

The Woman Engineer



Inside this issue.....



WES Boards are Recruiting

Join the WES Apprentice Board or the WES Early Careers Board to make a difference.

Page 6

Also inside



WES Annual Conference

Celebrating innovation.

Page 3

INWED 2022

Get involved with this year's theme of inventors and innovators.

Page 7



Solving the climate crisis

Women engineers unite.

Page 10

From the editor's desk

I note that much of this issue of The Woman Engineer is dedicated to the concept of courage. It was mentioned by several presenters at the WES Annual Conference in April, and it has been cited by contributors to this issue of the journal. It strikes me that 'courage', defined as "the ability to do something that frightens one", or "strength in the face of pain or grief" is often associated with uncertain or unknown situations.

It is notable that women are required to have courage to pursue their professional aspirations, but then again, I imagine men are too – it's just that they rarely discuss it when talking about their careers – unless they are in fact lion tamers or crocodile wrestlers! But it does take courage to be in a position where you may well be judged by your gender rather than your abilities. The usual: "You're strong/ feisty/practical for a girl!" Notably, at the *WES Annual Conference*, Katherine Bennett CBE posed the idea of considering alternative ways to see the future. Perhaps we will be in a world one day when people won't



Lynn Postle, FICME

be pigeonholed into so-called suitable careers for them based on anything other than their desires and their aspirations.

It is encouraging to note the latest research from EngineeringUK shows that 16.5 per cent of those working in engineering roles are women, compared to 10.5 per cent in 2010. It is particularly encouraging to see that it is not just a percentage increase but an actual increase in the numbers too – from 562,000 (2010) to 936,000 (2021); with the total number of the engineering workforce increasing from 5.3 million (2010) to 5.6 million (2021). We need to continue to grow the numbers but at least it is going in the right direction – a welcome relief for man (and woman) kind!

Next issue: Autumn 2022, contribution deadline – 10 July 2022



President's Message

As we now all transition into a more usual way of life with global travel increasing, face masks no longer required, and some movement back towards office based working; I am left wondering whether we will take the right lessons out of the last couple of years of challenge.

Technology, scientists and engineers have definitely driven us forward out of, and enabled us to continue throughout, the pandemic; but I hope that we do take the positive gains with us. If we were able to harness that flexibility without the burden of the extra demands of a lockdown, I think it would be all powerful. I have seen varied and sometimes contradictory commentary on the impact of the pandemic on women's careers. We must use the positive aspects of the potential for increased flexibility to act as an accelerator and to enlighten employers into what it is possible to achieve. In WES we definitely enjoyed the multiplier effect of our virtual events; but missed the closer and more personal networking. Surely, for both the workplace and for societies like ours the answer must be to try and achieve the best of both (as opposed to doing a bit of both poorly!) through hybrid working and events?

I really worry that we have somewhat missed the point (or failed to learn the lesson) when I see headlines and articles about the requirement for people to return to the office wholesale!

It will be very interesting to see how successful our *WES Annual Conference* is in its virtual form this year in comparison to our other face-to-face events that are emerging. We definitely had a great line up of interesting presenters. If you think we are missing a trick or not setting up events that you would like, then do get involved on committees or feedback to us. This will ensure that we deliver what you want in the coming months as we all navigate this return to normalcy!

Dawn Childs FREng

don't miss

International Women in Engineering Day

23 June 2022 – Globally
www.inwed.org.uk

Check the *WES* website for events and updates at:
www.wes.org.uk/events/wes-events



The Women's Engineering Society is a charity registered with the Charity Commission No. 1008913 and a company limited by guarantee registered in England No. 162096. All correspondence regarding membership and the work of WES should be addressed to:

The CEO, Women's Engineering Society
Futures Place, Kings Way,
Stevenage, Hertfordshire
SG1 2UA
Tel: 01438 765506
Email: hello@wes.org.uk
www.wes.org.uk

The Woman Engineer
Editor: Lynn Postle FICME
Email: editor@wes.org.uk

The *Woman Engineer* is published by the Women's Engineering Society. It is

distributed free of charge to members of the Society and to selected professional women engineers, scientists and women undergraduates.

Produced by: Rivers Media,
www.rivers-media.co.uk

Subscriptions: the journal is available to non-WES members in the UK at a subscription price of £30.00 per annum (inc postage). Send subscription orders to

WES. Cheques should be made payable to: Women's Engineering Society.

Overseas subscriptions: price by surface mail is £40.00 per annum. Sterling cheques or bank drafts should be made payable to Women's Engineering Society. All items for inclusion in *The Woman Engineer* should be sent to the Editor at the same address.

The views expressed in this journal are not necessarily the views of the Society.



[wes1919](https://www.facebook.com/wes1919)



[@wes1919](https://twitter.com/wes1919)



[Women's Engineering Society](https://www.linkedin.com/company/women-s-engineering-society)



[@womensengsoc](https://www.instagram.com/womensengsoc)

©The Woman Engineer 2022

Curious, creative, and courageous

WES Annual Conference celebrates innovation

The WES Annual Conference was held on 28 and 29 April 2022 and attracted high calibre speakers and a large number of virtual attendees. Such was the volume of information, that we will be publishing the report over several issues of *The Woman Engineer*. Here, part one highlights the importance of perception and visible role models.

Opening this year's WES Annual Conference in April, Katherine Bennett CBE from High Value Manufacturing Catapult, referred to articles and statements published in *The Woman Engineer* in April 1922. The issue included a competition regarding the first time in history that women were encouraged to invent, on this occasion it was a solution to locally produce energy and lower household bills (somewhat topical even now)! Katherine bemused how an article from Ewart S Andrews BSc Eng was indeed "laughable" in its manner, but that the fact was that "he couldn't consider alternative ways to see the future. New ideas, the exchange of ideas, to evolve his approach."

She noted that: "to imagine and to engineer the future, you need the latter."

Her presentation concentrated on what she entitled: '*The nine principles of innovation mastery*', which included exploring ideas, the importance of exchanging knowledge and experience, evolving your ideas and yourself.

She explained: "Perceiving things differently is what drives innovation, which is why I love working with engineers and in manufacturing. Curiosity is a great thing. Inclusion and diversity drive better decisions, innovations, and commercial opportunities."

She explained that highlighting people who you can learn from and build collaborations with is crucial and that anyone or anything (such as the Internet) can be a mentor. "Don't just seek one mentor," she advised.

