

"This is a great example of weaving entrepreneurial learning opportunities into the curriculum," points out Simon Harrison, Enterprise Programme Manager in the University's Enterprise Team. "As a result, when these students graduate they'll already have developed and practiced some of the key capabilities employers are looking for including creative thinking, collaborative problem-solving and applied commercial awareness."



Quench team members **Daniel Williamson**, **Olivia Albrecht** and **Alex Cochrane** with an early demonstration model indicating how their Quench cups might work.

Academic Partners

Correct at the time of going to print March 2019.

Academic

SAM gives a helping hand to manufacturing firms in the North East

More than £800,000 in Collaborative Projects Fund grants is now available to North East manufacturing businesses following the launch of a £5.1m project by the University of Sunderland.

The Sustainable Advanced Manufacturing (SAM) project has been developed to support small and medium-sized manufacturing enterprises (SMEs) across the North East Local Enterprise Partnership (LEP) region, aiming to create jobs and unlock growth.

This initiative will enable businesses to become more productive and sustainable by supporting projects that develop products, processes and technology.

"The North East is a region of entrepreneurs and innovators," says Project Manager Claire Defty. "These grants will support them to deliver business growth from their ideas and concepts."

The grants enable companies to access support for equipment and helps address other barriers to developing and implementing a new product or process. Applications are invited from North East manufacturing SMEs looking for investment to support:

- New technology development and/or use by the firm
- New product validation (tests/consultancy/ prototypes)
- Process improvement
- Research and development

Applications from SME consortiums are particularly encouraged. It is anticipated that most awards will be between £5,000 and £35,000 per project.

Anyone interested in a grant can find out more information at www.samprojectuos.co.uk.

Students design electronic egg for penguins

Heriot-Watt University students have designed an electronic egg that will help zookeepers monitor penguin incubation.

Pengu Project team members Dr Gerard Cummins and student Adam Hussain.

The Pengu Project features a 3D egg that will allow zookeepers to remotely monitor the temperature, humidity and motion of a penguin's egg during the critical time of incubation.

The project will take place at Edinburgh Zoo, which houses colonies of gentoo, king and rockhopper penguins.

Using interactive features, zookeepers will be able to observe in real-time and study useful historical information from sensors placed within the replica egg.

The data gathered by the egg will then be used by zookeepers to replicate this environment within their artificial incubators, making the process less intrusive for the penguin.

"This is a fantastic invention which will really benefit the penguins and zookeepers," says Professor Marc Desmulliez, Heriot-Watt. "Edinburgh Zoo is an ideal fit for the project because it's home to Europe's largest outdoor penguin pool and houses three different species of penguin.

"The students are getting a rare insight into the penguins' behaviour whilst compiling this research and it's great to work on something which will help conservation."

"It's very exciting to be a part of a project that will allow us to gather valuable data about our penguins and how they look after their eggs," continues Sean Meechan, Senior Bird Keeper at Edinburgh Zoo. "This device will give us detailed information about the egg incubation period, without having to disturb the birds or their nests and will hopefully help us to replicate those conditions more closely if needed."

Academic

Celebrating creativity in education

Birmingham City University (BCU) recently welcomed children from Welford Primary School to promote creativity in education as part of celebrations to commemorate the institution's 175th anniversary.

The special event saw 12 children from the local school visit the university's City South Campus in Edgbaston for a number of inspiring activities led by lecturers and students. The day included song, dance, chemical reactions and big bangs in science alongside LEGO® coding for the 21st century.

The children made use of the university's Primary Innovation Lab, home to £24,000 worth of LEGO®, which the children used to build a Bluetooth-controlled, motion-sensing fan. This allowed them to put creative problem solving into practice – a 'must have' skill for their future careers. They also took part in colourful chemistry activities, learning how to safely use a Bunsen burner to carry out flame tests and vibrant chemical reactions.

This comes as the Cultural Learning Alliance warned that from 2010 to 2018, there was a 35% decline in the number of arts GCSE entries in England.

"Creativity and cultural understanding are widely recognised as being key to children's education and a vital feature of a broad and balanced curriculum, but the reality in many of England's classrooms is very different," says Dr Victoria Kinsella, Senior Research Fellow at BCU.

"Challenges are continually posed such as the omission of the arts in school timetables and the continued emphasis on performative measures and assessments. With an increasing economic demand for creative knowledge, it is no longer enough for learners to simply pass examinations, they must also be able to draw from a wide range of experiences and be able to apply them in new and creative ways.

"The recent Edge Foundation Report concluded that current education policies do not address the challenges set by employers, the economy and young people, stating that the system is not only failing to meet their needs, but actively accelerating in the opposite direction," she continues.

"This is not to say that there are not excellent examples of creative teaching, and excellent teachers, whose work should be celebrated. I have seen a lot of amazing practices over the years, but more needs to be done to encourage creativity and I am thrilled that we have been able to celebrate creativity in education with this event."

Enterprise

Intelligent Energy and TCP launch off-grid hydrogen fuel cell

New product will help construction industry transition to zero emission power.

