

IBSA Manufacturing 2019 Industry Skills Forecasts Report Highlights



July 2019

Background

An Industry Reference Committee (IRC) *Skills Forecast and Proposed Schedule of Work* is a report that is submitted to the Australian Industry and Skills Committee (AISC). The report identifies training package development work required to meet industry needs and sets out the evidence of that need. The AISC draws on this information, to determine future training package projects, and allocates them to the AISC National Schedule.

An Industry Skills Forecast is developed for each Vocational Education and Training (VET) training package. IBSA Manufacturing supports six manufacturing Industry Reference Committees (IRCs) to produce the following Skills Forecasts:



MEA Aeroskills Training Package



MSS Sustainability Training Package



MEM Manufacturing and Engineering Training Package



MST Textiles, Clothing and Footwear Training Package



MSL Laboratory Operations Training Package



PMA Chemical, Hydrocarbons and Refining Training Package



MSM Manufacturing Training Package



PMB Plastics Rubber and Cablemaking Training Package

Note: The 2019 MSF Furnishing Industry Skills Forecast has not yet been approved.

The 2019 Industry Skills Forecasts are based on research, analysis and consultations with IRC members and industry stakeholders and provides evidence of current and emerging industry skills needs. These Industry Skills Forecasts have been endorsed by the IRC and approved by the AISC.

The Proposed Schedule of Work (2019–2020 to 2022–2023), for each training package, were developed by the IRCs, with support from IBSA Manufacturing, based on identified industry trends. The Schedules list training package priorities over the next four years, including the rationale and proposed timeframes for these activities.

This report provides the highlights for each IBSA Manufacturing Industry Skills Forecast.

MEA Aerospace Industry Skills Forecast

What is the Aerospace Industry?

The aerospace industry can be broken down into three sub-sectors:

- aircraft and aircraft parts manufacturing
- civilian aircraft repair and maintenance
- military aircraft repair and maintenance.

This industry has a key role in the Australian economy and supports growing industry sectors including tourism, protection, rescue and exports. The industry also plays a critical role in supporting regional and remote communities.

Business locations



NSW	280	SA	53
VIC	180	TAS	9
QLD	272	ACT	5
WA	98	NT	23

Source: ABS 8165.0 Counts of Australian Businesses, including Entries and Exits.

Critical Workforce Challenges and Opportunities

*'Shortages of aircraft maintenance engineers are apparent. While a large proportion of applicants are qualified and licensed (where applicable), few Licensed Aircraft Maintenance Engineers (LAME) employers can find applicants with the correct licence type or aircraft rating required for their vacancies. Employment and advertised vacancy data suggest that the demand for LAMEs has increased over the past year, while new supply through apprenticeship training is at historically low levels.'*ⁱ

With less than 10,000 aircraft engineers in Australia, the nature of the work means that any shortages can have significant impacts on safety and on other industries such as tourism and local business operations. The time it takes for new entrants to complete and gain their licences and aircraft ratings means there are virtually no quick-fix solutions.

Alignment of the Civil Aviation Safety Authority (CASA) regulatory frameworks and the national VET Quality Framework provides the opportunity to create an efficient means to train aircraft maintenance engineers and offers a long-term solution to a long-standing issue that is becoming critical. Alignment of the VET Quality Framework with the CASA regulatory framework will also create an acceptable means to train (licenced) aircraft maintenance engineers from the Indo-Asia-Pacific region.

Forecasting Skills Priorities

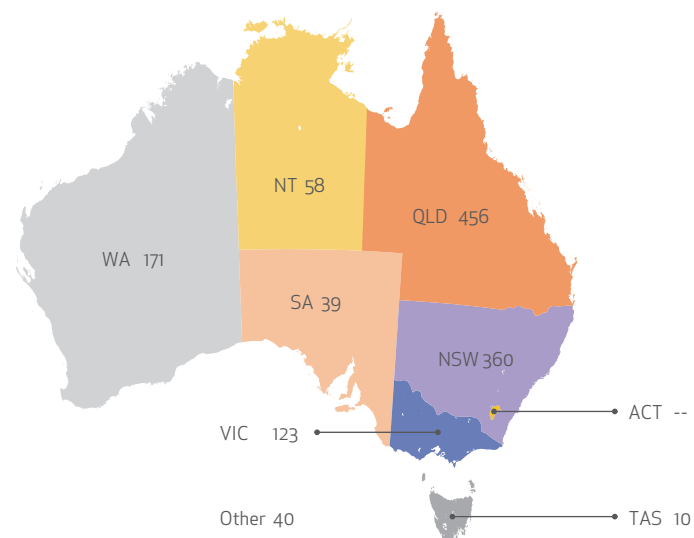
The Aerospace IRC has identified the need to review and update training components to reflect changing skill and knowledge requirements impacted by new technologies and materials; traditional repair and service; and maintenance skills. These skills will continue to be important to the ongoing maintenance of a wide range of aircraft in operation.

