UNCORRECTED TRANSCRIPT OF ORAL EVIDENCE
To be published as HC 665-i

House of COMMONS

Oral EVIDENCE

TAKEN BEFORE the

Science and Technology Committee

Engineering Skills

Wednesday 24 October 2012

Steve Radley, Lynn Tomkins, Richard Earp and Andrew Churchill

Evidence heard in Public Questions 1 - 39

USE OF THE TRANSCRIPT

Oral Evidence

Taken before the Science and Technology Committee

on Wednesday 24 October 2012

Members present:

Andrew Miller (Chair)

Caroline Dinenage

Jim Dowd

Stephen Metcalfe

Stephen Mosley

Graham Stringer

Hywel Williams

Roger Williams

_____

Examination of Witnesses

Witnesses: **Steve Radley**, Director of Policy, Engineering Employers Federation, **Lynn Tomkins**, UK Operations Director, Sector Skills Council for Science, Engineering and Manufacturing Technologies, **Richard Earp**, Education and Skills Manager, National Grid, and **Andrew Churchill**, Managing Director, JJ Churchill Ltd, gave evidence.

Q1 Chair: We will now move seamlessly on to the beginning of our inquiry into engineering skills. May I welcome the new panel? I think that all four of you have seen that we operate in a very friendly and collegiate way. Hopefully, we can carry on like that. It would be helpful if the four of you could formally introduce yourselves.

Steve Radley: Good morning. I am Steve Radley. I am the policy director for EEF, an organisation that represents 6,000 manufacturers.

Lynn Tomkins: I am Lynn Tomkins from SEMTA-the Sector Skills Council for Science, Engineering and Manufacturing Technologies. I am director of operations, and I am responsible for both strategic and direct engagement with employers in the sector.

Richard Earp: Good morning. I am Richard Earp. I am the education and skills manager at National Grid. I have spent the last three years running all of our schools and educational outreach programmes.

Andrew Churchill: Good morning. I am Andrew Churchill, managing director of JJ Churchill Ltd, a family-owned SME precision engineering company that employs about 130 people in the midlands.

Q2 Chair: The first question that I want to pose is about employers' difficulties in recruiting good engineers in the UK and to discuss whether there is in fact a skills gap. Specifically, Mr Churchill and Mr Earp, how do you see your companies' engineering skills need changing in the future?

Andrew Churchill: We compete in a high labour cost economy; therefore, to compete on the cost of labour is going to take us nowhere. We need to compete with the best skills and the best technologies. What we are seeing in aerospace and defence, and in civil and defence nuclear as they get off the ground, is that an increasing level of higher skilled employees is required. That means that I am looking for employees with experience and competence. This is probably common across many engineering sector employers, but I am finding it harder and harder to get that type of competence and experience.

We are relying to a greater and greater degree on our well-established apprenticeship scheme to develop and grow our own skill sets internally. That is fine, but it means that there is a lack of new blood coming into the business unless we specifically go out and look for other people to bring in. That itself is a difficulty if you are a rural business such as we are-an SME competing with blue-chip multinationals, who are also our customers, and also with some of the security-controlled sectors such as defence and nuclear.

Richard Earp: I think we said in our written evidence that this year we were looking for 280 trainees. In fact, we have taken on 310. We have found the people that we were after. However, our sense was that the strength in depth in the pool from which we were recruiting wasn't quite what we would like it to be. Whilst we have been able to secure people, we had concerns about the strength that is there and what that means for the companies around us and for us, going forward.

We run training schemes at all levels, from apprenticeships through to graduate training schemes. We are growing the intermediate skills sector, which is really quite important. We take on something like almost 70 trainees with level 3 qualifications on entry and then use a foundation degree route to bring them up to advanced technician status and so on. Something like two thirds of our people don't need degrees. On the other hand, you could cut the data a different way and say that something like two thirds of our people need A-levels or level 3 equivalence. There are some messages here about the average skill base needing to be stronger. We are looking to recruit people with quite strong science and engineering skills, but the source of those higher skills isn't as strong as we would like it to be. That is our observation.

Q3 Chair: Based on those two responses, Ms Tomkins, in the centre's written evidence you mention problems with the ageing work force and the fact that companies are having difficulty in finding the right skill sets. Do you foresee a point in the future when young engineers in the pipeline are so few and far between that it will have an irreparable impact on industry?

Lynn Tomkins: I think we are seeing some of those issues now. We need something like 82,000 engineers and technicians just to deal with retirements to 2016. There is a key issue in getting the message out to young people that it's a great creative career in engineering. Companies such as Andrew's are quite unusual, as SMEs, in actually taking on young people and training their own apprentices. Only 18% of companies in our sector recruit apprentices and only 16% of SMEs take on graduates. There is a variety of reasons for that, including the

bureaucracy of finding good talent and being able to attract it if you are competing with blue-chip companies. There are a number of things that we can do to address that.

Toyota and Rolls-Royce in the east midlands certainly get a lot of people applying to work for them. What we are trying to do, if they are tested and make the grade, is to support those young people perhaps to a job with an SME in the region so that they don't need to be retested; they just haven't got a job. In the west midlands, the recruitment of Jaguar Land Rover is having a major impact on companies, because it is taking on 1,000 graduates and 500 apprenticeships.

We need schools to promote a career in engineering, and we obviously cover that. The engineering diploma is addressing some of that. It is also attracting a significantly high number of girls, which is, again, an issue. Girls in advanced manufacturing and engineering are 21% compared with 48% in other sectors, and even less if you then get into the occupations of engineering. There is a lot to do.

Q4 Chair: You may have heard Sir John answering a question earlier on about science and engineering education. There is a very strong view-it is easy to produce evidence on it-that young people are influenced by those around them from a very young age, yet the sector skills councils are now under pressure to be programme-based and focused on the employers, rather than looking backwards at doing work with schools, and particularly, for example, primary schools. Doesn't that give you a problem in creating your next generation pull-through?

Lynn Tomkins: Yes. Certainly our remit is to support our employers; clearly, by doing that, we are clearly supporting them, if you like, to have positive campaigns. I shall give you an example.

