

International Women in Engineering Day: In Conversation Episode Four

Voiceover [00:00:03] This podcast is brought to you by the University of Aberdeen.

Sarah [00:00:08] Hi Emma, thank you so much for saying yes to this exciting series, and I'm especially excited to chat to you today and to get us started, It would be great if you tell us a little bit about yourself, who you are and what you do in the engineering industry.

Emma [00:00:24] Hi, Sarah. Thank you so much for the opportunity to come and speak on Women in Engineering Day. I'm Emma and I'm an engineer and I've been an engineer for 30 years now and it's amazing to see how engineering has changed over time and my engineering journey, of course, including some time Aberdeen, which is why I'm on the Aberdeen podcast. I work in safety and now I work in cybersecurity and over the past 30 years, I've worked in the space industry, in oil and gas, classical safety, engineering and now doing cutting edge engineering, cyber security on the railway.

Sarah [00:01:01] That is such diversity. Just so it's amazing to think that engineering has allowed you to go from one different sector and industry but it's not universal passport for you. What inspired you to get into engineering in the first place?

Emma [00:01:16] I think it's curiosity. I think as a child, I was always asking why I think I might have been quite a curious and questioning child, I was quite determined as well, because in the 1970s, engineering information wasn't as easily available and my first interest was really around astronomy. I remember building a bridge when I was 11 and I think that it was a thread, a backbone that taken some time to come forward. I was an engineer before I realized, I was an engineer, if that makes sense. I remember when I was 18 and I wanted to do work with industry as part of my degree and there were all these schemes. They were called fix sandwiches at the time. You'd have a year before and in summer placements in a year afterwards. I remember applying and I was ever so lucky to get a placement with British Aerospace Space Systems who are now the company that are doing the Mars rover. I turned up 18 and like as an apprentice and I didn't really know what to expect and you walk into the office and it's an office, but you see engineering being done all around you on paper in the manufacturing area and your eyes get opened, and every day I know it sounds a bit cheesy, but every day is inspirational. Every day I'm learning something new. Every day I'm realising there's something I need to go and learn. Especially now working in cyber security on the railway trains are becoming ever more complex and sophisticated and efficient and every train is different, whether it's in the UK, Europe or worldwide. I'm never going to get bored ever. That's the fantastic bit about engineering.

Sarah [00:02:52] Yes, because you're inspired to get into engineering. It's this idea that your curiosity is still being fed every single day with the people you work with and the challenges you meet. I think the idea that anyone who loves problem solving or curiosity than engineering could be for them but also you mentioned about working with other people there and the impact that they have, the idea of that that teamwork, it's these sort of things that people enjoy. It definitely means that they should think about being an engineer as one of their one of their options, because it definitely keeps you on your toes. and just it's a great way to learn about life. Your experience, though, is a woman in the industry. What benefits has this given you?

Emma [00:03:36] It's an interesting perspective because engineering is for everyone and when you talked about engineering, when I started, you were either a mechanical engineer or an electrical engineer or any software engineer. Even then, there was software. Even then there were sort of considerations about cyber security that we didn't call it that at that time and now engineers are more innovators or problem solvers. So, if you like, the labels changed and so I was always like an underrepresented group. You know, as a woman in engineering industry, you weren't in the majority or you weren't even 50/50. But I think having a different perspective helps you have that sort of diversity of curiosity, which means that you can bring some new ideas in and because an engineering problem by definition is one that's not already been solved, the more voices, the more views, the better the potential solution. I think also one of the things that and this impacts women more than men or has done up until now, I think the pandemic has impacted everybody's family and sort of family network lives. Is that when you have a career break? I was a carer for a while. It means that you come back again with a more holistic view and these kind of underrepresented groups or underrepresented life experience means that you can really have more of an impact because you're a new voice and your view and this diversity of thought and experience is so relevant for cybersecurity in all its shapes, whether it's your family cybersecurity or your trained cybersecurity or even the Aberdeen University cybersecurity, because this diversity of thought and experience helps you think about what might happen. What are the reasonably foreseeable scenarios? And the National Cybersecurity Centre in the U.K. who I work with closely, as in my role as head of digital safety, they encourage diversity thinking in all these forms. So I would say that whilst at times my engineering career has been challenging, it actually makes me a better engineer and I would encourage plenty of other people who perhaps started in engineering and then stepped out for whatever reason to consider coming back. I'm 50 and I've just started with a rail cyber security company. So, there are always options at whatever stage of life.