Although she is now a successful career woman, Katherine reminded participants that learning and indeed driving innovation often involves bravery. "When you see what can and should be done, it takes courage to take the initial step for innovation and possible failure. But my proudest achievement concerns my A 'Levels. I didn't get the grades I wanted and then I had to take a year to do re-takes, but it allowed me to get into the university I wanted. It taught me to turn failure and disappointment into something to spur me on."

She explained how often companies hold back from investment because of fear of failure, which is why Catapult is working to "strip the risk out of it" and is "helping to turn ideas into business propositions that help people, the planet and profit."

She said that the best piece of advice she had been given goes back to the subject of curiosity. "Read around the subject – doing your research is so powerful, that's basic sales."

A sense of belonging

Dr Salma Alarefi of University of Leeds considered '*Belonging as the foundation for innovation*'. Looking at the definition of 'belonging' she noted: "It is beyond inclusion; it is about empowering somebody to occupy their space. It is human nature to want and need to have a sense of connection and to want to be included. Belonging does not require an individual to 'fit in' or change themselves. It is about being your 'authentic' self. Creating your own, and influencing, existing communities. Thus, belonging is beyond inclusion."

She urged that a sense of belonging was vital to development and success. "It only adds value if people feel they belong, only then can they contribute to their full potential to innovate," she said. She also warned that: "women don't want to be advocates for this work."

When considering equality, diversity, and inclusion she said: "Inclusion is not enough, it's a promising progression but not enough. The key component in a truly inclusive society lies in belonging."

"Inviting someone who is underrepresented onto Boards etc. is not what we are talking about. What's in place to centre and amplify their voices? Then do we listen to them? Do we celebrate their individuality? Do we ask the uncomfortable questions, or do we just tick a box without acknowledging the diversity and backgrounds of the women in our organisations?"

"Belonging is about the individual experiences. It can't be measured or modelled because what belonging means to me could be completely different for somebody else. Support women to be their full creative, potential self to fulfil innovation possibilities."

She said it was crucial to encourage authenticity because a sense of belonging is only achieved if someone can feel themselves. She also said a "decolonial mindset" was vital. "I mean a position where you don't misuse power to dictate how others will have an enhanced sense of belonging," she explained.

You can't be what you can't see

Alexandra Knight of STEMAZING Ltd spoke about why diversity and inclusion is so vital for



innovation and considered how we could build diverse teams "when the pool is getting smaller."

She said that the "root cause" was "inspiring young children with diverse role models." She warned: "It's stark how young they recognise options for boys and options for girls. Use your voice to make a difference and tackle stereotype bias early on – from age three to five."

She said that the media was a great influencer and that it is vitally important to "sow the seed early, then reinforce it throughout their education. It's hard to change attitude once the seed has already been sown."

STEMAZING is empowering young women to be visible role models. Alexandra said: "You can't be what you can't see."

She highlighted an important value in STEM, which is the need to be curious, creative, and courageous. "Things will go wrong and will be hard, but it doesn't mean that we can't do it," she said. She spoke of a STEMAZING initiative that targets seven to nine-year-olds. The Inspiration Academy is about innovation and improving our children's and our future. "Role models are key to building diversity, which in turn is key to greater innovation which we need to solve global engineering challenges," she said.

"YOU are a role model; we are all role models. We must inform, influence, and inspire. As a woman in engineering, take up space, make yourself visible and vocal. Remember the three c's (curious, creative, courageous) and stretch your comfort zone because you have huge capacity to inspire others."

Look out for more inspiration from the WES Annual Conference in the next issue of The Woman Engineer. WES thanks sponsors of the event, Ball Corporation, McLaren Racing and Jaguar Land Rover.

Revolutionising recruitment one returner at a time: Ramboll's Return to Work scheme

Back in September, a report on the state of the construction sector published by employment experts Citation found more than 40 per cent of respondents surveyed were struggling to fill vacant positions in their business. As this skills crisis continues, the challenges facing the attraction and retention of talent are never too far from the pages of the construction and engineering sector press, let alone conversations within the halls of firms themselves.

Unfortunately, there is no silver bullet for such a complex challenge. It would be naïve to suggest as such, as the solution to the situation will only come through concerted and continued efforts in workplace culture to both retain and attract new talent. Among the sector's efforts on this front, Ramboll is a firm that has been leading the charge, investing in the untapped talent of career break returners.

Ramboll's 'Return to Work' scheme

In 2021, Ramboll introduced its UK 'Return to Work' work scheme, a recruitment initiative directed at engineering, design, project management and consultancy professionals who have taken a break from their careers for at least twelve months. With such career breaks disproportionately affecting women, the initiative forms part of Ramboll's wider programme to improve gender representation across the business. However, it is important to note, the scheme is open to all genders.

The first intake was a success: seven women joined the business in roles across project management, engineering and sustainability, to welcoming acclaim from team members and colleagues further afield. With applications open for the second round of the programme, Ramboll sought the reflections of those first returners, their managers and colleagues and consider what the industry and other potential career returners can learn from their experiences. In the words of Ramboll's UK Managing Director Philippa Spence: "culture needs to be constantly shaped, and we do this by making the effort to discuss things – particularly difficult topics – throughout our organisations." The sector must not overlook the barriers, both real and perceived, that individuals returning to work after a career break have overcome to secure their positions. After all, it is by recognising the individualities of their experience that solutions to the challenges they have faced can be identified.

The returner's landscape

Looking for work after a career break can feel like an uphill battle. Whilst perhaps now less common post-pandemic, applicants might come up against a lack

of flexibility that is incompatible with their family responsibilities, which is one of the leading reasons for women taking their career breaks. A 2020 Office of National Statistics report on families and the labour market found 15 per cent of mothers were out of work because of caring responsibilities, compared to just 1.9 per cent of fathers.

Additionally, rigid application processes might ignore the wealth of relevant experience or transferable skills a candidate holds or fail to take into account what has driven their decision-making, seeing them only for the last position on their CV. This was something experienced by Ramboll Project Manager and Return to Work scheme alumni, Hajra Khan: "If you are being rejected from your field for taking a career break and yet also rejected from less skilled jobs for being overqualified, where are you supposed to fit?" To add to the frustration, Khan was also completing a second degree in business management during this period.