We have regional councils in all of the nine English regions, as well as in Scotland and Wales. The good messages that are powerful to young people are about other young people who have got a great job in a company, what they are earning and so on. We supported our companies to have a campaign in the press. In the region's local companies and in the north-east, we have certainly increased engineering apprenticeship starts over a six-month period. There were 1,800 in 2010; they are now at 2,200 in the first six months of this year. There is lots that employers can do, and they do it, especially the large companies supporting their supply chain. Everybody understands that it is a major task.

Q5 Chair: Would you answer the question directly? Are you now restricted because of the new rules that you are working under from doing innovative work to reach into areas such as primary schools?

Lynn Tomkins: We are not restricted, but we are not funded to do any careers.

Q6 Chair: You are restricted, then, as funding stops you.

Lynn Tomkins: Yes, we are, as such.

Q7 Stephen Metcalfe: I recognise that a range of levels of qualification are obviously required across the whole engineering sector, but do employers prefer taking on apprentices and training themselves to make sure that they end up with the skills that the business needs,

or is it better to take in graduates, bearing in mind that graduates are unlikely to have the relevant experience that you spoke about earlier? Which is the better route?

Richard Earp: From our point of view, I would not say that there is a better route. It is going to sound clichéd, but it's true. The business is a team, and you need people with different backgrounds, different experience and education at different levels. We have a strong need for graduates because we have a strong need for people with the necessary analytical skills and, frankly, the depth of theoretical knowledge to solve complex problems. But we also need people with practical skills, people who prefer a lifestyle out doing practical jobs rather than a head office-type job. We need all of them, and I wouldn't say that there is a preference. Like any good team, if you have a strong weakness in one area, the whole team suffers, so you can't neglect anything.

Andrew Churchill: May I add to that? I agree basically with Richard's comments, but we have to be incredibly careful not to suggest to our youngsters, from primary age onwards and right the way through as students, that to go down the vocational line is in some sense a failure. We are selling our culture and our community short by doing that. It is not the case in Germany. I am not suggesting that we should ape Germany, but vocational training there is seen to be far more of an equivalence and you are not a failure if you don't go immediately from school to university.

It isn't just a big company blue-chip prerogative to send your best and brightest apprentices on to university; we do that. We need to expect far more from our SME sector, which, after all, is about 90% of our manufacturing businesses, to do just that. If you articulate career progression for your apprentices, you keep them. If you keep them, they are getting that competence with you and you don't lose them to your competitors.

Steve Radley: I would like to add to some of the points that Andrew and Richard have been making but also in answer to the previous question, with your permission just very quickly.

We have recently conducted some new research, which I think was completed after we had submitted our evidence. It certainly shows that, across the board, employers are saying that their skill needs are increasing across a range of different skills. Between 60% and three quarters of companies are saying that they expect to have higher skills needs in a range of areas over the next few years. Some of this is probably to do with things that we traditionally talk about, such as craft technician skills, but we find that other factors such as R and D, technical skills, project management skills and even some other things like sales and marketing are becoming increasingly important. This really reflects employers' focus now on innovation and finding new markets abroad, particularly in emerging economies, and also on developing service offerings and improving their processes.

As Andrew and Richard have said, it is very much horses for courses. Some companies will want to go down the apprenticeship route, but others will want to recruit directly from higher education. When looking into the future, in many cases it will be a hybrid route. In some cases, people will go into a company, get an apprenticeship at level 2 or level 3, or perhaps in the future at a higher level, but over their working lives they will probably go to higher education institutions to get further qualifications at degree level. It will be much more of a hybrid innovative approach in the future.

Q8 Chair: By the way, we would welcome sight of that research.

Lynn Tomkins: May I add to what Andrew said? We have developed a higher advanced apprenticeship that takes people through to level 4 and level 6 and gives chartered status. An apprenticeship is just a starting point and it is definitely valued. Recently, Nigel Whitehead of BAE Systems said that 270 of the 400 leaders in military aircraft manufacturing started as apprentices. There is a real need for a mix.

Q9 Stephen Metcalfe: I wouldn't want you to go away for one minute thinking that I don't recognise the importance of apprenticeships. That is what the question was-that you, as employers, get the opportunity to direct people earlier in their engineering careers. I am not trying to differentiate between the two. Are there advantages in apprenticeships? By the sound of it there are, but it is horses for courses.

Bearing that in mind, though, is it more difficult for small and medium-sized companies to offer apprenticeships? You are obviously doing very well, but you said that only 18% of small businesses are able to do it as opposed to-I couldn't hear whether you said 16% or 60%.

Lynn Tomkins: It is 16% who take on graduates.

Q10 Stephen Metcalfe: What are the barriers to small and medium-sized businesses taking on apprenticeships or graduates?

Lynn Tomkins: A lot of small businesses don't have an HR or training function, so taking on a young person is quite resource-intensive. It is quite complicated. You have to find a good provider, and the staff will be off the job for the first year while you are paying wages. There is a whole range of barriers that are well documented and well researched in doing that.

We are doing some work at the moment, which is supported by the Employer Investment Fund, to target new employers who have never taken on an apprentice. We are very successful. There is a great willingness if they can be supported in recruitment, because, again, it is attracting the right talent, helping with selection and linking to a good provider who will respond well to a small company. A lot of the contracts for engineering apprenticeships go to the big providers and therefore having flexible delivery is really important. Giving good service to employers is an issue.

Andrew Churchill: There is a division between barriers and perceived barriers, particularly at SME level. There is also the fear of the unknown. My company doesn't have a professional HR department. We can't afford to resource one, but by working closely with the local college we have been able to develop and run our own apprenticeship scheme for seven decades, and 8% of my work force are in apprenticeship. That is our lifeblood.

That fear is something that communication and education of the SME sector can overcome, but one thing it has to be is local. Apprentices and students don't travel. Most don't have driving licences. There is a one-size-fits-all approach; the UTCs are fantastic and I am sure that we will come on to that later, but it is only for that area. You have to engage with the local primary schools, your local schools and local colleges, but it has to be within scooter distance. I know that sounds quite bizarre, but we want to keep them.