Training Package Priorities

The current focus of the Aerospace IRC is the completion of the 2018 Case for Change for a complete review of the MEA Aeroskills Training Package that also considers alignment of VET qualification standards to CASA licensing regulations.

Program enrolments in MEA Aeroskills qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in a MEA Aeroskills qualification was:

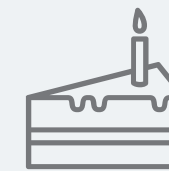


ENROLLED IN CERTIFICATE IV IN
AEROSKILLS (MECHANICAL)



STUDYING IN QUEENSLAND

IN THE 19-YEARS-AND-YOUNGER
AGE BRACKET



NOT IN AN APPRENTICESHIP
OR TRAINEESHIP



ENROLLED WITH TAFE



MALE

MEM Manufacturing and Engineering Industry Skills Forecast

What is the Manufacturing and Engineering Industry?

Manufacturing and engineering industries cover a diverse range of businesses and occupations associated with designing, making, assembling, installing, maintaining and repairing manufactured products.

The qualifications in the MEM Manufacturing and Engineering Training Package relate to the following broad sectors:

- Engineering
- Boatbuilding and Shipbuilding
- Jewellery Manufacture
- Locksmithing
- Watch and Clock Service and Repair.

Critical Workforce Challenges and Opportunities

Critical workforce challenges and opportunities facing the manufacturing and engineering industry include:

- new Defence projects, creating a significant number of jobs and demand for engineering skills for the next 50 years
- changing technology impacting the ways in which work is conducted, providing new business opportunities, increasing business efficiency and productivity and driving a need for new skills and new combinations of skills
- changing business models that are shifting the focus from the manufacture of discrete products to the provision of integrated service-product bundles and an increasing focus on niche markets and the production of bespoke, high-quality products
- an increasing focus on the sustainability of products and business practices
- skill shortages in several occupations (locksmiths, Sheetmetal trades workers and structural steel and welding trades workers) and recruitment difficulties regarding STEM skills, automation, big data and artificial intelligence
- a lack of leadership and management skills in the workforce
- challenges in attracting new, highly capable entrants to the workforce.

Forecasting Skills Priorities

These workforce challenges and opportunities have implications for skill development priorities, including:

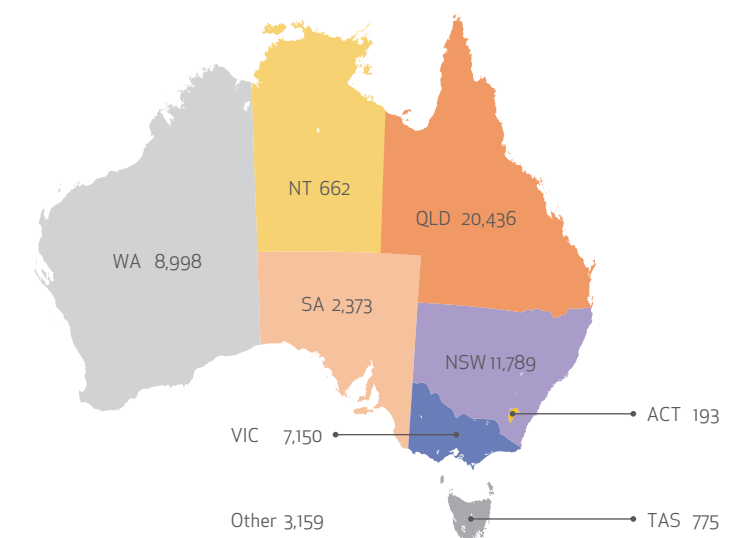
- technician skills
- Non-Destructive Testing (NDT)
- planning, scheduling, logistics and supply chain management
- maintenance and diagnostics skills
- mechatronics
- design and drafting skills
- computer-aided manufacturing
- additive manufacturing
- industrial instrumentation
- composite materials
- business skills
- generic skills, including maths and problem-solving
- operation of drones and AI mobile machinery
- electroplating
- hydraulic hose fabrication.

Training Package Priorities

The priority identified as important and proposed for 2019–2020 is to address skill needs arising from new and converging technologies, including Non-Destructive Testing (NDT); planning, scheduling, logistics and supply chain management; maintenance and diagnostic skills; new diploma to cover the skills associated with the emerging technologies and applications; covering skills in emerging technologies mechatronics; and design and drafting skills.