Beyond the obvious financial and security struggles such barriers can throw up, there is a myriad of emotional consequences to those rejections, which are only likely to further negatively impact a search for employment. A common experience shared by several of Ramboll's returners was a loss of confidence when looking for their first role back. They talked about previously feeling the need to apologise for their background and career break or else to compromise on their ambitions. Ramboll returner engineer and project manager Naz Jones, for example, ended up settling for a part-time role in a different field after having her child because she was sceptical about finding a full-time position utilising her skills and experience that would fit around her family responsibilities. It's an all-too-common situation; sometimes a part-time role provides exactly what the returner needs at that stage, but it doesn't necessarily follow that a part-time role is a flexible one. Hearing of too many such situations begs the question: what can the engineering sector do to ensure that no one need compromise their career in the pursuit of a more family-friendly working pattern and culture?

Furthermore, whilst the workplace revolution wrought by the pandemic has helped many organisations take strides forward in the way they support their employees' work-life balance, individuals who have been away from work for some time may not fully realise the cultural shifts that have taken place. The pre-pandemic offices they expect to return to can seem like daunting and unforgiving places.

It's important to remember that each of these challenges, formed by conscious or unconscious bias, are happening to qualified and experienced professionals. Clearly, something still has to be done differently to prevent valuable talent being locked out of a sector challenged by a continuing skills shortage.

To return to Ramboll

One of Ramboll's responses to these issues has been to divide the hiring process of the Return to Work scheme into broad categories of work, rather than specific roles. Hiring managers have also been trained to unpick CVs, so rather than applying strict criteria for a role, they look at candidates' wider backgrounds and transferable skills and how these might be developed to fit within their teams. Ramboll's UK MD Philippa Spence herself is a role model for this, leading an organisation best-known for its engineering expertise, despite being from a consulting background. For Hajra Khan, who worked as a Design Manager in Telecoms in Pakistan before she moved to Scotland, Ramboll's recognition of her skills and experience from her role abroad was a relief and a marked change from previous applications. Naz Jones too acknowledges the value of this approach: "If Ramboll hadn't been willing to look past the most recent listing on my CV, there's no telling how long it would have taken to get my career back on track and to the level I'm currently working at."

In addition, Ramboll's scheme was developed alongside Inclusivity Partners, return to work specialists who offered extra support to the applicants during the hiring process and throughout the programme. Returners benefitted from additional training, one-to-one sessions with a return-to-work coach and had internal mentors upon starting their role. For Zhi McPherson, now a Senior Engineer in Ramboll's Building Structures team, this bespoke support and the fortnightly catch up sessions with her fellow returners was a crucial element of the scheme: "Returning to work is a practical challenge and having a dedicated support programme to guide

you through it validates your experience, as well as securing its success.” As Hajra Khan adds: “we need to better appreciate the anxiety of someone returning to work, and employers should be looking to invest in people rather than ready to use, carbon copies of what they already have or expect.”

Unsurprisingly, the flexibility on offer to members of the *Return to Work* scheme has been another essential pillar of its popularity, if not the most essential. Arrangements have taken various forms, from term-time only positions to more familiar working from home set-ups. It is important to note too that this is a policy embedded across Ramboll, rather than being reserved for returners or on the basis of length of service or goodwill. A recent internal survey of employees who joined Ramboll within the past six months showed that the availability of flexible working was their most frequently reported priority, followed by opportunities for development and salary.

The wider landscape

To those who might be considering a return to work, schemes like Ramboll’s are just one sign of the progress that an increasing number of organisations are striving to achieve when it comes to embedding employee wellbeing at the heart of their culture. For example, Ramboll has also recently added to its wider diversity and inclusion networks with the launch of an ‘Ability’ network to support and advocate for different abilities, thinking styles and visible and non-apparent disabilities. Such networks are enjoying high levels of engagement, with a recent internal Ramboll webinar on dispelling neurodiversity myths attracting more than 200 attendees.

Of course, the working world is by no means perfect yet, but meaningful efforts like dedicated *Return to Work* schemes are consciously creating not only more equitable, inclusive and flexible workplaces, but careers that work for the talented individuals driving them forward. What people want from their careers has changed over the last 20 years, as employees now want to (and can) pick their employer based upon their own priorities and values.

Employers, take note: the industry needs to capitalise on this post-pandemic moment to drive progress forward, rather than letting it fall back to 2019. Ultimately, productivity relies on recognising this shift. And to career breakers considering a return to work, or even any employee considering a move: the work-life balance you strive for is possible. A fulfilling career, your wellbeing, and your family priorities can co-exist. Hopefully in the near future this will be nothing to shout about, and instead simply a given.



WES Fellow Louise Hardy FWES explains how volunteering can transform your life and your career.

Volunteering – the benefits to your career

We all know that giving your skills to a worthy cause for free is an affirmative and positive contribution to society. However, when I began undertaking voluntary work 15 years ago, I thought that I was just giving to others. I was wrong. I had no idea how beneficial, skills-rich, mind expanding and educational it would be for me. In fact, ultimately this voluntary work would enable me to later reshape my own career. This is my volunteering journey.

In my thirties I was a totally focused career woman, managing a huge, complex portfolio of infrastructure projects on the London 2012 Olympics. Big pressure; even bigger, globally visible deadline! My boss asked if I would stand for election to the General Council of the Institution of Civil Engineers [ICE]. My initial reaction was: “You have got to be kidding me!” I was already so busy working long hours, how could I fit in another role? The company had never had anyone elected to this council, but they thought that I was the person to do it. So, I stood and was elected. The volunteering bug had bitten me! The different culture, governance structure and broader context of debate were mind expanding. I could almost feel new synaptic connections forming! Soon I was co-opted on to a range of other ICE committees, all of which extended my knowledge.

Great value in volunteering

Additionally, I went on to become a chartership reviewer, assessing young engineers to enable them to obtain their professional qualification. Connection to the younger generation provided a window to emerging technology and changing societal needs. It was a crossroads for me, and I pledged to commence a personal quest to help educate and mentor youngsters. Volunteering had now become an essential part of my life. Even during my maternity leave I continued my voluntary activities, thereby providing a valuable link within the construction industry and easing the sense of career separation that some

Voluntary work:

- Is it educational, skills building, and mind expanding? Yes.
- Is it fulfilling and personally and societally beneficial? Yes.
- Can it help you in the course of your career? Absolutely, yes!
- So, I say to everyone, get out there and volunteer.

new mothers can feel. Voluntary work was educating me and opening up new avenues of fulfilling activity.