The final point is that you must engage as an employer, as an SME, with the parents. You have to shatter that image of dark satanic mills and greasy rats. We are not like that in the UK. I wish that our media would better represent engineering manufacturing today. We need

to get our parents into our factories, and our careers advisers at schools and school form teachers, just to see what we are about and how exciting it is. Then you will get that excitement cascading through the generations.

Q11 Stephen Metcalfe: Is there anything more that we as the Government could do? What recommendations would you like to pass across that would improve things?

Richard Earp: We have certainly spent a lot of time in the last three years working with schools. Work that we did about three years ago suggested that one of the issues underpinning Andrew's point is that young people struggle to visualise a professional engineer, certainly in a positive way, so we have been making great efforts to send our engineers into schools to do exactly that-to help that.

The system of incentives and so on that drives the school timetable and schools' priorities does not necessarily make space for employers to do that. Perhaps the Government could give some thought to that aspect. Is it essential, if a school is to be perceived as doing well, to involve employers? If we have a system of incentives for schools whereby schools can be seen to be succeeding without involving employers-that is possibly what we have now-then something could be done in that space.

Steve Radley: I would support many of the points that my colleagues on the panel have made about the challenges that employers face, particularly small and medium-sized firms. One other point to recognise is that, particularly in engineering, the investment required of an employer is significant. Figures from BIS, taking level 2 and level 3 apprenticeships combined, show that the cost to the employer is about £40,000. If you just stripped out level 3, it would be higher than that. That is a significant investment, but employers are willing to make it. On top of that, our research shows that there hasn't been any improvement in terms of the ease of investing in apprenticeships, in finding the right college, as Andrew said, and a provider that is responsive to their needs.

A number of things need to be done. If we are talking about the issue of apprenticeships more widely, looking to the future, we need to raise our level of ambition. Level 1 and level 2 apprenticeships have their place, but looking to the future, if we are going to be competitive as a nation, we need to focus on level 3. Where there is money available to increase funding of apprenticeships, it needs to be particularly directed in that area.

We need to do more to put employers in control in terms of driving standards within apprenticeships. There are far too many apprenticeship standards at the moment, and that is confusing for employers.

We also need to look at exploring alternative funding models. One of the ideas that we are quite attracted to, rather than giving the money up front to the provider, is to route the money through the employer, perhaps through a reduction in the national insurance contributions. That would address some of the cash-flow costs that particularly smaller employers face, but it would also put the employer in control and would drive innovation from providers and make them more responsive.

Lynn Tomkins: In terms of the wider picture for SMEs, Wales has a sector priority fund that employers drive, that we have control of, that employers prioritise, and they have gone for the higher advanced apprenticeship, which is the need to raise skills. They invite employers to

tender for that work. So it has driven up quality, it has ensured a good price, and it has allowed flexibility for local provision. Where there is a collection of employers that have a need, we have done that. We would hope to see that opportunity, through the employer-ownership pilots that are about to be released, to make engineering manufacturing a priority within that so that growth can be driven by employers.

Q12 Jim Dowd: My career started as an engineering apprentice, and it has been a catastrophic failure. One can never tell. Can I look at UTCs-university technical colleges, as they are known? There has been an almost universal welcome for the idea-so much so that it leads you to think that somebody has not told you everything. Are there any downsides to UTCs that anybody can see?

Andrew Churchill: The first downside from my perspective is that there is naturally going to be a postcode lottery, a patchwork of opportunity for youngsters, given that the UTCs rely substantially upon large company management expertise, funding and interaction. They are a fantastic step forward and they are very exciting, but they are only part of the solution. In my area of the midlands, I have a couple of UTCs nearby but not near enough, so they don't help with my catchment zone for youngsters who come to me with that background.

Q13 Jim Dowd: That is not a defect in the proposition, is it?

Andrew Churchill: Not at all. It means that it will not be a universal solution but only an element of the overall provision.

Richard Earp: It is hard to see a huge downside. I absolutely accept the point. I guess, if policy formation assumes that UTCs on their own are the answer to engineering skills and therefore that nothing else is done, then that is a risk and it would clearly be a mistake, because they are not.

We have been heavily involved with the early UTCs-the very first one in fact-and we like the idea. We think that the prospect of them is great, but they need to be nurtured and to find their position in the education system more generally because there are a number of risks to their future success, not least of which is the scalability of the model.

One reason why we are behind them is that we want them to be beacons. We want them to be exemplars in engineering education. What we often say to the UTCs that we have worked with is, "Are you going to reach out to your local schools? Are you going to share the project work and the new learning techniques and so on that you are going to develop with other schools?" For us as a company, that is going to be one of the things that we will always be looking for, because we know that we have to spread the message much more widely.

Q14 Jim Dowd: Is the danger not precisely the converse of that, namely, that schools more generally will say, "Technical education is now dealt with as a specialism, so we don't need to bother"?

Richard Earp: That is a danger, and we have to be alert to it. We need to set a new standard. We need schools specialising in this. For example, we have gone in and given projects to a couple of UTCs for their students to work on. That same project material, and the stuff that we have developed to support it, can and will be available to all schools. It is about using them as leaders, not as being the only answer.

Steve Radley: We are very attracted to the idea of UTCs. It is extremely early days; only 34 of them have been approved and have funding, and not all of them are up and running.

Q15 Jim Dowd: Is that enough?

Steve Radley: We need to look at expanding things, but we need to look harder at how the first few are doing before we go too fast. There are a number of very attractive aspects of it. It gets universities and employers working together, and it gives employers an opportunity to get involved in influencing curriculums and providing support. Probably very importantly, one thing that our overall education system could learn from UTCs is that their students are taught by teachers with real-life practical experience of work.

One potential threat-this is something that we are probably coming on to-is that there are some attractions to the idea of introducing an English baccalaureate, but it is very important that the way it is introduced doesn't constrain the development of UTCs or put them on a lower level of esteem than the English baccalaureate. It is absolutely vital to address those issues.

