

## A CLOSER LOOK AT ENGINEERING

In this report, Engineering refers to the broad educational field of Engineering and Related Technologies. Engineering is the largest STEM field of education, with 928 140 people with VET qualifications and 277 807 people with university qualifications in the labour force in 2016.

This chapter analyses the VET and university qualified Engineering populations including their labour force status, industries of employment and occupations. The chapter investigates differences between the 11 narrow fields of education within the broad field of Engineering and Related Technologies.

Chapter 12 of this report also looks at people with Engineering qualifications, but is restricted to only analysing the employment pathways of those with university qualifications in Engineering.

## HIGHLIGHTS

- ▶ Engineering is the largest STEM field—in 2016, people with Engineering qualifications made up 80% of the VET STEM qualified labour force and 38% of the university STEM qualified labour force.
- ▶ Engineering is male dominated at both levels of qualification but particularly within VET. In 2016, males made up 96% of the Engineering labour force with VET qualifications and 85% of the Engineering labour force with university qualifications.
- ▶ The unemployment rates of people with VET and university Engineering qualifications increased substantially between 2011 and 2016.
  - The unemployment rate of the VET qualified Engineering labour force increased from 2.9% in 2011 to 4.6% in 2016.
  - The unemployment rate of the university qualified Engineering labour force increased from 3.5% in 2011 to 6.1% in 2016.
- ▶ Unemployment rates were lower for males than for females across the board.
- ▶ As was the case across the STEM qualified population, a greater proportion of males than females with Engineering qualifications worked full-time.
- ▶ 83% of employed males with VET Engineering qualifications worked full-time in 2016, compared to 55% of the corresponding cohort of females. By gender and narrow field, the group with the smallest percentage working full-time were females qualified in Other Engineering and Related Technologies (45%).
- ▶ 83% of employed males with university engineering qualifications worked full time, compared to 67% of the corresponding cohort of females. By gender and narrow field, the group with the smallest percentage working full-time were females qualified in Maritime Engineering and Technology (54%).
- ▶ The top occupations and industries of employment differed depending on qualification level.
  - The top industry divisions of employment for people with VET Engineering qualifications were Manufacturing or Construction and the top occupation was Technicians and Trade workers.
  - The top industry division of employment for people with university Engineering qualifications was Professional, Scientific and Technical Services and the top occupation was Professionals.

## What does Engineering include?

This chapter analyses people with VET and university qualifications in the field of Engineering, while recognising that many of these people do not work in traditional Engineering occupations or industries.

The Australian Bureau of Statistics uses the Australian Standard Classification of Education (ASCED) to categorise qualifications by field.

*Engineering and Related Technologies is the study of the design, manufacture, installation, maintenance and functioning of machines, systems and structures; and the composition and processing of metals, ceramics, foodstuffs and other materials. It includes the measurement and mapping of the earth's surface and its natural and constructed features. The main purpose of this broad field of education is to develop an understanding of the conversion of materials and energy, the measurement and representation of objects, and the operation of plant, machinery and transport systems.*

—Australian Bureau of Statistics, 2001

The broad ASCED field of Engineering and Related Technologies (simplified to Engineering in this report) contains 11 narrow fields of education:

- ▶ **Manufacturing engineering and technology:** the study of the planning, organisation and operation of manufacturing methods, processes, facilities and systems.
- ▶ **Process and resources engineering:** the study of planning, designing and developing systems, processes and plant for locating and extracting minerals, oil and gas from the earth, and for physically and chemically transforming raw materials to produce metals, alloys, petrochemicals, ceramics, polymers and other materials. It includes the industrial manufacture, processing, packaging and handling of foodstuffs, pharmaceuticals and biochemicals.
- ▶ **Automotive engineering and technology:** the study of planning, designing, developing, producing and maintaining motor vehicles including earth moving equipment, motor cycles and small engines.
- ▶ **Mechanical and industrial engineering and technology:** the study of designing, planning, installing, operating, maintaining and repairing mechanical plant, machinery and tools.
- ▶ **Civil engineering:** the study of planning, designing, testing and directing the construction of large scale buildings and structures, and transport, water supply, pollution control and sewerage systems. It includes economic, functional and environmental considerations in the design and construction.
- ▶ **Geomatic engineering:** the study of measuring and graphically representing natural and constructed features of the environment.
- ▶ **Electrical and electronic engineering and technology:** the study of planning, designing, developing, testing, installing and maintaining electrical, electronic and communications equipment, circuits and systems. It includes designing, installing and maintaining equipment for generating and distributing electrical power.
- ▶ **Aerospace engineering and technology:** the study of planning, designing, developing, assembling and maintaining aircraft structures and systems. It includes operating and directing aircraft.
- ▶ **Maritime engineering and technology:** the study of designing, maintaining and operating marine craft and shipboard machinery and systems.
- ▶ **Other engineering and related technologies:** includes all Engineering and Related Technologies not elsewhere classified:
  - Environmental Engineering
  - Biomedical Engineering
  - Fire Technology
  - Rail Operations
  - Cleaning
  - Engineering and Related Technologies, not elsewhere classified
- ▶ **Engineering and Related Technologies, not further defined (nfd):** includes non-defined qualifications in Engineering.

## Different levels of Engineering qualifications

The skills, occupations, and industries of employment for people with Engineering qualifications differ substantially depending on their level of qualification.

At the VET level, the field of Engineering is populated largely by people holding certificate III and IV qualifications in Mechanical, Electrical, and Automotive Engineering, who hold occupations such as mechanics, welders, metal fitters and machinists, and electricians. Table 17.1 clarifies the major trades that are categorised by the ABS under the Engineering fields of education and those that are not.

The VET qualified Engineering labour force is largely male. In both 2011 and 2016, females made up just 4% of this population, the lowest representation of any STEM field.

For university qualified Engineering graduates, the most common qualification was a bachelor degree, and close to half (44%) of people with this qualification did not specify a narrow field of education in the 2016 Census. It is likely that the most common qualification at this level is a four-year bachelor degree, as required for entrance to professional engineering practice.<sup>61</sup> However, the length of qualifications is not available from Census data. University qualified Engineers were most likely to work as civil engineers, industrial engineers, software programmers, or in other professional occupations. The university qualified Engineering labour force is also largely male. In 2011, females made up 13% of the university

**Table 17.1: The categorisation of selected trades under Engineering, and Architecture and Building detailed fields of education**

Engineering trades	Architecture and Building trades
Electrical and Electronics Engineering	Plumbing
Metal Fitting and Machining	Carpentry and Joinery
Vehicle Mechanics	Painting
Boilermaking and Welding	Bricklaying
Printing	Plastering
	Building

qualified Engineering labour force. In 2016, this proportion had increased, with females accounting for 15% of the cohort.