I travelled widely to give talks to institutions and schools. Consequently, I was mentoring a growing group of engineers and future leaders, learning much from them in the process. My skills were to be further embellished as I began to Chair some of my voluntary committees. The volunteering experience that I had gained was to prove pivotal when I decided to embark upon a non-executive portfolio career and move on to the main boards of engineering companies as an independent director. My most potent, relevant, and demonstrable skills for these roles were derived from my voluntary work and facilitated an almost seamless move into a new career dimension.

I now sit on several FTSE listed boards, but I place so much value on the great benefits of volunteering that I always keep a charity or trust board position within my portfolio, as well as continuing my mentoring and STEM education activities.

Read more about Louise Hardy’s achievements on page 11

WES Boards are Recruiting

The WES Early Careers Board and the WES Apprentice Board are recruiting. They are looking for enthusiastic individuals who are passionate about promoting diversity and inclusivity in engineering. Not only will you lead on projects supporting and empowering other women whilst diversifying your skill set; but this is also a great opportunity to aid your own personal development and learning.

WES Early Careers Board

The WES Early Careers Board is a group of twelve early career engineers who are passionate about promoting diversity and inclusion in engineering. The ECB aims to make WES more accessible to younger members, to reflect their concerns and priorities, and provide input to WES Trustees and staff, allowing the voices of younger engineers to be heard.

Applications are open to anyone over the age of 18 who is in the early stage of their engineering career. The Board is looking for individuals who share a passion for promoting diversity and inclusion in engineering, and who want to actively support and lead projects.

To apply visit: www.wes.org.uk/ecb

WES Apprentice Board

The WES Apprentice Board was formed in 2020 as a voice for female apprentices in the engineering industry. The Apprentice Board is currently recruiting for new members who share a passion for promoting diversity and inclusion in engineering, and who want to actively support and lead projects.

Applications are open to members over the age of 18, not in full time education who are currently undertaking training in line with one of the National Apprenticeship Standards or Apprenticeship Frameworks in an engineering field.

To apply visit: www.wes.org.uk/content/wes-apprentice-board-applications-2022

University Groups Board

Turning the page for a successful start to the year

The WES University Groups Board (UGB) hosted a Book Club event in February.

Focusing on networking, attendees brought along their favourite books by female writers, or that had main female characters to discuss with other students in breakout rooms. The event was a success with attendees from six different universities taking part.

As well as hosting events, the WES UGB Instagram and LinkedIn were set up with the aim of expanding the reach of the group board and increasing the profile among other WES affiliated university societies. Both platforms have had a positive impact on the Board and have encouraged more students to join events. They can be found @wesugb on Instagram and WES University Groups Board on LinkedIn.

The second event hosted by the WES UGB was an early careers panel talk which took place on International Women's Day and which attracted over 20 attendees. They were joined by Patricia Ashman,

New Members

WES welcomes the following new Members:

Denise Atkins, Rachel Bennett, Lottie Billson, Judith Calvert, Gillian Cameron, Kate Caste, Cassie Croghan, Lilla Csernus, Emilia De Luca, Beth Dickens, Jessica Falconer, Dominika Falecka, Hannah Fisher, Federica Franceschini, Tamsin Fuller, Lily-Ebony Ganchi, Cecile Garaygay, Lisa Hey, Nicole Hennessey, Ahmed Hosne Zenan, Alice Lacy, Sarra Lebeche, Cary Marsh, Tara Mckibbin, Susmita Naskar, Georgia O'Keefe, Louis Raynham-Throp, Joanne Roberts, Liliiana Rose, Agnieszka Rutkowska, Natalie Ryott, Lucy Alice Shaw, Niamh Spurlle, Swati Swati, Navya Thomas, Katie Tilley, Zandan Uvgunkhuu, Amelia Weaver, Roshna Zangana, Sheri Zhang

New Associate Fellow

WES congratulates the following new Associate Fellow:

Susan Robson

Partner News

WES is delighted to welcome our new Event Partner Jaguar Land Rover. We are also delighted to welcome Company Partners: Harbour Energy, Spirax-Sarco Engineering, and TPG Services Ltd.

We are also grateful to our renewing Partners which include: Costa Express, DP World (London Gateway Port Ltd), Scottish & Southern Energy PLC, Sellafeld Ltd, YASA Limited, Cubic, Thales, Anthony Best Dynamics Ltd, Rotork, Aston University, Henry Royce Institute, Coventry University, Edinburgh Napier University, Durham University, Heriot-Watt University, University of Sheffield, and Dialog Semiconductor.

Partnership enquiries, contact: partners@wes.org.uk

New Events and Marketing Manager

We are delighted to announce that Candi Colbourn has joined WES as our new Events and Marketing Manager.

She joins us after 17 years as the Conference Manager at the Institute of Physics and Engineering in Medicine.

Speaking about her new role, she said: "I am absolutely delighted to be joining such an exciting and important organisation as WES. I am a passionate believer in equality and am looking forward to using my knowledge and expertise of events and marketing to help build on the incredible work being done. If you have any ideas for events or projects that you think we could help with then please do get in touch as I'd love to hear from you." Email: Candi.Colbourn@wes.org.uk

Apprentice Board Coming together fosters a greater community

WES APB member Jade Kimpton offers an insight into the recent board activities.

In March, the WES Apprentice Board was fortunate enough to attend their first in person meeting at Volvo Trucks and Buses. Not all the members of the APB were able to attend, but it was great to meet those who were present. Members from the WES University



Groups Board and WES Early Careers Board also attended the meeting; offering a fantastic opportunity to network between the different boards.

The members of the APB all agreed that one of the key benefits to being on the Board, is having a support network of other women engineers. Not only are we able to support each other and grow together, but it's also interesting to learn about each other's different engineering disciplines. The APB wants to try and develop this sense of community between WES Members who are also apprentices but not on the Board. Therefore, and as a result of the meeting, some exciting projects are being developed. The APB members are currently looking into the possibility of hosting a networking event for apprentices who are also WES Members – hopefully these events would allow us to support other apprentices and develop more of a community amongst women engineers. The APB is also looking to create a series of 'How to guides', aimed at apprentices, to help with career development and dealing with challenging situations. New episodes of the APB podcasts are also being developed; each episode will provide an insight into a specific engineering discipline.