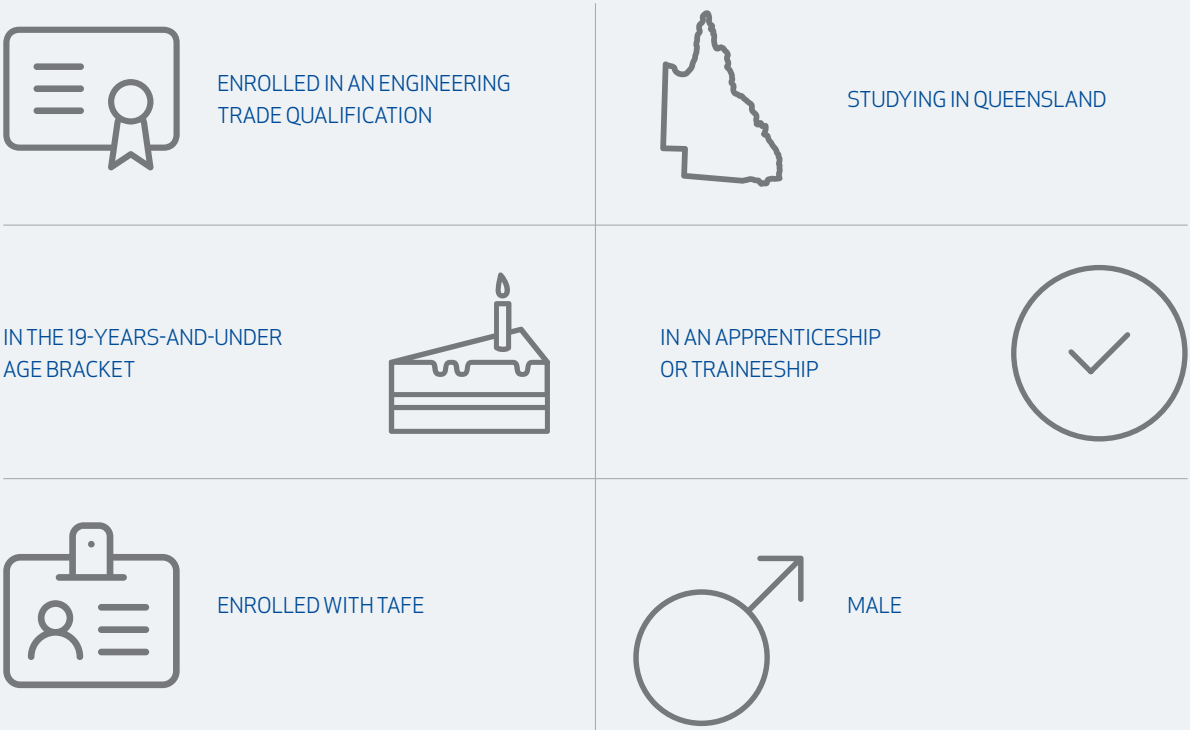
Program enrolments in MEM Manufacturing and Engineering qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in a MEM Manufacturing and Engineering qualification was:



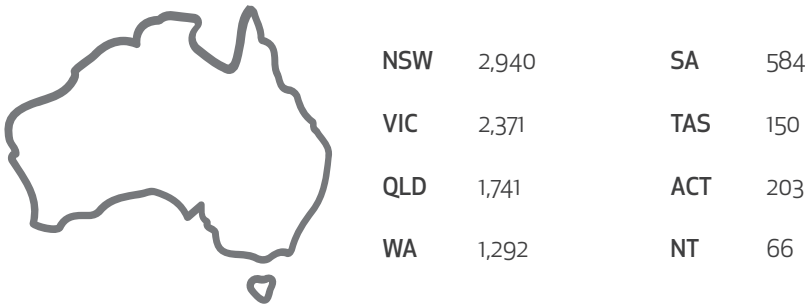
MSL Laboratory Operations
Industry Skills Forecast

What is the Laboratory Operations Industry?

Laboratory operations is not a discrete industry. It covers a wide range of industries such as agriculture, biotechnology, construction, educational support laboratories, environmental management, food, health, manufacturing and mining. Laboratory operations occupations include those involved in testing, laboratory work and sampling. These occupations are characterised by their focus on non-professional technical and scientific skills.

Laboratory services are critical in ensuring the safety, quality and compliance of many Australian businesses and industries. As a consequence, this work is heavily regulated and subject to compliance with both international and Australian standards, as well as Commonwealth and State regulations.

Business locations



Source: ABS 8165.0 Counts of Australian Businesses, including Entries and Exits.

Critical Workforce Challenges and Opportunities

Increasingly, employers are describing robotics and automation as imperatives for their businesses. Due to the likelihood that most manual processes will eventually be automated, employers are looking for laboratory services technicians, who are comfortable and practised in their use of automation. These workers will require higher skill levels to maximise the use of new technology.

Other industry challenges include:

- Laboratories in the mining industry are challenged to provide a high standard of service, while managing an increased workload, and retaining a sufficient number of skilled workers.
- Within the gold industry, there is an increased demand for onsite laboratories and technicians with wet chemistry and metallurgical assay experience.
- Changes in Point of Care Testing (PoCT) and the significant opportunities that lie ahead for clinicians and patients, especially those with chronic conditions and those living in remote and rural areas.
- The increase of synthetic biology will generate a demand for specialist skills and will be linked to the expansion/ investment in biofoundries: an integration of biology with software and hardware systems.