### How many people in the labour force have Engineering qualifications?

#### THE VET QUALIFIED ENGINEERING LABOUR FORCE

In 2016, there were 928 140 people in the labour force with VET engineering qualifications, making up 80% of the VET STEM qualified labour force. Between 2011 and 2016, the number of people in the labour force with VET Engineering qualifications grew by 3% (24 040 people). This compares with a growth of 4% in the total VET STEM qualified labour force over the same period.

#### THE UNIVERSITY QUALIFIED ENGINEERING LABOUR FORCE

In 2016, there were 277 807 people in the labour force with university engineering qualifications, making up 38% of the university STEM qualified labour force. Between 2011 and 2016, the number of people in the labour force with university Engineering qualifications grew by 28% (60 030 people). This compares with a growth of 25% in the total university STEM qualified labour force over the same period.

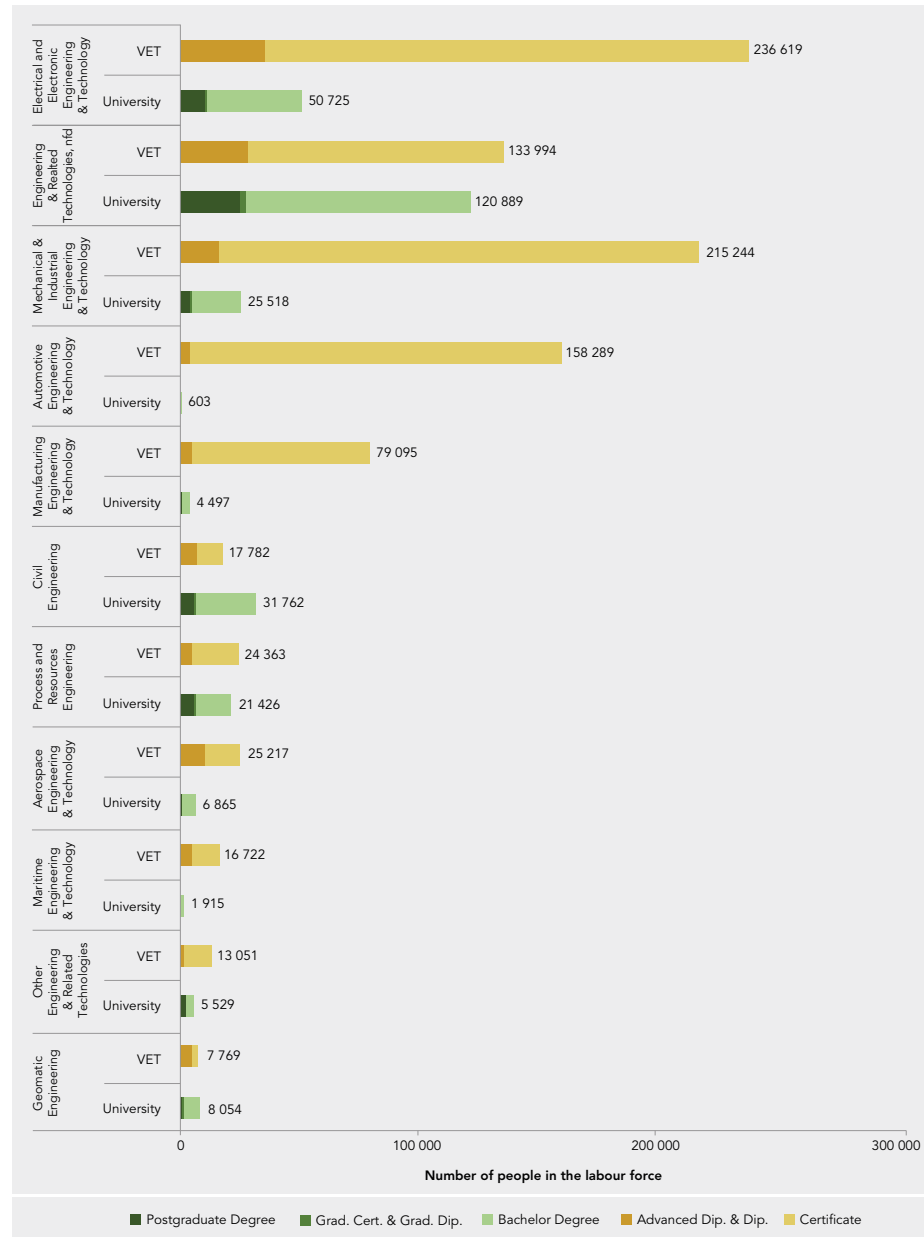
<sup>61</sup> <https://www.professionalengineers.org.au/rpeng/qualification/>

## Which are the most common narrow fields of Engineering?

There are 11 narrow ASCED fields of Engineering (pg. 247). Of those with VET qualifications, the largest narrow field was Electrical and Electronic Engineering and Technology (26% of the VET Engineering qualified labour force; Figure 17.1). The next largest narrow field was Mechanical and Industrial Engineering and Technology (23%), while the smallest was Geomatic Engineering (less than 1%).

Within the university qualified Engineering labour force, the largest narrow field was Engineering and Related Technologies not further defined (44%), meaning that the respondents did not specify a more detailed field of education than the broad field of Engineering. The next largest narrow field was Electrical and Electronic Engineering and Technology (18%), while the smallest was Automotive Engineering and Technology at just 603 people (less than 1%).

Figure 17.1: Number of people in the labour force, by narrow field and level of education. The data labels show VET and university totals



## What level of education does the Engineering labour force have?

In 2016, the majority (84%) of people in the Engineering labour force with VET qualifications had a certificate qualification, while the remaining 16% had advanced diplomas or diplomas (Figure 17.2). Females represented 3% of those with certificates and 8% of those with advanced diplomas or diplomas.

Within the university qualified Engineering labour force, the majority (77%) of people had a bachelor degree, 21% had a postgraduate degree, and 2% had a graduate diploma or graduate certificate. Females represented 17% of those with bachelor degrees, 15% of the cohort with graduate diplomas and graduate certificates and 20% of those with postgraduate degrees.

## What are the unemployment rates of people with Engineering qualifications?<sup>62</sup>

The unemployment rates of people with Engineering qualifications have increased over the last decade. The unemployment rate of people with VET Engineering qualifications was 2.7% in 2006, 2.9% in 2011, and 4.6% in 2016 (Chapter 3, Figure 3.10). Within this cohort in 2016, people with advanced diplomas and diplomas had an unemployment rate of 4.8%, and those with certificates had an unemployment rate of 4.6% (Figure 17.3). Overall, people with VET qualifications in Engineering had a lower unemployment rate than those with VET qualifications in any other STEM field (Chapter 3, Figure 3.10).

