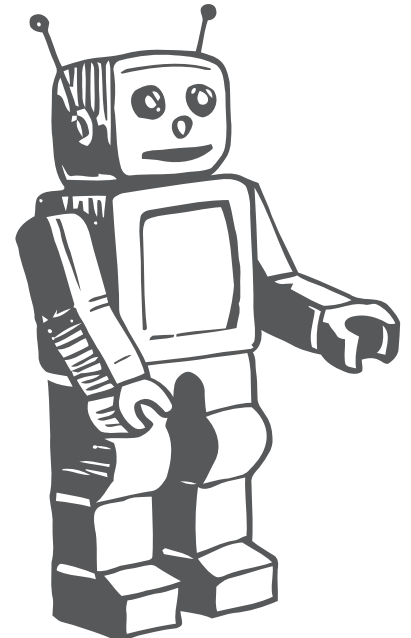




# Inspiring the **NEXT GENERATION** of **engineers**

Understanding the perceptions  
of engineering that parents and  
young people have today and  
how we can change them.



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# Inspiring the **NEXT GENERATION** of engineers

## Foreword, Nigel Fine, Chief Executive, IET

**The Institution of Engineering and Technology is working to engineer a better world by inspiring the next generation of engineers and technicians. We do this through sponsorships, award schemes, education initiatives and through our involvement in national campaigns championing engineering to young people, such as Tomorrow's Engineers.**

We strongly believe that a career in engineering and technology offers a combination of creativity, excitement, challenge and financial reward that few other careers can better. But how do we make sure that parents and children are aware of this?

Parents and children form their impressions of school subjects and the potential careers these could lead to at a young age – often before secondary school – which is why we have focused on the 9-12 year age range for this new research.

Our aim with the 'Inspiring the next generation of engineers' research was to gain a deeper understanding of the perceptions parents and young people, particularly girls, have of engineering today – and to find out how we can improve these perceptions in the future. What are the principal images of engineering that parents and children hold – and what images or messages should we use in the future to appeal to these audiences?

The findings show that children often view careers in engineering as fixing, mending, maintenance, messy, dirty and 'more for boys'. Parents have a more positive view, describing engineering jobs as skilled, professional, paying good money, interesting, inventive, important and creative. However those with daughters are more likely to see engineering as difficult, messy and dirty.

Fewer than half of parents of girls would encourage their children to consider a career in engineering, compared to two thirds of parents

of boys. More than half of parents feel that engineering careers are more for boys, and children's views are largely similar.

Two thirds of parents don't feel they know enough to help their child if asked for advice on engineering - although the majority said they would like to know more after being shown additional information about careers in engineering and technology.

Most parents, particularly those with daughters, simply are not aware of how many different types of engineering jobs there are – and that these jobs could be so creative, interesting and varied. But, encouragingly, after being shown information on engineering careers highlighting these aspects, three quarters of parents would encourage their children to become engineers, including two thirds of parents with girls.

So we have a clear-cut challenge ahead of us. We need to send out strong and compelling messages that engineering encompasses a wide range of creative and fascinating careers for young people, including girls.

**We hope you will join us in doing this – and in inspiring the next generation of engineers and technicians.**



**Mr Nigel Fine** BSc MBA CEng FICE FIET,  
Chief Executive

## Introduction



### **The demand for engineers has never been greater yet there are factors discouraging children and their parents from considering engineering as a career**

**There is a significant engineering and technology skills gap in the UK, so educating tomorrow's engineers is critical to the future success of our economy.**

The IET believes that engineers need to work harder to make engineering appealing to the next generation – and their parents – and to convince them that it is a worthwhile and motivating career choice, particularly for girls. Data from the IET's latest annual skills survey showed that women represent only 6% of the engineering workforce, a figure that has remained virtually static in recent years.





## Children and their parents have an outdated view of engineering

Our research shows there continues to be a strong association with the traditional manufacturing industry rather than modern technology economy. The sheer diversity of jobs that falls under the banner of engineering is not fully appreciated.

## Providing the right information

More encouragingly this research suggests that, if provided with the right information about engineering and the range and diversity of careers within it, parents and their children do see the appeal of a career in engineering.

## Interest and take up of STEM subjects is key

Of course, some will never be interested in, or suited to, an engineering career; a good indicator is their enthusiasm for STEM (science, technology, engineering and mathematics) subjects. There has been much discussion about this in educational circles but the consensus is that enthusiasm for these subjects needs to be nurtured at a young age. It is for this reason that we chose to conduct this research with children between 9 and 12 years of age, and their parents. These years are important in children's educational development, as it is when they start to establish their interests and prepare to make the transition to secondary school.

## Girls and STEM subjects

There is some concern about girls' interest and take up of STEM subjects – but this research shows that many girls do have an interest and aptitude for these subjects but can sometimes be put off by the way these subjects are taught.

## IET determined to play role in addressing the knowledge and gender gap

There is much that needs to be done to inform parents and children about what modern engineering is, and the range of opportunities encompassed by an engineering career. At the IET we are determined to play our part in this.

In the case of girls, all those concerned with promoting British engineering have a responsibility to encourage girls, and not alienate them. More than that, we need to promote activities and events targeted specifically at girls.

The good news is that if we can address this knowledge and gender gap, there is every chance that more young people will see the appeal of a career in engineering, especially girls.





**CHILDWISE**  
↗

## About the research

**CHILDWISE** research was commissioned to explore what factors inform parents' and children's' opinions about engineering as a career, what might be preventing parents from promoting engineering to their children and what might encourage them to do so.

The research was conducted across January and February 2015 with boys and girls aged between 9 and 12 and their parents. It consisted of in-depth interviews across England, involving 32 children: 16 boys and 16 girls, and 18 parents, followed by an online survey, with over 1,000 children and their parents.