Intelligent Energy and Taylor Construction Plant (TCP) have launched the ECO GH2, a zero emission hydrogen fuel cell power product aimed specifically at the construction industry.

Intelligent Energy announced a strategic partnership with UK-based TCP back in 2017 to integrate, test and evaluate new products for the construction industry. The first product from this collaboration is the ECO GH2, which provides an off-grid, zero emission power solution.

The unit, fuelled by hydrogen, uses an Intelligent Energy 801 Fuel Cell Module (FCM) to produce a DC generator, capable of a maximum output of 1kW. It can be used with DC power loads or with a TCP inverter power pack to produce an off-grid generator unit up to 5kW for power tools, accessories and welfare units.

A cleaner way of working

The construction industry has come under increasing pressure in recent years to look at ways to reduce its carbon footprint, environmental and neighbourhood noise and risk of oil or diesel spillages. Products like the ECO GH2 will help achieve this.

Powered by Intelligent Energy's Air Cooled fuel cells, the ECO GH2 is zero emission at point of delivery and has near silent operation. This is an advantage for night-time work and when operating in urban areas. The product is lightweight, can be used in enclosed ventilated spaces and there are no liquid fuels.

ECO-GH2, an off-grid hydrogen fuel cell power system. *Copyright Taylor Construction Plant Ltd.*

Intelligent Energy's FCMs provide further benefits that make them a versatile solution for the construction industry, including compact and robust design, lower lifecycle cost than standby diesel generators, and minimal service requirements.

A responsible alternative to diesel generators

"Change is taking place in the construction industry as a growing number of businesses understand the need to transition to a cleaner way of working. Our fuel cell products could have a marked impact for the construction industry in addressing issues around ambient noise, air quality and climate change," says David Woolhouse, CEO at Intelligent Energy.

"Our FCMs have been developed to be a viable, more responsible alternative to diesel generators and can be deployed to deliver power for a wide range of applications working in both urban and non-urban areas."

"By integrating Intelligent Energy's 801 Fuel Cell Module with our product design we have produced a fully functional DC generator which can be used for multiple applications," continues Andrew Barker, TCP Managing Director.

"The unit is also a vital component to our new LGP inverter power pack, together they provide an output of 5KW and are an invaluable resource for the construction industry in its bid to achieve zero emissions."

> Our FCMs have been developed to be a viable, more responsible alternative to diesel generators.

Enterprise

Comau launches lightweight wearable exoskeleton

Advanced industrial automation company, Comau, has launched its first wearable exoskeleton, designed to improve work by providing consistent and advanced movement assistance during repetitive or daily tasks.

The MATE Fit for Workers exoskeleton uses an advanced spring-based passive structure and is fully able to replicate any movement of the shoulder while adhering to the body like a second skin. It delivers lightweight, breathable and highly effective postural support without the need for batteries, motors or other failure-prone devices.

It is also compact and ergonomically designed thanks to the partnership between Comau, leading non-invasive orthopedics company ÖSSUR and IUVO, a spin-off company of The BioRobotics Institute, which specialises in wearable technologies.

"MATE has been designed in close collaboration with factory workers, therefore responding directly to their specific needs. With our exoskeleton, they will be able to do the same tasks but with less fatigue," says Maurizio Cremonini, Comau Head of Marketing.

"For Comau, this is also an extraordinary opportunity to reach a global market that, according to the International Federation of Robotics (IFR), grew more than 60% from 2015 to 2017 and is estimated to continue growing at a rate of 25% each year until 2020."

MATE is an important part in the company's HUMANufacturing Technology strategy, a concept in which people are protagonists within the smart factory together with cutting-edge, digital tools, enabling technologies and intelligent industrial robotics within a networked production system. It is also the first of a series of wearable robotics that Comau is developing and commercialising in partnership with IUVO and Össur.

A fundamental aspect of the collaboration is the joint desire to progress and evolve human-machine collaboration within diverse sectors, including biomedical, manufacturing and consumer.

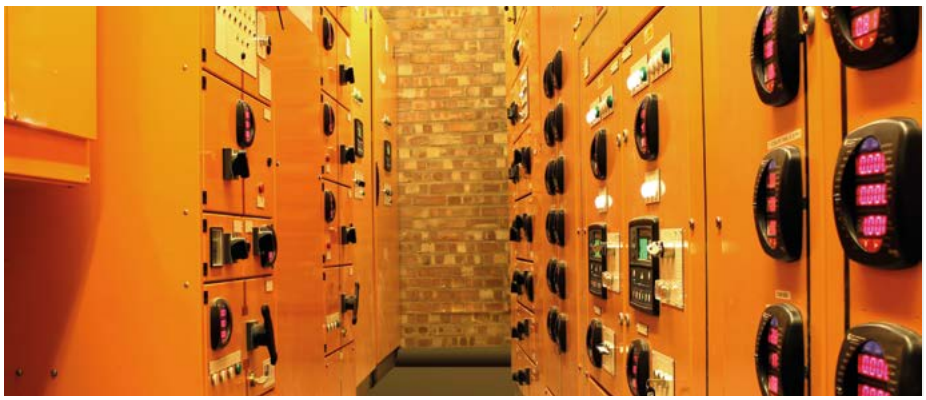
Features
- Designed in close collaboration with factory workers engaged in manual activities.
- Naturally comfortable, breathable postural structure.
- Compact structure fully follows the movements of the upper limb without resistance or misalignment.
- Passive spring-based mechanism: no risk of battery or motor failure.