Figure 17.2: Engineering qualified population by level of qualification and gender. Data labels show the total number of people in the labour force qualified at each level

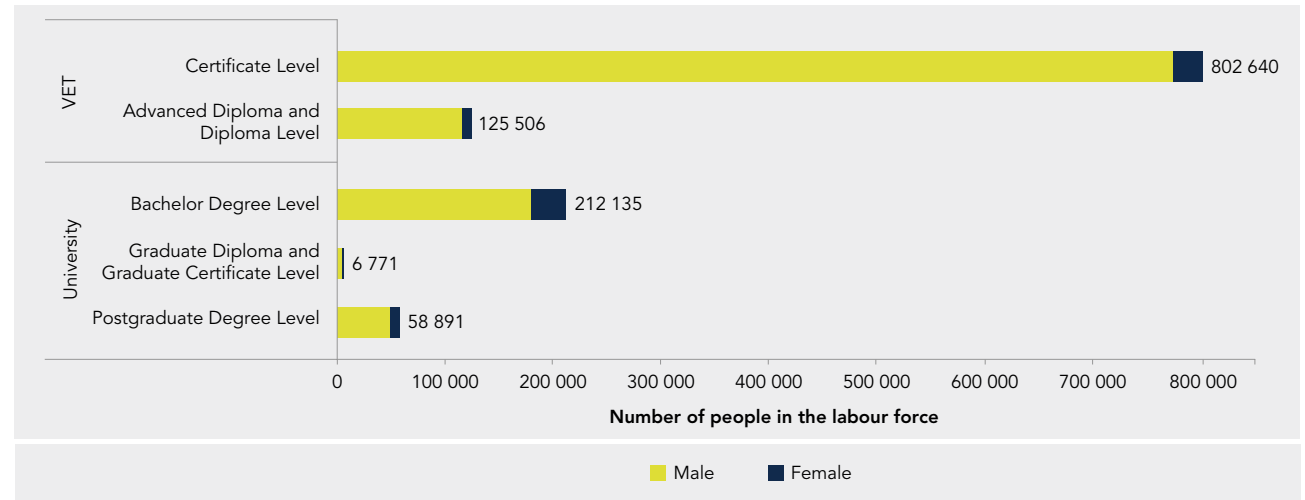
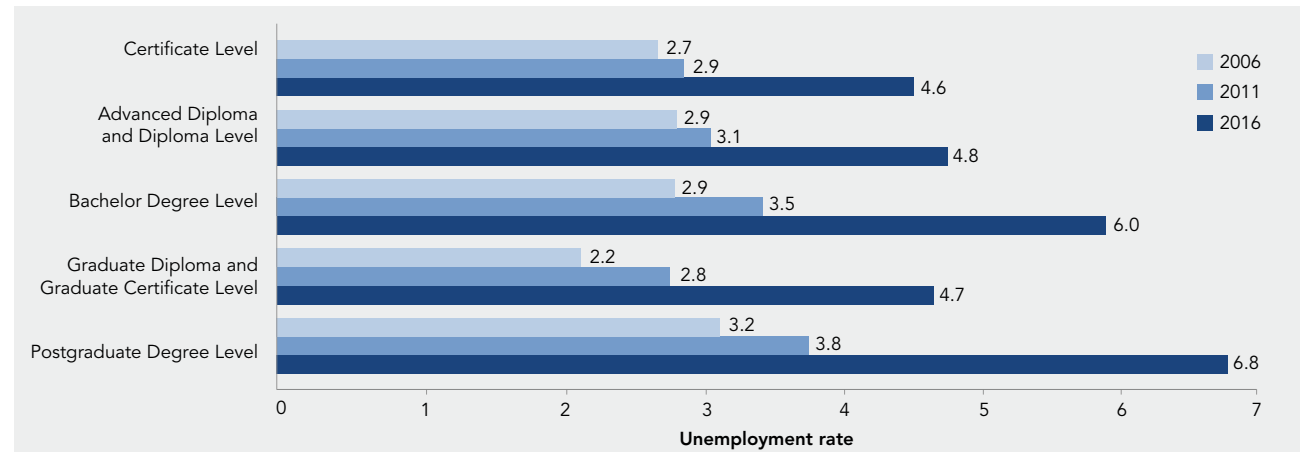


Figure 17.3: Unemployment rates of Engineering labour force by qualification level, 2006 to 2016



<sup>62</sup> Unemployment data in this report should be read with reference to prevailing labour market and unemployment conditions in the Census years. Refer to Chapter 1 for further detail.

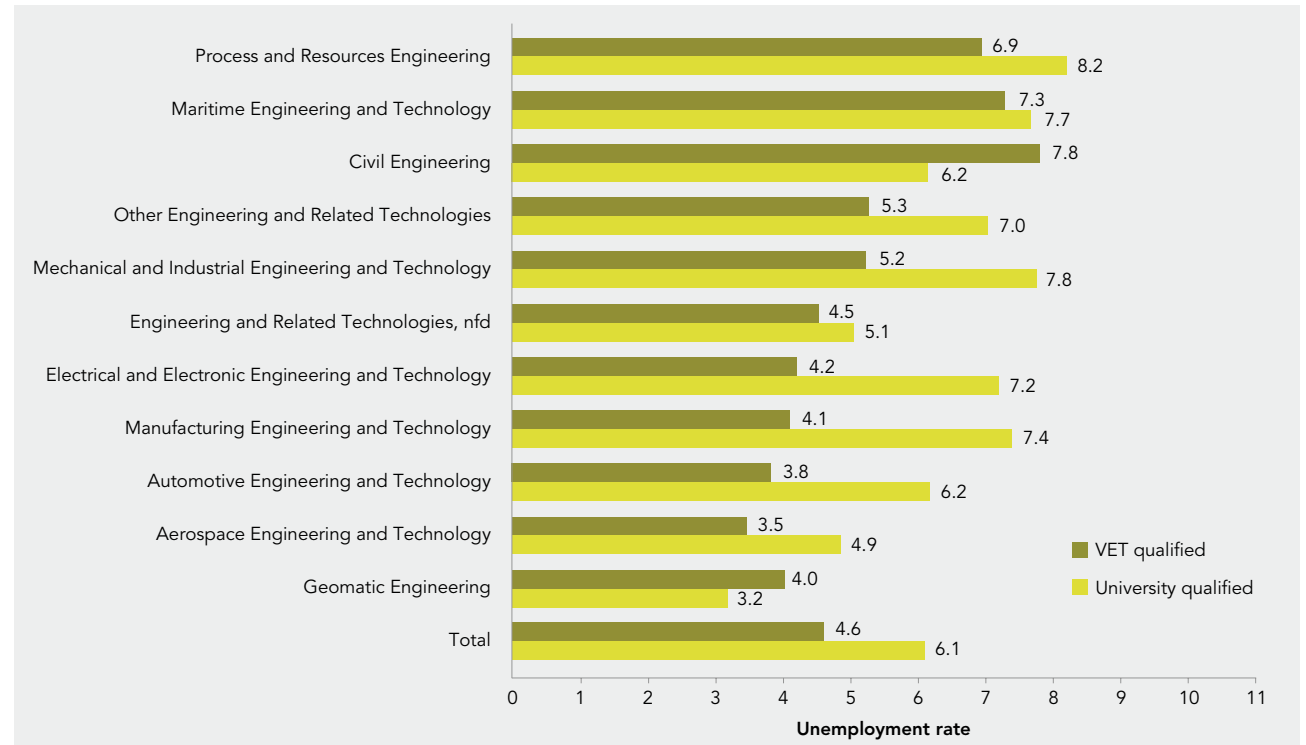
For those with university Engineering qualifications, the unemployment rate was 2.9% in 2006, 3.5% in 2011, and 6.1% in 2016 (Chapter 3, Figure 3.11). Within this cohort in 2016 people with postgraduate degrees had an unemployment rate of 6.8% and those with bachelor degrees had an unemployment rate of 6.0% (Figure 17.3). Those with graduate diplomas and graduate certificates had the lowest unemployment rate at 4.7%. People with university qualifications in Engineering had a higher unemployment rate than those with university qualifications in any other STEM field (Chapter 3, Figure 3.11).

