



Engineering a Better Future

Solving the underrepresentation of
Women in the UK Engineering Sector



INCLUSIVE BOARDS

Acknowledgements

Inclusive Boards would like to say a special thanks to :

Samuel Carey: Lead Researcher

Matthew Latham: Research Assistant (Quants)

Elizabeth Oni-Lyiola: Editor

Katie Petrou: Conference Coordinator

Ellen Partridge: Campaigns Officer

Mariya Green: Campaigns Officer

Philip Kasumu: Membership and Partnerships

We would like to extend a thank you to the individuals and the exhibitors who supported the Women in Engineering Conference, October 2019. We would also like to thank the senior women in engineering who were interviewed as part of Inclusive Boards 100 Most Influential Women in Engineering list, their thoughts were invaluable to the construction of the recommendations included in this report.

Contents

Executive Summary	5
Key Findings	6
Methodology	9
Literature Review	10
The UK Engineering Sector	10
The Skills Shortage	10
Graduate Prospects	11
Women In Engineering	11
Quantitative Findings	12
Qualitative Findings	18
Conclusion	20
About Inclusive Boards	21

Executive Summary

Engineering encompasses the broad design and construction of machines, structures, materials and products. EngineeringUK estimates that in 2018 workers within the sector accounted for 19% of all UK employees and in 2016 engineering generated 23% (£1.23 trillion) of the UK's total turnover.

Indexes show the UK's gap between employment supply and demand is worsening year on year. According to a 2017 government study, for the engineering sector to gain enough candidates to reduce the skills shortage, they would need around 186,000 skilled recruits each year until 2024. This amounts to around 1.8 million vacancies in the next 5 years. Women currently make up just 12% of the engineering workforce in the UK and with the challenges associated with Britain's exit from the European Union looming, there is a clear need for immediate change to plug the workforce deficit that currently exists.

Efforts must start with children from a young age, as research shows, career preferences are formed early: around 45% of girls aged 11-14 would consider a career in engineering compared with 70% of boys and this figure drops significantly to just 25% of girls aged 16-18 compared with 52% of boys. This rate drops further with just 22% of female students studying A Level Physics. The figure for male students remains high right through the degree level with 83% of people studying engineering and computing degree subjects being men.

This disparity continues once in industry and up to the executive level – Inclusive Boards quantitative data analysis found that 41.8% (209 out of 500) of engineering firms have no women on their Boards or serving as executives at all, and women from a BAME background make up less than 1% of Board members and executives combined in the sector.

Based on interviews with senior women we make recommendations to the sector to improve the representation of women and address the growing crisis. These include: Increasing **Pipeline Activities**, providing more **Careers Advice and Guidance**, creating **Inclusive Working Cultures**, celebrating **Role Models** and **Advocacy** by both men and women working in the sector to support future talent.

Key Findings IN THE UK ENGINEERING SECTOR:

13.4%

OF BOARD AND
EXECUTIVE POSITIONS
ARE HELD BY
WOMEN

51.8%

(259/500) HAD NO
FEMALE BOARD
MEMBERS

WOMEN FROM BAME
BACKGROUND
REPRESENT ONLY

0.8%

OF BOARDS AND
EXECUTIVE TEAMS

41.8%

(209/500) OF
ENGINEERING
COMPANIES **HAVE
NO WOMEN IN
EITHER A BOARD
OR EXECUTIVE
POSITION AT ALL**

WOMEN WHO HOLD
EXECUTIVE DIRECTOR
POSITIONS ARE LIKELY
TO COME FROM AN
ELITE BACKGROUND IN
COMPARISON TO THEIR
MALE COUNTERPARTS
WHO HOLD THE SAME
POSITION.

WOMEN IN THE TOP 100
ENGINEERING FIRMS IN
THE UK ARE LESS LIKELY
TO HAVE ATTENDED
NON-RUSSELL GROUP
UNIVERSITIES WITH 37.04%
COMPARED TO 45.39% OF
MEN. BUT MORE LIKELY TO
HAVE ATTENDED OXBRIDGE
IN COMPARISON TO THEIR
MALE COUNTERPART
AT 24.69% AND 16.67%
RESPECTIVELY.

Recommendations



Careers, Advice and Guidance

Engineering companies should work with schools and colleges to improve the information given about career opportunities in engineering and what it means to be an engineer.



Increasing Pipeline Activities

There is a need for targeted recruitment activities of undergraduates and postgraduates who study engineering related subjects, particularly women. Organisations should consider starting engagement with students from their first year of study through Insight days and offering work experience opportunities. To ensure the widest pool of candidates are being attracted, there is a strong need to target universities outside of Oxbridge and Non-Russell group institutions.



Inclusive Working Cultures

Organisations should develop inclusive working practices such as flexible working and job share programmes for their employees. They should also develop inclusive recruitment processes. These should be rolled out company-wide and be supported at Board and executive level.