Benefits
- Reduction of shoulder muscle activity for some muscles of up to 50%.
- Users can do the same tasks with less fatigue.
- Consistent, ergonomically-assisted movement support increases the quality and precision of repetitive tasks.
- Users can improve their quality of work.

Enterprise

Double accreditation for Eta Projects

Eta Projects is now an accredited member of both the Energy Network Association and Lloyds National Electricity Registration schemes.



HV/LV Sub-Station Upgrade Project

Eta Projects is now an accredited member of the Energy Network Association (ENA) scheme. The ENA runs the National Equipment Defect Reporting System (NEDeRS®), which gives subscribers access to their international database of reports from service providers and industrial users on electrical equipment defects worldwide.

Subscribers gain unlimited access to the NEDeRS® website and are emailed information whenever a report is issued. Members can also carry out historic searches on electrical equipment and specific manufacturers.

Many new designs have the same failure mode and manufacturers are frequently challenged on the basis of information provided by NEDeRS®. The scheme avoids delays from manufacturers in notifying users of potential problems, saving time and money and more importantly the safety of users. As an overview, Classes of NEDeRS® reports are as follows:

- **Dangerous Incident (DIN)**: A dangerous incident is one where the incident resulted in or could have resulted in a fatality or serious injury with an item of plant.
- **Suspension of Operational Practice (SOP)**: A notification of a company-specific suspension/change in some operational practice or procedure with an item of plant, for example, circuit breakers to be operated from a remote location or access restrictions around plant items.
- **National Equipment Defect Report (NEDeR)**: A notification of a design defect or in service problems/faults with plant items.
- **Defect**: A potential DIN or NEDeR, which is recorded for reference purposes. These are not circulated.

Eta Projects also recently passed a rigorous assessment by Lloyds Register to become an accredited member of the Lloyds National Electricity Registration (NERS) scheme. Under this scheme, Lloyds performs a technical assessment of service providers who elect to be assessed for accreditation for contestable works associated with the design of electrical connections.

Once accredited, the service provider is a NERS provider, commonly known as an Independent Connection Provider (ICP). NERS providers can undertake work such as the design of new connections and the installation of electrical switches and transformer to the DNO network.

For further information on Eta Projects please contact Kim Shelley on 0207 902 8570 or at kim@etaprojects.co.uk.

Enterprise

Demand side response – why safety must come first

Paul O'Brien, Director of Operations at Open Energi, explores the need for the UK's growing demand side response (DSR) industry to adopt a safety-first approach to unlock its full potential.

The UK's energy system is undergoing a massive transition as advances in technology and the urgent need to decarbonise our energy supplies reshape traditional value chains and empower consumers. For businesses, embracing the need to become more sustainable is also creating opportunities.

By managing their electricity demand more intelligently, businesses can reduce costs and cut carbon. In the process they can provide vital flexibility to the system, helping National Grid to balance electricity supply and demand, and integrate more renewable generation.

Demand side response (DSR) involves businesses increasing, decreasing or shifting their electricity use in response to different market signals including network charges, wholesale prices and system frequency.

Technology is a key part of the solution. For DSR to work effectively it should operate invisibly without impacting end user processes. Intelligent platforms are needed to receive market signals, assess the flexibility within a business' assets and automate a response.

Potential benefits of DSR

The potential benefits are enormous. Open Energi's analysis suggests the UK has around 6GW of demand flexibility that can be shifted for up to an hour without affecting end users. This is equivalent to over 10% of total peak demand, or two new nuclear power stations.

Unlocking this flexibility, which exists in everyday assets and processes all around us – from fridges to furnaces – is the cleanest, cheapest way of integrating renewable generation at scale and creating a smarter, more efficient grid.

But research shows that trust in technology is a major hurdle to DSR uptake. In a recent survey of businesses, 40% of those not providing DSR cited concern about disruption and impact on business performance as a reason for not getting involved. It is understandable that businesses should be concerned; after all, a single critical failure of an incorrectly integrated DSR solution could wipe out months of benefits. Clearly, the DSR sector must do more to give businesses assurance and help deliver the full benefits of a more flexible grid.

The ADE Flex Assure scheme

An important step is the Association for Decentralised Energy's (ADE) Flex Assure scheme – a voluntary code of conduct set to be launched this spring. This, combined with new directives designed to protect critical national infrastructure, will bring issues of safety, quality and reliability to the fore.