It was good to have the opportunity to discuss these ideas in person and we're all really looking forward to sharing the results. The APB would also like to say a special thank you to Volvo Trucks and Buses for hosting such an insightful day!

The APB is also developing the Board's social media presence to try and further build a network of female apprentice engineers. The APB can be found on LinkedIn, Twitter, and Instagram @WESAPB; where you can find further information about the Board members and get exciting updates on the Board's progress.

New role for a PAST PRESIDENT

WES Past President Dr Carol Marsh OBE, CEng FIET, Chair of the IET Council and of the Engineering Policy Group Scotland, has joined Celestia UK as its new Head of Digital Systems.

Marsh joins Celestia UK from Leonardo, where she held various senior roles and most recently was Deputy Head of Electronics Engineering. She will expand the digital systems capabilities for satcoms, signal processing algorithms and distributed platforms which augment Celestia UK's RF and antenna expertise.

As a Chartered Engineer and EUR ING, Marsh has had a distinguished career in industry and academia, winning a plethora of awards in technology and for inspiring women in engineering. In 2020, she was awarded an OBE for services to diversity and inclusion.

Marsh was awarded the degree of Doctor of Engineering in System Level Integration from the Universities of Glasgow, Edinburgh, Heriot-Watt and Strathclyde in 2011 and holds an HND in Electrical and Electronic Engineering from Edinburgh Napier University.

She brings more than 30 years of industrial experience at senior engineering levels including Senior Design Engineer for GEC Marconi Avionics, becoming their first engineer to produce a design using an FPGA. She then went on to hold principal digital design and FPGA engineer roles at BAE Systems and ECS Technology, respectively.

Marsh said: "The Celestia UK team is working on really exciting innovative technology that is creating new options for the satcom marketplace, and I am very excited to be getting involved in the design and ultimately the production processes at such an important juncture.

"For me, it's the chance to get back to engineering development as well as be involved in the space industry which here in Scotland is growing faster than anywhere else in the UK. I'm looking forward to being able to put all the experience I've gained in the field to help Celestia UK achieve its aims, as well as continuing to promote engineering, STEM and women engineers."



Inventors & Innovators #INWED22



With less than a month to go, INWED 2022 looks set to be even bigger than before and have a greater impact.

This year we are concentrating on **Inventors & Innovators** and once again highlighting the breadth of opportunities a career in engineering offers.

Our INWED website is packed full of ideas and inspiration to encourage you and your workplace to celebrate this special day.

In 2021, INWED's Twitter campaign recorded a potential reach of 526 million users, with the official INWED hashtag trending at number one in the UK on the day! The INWED website was viewed 56,000 times during the month of June, with hundreds of events registered and reports of many more. INWED events took place in countries such as Panama, Canada, Rwanda, Hong Kong, Sierra Leone, Australia, and New Zealand (to name a few!).

Get involved in this year's event #INWED22

www.inwed.org.uk



Staying focused in a world of negative career advisors

Continuing our series where WES Heritage Officer, Helen Close, delves into the trailblazing past of some of our members.

An academic system that frowned upon a non-academic route couldn't deter Barbara M Stephens OBE from becoming a very successful mechanical engineer, thanks to encouragement from her family, who didn't subscribe to so called traditional gender roles.

"I spent a lot of time with my Uncle George who was a very skilled mechanical engineer, and my grandfather, who drove steam locomotives," she says. "I was fascinated by their stories and skills. My all-girls school was pushing me towards a degree in history, but I couldn't see what I would do with it if I had it (no way was I going to be a teacher), and then I saw a newspaper article about apprenticeships. I applied to six companies, and Marconi offered me an apprenticeship. My school was very cross about me turning down a place at the University of Kent, but my father encouraged me to go for it, and said if it didn't work out, I could always do something else. So, I did."

With the support of her family and a passion for understanding how things work, Barbara embarked on a lengthy and rewarding career. However, her journey did involve some resistance, most notably from a newcomer to senior management at the company she loved working for. Barbara explains: "Initially I worked at Marconi as Chargehand of a section of capstan lathes with five men working for me, then I had a variety of roles, including Chargehand of the paint shop (where equipment made by Marconi was painted), Workshop Superintendent of a small factory making electronic devices, Production Engineer, and later Production Controller, then a Sales Manager, then Project Engineer and finally Project Controller, so finally qualifying as a Project Engineer. I stayed in industry for 18 years, until a new Managing Director introduced a brand-new glass ceiling that had never been at the company before, and I left to become an adviser to the electronics industry at the National Economic Development Office (NEDO), who sponsored me on an MBA specialising in engineering."

Her time at Marconi had proved educationally successful too as she had undertaken a Mechanical Technician Apprenticeship and achieved an HNC in Mechanical Engineering. Marconi also sponsored her to study for a Diploma in Management Studies part-time and she qualified in project management.

When the Government closed NEDO at the end of 1992, Barbara secured a role as Chief Executive of the West Cumbria Development Agency. She recalls: "They had advertised for someone who had an in-depth understanding of industry, a background in economic development and a formal management qualification and didn't expect a disabled woman to be the best candidate. When the incoming Labour government created Regional Development Agencies, quite a lot of our funding was diverted to the new regional agency, and I had to downsize WCDA, and make myself redundant."

Subsequent roles were: Chief Executive of the Local Government Commission for England, based in London; then leading the job of merging the LGCE with the Electoral Commission. Having been made redundant in March 2002, Barbara moved into executive recruitment, focusing on Vice Chancellors, PVCs, DVCs and Deans in higher education, as she had had a number of non-executive roles in engineering education and higher education, including Senator of the Engineering Council and Board member



of the Higher Education Funding Council for England. Barbara says: "I had two roles in recruitment until the financial crash in 2008, when executive recruitment came to a grinding halt and I was made redundant for the fourth time. However, I was then successful in applying for the role of Regional Director for London with the Open University, commencing that role in April 2009.

"In 2011, the Government introduced fees for HE students in England, and a much slimmed down funding regime for universities, and the Open University lost many millions in funding. This necessitated a slimmed down senior management, and guess what, the role of Regional Director was abolished (my fifth redundancy). However, I applied for redeployment and became Director of Student Casework and Director of Special Projects, building on my previous experience. I had intended to work for another five years, but unfortunately in 2013 I had a heart attack at work, after which it was discovered that I had cancer, surgically treated, and lost my stamina. Although I returned to work briefly, I could no longer cope with the extensive travelling, and retired from the Student Casework role, which was 75 per cent of my work, in early 2014. I continued as Director of Student Casework (a 25 per cent role) until May 2016, as they had some difficulty recruiting to this role, and it could be performed remotely, attending Milton Keynes on average one day a month."

