



Plymouth Manufacturers' Group

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Careers in engineering & manufacturing for graduates



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Introduction

Engineering contributes over £450 billion to the UK economy, that's equivalent to over a quarter of the total and, with 1.82m engineers needed between now and 2022, there is an annual shortfall of 55,000 skilled workers and not enough new recruits coming through the system. In fact, to meet demand we need to double the number of engineering graduates entering the industry.

There will always be a demand for skilled engineers. The skills that you develop as an engineer are incredibly valuable and highly sought after. If you are curious about how things work and have a keen mind for applying what you learn to solve real world problems, engineering is the perfect avenue for your talents.

As a career path, engineering offers the highest level of social mobility and the second highest graduate premium of any profession.

STEM education (the subjects of science, technology, engineering and mathematics) creates critical thinkers, increases science literacy, and enables the next generation of innovators. If you are a young person considering a career in engineering (or the parent of one), you need to give careful consideration to selecting STEM-related subjects as you progress through school.

Plymouth has the highest concentration of manufacturing employment of any city south of the Midlands. It offers fantastic opportunities for young engineers. This booklet comprises a series of case studies of young graduates who are now employed by members of the Plymouth Manufacturing Group. I commend it to you.

Bill Murphy

Chairman of the Plymouth Manufacturers' Group

12 good reasons to choose engineering

87,000
of graduate level engineers needed every year between now and 2020

72%
of UK R&D is funded by manufacturing

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16.3%
of Plymouth's GVA comes from manufacturing

£63,000
The national average salary of a Chartered Engineer

13,000
people are employed locally in manufacturing

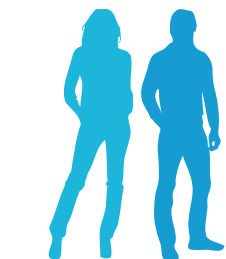
£0.83bn
The amount that's contributed to Plymouth's economy annually



1 in 8
people are employed locally in manufacturing. More than any other city in the south of England

2.5m
People employed in manufacturing jobs across the UK

54%
of all UK exports come from manufacturing



Not just for boys!
take a look at page 19



Amazing career prospects

80,000
employed in manufacturing and engineering in the far SW

05

Olivia Ellard

Graduate Mechanical Engineer, Babcock International Group,
Devonport Royal Dockyard, Plymouth

When she was growing up, Olivia was (and still is) a big fan of Jenson Button and Lewis Hamilton and the whole world of Formula 1. Now she has a flourishing career in engineering – are the two connected? We think so.

'I selected engineering when I was applying for universities at the age of 17. I always enjoyed maths and science, but more than that I enjoyed problem solving, which is essentially what engineering is. I was influenced a lot by my love of Formula 1 at that age, which is probably what made me choose mechanical engineering over electrical or civil.'

'To become an engineer, I think you need to be the type of person who wants to solve problems and understand how things work. You need to be able to communicate well and work well in a team. You also need to be willing to work hard – but if it's something you enjoy doing I think this comes naturally.'

'I think the most critical choice I made was to keep my options open. At the end of GCSEs I had no clue what I

wanted to do as a career, so I decided that it was okay to not know and to choose A-Levels that wouldn't cut off any options. I chose Maths, Chemistry, English Literature and History in the end, thinking History was my favourite, but over the following two years I realised that I enjoyed maths and science most.'

Now Olivia is employed by Babcock International, the UK's leading engineering support service organisation. 'At work I enjoy overcoming a challenge, whether that's just successfully answering questions in a meeting, finishing a design calculation or getting involved in STEM events and getting people involved and excited by engineering. I also enjoy knowing that something I've helped with or designed is going to be implemented in a real project and that my work will have had an effect'.



trusted to deliver™



Kristian Williams

CAD Designer, Tooltech Ltd,
Huxley Close, Newnham Industrial Estate, Plymouth

There is a view that the STEM 'agenda' is too narrow and that in order to fully recognise the value of creative skills it needs to become 'STEAM', i.e. inclusive of the Arts. Kristian's experience is a case in point.