At Open Energi we apply best practice to hardware and software design to ensure our DSR products cannot adversely impact sites or assets. This includes adherence to core industry standards. A key requirement must be safe operation of the asset under any failure mode. Our on-site controllers are always supplemented by independent hardware or software interlocks that we cannot modify. This creates an orthogonal layer of control required to operate critical assets.

For example, on asphalt sites, we supplement our own controls with hardware interlocks to disable our control should the temperature of the tank increase beyond a safe limit. On wastewater treatment sites we augment our controls with independently developed PLC code that checks that the asset is still within its control parameters and disables our control immediately if not.

This dual layer of security redundancy means that when process exceptions occur e.g. for bitumen tanks, when an overtemperature bitumen delivery occurs or, in the case of water sector

Enterprise

"Unlocking flexibility is the cleanest, cheapest way of integrating renewable generation at scale and creating a smarter, more efficient grid."

storm conditions occur, the DSR assets will still continue to operate safely.

Safety first

The success of our safety-first design approach is borne out by our performance. We have performed more than 43.8 million dispatches over the last four years on 3,939 assets with no deviation from the process control parameters. For the 0.1% of requests where the behaviour of the system was not within our tolerance, we were able to inform clients of a maintenance requirement or failing component before it disrupted their operations.

As DSR matures it must continue to learn from other industries such as aviation and automobile. These have a long history of transparently and forensically examining failure, re-specifying standards, and imposing strict governance.

In recent decades the approach to safety across these industries has dramatically reduced system faults and flaws and their associated consequences, including reducing safety incidents and accidents and overall support costs. By following in the footsteps of these industries and adopting safety-first design principles, the DSR sector can help ensure more businesses, and ultimately households, have the confidence to participate in, and benefit from, the energy transition.

Enterprise

From coal to turmeric – how switching to biomass has spiced up GSH India

GSH India has won a major award for its work with Indian firm Kaleesuwari, switching from coal to turmeric to produce steam for its refineries across the subcontinent.

Enterprise

L-R GSG Group India's **Dr Sethumadhaven** and **GD Anand** with **Lord Deben**, Chairman of the Committee on Climate Change, GSH Chairman **Rachael Scarr-Hall** and award presenter **Louise Minchin**.

Think of biomass, and hay or straw briquettes spring to mind. But GSH has taken biomass to new, spicier levels.

Since 2015 it has been managing the refineries of Indian firm Kaleesuwari. Looking for ways to become more sustainable, in 2017 GSH started to mix biomass – turmeric, sawdust and wood charcoal powder – with coal as a fuel for the fluidised-bed combustion boilers in two power refineries. Over the following six months, this increased to 60% and 20% biomass respectively. The powdery biomass is mixed with coal and fed under-bed into the boiler's existing feeding mechanism and burned.

There are many benefits of using biomass over coal. Coal has a significantly higher cost per tonne than biomass and although its gross energy is higher, the same energy produced by biomass is roughly 70% of the cost. As a result of the change, GSH achieved a 60% reduction in CO2 emissions together with a 15% reduction in the cost of steam.

There are also technical benefits to using biomass. It has a higher volatile content than coal so is more easily combustible. It has less ash content than coal and contains more oxygen and hydrogen so therefore requires less external air.

Reducing long-term costs

No adverse reaction has been noticed in the boilers from using biomass and the generation of pollutants that form corrosive acids is negligible with biomass residues. This means that burning biomass will have a positive impact on the lifetime of boiler parts and the facility itself, reducing costs in the long-term.

At the same time there are clear environmental advantages. Biomass is carbon neutral and it also contains less nitrogen and sulphur, which makes it more environmentally friendly to burn. It uses up agricultural and forestry bi-products and also reduces India's dependence on fuel imports.

> Beating climate change calls for innovation and a lot of hard work.

What's essential is that the biomass product is sustainable itself – there have been examples elsewhere in the world of biomass being harvested unsustainably which creates more problems than the use of coal. The biomass in the Kaleesuwari project is sourced from within a 20-kilometre radius from the two plants and the products are typically bi-products of other production processes. Turmeric waste, for example, is generated from the extraction and separation of turmeric and the waste chilli powder is generated from the extraction of colour and capsicum pigment from chilli. Biomass is widely available in India thanks to the swathes of agricultural land meaning there is a long-term source of the products.

Overall the results have been so positive that GSH is now in the process of switching over to biomass completely and increasing the range of biomass products it uses.

This project won GSH Group India the Environment category at the prestigious 2018 Energy Institute Awards.

"GSH Group should be proud of the inroads they've achieved in reducing the environmental impact of Kaleesuwari's steam production process and showing other businesses in India that shifting from coal to alternative fuels can be a viable option.

"Beating climate change – while extending the tremendous benefits of energy to all populations – calls for innovation and a lot of hard work, by many smart people, all around the world," says Energy Institute President Malcolm Brinded.

Fundamentals selected as new partner by industry giants GE

The fast-growing electrical engineering company has been appointed as a channel partner for GE Grid Solutions' Monitoring and Diagnostics (M&D) portfolio.