Lynn Tomkins: I would like to add to Andrew's point. There are two very good examples in the west midlands, but again it is only one part of the solution. We need to look at good training associations, which are much smaller specialist providers that can provide a local solution, but we have not missed the fact that one size doesn't fit all.

Q16 Jim Dowd: I don't think that anybody is suggesting that this is all that needs to be done. I am trying to examine what is being done in this area. Is the answer that it is quite promising?

Lynn Tomkins: Yes.

Q17 Jim Dowd: May I say to Mr Churchill in conclusion that the dark satanic mills to which Blake referred, given the coded intellectual satire of the Victorian era, are actually Oxford and Cambridge?

Andrew Churchill: I am fully aware of that, but it is used as a shorthand in common parlance and by the media for the antithesis of that.

Q18 Caroline Dinenage: I would like to talk about other academic groups that are producing the sort of skilled work force that employers tell us they need and which is lacking. The first would be the engineering diploma, and, as you know, there have been changes to that. Some people have reported to us that they felt the engineering diploma wasn't popular in schools because it was only one qualification and that, although it was the equivalent of many GCSEs, it didn't look particularly impressive in the league tables because it was only one qualification. The opposite of that is that others have felt that, by the Government not necessarily celebrating that as a vocational qualification, in some way they are not promoting vocational qualifications and not celebrating engineering. I wanted to have your thoughts on the engineering diploma and whether you think that it is a worthwhile qualification in the eyes of employers, first of all.

Andrew Churchill: There has been a relatively low take-up of the diploma, but it has not really been long enough in existence for us to make a proper assessment of where it is going.

It was debased substantially and very quickly, down from five GCSE equivalents to one GCSE equivalent. That has sent a very unfortunate and very loud message to careers advisers and to secondary school teachers that engineering does not have the same basis of value as academic subjects. I fully understand that that is not the intention of it, by the way; I understand the intention of rebasing it, but intentions and perceptions are quite different things.

It would be a pity to chop and change too quickly, too radically, without having analysed the benefits and weaknesses of what went before. We are leaving youngsters, careers advisers and teachers-and SMEs-with the perception of a constantly changing basis for engineering achievement at school level. That constant change is unsettling. It leads you as a teacher perhaps much more to lean towards the academic bias because it is simpler. The E-bac will also probably accentuate that if we are not very careful, as some of you mentioned earlier. There are elements of truth in all that you have said, but the biggest damage has been the perception of the debasing.

Richard Earp: I would agree with that. We support the Government's efforts to ensure high standards in English, maths and science. They are absolutely the bedrock of engineering and employability, but it is not enough on its own. Having the diploma alongside high standards in maths, English and science was a pretty good introduction for young engineers. In that sense, the fact that it is not there any more is regrettable. Yes, the message that it sent to schools about what their priorities should be is unfortunate, and we need to think quite carefully about that.

Q19 Caroline Dinenage: Do you think that, in its original form, it was a worthwhile qualification in the eyes of employers?

Richard Earp: Yes. My only hesitation is that any qualification depends on how well it is taught by the local teachers in that school. Where it was taught well, and where it was alongside a good maths and science background, it was a good qualification, yes.

Lynn Tomkins: I can confirm that our employers welcomed the opportunity to develop an engineering diploma, and you can see from our evidence how many. We also worked with academic institutions. It was a great route to an apprenticeship or an engineering degree. It attracted a significantly higher number of girls who took that opportunity, with an increase of 35%, when 5% are taking engineering apprenticeships, and employers were hugely disappointed by the downgrading of it. I have an automotive strategy group, and when the first results came out a number of them had already offered jobs, irrelevant of the diploma results, because they had had a really good grounding and had worked with them and their schools. There was huge disappointment at the downgrading.

Andrew Churchill: May I come back on that? One of the difficulties as an employer when recruiting youngsters to be apprentices is that you can't reasonably expect them to be experienced. That is what they are; they are just starting out on their careers. I recruit for attitude and aptitude. I can't look at academic results; they are no longer a good enough indicator. I am looking for that spark that says they will find engineering and manufacturing really exciting.

The one thing that the engineering diploma did was to provide an opportunity for the student to learn something about the engineering and manufacturing world, with visits and so on as

part of it, before making the leap into the unknown of taking an apprenticeship or doing an engineering degree. With that gone, and with design and technology coming out of secondary education-although there are debates about doing it in the primary sector-we employers, particularly SMEs, are left with a group of youngsters that know almost nothing about our sector at all unless one of the parents happens to work in engineering. The only way that we can engage now is right on the front line by going to see those primary school children and then getting them in for work experience at secondary level. One of the arrows that we have lost from our quiver is trying to educate people on what the manufacturing world in the UK is about today.

Q20 Caroline Dinenage: What can the Government do to make the engineering diploma more attractive not only to students but to employers and schools?

Lynn Tomkins: The downgrading was a huge turn-off for schools and students, and we would like it reinstated. We have employers that have put the point to John Hayes, and we clearly expect it to be made to Mr Hancock, the new Minister.

Richard Earp: It comes back to the point that we mentioned earlier about having a system of incentives for schools. It may or may not be appropriate to put the engineering qualification in an E-bac wrapper or something like that, but, if the criteria that schools are judged on-leagues tables, Ofsted inspections and so on-exclude coming to see what manufacturing industry is about and exploring engineering, then schools aren't going to do it. That is our assumption, and the evidence seems to support it. That system of incentives needs to be looked at very hard. Finding out about the world of work and engineering has to be in there somehow.

Steve Radley: A further point about incentives to schools goes beyond the downgrading. If you look at diplomas as a whole, the level of pass rates is pretty low. If that continues to be the case, there is clearly not going to be an incentive for schools to get involved.

That takes us back to some of the earlier points that have been made. It is not just about the status of the diploma in terms of the grades that it accounts for. It is about putting together a pretty complex consortium of employers, teachers and technical colleges, and getting good delivery. It is a good idea, but the problem in many cases is that it has been undermined by weak delivery.