'At school, I was good at art, and was creatively-minded. I studied resistant materials both at GCSE and A Level. It was only later while I was at University, studying product design, that I found that I was fairly good at computer aided design, having taught myself how to use SolidWorks. Now, having just completed three years working for Tooltech, a leading design and manufacture company in the field of wax injection mould tools, I'm working as a CAD Designer using Siemens NX, an advanced high-end software package which is favoured by the aerospace sector.'

In a job like his, he advises, 'You need to be adaptable; be able to learn new skills and to rise to new challenges. You also need to be quite objective about things and try not to get too attached to anything on a particular job as that's normally the thing that will change. Inter-personal skills and teamwork are critical, and the key to both is the ability to know and understand people.'

One further piece of advice that Kristian offers is that, 'You need to accept that you will inevitably at some point make a mistake. When you do, it's not the end of the world, but you need to learn from it and not get hung up on it.'

Thinking back on his days at school, Kristian recalls that, 'When I was in year 10/11 one of the most important things I did was to sort out my understanding of maths. Having a good grounding in maths is so important if you want to pursue a career in engineering.'

Michela Briffa

Quality Engineer, Rittal-CSM
Broadley Park Rd, Plymouth

Michela first realised that she had a passion for engineering when she was at secondary school in Malta. 'During the Physics lab sessions I used to get really intrigued by the way things work and fascinated by how things were created'.

'My first critical decision was deciding what subjects to take for A-Levels. For me, choosing Maths and Physics at college was a no-brainer. At university, I chose Mechanical Engineering due to the broad range of the subject. The course covers areas such as manufacturing, design, control engineering, quality engineering and much more besides. This creates a range of options career-wise'.

'I started getting interested in manufacturing and quality engineering when I was in my second year at Plymouth University. As part of my course, one of the modules we had to study was quality management. You get to interact with everyone within the business whilst applying problem solving and continuous improvement skills to help produce the best product'.

'My advice to young people and in particular to girls who want to pursue an engineering career is to never doubt yourself regardless of what the opinion of others might be. A career in engineering is not an easy option but it is a very rewarding one. It will take you to a lot of places and the opportunities are endless. Do something only if it makes you happy and not to prove anyone wrong. All you have to do is believe in yourself. Finally, don't let anyone define you by your gender, age ethnicity, nationality etc'.

Michela now works for Rittal-CSM, a global business that manufactures industrial and IT enclosures for world renowned companies such as GE Energy, Facebook, Microsoft and Hewlett Packard Enterprise. 'The customer appreciating my effort is the most rewarding feeling I get from my job', she says.



Drayton
by Schneider Electric



Anthony Watters

Firmware Developer, Schneider Electric
Southway Drive, Plymouth

Not everyone's path to engineering is straight forward. Anthony's experience certainly wasn't and proves that a STEM career can be accessed by the most circuitous of routes.

'Understanding how things work has always been interesting to me, and I had an interest in computer programming from a young age thanks to my parents acquiring some second-hand microcomputers (Commodore 64, Amstrad CPC 464). My interest and knowledge led me to understand how games worked. However, it wasn't until much later when I was at University that I realised I also had an inherent understanding of how computers functioned and that programming was really enjoyable for me.

'After leaving school (without the best of qualifications) and working in a series of dead-end jobs, I began to look at how I could obtain skills in an area that was of interest. I found that I could gain a place on a Computer Science BSc course by completing an access to higher education diploma. The course I took was a science-based diploma of four subjects, Maths, Physics, Chemistry, and Biology. Although not directly related to

computing, I was then accepted into the BSc course at Plymouth University'.

Anthony went on to gain first class honours in his Computer Science degree and is now a software engineer with Schneider Electric in Southway. His role involves using languages, such as C++, to develop Smart Home products. This involves working closely with the hardware team who produce the electronics on which the software runs. 'I think you need to have a good logical understanding of how systems work, and how you want to fulfil the functionality requested. You also need to be willing to push your understanding and try new things. Enjoy creating things, even if they are just to answer "would this be possible?"; if it interests you, do it, learn and show it off.

Ellie Carron

Mechanical Design Engineer, Oakmount Control Systems
Sisna Park Road, Plymouth.

