WOMEN IN ENGINEERING: REALISING PRODUCTIVITY AND INNOVATION THROUGH DIVERSITY
Was there evidence of a gender pay gap in the engineering workforce surveyed?

Did the survey find a pay gap in like-for-like roles?

Did the survey find a pay gap arising from occupational segregation?

Was there evidence of the attrition of women by age?

What does the workforce distribution by years of experience show?

Does the recent increase in the number of women doing engineering degrees explain their concentration in lower responsibility levels and years of experience?

Were there any gender differences in work priorities?

What did women report about their experience of discrimination in engineering workplaces?

Were there any gender differences relating to professional development?

What did the survey tell us about the participation rate of women in engineering?
FOREWORD

We are all agreed that ensuring a strong and sustainable engineering capability into the future is part of the main game in building Australia’s innovation and productivity potential.

Addressing the underrepresentation of women in engineering is a workforce development strategy that will play a major part in ensuring this capability in the longer-term.

There is no doubt that the current focus on encouraging greater numbers of women and girls to undertake STEM subjects at secondary school and engineering courses at university is vital to improving the participation of women in engineering - the problem is that this approach belies the complexity of the factors contributing to the underrepresentation of women in engineering and is at best only half the story.

Addressing the attrition of women from the engineering workforce is the vital second half of the equation. Removing the obstacles, barriers and biases which operate as disincentives for women to remain in engineering is just as fundamental as increasing the participation of women and girls in engineering education.

So, as well as efforts to encourage women and girls into engineering, an effective long-term solution will require addressing the complex range of factors that operate to disadvantage women in employment generally, as well as the factors particular to the engineering workforce that create disadvantage and lead to the attrition of women from the profession.

The contribution that a diverse workforce makes to organisational effectiveness is well-documented\(^1\), and improving the level of participation and retention for female engineers remains one of the most significant challenges in achieving a diverse and sustainable engineering workforce. Women represent one of the largest underrepresented pools of talent in engineering and organisations will need to devote greater attention to addressing the workplace practices that create disadvantage for women if they wish to attract and retain their top talent.

Addressing the progression, attrition and retention issues for women highlighted in this report should be a national priority. Ensuring a strong and sustainable workforce and fully realising our innovation and productivity potential will depend on it.

Chris Walton

Professionals Australia CEO

THE SURVEY

Based on data from the 2017 Professional Engineers Employment and Remuneration Survey, this report considers a series of critical questions about the attrition of women from the engineering workforce, occupational segregation in engineering, the gender pay gap, the incidence of discrimination and the underrepresentation of women in senior management and leadership positions in engineering workplaces.

Key results

- The survey found a gender pay gap with female engineers’ reported average earnings 89 per cent of their male counterparts.
- The pay differential arose out of the concentration of women in roles of lower levels of responsibility with males being more likely to be employed at higher levels of responsibility.
- 13.1 per cent of the female workforce dropped out between the 20-29 and 30-39 age brackets, compared with a drop of only 1.4 per cent for the male workforce - confirming substantial attrition of the female workforce beyond the 20-29 age bracket.
- Only 30 per cent of female engineer respondents were aged over 40, compared to 42.6 per cent of their male counterparts.
- Only 14.0 per cent of female respondents indicated that they had worked as an engineer for over 20 years compared with 32.1 per cent of male respondents.
- 47.1 per cent of female respondents reported that they had experienced discrimination on the basis of gender.

Summary analysis

- The reported earnings of survey respondents confirmed a gender pay gap with an average base salary of $101,238 for females compared to $113,222 for their male counterparts, meaning female engineers reported average earnings of 89 per cent of male engineers’ earnings.
- The pay differential arose not from differences in pay in comparing like-for-like roles but the concentration of women in roles of lower levels of responsibility. The data confirmed a clear difference in the distribution of male and female respondents across responsibility levels, with males being more likely to be employed at higher levels of responsibility, and females more likely to be employed at less senior responsibility levels.
- 13.1 per cent of the female workforce dropped out between the 20-29 and 30-39 age brackets, compared with a drop of only 1.4 per cent for the male workforce.
- Only 30 per cent of female engineer respondents were aged over 40, compared to 42.6 per cent of their male counterparts.
- Only 14.0 per cent of female respondents indicated that they had worked as an engineer for over 20 years compared with 32.1 per cent of male respondents.
- 47.1 per cent of female respondents reported that they had experienced discrimination on the basis of gender.
- Female respondents engaged in fewer hours of continuing professional development than their male counterparts.
- For those considering leaving their current employer, there was a clear difference in the factors that would alter their intention to leave for male and female respondents (aside from the factors of a pay increase and a promotion which male and female respondents reported as a factor at similar rates). Improved workplace culture, improved work/life balance and a more challenging workload were the three main factors for female respondents, while the three main factors for male respondents were professional development opportunities, improved workplace culture and better management.
- Female engineers accounted for only 9.9 per cent of respondents, with males making up the other 90.1 per cent. This broadly reflects the gender imbalance in the engineering workforce which is 11 per cent female and 89 per cent male.
**FINDINGS**

Was there evidence of a gender pay gap in the engineering workforce surveyed?