Forecasting Skills Priorities

Future skills priorities are emerging in the pathology sector, specifically in relation to PoCT and surgical cut-up skills, being driven by job role changes and increasing complexity in the workplace; and genetic and molecular testing an emerging and important field.

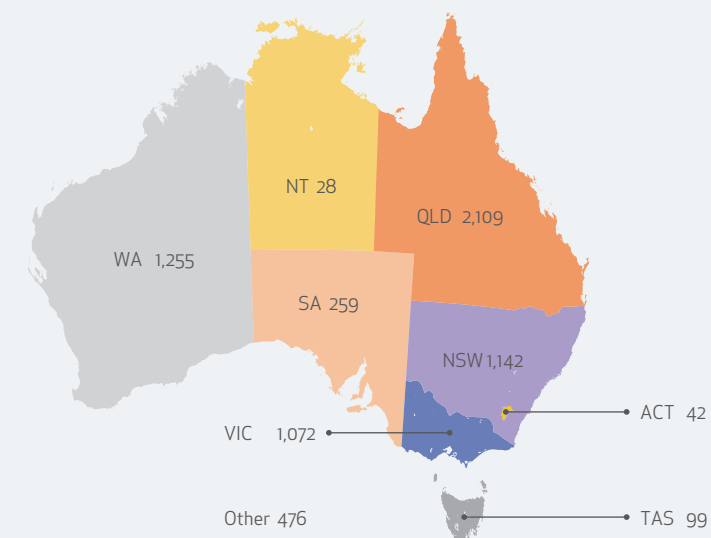
Outside the pathology sector, foodtesting skills is an issue that is emerging to ensure compliance with current health and safety standards and quality standards in the food processing industry. Metallurgical skills are also changing, and the need for the development of a skill set focused on gravity separation, flotation, hydrometallurgy (leaching, salt roasting solution refining, solvent extraction, ion exchange resin, precipitation) has been raised by some in the mining industry and warrants further consideration.

Training Package Priorities

In response to current and emerging skills needs, the item identified by the Process Manufacturing, Recreational Vehicle and Laboratory IRC as critical and proposed for inclusion as a priority for the 2019–2020 Proposed Schedule of Work is the creation of a skillset for pathology workers involved in PoCT. PoCT is an area of high growth in the pathology sector and one that continues to evolve. Large public health systems and small community facilities are all seeking the development of a specific skillset for PoCT to improve the availability and timeliness of health services.

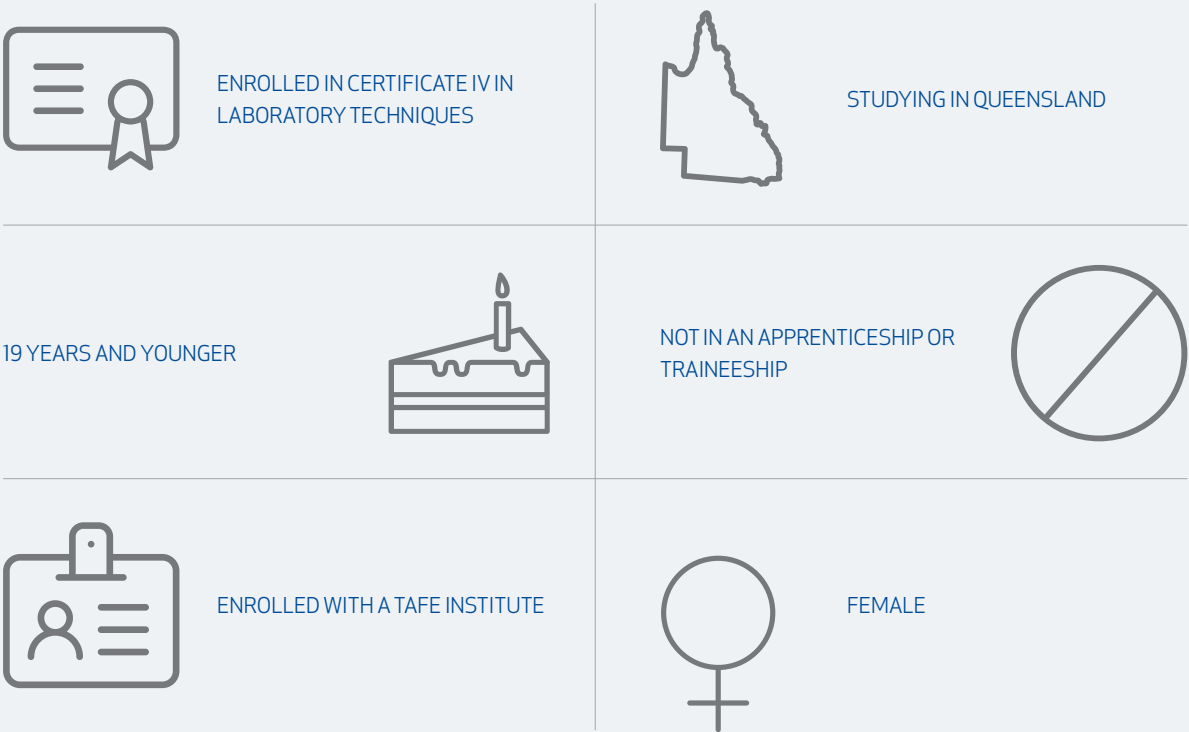
Program enrolments in MSL Laboratory Operations qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in an MSL Laboratory Operations qualification was:



MSM Manufacturing Industry Skills Forecast

What are the Process Manufacturing and Recreational Vehicle Industries?

The process manufacturing sector is involved in the production of goods that are manufactured in bulk quantities from raw materials, as opposed to products manufactured from parts. Process-manufactured goods include food, beverages, refined oil, gasoline, pharmaceuticals, medical technologies, chemicals and plastics. The process manufacturing qualifications in the MSM Manufacturing Training Package are deliberately generic and have been designed to support the work of people in production support roles, rather than in the manufacture of specific goods.

The recreational vehicle sector includes the manufacture of motor homes, caravans, camper trailers, slide-on campers and fifth wheelers. The relevant qualifications in the MSM Manufacturing Training Package covers the three aspects of the recreational vehicle sector: recreational vehicle manufacture; recreational vehicle service and repair; and recreational vehicle and accessories retailing.

The MSM Manufacturing Training Package also includes qualifications and skill sets related to a range of other manufacturing sectors, including the following:

- Surface preparation and coating – specialises in preparing metal surfaces and applying a coating that increases its durability and protection against rust.
- Manufactured mineral products – uses minerals extracted from the earth to produce a range of products used in the building and construction, civil construction, heavy industry, automotive and landscaping industries.
- Fenestration – the manufacture of windows and doors.

Critical Workforce Challenges and Opportunities

Critical workforce challenges and opportunities facing the process manufacturing and recreational vehicle industries include:

- legislative changes in relation to Road Vehicle Standards and Measurement Law
- impacts of changing technology upon skill demands, job roles and work practices
- demand for sustainable products and sustainable business practices
- challenges in attracting and recruiting workers in the recreational vehicle sector, creating shortages of skilled labour.

Forecasting Skills Priorities

Workforce challenges and opportunities have implications for skill development priorities, including:

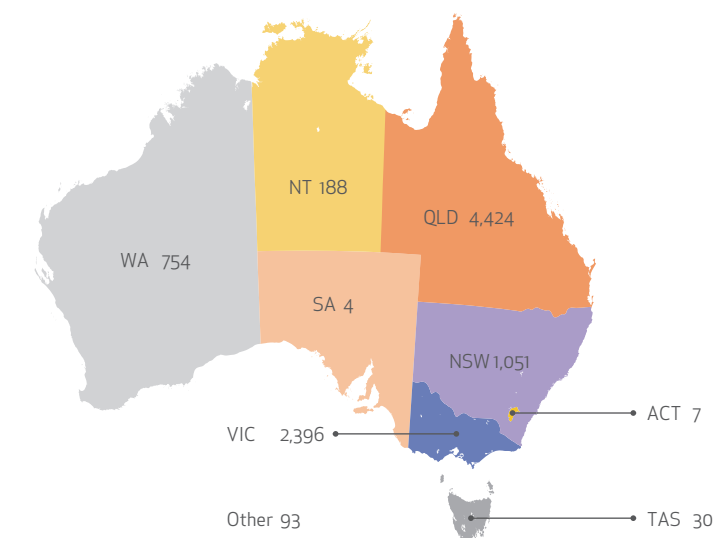
- increased product safety standards to be met in the manufacture of recreational vehicles
- needed to meet changes in technology and advanced manufacturing processes
- potential changes to job roles in trade measurement inspection and verification
- emerging job roles related to the use of high-pressure water jetting and vacuuming.

Training Package Priorities

The priority identified by the Process Manufacturing, Recreational Vehicle and Laboratory IRC as important and proposed for completion in 2019–2020 is the review of recreational vehicle qualifications to reflect requirements of the upcoming Road Vehicle Standards Act (RVSA), to ensure currency in relation to any new trends and changes in practice in the sector and to consider whether there is a need for inclusion of business skills within recreational vehicle qualifications.

