

International Women In Engineering Day



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We do not stand still. Together we remain agile, put innovation and technology at the forefront of our thinking, and **drive change** for the future.



Introduction

During these unprecedented times with regard to Coronavirus it is not possible for BAE Systems Maritime Services to support the International Women In Engineering Day (INWED20) in our normal way at Portsmouth Naval Base.

In previous years BAE Systems Maritime Services, in collaboration with Winchester Science Centre, hosted a special event to celebrate Women in Engineering attended by teams of 10 female students from up to 10 schools within the Hampshire area. The event provided a great hands-on experience to explore how engineering is applied in the real world, as well as to develop teamwork and presentation skills.

This was a fantastic opportunity to inspire students, introduce them to careers in Science, Technology, Engineering and Maths (STEM) and for them to hear from female role models from within our business.

All students had the opportunity to explore the wealth of STEM careers within BAE Systems Maritime Services, identify which STEM career might suit them, and to talk to the various BAE Systems STEM Ambassadors who support the event throughout.

This year, to continue our commitment to INWED20, we have decided to introduce you to some of the many women in engineering within BAE Systems Maritime Services.

You will read about the various engineering disciplines and outputs in supporting the following: the Royal Navy ships; radar; torpedoes; training services; how we recognise and celebrate our engineers and what we are doing in the current pandemic to support the NHS with innovative engineering solutions.

At the end of this article are contact numbers and details of how you can become involved with the various schemes and also the different early career opportunities offered by us.

Jo-Anne

I retired from my previous career in 2003 and relocated to Portsmouth. I have been working in the Naval Base since then, first for the Ministry of Defence and then I joined BAE Systems in 2007. My role is 'Senior Business Support – Professional' within the engineering function. I am not an Engineer, but I think I have the right aptitude to have been a good one. I enjoy everything associated with engineering and as a direct result I have become a registered STEM Ambassador. Everything we do at work, and in life, has the opportunity for improvement or doing it another way. I relish being given challenges and coming up with solutions to difficult situations – thinking outside the box (the same as an engineer does). It would have been so easy to assume the public would understand that because of Coronavirus, BAE Systems Maritime Services could not support International Women in Engineering Day 2020. But this is so wrong – think outside the box – think of another solution. On 6th May I had the idea of creating a booklet and my Line Managers supported me straight away. I contacted several women engineers in Maritime Services and asked for their stories and this is how the booklet began. We hope you enjoy it.



Maddie

What do I do?

I am currently a Craft Apprentice at Portsmouth Naval Base.

I am a Mech Elec by trade which means I can do any Mechanical or Electrical work that is needed on the ships in the Naval Base. I am currently working in the warship support team, with my main place of work being on Type 45 destroyers. There are six Type 45 ships and I have currently completed work on five of them. We are a maintenance team so, our job is to go onto the ship and perform any maintenance or servicing that needs to be done to make sure that it runs safely and efficiently before returning to sea.

I am 3rd year apprentice on a four-year scheme and am due to finish in roughly 18 months' time.

Why did I choose engineering?

My drive towards engineering started from a young age as my dad was a mechanical engineer in the Royal Air Force and performed maintenance on aircrafts. I remember going on family days to his base and being so fascinated by all the work he did because, I could tell that he was making a significant difference to the world. All through school I was determined that I would join the Royal Air Force and follow in the same footsteps as my dad.

What did I study?

In my last year of school I saw a career advisor who encouraged me to think about college and extending my qualifications as much as I could. After visiting a few local colleges I realised that I wanted to do a BTEC in Engineering because I could increase my knowledge of engineering and broaden my knowledge when it came to looking for full time work. I went to college for two years and achieved an Extended Diploma in Engineering however, I really didn't enjoy the theory side of things as I have always been a hands-on type of person.

Before I completed my final year I applied for an apprenticeship with BAE Systems because, I had previously been on a one week work experience with BAE Systems where I saw all the different trades there was to offer and I loved it.

After a successful application I got to the interview stage where I showed two BAE Systems employees a project I had made at college and I was accepted for the job and started in the September.

Why do I love my job?

I chose the craft scheme because I love being hands on and I can't sit still so I always knew I would have to do something that didn't include sitting at a desk five days a week. I work three and a half days on board ships and one day a week doing college work to achieve my level 2 and level 3 qualifications. This is perfect for me because it keeps me busy and interactive.

I chose BAE Systems for many reasons but mainly for the reason that I felt so comfortable. Going into what can be a male dominant industry is very scary, especially being on the tools because it's easy to feel like you are not going to be as good as them but no one has ever made me feel at any disadvantage because of my gender. Everyone is always willing to help me and help me learn new things. I do not feel like I am given a special treatment either. I just feel equal.

Overall, every day I wake up I am glad to be getting up to go and do a job that I love and know I am making a difference to the world. Some days are a struggle but, it is always worth it. I am also at ease knowing if things do not work out at BAE Systems then I have a trade behind me that I can use elsewhere.

I would love to work at Portsmouth Naval Base for the rest of my life because, it just feels like home now and I can't picture myself working anywhere else. I hope to work my way up the ladder to a team leader or trade head role when I feel like I am competent enough to do so but until then, I am enjoying learning new things every day.



Gabrielle

What do I do?

I joined BAE Systems in August 2019 for my Industrial Placement Year as part of my University Degree. I am based at our Cowes Site which forms part of our Radar business and I work to provide mechanical engineering support to both the Artisan 3D Radar, which is for the new Type 26 frigates, and the AWS-10 Radar System. Radars are systems that are used to detect aircraft, ships and other objects and give information on their direction, speed and distance. They do this by sending out pulses of electromagnetic waves that travel out and are then reflected back when they meet an object. A Radar usually sits at the highest point of a ship so is therefore very exposed to the elements, such as; wind, rain, snow, lightning etc. From a mechanical engineering perspective, all of these things must be taken into account when designing a radar as any damage done by these could impact the radars ability to detect, making the ship more prone to attack.

Why engineering?

When I was younger I was fascinated with the 'how' part of everything. I would always be asking how things work, such as; How do the gears work on a bicycle? How does a bridge not collapse when it only has supports at certain points along its length? How can we get electricity from a turbine being turned by the wind? Although this constant stream of questions probably got a little boring for my parents, there were just so many things in the World that I didn't yet know how they worked but really wanted to find out!

What did I study?

This curiosity and love for knowing how led me to study Maths, Further Maths, Physics and Product Design at A level. Throughout sixth form I completed various STEM-related courses and went to talks about the different engineering disciplines. Eventually after a lot of deliberation I decided that I wanted to study Mechanical Engineering at University. I have now completed two years of my Mechanical Engineering Degree at Loughborough University and as part of this course we are encouraged to

complete a 'year in industry' between either the 2nd and 3rd, or the 3rd and 4th years. This is where you go and work for a company for a year to develop your skills and it allows you to apply what you have learnt to real life problems. The industrial placement scheme that I am currently on was advertised by our university and looked like a great opportunity to develop my engineering skills and expand my knowledge.

Why be an engineer in BAE Systems?

BAE Systems is such a renowned company and throughout my first two years at university I had heard so much about them from an engineering perspective. A number of previous students from Loughborough had completed placements and internships at BAE Systems and had said how rewarding, educational and, most importantly, how enjoyable it had been for them. I applied for Industrial Placement schemes at several different companies but I chose BAE Systems as I wanted the experience of working for a global company with such a huge influence on our nation's defence and in the global defence industry.

Another reason as to why I chose BAE Systems was that whilst on this IP scheme, you are encouraged to take part in lots of STEM outreach events. Through becoming a STEM Ambassador I have been lucky enough to help out at a number of open days and careers fairs at a range of schools on the Isle of Wight. I have also helped at the Noel Turner Science Festival and at an 1851 Trust's Maritime Roadshow for Girls event where a few colleagues and I delivered the WISE Campaign's My Skills My Life Workshop and this can be accessed at this web address. <https://www.wisecampaign.org.uk/what-we-do/expertise/welcome-to-my-skills-my-life/>. Inspiring young people to learn more about STEM and explore the different career opportunities that our industry has to offer is really important to me so I am so grateful that BAE Systems has given me the platform to do that!