Females with Engineering qualifications had higher unemployment rates than males at both levels of education. This gender difference was particularly evident among those with university qualifications, where the female unemployment rate was 3.6 percentage points higher than the male unemployment rate (Chapter 3, Figure 3.12).

For the VET Engineering qualified population, the narrow field of Civil Engineering had the highest unemployment rate (7.8%), while Aerospace Engineering and Technology had the lowest, at 3.5% (Figure 17.4).

For the university Engineering qualified population, the narrow field of Process and Resources Engineering had the highest unemployment rate (8.2%). Geomatic Engineering had the lowest unemployment rate (3.2%), as well as the smallest overall cohort size.

**Figure 17.4: Unemployment rate by narrow field and qualification level**



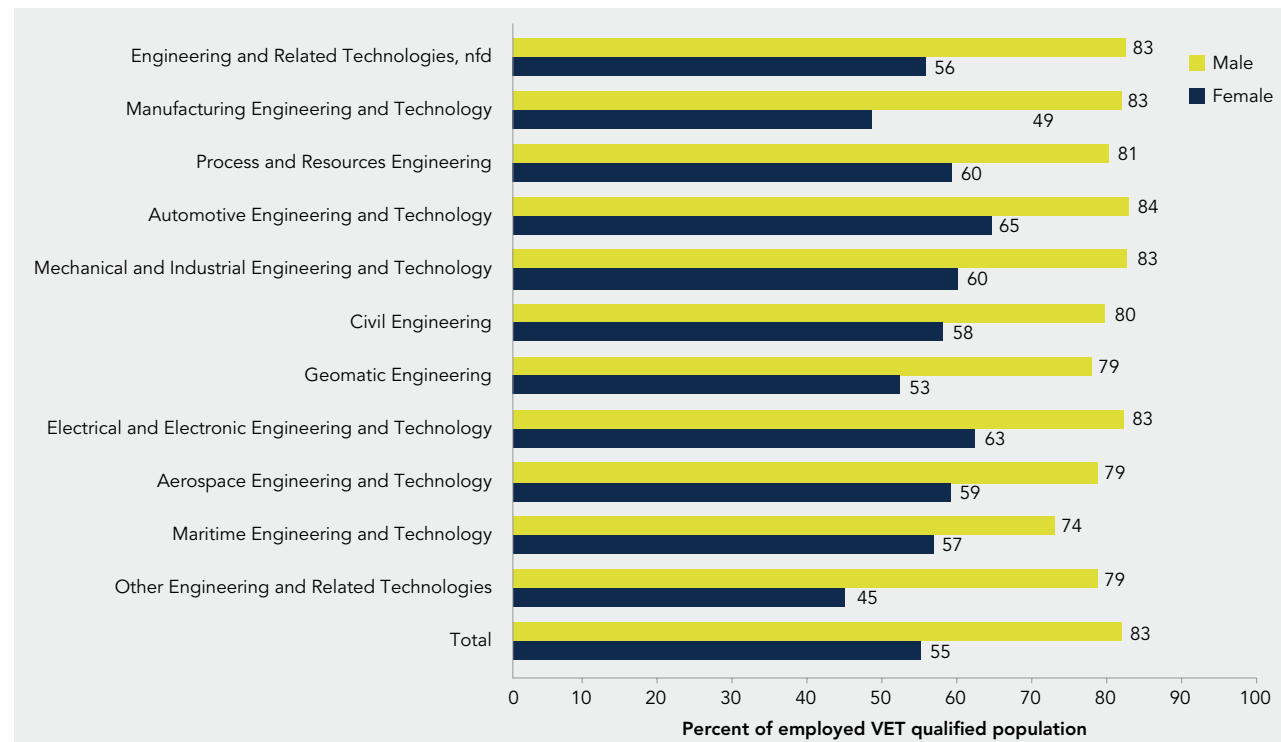
## What proportion of employed people with Engineering qualifications work full-time?

The proportion of employed people with VET Engineering qualifications who worked full-time in 2016 is shown in Figure 17.5. 83% of employed males and 55% of females with VET Engineering qualifications worked full-time. These figures were the same in 2011.

In comparison, in 2016 82% of males and 52% of females with VET STEM qualifications worked full-time (data not shown).

For VET Engineering qualified workers, the narrow STEM field of education with the highest full-time employment rate for both males (84%) and females (65%) was Automotive Engineering and Technology. The narrow fields with the lowest full-time employment rates were Maritime Engineering and Technology for males (74%) and Other Engineering and Related Technologies for females (45%).

