

Events Newsletter

Mersey and Western Cheshire Network

September 2024 – December 2024

All our events are
free to attend for
IET members and
non-members alike,
pages 22–25

**Integrated Robot Applications –
Current Technology Trends
and Digital Transformation**



**Updates from Academic, Industrial and Research Partners
Welcome to our face-to-face events and webinars!**

The 2025 Annual Dinner

Friday 7th February 2025

£70 for individual tickets for Members, Non-Members and Guests
£40 for Student Members
See page 41 for full details

Friends of the Network

The Mersey and Western Cheshire Local Network is run by volunteers, who each year arrange free-to-attend lectures, technical visits, workshops, and annual dinners.

These activities would not be possible without the support of our Friends of the Network. These organisations support the Local Network in many different ways, from sponsorship of the local network, taking advertisements in the two events newsletters that are published each year,

taking tables at our Annual Dinners, funding places at our Annual Dinners for young engineers, providing speakers for lectures and allowing technical visits to their factories, engineering offices and academic institutions. Without their help and support, it would not be possible to run the high-quality events that we strive to deliver.

We are grateful for the support given both in the past and going forward into the future by our Friends of the Network.



Thank You for Your Support!

Chair's Message

The activities of your Local Network continue with some great events and presentations already completed – you can read about these in the following pages!

We seem to be languishing in a strange “Netherworld” as, even though Covid lockdowns are definitely a ‘thing’ of the past, attendance at Meetings, Presentations and Technical Visits appears to be low on anyone’s priority list!

That said, the one event attracting lots of attention again this year was our Annual Dinner!

You will read more on this later but, we *must* make special note of the generosity of all the guests who made this such a special evening!

We held a collection and raised a total of £1500 – a fantastic amount that is shared between Alder Hey Children’s Hospital and The Trussell Trust.

As usual, our upcoming events are detailed in the centrefold calendar – and there is likely to be more so, keep an eye on the IET Events webpage – and, come along or join in if you are able!



Alder Hey Children's Hospital cheque with Adam Wilson (Hon. Sec.)

These events are arranged by the small group of active volunteers in our Network but, we are always looking for more ideas, different topics of interest, different venues and, importantly, more volunteers!

So, if you have a particular interest, want to get involved or want to add “volunteering” to your CPD – please make yourself known to any of the current volunteers whose contact details are on the last page of this newsletter.

Finally, although it is a while off yet, please ‘pencil in’ the 7th February 2025.

Our next Annual Dinner invitations will be released very soon and, you don’t want to miss it!

Godfrey Evans

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What is an Engineer?

I attended a STEM event at Queens Park High School in Chester and was asked to talk about my career in Engineering. This was in front of some two hundred students.

I had my power point presentation running and it was projected on to a big screen but the students were about 30 to 40 metres away and the data on the screen was not easy to read. So lots of talk needed but it seemed that things were going across okay. The presentation had a number of slides which showed a man or woman and ask the question 'Is this an Engineer?' The first few said no this is a Technician, and went through a carpenter, male and female and then yes 'this is Engineer'. The next slide showed a group of four people but they are Scientists, not Engineers. The other slide showed the relationship between Engineers and Scientists and that they worked together designing things and that they relied on the technicians and skilled workers to complete the design or project. So the definitions of the various aspects of Engineers are defined as:

Definition of an Engineer

A person trained and skilled in the design, construction, and use of engines or machines, or in any of various branches of engineering: a mechanical engineer; a civil engineer; electrical engineer; electronics engineer etc.

Definition of a Technician

A person who is trained or skilled in the technicalities of a subject: Medical technician; Electronics technician.

Definition of a Mechanic

A person, who repairs and maintains machinery, motors, etc.: an automobile mechanic.

Definition of a Fitter

A person who puts together or installs machinery, engine parts, or other equipment: a gas fitter.

As I said I was a Chartered Engineer I had to show them projects I had worked on any and research I had to carry out for some of my projects.

I also said that I had started my career as an Apprentice in the RAF. I had not gone to University but still had to get qualifications such as ONC and HNC by going to night school.

Any questions? Yes I received a lot of questions which I was able to answer hopefully to the questioners' satisfaction.

A short pause and the next two hundred students arrived. A repeat of my presentation but to my surprise no questions at the end. The last group were older than the first but I still expected a few questions.

I was thanked for my presentations by the teachers running the event and I packed up and left.

On Monday 18th March Alan and I went to Leftwich High School where we had been asked to attend and help out taking students through mock interviews. This is something we have done before and they had been well received so we needed to do a repeat performance.

We both interviewed between ten and twelve students and I had two students who failed to turn up but the others, once things settled down, were happy to talk and answer our questions. Generally once it was explained that the interviewer was not going to give them the third degree and the question being asked were just to determine if the candidate had the right skills for the proposed position. Many of the boys wanted to get an apprenticeship working on motor cars. That was petrol and diesel and electric was very much down the list but I did point out that before long internal combustion engine would be a museum piece. So work on electrics, electronics and body work would be the only things left.

The girls were interested in topics such as childcare, beauty products and hairdressing. One or two did look at working on IT type jobs and I did try to point out that the STEM topics were open to anyone and we did need many more Engineers and Technicians and it could be very well paid and frequently involved travel.



Roger Todd, Alan Dixon

Local Network Annual Dinner – What a “do”!

Friday 2nd February saw the Annual Dinner of IET Mersey and Western Cheshire Local Network at the Hilton City Centre in Liverpool.

There were 15 tables hosted by Businesses, Universities and our friends from the IMechE meaning that we had, an absolutely fabulous, 153 guests from around the area – and beyond – who enjoyed some wonderful food, some lively conversation and two really inspirational speakers.



Kristina Pearson-Rampeearee gave the Keynote speech, discussing inclusion and diversity in engineering AND the, absolute, need to engage with young people to encourage STEM learning and an engineering career.

After dinner, Alan Cross told us about his early ‘choices’ that lead him into acting and singing – all while having a lifelong passion for outer space.



His volunteer role in the fledgling Northern Space Consortium eventually led to him being appointed to his current role as Manager of the North West Space Cluster, where he works tirelessly to bring more manufacturing, development and investment to the Northwest of England.

The guests on the evening included the three finalists for our networks’ award for the business demonstrating excellence in their delivery of The Workforce of The Future. This years’ award was kindly sponsored by Bilfinger UK Ltd – a long-time supporter of our Local Network.

The finalists had submitted detailed evidence of their approach to, and results from, their own training and development programmes.

The finalists were:

Sellafield Ltd,
Scottish Power Energy Networks (SPEN) and
CNC Robotics Ltd.

The judging panel had a difficult task to make the final selection for the winner, as all three businesses demonstrated significant efforts – and results – in their individual approaches.

Thomas McNulty, of Bilfinger UK, presented this years’ trophy to a very worthy recipient in Scottish Power Energy Networks with all finalists receiving a certificate recording their achievements.

The celebrations continued on and I understand that the trophy is going on a “walk about” tour of all of SPEN’s offices! Proud winners indeed!

We now look forward to the next Annual Dinner on **7th February 2025!**

Save the Date in your diary and look out for your invitation later in the year.

Godfrey Evans
LN Chair

Dinner Keynote Speaker

It was a pleasure to deliver the keynote speech at the Mersey & Western Cheshire [Institution of Engineering and Technology \(IET\)](#) Local Network’s annual dinner.



A great opportunity to discuss the importance of role models in engineering and network with industry leaders.

Thank you to Godfrey Evans and the committee for inviting me to be a part of the event!

[Krystina Pearson-Rampeearee CEng MRAS FWES FRSA MIET](#)
[Krystina Pearson-Rampeearee CEng MRAS FWES FRSA MIET \(She/Her\)](#) • Multi-Award-Winning Chartered Aerospace Engineer at BAE Systems | STEM Advocate | Speaker | 2023 DfT Aviation Ambassador | IET Young Woman Engineer of the Year 2023 Finalist | Multi-Award-Winning Chartered Aerospace Engineer at BAE Systems | STEM Advocate | Speaker | 2023 DfT Aviation Ambassador | IET Young Woman Engineer of the Year 2023 Finalist

[#Engineering](#) [#WomenInSTEM](#) [#KeynoteSpeaker](#)

Krystina Pearson-Rampeearee

Sellafield Warrington at the Annual Dinner

The highlight of the North West calendar for IET engineers, young and experienced, is the IET Mersey and Western Cheshire Annual Dinner in Liverpool. From a range of perspectives, it was a noticeably different dinner this time to previous years and it was great to see that there was a more diverse group of people in the room than just 10 years ago. This is all good progress and has been a long time coming. The age demographics in particular was noticeably more mixed and vibrant, there were more dresses than before, and the inclusion of Shakespeare's plays for the table names was an absolute first!

In light of the changes, this year's dinner included a new award sponsored by Bilfinger for 'The Workforce of the Future' and as Electrical Apprentice Co-ordinator, I was the person who accepted the opportunity to put together the application for Sellafield Warrington. I was delighted when our application was shortlisted, the work to put it together made me realise just how many people there are within both Sellafield Warrington and Cumbria who are highly invested in our workforce of the future.

When I started at Sellafield some 14 years ago, at 40 something, I was surprised to be at the younger end of the age spectrum in the team. The reason for the age gap is partly owing to the lack of investment in young people around the 1990s, where apprenticeships fell out of fashion as the government sought to send all to university. Fortunately, that limiting scenario is long behind us and Sellafield's wide provision for young people in the form of work experience, industrial placements, apprentice schemes, and graduate schemes, has led to a vibrant work community,

well-resourced and with excellent training from experienced engineers. We now train new recruits across a range of engineering disciplines mainly electrical, mechanical, civil and structural, but owing to the successes in those areas, our offering to engineers of the future has expanded to include specialist areas such as systems engineering, operational research & analytics, and safety case. This is likely to grow further in the future.

The award application prompted conversations with trainees, trainers, and academic partners – especially Wigan and Leigh college. The trainees offered great insight and many testimonials into their experiences of being nurtured, supported, and taught well. The trainers clearly put in a lot of discretionary time and effort into mentoring and guiding our young people. The academic institutes describe how the apprentices' professionalism and enthusiasm develops over the years of study. The IET is also to be commended on its commitment to young people, its vision for the future, and its desire to encourage companies across our region, large and small, to put in place robust training provision and guidance for those new into the workplace. The praise and enthusiasm across all of our streams for young engineers has been astounding to listen to.

It is so good to see that times have changed and that being a 40 something is no longer the younger end of the spectrum. Even at the dinner, Sellafield's representatives had a very young and eager group.

Keep up the good work IET, despite my enthusiasm I expect to be the oldest at our Sellafield table for the Liverpool dinner next year!



Kevin Dean
CEng MIET Sellafield Warrington

Scottish Power Energy Networks

Our team were proud to win the Institution of Engineering and Technology (IET) "UK Workforce of the Future Award" for their work in the Merseyside and West Cheshire area to transform our current and future workforce for Net Zero.

As part of our workforce strategy, we're committed to recruiting locally and training centrally, with training programmes targeted at different stages of individuals' working career and age central to this.

Winning this award recognises our hard work over the last few years to grow the breadth of our training programmes and diversity of our trainees across different skills and our ambitious plans to enable our workforce to evolve to meet the changing workload, technology, sustainability and portfolio requirements, whilst developing a modern, diverse, well-trained workforce fit for the future.

We're always looking for talented individuals who can join us at this exciting time.

Find out more about our career opportunities with SP Energy Networks <https://lnkd.in/eF2DKvnF>.

Source: SPEN linkedin post



IET Merseyside & West Cheshire Local Network Annual Dinner and Bilfinger UK 'Workforce of the Future Award 2024'

On Friday, 2nd February 2024 our team attended the Institution of Engineering and Technology (IET) Mersey & West Cheshire Local Network Annual Dinner, celebrating the workforce of the future, networking with North West based engineers and enjoying speeches from Krystina Pearson-Rampeearee CEng MRAeS FWES FRSA MIET, Alan Cross and Godfrey Evans.

It was great to hear about the urgent initiatives for attracting young and diverse talent in STEM, empowering manufacturing companies in Merseyside and West Cheshire.

CNC Robotics Ltd finished as finalists for the Bilfinger UK 'Workforce of the Future Award 2024'. We are proud to stand next to Scottish Power and Sellafield Ltd as runners up for the award, having invested in young talent through successful apprentice and graduate programmes.

Thank you to Godfrey Evans, Andrew Kaldos and the IET cluster for the invitation and hospitality!

Max Barnett



Cheshire College Student Wins National IET Award for Excellence in Engineering



A Cheshire College – South & West student has been formally recognised by the Institution of Engineering & Technology (IET) and presented with a national Student Excellence Award for his consistently high-quality work.

Eighteen-year-old Sonny Wortley from Congleton is studying a BTEC National Extended Diploma in Level 3 Engineering at the College's Crewe Campus and said that he was not expecting to be recognised by the IET, whose organisation places excellence as one of its core values in its ongoing mission to engineer a better world.



“My lecturer Tim sat me down recently and when he told me I'd won I was speechless. I literally couldn't get my words out! It was such a surprise that I was being recognised for my efforts so far. And for that recognition I feel very appreciative, very thankful, and very proud.”

In honour of his achievement, Sonny received a visit from Godfrey Evans (Chair of the Merseyside and West Cheshire Local Network for the IET) and Alan Dixon (Member of the Merseyside and West Cheshire Local Network for the IET, and Education Officer), who officially presented him with his award and shared an engaging conversation with Sonny about his prospects and aspirations.