Role Models

There should be more female engineer role models showcased at all levels. These role models should be shown in schools, colleges, universities and in workplaces.



Advocacy

Allies are an important part of increasing representation of women in engineering. This means that senior men should also be part of the advocacy effort to champion more women in leadership positions.

The Executive Leadership Programme

From 'glass-ceilings', 'leaning-in' and 'Onlys' to the 'motherhood gap', women in senior leadership positions face a number of barriers.

These include gender stereotypes and unconscious bias. Women face structural obstacles such as being under-mentored and under-sponsored as well as societal pressures including having to balance career and caregiving responsibilities.

The 2018 Hampton-Alexander review revealed that around 40% of all appointments need to go to women in the next two years for the FTSE 350 to reach a target of 33% representation by 2020.

Women executives rarely have an opportunity to come together and share their leadership

experiences in a learning environment that has direct relevance and personal impact. Inclusive Boards Executive Leadership Programme has been designed to do just that!

This year we've had senior executive women take the course from some of the largest organisations in the world including Deliveroo, HSBC, Lloyds Banking and other great organisations.

Inclusive Boards is the only Women Executive Leadership Programme to provide you with a board placement.

The next programme intake is March 2020 register your interest today!

Contact Ellen Partridge to learn more.
ellen.p@inclusiveboards.co.uk

INCLUSIVE BOARDS

Methodology

LITERATURE REVIEW

Inclusive Boards conducted an extensive review of available online literature, published reports and other sources relating to the UK engineering and manufacturing sector. Our findings were grouped thematically, covering the composition of the sector and its contribution to the UK economy; current and future skills shortages; women in engineering; and the challenges associated with Britain's proposed exit from the European Union.

DATA ANALYSIS

Inclusive Boards conducted a detailed quantitative diversity survey analysing the gender, ethnicity, age profiles, and educational and socioeconomic backgrounds of Boards and executives of UK's 500 largest engineering firms by revenue.

Since there is currently no accepted determinant for analysing socioeconomic background, Inclusive Boards' research team developed a bespoke socio-economic index using available secondary data. The index eliminates the problematic issues faced with primary data collection for socioeconomic background (self-

identification). We created a detailed profile of backgrounds through the lens of education (including school type and university education). We used a ranking index to segment school backgrounds by comprehensive and public. For universities this was segmented by Oxbridge, Russell Group, Non Russell Group and International institutions.

Our full data set is made up of 4,775 individuals, comprising 1,860 executives and 2,915 directors. Our subset of the top 100 engineering firms by revenue contains 997 people, made up of 323 executive directors, 375 non-executive directors and 299 executives.

PRIMARY RESEARCH

To add depth to our research, we conducted interviews with over 100 women in senior positions from across the engineering sector. We analysed the interview responses thematically to pinpoint what strategies and solutions senior women working in the sector thought should be put in place to solve the issues surrounding the underrepresentation of women. These themes formed the recommendations in this report.

Literature Review

THE UK ENGINEERING SECTOR

Engineers build roads, bridges, schools and hospitals, they make medicines and develop new materials like high performance sports fabrics. They also manage our water, gas and electricity supplies and develop new ways to generate electricity, such as wind and solar power¹. Engineering encompasses the broad design and construction of machines, structures, materials and products² and is one of the UK's most prominent sectors. EngineeringUK estimates that in 2018, workers within the sector accounted for 19% of all UK employees³. For every one person employed in engineering an average of 1.74 more jobs are created further down the supply chain⁴. According to EngineeringUK, in 2016 engineering generated 23% (£1.23 trillion) of the UK's total turnover⁵.

Engineering's economic contribution is not limited to the capital. While London remains a centre for many highly skilled professionals, Advanced Engineering's league table of manufacturing hotspots ranks Sheffield as the top advanced engineering hub.⁶ Other key towns and cities include: Bristol, Milton Keynes, Derby, Leeds, Coventry and Birmingham⁷ and the government is keen to support further regional growth. The Sainsbury review was commissioned to advise ministers on measures which could improve technical education and recommends that industry experts play more of a role in designing the curriculum to ensure it is skills focused. In response the government made regional investments in engineering education totaling nearly £80 million.⁸ This funding helped to create employer-led national colleges, for example The National Colleges for High Speed Rail (with hubs in Birmingham and Doncaster) and for Nuclear (with hubs in Somerset and Cumbria)⁹.

Local Enterprise Partnerships (LEPs) have also worked to strengthen engineering skills across regions of the UK. Black Country LEP for example, in response to the high demand for engineering skills in the Black Country, launched a 'Skills Factory' Initiative. The Skills Factory works in collaboration with local training providers and colleges to offer funded

upskilling courses. The initiative also sign-posts to the two-year accelerated BEng Manufacturing Engineering degree delivered by the University of Wolverhampton in the region. A positive initiative likely to support the sector in the future and encourage more people, particularly women, to study engineering. In 2015 to 2016 a total of 163,255 Higher Education students were studying an engineering related course, a 1% rise on the previous year¹⁰. Nevertheless, this falls short of addressing the growing skills shortage facing the sector.