The survey found a pay differential for the total survey sample with a mean base salary of $101,238 for females compared to $113,222 for their male counterparts – female engineers earned on average 89 per cent of male engineers’ mean earnings.

**Figure 1 - Mean male and female base salary for all respondents across survey sample**

<table>
<thead>
<tr>
<th>Salary Range</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>$101,000</td>
<td></td>
<td></td>
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<tr>
<td>$102,000</td>
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<td>$111,000</td>
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</table>

**Did the survey find a pay gap in like-for-like roles?**

The data did not confirm any clear pay gap when comparing like-for-like roles by responsibility level or years of experience.

**Figure 2 - Median base salary across responsibility levels by gender**

<table>
<thead>
<tr>
<th>Level</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>$64,000</td>
<td>$64,375</td>
</tr>
<tr>
<td>Level 2</td>
<td>$67,000</td>
<td>$67,700</td>
</tr>
<tr>
<td>Level 3</td>
<td>$71,000</td>
<td>$71,560</td>
</tr>
<tr>
<td>Level 4</td>
<td>$74,000</td>
<td>$72,637</td>
</tr>
<tr>
<td>Level 5</td>
<td>$77,000</td>
<td>$76,097</td>
</tr>
<tr>
<td>Above level 5</td>
<td>$177,284</td>
<td>$177,284</td>
</tr>
</tbody>
</table>
Did the survey find a pay gap arising from occupational segregation?

The survey data did confirm that the pay differential could be attributed to occupational segregation in the survey population – that is, a concentration of female respondents in less senior roles and the underrepresentation of females at senior levels.

In looking at female representation at different responsibility levels, the survey found a clear difference in the distribution of male and female respondents across levels, with males being more likely to be employed at higher levels of responsibility and females more likely to be employed at less senior responsibility levels.

50.0 per cent of female respondents reported being employed at levels 1 or 2, and only 26.0 per cent were employed at levels 4 or above. By comparison, only 27.2 per cent of men were engaged at the lower two levels, while 42.4 per cent were employed at levels 4 and above.
Was there evidence of the attrition of women by age?

The 2002 CREW report stated the following:

*There is a striking disparity in the age profiles of female and male engineers. After peaking at 51% in the 20-29 age bracket, the age profile for all women surveyed falls steadily. Only 15% of women are over 40 years of age.*

*In contrast, the age profile of all male engineers peaks in the 30-39 age bracket, and after that falls gradually up to retirement age. Forty-three percent are over 40 years of age ... The age profile of women who are no longer working as engineers indicates that women over thirty are leaving the profession.*

The Professionals Australia survey confirmed the CREW report findings in the following ways:

1. There was a steady fall in the age profile of women beyond the 20-29 age bracket. Our survey found the percentage of female engineers dropped by 13.1 per cent between the 20-29 and 30-39 age brackets compared with a percentage decline of 1.4 per cent for male engineers; and

2. The proportion of women aged over 40 is significantly less than that of the male engineering workforce. Our survey found that only 30 per cent of female engineer respondents were aged over 40, compared to 42.6 per cent of their male counterparts.

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What does the workforce distribution by years of experience show?

Differential rates of attrition by gender were evident by years of experience most clearly in the comparative underrepresentation of female respondents at greater years of experience.

Only 14.0 per cent of female respondents indicated that they had worked as an engineer for over 20 years compared with 32.1 per cent of male respondents.

59.0 per cent of female respondents reported having fewer than six years’ experience compared with 39.7 per cent for males. The findings around age and years of experience confirm that the engineering workforce is characterised by the substantial attrition and lack of progression of its female workforce at the 30-39 age bracket - so the mid-career stage of women’s professional lives.

Figure 6 - Workforce distribution across years of experience by gender (percentage)
Does the recent increase in the number of women doing engineering degrees explain their concentration in lower responsibility levels and years of experience?

It was important to consider whether or not the increase in the number of women undertaking engineering degrees over the last 15 years could account for the concentration of female engineers at lower responsibility levels and fewer years of experience.