The new partnership will see Fundamentals working closely with GE's M&D team. They will offer a wide range of products and solutions to monitor and manage critical assets on the electrical grid, detect and diagnose issues and provide expert information and services to customers. All GE M&D business for the UK market will now be handled by Fundamentals.

"This new partnership is a huge step in the growth plan of Fundamentals and it complements our existing range of products and services," says Fundamentals' Sales and Marketing Manager, Russell Clayman.

"It means that we can expand our portfolio to offer more comprehensive solutions to our existing clients, start engaging with new clients and, most importantly, create even happier customers."

"Our portfolio includes solutions for single- and multi-gas transformer dissolved gas analysis (DGA), enhanced transformer solutions and switchgear monitoring, as well as software and services," says Daniela Stearn, GE Power's Grid Automation Manager.

"Fundamentals has a lot of expertise in these areas and it seemed like an obvious choice of partner. We look forward to working with them."

> This new partnership is a huge step in our growth plan and complements our existing range of products and services.

Pektron makes a buzz over Bee Lighting investment

Pektron has made a major investment in Bee Lighting, having identified its expertise in designing cutting edge lighting systems.

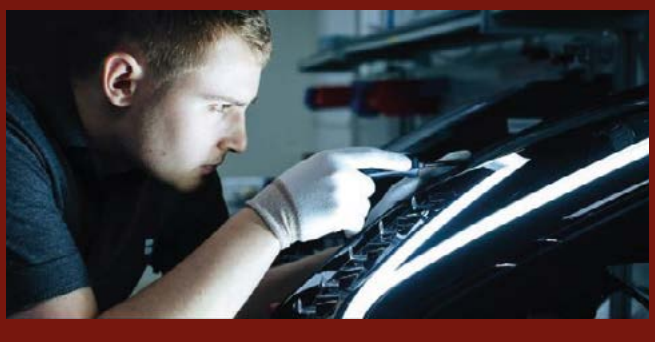
Pektron recently worked with Bee Lighting on the latest Ford GT. With its own experience in high volume electronics manufacturing, the company could see synergies between the two businesses' electronics and enclosure manufacturing and leading-edge automotive optics expertise, bringing opportunities for collaborative growth and success.

Bee Lighting is well known in its field for cutting edge design and state-of-the-art vehicle lighting technology. It has a unique mix of creative and technical talent all under one roof that work closely with customers.

Having the support of Pektron's large scale manufacturing facilities and brand new injection moulding capability will enable Bee Lighting to develop its technology even further. Together they will be able to deliver complete technology packages for vehicle manufacturers.

"We have a world-class team in Redditch that has designed and delivered lighting solutions for some of the most desirable global car brands. Pektron's investment will ensure we achieve our ambition to continue to grow and expand the business into the future," says Colin Fulford, Bee Lighting's Operations Director.

"Going forward we will all be looking at opportunities to deliver innovative solutions for our customers using our combined knowledge and capabilities," Neil Morgan, Pektron Managing Director adds.



Enterprise

Servelec Controls delivers vital safety systems for Garten development

Systems integrator develops a larger, more resilient fire and gas safety system in just 10 weeks.

Last March the Apache Corporation made the 10m barrel Garten discovery in the Beryl area of the UK Continental Shelf (UKCS), renewing confidence in the UKCS as a producer. By May, the US-based oil company had determined viability and by November production was underway.

The achievement of first oil from Garten after just eight months is testament to the company's innovative approach to use existing subsea infrastructure. This reduced risk, time and cost.

In order to protect workers, the environment and both the existing and new plants, Apache called on Servelec Controls. The company, which develops and integrates mission-critical systems for national infrastructure whilst minimising risk in hazardous and volatile industries, turned the existing fire and gas safety system into a newer, larger, more resilient system. Thanks to the ambitious timescales of the development, the project was completed in just 10 weeks.

Pride in flexibility
The expectations on this project were nothing new to Servelec Controls, which prides itself on its flexibility and capacity to meet client demands.

"While the pace of the development was ambitious, we had the capability to match the tight timescales as we have done consistently over our longstanding relationship with Apache," explains Chris Stones, Sales Director for Servelec Controls.

"Our experienced engineers are well-versed with a wide range of control and safety systems and we were able to commit the necessary resource to deliver this fire and gas system expansion within Apache's tight timescales."

Long-term partnership
As a long-standing supplier, Servelec Controls has built a strong relationship with Apache over the last 15 years. It has completed numerous projects, providing resilience through a support contract covering many of Apache's UK assets. This gave Apache the confidence to rely upon Servelec to help deliver the Garten project.

"Servelec Controls has consistently delivered quality solutions within agreed timescales and project plans," says Kevin Duncan, Facilities Projects Manager at Apache North Sea. "The Garten development is set to deliver significant production without the long cycle time of large scale projects, and we trust Servelec's ability to match Apache's innovation and ambition."