With a vast experience in the education sector, Barbara has some thoughts on what needs to change to encourage more girls into STEM subjects. "The problem that all careers have is that, if it isn't something that pupils come into contact with in their normal lives, then they often don't feel comfortable applying for that role. I am Chair of Governors of Energy Coast University Technical College, taking pupils from Year 10 to Year 13 inclusive, and with the specific aim of attracting the best talent into industry. We work closely with employers (lots of them) on projects and work experience, and in a normal year 85-90 per cent of our pupils, of whom 30 per cent are girls, go into apprenticeships at all levels including degree apprenticeships. That is what we need to do – bring students into contact with industry early.

"Just because you start as an engineer, doesn't mean that is what you will end up as – my career demonstrates what an engineering base can lead to. There are lots of transferable skills, like teamwork, problem solving and others, which employers like. I have had such a special life, and if I had become a teacher, I am sure it would not have been as much fun."

Barbara was awarded the OBE for services to local government in the Queen's Jubilee Birthday Honours.

For 30-year-old Process Engineer Fella Ryanitha, the expectations from her family and the wider community in her native Indonesia were somewhat different. "In my family especially, and in Indonesia generally, it is a common perception that although women can work professionally, at the end of the day women will support the husband as the main breadwinner in a family. So, the women do not need to work too hard because at the end of the day they will also take care of the house," she explains.

However, Fella is full of curiosity. "I like solving

problems logically, to give a solution which is useful and efficient," she says. "I believe the technology that is created by an engineer can achieve that." Consequently, she became a "first" in her family and community. She tells us: "I am the first granddaughter in my family, from both of my mum and dad's side, to take an engineering degree, back in 2009. I took a Chemical Engineering Degree at the Universitas Diponegoro, Indonesia.

I am the first woman from my university to have an internship in an oil & gas facility in Hess (Indonesia-Pangkajene), East Java, Indonesia. I had my internship alone back in 2011, although usually the Internship is undertaken in conjunction with another person. Taking an engineering degree, I wanted to prove that women can also work in a profession that is deemed fit for men by the 'usual' standard.

"Back in 2011, it was also uncommon for women, especially alone, to have an internship in an oil & gas company, with the perception that woman do not have enough power to work in a 'tough environment' like this. But while I was there, I took part in the plant's shift schedule, and I also managed to make a simulation calculation for one of the distillation processes in the plant."

Fella is keen for the message about women selecting engineering careers to filter through to the educators and influencers in a society. "What I think needs to happen to get more girls into engineering is to not only give more exposure about STEM to girls and women, but also to provide more explanation to their parents and family, that girls can also pursue a career in engineering, so the daughters can get the support from their family, even if only a moral support."

Fella recently joined WES and is clear about her motivation. "One of the reasons I joined as a member of WES is because I am interested in the WES MentorSET Program.

"I would like to change my career into a different subject of engineering, but I am not sure how to start and whether the skills that I have now and the skills that I am learning now provide the right path to start a new career. I would love to have a mentor whom I could ask for advice." Now that's a call to action for WES Members keen to help a kindred spirit!

When contemplating "firsts", Lynda Murchie, an electronic engineer and Programme Manager for cyber and physical security for BT, tells us, in much of an afterthought manner: "I launched the first Broadband product in the UK." Now that's quite some "first". Lynda is also proud that she was the first chairman of the IEE (now IET) satellite communications group.

When questioned as to what she believes is significant about her "firsts", Lynda humbly says: "No idea, I just did it."

For Lynda the journey was borne out of a compelling need to find out how things work, something she has always experienced. This led to a Degree in Electronics and Microcomputer Systems in 1989 and becoming a Chartered Engineer in 2001.

Lynda was keen to do a course to find out more about engineering when she was at school but didn't get a place, so she opted to do a chemistry degree, but at some point she changed her mind and focused on engineering, something she has not regretted and she is keen to encourage other girls and women to consider engineering. Such is her interest in what individuals can achieve that she is part of the WES climate change group and is currently mentoring six mentees to, as she puts it, "give something back."

For Samantha Ashman, her career path could have been so different if she had listened to the naysayers, who sadly discouraged her from an early age. "I found engineering interesting

and loved the aspect of the practical experience to solve problems," she says. "My career advice was not positive about engineering and the career advice team tried to steer my career into something that I did not want to do as I loved my GCSE subject of Design and Technology and wanted a career in this area."

Thankfully, Sam stuck to her guns and took inspiration from those close to her. "My male family members have been engineers either current or retired and worked in a variety of industries such as power stations, mining, vehicle repair, wire production and centre lathe turner for tractors and plant machinery and I loved hearing their stories on how they solved problems and made new products which is why I chose this career," she says.

Sam went on to gain a BEng (Hons) Mechanical Engineering from Sheffield Hallam University in 2002; and an MSc in Engineering & Management at Sheffield Hallam in 2005 and PGCE in Education from the University of Hull in 2006.

She is a multiskilled engineer with expertise in fabrication and welding, mechanical, refrigeration and air conditioning and motor vehicle and she is working for the awarding organisation City and Guilds as a Technical Advisor for engineering.

Sam has a list of firsts:

2000 – first female engineer to work as a Trainee Mechanical Engineer at Corus Engineering Steels (Bright Bar Rotherham), part of degree placement.

2002 – first female engineer to work as a draughtsperson / Co-ordinator Engineer for Sheffield-based Blessvale (UK)/Specialist Cladding Limited – now dissolved.

2003 – first female engineer to teach motor vehicle engineering at Doncaster College.

2005 – first female engineer to work as a Material Technologist at Independent Forgings and Alloys Ltd.

2006 – first female engineer to teach engineering (fabrication & welding, mechanical, refrigeration and air conditioning) at Grimsby Institute of Further & Higher Education as well as the EAL Co-ordinator for functional and key skills.

2010 – first female engineer to teach motor vehicle at North Nottinghamshire College.

2011 – first female engineer approached by WorldSkills and WorldSkills International to become a Workshop Supervisor for around 30 competitors and 20 international chief experts for Manufacturing Team Challenge at London Excel Arena.