THE SKILLS SHORTAGE

In spite of efforts by government, LEPs and others to provide training opportunities, the engineering sector still faces a skills shortage¹¹. While there is plenty of available labour in the UK the type of skilled labour required by the engineering sector is lacking. In other words, there is significant disparity between the skills that employers want or find most desirable and the skills offered by workers seeking employment¹². Productivity issues and slow economic growth since the 2008 financial crash have often been cited as a cause and in response the government has taken further action to address the imbalance in skills. 2018 was designated 'the year of engineering' and the 'this is engineering' campaign was launched in a bid to turn the tide. The campaign aimed to inspire the next generation of engineers, change perceptions, and improve diversity, however, it failed to address the growing near term shortage of skilled workers. Indexes show the UK's gap between employment supply and demand worsening year on year.¹³ According to a 2017 government study, for the engineering sector to gain enough candidates to reduce the skills shortage, they would need around 186,000 skilled recruits each year until 2024. This amounts to 1.8 million vacancies in the next 5 years¹⁴. Currently there is also an annual shortfall of up to 59,000 engineering graduates, yet 62% of engineering employers say that current graduates cannot offer the right skills and suggest that not enough is being done by schools and universities to prepare future engineers for their debut in the workforce¹⁵.

GRADUATE PROSPECTS

In 2018 The Engineer reported that 2,000 engineering graduates are out of work or in jobs that don't require a degree¹⁶. Nearly 45% of these unemployed graduates are BAME. This is particularly damning when considering that engineering is one of the most diverse degrees with 27% of graduates in 2017 coming from a BAME background¹⁷. Prospects on graduation are better for women but their undergraduate representation is significantly worse, making up just 15.1% of engineering undergraduates in the UK in 2017¹⁸. The engineering sector overall has significant gender disparity – 87.6% of the sector's employees are male compared with 59.9% of the overall UK workforce, meaning that women make up just over 12% of engineers¹⁹. Addressing the barriers faced by women is vital to confronting the shortfall in skills and building the home grown engineering talent which will secure the sector's future.

WOMEN IN ENGINEERING

Women face significant educational barriers when entering engineering professions. In 2017, Accenture found that almost 60% of teachers admit stereotyping girls and boys and subsequently steering boys towards STEM subjects²⁰. It is no surprise that just 22% of students studying A Level Physics in 2018 were female²¹ and 83% of engineering and computing degree undergraduates are male²². Girls, however, consistently outperform boys in engineering fields of study, in most STEM A-levels, more girls than boys get A* – C grades and almost 80% of female engineering students graduate with a first or a 2:1 compared with 75% of males²³. Yet, in a Royal Academy of Engineering (RAEng) survey of women in the sector, 75% said they felt engineering was perceived as a male career²⁴. There is currently no tangible reason beyond assumed perceptions of an engineering career and societal stereotypes as to why so few women work in engineering. Results from the Engineering Brand Monitor (2015) highlighted the need to improve information about engineering careers being delivered to pupils at the early stages of their education²⁵.

Women report innumerable barriers beyond those directly associated with education. For example: the male dominated culture in the sector, too few female role models and discrimination based on gender. In 2018, Randstad surveyed 500 women working as engineers and found that half had experienced gender discrimination in their employment, 1 in 10 said that discrimination was a driver in women leaving the workforce and 31% experienced being passed over for promotions or being offered less important roles²⁶. Pay parity for female engineers has also seen limited progress, the gender pay gap for the engineering sector occupations is 18.7% compared with a UK average of 8.6%. Amongst graduates, for first salaries, however, the gap stands at 1.19%, women starting an engineering career can expect to earn the same as their male counterparts²⁷. For those who break into the sector career satisfaction is high. According to RAEng 80% of female engineers are happy or extremely happy with their career choice and 98% find their job rewarding²⁸.

CHALLENGES ASSOCIATED WITH BREXIT

Britain's proposed exit from the European Union presents problems for future skills requirements of the UK engineering sector. This makes it more urgent to increase the representation of women in the sector at all levels. On average 10% of consultancy and engineering firms' staff are from EU member states which is higher than the industry average of 6%, migrant labour therefore plays a crucial role²⁹. RAEng state that,

*"Engineering success is based on people – the best and brightest at all levels – and the UK has a world-class research base and world-renowned engineers across all sectors. However, the UK is already experiencing a serious engineering skills crisis and the impact on this of leaving the EU needs to be carefully managed"*³⁰

Quantitative Findings

Our detailed diversity survey found a number of worrying patterns in executive and Board positions in the engineering sector.