Richard Earp: I would agree with that. Our support for it in principle, as I said, is based on the fact that where it is taught well we have seen it do well. If there is a pragmatic argument that it is just too difficult to put together the ingredients for a well-taught diploma and therefore young people are better off spending their time doing something else, that may well be true, but the policy response therefore needs to be, "Well, let's sort out the practical difficulties. Let's make it happen rather than let's not do it."

Lynn Tomkins: Just to pick up on Andrew's point, the Government had a "see inside manufacturing" initiative that they started in the automotive sector last summer. A lot of employers went to a lot of trouble to open their doors and invite the schools in, but at the first attempt a lot of schools just didn't bother to show up on the day. You can imagine the disappointment there was in them not wanting to do that. None the less, the employers tried again in the October, and it was really well received. Aerospace is another sector that could become involved. But, again, if a school can just think, "We won't bother taking students to a

leading factory that is opening its doors", then it is a great disappointment, especially if it is on their doorstep. Employers really struggle to deal with that sort of concept. Why would they not want their students to experience what it is like?

Richard Earp: The answer is that what they are judged on doesn't require them to do so.

Andrew Churchill: May I add to Lynn's comments? This is where I think the responsibility comes back on the employers rather than the Government, which might seem slightly oxymoronic.

We know that the schools find it hard to understand our sector. I believe it is unreasonable to expect teachers to have a great in-depth experience and knowledge of the manufacturing sector. Making sure that you have that engagement with your local primary and secondary schools means that, when a "see inside manufacturing" event comes along, they will attend because they see the value. I am sorry to say it, but the only group that can do that is the employers. That is our bit of the bargain. Your bit is to facilitate it; our bit is to make sure that the groundwork and understanding is there to start with.

Richard Earp: We have certainly done that. We have also got involved in teachers' CPD work; a potentially efficient opportunity for employers to get involved in education is to talk to groups of teachers. We have held open days for teachers at our premises, and we have worked with some of the science learning centres in helping with teacher training courses and CPD courses. We welcome those opportunities, and we will continue to do that. That might be something that the employers can do efficiently and well and more of.

Q21 Caroline Dinenage: That is right. I have seen the practical knock-on effect of engineering skills. Qinetiq in my constituency runs a power boat challenge. It sends engineers to the schools to give kids tips on how to build the boats, and on the final day they take them to a massive indoor water tank where they have the chance to race the boats. As a result, they understand the potential attraction of a career in engineering but without necessarily knowing that it is engineering they are doing because it is wrapped in adventure and fun.

Steve Radley: The point about CPD is really important. I agree with Andrew that ultimately a lot of this is down to employers. They have to find innovative and exciting ways to host visits to their factories or going into schools and stimulating young people. There is a very important role that teachers can play in reinforcing that.

I know that a lot of responsibilities are put on teachers, but one thing that we would be keen on would be to require that part of the teachers' CPD should involve spending at least a few days in industry. That would allow them to reinforce the messages that employers are looking to get across. Also, when they teach some of these key subjects such as science and maths, it would allow them to bring things to life and make them a lot more exciting and relevant to young people.

Q22 Caroline Dinenage: That is a good point. You mentioned the English baccalaureate. Some employers have welcomed it because of its strong emphasis on maths and science, but others have flagged up the fact that it would marginalise things such as design technology and computer science. Which GCSE subjects are important for producing skilled engineers, and what is your view on the English baccalaureate? Who would like to start?

Richard Earp: We are not going to be quoting the English baccalaureate as an entry qualification to any of our training schemes. That probably says something, in the sense that that is not exactly what we are looking for. However, we have always looked for GCSEs in maths, English and science, and that's true. We just don't see the necessity to prioritise some of the humanities and languages subjects over design technology, electronics, business studies or any of the other GCSEs.

Andrew said something earlier about academic qualifications and their relevance. They are important. Standards in maths, English and science are certainly important, and evidence that someone has applied themselves enough to get a set of qualifications is important, but, like most employers, we use lots of other criteria to decide which young people we want to employ. I am not really too bothered about which GCSEs they have, beyond maths, English and science. I would love to see them doing the sort of challenge that you describe, where they get involved with practical engineering projects or have been out and done things. That tends to serve them better in our recruitment and assessment process.

Q23 Caroline Dinenage: The girls' team won, incidentally.

Richard Earp: Excellent; fantastic.

Q24 Caroline Dinenage: Does anyone else have any thoughts on this aspect?

Andrew Churchill: Yes, if I may. It would be hard to find a manufacturing or engineering employer who was keen to say that the STEM subjects weren't important. We all agree on that; there is no problem there. For a lot of youngsters, finding the link between those key core subjects and the real world-the bridge of application, of which the motorboat challenge was a perfect example-is the spark that is needed to secure success in those STEM subjects.

If you take design and technology out of the curriculum, a lot of children will find it hard to see how what they are learning from the blackboard-I am betraying my age now; I mean the whiteboard and the projector-is linked to the real world where they might end up being employed. Yes, STEM subjects are terribly important, but, for goodness sake, let us not lose design and technology. After all, I think that I am correct in saying that, of the non-compulsory GCSEs, design and technology is by far and away the most popular. Let's leave room for it. Am I right, Lynn?

Lynn Tomkins: Yes.

Andrew Churchill: Yes, let's leave room for that.

Q25 Chair: Does anyone disagree with that?

Lynn Tomkins: No; you have a small employer who has answered that really powerfully.

Steve Radley: I completely agree with that, but there is a wider point to be made. All parties are looking at the reform of qualifications, but E-bacs, A-bacs and Tech-bacs all have interesting elements. Richard mentioned English and maths, but it can't be a substitute for really driving up the standard of attainment in English and maths. We set one of our key benchmarks so that 65% of people at GCSE level should be getting A to C grades in English and maths. We are some way below that at the moment. It is not just about reforming the

qualifications. We have to find other ways to drive up teaching standards in those basic building blocks.

Q26 Stephen Mosley: You were speaking about teachers and the effect that they have on children. What sort of careers advice do young people get at school? Could it be improved?