After this year I will return to university to complete the final 2 years of my integrated master's degree. My placement at BAE Systems has cemented and increased my love for working in Engineering. It has shown me how much variety a career in Science, Technology, Engineering or Mathematics has to offer. My highlight so far has been meeting all my incredible colleagues that I work with on a daily basis and in particular hearing the stories of the many other Women and their journeys into Engineering. They are all truly inspirational and it is certain that I would not be where I am today without them.



Jess

What do I do?

I am currently on an Industrial Placement Year in Maritime Services based at Portsmouth Naval Base. I work as part of the Type 45 Engineering Projects Group, working on these warships.

Why did I choose engineering?

When I was younger I dreamt about being a vet as I grew up surrounded by animals and loved looking after them. When I started secondary school however, I began to realise that I really enjoyed Science and Maths and figuring out how things worked.

This curiosity continued to grow as I started thinking about what I wanted to study at college. I remember we had numerous careers evenings at school, where ex-students would come in and talk about their jobs. Looking back a lot of ex-students had pursued STEM subjects. One that I still remember to this day, was someone who was an engineer in the Royal Navy. She talked about her role as an engineer and how she got to travel around the world as a result of her job. I started researching roles that engineers can do and realised that the opportunities are endless.

What did I study?

Whilst undertaking my studies for my GCSEs, I realised the subjects that I enjoyed most were Physics, Maths and Computing. As a result of this I applied to a local college to study these three subjects. While I was at college they had many careers evenings that I attended where I spoke to people from the RAF and the Royal Navy. I had the opportunity to learn about their jobs and it was always very interesting. I also completed an Extended Project Qualification (EPQ), where you were allowed to choose what you wrote about. As I was interested in engineering and many people had made me aware of the gender split in STEM roles I used this as a guide for my subject. Eventually the title of my EPQ was "How much equality and encouragement do women receive regarding careers in engineering?". I really enjoyed working on this project and learnt a lot about many different STEM roles as well as engineering.

What did I do next?

When I started looking at different engineering roles, one that involved everything that I enjoy was Electronic Engineering. I started looking at different universities to see what each university covered for this course. I went to lots of open days and understood even more about the course that I would get to study. It was very exciting speaking to the lecturers at universities and finding out all about the opportunities available whilst at university.



I started studying Electronic Engineering at the University of Portsmouth in September 2017. The university held many careers fairs which provided the opportunity to talk to different companies. At one of these fairs I met with someone from BAE Systems who provided me with a lot of information about their organisation. BAE Systems is a significant employer in Portsmouth, providing a range of services to the Royal Navy.

Subsequently I obtained information from the university about undertaking a placement year. I was very lucky when BAE Systems advertised the perfect role that I wanted to pursue. I decided to apply and secured the role of an undergraduate Electrical Engineer.

What else do I do?

I have been in Portsmouth for two years studying and I knew about BAE Systems as I have seen the ships when I visited the Historic Dockyard. I did not ever think that I would have the opportunity to work on the base and go on board the ships as part of my job.

As well as doing my job in the office and going on Type 45 Destroyer ships, I am now also a STEM Ambassador. As part of this I have had the opportunity to go to colleges and schools and talk about BAE Systems. I have really enjoyed running a glider project at UTC, as well as talking to students at University of Portsmouth about the application process and possibilities within BAE Systems.

I have completed two years of my Masters degree course and, after completing my industrial placement in August, I will return to complete the final two years of my degree. I am excited for what the future brings once I have finished university and I hope that BAE Systems plays a part in it.

Aimee

What do I do as an engineer?

I am currently a Higher Engineering Apprentice (EHA) in Maritime Services based at Portsmouth Naval Base. I am completing my end role in Type 26 Integrated Logistics Support (ILS) which looks at writing the maintenance for a ship while it's in service. Just as a car has a manual, so does a ship. This helps influence the design so that it's maintainable through service. It also provides all the maintenance tasks so that Navy personnel can be trained before they go to sea. I am about to complete the Apprentice scheme.

How did I get into engineering?

My journey started by me wanting to teach. Ever since I could remember I always wanted to teach. As I got older, I realised I had a passion to teach maths. I stayed at my Secondary School after my GCSEs to do my A-levels in maths, physics and product design. I remember being in my final year of A-levels and going to a talk on teaching. I came out of it and realised that it wasn't for me. I have a lot of respect for teachers as I just wasn't made of the right stuff. Of course, then I was panicking about what I was going to do. I always thought I was going to be a teacher. I went to talk to my product design teacher about what I was going to do now. He mentioned engineering to me, but I didn't know what he was talking about.

I had already attended quite a few STEM events but from a maths point of view. I started to go to listen about engineering. I went to one particular talk at Bournemouth University where I met two guys from BAE Systems in Weymouth. I spoke to them at the end and talked about what I had wanted to do and what options there were. They walked me through their apprenticeship scheme.

I ended up applying for numerous higher engineering schemes. I went to a lot of assessment centres and I succeeded in getting a couple of offers. I managed to narrow it down to two options. After much debate and many pros and cons lists, I decided on BAE Systems. The main difference between the two companies was that BAE Systems was a global corporation.

As I was new to engineering, the fact that I could try out different placements was ideal. I could explore different types of engineering in many departments to work out what I was good at and what I wanted to do. Since then I have completed 5 placements –

- Energy Solutions and Services looking at optimising the energy consumption on the base. While there we looked at implementing LED lighting on ship and creating a power plant exclusively for the base.
- Naval Base Services looks after the maintenance and upkeep of the base. As the base has been there for hundreds of years, it needs looking after. We need to ensure that modern capabilities can be integrated in building which are hundreds of years old.
- Type 26 Integrated Logistics Support (ILS) looks at writing the maintenance for a ship while it's in service. Just as a car has a manual, so does a ship. This helps influence the design so that it's maintainable through service. It also provides all the maintenance tasks so that Royal Navy personnel can be trained before they go to sea.
- Product Safety differs from health and safety. It looks at making sure the products we deliver are safe to operate. It looks at potential hazards, capturing risk and implementing mitigations.
- T45 Equipment Improvement Programme upgrades the T45 with equipment that cannot be done through normal routes. You work with the customer to understand the possibilities and then fit equipment - I worked on sneaky beaky communications stuff!

Aimee (continued)

It has always been important to me that I complete my degree and this was a way to do that whilst gaining valuable experience. I could learn something in college one day and then be applying it at work the next. This type of learning really resonated for me, also the chance to work with experienced engineers and to learn from them was a fantastic opportunity. The scheme offered a HND (essential a foundation degree) alongside work. Then at the end of the scheme was a year in your final placement. I applied for funding to complete my degree in the last year of my apprenticeship as I didn't want to take a break from learning. I was lucky enough to have it accepted and I have just finished the first year of my two year distance learning course. Next year I will graduate, no longer an apprentice and having a degree that I didn't have to pay for!

Why was STEM so important?

My mum actually told me not to go into engineering. She had a misconception about what I would actually be doing and it was very hard to go against her recommendation. She has since told me she regrets saying this as she misunderstood what I would actually be doing. She thought I would be a grease monkey turning spanners - of course if this is what you like, I think it's great! But I spend a good part of my time on ship and in my office. I like this split and think it gets me the best of both worlds.

Without STEM events I don't know what I'd be doing. But I don't think I'd be doing something I love as much as this.

Since starting my apprenticeship I have had fantastic opportunities to get involved in loads of exciting projects. Not just work related, but outreach work to schools as well. I love attending careers fairs. I also went to teach ILS engineering with my team in the UTC Portsmouth.

I achieved apprentice of the year for my cohort in my first year and then won Trainee Engineer of the Year in the Team Portsmouth Engineering Awards 2018



Bethany

What do I do as an engineer?

I am currently on the engineering graduate scheme at BAE Systems Maritime Services, having joined the graduate scheme in September 2018. When I first joined the graduate scheme, I worked on the aircraft carriers helping to both resolve issues that come up and also look at upgrading some of the systems on board to help improve the way that the ship works. I have also helped to deliver a long term refit to the HMS Middleton, one of the Royal Navy's Minehunters, where it was taken out of the water completely, I am now just starting my last placement working on the Type 45 Destroyers where I am part of a team upgrading the power and propulsion system. I still can't believe that I am able to work and go on board the Royal Navy ships every day as part of my job!