13.4% of Board and executive positions in the sector are held by women compared with 24% in the same positions in the FTSE100. When looking at Board and executive roles combined, we found that 100 percent of the FTSE100 companies have at least one woman in those positions compared with 58% of engineering companies. The Boards and executive teams of 156 of the 500 companies that we analysed were made up entirely of white men, meaning there was no gender or ethnic diversity in these companies.

GENDER

Looking at the top 100 engineering firms by revenue women make up 18.5% of Board members and executives while 32 companies have no female representation at all.

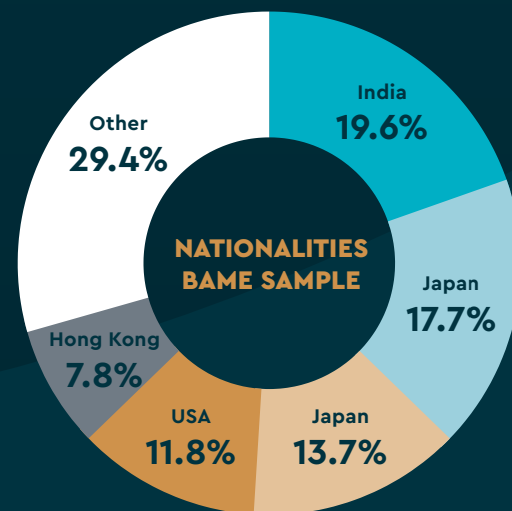
Women make up a much greater share of non-executive director positions in comparison to Board and executive level positions. They hold 26% of non-executive positions, 11.8% of executive director positions and 16.4% of executive positions. This higher proportion of non-executives is likely because sector specific experience is not always required when serving on a Board. Women from outside engineering with, for example, legal experience are therefore able to hold Board positions in the sector.

ETHNICITY

5.7% of Boards and executive positions in the top 100 are held by people from BAME backgrounds. Looking at companies with at least one person from a BAME background in a Board or executive position in isolation, the average BAME share of senior positions is 18.1%. These companies are often the UK subsidiaries of larger multinational companies, often based in East Asia. In the sector more widely BAME share of Board and executive positions is at a similar standing with 5.5%, 365 companies had no BAME representation whatsoever.

Looking at companies with BAME representation on their Boards, we found that 19.6% of Board members are executives were of Indian origin,

17.7% were of Japanese origin, those with UK origin made up 13.7%. The share from the United States sits at 11.8% and those from Hong Kong make up 7.8%.



The share of BAME women in the top 100 firms stands at 18.2%. This has BAME women making up around 1% of Board members and executives in the sector, there are very few BAME women; taking Boards and executive teams together, they only make up a 0.8% share. This includes a 0.9% share in executive roles and 0.7% on Boards. Only 53 companies out of the 500 that we analysed had at least one BAME female.

GLOSSARY

We use a number of terms in this section to refer to those working or in positions of leadership in engineering firms. A glossary is provided for your reference.

Executive directors: this refers to the board members including the CEO.

Non-executive directors (NEDs): this refers to the members of the board.

Executives: this refers to the executive team only.

When referring to **'the Board'** we mean Executive Directors and Non-executive Directors combined.

AGE

Age is only identifiable for those holding Board positions. The average age is just over 55, with the youngest Board member being 33 and the oldest being 81.