Godfrey stated: “My first impression of Sonny was excellent. He's very direct, considered, and intelligent in his



presentation. We hope this award goes to show the rewards which can be gained from enthusiasm and great personal effort.

People like Sonny are essential for closing the skills gap. The engineering requirements for the UK are massive year-on-year, and it means there are lots and lots of opportunities for young people to make their mark in engineering.”

On the significance of Sonny's award, Alan said: “This is the first step on his route to becoming a professional engineer. We hope Sonny will become a Student Member of the IET, as this will help him through his whole career, and we just wish him all the very best. He is a young gentleman who will do really well in the engineering industry, and we would like to extend our congratulations on behalf of the IET.”

In addition to his official certificate recognising his excellence, Sonny also received £250 in prize money, some of which he plans to use for an IET Student Membership which will allow him to network with other engineering professionals and enhance his connections.

Upon receiving his award, Sonny was quick to thank Cheshire College, his lecturers, and support staff for playing a role in his success: “My experience at Cheshire College has been exceptional; I couldn't ask for any more support from my lecturers and my peers. I've had careers advisors help me with my CV and explore industry opportunities, and Tim and Dan have given me the utmost support throughout my studies.”

Throughout their studies, Engineering students at Cheshire College have access to industry-standard equipment to develop their skills and achieve a broader understanding of engineering.

The College is proud to have strong links with regional and national employers within the industry including Bentley Motors, Stellantis, Ecolab, and National Grid. These relationships benefit students immensely as they explore work placements, advice and apprenticeship or employment opportunities.

Cheshire College are now accepting applications for 2024/25. Learn more and apply at www.ccsw.ac.uk.

Rebecca McHugh



On the Cheshire College



- Cheshire College is the largest provider of post-16 education in the region offering exciting opportunities to 11000 students and 1000 apprentices.
- Cheshire College offers a range of courses from Entry Level to Level 7 in:

A Levels; T Levels; full-time courses; apprenticeships; part-time courses for adults; Access and Higher Education courses; bespoke training for employers; Maths, English, IT and ESOL courses for adults; programmes for international students; Futures Programme for students aspiring to progress to university.

- The College's modern Campuses across Cheshire in Crewe, Ellesmere Port and Chester have world-class facilities which are the result of a £200m investment in the latest technology and real work environments.
- The College boasts state-of-the-art equipment such as Crewe Campus' hospital ward and Anatomage Tables and Esports suite, Ellesmere Port's Sustainable House and

Motor Vehicle Workshop, and Chester Campus' media booths, TV Studios, gaming suites, Digital Hub and 3D printers.

- The College also works with employers, industries and organisations to drive economic growth through the development of future e-focused skills and works to expand digital infrastructures in existing workforces and facilitate access to technology within community organisations.
- The College has strong links with local businesses of all sizes and work with many major employers such as Bentley, Grief, Brownlow Furniture, Ecolab, Stellantis, Scottish Power, Brunning and Price and National Grid.
- Cheshire College is an approved apprenticeship provider and can support local employers who are using the Levy system to recruit and train apprentices within their business.

Rebecca McHugh

Young Professional Engineers Group

Opportunities as Young Professionals

Normal has changed. With the pandemic and changes in how businesses operate everyday tasks and activities have moved online. Whilst this is great and has created opportunities it has also reduced others such as networking and local communities. How many of you live within the same area of your workplace or in your team everyone is in the local area? How many are now in the office every day or have regular physical meetings with people in the same workplace instead of online meetings or emails? We all know you do not read all your emails as it is common to get 100 or more in a day. Some people prefer this change, and others want to go back to a traditional lifestyle. The key is balance. As Young Professionals many of us are in a career we want to progress in and rise the ladder and others still do not know what sort of career they want to do in the long term. Either way to know what opportunities are out there, communication with people and research are required.

Anyone can search online for jobs or ask AI (Artificial Intelligence) software what jobs suits my skills but not everyone is able to go to events and talk to people in different fields of work or get the business card of a specialist in their field. Often official talks give a broad view of opportunities, and it is informal discussions where you find specific details or may find something out that makes you realise something you are interested in is not for you.

Whilst the focus of opportunities is being on work and as part of the IET the Information, Engineering and Technology sectors specifically. Networking for opportunities does not always have to be work related. Everyone has hobbies,

which a solo activity, team activity, online focused or a sport for examples. These hobbies and socialising are a part of your work life balance. Some of these hobbies may even be done because they are as far different as your work as you can get but you may find someone else that does your hobby has a similar job to you or works in the same industry.

You may even end up doing a hobby with someone who ends up a future colleague.

However, none of this will happen if you do not go out and explore what is around you. Some of this can be done virtually but to get an idea of what is in your local area it is easier to find information by visiting places. If you search online for what is on in your area, you are highly likely going to find a club or place you did not know existed. If you go to a community place like a club, religious place of worship or a council owned building, such as a library then you will find discover events that you are interested, which have been held or will be running in the future.

If engineering is where you want to develop your opportunities, then why not get involved with the IET or another professional body. Even if you are not interested in gaining chartership there are still opportunities to find out about and skills to develop. Going to events is a way to network and learn about opportunities. If you want to find out about opportunities, as a member or not, then contact your local network or a contact in the newsletter that is part of a committee you feel is most relevant to you.

Darshan Gahle

Mersey and Western Cheshire Network Young Professional Engineers Group

Mersey and Western Cheshire LN Engage with Students at LJMU Careers Insights Fair



Members of the IET Mersey & Western Cheshire local network were supported by members of the Young Professionals in holding a promotional stand at Liverpool John Moores University's Sustainable Businesses and Green Careers Insights Fair on Wednesday 13th March 2024. The event was organised by the LJMU Green Internship Team to provide engagement opportunities for students to connect with businesses and networking institutions with a strong focus on sustainability. It was an important promotional opportunity for the IET to raise awareness of our profile with both students and LJMU staff with an aim to develop ongoing relationships and encourage new membership. The event was a great success for the LJMU Team and the IET stand received a lot of positive attention, plus there were several actual enquiries of interest to follow up on. The IET M&WC LN extend thanks to Young Professional members for their support.



Young Professionals: William Mullins and Dylan Towers

Ian Lucas

Mersey and Western Cheshire Network

How Do We Do It?

The LN is proud to have an approximately 4600 strong membership living in a considerably large region, from Southport in the north to Whitchurch and Crewe in the south, from the Wirral and Liverpool in the west to the Wigan and Warrington area to the east and it includes the Isle of Man.



In line with the IET mission, the Local Network (LN) facilitates the dissemination of knowledge and the advancement of science, engineering and technology through the provision of various activities including school visits, lectures, seminars, workshops, technical visits, bi-annual recognition events, group meetings, and our Annual Dinner. The LN is governed by the Network Committee (NC), which meets six times a year and has representatives from all the sub-committees and specialist groups. The LN publishes two events newsletters per year, one in January and one in September. Traditionally the NC meetings have been face-to-face meetings, but we make every effort to use IT to organise as many meetings

as possible as virtual meetings. The NC endorses major proposals, propose strategic direction, provides a forum for the sub-committees to network, delegates authority to the sub-committees and manages the event programmes and financial budget.

The sub-committees or groups are as follows:

- School Liaison Officers (SLO), whose main activity is working with schools to promote STEM and engineering for the school generation.
- Young Professionals Group. A Young Professional is a person in any class of membership who is up to 30 years of age, typically university students, young graduates in industry and commerce.
- Energy and Environment Group.
- Electronics and e-Systems Group.
- Manufacturing and Management Group.

The LN works in close cooperation with the region's Universities, Research and Development Institutions and Industrial Companies both small and large, whose contribution to the events programme is absolutely instrumental to maintaining the provision of high quality activities.

The LN is keen to have new members to contribute to the work of the Network Committee and all sub-committees. Are you interested? Please contact any of the Key Contacts on page 43.

Andrew Kaldos

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Supporting the Nuclear Renaissance – how the IET is Making a Difference

I am grateful to the committee of this Local Network for giving me some space in its popular newsletter. I am an ex-member of the Network committee, and it has always felt very much like my IET “home”. As they say, you can take the man away from the Network, but you can’t take the Network away from the man.

I would like to talk briefly about the ongoing work of the IET Technical Network (TN) for Nuclear. “Nuclear” as an area is undergoing a significant renaissance within the UK. There is talk of new reactors, SMR technology, nuclear fusion is being explored and is on the (distant) horizon, Great British Nuclear has been formed and, suddenly, Nuclear Power is a clean energy source and a potential saviour from climate change, rather than the pariah it was seen as – unjustifiably – not that many years ago.

Timely then that the IET Technical Network for Nuclear has recently been re-invigorated and re-launched. The TN was put together some years ago, to provide a voice for the nuclear industry, in its broadest sense, and to connect and support all of the diverse areas that have “nuclear” at their core.

Local and Technical Networks have a very similar purpose, the essential difference being that a TN is less broad, focusing on a specific industry or area of engineering or technology. Both are supported by committed volunteers, both focus on connecting to their interested IET members and both are a valued component of our Institution.

The TN Committee, ably supported by IET staff, is comprised of experienced nuclear engineers, scientists from a wide range of organisations in the broad nuclear industry. Our purpose is to be a cross-industry working group

supporting the IET and its members, providing a range of member-focused services, such as:

1. Advocating for the nuclear industry within the UK technical community.
2. Encouraging sharing of information between nuclear licensees.
3. Advising the IET on key events within the nuclear industry.
4. Supporting IET Members working within the nuclear industry with cross-industry events thereby supporting Continuous Professional Development.
5. Engaging and inspiring future generations of engineers and technicians to work in the nuclear sector.

The North-West of England provides a significant hub of nuclear skills and expertise, from BAe Systems and Sellafield Ltd in Cumbria to a range of design offices in the Warrington area. As such, this LN and the TN are “neighbours” and we would welcome interest, from anyone with a passion for all things nuclear, so feel free to get in touch and get involved.

In 2024 the TN’s activities will include a major in-person conference in October and a series of lunchtime webinars on a wide range of relevant topics. The first of the webinars – **How the Use of Digital Technology can Transform your Business Effectiveness** – took place on 21st February, featuring two employees from Jacobs who explained how innovation is enhancing the performance and effectiveness of their own business and those of their clients.

The presentation covered Jacobs’ ability to engage with any project no matter what its stage of development – from pre-design through to decommissioning.

© Jacobs 2024

The provision of intimate engineering knowledge with a team of developers skilled in virtual reality techniques supports the creation of detailed animation sequences, virtual reality reviews and augmented reality applications, facilitating better understanding of projects and the problems to be overcome, thereby reducing risk significantly earlier than with traditional methods.

A key element of the work is with human factors and anthropomorphic manikins. Using virtual reality allows engineers to get closer to the design early on to spot any ergonomic issues and to work more closely with the HF teams to better understand any special constraints,

allowing them to provide more detailed task analysis information.

A second Webinar in April has considered “**Alternative Routes to market with modular nuclear reactors**”, another topic with a strong sense of innovation and an eye on the nuclear future. There will be a programme of webinars throughout 2024.

Our role as a TN is to push the nuclear agenda and to engage and interest our members. We will hope to maintain a strong connection to this Local Network and will explore the potential for further articles and, perhaps, an in-person event in 2025. If nuclear is of interest to you, I hope this article might encourage you to support what we do.



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Ian Belger

FREE EVENTS OPEN TO ALL

Register online at www.theiet.org/events

Optical Fibre and 5G

On Thursday 21st March we welcomed Andy Sutton, BT Fellow and Principal Network Architect at BT to the Wirral YMCA to present a talk on the need for Optical Fibre in 5G.

He started out by stating that fibre and the high bandwidth that it offers was essential for 5G and was present in many parts of the overall network. He described the top of a cell tower and noted the number of coaxial cables which connected to the passive antenna systems and compared this with the optical fibre connection to the MIMO (Multiple Input Multiple Output) antenna system, which utilises RF over fibre connectivity. The use of single mode fibre transmission and Dense Wavelength Division Multiplexing helps maximise capacity in optical network. The importance of factors such as “critical angle” to avoid signal loss was stressed to the audience. Particular emphasis was given to the high level of engineering involved to “illuminate” single mode fibre given its very small diameter. Mention was made of the increasing use of multiple modulation modes which built on the techniques previously used on copper lines. Typical optical “windows” were given as 850, 1310, and 1550 nm.

Andy then moved on to explaining how the term “colours” was used to identify the various wavelengths and described how “power budget” is important particularly when you need to take account of “fibre aging” and how splicing and laser “aging” need to be taken into account. The importance of standardisation was described to avoid “manufacturer lock-in”.



The growth of traffic via the Internet was described in terms of how initially mobile network operator Orange needed two E1 (2 Mbps) circuits (one for resilience) to how the current EE mobile network transmits 1.2 Tbps to the Internet and BT carries around 30 Tbps of traffic on its national core network.

The ability to deliver high bandwidth has given a new lease of life to Telephone Boxes with equipment in the roof space to deliver mobile network capacity upgrades at an optimum height for delivery into city centre offices, which improves on the original method of macro cells which suffered from building attenuation which reduced coverage efficiency.

The very informative presentation finished with a lively Q & A session in particular on the optical networking equipment Andy had brought along for inspection.