Figure 17.5: Proportion of VET qualified people working full-time by gender and narrow field



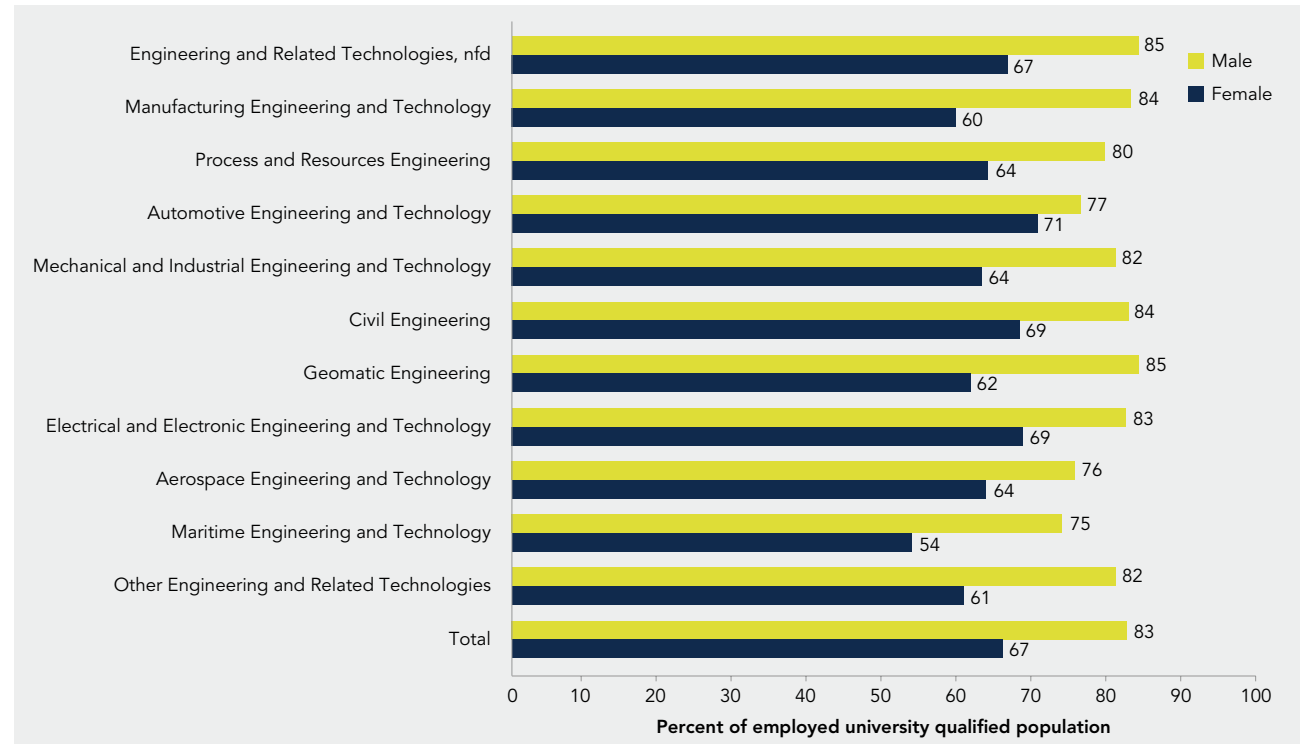


The proportion of employed people with university Engineering qualifications who worked full-time in 2016 is shown in Figure 17.6. 83% of males and 67% of females with university Engineering qualifications worked full-time. These figures show a drop from 2011, when 86% of males and 70% of females worked full-time.

In comparison, in 2016 82% of males and 60% of females with university STEM qualifications worked full-time (data not shown).

For university Engineering qualified workers, Geomatic Engineering (85%) and Engineering and Related Technologies, not further defined (85%) were the narrow STEM fields of education with the highest full-time employment rates for males, and Automotive Engineering and Technology had the highest full time employment rate for females (71%). The narrow field with the lowest full-time employment rates was Maritime Engineering and Technology for both males (75%) and females (54%).

**Figure 17.6: Proportion of university qualified people working full-time by gender and narrow field**



## Industries and occupations of the VET qualified Engineering labour force

This section analyses the employment outcomes for people with VET Engineering qualifications. The size of the labour force in each narrow field of education is shown in Figure 17.1.

## WHICH INDUSTRIES EMPLOY PEOPLE WITH VET ENGINEERING QUALIFICATIONS?

Table 17.2 shows the distribution of industry divisions of employment for people with VET Engineering qualifications across each narrow field of Engineering in 2016. In most fields of education there was a single dominant industry of employment. Across the fields of education, Manufacturing, Construction, and Transport, Postal and Warehousing were common top industries of employment. The top industries of employment for the total VET Engineering population (far right column) were Manufacturing, and Construction, each employing 18% of the working population.

Table 17.2: Industry divisions of employment of VET qualified workers by narrow field of Engineering qualification. Numbers are percentage of population. The darker the shade of blue, the higher the percentage

Industry division of employment	Narrow field of education											Total
	Engineering and Related Technologies, nfd	Manufacturing Engineering and Technology	Process and Resources Engineering	Automotive Engineering and Technology	Mechanical and Industrial Engineering and Technology	Civil Engineering	Geomatic Engineering	Electrical and Electronic Engineering and Technology	Aerospace Engineering and Technology	Maritime Engineering and Technology	Other Engineering and Related Technologies	
Agriculture, Forestry and Fishing	3	2	3	3	4	2	2	1	2	9	1	3
Mining	7	2	26	5	11	2	7	5	2	4	4	7
Manufacturing	15	40	28	8	29	5	3	9	15	15	5	18
Electricity, Gas, Water and Waste Services	2	1	1	1	3	3	3	8	1	1	2	4
Construction	11	14	7	8	15	32	13	36	3	8	6	18
Wholesale Trade	5	4	4	6	4	2	2	4	2	2	2	4
Retail Trade	8	7	6	12	3	3	3	4	3	5	3	6
Accommodation and Food Services	2	2	3	1	1	2	2	2	2	3	2	2
Transport, Postal and Warehousing	9	6	4	10	7	6	5	5	35	28	17	8
Information Media and Telecommunications	1	2	0	0	0	1	1	5	1	0	0	2
Financial and Insurance Services	1	1	0	1	0	1	1	1	1	1	1	1
Rental, Hiring and Real Estate Services	2	1	1	2	1	1	1	1	1	1	1	1
Professional, Scientific and Technical Services	6	3	4	1	3	15	30	5	4	3	1	4
Administrative and Support Services	2	3	3	2	3	3	2	2	2	3	13	3
Public Administration and Safety	6	4	3	4	4	19	19	5	19	8	27	6
Education and Training	1	2	1	1	1	1	2	1	3	2	4	1
Health Care and Social Assistance	1	3	2	1	2	1	2	2	2	2	5	2
Arts and Recreation Services	1	1	0	1	1	1	1	1	1	1	1	1
Other Services	16	3	2	32	6	1	1	6	2	3	5	11
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

## What are the occupations of people with VET Engineering qualifications?

For most narrow fields of education in Engineering, Technicians and Trade workers was the top major group occupation. In 2016, 51% of the working VET Engineering qualified population worked as Technicians and Trade Workers (Table 17.3). Three fields had other leading occupation classes—Machinery Operators and Drivers was the top occupation class for people with qualifications in Process and Resources Engineering (26% of workers qualified in this narrow field), and Professionals was the top occupation class for those with qualifications in Geomatic Engineering (46%) and Maritime Engineering and Technology (29%). The top occupation class for people with qualifications in Other Engineering and Related Technologies was Labourers (28%).