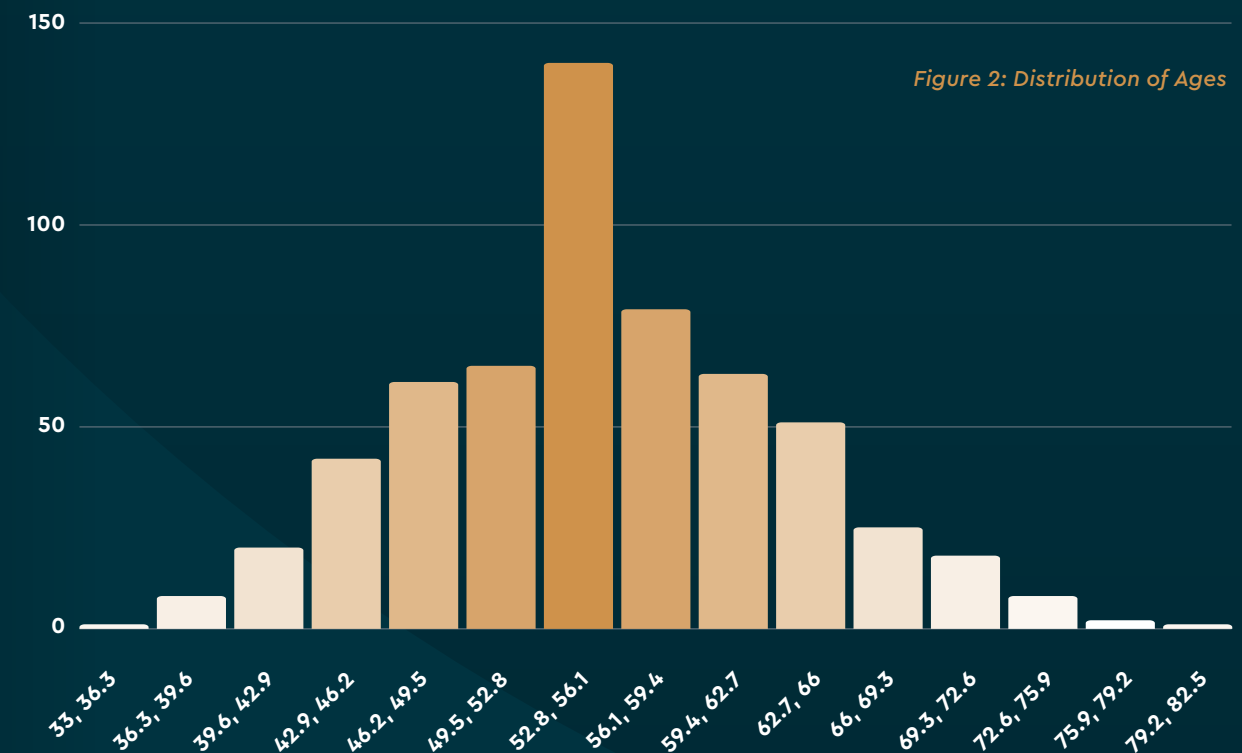


Figure 2: Distribution of Ages

On average, executive directors are a little younger than non-executive directors, with respective average ages in the two groups being 53.7 and 57. There exists almost no variation between the men and women or white and BAME individuals in the top 100.

EDUCATION

Schooling

58.3% of women in the top 100 attended a comprehensive school compared with 42% of men. Men were more likely to have attended both grammar and independent schools with shares of 22% and 35.78% respectively. Women were less likely to attend grammar and independent schools with shares of 8.3% and 33.3%. Overall, men appear to come from more prestigious schooling backgrounds than women.

Universities: Undergraduate

363 people provided university information. Of these 43.5% went to Non-Russell Group universities, 38% went to the Russell Group and 18.46% attended Oxbridge. They have a share of Oxbridge graduates more than twice as high as those in the other positions, they also have a significantly lower share of people going to Non-Russell Group universities.