Gordon Nicholas



Reading the Newsletter on both
Android and Apple devices using
Adobe Liquid Mode:

<https://www.adobe.com/acrobat/hub/how-to/what-is-adobe-liquid-mode.html>

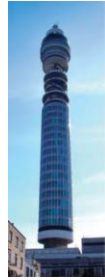
Telecom Towers, Masts and Poles-The Visible Face of Telecommunications

On Thursday 15th of February, Professor Nigel Linge (supported by Prof Andy Sutton) from Salford University, gave a very informative presentation, on the subject Telecom Towers but the detail was all about the underlying Infrastructure including towers, masts and poles. It all began with beacons which were the means of communicating messages about events across distances. The first sizeable installation was in France and was a semaphore using wooden arms to signal characters. The example was given of a message transfer from Paris to Calais, a distance of 180 miles in less than five minutes.

The advent of the railways initiated the Cook and Wheatstone "Telegraph" for communicating information on train locations in the UK. This required telegraph poles and an example was shown of a porcelain insulator which was needed to support the bare copper wires. Character information was presented by moving needles on a display unit. This communication medium could also carry telegrams for general messaging. This led to the use of the wires for voice telephony and "Exchange" equipment for switching the circuits.

This led to the development of radio and the introduction of Marconi and the development of "wireless telegraphy" and in 1899, the first international transmission between St Margarets Bay, Dover and Wimereux near Boulogne in France. Following on from this point-to-point link Maconi then pursued "broadcast" transmission which, following tests from Chelmsford, started in London (callsign 2LO) then Manchester (callsign 2ZY) which then developed into regional broadcasting.

Nigel then moved on to the basics of radio transmission and outlined how received signal is related to source power



Telecom Towers, Masts, and Poles

The visible face of telecommunications

University of Salford
MANCHESTER

Professor Emeritus **Nigel Linge**
and
Professor **Andy Sutton**
School of Science, Engineering and Environment



and due to degradation (path loss etc) the received signal is related to the square of the distance between the two points although many other factors are involved. The example was given of the Droitwich Long wave transmitter (198 kHz) which came on-air in 1934 and has a transmit power of 600 kW.

The broadcast history of television was explored, starting with Alexandra Palace (London) where the two rival systems had individual studios, one the Baird system (rotating disc) and the all-electronic system from EMI. The development of communications to "ships at sea" (Maritime) was covered and the use of the site at Rugby for trans-Atlantic telephony and the transmission of a UK time signal.

Nigel brought his talk to a conclusion with an outline of microwave transmission and in particular the use of the "horn-reflector" microwave antenna that was commonplace on various relays up and down the UK but in particular their use on the British Telecom Tower which is the "hub" of the network and the original focus of his excellent presentation.

Gordon Nicholas

Mersey and Western Cheshire Network

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Towards Net-Zero Domestic Heating now and in the Future

The Energy and Environment Group organised an event on Net-Zero Domestic Heating. Professor Counsell presented an overview of where sustainable and electric domestic heating has originated from in the 1970s with conventional gas boilers and Economy 7 storage heaters to today's highly efficient gas condensing boilers and Air Source Heat Pumps (ASHPs). He concluded that ASHPs provide a great solution to reducing carbon emissions for domestic heating but remain challenged to provide a sustainable economic solution. The capital cost of ASHPs and high electricity energy unit costs still create a significant barrier to mass take up of ASHPs. Professor Counsell identified some low hanging fruit to focus on dedicated ASHP heated Domestic Hot Water tanks to decarbonise domestic hot water and provide highly efficient and low cost energy storage for roof solar PV and time of use tariffs with optimising controls. In the commercial and industrial sectors he identified the great opportunity to fully integrate and optimise the performance of local energy systems utilising time of use tariffs, local renewables such as PV and Solar heat storage, heat pumps, thermal energy storage, and battery storage. Such an example of a smart local energy system (SLES) is being developed by EA Technology (Timothy Butler), Advanced Control Ltd (Professor John Counsell) and University of Chester (Cameron Downing).

EA Technology's headquarters building had typical efficiency issues common for buildings built in the 1950's. Poorly insulated, and difficult to modernise, it was a good case study for upgrading a commercial building to be Net Zero compliant while allowing for cost and disruption to be spread out in an affordable manner.

The company has implemented a series of measures including: LED lighting; solar PV generation; battery storage; EV charge points, and an air-to-air heat-pump heating system for the refurbished top floor, all monitored by a purpose-designed building management system. Some upgrades



were straightforward, while others required more complex implementation, detailed in individual case studies that can be accessed via the EA Technology website .

Key learning from the process emphasise caution with finance or business models reliant on government policy, the importance of contractor oversight, the rapidly changing commercial position of low carbon technology, and slower translation of domestic market technology improvements to often more complex commercial buildings.

The upgrades have proven commercially advantageous, enhancing energy efficiency, reducing grid electricity reliance, and allowing for system monitoring and control. This includes the ability to modulate new systems to prevent exceeding the network connection agreement.

The designed building management system seeks to control both the top floor heating and the battery all within one industrial PC. To develop the system, wireless communications links had to be established with various APIs for grid carbon intensity, building load and PV generation, whilst Ethernet communications links established connections to the heating system, and to the battery. The aim of the control mechanism was to use the grid carbon

intensity to optimise the heating of the top floor and the charge/discharge rate of the battery. This enables the top floor to slightly overheat at times of low carbon intensity, and underheat during periods of high carbon intensity. Moreover, the carbon intensity controlled battery causes the battery to charge during the low carbon intensity points, and discharge during high carbon intensity points. All of this aims to reduce the grid load on the building when the supply is dirtier. This control strategy has proved to be successful in implementation, for both the heating and the control of the battery.

Cameron Downing



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Technical Visit to Jacobs – Robotics Applied to Remote Engineering

The Engineering Development department at Jacobs organised a technical event to showcase robotic solutions developed to solve remote engineering challenges in extreme environments such as nuclear and subsea. Held on April 3, 2024 in the Engine Rooms at Birchwood Park, Warrington, there were presentations from four of their specialists alongside an exhibition of some of their solutions and a networking session.

After an introduction to the IET and the Mersey and Western Cheshire Network by Godfrey Evans, Jacobs' Jon M Montgomerie presented a project carried out at Heysham and Hartlepool nuclear power plants a few years ago when a rise in the Hot Box Dome temperature was identified inside the reactors, necessitating power reduction to around 75%, losing output (and revenue). This was caused by carbon deposition, and to restore cooling a series of new bleed holes needed to be created deep inside the reactor. The team developed a strategy to create these additional bleed holes using three bespoke tool packages to be deployed through some of the reactor's standpipes. The first tool detected the dome height, the second drilled through the standpipe to create the bleed hole itself in the surrounding nozzle, and the third package welded a plug into the initial hole to restore the correct gas flow. Jon had brought two of these tool packages with him, which the attendees had the chance to examine afterwards. To develop and train the operators, as well as to prove the equipment to the client and regulators, a full-scale mock-up of a reactor quadrant was built. The solution was successfully deployed on-site only six months from project start, and all four reactors were able to return to full power.

John Brotherhood provided an overview of Jacobs' approach to providing better solutions to customers by working closely with academic institutions and small and medium-sized enterprises (SMEs), adopting cross-sector solutions, and utilising Jacobs' laboratories and rig halls, mainly in Birchwood, to develop, integrate and prove solutions. This was explained using the example of the Integrated Innovation for Nuclear Decommissioning (IIND) and Map the Gap projects, both involving the use of robotics in hazardous environments to remove people from harm's way. For IIND, Jacobs and nine collaborating organisations developed a prototype of an end-to-end nuclear

decommissioning system which brought the laboratory into the cell using a robotic toolkit, together with an agile planning process underpinned with data collected by mobile manipulators, through-hole deployed arms, and gantry robots. John explained how one of the SMEs involved in this collaboration subsequently led the Map the Gap project, which transferred robotic and data management technology from IIND to develop a new way for the British Army to find the best routes for river crossings.

Inspection solutions were presented by Dr Lenka Mudrich, starting with two underwater remotely operated vehicles (ROVs). She introduced the MicroROV, a 7 cm wide tethered ROV equipped with cameras and leak and pressure sensors for inspecting confined and hard to reach underwater spaces. She presented the MarineROV, a bigger system aimed at inspection of piers or boats coming into port. Despite being bigger than MicroROV, it is still relatively small at only 40 cm long, but it offers improved manoeuvrability. The MarineROV is battery powered, so it can perform autonomous underwater inspection as well, due to powerful onboard computing and a stereo camera. Lenka explained that simulation of these platforms is necessary for their development. She showed video examples of the visually realistic simulation used to develop the platforms and the algorithms to run them. Her presentation ended with two custom-made robots used for monitoring: one for radioactive waste containers, where hydrogen levels need to be regularly measured, and the other to repeatedly and accurately perform structural and radiometric surveys on walls.

Finally, Martí Morta-Garriga presented the Centre for Robotic Autonomy in Demanding and Long-lasting Environments (CRADLE), an Engineering Physical Sciences Research Council (EPSRC) Prosperity Partnership between Jacobs and the University of Manchester, which is researching components, architectures, interactions and assurance of robotic systems designed for extreme environments. He explained how free-of-charge industry engagement activities are great opportunities for collaboration, to ensure that academic research is led by industry need.

After the talks, members of the audience – energy levels boosted by coffee and cake – engaged with the presenters and networked while having a look at the devices on display.



Dr Lenka Mudrich showing some of Jacobs robotics solutions with an engaged audience



Networking in the presentations room

Centre for Robotic Autonomy in Demanding and Long-lasting Environments

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Lasers in Manufacturing: Past, Present and Future (Part Two)

In part one of this article, the development of industrial lasers for materials processing was described, particularly CO₂ and Nd:YAG lasers. Their development had allowed the development of a range of laser processes, from micro and macro cutting, welding, and surface treatments. There were other laser developments e.g. Excimer UV lasers, a valuable tool in the fabrication of semiconductor chips.

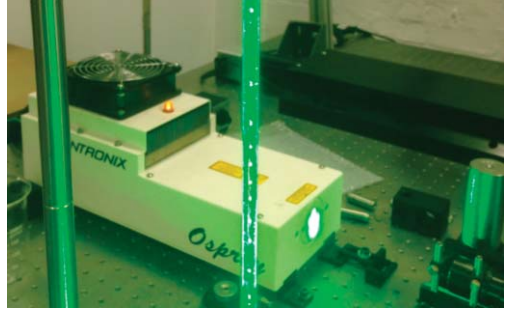
The main developments were to increase “wallplug” efficiency (electrical to optical power), beam quality, particularly at higher powers, and the general increase of laser power of the different types of industrial lasers.

The wallplug efficiency and beam quality issues are related in that the fraction of input energy that is not converted to laser light manifests itself as heat in the laser cavity affecting beam quality. A more efficient laser makes less heat and can deliver better beam quality, giving smaller focal spots, so increasing the intensity at the workpiece, and allowing for longer focal length optics, allowing better tolerance in focal position and larger standoff to the workpiece, reducing damage to optics.

In part one, lamp pumped Nd:YAG lasers were described, including 3 kW continuous power lasers and millisecond pulsed YAG lasers up to 2 kW average power and 50 kW peak power. These lasers were of wallplug efficiency <3% or less, and required very careful optomechanical engineering of the laser cavity to achieve usable beam quality.

In the 1990's the use of low power diodes and fibre optics was booming in the telecoms industry. Then there was a crash. Manufacturers had built significant production capacity for laser diodes operating around 850 nm, and now there was a surplus. These wavelengths were ideal for pumping Nd:YAG and Nd:YVO₄ (“Vanadate”) lasers. Unlike flashlamps, which produced a broadband spectrum and heat, diode pumping was efficient and specific to pumping the YAG and Vanadate lasers. Wallplug efficiency increased, and the greatly reduced heat input into the laser medium gave more stable and improved beam qualities. Flashlamp pumped lasers, Q-switched nanosecond pulsed lasers were replaced with “Diode Pumped Solid State” (DPSS) lasers.

Nanosecond pulsed lasers have sufficient intensity that certain crystals can be used to change the wavelength (frequency) of the laser light. A birefringent crystal such as Lithium Triborate (LBO) can double the frequency of a YAG laser beam at 1064 nm into a green beam at 532 nm. This is called second harmonic generation, or frequency doubling. It is also possible to triple, quadruple and quintuple frequency to create 355, 266 and 213 nm UV wavelengths. Such frequency multiplication tends to reduce the average laser in proportion, as a frequency doubled YAG laser that

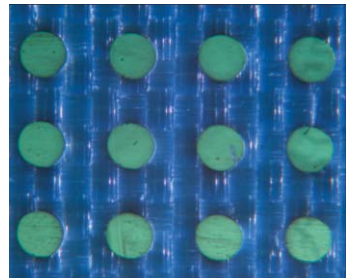


8W Green DPSS nanosecond pulsed laser

produces 10 W average power at 1064 nm, would produce less than 5 W average power at 532 nm.

As well as the potential impact of differences in reflectivity at the different wavelengths, the size of a focal spot is proportional to the wavelength – doubling a YAG laser to the green wavelength will allow for focal spots half of the diameter of the fundamental wavelength.