How did I get into engineering?

I didn't always want to be an engineer. I wanted to be a doctor instead, until I was 16 as I had never even heard of engineering as a career. I liked the idea of helping people and being able to make people's lives better. However at the end of Year 11, we had to complete two weeks' worth of work experience. I applied to go to a hospital however I was told that you had to be 16 to do this. My birthday is in August, and so I was always the youngest in my year at school. This meant that I was only 15 in Year 11 and so I couldn't get work experience. I was gutted and started scrabbling around trying to find other work experience instead. Luckily, my dad knew someone who worked at a company called EADS Astrium, where they design and build satellites. I spent two weeks at EADS doing a variety of things including using Computer Aided Design (CAD) and seeing how many people work together to design satellites. I was also involved in the testing of the satellites to make sure that they work as they were intended to.

What did I study?

Those two weeks were the first time that I had experienced what engineering was like and I loved it! It completely changed my mind about what I wanted to do in the future and so I ended up changing my A Levels so that I did Physics rather than Biology but kept my other options of Maths, Further Maths and Economics the same. It didn't occur to me until later on that actually my engineering career now still involves helping people and improving their lives in one way or another.

In Year 12, I also took part in a scheme called the Engineering Education Scheme (EES). This was a six month scheme where I had to work in a small group of four from my year at school to solve a real life engineering problem provided by a sponsor engineering company. That company was BAE Systems and we had to design a product that would help aid situational awareness for soldiers on foot patrol in Afghanistan. I really enjoyed my time on this project and it cemented my view that engineering was the right career for me.

After my A Levels, I completed a master's degree in Mechanical Engineering at Loughborough University. Halfway through my degree, I completed an Industrial Placement Year where I spent a year working. I applied for schemes at multiple companies, including BAE Systems, as the work that I had done on the EES really inspired me and it seemed like a good company to work for. I was lucky enough to be offered a place on the Industrial Placement Scheme at BAE at Portsmouth Naval Base, where I started in June 2015. I spent a year working there and really enjoyed my time. I found that I was contributing to something really interesting and had lots of responsibility and felt valued, which are a few things that are really important to me. This meant that when I was given the offer to come back on the graduate scheme after I had completed my degree, I jumped to accept it. Following this, I went back to university and completed my degree, before returning to join the graduate scheme two years later in September 2018.

Bethany (continued)

What else do I do?

Throughout my time at BAE Systems, I have also been given the opportunities to take part in lots of STEM events which I find really rewarding. I led the Schools Engineering Challenge in 2019 which was a large-scale project in ten local schools where pupils in Year 9 designed and built their own boats before competing in a trials day at Portsmouth Historic Dockyard. I have also spoken at several Women in Engineering day events and attended careers fairs as well as developing a lesson for Year 10 pupils showing how algebra is applied to real problems at work.

Is engineering just getting your hands dirty?

I think it's really important for people to realise that there are so many different career paths within engineering, let alone STEM as a whole, and that there are a wealth of opportunities out there. You don't necessarily have to be interested in cars to go into engineering, you don't necessarily have to get your hands dirty if you don't want to, and you can certainly shape your career to what suits you best.

Since being back at BAE Systems, I have been privileged enough to have received awards for Graduate of the Year for my cohort in 2019, and also the Team Portsmouth Engineering Award for Inspiring Engineers. It was such a surprise to have been nominated and I was overwhelmed to have won the awards. The awards evening was a great event and it was so inspiring to hear about the achievements of the other winners. I feel so lucky to have had all of the opportunities that I have had so far in my short career and am forever grateful that I am in a job with people who inspire me every day.

To reflect on being a female engineer – the truth of it is that I don't think that it has made any difference, apart from maybe people remember my name more!



Charlie

What do I do?

I joined the Maritime Services division of BAE Systems in November 2018 as a Naval Architect responsible for the structural integrity of the nation's new Aircraft Carriers. Having worked alongside BAE Systems for many years I was very excited when the opportunity came up to join the company; it was the people I had worked with, particularly the way they came across in being so supportive and driven, that made me want to be part of the team.

Why did I choose to be an engineer?

I didn't always know that I wanted to be an engineer. Throughout school, I dropped the subjects that I didn't enjoy and wasn't very good at; I really struggled with English and languages at school and was diagnosed with dyslexia just before taking my GCSE's. I ended up taking Maths, Physics and Design and Technology for my A Levels, still not at all clear on what I wanted to focus on for a job. My parents suggested I went on an Engineering Insight week at Birmingham University to experience the different engineering disciplines. I had a brilliant week and it was the first time that I experienced what it actually meant to be an engineer; because of that week and combining it with my love of sailing, I was determined to become a Naval Architect. Upon reflection, I probably was always destined to be an engineer, I've always loved solving problems, dismantling and re-assembling things and working out how things work; I got there in the end.

What else have I done?

After school, I went onto complete a Bachelor's Degree in Naval Architecture and Marine Engineering (Ship Science) at Southampton University. I had originally planned to complete a master's, however, after three years I was presented with an exciting opportunity to sail around the world. With my love for the sea I felt this was an opportunity too good to be missed so I graduated with a BEng and sailed the world for two years.

I learned so much about myself, how I dealt with high pressure situations and learning to get on with people from different cultures, backgrounds and various stages of life; it taught me skills in how to lead a team when faced with adversity, which is something I will always be grateful for.

In September 2011, I started a Naval Architecture graduate scheme in Plymouth, which involved six placements throughout the business over a two year period. These included working in the design department, installing key capabilities in the operations team, and repairing warships and submarines. The graduate scheme was invaluable as it gave me the opportunity to experience different areas of the business and to discover where I wanted to focus my career. I quickly realised I preferred working in the waterfront team as opposed to working in the design office; the variety of working on ships and submarines gives me a real buzz and always keeps me on my toes.

I have had a number of different roles within the waterfront delivery team since leaving the graduate scheme, such as; conducting structural surveys working with the class surveyors; providing technical support to the operations teams to ensure programme delivery, and managing new innovative technologies being installed on warships. I feel incredible lucky to work on board the nation's warships, supporting the Royal Navy with their needs.

What I love as an engineer

I am now responsible for project managing all change, from design through to installation, for both our aircraft carriers HMS Queen Elizabeth and HMS Prince of Wales. No two days are the same, I work with the Ministry of Defence, the Royal Navy and many different contractors which I really enjoy and always means I am learning something new. I love the variety of my job day-to-day and feel really lucky to have had the opportunities I have had so far in my career.

I don't think young people are exposed enough to engineering when they're at school, and if it hadn't been for my parents encouraging me to find out more about it, then I don't think I would be in the job I am in today. I am very glad to have the opportunity to be part of STEM events, and have been passionate about it throughout my career.



Abbi

What do I do?

My role as Data Management Lead is to connect with people across the business to explore and motivate improvements in how we manage and get value from data. However, my journey started in engineering and by qualification I am an engineer.

Why did I choose engineering?

For as long as I can remember I've always been intrigued by the way things work, but my journey into engineering wasn't straight forward. I'm a very creative person, but growing up and at secondary school - I didn't really understand the value of STEM subjects to me.

Completing secondary school was scary, I felt pressure to decide what I wanted to do, but still couldn't see how subjects I was learning translated into career paths. I was curious about people, language and enjoyed creative subjects, so I joined college taking Psychology, English Language and Photography A-Levels. Although they were interesting, I still didn't have a vision of what kind of career I wanted, and I didn't enjoy the classroom environment; before long, I was so disengaged I left.

With only GCSEs, I worked hard as a waitress, saved what I could and sought out an opportunity that ended up inspiring me. Now ten years ago, at 16 I travelled across the world on my own, joined a yacht as crew and sailed around the Caribbean Sea for three (glorious) months. I'd simply sought after the opportunity because I felt I needed to escape from both 'not knowing' what I wanted to do, but equally feeling I wanted to contribute more to the world than my current job enabled me to. I had no experience, no plan, and little money, but I was curious, had a Spanish GSCE, desire to learn, ability to adapt, and a passion to make the most out of what I could – it's not every day you get to sail the Caribbean on a yacht, and I've also since learnt that these skills are invaluable!