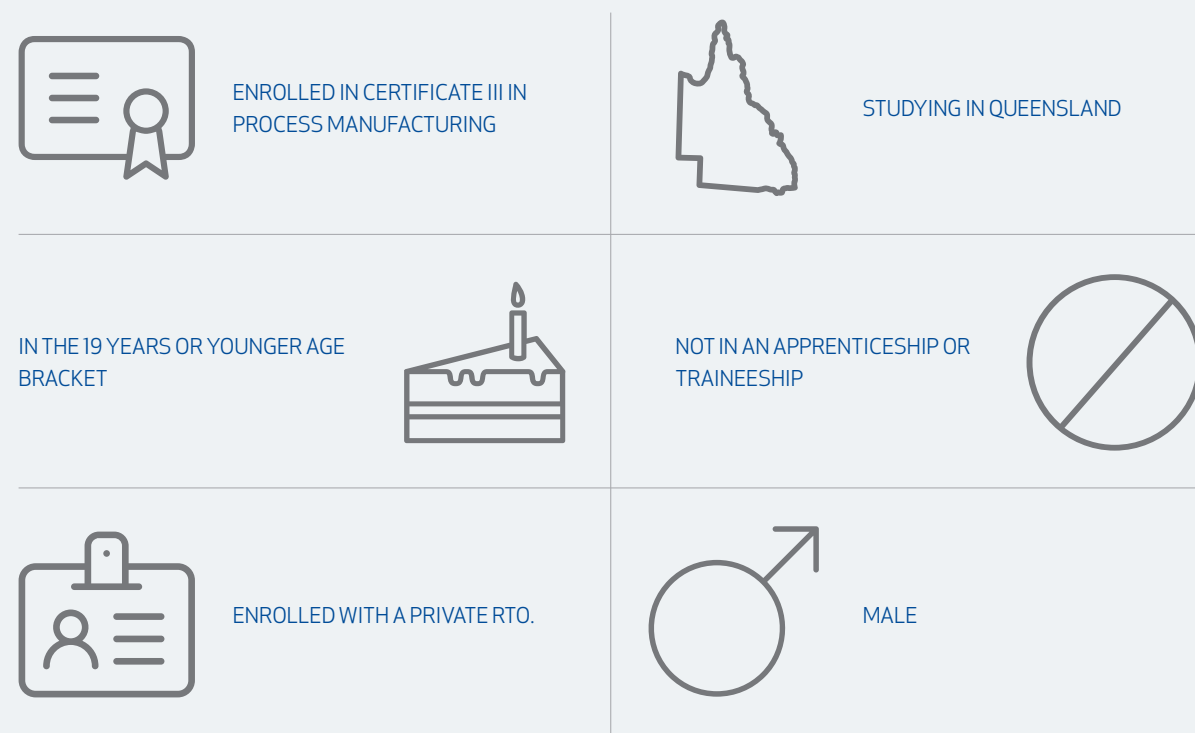
Program enrolments in MSM Manufacturing qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in an MSM Manufacturing qualification was:



MSS Sustainability Industry Skills Forecast

What is the Sustainability Industry?

Sustainability underpins or comprises work across a very broad range of industries, making these skills very much cross sectoral in nature. Three core elements, economic growth, social inclusion and environmental protection, form the foundation of the philosophy and social science of sustainability. It underpins the United Nations Sustainable Development Goalsⁱⁱ and various national and international standards and certification schemes, as well as provides a basis for tackling core global challenges such as climate change, water scarcity, waste management, diversity and inclusion, human rights and modern slavery and the future of work.

Sustainability skills enable businesses across all industries to not only measure, monitor and improve financial/ economic performance, but also to measure and monitor social and environmental/ecological performance, to improve the value generated by the organisation.

There are three distinct streams within the MSS Sustainability Training Package which focus on separate functional areas: Sustainable Operations, Competitive Systems and Practices and Environmental Monitoring and Technology.

Critical Workforce Challenges and Opportunities

Critical workforce challenges and opportunities relating to the MSS Sustainability Training Package include:

- the rise of the 'circular economy'
- concerns by businesses around energy costs and energy security and major projects in renewable energy
- technology changes, particularly in relation to monitoring, automation and digitalisation
- increasing focus on advanced manufacturing and sustainable manufacturing
- the emergence of new business models in which products are bundled with ongoing services
- increasing employer and learner demand for smaller 'chunks' of learning as a means of upskilling, and for the development of generic skills, including STEM skills.