2013 – first female engineer to teach engineering to apprentices and then become the Curriculum Manager in 2014 at Training Services 2000 Ltd/Learning Unlimited Derby.

2020 – One of two Technical Advisors for Engineering at City and Guilds, the other is male.

Sam is particularly proud of her current role. "At City & Guilds we do work with women engineers who are consultants and help us develop qualifications for the future," she says.

She has strong opinions about what needs to be done to shape engineering recruitment in the future, saying: "Promotional material needs to be less stereotypical, there needs to be less stereotype in industries, more events around STEM, role models of female engineers to be published worldwide including noticeboards etc., and there needs to be advertising material such as news feeds on social networks around girls in engineering.

Having experienced negativity at school, Sam warns that following ambitions is vital. She tells us: "If your dream is to work in engineering, then go with your instinct. If a career adviser tries to change your career direction, then ignore them. Engineering is a great career and can open different avenues as you train and qualify."



The climate crisis is arguably the biggest challenge to face mankind, and its far-reaching impacts will affect all of us, whatever our gender. Yet, the professions working to solve our most pressing environmental problems are predominantly male. Here, renewable energy start-up Katrick Technologies celebrates two of its female engineers and their contribution to address the environmental crisis, as well as exploring what businesses can do to attract and retain female employees in STEM roles.



Are more women engineers needed to solve the climate crisis?

As a result of gender inequality, women bear the greatest burden of the effects of global warming. According to the UN, women make up an estimated 80 per cent of people around the world displaced by climate change. It would make sense, then, that women are also at the forefront of the fight against global warming. However, many of the professions able to make real change in this area are in the heavily male-dominated STEM fields. For example, even in the UK women make up just 24 per cent of the total core-STEM workforce, falling to just over 16 per cent of engineering professionals.*

The importance of women in environmental decision-making roles was emphasised at COP26 in Glasgow, with a joint statement published by the Scottish Government and UN Women, calling for the role of women and girls in addressing climate change to be advanced. The statement declares: “the fight against climate change must be closely connected to the fight against gender inequality, and... ensuring women’s and girls’ leadership is vital if global efforts to tackle climate change are to succeed.”

With more women needed in STEM roles to help with the fight against climate change, businesses must encourage more women into STEM careers. Here, two women engineers working at green energy start-up, Katrick Technologies consider the situation.

Disrupting the energy sector

Katrick Technologies is a leading innovator in the carbon-zero market, recently identified as one of 50 key disruptors in the UK with the potential to make a difference against climate change. The start-up has designed and

patented two lead products. The first – wind panels – reimagines wind-power generation, by using smaller devices with no rotating parts, which can be installed in a far greater number of areas, including on commercial buildings and built-up zones. The second is passive cooling, which is a system that uses oscillations, generated by the vibrations from waste heat energy, to passively cool data centres. This technology represents a 50 per cent reduction in power consumption and carbon emissions.

Two women engineers working on Katrick Technologies’ world-first renewable energy technologies are Victoria Phillips, lead engineer, and Amy McGill, mechanical engineer; both work on Katrick Technologies’ wind panels. Phillips leads and manages all research and development relating to the wind technology, as well as facilitating engagement with academic and industrial partners. Phillips studied maths and physics at university, followed by a master’s degree in engineering. She explained: “I made the switch to engineering as it gives you an opportunity to be creative, in a field that normally isn’t thought of that way. With engineering, you get the opportunity to dream up an idea and then go into the lab and actually build it.”

McGill began work at Katrick Technologies as an intern just a week after graduating from a computer-aided mechanical engineering degree, before joining the company permanently at the start of 2022. Her role includes a mixture of practical and lab work, and later this year she will begin developing new prototypes.

According to McGill, the reason it’s important for more women and girls to pursue a career in STEM is simple. “Diversity benefits every

industry,” she explained. “STEM careers develop things for everyone to use, so having the biggest variety of inputs results in better end products.”

Phillips agreed, adding, “STEM has always been a male dominated environment, and so it’s important that women, especially young girls, know there are no limits on them or what they can achieve.”

Careers that can change the world

STEM careers offer the potential to leave a lasting impact on the world. For McGill, pollution is a significant concern. She says: “Pollution is really an all-encompassing issue when it comes to environmental concerns. Related issues include greenhouse gases, public health, and biodiversity. At Katrick Technologies, we’re building clean energy solutions that present an alternative to fossil fuels – it’s rewarding to know what I do is linked to the big issues I care about.”

Both McGill and Phillips are enthusiastic about the potential of the company’s products. They commented: “The wind project is an adaptation of something everyone is familiar with, taking wind energy and generating electricity from it. But, our technology reimagines this concept, creating new opportunities for power production in non-conventional environments. While the passive cooling system is unique from an academic standpoint, it introduces a completely new refrigeration cycle. Both technologies are significant for different reasons.”

For Phillips: “a career in engineering lets you use your problem-solving skills every day. Just

when you think you've seen it all, new challenges evolve. As an engineer, you never stop learning and progressing – it's just fun!"

Plugging the leaky pipe

When it comes to the challenges of hiring more women employees in STEM roles, McGill points to reviewing the job advertisement processes. "The numbers of women working in STEM roles are growing year on year. Qualified female candidates are out there, so if a business is getting no female applicants, they have to do better to seek them out." For example, reviewing language used in a job advert, as well as where the business is posting jobs.

Having been part of the recruitment process at Katrick Technologies, Phillips recognises that there is still a long way to go to increase the numbers of female applicants. She believes in encouraging women and girls much earlier on in the education process, ensuring all children get to explore their curiosity without the restrictions of gender expectations.

When it comes to retaining existing women engineers, McGill points to the importance of an individualised approach to employee welfare, noting that women do 75 per cent of unpaid care work. "We need more equity, rather than equality, recognising that everyone has different circumstances and therefore needs slightly different treatment to be truly equal," she said. "Many women take on much of the burden outside of work, including care work, and so implementing a culture where employees have to work long hours in order to progress, for example, would be unfair to those women's disadvantage."

"To retain more female employees, businesses should ensure they offer flexible working practices, and are able to appreciate and meet the needs of their employees."

According to Phillips, a culture of support and transparency is essential. "It's an uncomfortable truth that there are inequality issues within the engineering industry. Rather than sweeping these issues under the rug, companies should ask their employees about the challenges they face and encourage open conversations... everyone's voice carries the same value and deserves to be heard."