Whilst I was travelling, I was exposed to incredible design solutions to seemingly impossible maritime engineering problems...I was both confused and more curious than ever. I didn't know it at the time, but I was experiencing the real world of what STEM

subjects enable. When I got home I did some research and decided I would use my creativity to be a design engineer.

How did I get into engineering?

Despite lacking qualifications, I was determined to succeed and I knew my passion would drive me through challenges to come, so at 17 I moved 300 miles to Falmouth, to study a BTEC in Marine Engineering at a different college. Studying STEM subjects were now really enjoyable, and the BTEC was assignment based, we also spent lots of time on practical projects, enabling me to bring my interests into my qualification and see how what I was learning would translate to real applications. This type of learning suited me, so on completion I applied to the Engineering Higher Apprenticeship scheme at BAE Systems, where some of the most complex maritime engineering problems are solved. On the scheme, I was additionally able to gain an HNC and HND in engineering, whilst gaining real-life experience from placements across different areas of the business, and earning a good salary.

What do I love about my job?

I've since realised that I didn't need to fret over 'what' I wanted to be – what matters is doing something that I enjoy, and leverages the skills that make me who I am – the curious, passionate, determined 16 year old who travelled to the Caribbean! And this too is why and how I'm now working in Data. Armed with problem solving skills I learnt in engineering, and experience of a placement in technical information management, after the scheme I went on to be sponsored to do a master's degree in Information Management. I'm now continuing my journey of complex problem solving – just a different type, today I'm solving and exploring data problems and opportunities through collaborating with people, which interests me from a psychology and language perspective too. Every day is challenging and brings variety, and that's why I love it! I'm also still continuously finding more things I'm interested in and passionate about, so I'm sure throughout my career I will go on to adapt into different roles that also use core skills I've learnt in engineering, as well as the perspectives I've gained in my journey so far.

In 2015 I was a member of the Portsmouth team that won the apprentice innovation challenge, which was a ten-month long national competition to design, manufacture, finance and present a product. Then in 2017 I won the BAE Systems National Outstanding Achievement Award for contribution and commitment to promoting engineering and diversity. In 2018 I won Apprentice of the Year – UK Business Awards, for overall performance and delivery over the duration of apprenticeship scheme.



Did you know?

The Women's Engineering Society (WES)

Last year celebrated the centenary of the formation of the WES in 1919. Many of WES's founders had been involved in WWI war work including munitions and other factories. Their experience of running and managing factories, working on the shop floors, design studios, workshops and engine sheds (particularly in the newly developing aeronautics industries) gave them experiences and skills they could never have expected to access in peace time. WES's early members were campaigners, hands on engineers, inventors, designers, electricians, pilots, managers and administrators. Today, only 11% of the British engineering workforce is female, yet women have played, and continue to play, a significant role in the field.

Emily Warren Roebling - The accidental engineer (1843-1903).

Mr Roebling was the chief engineer for the construction of New York's Brooklyn Bridge. He became ill and became bedridden with a disease. Emily, his wife, relayed information to his assistants and reported back to him the progress of work on the bridge.

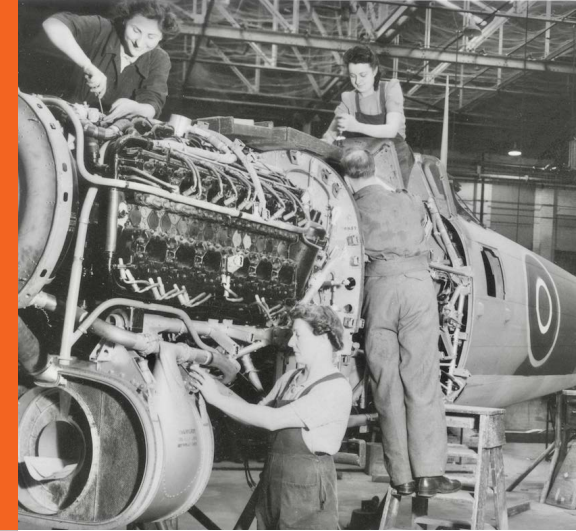
She developed an extensive knowledge of strength of materials, stress analysis, cable construction, and calculating catenary curves through her husband's teachings. He was bedridden for 10 years and Emily's dedication to the completion of the Brooklyn Bridge was unyielding. She took over much of the chief engineer duties, including day-to-day supervision and project management. She and her husband jointly planned the bridge's continued construction. She dealt with politicians and competing engineers to the point where people believed she was behind the bridge's design.

The Brooklyn Bridge was completed in 1883. In advance of the official opening, carrying a rooster as a sign of victory, Emily Roebling was the first person to cross the bridge.



Engineering

The term engineering is derived from the Latin ingenium, meaning 'cleverness' and ingeniare, meaning 'to contrive, devise'.



Work underway on the Typhoons in 1942



Brooklyn Bridge, New York



Engineers

A problem is a situation without a solution. Engineers identify the solution, arrange to implement and thereby solve the problem.



Did you know?

One of the earliest women inventors was **Hypatia of Alexandria** (360–415), who is credited with the invention of the hydrometer. (A hydrometer is usually made of glass and consists of a cylindrical stem and a bulb weighted with mercury or lead shot to make it float upright and it measures the specific gravity or density of liquids).

1784-1853 **Tabitha Babbitt** was an American toolmaker who invented the first circular saw.

1770-1852 **Sarah Guppy** (bridge patentee) was an inventor who contributed to the design of Britain's infrastructure and developed several domestic products. In 1811 she patented the first of her inventions, a method of making safe piling for bridges.

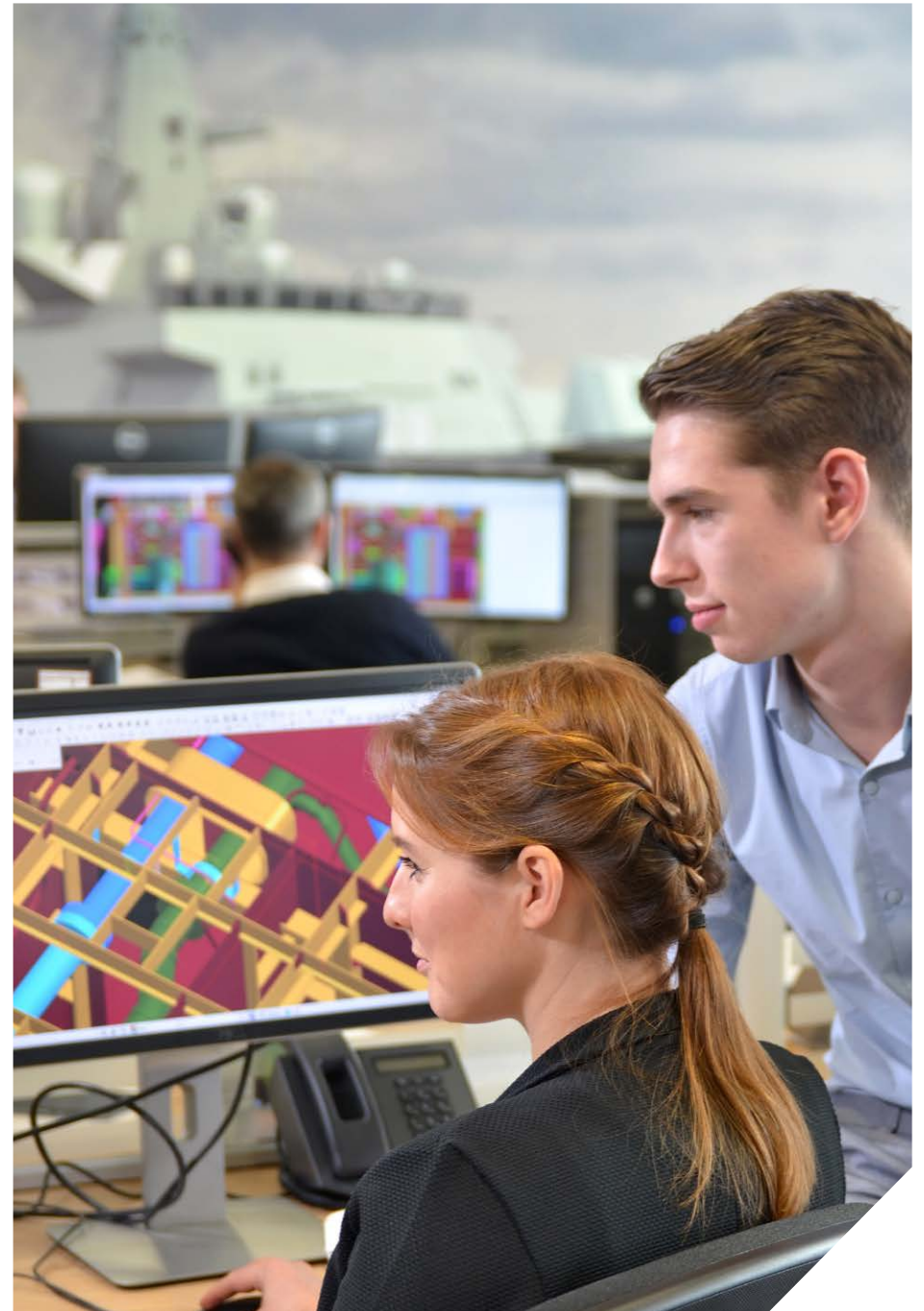
1885-1969 **Alice Perry** (civil engineer, Eire) graduated with a first class honours degree in Civil Engineering from Queen's College Galway in 1906. It is understood that she is the first woman to graduate with a degree in engineering in Ireland or Great Britain.