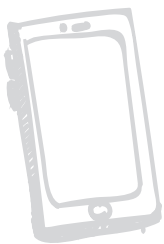


## Online survey findings

### What is it children like about STEM subjects?



### Children like STEM subjects for different reasons



- Science involves experiments, finding how things work, is interesting and fun, creative, practical/hands on, exciting, involves making things.
- Design and Technology is about making things, designing, creativity, drawing, building, it is fun, they find how things work, challenging, makes them think hard, is graphical and technological.
- ICT / Computing involves computers, also playing games, the technology is fun and interesting, it involves designing / making / building / programming in code, they are good at it, they find out how things work.
- Maths they feel they are good at, they like numbers, working things out, solving problems, it is easy but still challenging, makes them think hard, interesting, logical, involves puzzles and games.

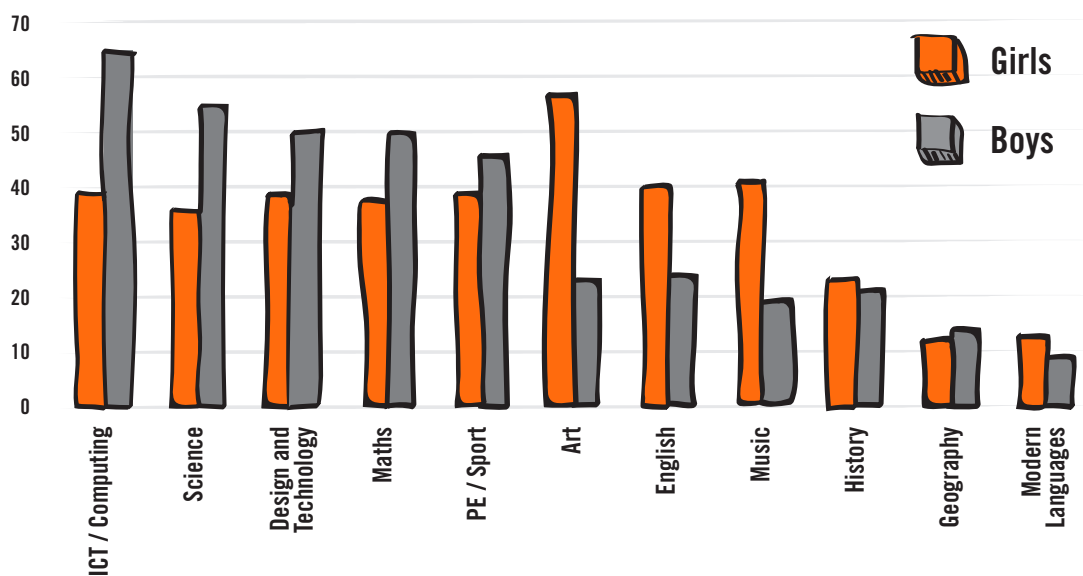
### What they don't like

Boys tend to dislike STEM subjects because they are boring, while girls say they are hard or difficult, or they are just not good at these subjects.



## Favourite subjects at school by gender

Which subjects do you enjoy most at school?



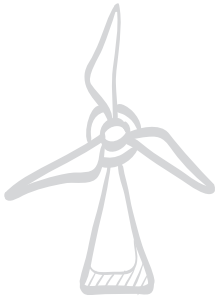
When asked what subjects they enjoy at school, STEM subjects top children's list, particularly ICT/Computing, enjoyed by more than half of children (52%). More than two in five also enjoy Science (46%), Design and Technology (45%) and Maths (44%).

However, the difference between girls and boys is very apparent – STEM subjects are enjoyed far less by girls. Girls enjoy Art (57%), Music (41%) and English (40%), all more than any of the STEM subjects, while even PE/Sports (39%) are enjoyed more than some STEM subjects.

Girls have some awareness that STEM subjects can lead to a career in engineering, focusing mainly on Design and Technology, and Maths. Art, Music and English however tend to be of more interest to girls overall.

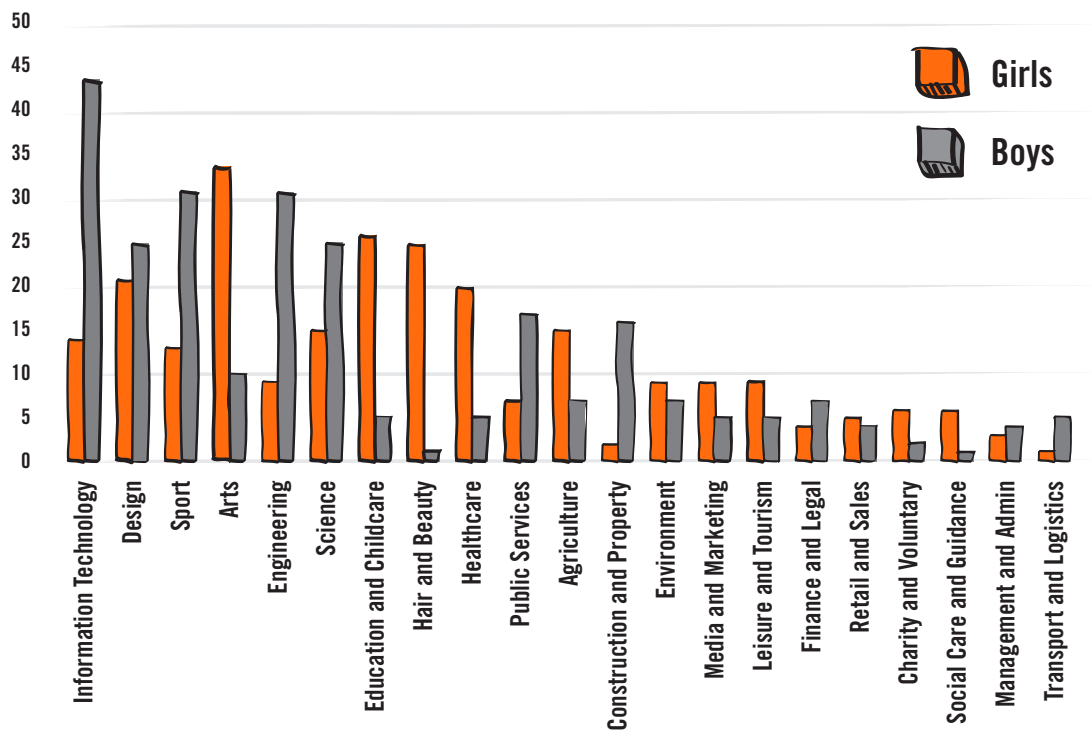
Those girls who enjoy any STEM subjects do so because they like making things, like computers, it is fun, they like maths, find it interesting, and like the experiments. For those girls that don't enjoy a STEM subject, it is mostly because they find it boring or hard, especially so for maths, but also in some cases science.