At a more detailed level of occupation, the unit group level, there was more diversity among occupations (Table 17.4). The top occupation was closely linked to each narrow field of Engineering—for example, the leading unit group occupation for those with qualifications in Electrical and Electronic Engineering and Technology was Electricians, and for those with qualifications in Automotive Engineering and Technology was Motor Mechanics.

### Occupations are classified in five levels:

- Major group (the broadest level)
- Sub-major group
- Minor group
- Unit group
- Occupation (the most detailed level)

Table 17.3: Major group occupation of VET qualified employees, by narrow field of Engineering qualification. Numbers are percentage of cohort. The darker the shade of blue, the higher the percentage

Major group occupation (1-digit level)	Narrow field of education (4-digit level)											
	Engineering and Related Technologies, nfd	Manufacturing Engineering and Technology	Process and Resources Engineering	Automotive Engineering and Technology	Mechanical and Industrial Engineering and Technology	Civil Engineering	Geomatic Engineering	Electrical and Electronic Engineering and Technology	Aerospace Engineering and Technology	Maritime Engineering and Technology	Other Engineering and Related Technologies	Total VET Engineering population
Managers	14	13	15	10	11	14	12	11	11	13	9	12
Professionals	7	4	6	2	4	11	46	6	26	29	3	6
Technicians and Trades Workers	48	41	21	53	52	26	15	65	41	22	12	51
Community and Personal Service Workers	3	4	3	2	2	3	4	2	4	4	24	3
Clerical and Administrative Workers	4	7	4	4	3	6	8	4	4	4	3	4
Sales Workers	4	6	4	5	3	3	3	3	3	3	3	4
Machinery Operators and Drivers	11	13	26	14	15	19	4	4	6	8	17	11
Labourers	8	12	22	9	10	19	7	5	4	17	28	9
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 17.4: Top unit group level occupations for VET qualified Engineering employees, by narrow field of Engineering qualification

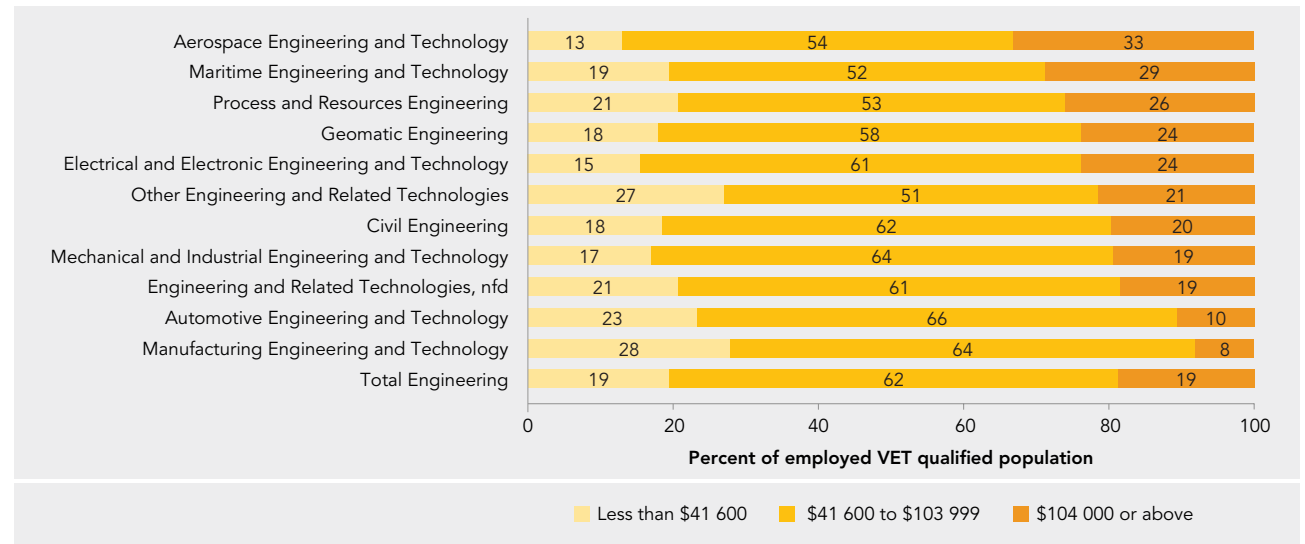
Top Unit group occupation (% of employed population)	Narrow field of education (4-digit level)										
	Engineering and Related Technologies, nfd	Manufacturing Engineering and Technology	Process and Resources Engineering	Automotive Engineering and Technology	Mechanical and Industrial Engineering and Technology	Civil Engineering	Geomatic Engineering	Electrical and Electronic Engineering and Technology	Aerospace Engineering and Technology	Maritime Engineering and Technology	Other Engineering and Related Technologies
Motor Mechanics (19)											
Cabinetmakers (15)											
Drillers, Miners and Shot Firers (10)											
Motor Mechanics (23)											
Metal Fitters and Machinists (18)											
Civil Engineering Draftspersons and Technicians (10)											
Surveyors and Spatial Scientists (37)											
Electricians (38)											
Aircraft Maintenance Engineers (32)											
Marine Transport Professionals (24)											
Fire and Emergency Workers (21)											

## What do people with VET Engineering qualifications earn?

In 2016, around two-thirds (62%) of the employed VET qualified Engineering population had an income between \$41 600 and \$103 999 (Figure 17.7). While close to one-fifth (19%) of the VET qualified Engineering population had an income of \$104 000 or above, this varied substantially across the narrow fields of Engineering. People with qualifications in Aerospace Engineering and Technology had the highest proportion of workers earning \$104 000 or above (33%), while people qualified in Manufacturing Engineering and Technology had the lowest (8%).

A higher percentage of males than females had a high income—19% of VET qualified males with Engineering qualifications earned \$104 000 or above, compared to 6% of VET qualified females (data not shown). These percentages are similar to those for the STEM qualified VET population, where 18% of males and 6% of females earned \$104 000 or above.

Figure 17.7: Income of employed VET qualified population, by narrow field of education. Data labels show percentage of each cohort



## Industries and occupations of the university qualified Engineering labour force

This section analyses the employment outcomes for people with university Engineering qualifications. The size of the population in each narrow field of education is shown in Figure 17.1.