When UV wavelengths are reached, the nature of the process can change significantly, particularly for polymers and organic materials. The photon energy of a 355 nm laser beam is 3.5 eV. Such an energy is sufficient to break chemical bonds. This leads to “Photoablation” where material is removed by photons breaking bonds and expelling material, not by heat. It is a form of cold ablation, leaving very little heat behind in the substrate.



Carbon Fibre composite with 0.5 mm perforations

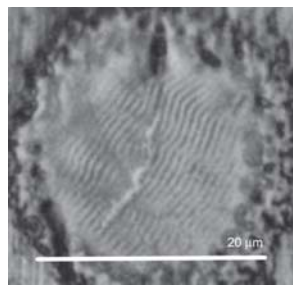
The development of these lasers allowed for improved laser micromachining, with applications in laser cutting of small components, hole drilling down to 1 μm diameter, perforation and the production of microfluid systems in metallic, ceramic and polymer substrates.

The heat affected zone (HAZ) associated with laser processes such as micromachining can be an issue, despite it being small. It reduces as the time scale of the laser interaction reduces, e.g. millisecond pulses produce less HAZ than continuous laser, and nanosecond reduces this even further. UV photoablation virtually eliminates the HAZ.

In the late 90's new optical techniques allowed the generation of femtosecond (10–15 s) pulsed lasers. A 1 mJ pulse of 100 fs is a million times more powerful than from a 100 ns laser, while being delivered into the same size focal spot. A femtosecond laser produces much higher intensities. Such intense pulses can invoke physical processes not usually achievable with nanosecond or longer pulsed lasers.

In metallics, absorption of the laser beam is governed by the interaction of its electric field with the free electrons in the substrate. The energy of the beam is absorbed by this "electron" gas, before it is transferred to the atoms to create heat. This takes a finite time, ("photon-phonon interaction time) of the order of 10's ps (picoseconds). When exposed to femtosecond laser pulses the light interacts with metal, it interacts with the electrons and a process called Coulomb explosion occurs that "rips" out the atoms from the surface of the metal. But this happens in a time shorter than heat can be created in the substrate. It is, in effect, cold ablation.

The intensity of these "Ultrashort" pulses causes another effect arising from the interaction of photons and phonons at the surface of a metallic surface, called Laser Induced Periodic Surface Structures (LIPSS). These are "micro-sized ripples on the surface of the metal with a sub-micron period. Such structures are finding uses in surface engineering such as superhydrophobic surfaces, antimicrobial and tribology.



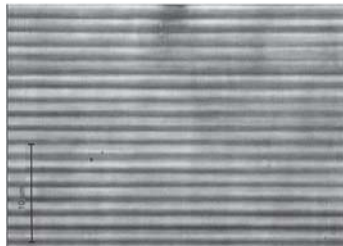
LIPSS Generated on Stainless Steel

become significant. This means that, for instance, a polymer that is usually considered transparent to the visible and near-infrared wavelength lasers, and hence does not absorb the laser light, start to absorb when the intensity of the light is high enough, as happens with femtosecond pulses. So, such lasers can be used for microprocessing of such materials.

An interesting application is that femtosecond lasers can be used to modify the refractive index of transparent materials. These lasers can be used to create Bragg gratings, where the refractive index of a material is periodically

modified. Such gratings can be used to create mirrors inside an optical fibre, and so can be used to create an optical resonator in a fibre optic.

Early industrial femtosecond lasers had low average power, e.g. 1 mJ pulse energy at 1 kHz giving 1 W average power. Development of the optical resonator, and associated optics to produce higher average powers raised powers into the 10's of Watts, making femtosecond processing viable.



Modified refractive index grating inside PMMA

What of picosecond lasers? These proved more difficult to develop, but when the first industrially relevant picosecond lasers entered the market at 10's of Watts average power, and while operating on the borders of the photon – phonon interaction time for many materials they quickly attracted interest from industry. They produced results with minimal or no observable HAZ. Importantly their average power levels moved into tripe figures and a 1 kW average power picosecond laser is available.

At these average power levels care needs to be taken to avoid heat building up in the substrate. Even with nearly "cold ablation", placing too many pulses in a small area inevitably increase the heating effect. One way of achieving the higher average powers is to have the laser produce the laser pulses at repetition rates of 1 MHz or above. In order to avoid the accumulation of heat, indicated above, high speed scanning strategies are required, e.g. the use of high speed rotating polygonal mirrors rather than galvanometer based systems. Such systems would then use high speed "pulse-picking" to place laser pulses suitably on the substrate to create the desired process.

This article has described the development of DPSS lasers and the associated development of mainly "microprocessing" applications. New designs of optical cavities, and even the introductions of "disks" and "slabs" as well as the traditional laser rod have enabled these developments. A range of wavelengths from NIR to deep UV have become available, and also the development of ultrashort picosecond and femtosecond lasers has enabled more applications in a wide range of materials. But in the early 2000's a new laser type was being introduced to the laser market that would ultimately transform the industrial laser market and its applications. The fibre laser and its applications will be introduced and illustrated in the third and final article of this series.

Martin Sharp

Built Environment | Design and Manufacturing | Digital | Education and Skills | Energy | Engineering Safety | Healthcare | Transport | Innovation and Emerging Technologies

DATE	EVENT AND LOCATION	PRESENTER	SECTOR	GROUP	TIME	CONTACT	CPD
Wednesday, 2nd October	Integrated Robot Applications: Technical Visit to CNC Robotics Ltd CNC Robotics, Unit 3, Mersey Reach, Galgate Dr. Bootle L30 6AD	Nick Parry and Technical Leaders	Design and Manufacturing	Manufacturing and Management	Start 6:00 p.m. Refreshments and Networking 6:00 p.m. Finish 8:00 p.m.	Nick Parry Online registration	2
Friday, 9th October	Professional Registration Workshop Sci – Tech Daresbury, Keckwick Lane, Warrington WA4 4AD	IET Professional Registration Advisers	All	Young Professionals	Start 6:00 p.m. Finish 8:00 p.m.	IET MWC Young Professionals Online registration	1
Wednesday, 23rd October	TheEye System from TheyeQ: Non-intrusive Quality and Process Control Online – Webinar	Neil Davies and Technical Leaders	Design and Manufacturing	Manufacturing and Management	Start 2:30 p.m. Finish 4:00 p.m.	Neil Davies Godfrey Evans Online registration	1
61Wednesday, 6th November	Growth Horizons – University Research Supporting Liverpool City Region Companies James Parsons Building, Liverpool John Moores University, 3 Byrom Street, Liverpool L3 3AF	Dr Martin Sharp, Visiting Research Fellow, Photonics in Engineering (LJMU)	Design and Manufacturing, Innovation and Emerging Technologies, Education and Skills	Manufacturing and Management	Start 6:00 p.m. Refreshments and Networking 5:30 p.m. Finish 7:30 p.m.	Martin Sharp Andrew Burgess Online registration	2
Wednesday, 13th November	Technical Visit to Tata Steel: Engineering Innovations in Steel Coating Process Lines Tata Steel Colors, Shotton Works, Weighbridge Road, Shotton, Deeside, CH52NH	Steve Smith, Plant Asset Development Engineer Manufacturing Nick Bennett, Senior Electrical Project Engineer	Design and Manufacturing	Manufacturing and Management	Start 2:00 p.m. Refreshments and Networking 2:00 p.m. Finish 4:30 p.m.	Steve Smith Godfrey Evans Online registration	2
Wednesday, 20th November	Christmas Lecture – 2024 Sci-Tech Daresbury, Keckwick Lane, Warrington WA4 4AD	Various	All	Young Professionals	Start 5:30 p.m. Finish 7:00 p.m.	IET MWC Young Professionals Online registration	1
TBC	The Production of Green Hydrogen by Electrolysis of Water TBC	TBC	Energy, Built Environment	Energy and Environment	Start TBC Refreshments and Networking TBC Finish TBC	Ian Lucas Online registration	2
TBC	Technical Visit to Liverpool University CHP Plant TBC	TBC	Energy, Built Environment	Energy and Environment	Start TBC Refreshments and Networking TBC Finish TBC	Ian Lucas Online registration	2

Event Programme September 2024 – December 2024

Event Programme September 2024 – December 2024

October

**Integrated Robot Applications:
Technical Visit to CNC Robotics Ltd**
Date: Wednesday, 2nd October 2024

Time: Start 6:00 p.m.
Refreshments and Networking 6:00 p.m.
Finish 8:00 p.m.

Venue: CNC Robotics, Unit 3, Mersey Reach,
Galgate Dr. Bootle L30 6AD

Speakers: Nick Parry and
Technical Leaders

CNC Robotics Ltd, the UK's leading robotics integrator, will be hosting a series of technical talks on robotics and automation geared at current technology trends and the digital transformation

journey. An expert will be on-hand to guide you through the current projects being carried out at CNC Robotics, and share their predictions on the future trends in manufacturing.
Online registration / CPD 2 hrs

Contact: Nick Parry, nick@cncrobotics.co.uk

All our events are free to attend for IET members and non-members alike

For more information on how the IET supports CPD please visit <http://www.theiet.org/membership/career.cpd>

If you do not have access to the internet, registration can be done via e-mail or telephone to the contact listed

Contact details are shown on event synopses on pages 22

Event Programme September 2024 – December 2024

Professional Registration Workshop

Date: Friday, 9th October 2024

Time: Start 6:00 p.m.

Finish 8:00 p.m.

Venue: Sci – Tech Daresbury, Keckwick Lane,
Warrington WA4 4AD

Speakers: IET Professional Registration Advisers

The workshop will give IET members and non-members the opportunity to have an individual appointment with a professional registration adviser to discuss your route to professional registration. This will be in the same format as the previous Professional Registration Workshop where there are 1 on 1 meetings, with IET Professional Registration Advisers sent from the IET.

Online registration / CPD 1 hr

Contact: IET MWC Young Professionals

TheEye System from TheyeQ:

Non-intrusive Quality and Process Control

Date: Wednesday, 23rd October 2024

Time: Start 2:30 p.m.

Finish 4:00 p.m.

Venue: Online – Webinar

Speakers: Neil Davies
and Technical Leaders

TheyEye System from TheyeQ is a non-intrusive Quality and Process Control system, able to inspect parts straight out of the manufacturing process through a unique and patented combination of cameras – Polarimetric and Thermal. It is capable of identifying quality and process issues within the production process through its AI learning capability, and thereby significantly reduce the costs associated with quality in any process.

Online registration / CPD 1 hr

Contact: Neil Davies, neil.davies@theyeq.com

Godfrey Evans, godfrey.evans@ietvolunteer.org

November

Growth Horizons – University Research Supporting Liverpool City Region Companies

Date: Wednesday, 6th November 2024

Time: Start 6:30 p.m.

Refreshments and Networking 6:00 p.m.

Finish 8:00 p.m.

Venue: James Parsons Building, Liverpool John Moores
University, 3 Byrom Street, Liverpool L3 3AF

Speakers: Dr Martin Sharp,
Visiting Research Fellow,
Photonics in Engineering (LJMU)

The 'Horizons' project is an innovation support project for the Liverpool City Region (LCR), funded by the UK Shared Prosperity Fund (UKSPF) and delivered by University of Liverpool's VEC, Liverpool John Moores University (LJMU) and Edge Hill University. This event introduces the project, and the delivery team based in the Faculty of Engineering and Technology delivering the LJMU element of the project. It will illustrate how the project supports

SMEs to unlock their innovation potential and increase R&D activity to realise tangible economic benefits in the short, medium, and long term.

Online registration / CPD 2 hrs

Contact: Martin Sharp, M.Sharp@ljmu.ac.uk

Andrew Burgess, a.burgess@2016.ljmu.ac.uk

Technical Visit to Tata Steel:

Engineering Innovations in Steel Coating Process Lines

Date: Wednesday, 13th November 2024

Time: Start 2:00 p.m.

Refreshments and Networking 2:00 p.m.

Finish 4:30 p.m.

Venue: Tata Steel Colors, Shotton Works,
Weighbridge Road,
Shotton, Deeside, CH52NH

Speakers: Steve Smith,
Plant Asset Development Engineer Manufacturing,
Nick Bennett,
Senior Electrical Project Engineer

A lecture and guided tour showcasing modern engineering technology at Tata Colors, Shotton Works. From its humble beginnings Shotton Works has evolved over 125 years serving the construction and domestic market in quality coated steel products. The event will focus on advanced engineering technology for delivering the next generation of steel strip sustainable corrosion protection.

Online registration / CPD 2 hrs

Contact: Steve Smith, steve.c.smith@tatasteelurope.com

Godfrey Evans, Godfrey.Evans@ietvolunteer.org

Christmas Lecture – 2024

Date: Wednesday, 20th November 2024

Time: Start 5:30 p.m.

Finish 7:00 p.m.

Venue: Sci-Tech Daresbury, Keckwick Lane,
Warrington WA4 4AD

Speakers: Various

A lecture by speakers on the work they have done to inspire young people on what they can achieve by doing an engineering career.

Online registration / CPD 1 hr

Contact: IET MWC Young Professionals

TBC

The Production of Green Hydrogen by Electrolysis of Water

Date: TBC

Time: Start TBC

Refreshments and Networking TBC

Finish TBC

Venue: TBC

Speakers: TBC

A liquid air energy storage (LAES) plant is a large rechargeable battery which will help the electricity grid cope with the increased uptake in renewable energy, which is often intermittent in its generation. The plant works by soaking up excess wind and solar energy. This is done by compressing and cooling air, transforming

the air to a liquid state that can be stored. When the stored energy is required, it is pumped to a high pressure and heated by ambient heat, creating a high-pressure gas that is used to rotate turbines, to generate electricity.