Forecasting Skills Priorities

These workforce challenges and opportunities have implications for skill needs, which have informed the following skill development priorities:

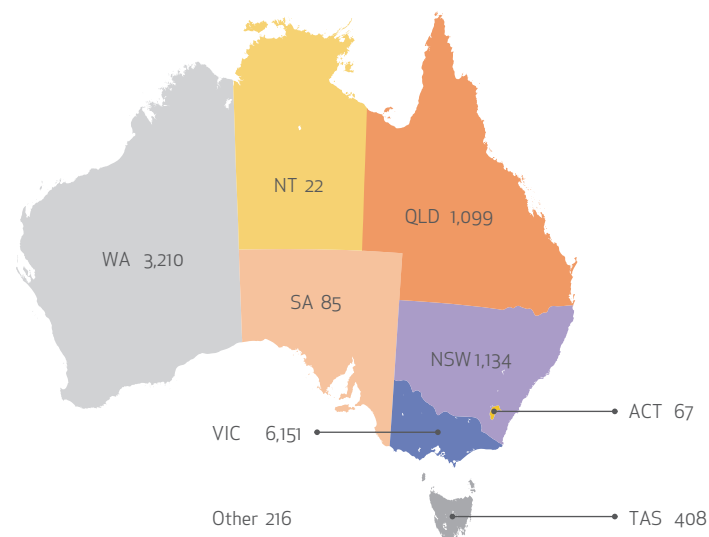
- energy management, use and procurement
- upskilling in specific elements of competitive systems and practices
- skills to meet emerging technological changes
- skills to address emerging job roles in environmental monitoring and technology
- generic skills, such as problem solving, design thinking, leadership, change management and innovation management.

Training Package Priorities

The priority identified as important and proposed for 2019–2020 is to review the fitness for purpose of Competitive Systems and Practices qualifications in meeting workforce upskilling demands and emerging technological changes, as well as to consider the development of skill sets in Competitive Systems and Practices. The proposed changes aim to enable skilled workers to implement specific initiatives and practices including 5S and Kaizen, as well as the removal of duplicate units.

Program enrolments in MSS Sustainability qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in an MSS Sustainability qualification was:



MST Textiles, Clothing and Footwear Industry Skills Forecast

What is the Textiles, Clothing and Footwear Industry?

The Textiles, Clothing and Footwear (TCF) industry is grouped into three broad areas:

- 1 Textile Processing and Manufacturing: covering processing of natural (wool, cotton and leather) and synthetic materials such as polyvinyl chloride (PVC) and shade cloth
- 2 TCF Production: covering production of clothing, textiles, footwear, leather goods and technical textiles
- 3 TCF Services: covering provision of services including fashion and textile design, dry cleaning operations, laundry operations and clothing and footwear repairs.

The industry is subject to global economic trends, including competition from cheaper imports and the impact of offshoring manufacturing processes. In Australia, the TCF industry revenue for 2017 is estimated to be \$13.2b.ⁱⁱⁱ

\$13.2b	TCF Industry Revenue
\$4.6b ^{iv}	Textile (processing and manufacturing)
\$4.9b ^v	TCF (production)
\$3.7b ^{vi}	TCF (services)

Critical Workforce Challenges and Opportunities

The TCF industry contains diverse sectors with differing workforce development challenges and future opportunities. Traditional TCF manufacturing has largely been replaced by sophisticated manufacturers offshoring all or some production work and local boutique manufacturers carving out niche and specialised market segments. TCF services businesses are not as directly impacted by import competition but businesses in the Laundry and Dry Cleaning Services sector have experienced ongoing consolidation by big players and resulting pricing pressures.

TCF businesses are also facing challenges associated with an ageing workforce, the introduction of new technologies and business models, changing consumer behaviour and environmental and ethical concerns. However, there are also opportunities for businesses that can access workers with appropriate skills.

Vocational Education and Training (VET) for the TCF industry needs to build advanced technical skills to support quality craftsmanship, as well as the broader science, technology, engineering and mathematics (STEM) and technological skills to capitalise on new ways of working.

Forecasting Skills Priorities

These workforce challenges and opportunities have implications for skill needs, which have informed the following skill development priorities:

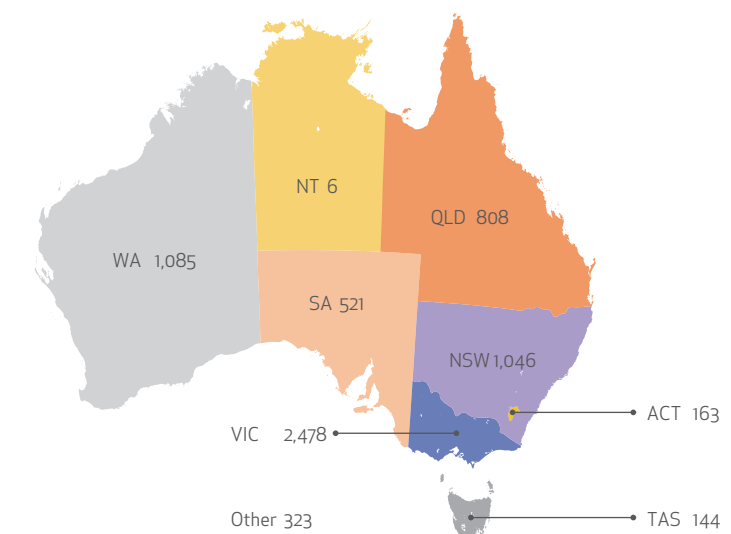
- ethical sourcing and supply chain management
- consumer engagement and marketing through social media
- intellectual property and copyright, standards and compliance
- industrial sewing transferable skills
- advanced pattern making
- repairs and alterations for mass-produced garments and textiles
- new technology skills, including:
 - CAD, laser cutting, and 3D prototyping
 - working with performance textiles
 - Radio Frequency Identification (RFID).