> While the pace of the development was ambitious, we had the capability to match the tight timescales.

Just four miles south of the Beryl Alpha platform the Garten discovery lies around 155 miles north east of Aberdeen, and demonstrates a hugely positive future for UK upstream industry and UK business alike.

Corporate

Fully accredited bespoke training and apprenticeships

The Uniper Engineering Academy offers a range of training programmes across a number of disciplines, from heavy current to health and safety explains **Chris Coates**, Customer and Business Development Manager.

The Uniper Engineering Academy offers innovative and engaging technical training programmes for a wide range of engineering, manufacturing and energy organisations. It offers a portfolio of courses, covering everything from power plant operation, apprenticeships and 'off the shelf' training, through to bespoke courses designed for individual company needs.

"We recognise that all of our customers' needs are different and it's our aim to find innovative ways of working together to meet these needs," said the Head of the Engineering Academy, David Hughes MBE.

"It may be that you have a challenge as a company around legislative compliance, or you may want to grow your business into new areas - whatever you're trying to achieve, we'll work with you to find the best solution."

The Academy, based at Ratcliffe on Soar, Nottingham, isn't just able to help organisations – it also caters for individuals, whether they're just starting out as an apprentice, or changing their career direction later in life, with courses and programmes available in high voltage operations, electrical, power plant operations, control and instrumentation, mechanical, and health and safety.

"We don't just provide this to UK companies and individuals - our world-class courses and bespoke training are available to companies around the globe. Clients can take advantage of our state-of-the-art facilities in the UK or we'll deliver training at their site," explained David.

Accreditations and affiliations with professional bodies such as the Institution of Engineering and Technology and Institution of Mechanical Engineers help the Academy offer a wide range of courses that are industry relevant and support the development of individuals. Many of its courses are viewed as best practice in the power sector and beyond. And the Academy was given a 'Good' overall rating in its recent Ofsted assessment.

"We want to inspire and support every generation of engineer, and there's no better place to start than at the beginning of an engineer's career – and that's where the Academy's apprenticeship offering comes into its own," added David.

"We know it's difficult to find a provider that can take an inexperienced person and teach the practical skills they'll need. Often, apprentices are taught the theory but practical skills need to be learnt at site. This can pose challenges around safety and how on-site mentors can ensure sufficient time is spent ensuring best practices are followed and learned.

"Using the Maintenance and Operations Engineering Technician (MOET) standard, our apprenticeship goes a step further than most. Through a BTEC certificate, apprentices first gain important technical knowledge that they will need for their chosen field, and then learn the practical skills that they'll need in the safe training environment of our purpose-built workshops and classrooms.

Apprenticeship training covers electrical, mechanical, control and instrumentation, wind technician, and power plant operator roles, and thanks to the apprenticeship levy, apprenticeships are more attainable than ever.

Want to find out how the Uniper Engineering Academy can help your business? Then call 02476 191540 or visit uniper-engineeringacademy.com.

Corporate

BAE Systems announces apprentice recruitment drive

BAE Systems plans to recruit almost 700 apprentices across its UK business this year, a 30% increase on last year.

The new recruits will join the Air, Land and Maritime businesses in September and will embark on one of 25 training programmes. These provide the opportunity to combine full-time employment with studying for a recognised qualification.

"We are proud to be one of the UK's largest employers of apprentices and our plan to recruit nearly 700 apprentices this year reflects our ongoing commitment to nurturing talent and developing high end skills for the future," says Charles Woodburn, Chief Executive Officer at BAE Systems.

"With technology becoming ever more advanced and integrated in the workplace, it is crucial that we train the next generation of engineers and business leaders to develop the necessary skills which will be needed to drive innovation, solve complex challenges and build on our position as one of the UK's most innovative and productive companies."

A range of exciting projects

The Air sector is recruiting almost half of the company's UK apprentices at its sites in Samlesbury and Warton. Here they will have the opportunity to work on a range of exciting projects including Typhoon and F-35: the world's largest defence programme. They will play a key role in developing emerging technologies for future combat air systems, supporting the UK's world-leading combat air capability for decades to come.

"I'm delighted that BAE Systems is taking on even more apprentices in 2019, with 700 young people being given the opportunity to kick-start their careers in this world-class firm," Prime Minister Theresa May said when hearing of the recruitment campaign.

"Britain's businesses have a hugely important role to play in training the next generation and themselves benefit by attracting diverse talent and improving their skills base. Through our modern Industrial Strategy we will encourage even more partnerships to create high-quality jobs across the UK."