Online registration / CPD 2 hrs

Contact: Ian Lucas, ian.lucas@ietvolunteer.org

Technical Visit to Liverpool University CHP Plant

Date: TBC

Time: Start TBC

Refreshments and Networking TBC

Finish TBC

Venue: TBC

Speakers: TBC

The University of Liverpool has invested £19 million on the Heating and Infrastructure Project (HIP), which saw the construction of the Combined Heat and Power Plant (CHP) and Energy Centre. The CHP uses gas to generate electricity for the University on site, and then captures the excess heat generated and distributes it into the district heating system for the University. This has enabled the University to secured savings of 7000 tonnes of CO₂ each year, a 13% reduction in the University's carbon footprint. The Energy Centre allows the University to monitor the electricity and heat produced from the CHP, alongside that received from utility companies.

Online registration / CPD 2 hrs

Contact: Ian Lucas, ian.lucas@ietvolunteer.org

IET Manufacturing Technical Network

The IET Manufacturing TN Continues to Promote and Raise Awareness of Developments in Manufacturing and Technology

During the first half of 2024 we have hosted two events looking at Emerging Technologies for Manufacturing Automation and the Potential and Practicality of Manufacturing and Artificial Intelligence (AI).

The first of these events focussed on awareness of technologies that are not yet fully developed but could have a significant impact when they are. An-Sofie Van Parys from Belgian company, Ansoomat, addressed the challenges to automation caused by a transition from Mass Production to Mass Customisation. She referenced a need for automation technology that supports operator decision making rather than just automating fixed processes.

The second event attempted to dispel misconceptions surrounding AI in Manufacturing, explaining how Artificial Intelligence techniques have been, currently are, and will continue to be applied within the realm of manufacturing. The goal was to provide attendees with a comprehensive understanding of the benefits associated with the adoption of AI in manufacturing and to demystify the intricacies of AI, rendering the topic accessible to engineers in manufacturing at all career stages.

In June the TN launched a Manufacturing prize for early career engineers, inviting them to submit an extract related to space technologies. The winner will be invited to present at a future TN event.

In addition, we are co-sponsoring an IET Apprentice Prize linked to Manufacturing, with invitations starting in September.

For the remainder of 2024 we have events scheduled on 9th and 10th October covering Manufacturing on the Moon (taking a futuristic look at what it will be like in 100 years) and on November 21st we will host a webinar on Academic topics in manufacturing.

The manufacturing on the Moon events will look into the future and make assumptions of how technology will develop and what it will enable people to achieve. This will include a road map of developments and achievements from 2024 to

2124 and identify key milestones on route. The events are designed to be challenging and to highlight the importance of Manufacturing in space as a stepping-stone to both enhancing delivery of products and services for use on Earth, as well as enabling further exploration of the Solar system. Speakers will address the challenges that will be faced.

The Academic topics event will highlight technologies that are currently the subject of academic research that may impact on future Manufacturing processes. The emphasis will be on future development and not on current capability. The format of the event will be to have a keynote speaker to give an overview of academic research in the Manufacturing sector. This would be followed by several case studies covering specific research topics, with a link to how these could impact manufacturing.

We are also developing a full programme for 2025 including:

- Lasers in Manufacturing (Joint with IET Robotics TN and Mersey & West Cheshire Local Network).
- New Technology Adoption in Manufacturing.
- Electric Vehicle (EV) Manufacturing.
- Manufacturing Related to Space.
- Education & Skills in Manufacturing.
- Working with Composites.
- Quantum Manufacturing.
- Process Related Manufacturing.

For more information on any of our events, including recording of past events please see our web-page [IET EngX \(theiet.org\)](https://www.theiet.org).

If you are interested in contributing to and/or helping drive our TN activities, we have openings for volunteers to join the TN and help reshape and expand the Executive. These opportunities range from simply attending a committee meeting, to bring new ideas to the table, through to organising, running, and promoting events. For more details, please contact us at Manufacturing-TPN@ietvolunteer.org.

Dr Chris Proudfoot – Chair IET Manufacturing TN

Building the Net Zero Workforce: Securing a Sustainable Future



Our team were proud to win the IET UK Workforce of the Future Award earlier this year for their work in the Merseyside and West Cheshire area to transform

our current and future workforce for Net Zero. So far, the trophy has travelled to our Head Offices in Prenton and Glasgow and to our training centres in Hoylake and Cumbernauld bringing with it a sense of pride and recognition for the many trainees that make up our future workforce.

As part of our workforce strategy, we're committed to recruiting locally and training centrally, with training programmes targeted at different stages of individuals' working career and age central to this. Winning this award was testament to the hard work of our talented team over the last few years to grow the breadth of our training programmes and diversity of our trainees across different skills and our ambitious plans to enable our workforce to evolve to meet the changing workload, technology, sustainability and portfolio requirements, whilst developing a modern, diverse, well-trained workforce fit for the future.

SP Energy Networks serves customers across Central and Southern Scotland, Merseyside, Cheshire, North & Mid-Wales and North Shropshire and we're proud to be leading the way in setting standards for future workforce planning, with training programmes integral to this.

Our workforce strategy defines our ambitious plans for ensuring our workforce can evolve to meet the future requirements of our electricity network. To ensure technical capability, we fill 50% of our engineering and technical roles, and 90% of our roles for field staff using trainee programmes. As well as this, our approach of recruiting locally and training centrally, with a drive to broaden the appeal of the sector to attract new entrants, is transforming the current and future workforce ahead of a Net Zero future.

30 training programmes are embedded across our organisation, created based on workforce statistics, industry insight and stakeholder engagement. Regional-based engagement, through workshops with local authorities has also informed our workforce plan. Deploying this plan has been possible through initiatives including growing talent from the communities we serve, and through a blended approach of inclusive trainee and up-skilling programmes and direct recruitment of key skills.

Our training programmes are covered within 4 key areas:

- *Graduate programmes*

While we predominately recruit engineering graduates for our future business requirements, we have expanded our graduate programmes over the last few years to include

wider ranging disciplines such as Data and Technology, Business, Land & Planning, Analysis and Design.

- *Apprenticeships programmes*

Our Modern Apprenticeship programmes support the core craft trades of Jointing, Overhead Lines and Fitting for our Networks business; however our apprenticeships now cover so much more in areas such as Logistics, Power Engineering and Project Management.

We have also expanded our apprenticeship programmes into Graduate / Degree apprenticeships and work closely in partnership with Universities to develop these programmes with future requirements.

- *Trainee Career Transition programmes*

Integral to our future workforce are our reskilling and upskilling programmes aimed at skilled and semi skilled workers with relevant transferrable skills looking to transition their careers into the energy sector or progress within the business. These programmes cover both craft and engineering disciplines and as a result of previous experience, individuals can move through the training programme at a quicker pace.

- *Pre-employment programmes*

We offer many pre-employment programmes aimed at introducing a future workforce to SP Energy Networks and providing alternative pathways into a career with us. From a pre-apprenticeship programme aimed at students who don't qualify for a modern apprenticeship, our pre-apprenticeship programme provides an alternative entry into the Modern Apprenticeship. We also run Year in Industry and Summer placement programmes to give work experience and support our trainee pipeline, as well as a very successful returners programme, supporting individuals back into the workforce.

Now more than ever is it imperative we grow our own talent. Industry wide skills challenges impacting the sector require all of the industry to invest in their future workforce and develop the skills required to meet the needs of our evolving network and future growth targets.

Over the next five years, SP Energy Networks will be investing further into trainee programmes, understanding the future skills needed and developing programmes to meet these needs. A step change is required across all of industry and to do this we will work together with the industry in attracting future talent to Energy & Utilities and supporting multiple pathways into roles within our sector.

We're always looking for talented individuals who can join us at this exciting time. Find out more about our career opportunities with SP Energy Networks:

<https://www.spenergynetworks.co.uk/pages/careers.aspx>.

Jennifer Davies

Accelerating the Future – Young Professionals in Engineering and Technology at STFC

Early careers development is one of the pillars of delivery at STFC Daresbury Laboratory, with long-running and successful apprenticeship, graduate and placement schemes all aiding the delivery of world class projects both in the UK and across the globe. With a range of placements available across all areas of delivery, below we hear the opportunities and work undertaken by two early careers engineers at STFC. Both Dan and Luke work in the Technology Department, delivering innovative engineering, driving development, and shaping the future of accelerator and detector design and development in the North West.

Daniel Skae – 3rd Year Mechanical Engineering Apprentice

Hi, my name is Dan, and I am currently in the third year of my mechanical engineering apprenticeship at Daresbury Laboratory. For the last six months, I have undertaken both design and assembly work on the High Luminosity upgrade for the Large Hadron Collider (LHC) at CERN in Geneva. Becoming involved with this project has given me the opportunity to work alongside experienced technicians, allowing me to develop competencies in critical parts of engineering, such as delicate assembly processes and metrology. Participating in the design side of this project, I have been able to face the challenges of conceptual design, becoming familiar with and utilising CAD packages such as CREO. This has helped me develop my problem solving skills, improving my competency and allowing me to think like an engineer.

As well as developing my practical skills, my time on this project has allowed me to establish professional networks with not just people at Daresbury, but with engineers from CERN in Switzerland. In turn, I feel my teamwork and communication skills have developed significantly.

The picture attached is of myself (far left) alongside engineers from STFC and CERN, after we assembled delicate laser tracking targets onto the cryomodule for



Daniel Skae (centre) and Luke Chatwin (right), alongside senior technician Luke Bladen (left) with the CERN High Luminosity (LHC) upgrade cavity assembly string and cavity lifter, in the Engineering Technology Centre at STFC Daresbury Laboratory

precise measurement and alignment at future stages of the build, a critical step, which it was great to be a part of.

Luke Chatwin – Industrial Placement Student

In August 2023, I started my role at STFC as a Mechanical Engineering Industrial Placement, and in three months I will return to finish my integrated master's in mechanical engineering at Durham University.

My focus at STFC since the new year has been on Daresbury Lab's involvement in DUNE (Deep Underground Neutrino Experiment), which is an international experiment that aims to understand the nature of neutrinos. Daresbury Laboratory is manufacturing over 130, 6.3x2.3 m detector parts called Anode Plane Assemblies (APAs), which register the interactions of the neutrinos with the supercooled liquid argon the detectors are submerged in. The APAs are rectangular frames on which copper-beryllium wires are wound, these wires are soldered to Printed Circuit Boards (PCBs) which detect the tiny electrical signals from the neutrino interactions. To meet the manufacturing deadline of the project, the DUNE factory will have multiple manufacturing processes running in parallel. One limiting resource within the factory are the winders, which wind four layers of wires around the APA frames at a specific tension. The winders are also used for soldering, checking the tensions, and applying the PCBs for each layer.

To ensure the most effective use of factory resources, all processes other than the winding will take place on a new system which I have been responsible for designing. The new system will be mounted to an aluminium extrusion process cart and uses parallel rails to slide two vertical linear motorised units along the APA. These linear units can then be automated to cycle through each wire vertically, checking the tension using a device to vibrate the wires and a laser to analyse the frequency of the vibration.

The priority of the project was to start evaluating the concept and system as soon as possible. This meant cycling through the design feedback loops effectively, and designing parts to be manufactured quickly and easily, using off-the-shelf components where possible. Within four months the system was designed, and all parts manufactured and delivered. Assembly is now underway for two systems, and after testing and validating the design two more will be procured. The long-term goal will be to design a system that is fully automated, and one that requires minimal input or adjustment to re-align the system as it checks the wires across the APAs.

If you are interested in meeting other like-minded early careers engineers, technicians, or students, and would consider joining the Local Network's Young Professional's Group, please [contact alex.headspith@ietvolunteer.org](mailto:contact.alex.headspith@ietvolunteer.org)

Daniel Skae, Luke Chatwin, Alex Headspith



Growth Horizons – A Liverpool City Region Innovation Support Project



The 'Horizons' project is a flagship innovation support project in the Liverpool City Region. It is funded by UK Shared Prosperity Fund (UKSPF) and delivered in partnership with the University of Liverpool's VEC, Liverpool John Moores University and Edge Hill University providing access to the knowledge, equipment, and facilities within the Higher Education Institutes across LCR.

Horizons has received £3.7 million from the UK Government through the UK Shared Prosperity Fund with the Liverpool City Region Combined Authority as the lead authority, with the key aim of increasing R&D spend in the region through increased innovation activity.

BUILDING ON PREVIOUS SUCCESS

Since 2016, the LCR 4.0 programmes (European Regional Development Fund) have been providing hands-on, practical support to local businesses to adopt digital technology for economic growth. The projects have won numerous prestigious awards, including being named by the Financial Times as one of the top 100 global digital influencers.

Since the inception of the first project, services have evolved based on demand-led needs from industry, with the legacy of the projects focusing on:

LCR 4.0 – First of a kind project supporting the adoption of Industry 4.0 technologies in LCR through innovation interventions and the development of smarter products, processes and services.

LCR4 START – Providing business support for recommendations and developing strategies for adopting and implementing digital solutions for accelerating the digital journey.

LCR HOLISTIC – Providing cross-sectoral digital innovation support to help organisations increase productivity, digitise operations and supply chains.