For women and girls considering a career in STEM, McGill and Phillips had this advice to give: "Don't be put off by being in the minority. You can't change the cards you are dealt, but you can change how you deal with it. For every disadvantage, being a woman in engineering, there is another advantage, so make sure you benefit from any opportunities that are given to you."

When asked about her experience of gender in the engineering field, McGill highlighted one of her final university projects – designing a high heeled shoe. The reason it was so notable, she explained: "was because it was the first time I had ever worked on something where women were the intended audience." Phillips, jokingly, responded that the reason high heels are so uncomfortable is because they aren't properly mechanically engineered. Perhaps this exchange points to the heart of the intersection between gender equality and the climate crisis. Collectively, women stand the most to gain from solutions to climate change, but too often they're shut out of the rooms where those solutions are designed. By encouraging women and girls into STEM fields, businesses can take advantage of the innovation a more diverse talent pool brings, while also helping to bring about a more sustainable and equitable future.

*recent statistics from EngineeringUK



Victoria Phillips, lead engineer



Amy McGill, mechanical engineer

WES Fellow honoured with AWARDS SUCCESS

WES Fellow Louise Hardy has been named as the overall 'Business Woman of the Year' at the National Business Women's Awards (NBWAs).

She picked up the accolade at the NBWAs in November 2021, where she had also scooped the award for Business Woman of the Year for large companies with a turnover greater than £25m.

This award acknowledges inspiring innovators and visionaries and is open to business leaders who have achieved accomplishments of significance over their career. Nominees possess qualities of vision, innovation, entrepreneurial drive, leadership and demonstrate their commitment to gender diversity.

Hardy certainly has the aforementioned attributes. Having become a fellow of WES in 2015, she subsequently was named in the inaugural *Top 50 Most Influential Women in Engineering* list published by WES and the *Daily Telegraph* in 2016. She is a chartered civil engineer and a Fellow of the Institution of Civil Engineers (ICE). Her most notable career role was as Infrastructure Director on the London 2012 Olympic Park where she managed £2bn worth of critical infrastructure.

Hardy manages to pack a great deal into her daily routine, including educating youngsters on STEM careers and mentoring women in the industry.

Following the birth of her twin daughters in 2012, she began to build a non-executive director portfolio sitting at main board level on FTSE listed and public sector engineering companies. This currently includes a board position at Severfield plc, one of the UK's largest steel fabricators and erectors, where she became the first woman appointed to the board in the company's 40-year history. It was roles such as these that saw her triumph at the NBWAs in November 2021.

She combines her board roles with voluntary work in the sector. She was the first female chair of the ICE and created one of the most diverse committees at the institution. Hardy's work with other women in engineering has been recognised at the *Forward Ladies National Leadership Summit*, where she was declared the winner of the 'Mentor of the Year' award and went on to be announced as their 'Overall Business Woman of the Year, 2021'.

Well done, Louise, it is fabulous to see one of our Fellows recognised for her professional and voluntary work.



A founder member of Electrical Association for Women is honoured

Norah Balls, a North Tyneside suffragette and community activist, has been honoured with a blue plaque and a special display about her life and achievements.

Balls, who championed women's causes throughout her life, was involved with many organisations, including as a founder member of the Electrical Association for Women (EAW) and as a chair of the local group.

In recognition of her many achievements, on *International Women's Day 2022*, North Tyneside Council arranged for a blue plaque to be installed outside the family's former home in King Edward Road, Tynemouth and a display about her was opened at the Old Low Light Heritage Centre, North Shields Fish Quay.

The display explains how Balls, daughter of a North Shields mariner, was an active member of the Women's Social and Political Union (WSPU), led nationally by Emmeline Pankhurst. She later became involved in many other aspects of community life focusing on supporting and improving the lives of girls, women, and families.

As a WSPU member she toured the region addressing meetings, often facing angry crowds. When Home Secretary Winston Churchill visited Newcastle in 1909, she challenged him over votes for women and later interrupted a



presentation he was making. A year later she joined over 300 suffragettes in London angry that Prime Minister Asquith had reneged on a promise to introduce a bill for partial female suffrage. There were ugly scenes and she was arrested on three occasions. Like many suffragettes she ended her campaign at the start of WWI, directing her efforts to setting up a canteen in Whitley Bay for soldiers.

Through the WSPU, she met Lady Katharine Parsons, wife of Sir Charles Parsons who invented the combine steam turbine, who was an engineer herself. Lady Parsons was involved in the development of a new association – the EAW – and Balls worked with her. Its purpose was to educate women to make the best use of electricity in their homes and lessen their burdens. They ran courses in colleges awarding diplomas. Balls became its chairman in the local area, promoting its work and speaking at

conferences around the country.

She helped to set up the Girl Guides in Northumberland, becoming the first county secretary. In 1932 she was awarded the *Oak Leaf Medal* in recognition of her outstanding contribution to Guiding and in 1936 became the County Commissioner and later president.

She was also a founder member of the Tynemouth Business and Professional Women's Club, a Justice of the Peace, a councillor in North Shields, served on health education and children's committees and a member of many other organisations. When she resigned as a councillor in 1951, she was reported to be a member of 28 different committees across the community.

In her later years she moved into a cottage in Bamburgh and died in Berwick Infirmary in 1980, aged 94.

Nina Brown, a volunteer and trustee at the Old Low Light, who researched the life of Norah Balls and curated the display said: "Women today stand on the shoulders of women like Norah Balls. During my research, I discovered a champion for women, with great courage for a cause, adventurous and with a strong belief in service to her community. During a recent conversation with her great nieces and great nephew, they described her as having a humble presence, just getting on and accomplishing things, one of life's great givers."

'Deeds not Words' is on display in the heritage gallery at the Old Low Light Heritage Centre, North Shields Fish Quay, which is open Tuesday to Saturday from 10am to 3pm. Admission to the gallery is £4.00pp (members free). For more information, visit: www.oldlowligh.co.uk



EAW and WES – pioneers for women

The Electrical Association for Women developed in 1924 from a proposal by electrical engineer Mabel Lucy Matthews which was taken up by Caroline Haslett at the Women's Engineering Society. There was ongoing involvement between WES and the EAW and in 1933, the EAW moved to share their new headquarters in London with WES.