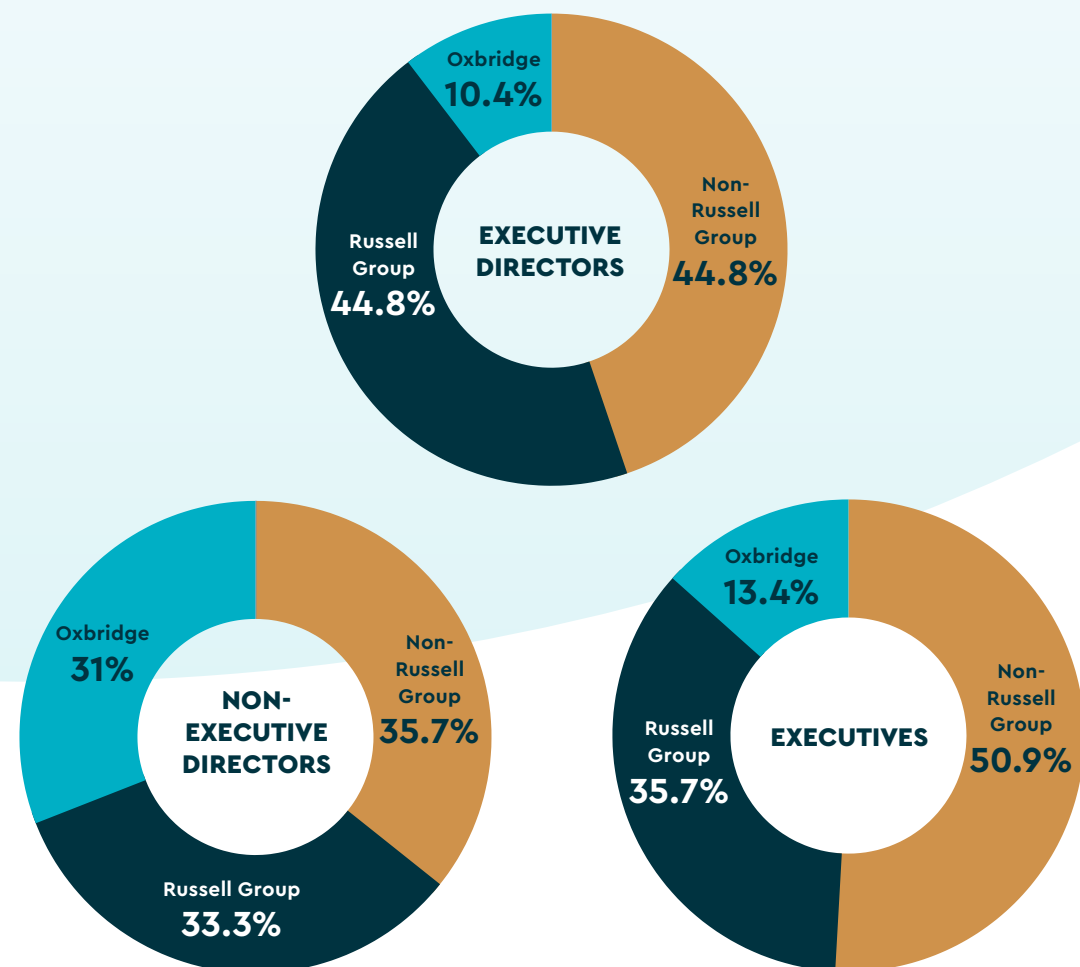


Figure 3: Undergraduate University Types Amongst Senior Roles

Women seem to outperform men in terms of undergraduate prestige. 37% of them attended Non-Russell Group universities compared with 45.39% of men, while the share of women attending Oxbridge was 24.69% compared with 16.67% of men.

Subjects of Study: Undergraduate

The degree categories used in this analysis are:

- STEM
- Business
- Social Sciences
- Humanities
- Law
- Other

In the top 100 STEM degrees were by far the most common, taking up almost half of all the subjects studied. This was followed by business related studies.

Table 1: Undergraduate Degree Types

	The Top 100	Men	Women	BAME	White
STEM	46.97	51.76	29.41	65.63	45.78
Business	15.41	13.65	21.85	9.38	15.72
Social Sciences	7.71	7.29	9.42	6.25	7.86
Law	5.5	4.24	10.08	3.13	5.7
Humanities	9.27	7.53	17.65	3.13	10.02
Other	6.42	6.82	5.04	12.5	6.09

Women were much less likely than men to have studied a STEM subject at undergraduate level, with just under 30% of women reporting STEM degrees compared with over half of men. Women were more than twice as likely as men to have studied law or humanities and were slightly more likely to have taken a business-related degree.

Just over a third more people from BAME backgrounds studied a STEM subject compared to white people. In contrast, business and humanities degrees were significantly more popular amongst white people than people from a BAME background.

Subjects of Study: Postgraduate

At postgraduate level there is a high prevalence of MBAs at all senior levels. The only group for which there was not a share over 50% was amongst women, therefore, men are more likely to hold an MBA than women in senior positions. The second most prevalent postgraduate degree are STEM subjects, with law coming in third.

Table 2: Postgraduate Degree Types

	The Top 100	Men	Women	BAME	White
STEM	19.08	19.6	17.74	30.43	17.99
Business	57.25	59.8	48.39	52.17	57.74
Social Sciences	2.67	2.01	4.84	4.35	2.51
Law	8.02	7.04	11.29	8.7	7.95
Humanities	3.82	3.02	6.45	0	4.18
Other	6.49	6.03	8.06	4.35	6.69

The standout difference between people from BAME backgrounds and white people comes from STEM subjects. People from a BAME background were more likely to have studied a STEM subject at postgraduate level (30.4% compared with 18%). There were no individuals from a BAME background who took humanities degrees at a postgraduate level, while the figure is 4.18% amongst white people.

Socioeconomic Backgrounds

Our index combines information regarding school and undergraduate university prestige to determine socioeconomic backgrounds. Higher scores indicate more privilege with the top score of 3 representing someone who has come from the most privileged background: independent school followed by Oxford or Cambridge university.

There is some variation between the different positions, with non-executive directors appearing to be the most privileged group. They receive an average score of 1.96. This compares with scores of 1.8 and 1.7 for executive directors and executives respectively. This means the general background of Board members and executives would be similar to someone who attended a grammar school and then a Russell Group university, however, non-executive directors are slightly more privileged than executive directors and executives

Men come from slightly more privileged backgrounds than women, with them receiving an average score of 1.849 compared to 1.795 for women.

Table 1 below shows the average scores of men and women by their roles within the companies.

Table 3: Socioeconomic Index Scores by Gender & Role

	Executive Director	Non-Executive Director	Executive
Men	1.773	2.003	1.714
Women	2	1.811	1.657

Female executive directors come from slightly more privileged backgrounds than any of the other women and all the other male categories except for the Non-Executive Directors. Executives come from the least privileged backgrounds and female executives have the lowest scores out of any subset. It is interesting that female executive directors tend to come from a more privileged educational background than their male counterparts and also than female non-executive directors. As seen in the earlier gender analysis women are less likely to occupy executive roles. Here we see that they appear to need a more prestigious education than men to obtain executive director roles. This suggests that women have more difficulty in moving into roles where sector experience is important and are likely to need a more prestigious education to do so.