Andrew Churchill: In our limited experience, yes, hugely, but our experience is very specific and very local. Some schools are excellent when it comes down to the individual that provides the careers advice and probably their own experience and background. Others are having to rely on what they have picked up elsewhere rather than from a direct experience of manufacturing, and that is very weak. I don't necessarily blame the teachers or the careers advisers, but it is something that needs to be addressed if we are going to articulate the real opportunity for employment in high-calibre jobs in engineering and manufacturing in the future.

Richard Earp: It is vital that we talk to teachers and careers advisers to make sure that they understand what modern employers need and so on. Careers advice is a really difficult job. How on earth typically one individual in a secondary school with 1,400 pupils can stay abreast of all the opportunities in the various sectors and professions I don't know. It is a really difficult job. We certainly welcome any opportunity we can get to talk to them and we do. There is no substitute for getting out and spending time there. As employers, we are very willing to step up to the plate and do that.

Q27 Chair: It is about creating space in the curriculum to allow the teachers to have the time to get involved in professional development so that they understand your sector.

Richard Earp: Yes. Many teachers progress from education straight back into schools, but, as one of my colleagues said earlier, spending time in industry is very helpful. We certainly run a few secondments and that kind of thing. Yes, we must make space for them to reach out and experience the world of work.

Steve Radley: There are a couple of recent trends that we would find particularly unhelpful. One of the things is that there has been a removal of the requirement for schools to provide face-to-face careers advice. These days, young people can get a lot of good information from technology and from their own research, but, given the complex choices that many now have to make about a range of difficult qualifications and different routes into work and careers, they need some good face-to-face advice as well.

The other regrettable change is the dropping of the need for work experience at key stage 4 for 14 to 16-year-olds to be compulsory. We would like to see that reversed. That would be really important. As well as getting good advice from teachers and careers advisers, if young people have that opportunity to learn about work at first hand through work experience, that is absolutely vital.

Q28 Roger Williams: I have been involved in some of this previously, and one of the thoughts that I had was that, if careers advice was delivered by the school teacher or someone else employed by the school, however well intentioned the advice, it would not be as good as it could be, because the school would be tempted to point the pupils in a direction that the school would benefit from-for instance, going on to do A-levels or whatever. It seems to me that externally generated careers advice is the very best thing for young people.

Andrew Churchill: That certainly works extremely well. Both of my village primary schools do World of Work weeks at the age of about eight. The schools get in a variety of different skills, from engineering to veterinary work and beauticians, to talk for about 40 minutes about their job. I find that that really lights a fire with youngsters.

Coming back to the diversity question, I always question a group of eight-year-olds at the beginning of a visit, and the girls will put up their hands and say that they want to become nail technologists or beauticians, and the boys will say that they want to be bricklayers or boiler repairers. There is nothing wrong with any of those, by the way, but the children are not thinking about manufacturing. At the end, they have thought about it. That is important.

Chair: Hywel, do you want to push this a bit further?

Q29 Hywel Williams: I should have prefaced my question about work experience. I used to learn at something called the practice centre at Bangor university, which was involved for years in finding placements and supporting them, and then assessing assessors and supporting assessors and all that sort of work, which was quite highly developed because it was at the post-graduate level. Talking to employers at the time, you would ask what they wanted, and they would say, "What have you got?" You didn't really feel that employers were always on board.

To some extent, you have already answered my question, because I was going to ask you how important you think work placements are, but there are supplementaries to that. How do SMEs deal with work placements because of the resources issue and also the localism issue? Do you just hook up with your local schools, or is there room for wider experience for people at the other end of the country?

Andrew Churchill: I offer about 10 to 12 work placements of a week each year. With 130 employees, that is about as many as I can manage. Every student, typically from 15 to 19 years of age, in that bracket, gets a taste of everything in every single department, including administration and finance. About 80% of those weeks are with very local schools, and they get my priority because within my seven-year STRAP plan they are going to be some of my apprentices. For other schools, particularly those attended by the children of people who work for me who come from further afield, I am very happy to open the doors to them as well. Naturally, I focus on the very local area because it is in my own interests.

Richard Earp: The issue of work experience and seeing the world at work is really very important. Twice a year, we give over a large part of our training centre to set-piece courses that we run for year 10s; we take about 100 students a year through that. We have work experience places throughout the business. One of the things that our research told us was that the best thing you can do in promoting engineering as a career is good quality work experience. However, the flipside of that is that one of the worst things you can do is bad quality work experience. We are absolutely in favour of ensuring that in key stage 4 somehow young people get exposed to the world of work and get to see the reality of what high-quality engineering and manufacturing looks like.

I am not sure that I support a blanket requirement for two weeks' work experience. There is plenty of evidence that not all employers step up to the plate and give those young people a positive experience for two weeks. In that case, given the loss of curriculum time, they could have been doing something more profitable. It probably would be a mistake crudely to say

that we are just going to do that. There are programmes to ensure that students visit a range of different employers over the course of key stage 4, for example. Certainly in science and engineering, the biggest loss of people for the higher skilled STEM careers occurs with their post-16 choices. If they are not going to see the world at work or experience good quality STEM employers before choosing which A-levels or level 3 subjects to do, then we have a real problem. We have to show them during key stage 4 what it is all about.

Lynn Tomkins: A range of things has been discussed. Impartial careers advice has been implied. Good work experience might be only a day or a few days or a really positive week. We also touched on teachers having some good industry experience so that they can talk in an informed way about what a subject can lead to in terms of a career. There are a number of areas. Our employers are certainly asking for guidance on what is a quality work experience and what they should include in it so that they know how to meet it.

Steve Radley: May I add one additional element that I think is missing from this discussion? Being an economist, I like to think that people make rational choices. One thing that is happening now is that young people are being required to fund a lot more of their higher education. They need better information on what these qualifications will lead to in terms of earnings potential. There is good data out there showing that, if you take an engineering qualification or an engineering degree, it will lead to much higher earnings over your lifetime, and we need to find better ways of getting that information to young people making these subject choices.