## Children's career aspirations play to gender stereotypes

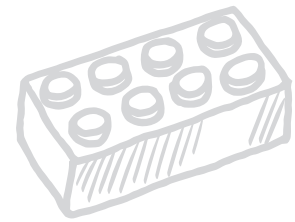
### What sorts of job are you most interested in?



When asked about careers that most appeal to them girls choose the Arts, Education & Childcare, Health & Beauty, Design and Healthcare. Engineering features in 9th place. Only a third of girls themselves would consider an engineering job.

More than half of girls feel engineering jobs are more for boys. This needs to be challenged if more girls are to pursue an engineering career.





## What would make girls consider engineering?

There is a knowledge gap particularly among girls. Only a quarter say they know anything about engineering – and they are twice more likely than boys to say they are not interested in finding out more. However, once they are shown more information about engineering, the majority say they would like to know more, and they become twice as likely to say they would consider a job in engineering.

Girls respond particularly well to the creative aspects of engineering – once they are shown more information, including aspects of creativity and design, far more girls who enjoy Art, but are less enthusiastic about STEM subjects, are encouraged to think about an engineering career. This includes a large proportion of girls who are put off STEM subjects because they find them hard, but armed with just a little information, feel more confident in considering engineering.

When girls were asked what they thought would encourage them to consider engineering as a career – they said school trips to see engineering in action, school visits from engineers, or practical activities in school would help. If some of these were specifically for girls they would be even more effective.

## Children’s understanding of what engineering is

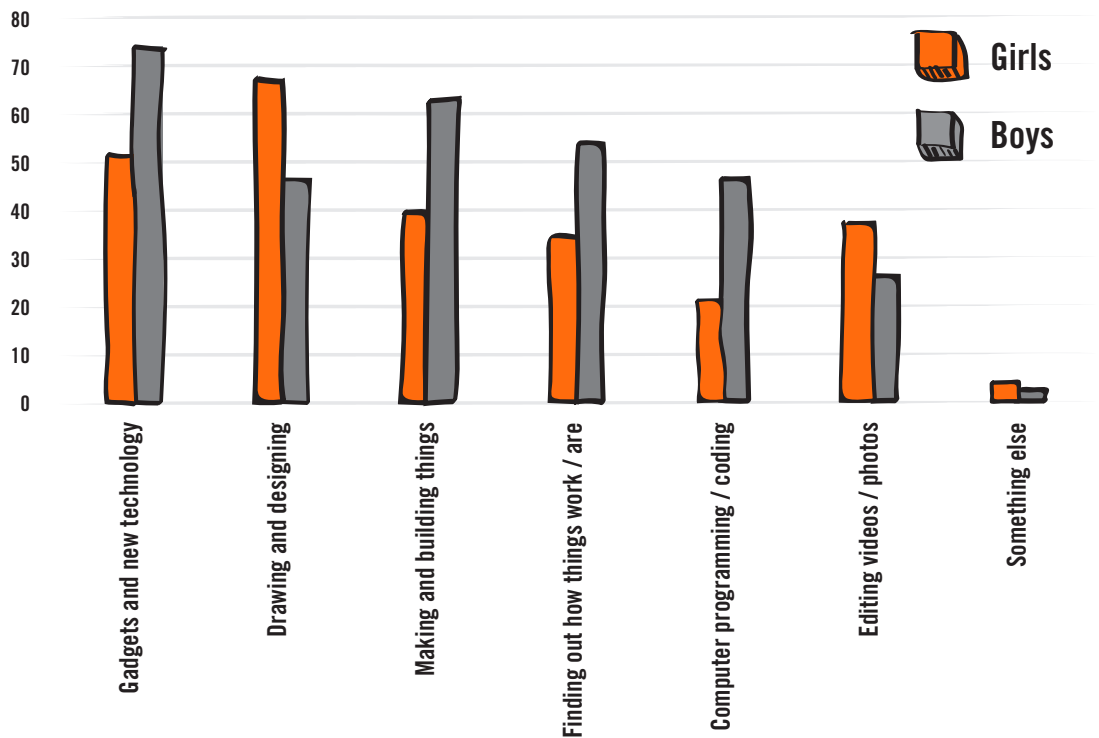
Children predominantly see engineering as making or building things, also fixing things. Only a minority say it is about designing things, while a small number see it as literally about engines, machines or cars. Girls are especially likely to assume engineering is just about cars.