Sarah [00:05:57] That's a great that's a great piece of life advice and to get it early as possible in your career is something that hopefully people will remember as they as life shapes and the challenges that we face along the way. It's great advice that you mentioned there about your time at university. How do you think your experience at the University of Aberdeen shaped you from moving into a career in engineering?

Emma [00:06:22] Well, I came in to Aberdeen as a mature student. I think I was I was 38 and I've talked about the curiosity I had to age three and I think I've always been an engineer. But before then, I didn't really have an official label because I did physics at University, Oxford. I went to the European Space Agency. I was working for space engineering companies, but I didn't actually see myself as an engineer and it's sad to say that when I was school at school, I remember being discouraged from being an engineer. It was like, you can't be an engineer, you're a girl. I do remember someone telling me that I won't say who on this podcast because probably people get really annoyed with them. But that was the kind of view that was expressed. You're not really that sort of engineer. You're not really a proper engineer and when I finished my time as a carer and restarted into the oil and gas career, I did it through the Aberdeen University MSc and I remember applying, you know, just the 38 and whatever. I remember sending the email saying, well, this is me, this is my background. I've worked in the space industry and I want to become a safety engineer and I remember the reply back and they said, yep, come on in and by the way, we've got this scholarship and would you like it? and it will pay the fees and the subsistence, and I was amazed. I was sat at my computer. Still the same computer I'm sitting at here, the chair thinking, wow, life would be really tough recently, but this is great and what it did was I arrived and I studied really hard because I had to my studying muscles were rusty. When you continuously learn, you know, you remember how hard

learning is. Universities, great. But it does involve work. What it is, is it kind of gives me that confidence. I won the prize at the end of the year for my research and it also showed me how safety engineers, because that's my discipline, training, safety and cybersecurity so closely linked is essentially be the same discipline area and it gave me the confidence that I could be an engineer and call myself an engineer and the Aberdeen Master's in Safety Engineering Risk Management is really well known for creating this sort of learning environments and one of the things about engineering, I talked about the fact you need to anticipate the future and with safety, engineering, digital safety, you're trying to think about what might happen and then anticipating it and then put in place measures so it doesn't happen. So that kind of small forward thinking that curiosity's really important and obviously oil and gas is very much an Aberdeen area of expertise, but oil and gas goes up and down and so that learning of engineering, thinking of what if helps you also apply it into other sectors, other energy generating sectors such as offshore, but obviously digital sectors such as cyber security, trains, planes, automobiles, whatever.

Sarah [00:09:11] The lovely thing about this podcast and people sharing their experiences that your experience at school when someone said you can't be, we're giving them the opportunity to meet someone like yourself through this podcast so that they're empowered to say, I can be and I will be. But more important, I am I think we put a lot of emphasis on going somewhere to become when, as you've said, you've always been an engineer, you just didn't know you were but this idea that you can transfer those that learning into different spaces, it's incredible. Can I ask you, you mentioned that you've won prizes at university and you were well, I think sounds like an excellent student. Were you always academically, you know, did you always do well at school? Were you a model student or was it only when you got to university and you were really loving your topic that that unleashed your ability to thrive.