1894-1978 **Victoria Drummond** (ship engineer) was the first woman marine engineer in Britain and the first woman member of Institute of Marine Engineers.

1895-1957 **Dame Caroline Haslett DBE, JP** was the first secretary of the Women's Engineering Society as well as the first director of the Electrical Association for Women (which she co-founded) which pioneered such wonders as the "All-Electric House" in Bristol in 1935.

1899-1985 **Dorothy Donaldson Buchanan** was the first female member of the Institution of Civil Engineers.

1909-1990 **Beatrice Shilling** (aero engineer) was an aeronautical engineer who was responsible for correcting a serious defect in the Rolls-Royce Merlin engine during the Second World War. oretical physicist, whose research from the 1970s is responsible for caller ID and call waiting. Her breakthroughs in telecommunications have also enabled others to invent the portable fax, fibre optic cables and solar cells.



Did you know?

1914-1997 **Mary Fergusson** was the first female fellow of the Institution of Civil Engineers, elected in 1957.

1914-2000 **Hedy Lamarr** was a famous Hollywood filmstar, appearing with Clark Gable and Spencer Tracey. She was also an engineer. She invented the 'frequency hopping', a method of encrypting signals to prevent enemy spies listening to sensitive information, the underlying method of how we use Wi-Fi today. Without Hedy Lamarr, there would be no wireless communication in our modern world.

1923-2014 **Stephanie Kwolek** invented Kevlar, a stiff synthetic material five times as strong as steel. Because of its resistance to corrosion and flames, it is the main element in the production of bullet-proof vests, as well as a whole range of everyday products including safety helmets, camping gear, snow skis and cables.

Anna Stork and Andrea Sreshta were graduate students at Columbia University's School of Architecture when the devastating earthquake hit Haiti in 2010 resulting in total loss of power and therefore - light. The pair created an inflatable, waterproof, and solar-powered light, the LuminAID Solar Light. Their design can be packed flat, charges in six hours to provide light for 16hrs, and even features a handle to make it easy to carry.

Ada Lovelace, born in 1815, was a computer pioneer who collaborated with Charles Babbage on the first programmable computers in the mid-19th century. Ada foresaw how Babbage's number machines could be used to translate any form of content into digits that could be manipulated by a machine. Her ideas were so far ahead of their time that they only became recognised as the first written computer language in the 1950s.

Josephine Cochrane wanted a machine that would wash her dishes faster than her servants, and be less likely to break them. Her machine, which involved a motor turning a wheel inside a copper boiler, was the first automatic dishwasher to use water pressure. Josephine patented her invention in 1886 and subsequently opened her own production factory.

Mary Anderson invented the windscreen wiper after a winter trip to New York in 1903 where she observed a driver leaving his front window open to clear falling sleet from the windscreen. In November 1903 Mary was granted her first patent for the invention of the windscreen wiper. After the patent to her wiper expired in 1920 and with the growth of the car market, car manufacturers adopted Mary's basic design of the wiper into their standard equipment.

In 1934, **Jeanie Dicks**, a WES member, secured the contract for the first electrification of Winchester Cathedral. Jeanie was the first female member of the Electrical Contractors Association and President of the Winchester Chamber of Commerce.

Dr Shirley Ann Jackson is an American theoretical physicist, whose research from the 1970s is responsible for caller ID and call waiting. Her breakthroughs in telecommunications have also enabled others to invent the portable fax, fibre optic cables and solar cells.

Olga D Gonzalez-Sanabria, who is originally from Puerto Rico, developed the long cycle-life nickel-hydrogen battery which powered the International Space Station in the 1980s. Olga is now director of engineering at NASA's Glenn Research Centre.

And many, many more...

Evidence shows that girls do at least as well as boys in their science and maths GCSEs. Girls often talk about their strengths as being things like an ability to communicate well, to enjoy working within a team with other people, and to be full of creative ideas. These are exactly the type of strengths we need in our engineers.

Kat

How did Kat use engineering to fix a problem?

Kat took over the role of Ship Manager in spring 2019, and resolved a critical engineering issue that was affecting the safe operation of scuttles, hatches and doors on board. Resolving this failure issue involved working with the manufacturer, and BAE Systems Naval Ships to identify the specific problem area, carry out root cause failure analysis, and develop an improvement to the design to ensure it was safe for ship's staff.

Her tenacity and attention to detail when dealing with the manufacturer, together with her detailed material engineering knowledge helped focus BAE Systems Naval Ships and the manufacturer, on the fundamental reason behind the failure of the scuttle lid. Her work successfully highlighted the inadequacy of the existing design and her determination helped develop improved maintenance, testing and certification requirements for the Scuttle lid gas support springs, and pivot pins, such that confidence has now been restored in the safety of these onboard emergency escape devices.

The significance and outcome of this contribution was to completely turn around a piece of safety equipment that had failed, and to ensure that the engineering behind the unit was fully understood and managed going forward. Following Kat's involvement, a known state of Engineering exists, with defined maintenance and inspection requirements for the equipment, through life.



Last year Kat was awarded the Team Portsmouth Engineering Award for Safety for this piece of work.

Kat's comments about the Awards are "Last year I was nominated for a Team Portsmouth Engineering Award by my chief engineer – when I heard that I had actually won and was being invited to a presentation dinner I was really surprised as I thought I was just doing my job. It was not until I was at the dinner with fellow Engineers, Directors and Senior Royal Navy Officers, surrounded by the oak panelling and naval paintings of the Wardroom lit up by candlelight, did I realise quite how special an event and award this was.

I felt very honoured and privileged to have been there and very proud that my work was recognised as so significant across BAE Systems and the wider Team Portsmouth. I would encourage people to nominate engineers they see doing good work especially in these difficult times – they too might be surprised to find how much their efforts are recognised as an important contribution to what BAE Systems is doing at Portsmouth Naval Base. It is much more than just a pat on the back or a certificate".

Sally

What do I do?

I am currently working as a Shipwright in the Small Boat's Centre of Excellence at Portsmouth Naval Base. I am from Manchester originally, and I moved down south in 2015.

How did I get into engineering?

I bought a wooden boat in 2016, although it did have a tree growing out of it! I spent two years working on the vessel and then sailed it to the Scilly Isles for its sea trial. I fell in love with the whole process. It was so rewarding to use my hands – traditionally I have used computers a lot – and I thought that I would like to try this as a job.

I found IBTC in the Portsmouth Historic Dockyard, which is the boat-building training college, and I completed their traditional boat-building course. From there, I graduated and found BAE Systems.