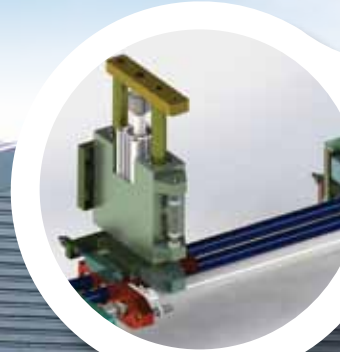
As is often the case with people who go on to develop careers in engineering, Ellie liked to take things apart as a youngster and was curious in wondering how things worked.

Ellie took double science at GCSE – ‘It helps you to think out of the box when problem solving’. Later, when she was seventeen, she took physics, maths and art at A-Level. ‘Engineering felt like being a combination of the three and these choices enabled me to take mechanical engineering at University and later opened the doors to industry’.

Ellie’s key influencers were her teachers and parents. ‘Most of my science teachers at school were women, all of whom encouraged me to think of having a career in science or engineering’. Other factors which affected her decision included her enjoyment of DT at school; her desire to continue using maths and physics in a practical way and the longer term job prospects that come with a career in engineering.

Engineering is both practical and challenging from an intellectual perspective and at the same time allows you to be creative which is important to Ellie. She still enjoys painting and sculpting in her spare time outside of work. But she warns young aspiring female engineers: ‘Be prepared for a very male dominated environment. When I did my degree at Plymouth University, the ratio of males:females was 93:7 but it didn’t put me off. Instead, it can help you to stand out more – it makes you more recognisable’.

Today, working with Oakmount, who design and manufacture process control systems and special purpose machinery for a wide variety of industries, Ellie spends much of her time on SolidWorks, a Computer Aided Design software program, drawing up parts to issue to the toolshop or a fabricator. ‘Every day is both different and enjoyable’, she says.



Oakmount
Control
Systems



Get interested in Engineering



1 Maths and Science

Engineers don't spend all their time doing calculations. But they do rely on maths and science principles. Calculating angles and learning the laws of physics might not always be the most exciting class – but product design can bring theories to life. When designing Dyson machines engineers use concepts like the Pythagorean theorem and Archimedes' principle.



2 Join the Club

Whether in school or out, engineering clubs challenge you to take your skills one step further. They also give you a chance to meet other students who have the bug for engineering. A lot of engineering clubs have mentors – professional engineers that take time out of the workday to help build everything from battery powered cars to robots.



3 Notebook at the Ready

Every Dyson engineer carries a notebook, full of past ideas and blank space for more. Take a blank notebook and start filling it with ideas. Write every idea down – nothing is too crazy. And don't forget to sign and date each page – so everyone knows who the idea belongs to.



4 Take Things Apart

If something stops working, don't toss it in the bin. Pull it apart to discover how it works. You might even find a way to fix it. Before they were building vacuums and fans, many Dyson engineers got a kick out of dissecting remote controls, old radios and bikes.



5 Make Stuff

Whether it's making cardboard prototypes or gluing together a model, building things hones practical skills – creativity, dexterity, resourcefulness. All will come in handy as an engineer.



6 Pen to Paper

Engineers rely on sketching to communicate complex ideas. These sketches are rough and ready and drawn very quickly. Practice drawing 3D shapes, shading and even life forms. It will help you feel more comfortable with drawing as a communication tool. Annotating sketches can help bring them to life.



7 Find a Mentor

Nothing replaces real life experience – so find a mentor. It can be a family friend, a teacher or even your parents. A mentor can give you insight into daily life as an engineer and the path they took to get there.



8 The Right University

Engineering is a very broad term. So decide what type of engineer you'd like to be before you choose a university. Some programs can be very maths heavy, while others rely more on art. You should find the program that fits your needs and talents.