Emma [00:10:07] I think that's the model student I've always been like enthusiastic learner thing is what happens when you've got parents who've got teachers. I can still remember parents evening, you know, like you take your parents and the teachers and let you couldn't pull the wool over their eyes because they were teachers talking to teachers. So, I've always been focussed on studying, but sometimes I've not been a very good student. Sometimes things are hard, sometimes your heart isn't in it. Sometimes life gets in the way of it and you don't achieve those marks and one of the things that I do now, because I learn from lots of other people and I help supporting other people is I key phrases. I hate to see wasted talent. I really, you know, both myself and other people, when you see people in there and they're struggling through no fault of their own, you know, like life obligations, life waits on their shoulder or just they having to work as well as study and in everything that I do and like the people I work with, I try and encourage them. I try and say, you know, you can you are potential you do have the potential to do this and just find the little ways in which you can support and I find that from talking with them. I also get to support myself and I learn from it as well. So, it's never really sort of like somebody in a perfect place advising someone having a tough time. We're all equal in this and so, I mean, I remember I remember, like, sort of like not doing well in my A-levels box and thinking really pull my finger out. I remember when I was taking exams at Aberdeen, I mean, I got really good marks at the end, but the first term, it was a bit touch and go well, one or two of the core modules and so I would encourage people thinking about this even if, like, your higher didn't go so well or your advanced highers or perhaps you're not looking at your first university choice or course, keep going, keep going. Ask for advice from lots of people around you, you know, do you think my potential lies in this area? Do you think that this is possibly the right route? Don't just stick to one advice, ask widely because you can then collectively see whether you're thinking you're heading in the right direction and also don't

feel that if you don't get it right at 18 because I went to university at 38, then it's going to game over. Perhaps like life has got a slightly different path. Perhaps working or taking apprenticeship is a route to learning just as much as university. Just realising an Aberdeen University podcast and I've suggested other routes. I'm sure Aberdeen doesn't mind if you turn up at 18 or 38 for your university experience.

Sarah [00:12:36] No, it's about finding your own personal journey in the right time. But nothing is a waste. I think that's something that we see a lot with young people, as you say, they might hit a bit of a roadblock and they've got to work their way through it. But we get to where we get to in the end through hard work and it's that idea of the right destination. I recently interviewed an astronaut and he took foregoes to get into NASA and he kept going and he kept going and he kept going that determination because he felt that that was his right destination but in between he learnt so much and his experience then when he did go into space, all of that or all of that comes together. I love the idea as well that we're learning from each other and we're sharing knowledge. It's a relationship. And it's so true. I think celebrating achievement, obviously, with women in engineering day, we're celebrating engineering heroes. Who is your who is your engineering hero for celebrating this theme for this year?

Emma [00:13:37] So I'm thinking like, do I have an engineering hero because like this sounds like a hero with a capital H and know sort of like a super cape and superpowers and I actually think it's like everybody's a hero. It's a daily hero. I was having a conversation. I was having a WhatsApp chat this morning with somebody who actually is like a is a rocket, a rocket engineer, and he literally builds a 3-D printing rocket. Engines in his is like, you know, sort of erases Scottish universities, not Aberdeen. But like, you know, he's definitely very good at this and he's had to overcome many hurdles and he's also deaf. Don't worry, I won't name him. He's probably got him at what you do, but he's deaf. And like, those are hurdles for me. He is a hero. And he's also taught me about using closed captioning and so I'd encourage everybody, whether you're deaf or not, to go to your teams and turn on the closed captioning. Because in this covid world, being able to if you're deaf or English isn't your first language or for whatever reason, being able to see and hear what people are saying helps with communication. So that, for me, is an example of a daily hero and also, I think people like, you know, the founder of the company I work for razor secure. So, they he saw he saw that there was a need for safety and cyber security in the railway. Nobody was doing it. I said, well, I better do something about that. I'm going to found a company and I'm going to lead it and I'm going to grow it and you can imagine in the early days it was going on, Crikey's, is going to work or not and that for me is also a hero and so it is women in engineering day. But actually, some would like the biggest supporters that I've had are men and I think we should think broadly in terms of role models and technical and non-technical. I'm one of the things that, like, I would also encourage people to do, because sometimes it's really hard to have that network. Sometimes you're sat there on your own in your room and you think, you know, like, you know, I haven't got, like, a mentor encouraging me or something. Build your own squad of advisors. Don't necessarily call them mentors because that kind of inspires lots of commitment and then also put people on that list that you don't know but who you admire. And so, for example, an astronaut like, you know, Tim Peake, you can ask yourself, what would Tim Pink do in this situation? And that's in a way is just a way is a good way of finding your own engineering heroes as actually knowing an astronaut and you can build anybody in that list is it's your own list of like scores of mentors and advisors. And when somebody has a conversation with you, you know, when I when I for example, I was talking to the guy who is deaf and is a budding rocket scientist, an engineer, then also they're encouraging me and I'm encouraging them. Sometimes it takes time, sometimes a