Can you have a varied career in engineering?

Yes, absolutely. Before this, I spent seventeen years working as a Sound Engineer in the television and film industry. I was able to work across a huge variety of projects, from day-time quiz shows to dramas; from working on special events like the Olympics and the Queen's 90th Birthday, to Entertainment shows such as The Voice and Take Me Out. I've also worked in many different roles, including fitting microphones for people, setting up speakers, and then actually designing sound effects and making sure recordings are right. A very technical career!

It's a huge change, coming to work for BAE Systems as a Shipwright. Although, there are similarities: both industries are people-driven. You can learn the technical skills but it's all about working in a team, communicating and meeting tight deadlines.

I would say to anyone looking at a career now: do what you love, try everything, and don't turn any opportunities down because you never know where things can lead you.

Clare

How did I get into engineering?

I didn't consider a career in Engineering until I was in my early 20s, after I had finished University. At that time I dismissed it as an option as I wasn't interested in staying in education.

My education was more creative than scientific, studying A Levels in Psychology, Art & Design and Communication Studies followed by a degree in Product Design: Silversmithing, pottery, woodwork & metalwork. If I'm honest, I wasn't sure what I wanted to do as a career. I had creative/scientific upbringing, my mother being a musician and teacher and my father being a Combat Systems Engineering Manager for the Ministry of Defence.

I travelled round the world for a few years, stopping for a while in Taiwan teaching English as a foreign language, before coming to rest in the USA where I worked as a regional manager for a charity supporting Drug & Alcohol rehabilitation. When I returned to England I worked as a Data Analyst for Hampshire Constabulary followed by a role as Service Manager in a Local Authority Art Gallery and Museum.

After a few years of designing and delivering a service to meet national strategic objectives and organisational sustainability I decided to retrain as an Engineer. Part of this was for long term job satisfaction and security, but mostly because I needed a challenge that stretched the logical part of my brain.

I found an entry level Engineering course (HND in Mechanical Engineering) which I could study locally, part time around my family commitments of two young children. I studied alongside some people on the Higher Engineering Apprentice programme for BAE Systems and they introduced me to the idea of working for BAE Systems. After joining BAE Systems, I realised the opportunities available would be enhanced by a science-based degree. I was lucky enough to secure corporate funding for a master's in System Engineering Management at University College London (UCL), which I studied part-time alongside work.

What do I do as an engineer?

I've worked in a variety of interesting jobs for BAE Systems. These roles have called on both engineering skills and the experience I gained in other industries. I now work as a Business Architect, where I spend my days talking to people to solve giant logical jigsaw puzzles.

Looking back now, it was an obvious career choice, however when making subject choices at school I didn't see myself as "an Engineer" or at least my concept of what I thought an Engineer was. My career journey before I retrained was varied and it hasn't stopped by my becoming an engineer. Engineering companies like BAE Systems provide a wealth of opportunities to explore.



Hilary

How did I get into engineering?

I wasn't sure what I wanted to do after leaving school at 16 so I enrolled at my local technical college to study Engineering. This was great fun & led onto to university degree in Mechanical Engineering. During my degree, I had the opportunity to learn about many different aspects of engineering & live and work in Germany for a year. Some of the projects I worked on during time at university included designing & building kit cars, writing software, and designing train air-conditioning systems.

After completing my degree, I became a Graduate Production Engineer for Racal Acoustics. This led to an interest in how Electrical & Mechanical systems work together, which I pursued further via a post graduate degree in Mechatronics and Optical Engineering.

What sort of roles can you do as an engineer?

I joined Control Techniques for a couple of years as a Process Engineer working on the implementation of automated warehouses, test facilities, automated guided vehicles and one of the first robotic production cell's designed for drive manufacture, before joining Proctor and Gamble as a Process / Production Manager. I was responsible for training, new product introduction, production line & engineering development.

After an exciting 10 years with Proctor & Gamble I needed a change, so became a contract project engineer helping companies with their management, programme delivery & business development.

I joined BAE Systems Ship build in 2009 as a Change Engineer for a new naval vessel & subsequently moved into the Quality department as Process Development lead to help the business improve their processes and identify new ways of working. Most recently my role is Production Engineering Lead. I now lead a small team of Engineers to improve ship delivery, and workshop processes, procedure and methodology.

I am passionate about promoting Engineering as a career for the next generation and actively support both company and Navy apprentices throughout their apprenticeships.



Common Misconceptions



Women can't progress in engineering

You can in BAE Systems. Have a look at Brooke's and Amelia's stories below and other profiles on the WISE and WES websites.



You'll want to raise a family
BAE Systems actively support working mothers and fathers by offering flexible working and part-time options. We also run a STEM returners scheme that helps women to return to the workplace after taking career breaks.



You'll never have nice hands
Of course you will.



You can't be an engineer and feminine
Show them this booklet.



Engineering is boring and monotonous

Engineering covers so many diverse aspects – hands-on manufacturing; product design; planning new systems; innovative technology; inventing; problem solving and so much more.



Engineering is a man's world

Not in BAE Systems. Also for many many years women have been involved in engineering as you can see from the stories about inspiring women engineers in the Did You Know section above.



Engineering is dangerous
Like many other Industries, engineering can be dangerous, but BAE Systems' focus is "Safety First" above all else. Everything is risk assessed first and you are provided with all the safety equipment for the task.



Engineering is dirty and messy

This can be true. It depends on what area of engineering you want to pursue. However, other dirty and messy careers Hairdressing, Nursing, Child Care, Vets, Working with animals, Doctors, Farming and many more.



You are capable of so much more
Read all these inspirational career stories. You can achieve whatever you want.

Brooke

What do I do?

I run the Products and Training Systems business within BAE Systems, which turns over £240m a year, and I have 1200 people who work for me. It all seems rather scary!

In some ways, I feel a bit fraudulent being in a booklet about engineering, as I've no formal engineering qualifications. However, a consistent theme throughout my career has been involvement with cutting edge technology and bringing this together with the right people in the right way to make a difference.

What did I study?

I went to an all-girls' school and confess I had no idea what engineering was. I chose Physics for my degree as it seemed like maths with a point to it. I loved languages at school too, but as I didn't want to be a teacher or a translator, it seemed that physics would give me better career options.

I did a PhD in biophysics, applying what I had learned in Physics to try to understand more about how muscles work, but I quickly understood that the lone-working of research wasn't for me. However, I never give up, so I completed my PhD and joined the Civil Service fast stream as a Scientist.

What jobs did I choose to do?

I worked on international negotiations over nuclear liability (who pays if there is a nuclear accident), internet policy (this was back in the days it was new!) and then worked for the Secretary of State for Trade and Industry as his Private Secretary (think "In the Thick of It").

I came to the defence industry on a secondment from government and decided not to go back. I enjoyed the freedom of working in the private sector and had more authority and autonomy. I worked at Raytheon, a large US defence company for 13 years, learning about business strategy, leading change and programme management.

My proudest moment was leading a team with six different companies working together to win a competition for a £1bn programme from the Home Office. It took us 3 years with many late nights and weekends, but it was worth it when we won.



After having two children, I decided it was time for a change and I joined BAE Systems. I have had various different roles, including setting up and running labs for one part of the company. This was a bit like running Q branch in James Bond (but without the fast cars, Daniel Craig or Dame Judi Dench). It was fantastic to look at innovative ideas and be at the cutting edge of technology.

Why do I love my job?

I love my current job, running the Products and Training Services because there is a huge variety every day. We make and support radars for the Royal Navy and the RAF and have customers as far apart as Brazil and Malaysia. We make and support torpedoes that help to defend our submarines and warships and mine neutralisers for the US Navy that we hope also to sell to international customers. We make Autonomous boats, and are looking at how autonomy will transform the way that we defend and fight. We provide training systems that help our sailors to understand how to work together to deliver their missions. And we manufacture all of these plus electronic circuits and assemblies for other customers.

During the current Covid-19 pandemic we turned our hands to making ventilators, and within a month we went from a blueprint to a production line. Luckily, the UK didn't need them but I'm so proud of the team and all that they did in such a short time.