Q30 Hywel Williams: May I ask a quick technical question on the value of having off-the-shelf work experience for school students as opposed to tailoring the experience to the individual student's express needs? Is there a dynamic here? Can you have the luxury of trying to find a student's specific needs rather than taking something off the shelf?

Steve Radley: That would be the ideal, of course. Part of good quality work experience is about addressing that person as an individual, but that is extremely difficult to do. During the work experience week that we run, we try to signal clearly to teachers what the week is all about, what we are going to be doing and at what level we will be pitching our material, so that we can match students to the opportunities as best we can. That dialogue is really important, and you have to do it, but it is probably utopia to think that we can tailor something perfectly to every student.

Andrew Churchill: I would add that it is particularly hard for us to tailor it. We do a week with a day in each department. However, unless it is extremely obvious that a youngster has a natural bent in a certain area, we quite often find that youngsters have the chance to get a taste of something that they had never heard of before. Had it been tailored up front, they would have missed that experience. I would be careful about over-tailoring. I would give them as broad an experience as possible, with a taste of work in as many areas as I can.

Q31 Chair: Going on with the question of careers advice and what should be done to improve it, there is a whole raft of ideas that one hears about. Of course every sector has its own nuances, and even within sectors, whether in big or small companies. Is there a big risk that we will end up with an attempt at one size fits all when, in reality, there needs to be a much better tailoring of systems to meet the needs of local students in local areas where local jobs are available?

Richard Earp: Yes, there has to be some tailoring. You have to give space for local employers and national employers operating locally. National Grid's engagement with schools differs quite a lot between the schools around our headquarters, for example, and those elsewhere in the country where we have a different presence. Actually, the successful engagement always depends upon the quality of rapport between the people who go in and the teachers themselves. It is about creating the space where people can have those conversations.

In reaching out to schools, it is quite interesting that you often have iterative conversations at the beginning. The schools don't quite know what we do and what we can offer. We know what we have got but do not necessarily know what they want and how it fits in with the curriculum. You have to go around that loop a couple of times before you can make things fit.

Q32 Chair: In some parts of the country the engineering industry is stronger than in others, but that does not mean that a supply of engineers might not come from other parts of the country.

The other part of that question is how you strengthen the professional development of teachers in areas where outreach programmes to the local factories and so on are not practical.

Richard Earp: One opportunity that I am aware of, although my colleagues may know of others, is courses that are run by science learning centres-for example, development courses. Indeed, we have got involved in helping run one of those courses. We started off at Southampton. It is a regional course in that part of the world

Q33 Chair: Do you see it as part of the role of the engineering industry to engage in those outreach courses?

Richard Earp: Yes. It appears to be efficient for us to talk to a group of 20 teachers and all the students that they can reach. We talk strongly about what our business looks like, about its future and future challenges, and what that means for their students. That seems to us to be an efficient opportunity that we are certainly going to explore further.

Steve Radley: In some cases, you are pointing to the fact that in parts of the country there is probably a lack of employers with the critical mass to provide that on their own. There is probably a role for bodies like ours to facilitate employers to come together to do that. It is something that local enterprise partnerships could usefully do themselves.

I return to the earlier part of your question. You are absolutely right that you should never think that there is a one-size-fits-all approach to careers advice. You need local variation and tailored solutions. If anything, at the moment, there is a greater risk that the requirements on schools to provide careers advice are becoming too loose, and that will lead to poor provision.

Q34 Roger Williams: The fact that there are fewer girls and women in engineering has been a well-worked theme, despite the fact that girls do better in maths and science examinations. It was Education for Engineering that said that the lack of black youngsters in those subjects and in engineering wasn't an ethnic issue but one of socio-economics. Because there were more black pupils in low socio-economic groups, that is why they weren't going forward.

However, even when girls and women and people from ethnic minorities go into engineering, they are not well retained. Is that because of bad practice by engineering companies, or is there some other issue?

Andrew Churchill: I shall probably be shot by my peer group for saying this, but I think that there is an element of that. We are a family business, and we know all of our employees very well and know what the families are up to. We are family-friendly in terms of flexible working time and looking after the health of all our employees. I am not talking from a statutory perspective but about providing private health care for all our employees, top to bottom. That makes good sense. We retain our employees and retain that competence. It also means that as family requirements change-perhaps a youngster gets married and has children-we can flex the hours. It has to be within business needs, and it is not always possible, but it's amazing what is possible when you have an environment that allows that discussion to take place. We don't need it to be Government policy to be told that it's a good idea to talk to our work force; it is just common sense.

Richard Earp: You certainly won't be shot by me for saying that. I agree with that wholeheartedly. We certainly go to great efforts to ensure that we retain all the people that we have spent quite a lot of money training. By and large, we are pretty successful at that. The issue of women in science and engineering is a long-standing one. We are not for giving up on it. We still spend time in girls' schools, for example, specifically, and we ensure that, in the work experience weeks, we have 50:50 representation. We shall continue working at it, but it is a problem that has been around for decades. As we heard from Sir John earlier, there are no glib solutions to some of these things, and I don't think there ever are.

Q35 Roger Williams: Are there any other reflections on that aspect?

Lynn Tomkins: We have certainly done some major work in this area over the last five years since the report on women in work was published. Funding was set aside for some sector skills councils to address the issue, particularly in sectors where women were under-represented. We got involved. Over the last five years we have developed a qualification, and 1,300 women in work have gone through that. The results are quite startling in terms of the number of women who have been promoted following that or who have taken on additional responsibilities. It is not just about the employers not doing their bit; it is about women recognising that they need to have the confidence to ask for the flexibility to tailor their careers and own them.

We can send you some examples where we have tackled some hard areas. For example, the submarine base at Barrow put all its women, in all occupations, through that. Atkins, too, is doing some leading work on that. It is a qualification that it really is delivering for women. For example, after doing the programme, a top-flight physics engineer with Airbus had three promotions because it gave her the tools to think about what she needed to do to progress. There was a willing employer who did not understand that perhaps women don't go for these jobs because they presume they are not going to get them. We have done quite a lot of work and that qualification has been taken up by some of our leading companies. Indeed, some of our SMEs also use it to help them keep their talent.