piece of advice that one of these sort of senior guys that was encouraging me when I was head of a professional engineering institution, it took about a year or two to sink in. But, you know, now, you know, like on the pathway to becoming a non-exempt director, you know, head of digital safety. So sometimes advice takes a little bit to brew. So, it really is engineering heroes with a small H everybody around you can help and advise and this back to this theme of sort of diversity in all its forms. You know, whether it's engineering disciplines, cybersecurity people, it all works together and so it's everyday heroics just as much as emergency ones. All people, you know, all backgrounds, all lived experiences, you know, all discipline, all ages. Everyone's a hero in one way or another.

Sarah [00:17:20] I love that. I think that's great advice as well to look around you and celebrate the heroes who are in our lives and what impact they have. I think also great advice. Build your own crew. This idea of being inspired by people who you don't quite know and they can they're hugely inspiration. I think that's fantastic advice and talking about advice and in a previous episode, we asked a student if you could ask someone an industry question about engineering, what would it be? and the question they asked for me to ask you is, what would you say was the biggest barrier you faced in industry and what advice would you give to overcome it?

Emma [00:18:03] It's a really good question. I think it's 'biggest barrier overall'. You know, life sometimes can throw you these curveballs. Like when I was a carer that was pretty tough and changing sectors is also kind of hard work. So, it's not only industry, but overall. and the advice thing is often when you're sat there in that kind of challenging situation, you know, the path in front of you isn't obvious. It's only with hindsight. Hindsight's a wonderful thing. Yeah, I did the right step here and here, but when it's in front of you, there's all these different paths. So, I would encourage people and I said this beforehand, you know, don't just ask one person to one question to one person, you know, ask for advice and ask widely and kind of leave things to brew a bit. You know, if you sit down on Monday and you want to sort of decide what we're going to do on Wednesday, you know, you're going to have to make a decision on Wednesday but if you don't have to make the decision there and then think, you know, what would a bit of extra time give me, you know, because lifelong learning is important. We've talked about the overall path and we talked around the fact that, you know, cyber security requires views from everybody at every stage of their lives in order to be an effective engineering discipline and that's for all aspects of engineering that what if questions got a lot of power? So, you can ask the question, what if I did this or that? You could look at different scenarios when you're trying to think, how do I get around this barrier or hurdle? And you can also ask what if when you were applying your engineering skills? So, I joined oil and gas as a result of like a challenge in my life, you know, going back to university after having been a carer and that really opened up opportunities and it opened up opportunities which continue to this day. There's no doubt in actually sometimes, you know, things can be really hard. Don't beat up on yourself if you can't see an easy route through. Sometimes it's just enough. Like in this pandemic, you just say, I'm going to put one foot in front of the other and then when things get a bit easier, then I'm going to think about how to overcome that barrier.