## Thinking about engineering, what do you think the word engineering means?



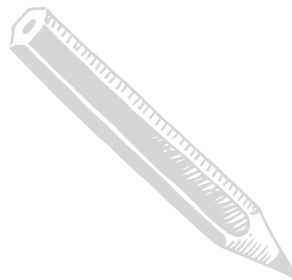
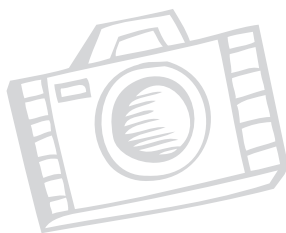
make or create  
skilled  
learning new exciting things  
building and construction  
working in a factory  
you make things  
Trying to make something new  
problem solving  
messy  
car engineering  
working outside  
about building engines  
The way things are made or created  
mechanical work  
what my dad does  
to repair, make or fix

## What engineering related activities do children enjoy?



Three in five children say they were interested in gadgets and new technology (62%), while more than half (56%) are interested in drawing and designing things.

Half enjoy making and building things (51%), while fewer are interested in finding out how things work/are made (44%). A third are interested in computer programming/coding (34%) or editing videos and photos (32%).





## Girls compared to boys

Girls are more interested than boys in drawing and designing things, with two thirds of girls saying this (67% vs 46% boys). Girls are also more interested than boys in editing videos and photos (37% vs 27%).

Boys on the other hand, are much more interested in gadgets and new technology (65% vs 51% of girls), making and building things (64% vs 40%), finding out how things work/are made (53% vs 34%) or computer programming (46% vs 21% of girls).

Broadly, boys are more motivated by understanding how things work and making things. Girls are more motivated by the creative applications of technology.

## What appeals about an engineering career?

Boys are more likely to gravitate towards engineering careers because STEM subjects top the list of their most enjoyed subjects, and while they are more likely to consider engineering in general, when prompted, boys and girls both like the broad range of jobs available in the sector.

What boys and girls like about engineering when given more information about it is that there are lots of different jobs, these looked interesting, and they include careers involving software and sound.

## Having seen this, what do you like most about engineering?



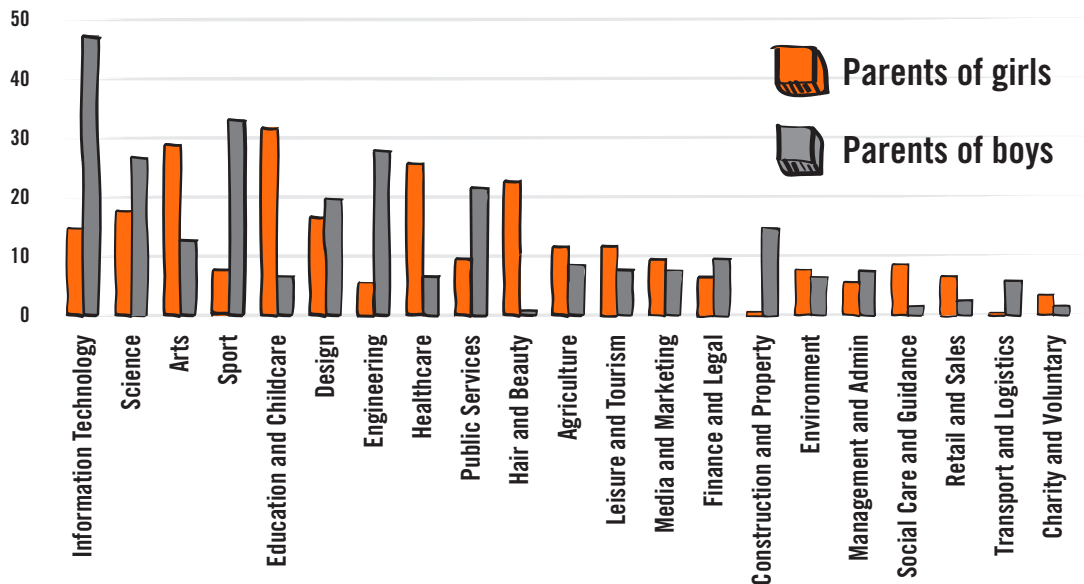


## Parents: How parents see engineering as an occupation

Parents describe engineering jobs as skilled, professional, paying good money, interesting, inventive, important and creative. However those with daughters are more likely to describe engineering as difficult, messy and dirty.

## Engineering is not top of the list when parents consider what their children might find appealing as a career

Thinking about YOUR child's future, which of the following careers do you think they would be interested in?



When parents are asked what the most appealing careers for young people nowadays are, the top three mentioned career areas are IT, Sport and the Arts. Engineering enjoys a reasonable profile, ranking around the same level as Design and Media & Marketing careers. For parents of girls, Education, the Arts, Healthcare, and Hair & Beauty are the most appealing careers, with Engineering ranked much lower down the list.

When asked to think specifically about what would appeal to their own child, parents still rank IT, Science, the Arts and Sports as careers that appeal the most. Engineering moved down to 17th place, along with Design and Healthcare careers. There is little understanding that many IT careers also involve engineering. Parents of girls ranked Engineering in 16th position for a career that might appeal to their daughter.

## Parents' views on why their children would or would not be interested in engineering

Parents who think their child would be interested in engineering cite reasons such as they like building things, they love Lego, making things, doing things with their hands, they like maths, or there are engineers in the family. Parents who think their child wouldn't be interested in engineering say they have no interest in it, they don't like maths, don't like science, or have a different career in mind.

### Why do you think your child would be interested in a career in engineering?



has an interest in how things work and are put together

she is good at problem solving

very hands on

fixing and building

loves science

imaginative

loves lego

loves lego

he is good in maths and loves building models

engineers in the family

keen on design and construction

Likes to know how things work

good opportunities locally

loves lego

enjoys science at school

rewarding and exciting





## Why parents would, and would not, encourage their children to consider engineering

More than half of parents would encourage their child to go into engineering because they see it as a good career, with good prospects, good money, it is important, interesting, and skilled.