According to data published by the Australian Bureau of Statistics\(^3\) (see Figure 4 below) the number of women entering the engineering profession as measured by university course completions in the fields of engineering and related technologies has been increasing over the past 15 or so years. However at the same time, the number of men entering the profession has also been increasing, and at proportionally similar levels. As a result, the mix of male to female graduates entering the engineering workforce appears to be unchanged over the period. An increase in women entering the profession is therefore unlikely to account for their concentration at lower levels of responsibility and fewer years of experience.

Given the concentration of female participants at lower levels of responsibility, it is likely that the engineering workforce is characterised by the substantial attrition and lack of progression of its female workforce beyond the 20-29 age bracket - so the mid-career stage of women's professional lives.

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\(^3\) Source: Department of Education and Training - Higher Education Statistics Data Cube (uCube) which is based on the student and staff data collections.
Were there any gender differences in work priorities?

The survey asked respondents whether they were considering leaving their current employer and if they were, the factors that might alter their intention.

The survey found no significant difference in the rates at which male and female respondents were considering leaving their current employer. For those who were considering leaving however, there was a significant difference in some of the factors that would alter their intention to leave (aside from a pay increase and a promotion which male and female respondents reported as a factor at similar rates). Improved workplace culture, improved work/life balance and a more challenging workload were the three main factors for female respondents, while the three main factors for male respondents were continuing professional development opportunities, improved workplace culture and better management.

Figure 8 – Percentage of respondents considering leaving current employer by gender

<table>
<thead>
<tr>
<th></th>
<th>Considering Leaving</th>
<th>Not Considering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>25.4%</td>
<td>74.6%</td>
</tr>
<tr>
<td>Male</td>
<td>33.7%</td>
<td>66.3%</td>
</tr>
</tbody>
</table>
Figure 9 - Factors that would alter intention to leave by gender

- A pay increase: Male 68.2%, Female 67.7%
- Professional development opportunities: Male 52.3%, Female 45.2%
- Improved workplace culture: Male 39.7%, Female 61.3%
- Promotion: Male 38.4%, Female 48.4%
- Opportunity for better management: Male 37.0%, Female 38.7%
- Improved work/life balance: Male 34.5%, Female 41.9%
- Flexible working arrangements: Male 28.2%, Female 25.8%
- Greater job security: Male 23.8%, Female 16.1%
- A more challenging workload: Male 22.7%, Female 41.9%
- Working closer to home: Male 20.0%, Female 25.8%
- Other: Male 9.6%, Female 6.5%
What did women report about their experience of discrimination in engineering workplaces?

The survey asked respondents to report on whether or not they had experienced discrimination in their workplace over the previous three years, and if so, the type of discrimination they had experienced.

A disturbing 47.1 per cent of female respondents reported that they had experienced discrimination on the basis of gender. Discrimination on the basis of age was the second most frequently reported type of discrimination reported with 12.8 per cent of males and 21.0 per cent of females reporting age discrimination. Men were much more likely to have not experienced discrimination on any of the bases listed with 81.6 per cent of male respondents reporting no discrimination, compared with 46.2 per cent of female respondents.

Survey respondents could nominate more than one type of discrimination.

Figure 10 - Types of discrimination experienced in the workplace over previous three years by gender

Were there any gender differences relating to professional development?

The level of professional development undertaken by women in engineering compared to their male counterparts is a critical issue with it being a key enabler of career progression and advancement, so any difference in the relative levels of continuing professional development (CPD) undertaken by survey respondents would be of interest.

The survey found a clear difference in the number of hours of CPD undertaken by male and female respondents, with males reporting an average 38 hours of CPD in the previous 12 months compared with 31 hours for females.
While this survey did not explore the possible reasons for any identified differences in any further detail, previous Professionals Australia studies in the Science, Technology, Engineering and Mathematics (STEM) professions have shown that employers can assume that women are less interested in undertaking CPD, that CPD is offered at times that make it more difficult for women to undertake it and they therefore self-select out of it, or that CPD is either not offered at all or offered less frequently to those who work part-time.

Gender bias on the part of employers in relation to CPD can play a role in sidelining women who could otherwise be undertaking further training and professional development activities that would underpin and facilitate career progression.4

- 31.3 per cent of respondents to the STEM survey said they were unnecessarily prevented from undertaking training and professional development because they worked part-time; and
- 58.2 per cent said the impact on personal or family time prevented them from commencing or completing professional development.

These were some of the comments female respondents made in relation to CPD:

The professional development sessions at my work are run Monday afternoons between 3 and 5pm which is impossible for me to attend due to carer responsibilities (school pick-up).

Employer will not provide video for viewing in own time though I have asked. My boss did not offer me the company-provided project management training that was offered to many others on equivalent grade to me, saying that I was not a priority as a part-time employee.

I am occasionally presented opportunities to attend training etc. however I choose not to take them up as it disrupts family life too much.