WC 4.0 – Providing innovative support to help organisations adopt Industry 4.0 technologies, and develop smarter products,

processes and supply chains within Cheshire and Warrington.

The independent summative assessments stated the projects have collectively had an impact of:

- Increase of gross GVA of £197.5 mn,
- Creation of 3,050 gross jobs.

Now the LCR 4.0 projects have evolved into a brand new, industry demand-led project – Horizons – providing all aspects of innovation support across LCR. The project directly addresses the challenges facing 21st Century SMEs and has developed a suite of services to maximise impact.

SERVICES

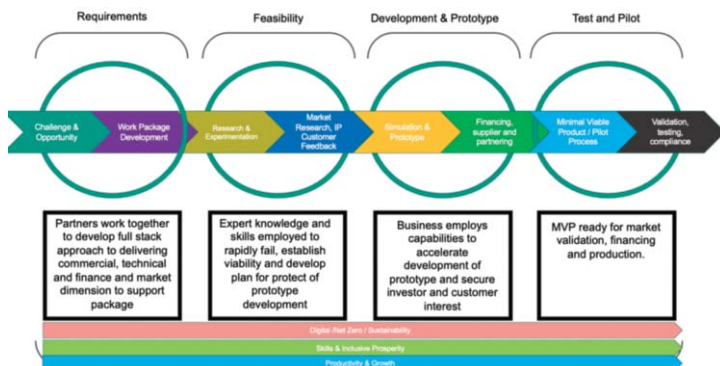
With a key driver of increasing R&D spend towards the ambition of 5% GDP in LCR, our objective is to increase innovation activity by providing:

INNOVATION SOLUTIONS	Dedicated, bespoke, timely innovation support from delivery teams
TECHNICAL SUPPORT	Engineering, design, testing and prototype development
EQUIPMENT ACCESS	Demonstrations, workshops, and laboratories
KNOWLEDGE BASE	Facilities, expertise, knowledge and collaboration
FUNDING/INVESTMENT	Support for access to finance for unlocking potential
CAPITAL GRANTS	Access to up to £20k for capital equipment to support high growth

We will support a wide range of innovation activities which will meet a number of key regional economic and sustainable metrics such as:

- Digital and Net zero technologies,
- Skills and inclusive prosperity,
- Productivity and growth.

This will be achieved by aligning industrial ambition in growth sectors and capability with regional HEI and RTO to



deliver innovations in products and services that cater to new and emerging growth markets.

WORKING WITH LJMU

Working with the team at LJMU, beneficiaries will gain access to knowledge, expertise, facilities, and new thinking to drive forward solutions to innovation challenges. As a modern civic university, LJMU is delivering solutions to overcome the challenges of the 21st Century. Here are just some ways the Faculty of Engineering and Technology (FET) are supporting this objective.

FETs collaboration with local, national, and international industrial partners is critical in fulfilling the University's core mission to serve "its people and communities, at home and further afield; enriching the lives of those they work with and acting as an anchor institution in the City of Liverpool".

FET has set up a dedicated departmental resource as part of LJMU's strategy and mission with a focus to play a unique role in fusing industry and academia together to promote value-added engagement and help strengthen the culture of innovation within the University and LCR.

The projects contained within the Faculty, bridge across several technology areas, such as the fourth industrial revolution, low carbon technologies, creative and digital, and maritime skills and they all unite in their industry-focused approach of helping industry solve their everyday challenges - transferring cutting edge technologies and know-how from LJMU's dedicated innovation delivery teams and highly experienced academics to the businesses they support. This valuable knowledge transfer mechanism enables both the business and academics to benefit, feeding directly into enhancing the student experience through promoting a progressive entrepreneurial spirit.

There are 5 key areas where the dedicated team can support industrial colleagues.

Dedicated Innovation specialist team	Access to over 250 research active staff	Bespoke, tailored, focused solutions	World class research facilities	Technology AND skills for growth
Experience team providing exposure to innovative technologies, access to academic knowledge base and facilities to increase productivity.	FET specialises in a whole range of advanced technologies relevant to our local business needs, with a focus on applied solutions.	The collection of world class expertise is focused on improving the competitiveness of SMEs with the 'right' support at the 'right' time.	We have 'Eight' first-rate research institutes and centres with state-of-the-art facilities, equipment and expertise to implement innovation solutions.	Educating the workforce of the future alongside technological solutions, we link teaching, research and industrial engagement for maximum impact.

We will support SMEs in LCR to unlock their innovation potential and increase R&D activity to realise tangible economic benefits in the short, medium, and long term.

KTPs and LJMU

While our dedicated innovation delivery team will establish the right mechanism to drive forward your innovation project, within the UK, LJMU is known for its successful KTP projects, winning numerous awards for our work in this area and the impact it has had on industry.

KTPs (Knowledge Transfer Partnerships) are one of the longest running schemes within the innovation ecosystem, which is testament to its effectiveness and ongoing demand, with the scheme being one of the largest graduate employment programmes. It helps UK-based organisations to innovate and grow through a three-way partnership with universities and graduates.

Businesses link up with an academic or research institution - the 'knowledge base' - to develop a KTP that will deliver a strategically important and challenging project. The partnership then recruits a suitably qualified graduate or postgraduate, known as a KTP associate.

By taking part in a KTP, you can use LJMU's knowledge, technology, and skills to strengthen your company. This is just one way we can help you become more competitive moving forward.

CASE STUDIES

Hi Tech Steels – IOT Condition Based Monitoring for manufacturing

Beverston – 2nd KTP around digitalising operations

Devonshire Bakery – Data analysis for informed decisions & real time monitoring

Endo Enterprises – Testing and validation of thermal models for heating

Rose Lane Dental – Additive manufacturing to improve efficiency

United Automation – ERP/MRP for efficient manufacturing

Chatwins – Sensor technologies for connectivity

Bryken – Smart factory KTP

Light Coatings – 3D modelling, simulation and product design

Brainboxes – IoT developments and machine to machine communications

Clatterbridge – Novel image processing, machine learning on a mass scale

Mannings Brewery – Operational efficiency, process efficiencies and manufacturing ops

EV2U – Electric vehicle communications

Data Performance – Smart procurement systems

Armada Technologies – Blockchain technology development

Paula Brennan

Collaboration Specialist –

Growth Horizons

P.E.Brennan@ljmu.ac.uk

The Hypothesised Dimensional Analysis of the Flow Behaviour of Additive Manufacturing Powders

Of all the emerging Additive Manufacturing (AM) techniques, one of the most popular current industrial methods is Powder Bed Fusion (PBF). In a PBF technique, metallic powder is delivered to the substrate within the building chamber and dispersed by the action of a roller or blade device. Regions of this spread layer are then selectively melted by a laser or electron beam depending on the characteristics of the process. The components are then generated layer by layer by melting selected regions of the powder bed in accordance with the dimensions specified in an imported Computer Aided Design (CAD) drawing. Despite the crucial role these powders play in the quality of the built part, their behaviour as they are processed in the build chamber remains underexplored.

In the PhD project which informs this article, performed by the author at Liverpool John Moores University, a technique to digitally model the powder flow known as the Discrete Element Method (DEM) is used. The DEM describes a range of numerical techniques for the simulation of granular materials and has been recently used by researchers to create a digital twin of commercial AM powder bed systems, without incurring the costs of practical trial and error based experiments. Unlike in a continuum approach, each particle in the powder bulk is considered to be a discrete element and the code solves for the interactions between these elements and wall interactions to simulate the bulk powder flow. The properties of the material are assigned and the analysis is performed in the system built to replicate AM conditions.

Leveraging the benefits of the DEM for AM powder investigations, multiple theories have been developed regarding whether a powder flow behaviour can be quantified, and categorised into “regimes” which inform the optimisation of the powder bed for the design realisation process. Most prominently, a hypothesis currently exists as to whether all relevant parameters of the build process can be considered holistically, to group variables together and perform a dimensional analysis of the powder flow behaviour. In AM literature, it is proposed that more than 130 different processing parameters can be adapted to induce a change in quality to the component produced. Thus, each possible parameter has been categorised in to discrete phases based

on the stage in the process prior to the melting operation. Pre-spreading, which constitutes the material properties of the build powder, mid-spreading, which is defined by factors such as the shape and size of the constituent particles, and post-spreading, including the thermal energy input to the powder bed and the melting pattern used.

Initial research has been conducted with a simple experiment concerning constrained powder flow through an orifice, compared to powder flow allowed to freefall under gravity. The comparison of constrained and unconstrained powder flow, and the difference in the shape of the formed pile in *Figure 1*, exemplifies how the nozzle diameter is another dimensioned factor in discerning powder flow behaviour.

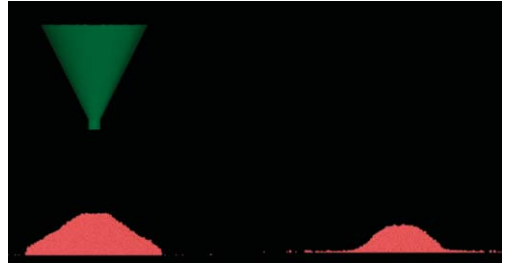


Figure 1. Comparison of Powder Processed through an Orifice and Allowed to Freefall under Gravity.

As shown in *Figure 1*, a more pronounced avalanching effect has generated a more clearly discernible angle of repose in the powder processed through a cone orifice (left), compared to the rounder and homogeneously dispersed powder pile allowed to freefall in an insertion region equal to the diameter of the cone nozzle (right).

If achieved, a robust model of powder flow regimes could have significant ramifications for what is considered industrial best practice in AM processing, as the build parameters could theoretically be configured to incur a flow behaviour which engenders the best conditions for a given batch production.

Andy Burgess

Reading the Newsletter on both
Android and Apple devices using
Adobe Liquid Mode:

<https://www.adobe.com/acrobat/hub/how-to/what-is-adobe-liquid-mode.html>

Novel Technologies: Air Lubrication Research at LJMU, a Potential Game-Changer in the Quest for a Greener Shipping Industry? Or just Compressed Air?

The world relies on shipping to transport the goods and materials we require in our daily lives and work; 80% of all trade is transported via shipping. Shipping contributes to global carbon emissions, equating to around 3% of all global emissions, and is subject to environmental targets similar to those of many other industries. As increasing focus has been placed on decarbonisation, so has increasing focus on research and development into how the shipping industry can meet these targets and align with a greener future. Maritime decarbonisation has a much broader impact on the UK and Globally than merely the industry itself, as the export and import of UK goods and resources remains very much reliant on shipping.

Liverpool John Moores University (LJMU) has been at the forefront of research into a promising decarbonisation technology: Air lubrication systems (ALS). When implemented on ships, these systems hold the potential to significantly reduce frictional resistance and enhance fuel efficiency. By introducing air bubbles or layers beneath the hull, the wetted surface area in contact with water can be reduced, leading to substantial energy savings and lower emissions.

Air lubrication technology has been around for several decades, with particular interest during the oil crisis of the 1970s and 1980s. However, renewed interest in recent years in achieving the environmental targets that the shipping industry has set has meant that ship operators are once again asking, 'Is air lubrication economically viable?' and 'Is the technology suitable for my ship?'

The work at LJMU is not just about the concept of air lubrication technology but about understanding its practical implications. They are using computational fluid dynamics (CFD) to study the complex interactions involved in using this technology. This approach allows us to gain insights into various areas, including its impact on seakeeping parameters and scaling of the technology. By providing a more comprehensive understanding of its operation, the research has led to significant advancements in simulating the multiphase interactions between air and water and the mechanism by which air lubrication achieves its drag-reducing effect, a phenomenon that has generally been poorly understood.

LJMU has successfully developed a number of models that can not only mimic bubble dynamics and ship operating conditions on the system but also understand bubble behaviour and even control it to further understand bubble size's effect on drag reduction.

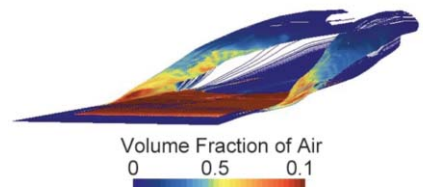
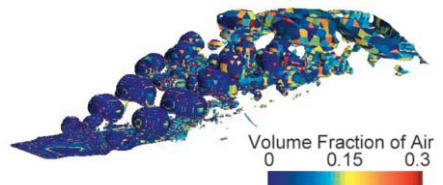
At this stage in the technology's deployment and development, there are strong indicators that it delivers what it has set out to, that is, reduce skin-frictional drag on ship hulls. However, there is still a great deal left to explore with

the technology, whether in optimisation or in understanding the possible drawbacks of utilising the technology and its suitability on a range of ships.

Strong early indicators of confidence in the technology exist; companies have not only shown interest but have also taken concrete steps towards commercialising this technology. We are witnessing the practical application of air lubrication systems on commercial ships today, further indicating the potential of this innovative solution.

LJMU's continuing work to investigate this technology holistically will enable a greater understanding of the technology. This will impart greater confidence in ship owners and operators that they can make an informed choice regarding whether the technology is suitable for their vessels.

It seems that air lubrication has a part to play in the decarbonisation repertoire of global shipping, alongside many of the other available decarbonisation technologies. One of the researchers involved with air lubrication at LJMU, David Hitchmough, was also recently involved with producing the UK's Academic Capacity & Capability for Shipbuilding report, which was presented to the National Shipbuilding office. The report discussed the current state of UK research in many areas, including decarbonisation within shipbuilding. Another researcher, Dr Andrew Spiteri, who has a PhD in optimising and understanding air lubrication systems, is currently working as a Research Associate in a Horizon-funded call – RETROFIT 55, which aims at understanding how retrofitting technologies such as ALS and wind-assisted propulsion could work together and enhance the overall savings.