Those that wouldn't encourage their children to consider engineering said their child isn't interested, it's too dangerous, boring, or a 'man's job'. Fewer than half of parents of girls would do so, compared to two thirds of parents of boys.

### Why do you agree that you would encourage your child to go into engineering?



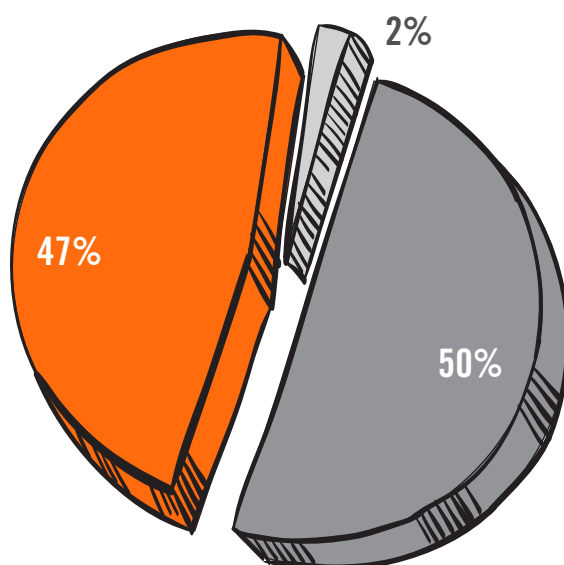
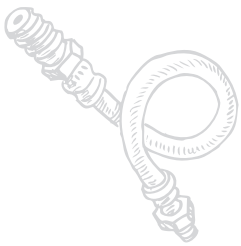
great prospects for the future  
lots of different areas of interest  
it provides a good solid background of principles for life  
a viable and vital vocation  
a good career  
**job for life**  
you can use it worldwide and job security  
good money  
it's an occupation that is always needed  
it's something they would enjoy  
creative as well as manual  
a good sound job with long term prospects  
more engineers needed








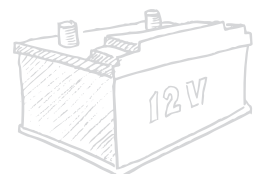
## Engineering is perceived as more for boys

Half of parents feel that engineering careers are more for boys, and children's views are largely similar.

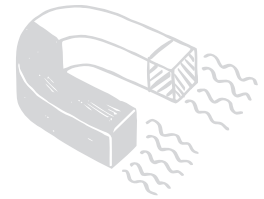


### Parents

-  More for boys
-  For boys and girls
-  Don't know







## The 'knowledge gap'

One of the reasons that parents give for not suggesting engineering as a career option is their lack of knowledge about it. Two thirds of parents don't feel they know enough to help their child if asked for advice on engineering. However, the majority would like to know more after being shown more information on it.

Parents need more information on the range of engineering careers available, with particular emphasis on encouraging parents of girls to think of it as a good potential career for their daughters.

The majority of parents, particularly those with daughters, had no idea how many different types of engineering jobs there were, the creative aspects, and that these jobs could be so interesting and varied. After being shown information on engineering careers, three quarters of parents would encourage their children into it, including two thirds of parents with girls.

When asked what they thought their child would like most about engineering, parents said their child would like the variety, that it is different, areas such as software and sound engineering, being creative, and making a difference.

## Having seen this, what do you think your child would like most about engineering?





### Changed view of opportunity for girls

Parents of girls were surprised engineering involved creativity and art, didn't realise it was so exciting or interesting, or that there were so many opportunities for girls



### Thinking more positively about engineering as a career

To encourage people to think more positively about engineering, parents believe there needs to be more engineering activities in school, more school visits from young engineers, more information about the jobs, apprenticeships and training available.





## The findings of the in-depth interviews

### Perceptions of engineering are consistent, but views on STEM subjects are varied

Parents' perceptions of engineering were broadly similar on the whole, but there were differences in their encouragement of STEM careers, and this was often a reflection of parental education, personal experience, age of child and expectations.

The broader spectrum of STEM subjects appears to be well understood amongst parents and the encouragement of these subjects is unanimously applauded. However, while some parents were delighted at the thought of their child being encouraged in a STEM career, others embraced the idea less well and seemed confused and unimpressed by the prospect of STEM for their child. These parents typically placed more emphasis on the importance of learning a skill or a trade, and being practical rather than theoretical.



## Gender differences

Gender differences were subtle, but indicative. While not across the board, for parents of some boys, the natural instinct is that their son needs a job that offers good money and security – based on the expectation that they will one day become the ‘breadwinner’. As a result, these parents tended to be most concerned about salaries, career progression and the availability of ‘actual jobs’ and apprenticeships – rather than the actual industry of work. Parents of some girls were typically more relaxed about this, and placed more emphasis on their daughter finding a career that she will enjoy and flourish in.

“I told James that he’s going to go and be a plasterer. Not just for the financial side, but I said it would be good for him to have a hands on job. To learn a trade. Ideally he would love to work with animals. He’s absolutely animal mad. That is his passion. But... I want him to get a trade so he’s got something to fall back on.”

**Mum of boy aged 9-11**

“She’s quite an eccentric child, and I quite like that. I think she will find her niche somewhere along the line. I would hate her to be confined to an office job, 9-5, tapping into a computer. I’d rather she went travelling and did something different. Jobs are suited to your personality really.”

**Mum of girl aged 9-11**

“As long as she’s happy in what she does. That’s the ultimate. She’s got to be happy. I’d like her to get her own job, not just me or dad find her a job in our companies.”