I’m not even considered when training is offered - I’m pigeon-holed as not being able to make it but I haven’t been offered it.5

What did the survey tell us about the participation rate of women in engineering?

Female engineers accounted for only 9.9 per cent of survey respondents, with males making up the other 90.1 per cent. This broadly reflects the gender imbalance in the Australian engineering workforce with only 11 per cent of engineering professionals being female.6

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IN SUMMARY

The Professionals Australia survey found evidence of industrial gender segregation (the low participation rate of female engineers in the survey reflecting the low participation rate women in engineering in the broader population), and occupational segregation (a concentration of women in less senior roles and underrepresentation at the senior/management level).

The survey also found a dramatic decline in the number of female engineers compared to their male counterparts in the survey population beyond the 20 to 29 age bracket, reflecting a similar point of attrition to that previously identified in the broader engineering workforce.

Given the concentration of female participants at low levels of experience and lower levels of responsibility, it is likely that the engineering workforce is characterised by the substantial attrition and lack of progression of its female workforce beyond the 20-29 age bracket - so the mid-career stage of their professional lives.

The survey also found high levels of discrimination on the basis of gender with women far more likely than their male counterparts to be discriminated against on the basis of gender, and more likely also to be discriminated against on the basis of age.

The survey showed that workplace culture, work/life balance and accessing a more challenging workload are major factors in the retention of females in the engineering at the workplace level. Female survey respondents reported engaging in less CPD than their male counterparts pointing to issues of differential access to, and/or self-selection out of, professional development activities that would normally underpin career progression.

In each of these ways, the survey confirmed the significant issues of industrial and occupational segregation as one of the most significant contributors to the gender pay gap in the engineering workforce, the high level of gender discrimination reported by female engineers and the significant cultural issues and workplace practices that create disadvantage for women in engineering.

Addressing the factors that contribute to lack of career advancement, attrition from the workforce at mid-career stage and the underrepresentation of women in the engineering workforce is not only a matter of justice and equity. Tackling the issues highlighted in this report will be fundamental to fully realising Australia’s productivity and innovation potential into the future.
ASSISTANCE WITH ADDRESSING GENDER BIAS IN THE WORKPLACE

Professionals Australia has produced a guide called *Stemming the Tide: Addressing the attrition of women from the STEM workforce* which looks at options for organisations wanting to address the attrition and progression issues for professional women working in STEM fields.


ABOUT THE SURVEY

Professionals Australia has been conducting regular salary surveys of members since 1974.

The Professional Engineer Remuneration Survey from which this data are drawn was conducted online during the first half of 2017 using the present engineering member base of Professionals Australia.

Non-members were also invited to participate in the survey. Non-members were invited using a combination of social media and contact engineers that had previously demonstrated interest in the association's remuneration reports. In total, 1820 completed questionnaires were returned, of which 1742 have been used for the analyses contained in this report.

The gender breakdown of responses was as follows:

Number of Responses

Female 172
Male 1,570

In order to provide comprehensive information on professional engineers’ remuneration, Professionals Australia publishes its main engineering survey report annually.

The survey is the largest of its kind undertaken in Australia and as such represents an authoritative picture of the remuneration and employment conditions of professional engineers.

For further information on purchasing the Professional Engineers Employment and Remuneration Report, visit:

ABOUT PROFESSIONALS AUSTRALIA

Professionals Australia is an association that represents the industrial and professional interests of more than 24,000 members including professional engineers, scientists, managers, architects, contractors and consultants and more.

Our members are employed in all sectors of the Australian economy, throughout all levels of government and across the private sector. Our professional engineer members perform design, scoping and project management roles across essential industries and services in Australia, including roads, rail, local government, IT, water, power, construction, mining, oil and gas exploration, manufacturing and more.

Professionals Australia began as the Association of Professional Engineers, Australia (APEA) which formed in 1946 and registered as an industrial association in 1948. APEA was the first organisation to ensure that professionals were recognised and rewarded for the high-value work they do.

The Professional Engineers Case finalised in 1961 saw engineers across Australia receive salary increases averaging more than 40 per cent. Even more importantly it set the precedent for work value and benchmark salaries for professionals.

Professionals Australia has Government approval as an assessment entity for the only mandatory engineering registration scheme in Australia – the Registered Professional Engineers of Queensland (RPEQ). Professionals Australia offer assessment in the areas of Civil, Electrical, Information, Technology and Telecommunications, Management, Mechanical and Structural Engineering.

Professionals Australia is a not-for profit organisation and is owned by its members.
WOMEN IN ENGINEERING: REALISING PRODUCTIVITY AND INNOVATION THROUGH DIVERSITY

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