Steve Radley: I agree with all those points, so I won't repeat them. Ultimately, as well as everything that has been said, the key thing is influencing the choices that young people make at school. As well as the points already made about careers advice, there is a role for

influencing younger people, and also their parents, at an earlier stage. You certainly wouldn't provide really formal careers advice in primary schools, but you could look at providing something like careers awareness. We work with some very good innovative organisations, such as Primary Engineer, that go into schools and stimulate young people-girls and boys and all ethnic groups-to get really excited about engineering and science at a very early stage. We would like to see more of that.

Q36 Roger Williams: As always, we have heard some terrific examples of good practice. As a generality, would you say that, within engineering, diversity is important to engineering businesses? Should they do more to make it work for them?

Andrew Churchill: It is half of our potential pool of recruits, and to ignore it would be criminal at a time when we are short of skills. It is unconscionable and it makes bad sense. It is time that we did something to address it rather than hand-wringing.

Q37 Roger Williams: There have been campaigns to increase diversity in engineering and other parts of industry. How have those campaigns affected either businesses or organisations such as those we have here today?

Richard Earp: The reality, I guess, is that we have not moved the dial very far, for instance, in terms of female participation in engineering degrees. I know that universities are not the whole story by any means, but things have not moved very far. One could conclude that none of this effort has been successful. That just means that we have to work harder and be smarter at it.

Primary schools are very important. I have personal experience of running an after-school science and engineering club-an Imagineering club-in a primary school. One year, when I walked in at the beginning, they were all boys. The teachers said, "Well, you know, girls don't do this sort of thing." Where on earth has that attitude come from? It is not something that any of us would have supported or endorsed or said. These are popular culture messages, and all of us in any kind of leadership role in society need to address that all the time. There is no magic bullet; it is just lots of continuous effort. We need to keep saying to everybody that this is for you.

Lynn Tomkins: You are right that for the last 10 years it has gone from 90% to 21% and 6% in terms of engineering apprenticeships. The only significant link that we saw was with the engineering diploma, which was up at 35%, which I suppose had the potential to increase the number of females coming in.

Steve Radley: I know that it was not exactly the reason behind your question, but, as well as all the points that we are making about employers working with schools and what goes on in terms of careers advice and teaching at schools, we can't neglect the fact that one of the routes for employers recruiting a diverse work force is what they do in recruiting from abroad. As well as what employers can do, we need to look at some aspects of migration policy-particularly the closure of the tier 1 post-study route. Clearly that is a very important route so that employers can make full use of all the sources of skilled people.

Q38 Jim Dowd: I have a brief question. We have a fridge magnet at home that says, "Do you want to speak to the man in charge or the woman who knows what's going on?"

Chair: That's quite right, in your household.

Jim Dowd: Janet bought it, by the way.

As you said on a number of occasions, Mr Earp, particularly in reply to Roger, we need local priority and tailored solutions in careers advice. How can you pursue that and avoid Mr Churchill's postcode lottery? The point is that either everybody does it the same, which avoids the postcode lottery, or you allow local priority, which will then bring in distinctions between one area and another. How do we reconcile that and how do you reconcile it?

Steve Radley: If you look at careers advice, there needs to be a national requirement right across the country on the level of advice that schools need to make available, however they provide it. Where you can do things in terms of local tailoring, it is about how you involve employers.

Q39 Jim Dowd: That is going to make things different in one area compared with another. Then you come up with a postcode lottery.

Andrew Churchill: We have to recognise that things already differ according to the skills of the careers adviser in a particular school. I don't believe for a moment that you are proposing this, but, assuming that we are going to have a vanilla-flavoured approach to careers advice across schools, that is not an opportunity that will ever pertain. There will be different opportunities in different parts of the country, and that will be reflected, quite rightly, in education.

We need to find a halfway house. We still need to give opportunities to students in schools where there is not a well-established, large manufacturing base so that they will still be able to taste and touch design and technology. For instance, when the E-bac comes in, there will be room left for that so that, if it does light a spark, the students will have the opportunity to pursue it either at degree level or to look further afield. If they have not had that opportunity and they live in one of those black spots, you then have that perfect storm where someone who could have gone into a career and really offered value to society will miss it because they did not understand that it was something that they would enjoy.

Lynn Tomkins: You could certainly give the big picture by saying, "If you become an engineer, this is the wide range of careers you could pursue." To be honest, lots of people will work in different environments as engineers during their lifetime, but you can also contextualise it to, "Locally, this is what engineering manufacture looks like and these are the sorts of companies you would work in, but in other regions there are these opportunities."

That obviously applies globally. Young people starting off on their careers might not want to be limited to working only in the UK. We can give the standard information on what a career as an engineer can deliver and then what it can mean locally, and also what it can mean globally. Given the way of the world, you are not normally in a job for 40 years. We also need to talk about that stepping stone; you might do your degree and then do something practical, or start as an apprentice and do your degree later in life, but it is definitely doable.

We could look at better ways of delivering it online. There would be a clearing place where you could get that information online because young people use that, but you could then go and talk to someone or you can experience that these are the companies who offer quality

work experience. That would also support schools. Students could then think, "What should I expect from my work experience?" It would also support employers who might like to offer it but who don't have a clue what it means.

Richard Earp: Perhaps you could ask schools to demonstrate, for example, at Ofsted inspections, how they have worked with local employers to innovate some good practice, but also how they have gone out and borrowed some ideas from other regions. In that way, best practice is spread. Inevitably, solutions need to be worked up locally. I am not sure that it is entirely a postcode lottery, but you will get differing quality in different places initially. You then have to ensure that it does not persist.

Chair: May I thank members of the panel for their contribution this morning? It has been very enlightening. Clearly, there are potentially some other pieces of evidence, including, Mr Radley, the report to which you referred. Any further information that you might like to submit would be most welcome.

This is clearly not an easy subject to look at because we are spanning the whole definition of engineering, which in itself is a fairly wide word. I thank you very much for your attendance this morning and for your very helpful answers.

Prepared 31st October 2012