**Mum of girl aged 11-12**



## Parental involvement is varied

Parental involvement and interest in talking about career choices was varied. Most families openly embraced the subject and talked with great enthusiasm about it, regardless of their child's age or gender. Parents who were especially involved and interested were often able to identify characteristics that they shared with their child, giving them a good understanding of what might motivate and interest them. This worked particularly well for mums describing their daughters and dads describing their sons, but was trickier if there were fewer shared interests.

"I look at this and think it's what you like as well isn't it... you're not trying to put onto your kids but... just relating everything to myself."

**Mum girl  
aged 9-10**

## Children's experience of school

School is an enjoyable place for most of the children. How they engage in different homework activities helps parents to identify the subjects they are most confident in, along with school reports and direct feedback from the child.

Girls can be motivated by STEM, and several were excited by science and technology – especially the practical side of these subjects. This becomes more apparent at secondary school, when they are trusted to use more equipment and carry out their own experiments. However, not all of them have the confidence to embrace this straightaway – some of the secondary aged girls referred to occasions in Design, Technology and ICT when they have struggled with certain activities. Without reassurance or further direction from the teacher they can become easily confused and frustrated, and this can cause them to disengage from the subject.

"I think she likes all subjects apart from maths. She struggles with it. She loves English, and she likes projects and things to do. The other day they had science and she was like 'oh we've got chemistry today!!' They love it when they're experimenting with the Bunsen burners."

**Mum of girl aged 11-12**

Maths tends to be the weakest link among the STEM subjects – for boys and girls. Interest and ability is varied, with several children (across the age range) receiving maths tutoring. Teaching, Medicine and Science are the career choices that children are most likely to associate with STEM subjects.

"Teachers don't always explain things enough, then when you ask, they say you should have been listening – but sometimes I just don't understand."

**Girl aged 11-12**



## Children and their thinking about their future

**Most of the children are looking forward to the future and the prospect of working, but some are worried and apprehensive – what if they're not good enough or they make the wrong decision about what to do. Once you commit to something, can you change your mind?**

Their thoughts about potential careers tend to be based around their interests and the subjects they are good at, and occasionally what their parents and extended family already do. This was particularly likely among primary school children who sometimes quickly cited that they wanted to follow careers or jobs that their Mum or Dad had. Faced with a vast number of possibilities, they do learn to make choices on the basis of limited information. With this in mind, it is important to catch their interest when they're young, to help ensure they remain open minded in the longer term. Most parents are keen to actively encourage new interests, especially those with educational benefits, but they want more support and direction to follow this through.

Between the ages of 9-12, few children are thinking about career choices in detail, and those that do change their minds often. Most have broad areas of interest but struggle to identify roles within these (beyond those they see on a day to day basis). Primary school boys often point to wanting to be a sportsman – especially footballers.

When asked what qualities they hope for in a future career, the girls highlighted the importance of working with others and *excitement* – these reflect what life is like for them now, as much as what they are looking for in the future.

*Creativity, good money and a job for life also featured highly, along with professional, skilled, good hours, familiarity, local and modern.* Prestige is something that is important to several of the girls, and this underpins many of their choices. *Value to society* becomes more important with age (as with boys), reflecting a wider awareness of the world around them.

Some of the girls liked the idea of having an easy career – although this did divide opinion, with others opposed to this (particularly older girls), assuming this would mean they would get paid less or it would be boring.

For boys, a career that delivers *fun* is considered to be most important. Like the girls, they also value *creativity, skill* and *good money* – but place a higher emphasis on *inventiveness*, doing something outside, and the opportunity to get *messy or dirty*, than girls do.

Having a *job for life* appeals to all except the oldest boys – who were concerned that this might become boring. The older girls thought a job for life would mean they could do something they really enjoyed, like a dream job.

None chose *problem solving, essential* or *geeky* as qualities they were looking for in their career.

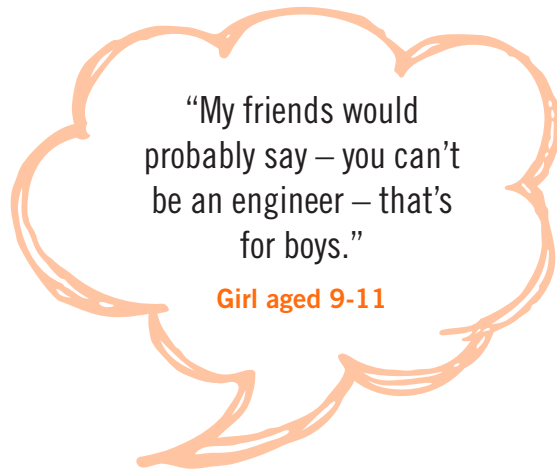


## Their perception of engineering before being exposed to promotional materials

Children's perceptions of engineering were broadly similar by gender – with both boys and girls having strong associations with engineering as being:


- fixing, mending, maintenance
- messy and dirty
- more for boys.

Engineering is perceived as more about maintenance and repairs than anything else – girls engage slightly less than boys because of this association – and their lack of desire for outdoor repair jobs where you get dirty.



“My friends would probably say – you can't be an engineer – that's for boys.”

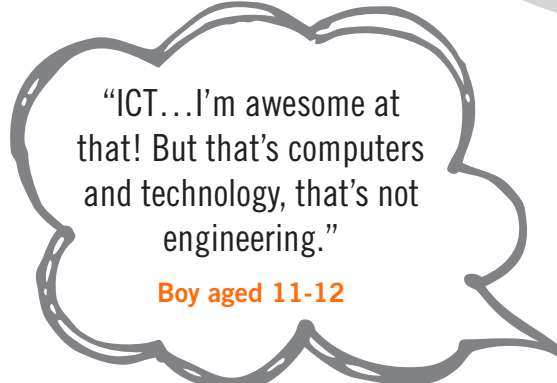
Girl aged 9-11



“I wouldn't really look forward to getting my hands all dirty, and just touching metal that can hurt your fingers.”