Running a business at its simplest is about making sure we delight our customers, that we make money and meet our commitments to our shareholders, working out where we should take our business for the future and ensuring that our colleagues feel motivated and inspired to help us on the journey. No two days are the same, and I get a huge buzz from seeing our people succeed and our products contributing to the defence of the UK.

Amelia

What did I do as an engineer?

My career began in the Royal Navy as an Engineering Officer. I served onboard HMS Ark Royal, an Aircraft Carrier and the Fleet Flagship, during the war in Iraq in 2003, and I was responsible for ensuring the availability of the Communication and Information Systems onboard. I also worked in defence procurement, leading an In-Service Support team and testing and accepting new Command Systems on behalf of the Royal Navy.

After leaving the Royal Navy I spent five years as an Information Technology (IT) consultant and Business Analyst, supporting Public and Private sector organisations with defining and delivering their IT requirements.

What do I do now?

I joined BAE Systems in 2013 as the Royal Navy Type 23 (T23) Frigate Combat System Design Manager. The T23 frigates are undergoing an extensive mid-life update, and I was responsible for the successful integration of the Combat System upgrades and changes. I then led the definition of new engineering support arrangements under a major Warship Support transformation programme.

In November 2016, I moved to my current role as Head of Engineering for Naval Ships Combat Systems. Here I am leading the Engineering function supporting 600 Combat Systems engineers across multiple programmes including the delivery of new ships to the Royal Navy and the support of in-service Combat System equipment.



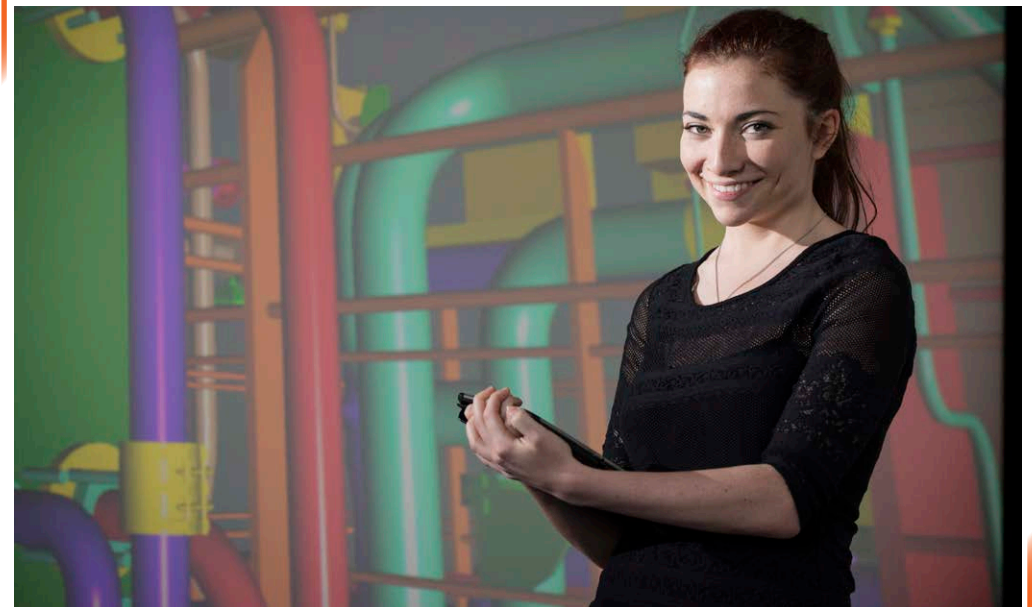
I am passionate about promoting Engineering as a career and am an active STEM Ambassador, and school Governor. In 2016 I received a Women in Defence Award for Promotion of Gender Diversity.

I am a keen sailor, and sail up and down the South Coast of the UK with my husband and two children whenever the British weather allows. I also sailed from the UK to Australia with my husband in our catamaran.

I also won the 2017 Women In Science and Engineering (WISE) Woman in Industry Award and received my Award from The Princess Royal, Princess Anne.

Quiz

1. What does STEM stand for?
2. You are standing outside a closed room, the room is completely sealed from the outside. There are no windows and nothing can get in or out except through the one door. Inside the room are three light bulbs A, B and C. Outside the room, in front of you, are three light switches 1,2, and 3 and each switch controls a different light bulb. Which light switch controls which light bulb? You are allowed to enter the room once only and when you come out, you must be able to state with 100% certainty which light switch controls which light bulb. How?
3. A 42 year old Accountant lives on the 10th floor of a block of luxury flats overlooking the River Thames. Every morning he takes the lift to the ground floor, checks his mailbox and walks along the Embankment and across the bridge to his office in the City. He returns at approximately 6.30pm and takes the lift from the ground floor to the 5th floor and walks up the stairs the rest of the way to his flat. On rainy days, or when he is with someone, he takes the lift all the way from the ground floor to the 10th floor. Why?
4. Three boxes, one containing two black marbles, one containing two white marbles, and the third box containing one black marble and one white marble. The boxes were labeled for their contents - BB, WW, BW - but someone has switched the all the labels so every box is now incorrectly labeled. You are allowed to take one marble at a time out of any box, without looking inside, and by this process of 'sampling', you need to determine the contents of all three boxes. What is the smallest number of 'samplings' needed to do this?
5. The Women's Engineering Society (WES) is a professional network of women engineers which aims to support and inspire women as engineers and leaders. When was it established?
 - a) 1919
 - b) 1944
 - c) 1994
 - d) 2009
6. Which of these celebrities DOES NOT have an engineering qualification?
 - a) Teri Hatcher (Desperate Housewives)
 - b) Jamie Laing (Made in Chelsea)
 - c) Oti Mabuse (Strictly Come Dancing)
 - d) Rahul Mandal (Great British Bake Off winner 2018)



Quiz Answers

1. Science, Technology, Engineering and Maths.
2. Press any switch e.g. no.2. Go and make a cup of coffee. Come back and turn off switch no.2. Press any other switch i.e. No.1 and go in to the room. Light bulb B is on, therefore you know switch 1 turns on bulb B. Touch bulbs A and C and one will be warm eg bulb A so you know this has been switched on. Therefore you know switch no.2 lights bulb A. So switch 3 must turn on bulb C.
3. This is an exercise which demonstrates the importance of identifying the relevant facts and not making assumptions. The relevant facts are highlighted. *A 42 year old Accountant lives on the 10th floor of a block of luxury flats overlooking the River Thames. Every morning he takes the lift to the ground floor, checks his mailbox and walks along the Embankment and across the bridge to his office in the City. He returns at approximately 6.30pm and takes the lift from the ground floor to the 5th floor and walks up the stairs the rest of the way to his flat. On rainy days, or when he is with someone, he takes the lift all the way from the ground floor to the 10th floor.* He is of short stature – and has dwarfism. On the 10th floor he can reach the button for the ground floor. When he returns home he cannot reach the 10th floor button, the highest he can reach is the 5th floor button. When it is raining he uses his umbrella to press the 10th floor button. If someone else is in the lift he asks them to press the 10th floor button.
4. You only need to select one ball to solve this. You know ALL the boxes are wrongly labelled. Therefore box BW cannot contain one white ball and one black ball. Take one ball out of this box. If it is a white ball the box must now be correctly labelled as WW. You know the boxes currently labelled as WW and BB are both wrong and one must be BW and one BB. Remember neither of these two boxes are right so BB cannot be BB. Therefore BB should be labelled as BW and WW must be BW.

5. a) 1919

6. The answer is b) Jamie Laing. Jamie has a degree in Theatre and Performance Arts from the University of Leeds.

In addition to studying drama, Teri also took a degree course in Mathematics and Engineering at De Anza College in California.

Oti is a Civil Engineering graduate from the Tshwane University of Technology in South Africa. Before becoming a professional dancer she was involved with designing irrigation systems for a dam.

Dr Rahul Mandal is an engineering researcher at the University of Sheffield's Nuclear Advanced Manufacturing Research Centre. Rahul came to the UK in 2010 on a scholarship to study for his PhD in Optical Metrology at Loughborough University.



Early Careers

We hope you have been inspired by the stories in this booklet and would like to find out more about becoming an engineer with BAE Systems. Here is a summary of the kinds of Apprenticeship and Graduate opportunities that we offer in Maritime Services.