David Hitchmough



Funded by
UK Government



Innovation happens here

and here

and here

and here

and here

and here

and here


and here

horizons

Providing innovation support to SMEs across Liverpool City Region


Funded by the UK Shared Prosperity Fund (UKSPF), Horizons will offer access to unique expertise, world-class facilities, and funding opportunities that are essential to foster innovation.

We're here to create better opportunities for people and communities across the boroughs and support businesses to prosper, regardless of sector and ambitions.

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VEC



SME Productivity
& Innovation Centre

Empowering Innovation: SMEs Broadening Their Horizons with the Help of Radical New Support of VEC through Innovative Liverpool City Region Combined Authority Programme

Since the late 2023 launch, the Horizons project has supported SMEs across the Liverpool City Region who want to accelerate their competitiveness and productivity. Funded by the UK Shared Prosperity Fund, Horizons offers practical support for economic growth and innovation in the region. Delivered by a partnership between the University of Liverpool's VEC (Virtual Engineering Centre), Liverpool John Moores University and Edge Hill University, the project helps businesses succeed and create opportunities for communities.

BOMAC: Selecting emerging technology for long-term benefits

A manufacturer of heating elements and products, BOMAC cater to global markets and major appliance manufacturers. BOMAC provide expertise in the design, development, and testing of resources, including CAD design, to ensure products meet high industry standards for safety, reliability, and durability.

BOMAC wanted to internalise jig production using Computer-aided design (CAD) and CNC to enhance manufacturing efficiency. The Horizons teams at VEC proposed technology integration and knowledge transfer for improved product assembly efficiency via 3D CAD modelling and printing, offering cost benefits. This approach involved creating a digital system for enhanced product assembly, leveraging existing capabilities and potential cost savings.

BOMAC also attended knowledge transfer workshops for exploring the benefits of technology such as additive manufacturing, supporting the company to be in a better position for making informed decisions on future investments to streamline tasks. With VEC support, BOMAC secured an Innovate UK grant as part of their pursuit of CNC machine procurement.

"We are extremely pleased with the support and assistance provided by the VEC... This collaboration has been instrumental in enhancing our understanding and capabilities in adopting computer-aided design and computer-aided manufacturing (CAD/CAM) technologies, particularly CNC routers," said Julia McDonald, Commercial and Marketing Director, BOMAC.

DefProc: Expanding the use of 3D Printing for accelerating innovation

Based in the Liverpool Science Park, DefProc specialises in research and development, designing for manufacturing processes, and production for testing. DefProc wanted to expand its current 3D printing with advanced materials to advance the quality of its products and services.

Undertaking a gap analysis between existing status and achieving their goal, the teams delivered an additive Manufacturing workshop for exploring advanced and progressive machinery options for future investments. DefProc plans to utilise new machinery, internal expertise, and composite materials like carbon fibre to create strong, yet lightweight parts for more durable prototypes, crucial for client communication as they plan to expand operations with a new facility and equipment to support advanced production lines.

Ultimately, this innovation will fast-track DefProc operations, introducing small-batch prototype production whilst reducing production costs. Since this collaboration, the DefProc teams have developed a smart valve prototype to support clients in the hydrogen sector, supporting their Net Carbon Zero goals.

"The support from VEC has given us a clear understanding of the new 3D printing capabilities and advancements available. As a result, we can begin to plan our expansion of 3D printing offerings. This will allow us to continue providing the most innovative services to our clients," said Jen Fenner, Managing Director, DefProc.

The Horizons teams have visited all six boroughs across the Liverpool City Region through several sub-local roadshow events. Visiting locations like Egerton House, Heath Business and Technology Park, Bowring Park, and Forby Hall, the teams have been discussing digital transformation projects with local business leaders across numerous sectors. In addition to the roadshow events, Horizons organises SME factory tours, offering local businesses the chance to form greater support networks, discuss overcoming challenges and access unique behind-the-scenes tours of the world-class facilities across the city.

Emma Green

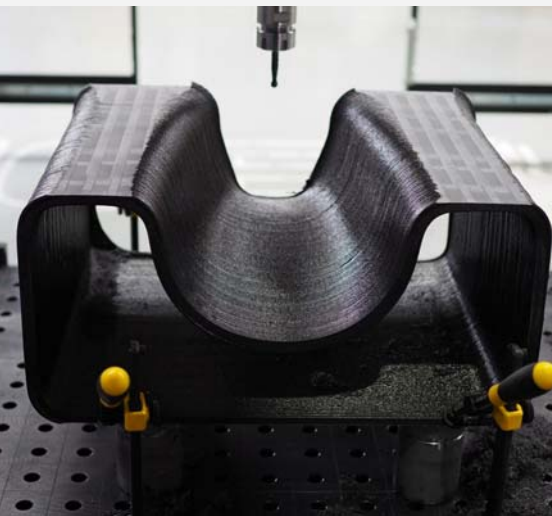
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Unlocking New Possibilities: CNC Robotics Expand Their 3D Printing Material Capabilities by Introducing the Paste-Pro System, Capable of 3D Printing Polyurethane Paste

CNC Robotics, a leading company in the field of robotics and automation, is driving advancements in manufacturing productivity both in the UK and Internationally. With their expertise in creating bespoke and automated robotics solutions for various manufacturing applications, CNC Robotics have added more capabilities to their robot-based solutions, with the potential to disrupt the industry.

To expand their 3D printing systems capabilities, CNC Robotics have developed a new system, The Paste-Pro, which combines a KUKA robot with a 2KM extruder, to print Sika's polyurethane paste on an industrial scale. The Paste-Pro offers an alternative to conventional manufacturing methods with tooling board or modelling board, allowing users to print polyurethane paste at large scale to a near-net shape, allowing manufacturers to create models, prototypes and tools at a fraction of the cost and material usage.



The Paste-Pro system set up

Using familiar polyurethane material, manufacturers can leverage its material properties to ease the transition from subtractive to additive.

This strategic development has opened new possibilities for manufacturing, thanks to the integration of state-of-the-art

robotic technology, hardware and software. The Paste-Pro, adept at handling the equivalent of 0.8 density tooling board, means the system is poised to revolutionise many sectors such as aerospace, automotive, composites, model making and prototyping. Capable of printing complex, hollow and lightweight parts, the Paste-Pro will allow these sectors to become more sustainable in aid of future proofing their businesses.

CNC Robotics and 2KM's expertise derives from concentrated R&D and testing. Therefore, their extruder will be developed to process a wide range of epoxy and polyurethane materials. With a variety of densities, the material can be adapted to the demands of the industry.



Mould produced for the automotive industry in three days

In aerospace, for instance, the ability to produce tools that can withstand autoclave temperatures would be significantly beneficial over traditional CNC machining, which generally leads to a lot of waste. The automotive industry can benefit from rapid prototyping and accelerated production with large format 3D printing, printing directly from CAD followed by CNC milling to the final details will allow full scale models to be produced in a matter of days.

CNC Robotics mission and values perfectly align with 2KM's ethos, with a shared passion for engaging in long term B2B relationships, clients are seen more as partners than customers. Both businesses work with partners to make sure they get the best solution for their application. In addition to this, systems are scalable, using a modular approach, systems can be upgraded to ensure the technology is the most relevant. One example is the ability to mount robots onto a track (up to 20 m long) to extend its reach and increase its applications.

This partnership marks a significant milestone for CNC Robotics and 2KM, uniting their strengths to drive innovation in the manufacturing industry. With a shared commitment to efficiency, sustainability, and cutting-edge technology, they are set to make a lasting impact on how we produce and what we can achieve.

Max Barnett

Updates from Academic, Industrial and Research Partners Science and Technology Facilities Council (STFC), Daresbury Manufacturing and Management Group

Digital Prototyping Technologies at STFC's Daresbury Laboratory

On Wednesday 26th June 2024, the Science and Technology Facilities Council (STFC) invited the IET Mersey and Western Cheshire Network to an inspiring event at Daresbury Laboratory showing how digital technologies are helping to transform industry through digital prototyping.

George Williamson and Kelly Hanifin, STFC Hartree Centre's visualisation team, gave an extensive update showing how UK businesses can leverage advanced technologies such as supercomputing, data analytics, artificial intelligence (AI), quantum computing, advanced visualisation and simulation to enhance their capabilities. The Hartree Centre works with all shapes and sizes of businesses and across a broad range of sectors from automotive, aerospace and advanced engineering through to healthcare and heritage. They are using the sandpit methodology providing customers with access to the very latest digital technologies, exploring these in a safe, neutral and technology agnostic environment. Case studies included:

- A virtual tour of Hartree Centre's current main supercomputer, Scafell Pike. This is a Bull Sequana X1000 system with an excess of 80 000 CPU cores. It is the largest supercomputer in the UK that industry have access to, to explore and adopt supercomputing, data science and artificial intelligence (AI) technologies for enhanced productivity.
- A high-definition stereo 3D rendering of a 409 million point catchment point cloud data set comprised of around 10000, 50x50 cm images combined with LiDAR data showing around 10 km² of Cumbria near Ullswater. With this they presented a visualisation of Dr Sim Reaney of Durham University's STFC funded work that looked at the impact of agricultural diffuse pollution on farming around this area.
- AI generated Metal Organic Frameworks (MOF's) rendered in stereo 3D. These are a class of porous polymers consisting of metal clusters coordinated to organic ligands to form one-, two- or three-dimensional structures. These are useful for carbon capture and storage and as such this research is important for the battle against global warming. This is a visualisation of data sets from the Hartree Centres Jonathan Booth's work.
- A visualisation of the Omicron variant of the Covid-19 virus (SARS-CoV-2 viral spike protein) in stereo 3D. This is from work for a published paper by Dr Ya-Wen Hsiao's group, at the Hartree Centre in collaboration with IBM Research who managed to model several subvariants of Omicron from molecular dynamics simulations. This work relied heavily on the supercomputer, Scafell Pike, running the simulations over many node hours.
- The Virtual Wind Tunnel was a project with Briggs Automotive Company, where their objective was to create



The above visualisation's/demonstrations are run in the Explore room and displayed on 5M 4K screen in the Hartree Centre's visual computing lab

the world's fastest, road legal, single seated supercar. They were trialling the use of Computational Fluid Dynamics (CFD), which was crashing their computer, which led to them approaching the Hartree Centre to assist. They ran the CFD simulations on Scafell Pike, while creating an easy-to-use pipeline, where they could login, load the VWT, upload a mesh and then run the simulation. The demo provides a realistic wind tunnel environment, which the viewer can walk around, meanwhile the Computational Fluid dynamic simulation shows how the air particles would flow around the vehicle.

- Fusion Computing Lab is a programme with UKAEA looking into creating an accurate digital twin of a nuclear fusion reactor. The four videos show the Te, Ti, Rho and D-Alpha measurements for a fraction of a second inside MAST-U, a spherical tokamak. The fusion within these reactors can get to temperatures several times hotter than the centre of the sun, therefore. The Hartree Centre are aiming to create a realistic digital twin so that this R&D process can be sped up, as any changes can be prototyped in a safe, virtual environment. Additionally, they are looking into creating a co-design space, where engineers, physicists, visual software engineers etc. can all work on the same project but still use the software tools their used to.
- The Rayleigh-Taylor Video is a simulation, created by Alex Grant from the HPSE Group on Scafell Pike, which shows a yellow denser fluid falling into a lighter red fluid, like cream on coffee or water on oil. This simulation of a Rayleigh-Taylor Instability is relevant to Inertial Confinement Fusion. Due to small imperfections on the capsule's surface and uneven heating from the lasers, instabilities can grow exponentially on the capsule's surface resulting in bad confinement. Simulating instabilities, such as this Rayleigh-Taylor Instability, can give a better understanding

of how they grow and develop over time, which could be the key to helping scientists develop a capsule that ensures that the fusion reaction takes place before the hydrodynamic instabilities grows.

- Ocado supermarkets are filled with robots travelling around picking up each person's shopping basket. Ocado approached the Hartree Centre to improve their routing algorithm. The team used a blend of quantum and classical computer to first find out all the possible routes and to find the optimum. It was also a trial at seeing whether quantum computing was developed enough for investment in that area and led to the creation of Hartree's Emerging Technology team, which employs ten Quantum Software Engineers.



The above visualisation's/demonstrations are run in the Immerse Room and displayed on a 10M 8K curved screen in Hartree Centre's visual computing lab

David Bogg (Manager, STFC's Campus Technology Hub) provided an insight into the role of the Campus Technology Hub (CTH) as a facility that works closely with entrepreneurs and small to medium sized companies to prototype new products and services effectively and efficiently. The CTH provides high tech lab space and access to range of digital prototyping technologies such as 3D printing (in a range of polymer materials and metals), 3D scanning, Virtual/Augmented reality and Internet of Things technologies (IoT). Working closely with in-house expertise the CTH enables clients to benefit from how these technologies are revolutionizing rapid prototyping of new products and services via several transformative ways:

3D Printing:

- **Speed and Flexibility:** 3D printing allows for the quick creation of prototypes directly from digital designs, significantly reducing the time from concept to physical model.
- **Customization and Complexity:** It enables the production of highly customized and complex parts that would be difficult or impossible to manufacture using traditional methods.
- **Cost-Effective Iteration:** Multiple iterations can be produced rapidly and at a lower cost, facilitating more efficient refinement and testing of designs.