Girl aged 9-11

But who makes the things that these people fix and repair? Inventors, Scientists, Designers, Architects... These are the people that children credit with making the things that engineers fix and maintain. Technology is also typically viewed as something different – this is more to do with computers, and would be the inside of something, like the inside of a computer or the hardware.



“ICT... I'm awesome at that! But that's computers and technology, that's not engineering.”

Boy aged 11-12

For some children, the leap from their preconceptions of maintenance and repairs to highly advanced technology, precision and science can be difficult to process – these new roles sound quite complicated, they involve lots of responsibility and pressure to get things right. This makes some children anxious that the responsibility may be too great for them and they are put off. To help ensure that engineering is seen as accessible to children, it will be important to bridge this gap, and help children understand that there is a path of progression, which includes training and education.

## Parents understanding of what engineering is

Parents often have an outdated view of what engineering today is, overall and in comparison to their children. They struggled to really understand what engineering is or what an engineer does. Until they are shown the broad spectrum of opportunities, it is difficult for them to predict what characteristics would be most useful.

The natural associations are that it would suit a child with the following skills:

- an interest in fixing / mending
- an interest in creating / designing new things
- an inclination for problem solving / non verbal reasoning
- a smart mind – inquisitive, curious, analytical
- attention to detail / thoroughness
- an interest in technology and computers
- an interest in making a difference / helping people (particularly for girls).

Given parents' lack of understanding, promotional and marketing materials that direct them to the relevant skills a child would need, would be particularly helpful.

“Milly likes designing things. She'll get my old catalogues and chop them up and make rooms and things, and do designs. When they get a project, they love it. They don't just go for the basic cut and paste... they want to do more. Giving that extra effort really and want it perfect.”

**Mum of girl aged 11-12**

“She plays that Minecraft and she talks about what she's building and what's in it and all that sort of thing. She's just really into building stuff.”

**Mum girl aged 9-11**

“He loves his Lego, and he's got that Hot Wires kit where you make circuit boards and stuff. He'll make a burglar alarm or a radio or something, following the diagrams and all that.”

**Mum boy aged 9-11**



## Need for more information

**Overall there is an eagerness for more information. Children are keen to explore the options and focus their interest, while parents want to know how they can react and respond to this.**

More than anything, children want to meet real engineers or “experts”. They want visits to their school, talks, practical activities and competitions – “People should come in to school and ‘do stuff’ with us”. Some prefer the idea of smaller groups with children of their own age, rather than with the whole school where the younger children would be less capable of keeping up or understanding.

They are keen to know about the different types of engineers – so that if they don’t like one type or if one type doesn’t fit what they’re good at, then there are lots more to choose from.

## Parents want to know how they can support their child choosing a career in engineering

“Real people, real careers and the route of how they got there. They need to be fascinated by what these people do.”

**Mum of girl aged 9-11**

Parents want to know how they can support their child if they show an interest in engineering. The most obvious route is via schools, but some also suggest events during school holidays, open days and apps. It’s not often that their children come home from school ‘buzzing’ about an activity or event, but when they do, parents like to be able to respond quickly and effectively, to help cultivate their interest. They want to see a dual approach: engage the child, and inform the parent.

“She likes live experimentation, her concentration span isn’t great. They need to be involved, have a hands on approach.”

**Mum of girl aged 9-11**

“Go into schools and do an engineering week. Give them all the information that they’ll find exciting, so they take it all in, and don’t just think it’s boring”

**Mum of girl aged 11-12**

“Any information needs to come via the child. If you send me a newsletter, I’m not going to read it. If you send me something in the post, it’s going to go straight in the bin. But if you engage with my child and send something home...”

**Dad of boy aged 9-11**

“Let us know how broad the spectrum is – I didn’t have a clue that engineering included half of these. I mean, is the word engineering even mentioned at school?”

**Mum of boy aged 11-12**

“Introduce it to the kids before work experience, and let them bring the information home.”

**Dad of boy aged 11-12**

“Maybe they should have an engineering club after school?”

**Mum of boy aged 11-12**

Towards the end of the interview, some of the children were shown a picture board, illustrating the many different facets of engineering. Some of the images did fit with their natural associations e.g. dirty, oily hands – but others were more surprising. In particular, Robotics, Drones and Science were found to have the broadest appeal.

Although children perceive engineering to be more about maintenance and repairs than anything else, many also regard it as an important and professional industry. All except the youngest girls were able to identify features that they would value in a career – including *creativity, inventiveness and the opportunity to learn a skill*.

Key features that they don’t typically associate with the industry, but do value themselves, include *fun and excitement*.

Parents can have equally misguided perceptions of engineering and can also associate it with the same maintenance, mending, fixing perceptions as children. Some have broader views from experience and can appreciate the wider managerial, design and creative elements of engineering. Or they can misassociate it with manufacturing and factory working.



The natural associations for some based on existing perceptions would be that a career in maintenance and repairs is probably not for their child – unless they are slightly less academic and/or like the idea of “getting their hands dirty”. Those with broader views are more likely to identify engineering as an industry that their child might potentially be interested in, and they find it easier to predict what characteristics would be most useful – problem solving, non-verbal reasoning, analytical mind, strong mathematical background, interest in technology

and/or science,

curiosity, hands on/practical. However, a minority are disillusioned by the industry, and wouldn't recommend it to their child.

“To me engineering is welding, hands on. Sort of like the whole concept of cars and machines and the mechanical... I think of mechanical engineering. Garage-ey... lorries. Not a nice area to be in really. It's in the word, engines... the whole, cars and fixing.”