Engineering Advanced Apprenticeship – Level 3

- Hands on training to become an Electrical Fitter, Mechanical Fitter, Steel Worker, Pipe Worker, Welder, Rigger or Boat Builder over four years in Portsmouth Naval Base.
- You will combine this with classroom study leading to a L3 Diploma in Development Knowledge and an NVQ L3 in Development Competence.
- You will need five GCSEs including English, Maths, and Science normally at grade 4 – 9. Applications can be considered from applicants who achieve less than a grade 4 in English and /or Maths where there is evidence that our in-house functional skills training will enable you to achieve this standard. For our one Rigger role you will need three GCSEs (including Maths and English) at grade 3- 9.
- Your starting pay will be about £275 per week before deductions for tax and National Insurance.
- This apprenticeship might suit you if you are good at working with your hands and like doing practical things like making and fixing things.
- See Maddie's story on page 3

Engineering Higher Apprenticeship – Level 4

- Three year programme combining formal study (towards an Engineering NVQ L4) with on-the-job training at our sites.
- At the end of your apprenticeship you will become an Assistant Engineer specialising in Mechanical, Electrical/Electronic, Civil or Marine Engineering.
- You will need five GCSEs including English, Maths, and Science/Tech subject plus 96 UCAS points including 2 STEM subject qualifications.
- Your starting pay will be about £335 per week before deductions for tax and National Insurance.
- This apprenticeship might suit you if you are creative and practical and like coming up with ideas to design and develop things that will solve problems.
- See Aimee's and Abbi's stories on pages 6,7 and 11.



Early Careers

Engineering Industrial Placement

- Twelve-month long placements at one of our sites, providing experience of working on real engineering projects before returning to complete your studies at university.
- If you perform to a high or exceptional standard while you are with us you will be offered the chance to complete a Summer Internship with us next year if you have more than one year left at university or an offer of a place on our graduate programme if your studies are finishing.
- You will need to be studying for a relevant degree at university (such as engineering or for some roles maths or physics) and be in line to achieve a minimum 2.2 class degree.
- Your pay will be about £346 per week before deductions for tax and National Insurance.
- An Industrial Placement might suit you if you are doing a degree and would like to get some real life experience of engineering to help you with your studies.
- See Gabrielle, Jess and Bethany's stories on pages 4, 5 and 8.

Engineering Summer Internships

- These are very similar to Industrial Placements but they are much shorter, lasting for a 12 week period over the summer between university years.
- In Maritime Services it would be more normal to do an Internship in the summer following completion of an Industrial Placement the previous year. If you go straight into an Internship (without completion of an Industrial Placement) your pay will be about £323 per week before deductions for tax and National Insurance.

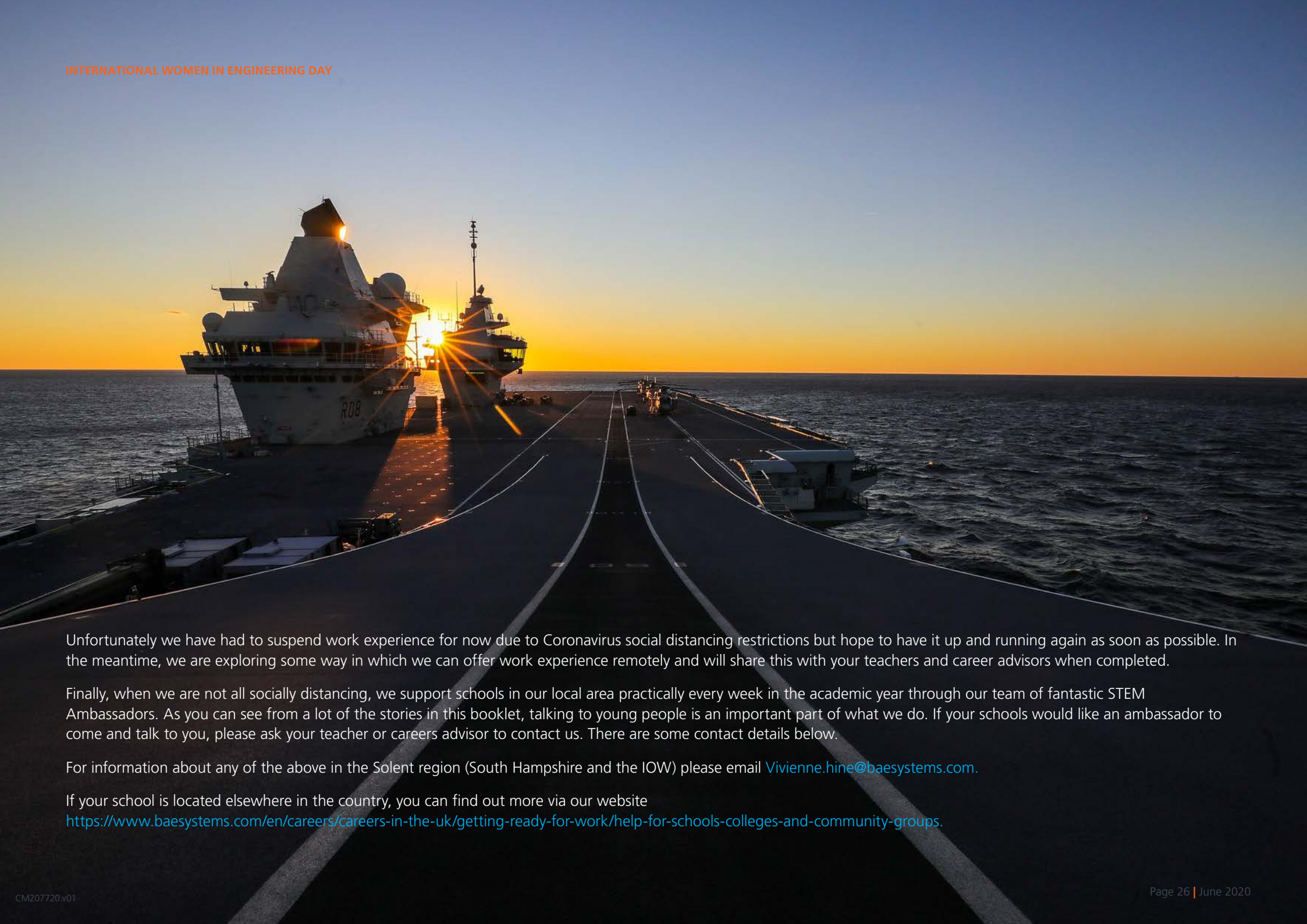
Engineering Graduate Programme

- 18 month –two year programme in which you will combine working in a challenging engineering role with formal technical and personal effectiveness skills training.
- You will need to have achieved a minimum 2.2 class degree in a relevant subject (such as engineering or for some roles maths or physics).
- Your starting pay will be about £538 per week before deductions for tax and National Insurance.
- See Bethany's and Charlie's stories on pages 8 and 10.

There are many more opportunities in other parts of BAE Systems including in our Air, Electronic Systems, Land, Ships and Submarines business units. You can find out more by visiting our website at www.baesystems/careers/early-careers.

You can also get a taste of what it is like being a BAE Systems engineer by applying for work experience by visiting www.baesystems/careers.





Unfortunately we have had to suspend work experience for now due to Coronavirus social distancing restrictions but hope to have it up and running again as soon as possible. In the meantime, we are exploring some way in which we can offer work experience remotely and will share this with your teachers and career advisors when completed.

Finally, when we are not all socially distancing, we support schools in our local area practically every week in the academic year through our team of fantastic STEM Ambassadors. As you can see from a lot of the stories in this booklet, talking to young people is an important part of what we do. If your schools would like an ambassador to come and talk to you, please ask your teacher or careers advisor to contact us. There are some contact details below.

For information about any of the above in the Solent region (South Hampshire and the IOW) please email Vivienne.hine@baesystems.com.

If your school is located elsewhere in the country, you can find out more via our website

<https://www.baesystems.com/en/careers/careers-in-the-uk/getting-ready-for-work/help-for-schools-colleges-and-community-groups>.