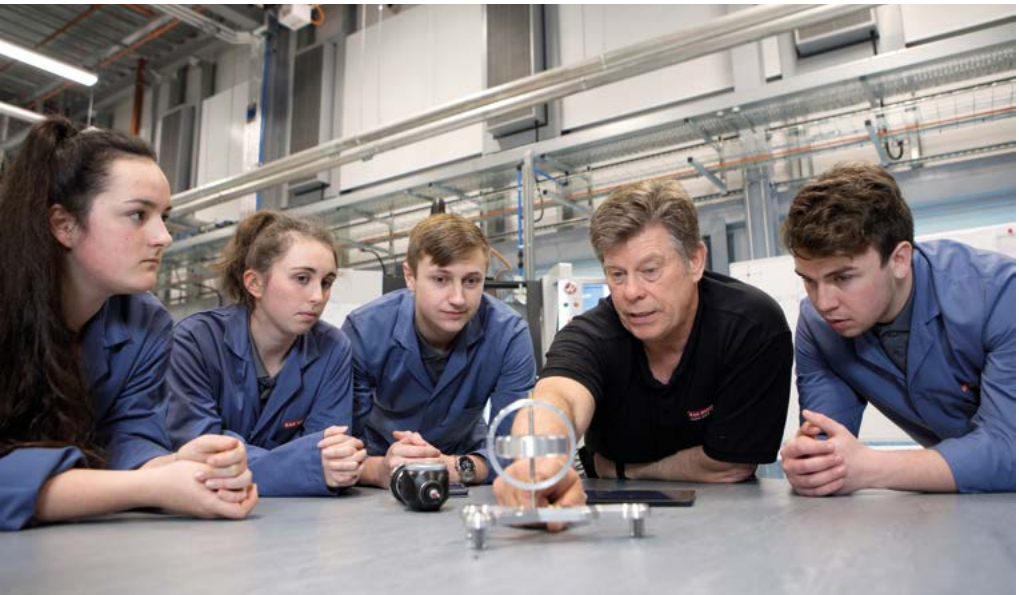
An important investment

BAE Systems invests approximately £90m per year in education, skills and early careers activities in the UK and has around 2,000 apprentices in training across its UK businesses at any given time, with circa 95% securing permanent roles each year.

The majority of BAE Systems' apprentices train for engineering-related roles and undergo a three to four-year training programme, with many progressing to study bachelor's and master's degrees. The business also offers direct entry onto new degree apprenticeships.

BAE Systems was recently named number one employer of apprentices in the UK on review website Rate My Apprenticeship.

It also won the Macro Employer of the Year Award and the Recruitment Excellence Award at the 2018 National Apprenticeship Awards, recognising the business' dedication to delivering high-quality apprenticeships.



Corporate

Energy companies can't afford to ignore digitalisation

If you had to provide the documentation for any construction your company has worked on, could you? **John Nixon**, Senior Director, Energy and Utilities at Siemens PLM Software, looks for answers.

Say it's 18 hours before the surprise safety inspection on a high-pressure boiler system. The project lead asks the design and installation team for the records that will let them prove to the inspector that every pipe and component was installed correctly and safely. Do they get a 250-page PDF that they had to spend the night poring over, or do they have a digital twin that guided the installation, continually updating during construction and accurately showing the specification, history and current state of every part of the system?

In the energy and utility world, the new normal seems to be prolonged lower prices, with revenue and margins going down even as supply increases. There's higher regulatory pressure and the need to clearly show social responsibility, all while building evermore complex and demanding projects.

Neither experience or a paper-based approach to documentation are enough to help companies thrive in the face of these challenges. What's needed is a data-driven approach that covers every aspect and process involved in bringing assets into the market, creating a truly digital enterprise. To get that, you need a digital thread that runs right through your organisation.

A digital thread

The digital thread joins teams and processes together that haven't been connected before. Having tools that support an integrated, cross-discipline environment avoids inefficiency during the design process and getting different teams to work together in a common environment reduces errors and omissions.

Once equipment is in the field, you need to know how long it will last and when it needs maintenance or replacement. Experience, gut feeling and spreadsheets can only give you a rough estimate. But using simulations verified with operating data from sensors produces a far more precise prediction of an asset's remaining life.

When you accurately predict remaining life you don't have to overprovision, wasting money replacing equipment sooner than necessary. Plus, you avoid the cost of dealing with unexpected failures.

New technologies simplify bringing the digital twin to the work site. Augmented reality devices and mobile tools let you close the loop with on-site guidance for inspection and maintenance crews. It shows them the information they need

about assets and procedures while they're working with them – and makes sure the information gets updated in real time as they check seals and tighten bolts, so it's always accurate and up to date.

Design for the future

Businesses in every industry need to do more with less. Regulation and the pressure to demonstrate social responsibility make this particularly acute for the energy and utility sector and there's significant value in making processes faster, simpler, more cost effective or energy efficient. Moving to modular design and construction

means more of the work can be done in advance in a controlled environment. This leads to less time finalising projects in unpredictable, uncontrollable field environments where you're subject to weather and other natural forces.

This process can reduce costs, improve safety and increase efficiency but it takes planning and investment. There's a cost to digitalisation across every area of your business, from planning and design to construction, installation and maintenance. However, there's also an enormous return on that investment when you evolve from being a document-based organisation to a data centric one – and an even higher cost if your organisation cannot make the transition.

“There's also an enormous return on that investment when you evolve from being a document-based organisation to a data centric one – and an even higher cost if your organisation cannot make the transition.