Virtual and Augmented Reality (VR/AR):

- **Enhanced Visualization:** VR/AR technologies provide immersive environments where designers and stakeholders can interact with virtual prototypes, offering a realistic preview and identifying potential issues before physical production.
- **Improved Collaboration:** Teams can collaborate in a virtual space, regardless of their physical location, enhancing communication and accelerating the decision-making process.
- **Simulated Testing:** Prototypes can be tested in virtual scenarios to assess functionality and usability, reducing the need for multiple physical prototypes.

Internet of Things (IoT):

- **Smart Prototyping:** IoT-enabled prototypes can collect real-time data on their performance and usage, providing valuable insights for further development and optimization.
- **Connected Development:** IoT devices can be integrated into the prototyping process to create interconnected systems, allowing for the development, and testing of smart products and services.
- **Continuous Feedback:** IoT technology facilitates continuous monitoring and feedback, enabling iterative improvements based on actual usage data.

Together, these technologies streamline the prototyping process, enhance innovation, reduce costs, and accelerate the development of new products and services, driving forward rapid advancements in many industries.

Virtual prototyping examples included creating an environment to virtually prototype layouts for a new factory, the digital recreation of a demolished manor house, and digital prototyping for a new design of wheelchair.

The event concluded with a tour of the CTH facility, where visitors saw first-hand 3D printers in operation, as well as a wide variety of 3D printed examples in a range of polymer and metal materials for aerospace, automotive, healthcare, and digital heritage applications.

The visit encapsulated the spirit of digital transformation, highlighting the pivotal role of STFC Daresbury Laboratory in fostering technological advancement and supporting UK businesses.



David Bogg



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Work collaboratively with our technical experts to rapidly translate new ideas into reality.

Whether it's prototyping, product design or improving manufacturing processes – we provide SMEs with impartial support and flexible access to leading 3D printing and VR equipment, reducing the risks associated with the development and trial of new products and accelerating time to market.



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4wardFutures is a Warrington based charity that is working to empower young people of all backgrounds to take control of their future careers and progression opportunities by engaging with employers, universities, and professional organisations against the backdrop of a world that is rapidly changing through the impact of innovation and new technology.

<https://www.4wardfutures.org.uk>



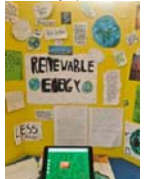
Engineering a Sustainable Energy Supply (EASES).

EASES is a recent 4wardFutures (4FC) project funded by the Royal Academy of Engineering Ingenious programme. 4FC worked with 18 engineers from the clean energy sector who are working on hydrogen energy, nuclear fusion, solar power, and innovative wind turbine design, to co-design and then co-deliver in person and online workshops that informed and inspired over 350 young people aged 8 to 11, from groups that are currently underrepresented in engineering.



Project evaluation showed that 100% of the engineers found the project enjoyable; interesting and informative and 88% said they are now more interested in public engagement.

The feedback from the 381 young people who took part in the project showed that 95% enjoyed taking part in the project, 88% learned something new about engineering, 56% said taking part in the project made them more interested in engineering, 82% found out how engineering improves our lives.



4wardFutures are now working on a new funding bid to extend the EASES project over the next 12 months. If you are an engineer working in the clean energy sector and would like to take part in the new EASES project, please get in touch.

<https://www.4wardfutures.org.uk/engineering-a-sustainable-energy-supply>

<https://raena.org.uk/ingenious> <https://www.progressive-energy.com/> <https://www.cuandc.com/>
<https://www.gov.uk/government/organisations/uk-atomic-energy-authority> <https://www.wall-lag.co.uk/>

AI Futures 4wardFutures are working with Warrington and Vale Royal College to develop an AI focused project that will give young people aged from 8 to 18-years-old a better understanding of the impact that AI is and will have on their current and future career opportunities across a wide range of sectors such as engineering, space, science, law, finance, art & design, retail, logistics, transport... If you are an engineer researching or working with AI or on the application of AI in your area of work and would like to share your work with young people through the AI Futures project, please contact us.



Virtual Sustainable Futures Careers Expo As part of the development of their Sustainable Futures programme, 4wardFutures have been hosting a Virtual Sustainable Futures Careers Expo.

<https://www.4wardfutures.org.uk/sustainable-careers-expo>



Through exhibiting at the Expo: companies, individuals, and organisations from all sectors will be able to share with young people, both the work they are doing to combat the climate and ecological challenges humanity faces, to reduce the carbon footprint and environmental impact of their own organisation and give an insight in the progression and career opportunities that you may offer young people.

Companies, organisations, training providers and universities who wish to exhibit are welcome to get in touch. **There is no charge to exhibit at the Expo.** The 4wardFutures team can if required work with you to help create an exhibition stand.

For further information about any of our projects or if you are interested volunteering or working with us, then please contact us at:

media@4wardfutures.org.uk or via <https://www.4wardfutures.org.uk>



Where Do Engineers Come from?

All of the 'active' members and volunteers within the Mersey & Western Cheshire Local Network are aware of the excellent work that has been done for many years by our Education Officers. Unfortunately, there are only two at the moment.

Education Officers and STEM Ambassadors are our Institution's direct connection to schools and colleges – and it is this contact that will help encourage the next generation(s) of Engineers and Technicians that the country really need in all areas of Engineering.

For that to happen we must create a stronger Education Officers Group to reach out to more Schools and Colleges.

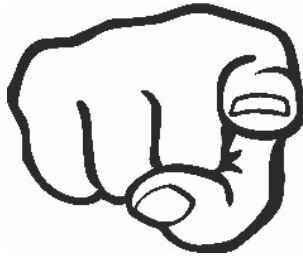
YOUR NETWORK NEEDS YOU!

But, more importantly,

YOUR COUNTRY NEEDS YOU!

This is simply because, without Engineers we *will* become a Nation of Shopkeepers!

This is our message to all those Engineers and STEM professionals, in our Network, to step up and help reach as many of the 100s of schools and colleges in our region as possible.



So that we can create a solid foundation to this, we have set out ambitious mission and vision statements of what success could look like in 12 months time.

Mission Statement

The IET M&WC Education team works with Schools and Colleges to promote the values of the IET, encourage students to consider a career within STEM, work with teachers to improve learning experiences *and inspire the next generation of Engineers.*

Vision Statement

The IET M&WC Education team will become the 'model' for all IET Local Networks. It will create and promote a sustainable and consistent relationship with as many Schools and Colleges in the region as practicable, provide sufficient education officers across our region, ample resources to aid STEM curriculum and by working with All About STEM to reach schools in need of assistance.

GET INVOLVED!

JOIN THE EDUCATION OFFICERS GROUP!

PROMOTE ENGINEERING TO YOUNG PEOPLE!

Godfrey Evans

Continuing Professional Development (CPD)

On the centre pages of this Newsletter you will see in the right hand column headed CPD and for each event a number of hours that this event qualifies for if you attend the full event. A few years ago the CPD hours for our events were not considered, but times change.

I have taken the paragraph from the Engineering Council's website: "CPD has several purposes, which will vary in relation to your circumstances, needs and career progression. It can also take a variety of forms. At its heart is informal learning through the challenges and opportunities of working life, and interaction with others such as colleagues, customers and suppliers, including professionals from other disciplines. This may be supplemented by structured activities such as courses, distance learning programmes, private study, preparation of papers and presentations, mentoring, involvement in professional body activities, or relevant voluntary work."

Recording your informal learning helps individuals progress through the different levels of registration, Engineering Technician, Incorporated or Chartered Engineer.

The IET provides Members an online tool called "Career Manager" for recording individual's CPD. The regular use of Career Manager helps individuals to:

- apply for professional registration;
- set goals and plan the steps you need to achieve them;
- record your career progress in detail;
- identify areas where you need extra help;
- record your CPD;
- export and share development reports with peers;
- call on expert advice;
- build an impressive master CV.

If you wish you can sign up to receive hints and tips on CPD and the use of Career Manager. To sign up for hints and tips just email your name and membership number to cpd@theiet.org using "CPD hints and tips" as the subject line. For engineers and technicians starting out in their careers, CPD will be a fundamental part of your professional life.

Rob McDonald

2025 Annual Dinner

Mersey & Western Cheshire Network

Join us on 7th February 2025

at Liverpool Hilton City Centre



Meet with prospective partners and build relationships with key people in your field.

Network with engineers from all sectors. Executives, Heads of Departments and Senior Engineers from a variety of organisations will all be attending.

Recognise your employees or host clients with a delicious three-course dinner in a prestigious waterfront setting.

Table Cost: £700 (seats 10)

Individual Tickets £70

Updates from Academic, Industrial and Research Partners

Bilfinger UK



Bilfinger drives Highview Power's innovative storage Project, accelerating the Energy transition in Manchester, England by:

- Comprehensive consultancy, procurement and construction services for pioneering liquid air energy storage facility in the UK.
- Leveraging Bilfinger's deep industrial expertise to propel significant advancement in sustainable energy storage technology.
- Significantly contributing to the UK's renewable energy goals and grid stabilisation efforts.
- Dedicated team of approximately 200 Bilfinger professionals deployed at the customer's site.

Bilfinger collaborates with UK long duration energy storage business Highview Power to pioneer the construction of the UK's first commercial liquid air energy storage facility, aimed at converting surplus electricity into liquid air for storage. The transformative facility will enhance sustainability by storing enough renewable energy equivalent to the electricity used by one million homes over an hour. Highview Power's facility will also provide critical grid stabilisation services. Bilfinger's Engineering, Automation & Projects UK business stream will be responsible for comprehensive procurement and construction services for the plant's realisation.

The scope of Bilfinger's services ranges from the procurement of steel to extensive plant construction services, including mechanical, electrical, instrumentation, insulation, painting and structural steel work, along with the overall management of all aspects of construction, including civil works and equipment installation.

Darren Clement, Vice President, Bilfinger Engineering, Automation and Project UK, said: "Highview Power's collaboration with Bilfinger represents a pivotal moment in the energy transition. By leveraging our industrial expertise, this project will see Bilfinger significantly contribute to the nation's renewable energy goals and grid stabilisation efforts."

The planned large-scale plant with an output of 50 MW and a capacity of 300 MWh is based on Highview Power's proprietary long duration energy storage system, which utilises liquid air as its storage medium. The system compresses air, which liquefies and can be then stored at low pressure in tanks for weeks. Upon exposure to ambient temperature, the liquid air reverts to its gaseous state, expanding 700-fold and powering a turbine to generate electricity – without combustion. The system is designed to serve as a buffer for surplus electricity from renewable sources.

Approximately 200 Bilfinger employees will work on the contract, focusing on extensive piping and steelwork specially insulated for cryogenic temperatures. Prefabrication will be carried out in Bilfinger's own local workshops, ensuring a streamlined and efficient process. Leveraging its extensive expertise, Bilfinger has demonstrated its flexibility in meeting

the unique challenges of the project, such as reorganising construction sequences to accommodate the installation of the 40 m long, heavy liquid air storage tanks, which exceed the capabilities of conventional cranes.

"We value Bilfinger as a solution provider and are pleased to have their adaptable and dedicated support as we deliver our first commercial facility. Our first project in Carrington will be the foundation for our full scale roll-out in the UK and expansion with partners to share this British technology internationally," says Highview Power CEO Richard Butland.

Sandy Bonner, President, Bilfinger Engineering & Maintenance UK, added: "As the world derives more and more of its electricity from renewable sources, there's a growing need for technologies that can capture and store it. We are excited to partner with Highview Power in pushing the boundaries of sustainable energy storage technology and to bring our extensive expertise in the energy industry to this effort."

Bilfinger has been a long-standing partner to the energy industry, offering support in designing and constructing new plants as well as the optimising, modifying or decommissioning existing facilities. Recent contracts include providing Engineering, Procurement and Construction Management (EPCM) services for a hydrogen pilot project in a cavern storage facility for Uniper, fabricating pressure piping for a new pump-turbine unit at the Kruonis pumped storage hydropower plant in Lithuania and delivering turnkey construction of a district heating storage facility for Stadtwerke Leipzig GmbH.

Bilfinger is an international industrial services provider. The aim of the Group's activities is to increase the efficiency and sustainability of customers in the process industry and to establish itself as the number one partner in the market. Bilfinger's comprehensive portfolio covers the entire value chain from consulting, engineering, manufacturing, assembly, maintenance and plant expansion to turnarounds and digital applications.

The company delivers its services in two service lines: Engineering & Maintenance and Technologies. Bilfinger is primarily active in Europe, North America and the Middle East. Process industry customers come from sectors that include energy, chemicals & petrochemicals, pharma & biopharma and oil & gas. With its ~30 000 employees, Bilfinger upholds the highest standards of safety and quality and generated revenue of €4.5 billion in financial year 2023. To achieve its goals, Bilfinger has identified two strategic thrusts: repositioning itself as a leader in increasing efficiency and sustainability, and driving operational excellence to improve the organizational performance.

You can find additional information, photographs and videos at:



Sarah Rodriguez

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Can't find the contact you need?

You will find contact details for each event in the event synopsis on pages 22–25.



Search "IET Mersey & Western Cheshire"

on these social media sites to keep up to date with events and activities!

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