Getting into engineering

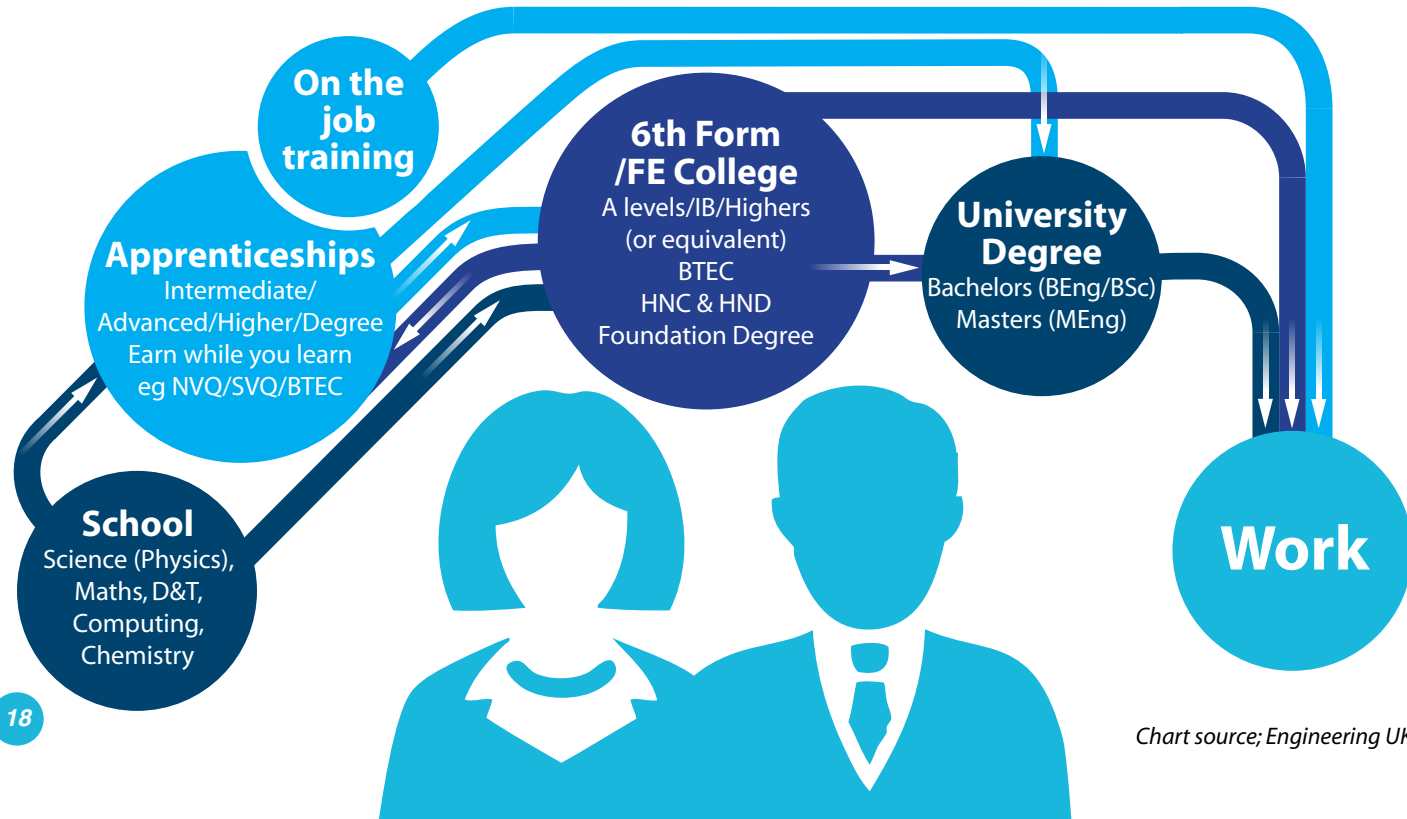


Chart source; Engineering UK



/WinSTEMplym



www.winstemplymouth.org

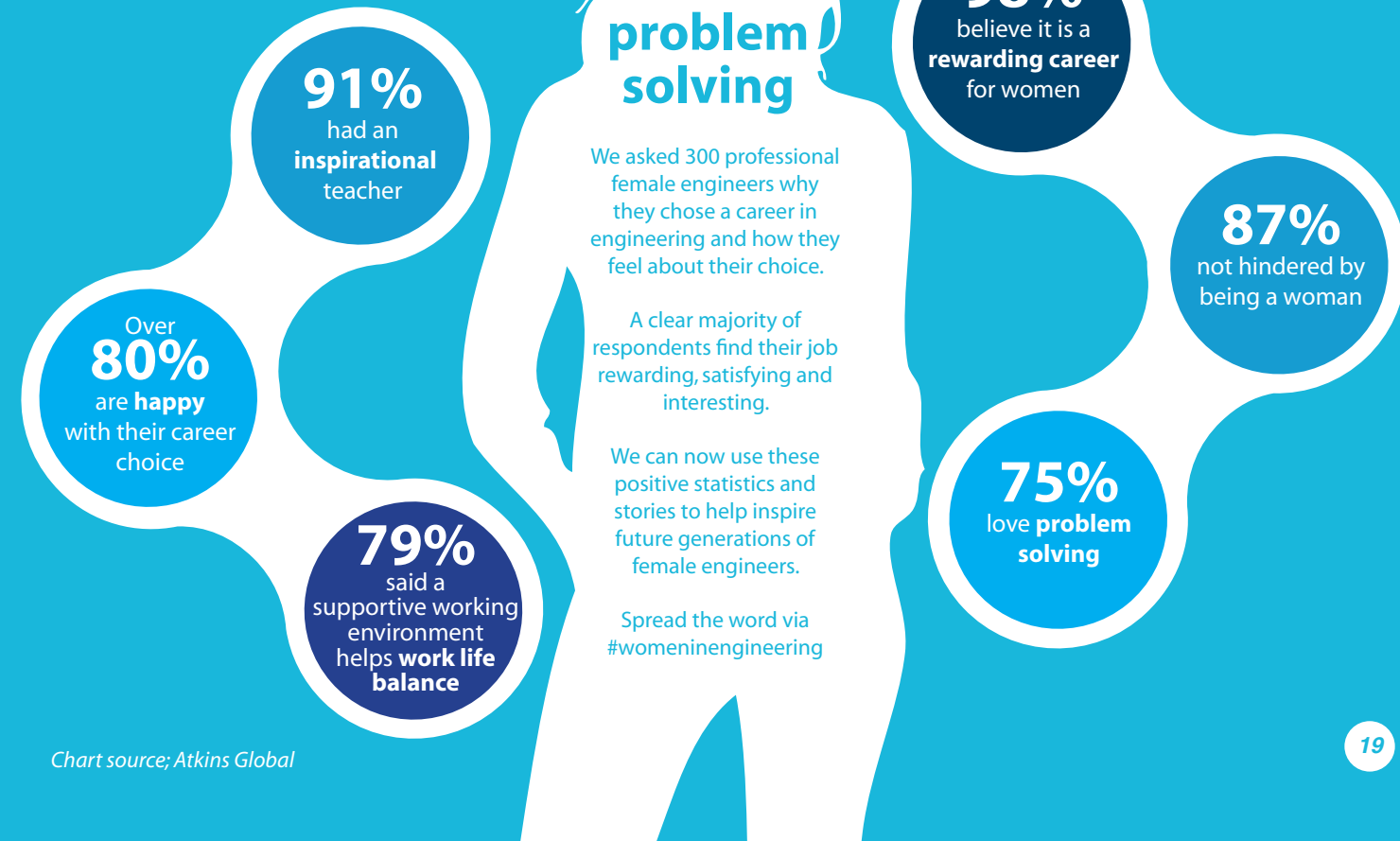


Chart source; Atkins Global

Characteristics of Generation Z

What we know about you ...

If you were born between the years 1995 and 2009, then congratulations you're a member of Generation Z - aka GenZ.

There are over forty thousand of you currently living in Plymouth. You are the most materially endowed, technologically saturated and formally educated the world has ever seen.



Globally Aware

GenZ has global aspirations and draws inspiration from all over the world. Nothing escapes their attention.

Digital Natives

GenZ have several screens and platforms at their disposal; they quickly adopt new technologies and are abandoning conventional media.



Speed Demons

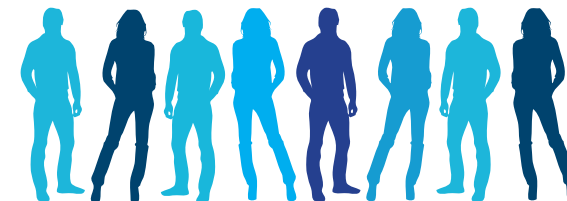
GenZ lives in a world of instant gratification. They thrive on acceleration and next, next, next.

Entertainment Addicts

GenZ prefer snapchat and Instagram. They watch twice as many videos on mobile as any other demographic and seek out captivating campaigns and entertainment.