### WHICH INDUSTRIES EMPLOY PEOPLE WITH UNIVERSITY ENGINEERING QUALIFICATIONS?

Table 17.5 shows the distribution of industry divisions of employment for people with university qualifications across each narrow field of Engineering. Nearly a quarter (24%) were employed in the Professional, Scientific and Technical Services industry division—the top division of employment for five of the 11 narrow fields of Engineering. Manufacturing, Construction, and Public Administration and Safety were also common industries of employment, employing 12%, 10%, and 8% of the university qualified cohort, respectively. While Retail Trade was the top industry of employment for people with Automotive Engineering and Technology qualifications, there were only 608 people with a university qualification in this field.

Table 17.5: Industry of employment for university qualified workers by narrow field of Engineering qualification. Numbers are percentage of each cohort. The darker the shade of blue, the higher the percentage

Industry division of employment	Narrow field of education											Total
	Engineering and Related Technologies, nfd	Manufacturing Engineering and Technology	Process and Resources Engineering	Automotive Engineering and Technology	Mechanical and Industrial Engineering and Technology	Civil Engineering	Geomatic Engineering	Electrical and Electronic Engineering and Technology	Aerospace Engineering and Technology	Maritime Engineering and Technology	Other Engineering and Related Technologies	
Agriculture, Forestry and Fishing	1	1	1	1	1	1	1	1	1	2	1	1
Mining	6	2	22	2	6	2	7	2	1	4	2	6
Manufacturing	13	23	20	16	23	4	1	10	10	12	7	12
Electricity, Gas, Water and Waste Services	5	2	3	0	3	3	2	5	1	1	5	4
Construction	10	5	3	3	8	26	9	5	2	5	4	10
Wholesale Trade	4	7	4	5	6	1	1	7	2	3	4	4
Retail Trade	4	10	4	21	5	3	2	5	4	5	4	4
Accommodation and Food Services	3	4	3	5	4	2	1	3	3	5	4	3
Transport, Postal and Warehousing	5	5	3	12	5	5	3	4	36	23	3	5
Information Media and Telecommunications	4	3	1	0	1	1	1	10	1	1	2	4
Financial and Insurance Services	3	3	2	1	2	1	1	5	2	1	2	3
Rental, Hiring and Real Estate Services	1	1	1	2	1	2	2	1	1	1	1	1
Professional, Scientific and Technical Services	26	17	16	4	18	29	45	25	9	13	24	24
Administrative and Support Services	2	3	2	4	3	2	1	2	2	3	3	2
Public Administration and Safety	8	3	4	1	4	12	17	5	16	9	14	8
Education and Training	5	5	8	2	4	3	4	5	6	3	10	5
Health Care and Social Assistance	2	4	3	2	2	1	1	3	2	5	6	2
Arts and Recreation Services	1	1	1	0	1	0	1	1	1	1	0	1
Other Services	2	3	1	19	3	1	1	2	1	2	2	2
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>



## What are the occupations of people with university Engineering qualifications?

For most narrow fields of Engineering, Professionals was the top major group occupation in 2016, representing 52% of the total university qualified population (Table 17.6). The only narrow field of education where this was not the case was in Automotive Engineering and Technology, where the leading major group occupation was Technicians and Trades Workers.

**Table 17.6: Occupation of university qualified Engineers, by narrow field of education. The darker the shade of blue, the higher the percentage**

Major group occupation (1-digit level)	Narrow field of education (4-digit level)											Total
	Engineering and Related Technologies, nfd	Manufacturing Engineering and Technology	Process and Resources Engineering	Automotive Engineering and Technology	Mechanical and Industrial Engineering and Technology	Civil Engineering	Geomatic Engineering	Electrical and Electronic Engineering and Technology	Aerospace Engineering and Technology	Maritime Engineering and Technology	Other Engineering and Related Technologies	
Managers	22	20	24	11	20	21	13	15	16	15	17	20
Professionals	54	40	47	17	41	54	70	52	53	38	52	52
Technicians and Trades Workers	7	11	7	38	13	8	5	13	9	12	9	9
Community and Personal Service Workers	2	5	3	4	3	2	2	2	4	5	5	2
Clerical and Administrative Workers	6	8	6	7	7	7	5	6	7	5	6	6
Sales Workers	3	6	3	5	4	3	2	4	4	3	3	3
Machinery Operators and Drivers	2	4	4	13	5	2	1	3	3	10	2	3
Labourers	3	6	5	7	7	4	2	5	3	13	6	4
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>102</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

At the more detailed unit group level of occupation, there was more diversity across occupations (Table 17.7). For each narrow field of education, the top unit group occupations fell under the Professional major group occupation. The only exception was for Automotive Engineering and Technology graduates, where the most common unit group occupation was Motor Mechanics—a detailed occupation under the major group Technicians and Trade Workers.

**Table 17.7: Top unit group level occupations for university qualified Engineering labour force, across the narrow fields of Engineering**

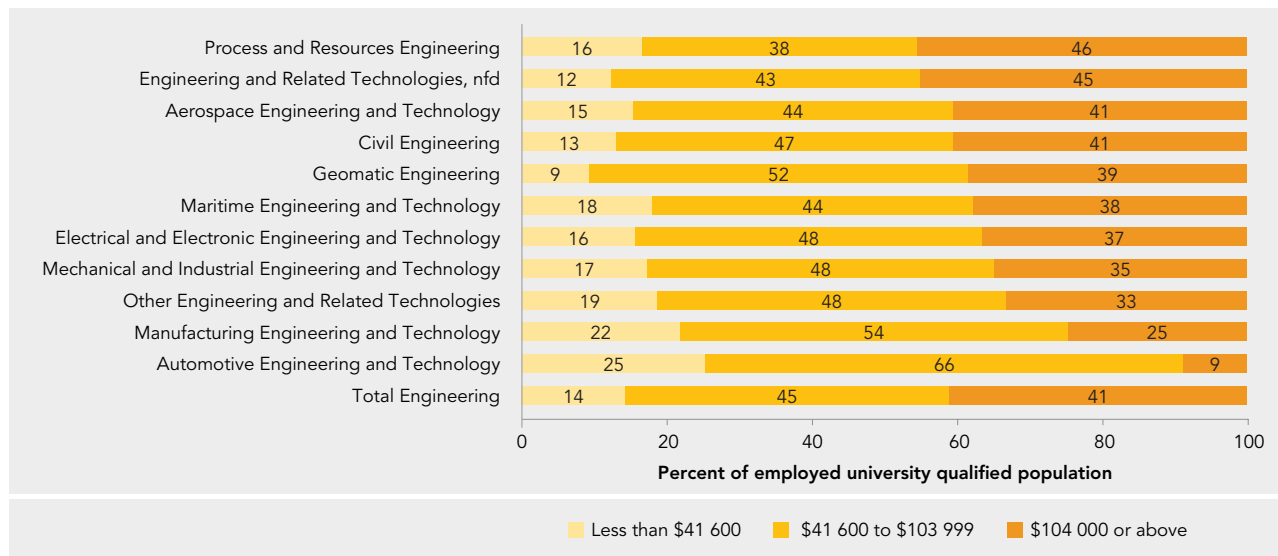
	Narrow field of education (4-digit level)										
	Engineering and Related Technologies, nfd	Manufacturing Engineering and Technology	Process and Resources Engineering	Automotive Engineering and Technology	Mechanical and Industrial Engineering and Technology	Civil Engineering	Geomatic Engineering	Electrical and Electronic Engineering and Technology	Aerospace Engineering and Technology	Maritime Engineering and Technology	Other Engineering and Related Technologies
Top Occupation (% of employed population)	Civil Engineering Professionals (11)	Industrial, Mechanical and Production Engineers (8)	Mining Engineers (11)	Motor Mechanics (28)	Industrial, Mechanical and Production Engineers (19)	Civil Engineering Professionals (41)	Surveyors and Spatial Scientists (54)	Software and Applications Programmers (12)	Air Transport Professionals (29)	Marine Transport Professionals (19)	Other Engineering Professionals (11)