Qualitative Findings

To better understand the experiences of senior women in the engineering, we interviewed over 100 women leaders to gain an insight into their journey to getting into senior positions in the sector.

We conducted a detailed qualitative analysis on their interview responses using a thematic analysis. We identified five key themes.

CHANGING PERCEPTIONS

The majority of the women we interviewed felt that schools and colleges need to improve the information given about career opportunities in engineering and what it means to be an engineer.

"I think it starts with education and making it clear to kids that you can do anything you want to do, just the way that I felt and I don't know whether that starts at home. But it's so important."

They mentioned how this can change perceptions of what it means to be an engineer. They advocated starting early and nurturing STEM talent.

There were also comments made on whose responsibility it is to start the conversation. Is it at home with parents or the school.

"It is about nurturing the understanding in parents about what different engineering roles are, so that they can educate their children."

A number of studies have found support for this theory with evidence to suggest that both parents careers have a significant influence on what their children do in the future³¹. Many respondents to our interviews for instance, noted that their mother or father was an engineer and this is why they'd chosen it as a career for themselves.

"My father is a civil engineer and he showed me engineering wasn't just about being on a building site."

ACCESS TO ENGINEERING

The pipeline of engineering talent was considered vital for the future sustainability of the sector. Currently, according to the Financial Times, sectors such as tech, health and hospitality suffer from severe labour shortages³² and this report has highlighted the problems faced by engineering. To help solve this growing problem the women interviewed felt more can be done to increase access to the engineering sector.

"If we are going to have a more diverse route, we have to do targeted internships etc. to find more diverse pools of people. For my company having internship with graduates definitely works well."

"Apprenticeship schemes for people from different backgrounds and women are a good way to open the door into engineering".

The women also identified the need for targeted recruitment activities of undergraduates and postgraduates who study engineering related subjects. Our findings show an elite education is not vital to succeeding in the sector and to ensure the widest pool of candidates are being attracted, there is a strong need to target universities outside of Oxbridge and Non-Russell group institutions.

ORGANISATIONAL CULTURE AND INCLUSION

Flexible working was frequently suggested as a positive initiative for improving female representation in the sector. Research has shown that a positive organisational culture fosters diversity, inclusion and a better work life balance. The benefits of this has been highlighted elsewhere in this report and widely in the literature on diversity. A number of women we interviewed said they felt changes to working patterns and more flexible working opportunities would help more women to access senior roles.

"The sector needs to change available working patterns".

"Bringing in flexibility to roles"

ROLE MODELS AND MENTORS

Research has shown that role models are vital to career development³³ and women we interviewed mentioned challenging themselves and other women in the sector to become role models.

"I think that part of the responsibility lies with all female engineers, we need to get out there, we need to be visible, we should be calling the shots."

This year the Women's Engineering Society celebrated its centenary and has been showcasing women in engineering's history through a number of activities. This kind of advocacy is vital to increasing the number of women in the sector. Showcasing modern women's achievements was highlighted by interviewees as just as important.

"Being a role model is very important and enables young women to see those that have progressed to the top, showing them that it is possible."

The women we interviewed also suggested that both men and women need to take an active role in supporting women.

"Men need to not view women with different skills/strengths as a negative, we have different strengths to contribute which are complementary. Different strengths are conducive to a stronger result."

Mentoring is vital to actively supporting women. This was highlighted by many of the women we interviewed who noted the importance of sponsorship from others as they progressed in their career.

"It is very Important to have mentors and allies especially targeting certain underrepresented groups. Engineering is considered a solitary endeavour, really it's about teamwork and having an impact - this really needs to be made clear"

Conclusion

Inclusive Boards advocates that increasing the number of women in engineering is vital for resolving the national shortage in engineering talent and in turn securing the future prosperity of engineering in the UK.

Women in Leadership

Women are underrepresented in non-executive roles and even more so in executive and executive director positions in engineering. The findings of our analysis also show that lower numbers of women in senior roles studied STEM subjects at both undergraduate and postgraduate level. These two findings are likely to be conducive of the fact that non-executive roles are open to more generalist skills whereas executive and executive director positions would require prior experience in the sector. There is also some evidence to suggest that where women do obtain executive director roles, they had to work harder to do so, coming from more prestigious socioeconomic backgrounds than their male counterparts in this group.

Challenges to the Sector

We found that the sector faces a number of challenges. There is a growing skills shortage and many employers claim that graduates are not always equipped with the skills they require. Furthermore, there is some uncertainty regarding future stability in the sector resulting from Britain's proposed exit from the European Union.

The Future

Our interviews with senior women in the sector found a number of positive strategies to both improve the representation of women in engineering and in turn alleviate some of the challenges facing the sector. We recommend improving careers advice and guidance to women and female students as well as increasing pipeline activities. We also recommend building more inclusive working cultures, celebrating role models in the sector and advocating on behalf of women to improve their chances of reaching the top.