Sarah [00:19:59] That's great. Breathing to take minute. I love that. Just if it doesn't need to be decided on Wednesday and then just let it brew, that's a that might be something I might put on my wall. Just let it brew. That can be your reaction to someone saying something that's got your hackles up, but it can equally be something that's got you pondering. So I think that's that's really great advice. We've talked about how you came back and you joined the University of Aberdeen, it as a mature student. What I believe you

always were an engineer. However, what piece of advice would you give to anyone moving into a career in engineering like you did by taking that sort of bold step?

Emma [00:20:41] I think that one thing is perhaps find out how much of an engineer you already are. Now, there is an organisation called the Engineering Council, and I lead the team for the professional engineering institution that awards professional engineer. This is a type of engineer called a Chartered Engineer, INC engineer, engineering technician and that's a recognised qualification and the Aberdeen University's in many of the Aberdeen University courses feed into that but the information's broadly available. You can Google Engineering Council, how to be an engineer and you can read it. It's all open there. What constitutes professionally registered engineer? And you can have a look at your own experience and think, well, how have what I've done now kind of might fit into that box? You know? So, it is almost before moving into a career of engineering. Is that where you already are now? And everything that you do helps feed in towards that? So, it's not really a sort of step change. It's more an evolution and I'd encourage everybody to sort of look at the courses that the university have and all other engineering courses and think, could I do that? What could I do now and then? What bits could I do if I did this and my husband would kill me for putting this in this. I'm going to put it in. He was an asteroid and comet scientist for twenty years and when I was looking at changing sectors, he was looking at changing sectors, too, you know, and he said, you know, what do you want to do? And it's that blank sheet of paper and like when you've been an asteroid and comet scientist and like, you know, a major university academic and I'm not going to give any more identifying information because it'll kill me if I do that, because people who Google him and he was like, well, I want to become a building acoustics engineer and that's a pretty big leap. I mean, I went from the space industry as an engineer, you know, like doing spacecraft shielding and like collision avoidance to kind of oil and gas engineering and like, you know, stopping things from like, you know, catastrophic accidents. So that's kind of relatively close but asteroids and comets, scientists to building acoustics, engineer, that's a pretty big leap and so what it did was the same sort of exercise we're doing here and I think. Right. OK, well, I've already had that bit of background and those are transferable skills. But I do need to get the specific qualification diploma in acoustics. So, does what it says on the tin. So it's you never starting from zero. I think, you know, and we all need to think about safety and digital safety in whatever aspect of our lives. You know, this is impacting our daily life, not just the engineering profession. So, you've only got like a step or two or three there. Even now, when you're considering moving into a career of engineering or returning to career in engineering, step back. What have you got? What might you need to learn? And like also, how important is it to you in society around you? How does engineering help? All that helps bring together the complete picture and gives you a starting point.

Sarah [00:23:29] Thank you so much for sharing your time with us and your experience and your top tips, as I say that. It's been quite a few here to sort of create that that poster board of advice, but it but the idea that we are all engineers, but we might go on and study and become different professional engineers, but it's this idea that engineering unlocks all these potentials and that other people could, like you, be inspired every single day and love their job because, you know, it's so important to love what you do and to you know, we spend so much time doing it. But I can imagine you and your husband have many a conversation over there, over the dinner table about both of your exciting, exciting day. So it's that in itself should maybe be a future. Exploration for us to look at is just what some people are having doing that, doing their jobs and meeting the challenges and solving this problem. It's amazing. But thank you ever so much and I look forward to hopefully meeting

you in person in the future. It's lovely to think that we're part of this family of the University of Aberdeen together. So, thank you so much for joining us.

Emma [00:24:36] Thank you very much. Enjoyed having the opportunity to talk through my engineering journey, my experiences in Aberdeen, and like what engineering looks like in the future, digital safety, cybersecurity and beyond.

Sarah [00:24:48] Oh, great growth sector, great growth sector. Absolutely, definitely one to put on everybody's list, there's a there's a place for everyone within digital security. It's a great a great sector. Thank you so much, Emma. This podcast is brought to you by the University of Aberdeen.