Corporate

Wopsie the cat captures young engineers' spirit of adventure

10-year-old **Hannah Donnelly** has won Leonardo's national Wopsie the Cat aircraft design competition, part of RAF100 centenary celebrations.

Hannah Donnelly, who attends Pirniehall Primary School in Pilton, Edinburgh, was presented with a trophy and £100 of book vouchers at a special award ceremony at Leonardo after winning their national RAF100 'Wopsie the Cat' STEM competition.

The prize was presented by Alastair Morrison, Leonardo UK's Deputy Managing Director, and Squadron Leader Sohail Khan from the Royal Air Force.

Famous stowaway

The national competition was created to mark the 100th anniversary of the RAF and was inspired by the true story of Wopsie the Cat, who stowed away on the first airship to travel across the Atlantic from east to west. The competition gave young inventors the opportunity to imagine the future of flight, while learning about the remarkable story of some of the first aviators of the last century.

Children were tasked with creating an aircraft for Wopsie's next adventure and the entrants, who ranged from four to 12 years old, demonstrated unbounded imagination and a flair for design in a rich range of drawings, designs and aircraft models submitted to the competition.

A total of 649 entries were received from children across the UK. These entries were whittled down to a list of 20 finalists, who were judged by an expert panel. All of the finalists received a certificate congratulating them on their selection and participating schools were also sent a certificate to acknowledge their participation in the STEM initiative.

During the judging process, which took place at RAF Cranwell, home to the RAF Air Force College, the personal details of all the finalists were hidden, so the judges could make objective decisions on the

Corporate

strongest entry. Hannah was unanimously chosen as the winner because of the degree of innovation she displayed, using water and solar power as energy sources for her invention.

"It's been fantastic to use stories like Wopsie the Cat to capture the spirit of adventure and the use of technology that makes air and space so exciting for young people," Air Commodore Chris Jones, RAF100 Industry Coordinator, said about the award.

"Well done to everyone who entered the Leonardo competition. The imagination, enthusiasm and creative talent in all the entries thrilled the judging panel and showed just how much fun Wopsie could have on her next journey.

"Many congratulations to Hannah for the winning design – a simple but truly inspirational use of sustainable solar and hydro power, fit for the next hundred years of aerospace exploration. Thank you to Leonardo for bringing Wopsie's story up to date as part of RAF100 and for showcasing the imagination, enthusiasm and creative talent that will inspire the next generation of aerospace pioneers."

> The imagination, enthusiasm and creative talent in all the entries showed just how much fun Wopsie could have on her next journey.

Wopsie's story

The first airship to travel across the Atlantic from east to west left East Fortune, Scotland, on 2 July 1919 and arrived in Long Island, New York four days later. While in flight, the crew discovered that a cat called Wopsie had been smuggled aboard by one of the engineers, William Ballantyne.

William was supposed to stay behind to save weight, but had somehow managed to hide himself and the cat on board at the last minute. As one of the first known aeronautical stowaways, William and Wopsie captured the imagination of the New York Press and William appeared on the cover of the *New York Times*.

Corporate

Siemens and Aker Solutions strengthen digital offerings through strategic collaboration

Siemens and Aker Solutions have signed a strategic collaboration agreement to further develop digital offerings in engineering, operations and services.

The collaboration focuses on the creation of software applications and joint service offerings. This includes the development of industrial digital twins that will drive efficiency throughout the entire plant lifecycle.

In addition, the companies will further develop specific offerings for the oil and gas sector based on Siemens' Comos engineering platform. These will help customers to reduce engineering and operational cost and enable improved decision-making.

A successful long-term relationship
The agreement builds on a long-standing, successful relationship between the two companies by combining individual strengths and promoting joint offerings.

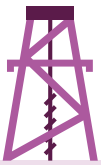
Aker Solutions brings its domain expertise and sector-specific digital offerings in field development, asset performance and integrity. Siemens will provide a wide range of digital offerings for the process – ranging from automation equipment to software applications for engineering and simulation.

"We are excited to strengthen our existing relationship with Siemens," says Dean Watson, Aker Solutions' Chief Operating Officer. "By working together to develop and deploy advanced digital solutions, our customers will be able to solve important engineering challenges.

"Within the energy industry – and beyond – digital twin solutions are providing increased insight which in turn enables better performance, maintenance and investment decisions. We look forward to working with a trusted partner like Siemens to further enhance these offerings."

"With this collaboration we are combining Aker Solutions' strong knowledge in upstream oil and gas projects as well as its domain-specific digitalisation offerings with Siemens' extensive knowledge in the field of electrification, automation and digitalisation," continues Siemens' Eckard Eberle, CEO Process Automation Business Unit.

"Customers across a broad range of industries, including the oil and gas industry, will benefit from an enhanced joint offering that will increase their productivity, efficiency and flexibility,"



> By working together to develop and deploy advanced digital solutions, our customers will be able to solve important engineering challenges.

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