**Mum of boy aged 9-11**

“For me, not my cup of tea. Completely mathematically based, design... I'm more flowing creative stuff. Very logical. Methodical. Analytical. These are stereotypes but I'm thinking of someone I do know who is an engineer and he is so like that, and it's just so opposite to me.”

**Mum of girl aged 9-11**

### **Views of engineering after being exposed to promotional materials**

**When presented with the wide range of engineering careers, girls are just as impressed at the breadth of options as boys and this definitely engages them and makes the idea of a career in engineering a highly interesting area to explore further. They are, in particular, surprised by the number of creative roles available – this is definitely a feature that needs more promotion.**

There were differences in the options that girls and boys found to be most engaging. For the girls, it was *Rehabilitation, Design and Special Effects* that appealed most. Rehabilitation was popular because they liked the idea of helping and caring for people, and making a difference to their lives. Design and Special Effects were chosen because they were seen as more creative and artistic. Some of the older girls struggled to find aspects that were appealing at all – reinforcing the need to target children from a young age. Boys were more engaged by the prospect of discovering something new.



## Conclusions and recommendations

### Raise the profile of modern engineering among young people, and their parents

- Engage children from a young age – by age seven children are becoming more concrete thinkers. They are beginning to form an identity away from their family unit and are more impressionable as a result.
- Help children to appreciate the impact that engineering has on their daily lives – e.g. latest electronic devices, improving how we watch and play sports.
- Deliver this in a fun and practical way – e.g. live experiments, visits to schools, competitions and open days.

### Communicate the breadth of engineering careers to young people, and their parents

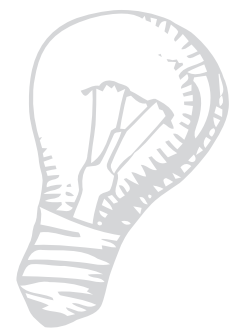
- Position engineering jobs in their wider context, keeping options open.
- Emphasise aspects of art and creativity to widen appeal.
- Promote accessibility by showing children and parents a clear path of progression and opportunities for training.
- Work in partnership with other organisations to help promote the creative and technological aspects of engineering.

## Help prevent girls becoming disillusioned and disengaged by STEM subjects

- Ensure that teachers understand the different learning styles of boys and girls so that they are able to create a learning environment that meets the needs of both.
- Offer more opportunities for girls to experience STEM in a girl-only environment – e.g. clubs at school, group work in class.
- Joint ventures with organisations such as Girlguiding UK, who work exclusively with girls – e.g. activities, competitions, trips.

## Better inform parents about the benefits of a career in modern engineering, for their child.

- Interest needs to be initiated by the child – but parents want to know how they can respond quickly and effectively, to help cultivate this interest.
- Promotional and marketing materials should direct parents to the relevant skills a child would need to pursue a career in engineering – as they find it difficult to predict what characteristics would be most useful.
- Communicate that there are careers for all levels of ability and qualifications, as well as apprenticeships and scholarships.
- Events during the school holidays – activities and days out that can be planned in advance.
- Partnerships with other organisations (e.g. supermarkets) to provide a list of boredom busting activities for school holidays.





## Afterword

The engineering and technology skills gap is a huge national problem for the UK. Part of the issue is the fact that we have the lowest proportion of female engineers in Europe. Only 6% of engineers are female.

EngineeringUK says that the UK will need to find 1.82 million new engineers in the decade up to 2022. The IET has already identified four key ways to do this:

- Improved and sustained collaboration between employers and the education system to make sure new graduates and school leavers meet the needs of industry.
- Employers taking concrete action to attract more women into engineering for example by offering coaching opportunities and promoting flexible working.
- Employers developing the skills of their existing workers to meet the growing and changing needs of industry.
- The Government ensuring there are clear progression routes into engineering through academic and vocational routes so that both are seen as equally valid.

All of these are important but we must also make engineering and technology careers more appealing to young people and the people influencing them: teachers and parents. After all, parents' concern is to find the right career for their child rather than to tackle the UK's skills gap.





We have known, anecdotally, for some time that finding the right role models and images to represent engineering is important. The findings of our 'Inspiring the next generation of engineers' research strongly support this view and suggest that we need to give engineering an image makeover away from greasy pipes, 'fixing' and hard hats.

Instead we need to tell and show people that engineers and technicians today are making a big difference to our world, working on everything from the next mission to Mars to healthcare technology for some of our most prevalent diseases to the next generation of smartphones and internet technology. Engineering is everywhere.

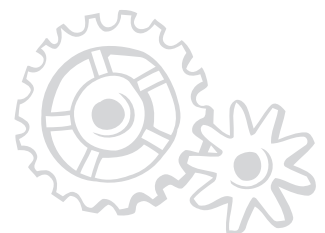
It is this great variety of engineering and technology jobs, and the creativity behind many of these jobs, that appeals most to young people – and their parents. This is particularly true of parents of girls. So let's make sure we get these messages across.

One of the ways we intend to do this is through our Engineering Open House Day initiative this summer, where a number of venues and organisations across the UK will throw open their doors to parents and children to show the engineering that is behind some of our big sporting events, leisure parks and technology.

Working with the Royal Academy of Engineering's Diversity Leadership Group (a group of senior leaders from around 40 engineering employers and employer-led organisations) and through Tomorrow's Engineers, we also want to share the results of this research with other organisations to agree other ways in which we can work together to 'sell' engineering and technology careers to the next generation and their parents.

**Engineers are in huge demand, for a wide range of creative and fascinating jobs, which means young people can take their pick of the best job.**

**There has never been a better time to be an engineer.**



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\*Savoy Place will be closed for refurbishment from summer 2013 until autumn 2015. During this time IET's London home will be within the Institution of Mechanical Engineers building at:

1 Birdcage Walk  
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If you are attending an event during this period, please check the venue details carefully.



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