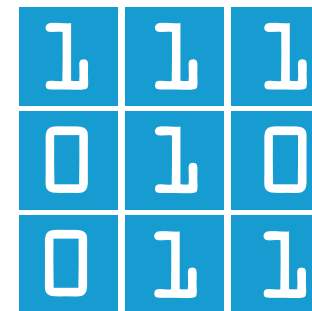


Charts source; Various



Collaborative partners

GenZ has grown up with social communities such as Facebook. Meeting, befriending and interacting with the online community is second nature. They want their voice to be heard and to be involved.



Micro Miners

Everything is broken into bite-size, manageable pieces for GenZ's. They thrive on small bits of information. Think Twitter-length messages. Information is condensed into its very essence.

PMG members

20 20 Plastics Ltd
www.2020plastics.co.uk

Advanced Medical Solutions
(Plymouth) Ltd
www.admedsol.com

Aldermans
www.aldermantooling.co.uk

Algram Group Ltd
www.algram.net

Applied Automation (UK) Ltd
www.appliedautomation.co.uk

Artemis Optical
www.artemis-optical.co.uk

Babcock International Group
www.babcockinternational.com

Bandvulc Group
www.bandvulc.com

Barden Corporation (UK) Ltd
www.bardenbearings.co.uk

BD
www.bd.com/uk

Birch Valley Plastics Ltd
www.birchvalley.co.uk

Bombardier Transportation
www.bombardier.com

Burts Potato Chips Ltd
www.burtschips.com

Composite Integration Ltd
www.composite-integration.co.uk

Derek Lane & Co
www.dereklane.co.uk

The Eurotech group plc
www.eurotech-group.co.uk

Fairford Electronics Ltd
www.fairford.co.uk

Fine Tubes Ltd
www.finetubes.co.uk

Ginsters, a division of Samworth Brothers Ltd
www.ginsters.com

HellermannTyton Ltd
www.hellermanntyton.co.uk

Hippo Leisure
www.hippoleisure.com

Hymec Aerospace (UK) Ltd
www.hymec.net

Hymid Multi-Shot Ltd
www.hymid.co.uk

Kawasaki Precision Machinery (UK) Ltd
www.kpm-eu.com

Luminati Waycon Ltd
www.luminati.co.uk

Magma Moulding Ltd
www.magmamoulding.co.uk

Manuplas Ltd
www.manuplas.co.uk

MB Aerospace Newton Abbot
www.mbaerospace.com

Meddings Thermalec Ltd
www.meddings.co.uk

MGB Engineering Limited
www.mgbl.co.uk

Mouldtech Solutions
www.mouldtechsolutions.com

M Subs Ltd
www.msubs.com

Oakmount Control Systems Ltd
www.oakmountcs.co.uk

Orchid Plastics Ltd
www.orchidplastics.co.uk

Paramount 21 Ltd
www.paramount21.co.uk

PCH Manufacturing Services
www.pchmanufacturing.co.uk

PD Devices
www.pddevices.co.uk

PEG Precision Engineering
www.peg-precision-engineering.co.uk

Permaban Ltd
www.permaban.com

Pipex px Limited
www.pipexpx.com

Plessey
www.plesseysemiconductors.com

Princess Yachts Int. plc
www.princessyachts.com

PTG Precision Engineers Ltd
www.ptgltd.co.uk

Rittal CSM Ltd.
www.rittal.com/uk-en

Schneider Electric
www.schneider-electric.com

Source (Myrna Ltd)
www.cable-accessories.com

Spinnaker Int. Ltd
www.spinnakerinternational.co.uk

Teignbridge Propellers International Ltd
www.teignbridge.co.uk

Thornbury Manufacturing Ltd
www.tml-ltd.com

Tideford Organic Foods Ltd
www.tidefordorganics.com

Tooltech Ltd
www.tooltech.co.uk

Underhill Engineering Ltd
www.underhillengineering.co.uk

UTC Aerospace Systems
www.utcaerospacesystems.com

Vexcolt Holdings Ltd
www.vexcolt.com

Vi-Spring Ltd
www.vispring.co.uk

Vortok Int Ltd
www.vortok.com

Westaway Sausages Ltd
www.westawaysausages.com

The Wrigley Company
www.wrigley.com/uk