Taking a historical perspective, in 1919 there were no female engineers, in 1969: 0.5% of all UK engineers were women, as we have seen the most recent figures suggest that in 2019 this figure has risen to 12.3%³⁴. If the sector is to prosper in the future, the next 50 years will need to see similarly radical change.

INCLUSIVE BOARDS

Inclusive Boards (IB) is a boutique executive search agency supporting organisations and sectors in their efforts to develop more diverse boards, senior leadership teams and stronger governance structures.

Our services include Research, Advisory, Executive Search, Executive Training and Conferences. We also have a flagship tech campaign in collaboration with the Financial Times (Inclusive Tech Alliance).

We are at the forefront of advancing diversity, equality and inclusivity within a range of sectors and have worked with over 150 organisations nationally and internationally to collate and analyse diversity and inclusion data. Providing evidence based research is at the centre of what we do.

Our Women in Engineering campaign seeks to advance diversity in the engineering sector with the launch of the first 100 Influential Women in Engineering list produced in partnership with the Financial Times. The landmark research presented here includes the first detailed diversity survey of leadership in the sector.

Bibliography

¹ RAENG (2019) <https://www.raeng.org.uk/education/what-is-engineering>, ² ibid, ³ Engineering UK (2018) <https://www.engineeringuk.com/media/156187/state-of-engineering-report-2018.pdf>, ⁴ ibid, ⁵ ibid, ⁶ Advanced Engineering (2018) https://www.easyfairs.com/fileadmin/groups/8/Advanced_Engineering/Advanced_Engineering_2015/news_release_advanced_manufacturing_regional_league_table_FINAL_-_specialists.pdf, ⁷ ibid, ⁸ Engineering UK (2018) <https://www.engineeringuk.com/media/156187/state-of-engineering-report-2018.pdf>

⁹ ibid, ¹⁰ ibid, ¹¹ Engineering UK (2019) <https://www.engineeringuk.com/news-media/engineers-remain-on-uk-skills-shortage-list/>, ¹² Combined Technical Solutions (2018) <https://www.cts-ltd.net/wp-content/uploads/2018/10/cts-whitepaper-skills-shortage.pdf>, ¹³ ibid, ¹⁴ The Telegraph (2017) <https://www.telegraph.co.uk/education/stem-awards/energy/the-great-uk-engineering-shortage/>, ¹⁵ The Engineer (2016) <https://www.theengineer.co.uk/work-experience-for-students-essential-say-engineering-employers/>

¹⁶ The Engineer (2018) <https://www.theengineer.co.uk/skills-shortages-engineering-pipeline>, ¹⁷ ibid, ¹⁸ Migration Advisory Committee (2019) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/806331/28_05_2019_Full_Review_SOL_Final_Report_1159.pdf, ¹⁹ Accenture (2017) https://www.accenture.com/t20170905t101544z_w_/ie-en/_acnmedia/pdf-60/accenture-girls-in-stem-research-report-2017-online.pdf, ²⁰ ibid, ²¹ WES (2018) https://www.wes.org.uk/sites/default/files/2018-01/Women%20in%20Engineering%20Statistics%20-%20January%202018%20-%20created%20by%20Sarah%20Peers_0.pdf, ²² The Guardian (2019) <https://www.theguardian.com/careers/2019/jun/26/how-changing-attitudes-are-closing-the-gender-gap-in-engineering>, ²³ RAENG (2013) <https://www.raeng.org.uk/publications/other/britains-got-talented-female-engineers>, ²⁴ IFF Research (2015) <https://www.engineeringuk.com/media/1325/sep-2015-engineers-and-engineering-brand-monitor-2015-1.pdf>

²⁵ Randstad (2018) https://www.randstad.co.uk/workforce360/archives/3-barriers-female-engineers-face_1346/, ²⁶ The Guardian (2019) <https://www.theguardian.com/careers/2019/jun/26/how-changing-attitudes-are-closing-the-gender-gap-in-engineering>, ²⁷ RAENG (2013) <https://www.raeng.org.uk/publications/other/britains-got-talented-female-engineers>, ²⁸ ibid, ²⁹ ibid, ³⁰ ibid

³¹ Ashton D. Trice & Linda Knapp (1992) Relationship of Children's Career Aspirations to Parents' Occupations, The Journal of Genetic Psychology, ³² Financial Times (2018) <https://www.ft.com/content/36baacce-ddd0-11e8-9f04-38d397e6661c>

³³ Gibson, Donald. (2004). Role Models in Career Development: New Directions for Theory and Research. Journal of Vocational Behavior.



INCLUSIVE BOARDS

hello@inclusiveboards.co.uk | www.inclusiveboards.co.uk