## What do people with university Engineering qualifications earn?

Around two-fifths (41%) of university qualified Engineers had an income of \$104 000 or above, with a similar proportion (45%) earning between \$41 600 and \$103 999 (Figure 17.8). Of the narrow fields of education, those with qualifications in Process and Resources Engineering had the highest percentage earning an annual income of \$104 000 or above, with close to half (46%) of the cohort in this group. Automotive Engineering and Technology had the smallest proportion of people earning \$104 000 or above (9%)<sup>63</sup>, followed by Manufacturing Engineering and Technology (25%).

A greater proportion of males than females had a high income—44% of males and 24% of females with university Engineering qualifications had an income of \$104 000 or above (data not shown).

Figure 17.8: Income of employed university qualified population, by narrow field



<sup>63</sup> Note that only 608 people were qualified in Automotive Engineering and Technology at this level.

## Do people with Engineering qualifications work in “Engineering occupations”?

Although the Office of the Chief Scientist does not distinguish between STEM and non-STEM occupations, other organisations have developed classification systems that allow for more in-depth analysis of the workforce destinations of people with Engineering qualifications.

There are 358 4-digit (detailed) unit group occupations in the ANZSCO list. According to Engineers Australia, 51 of these occupations can be considered as Engineering occupations (Appendix A). These occupations require formal Engineering qualifications, the applications of Engineering skills, and attachment to the Engineering profession.

While the following analysis uses the Engineers Australia’s list of occupations (Appendix A), the population analysed in this report is not comparable with Engineers Australia research. Table 17.8 shows the population analysed in this section and the population used by Engineers Australia. The university population is used in this section to align the analysis with the rest of this report.

In this section, ‘Engineering occupations’ refers to people with university Engineering qualifications working in Engineers Australia defined Engineering occupations, and ‘Non-Engineering occupations’ refers to people with university Engineering qualifications working in any other occupation.

In 2016, the majority (63%) of people with university qualifications in Engineering worked in Engineering occupations. The cohort working as Professionals had the highest percentage of workers holding Engineering occupations (84%, Figure 17.9), followed by Managers (71%), Technician and Trades workers (41%), and Clerical and Administrative Workers (39%).

**Table 17.8: A comparison between the population analysed in this section and the population usually analysed by Engineers Australia**

Engineering population analysed in this section	Engineering population used by Engineers Australia
People with university qualifications in Engineering (bachelor degrees and above)	Professional Engineers (4-year degrees or higher)
	Engineering Technologists (3-year degrees)
	Engineering Associates (Associate degrees and Advanced Diplomas)

## Are Engineering occupations more common for graduates of some narrow fields of Engineering?

The narrow field of Engineering qualification with the highest proportions of graduates working in Engineering occupations was Civil Engineering (74%), followed by Electrical and Electronic Engineering and Technology (62%, Figure 17.10). The fields where the lowest percentage of graduates held Engineering occupations were also those with the smallest number of university graduates —Automotive Engineering and Technology (101 graduates in Engineering occupations, 18% of the population with university Automotive Engineering qualifications) and Geomatic Engineering (61 graduates, 23% of the population).

Figure 17.9: Number of employed people with university Engineering qualifications working in Engineering and non-Engineering occupations as defined by Engineers Australia, by major group occupation

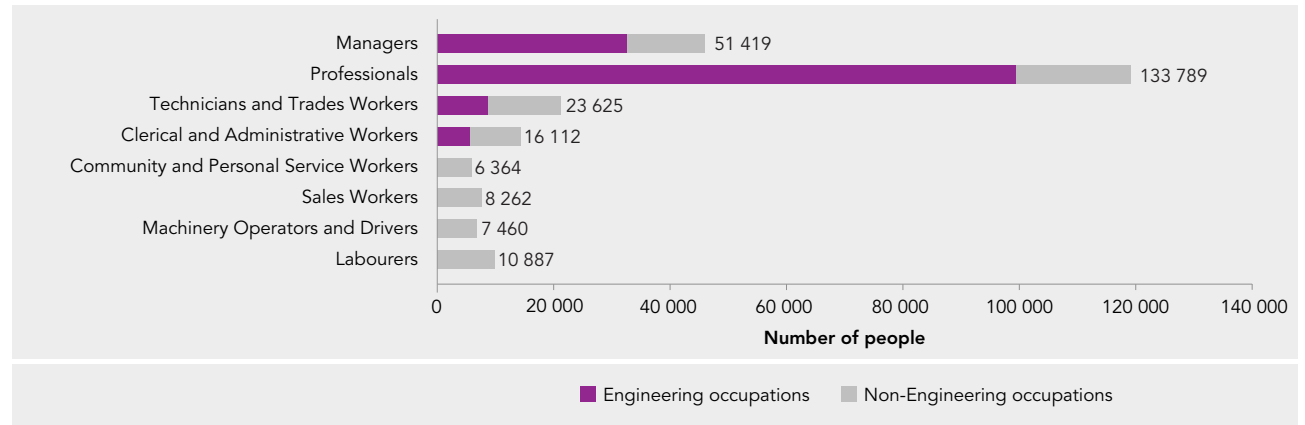


Figure 17.10: Proportion of workers with university Engineering qualifications employed in Engineers Australia defined Engineering occupations, by narrow field. Data labels show the number of workers