Training Package Priorities

The priority identified by the Textiles, Clothing and Footwear IRC as critical and proposed for completion in 2019–2020 is the creation of a new Industrial Sewing skill set that will support the development of transferable, entry-level skills allowing workforce mobility across a range of TCF industry sectors.

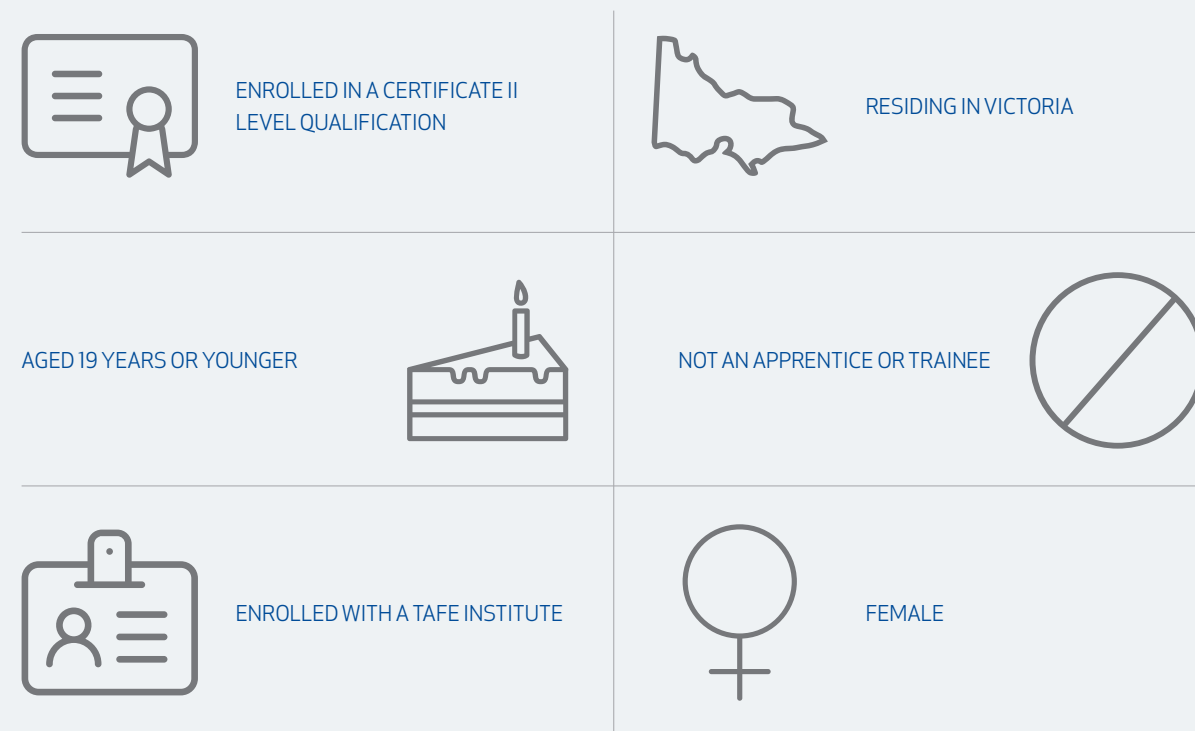
Program enrolments in MST Textiles, Clothing and Footwear qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in an MST Textiles, Clothing and Footwear qualification was:



PMA Chemical, Hydrocarbons and Refining Industry Skills Forecast

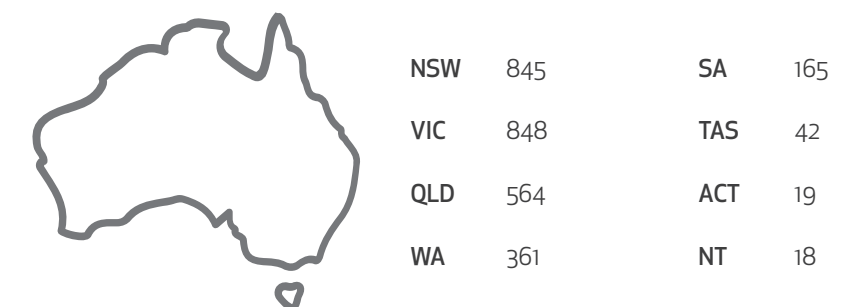
What are the Chemical, Hydrocarbons and Refining Industries?

The chemical, hydrocarbons and refining (CHR) industry sectors cover the production of chemicals, petroleum, coal products, and metals product manufacturing and refining.^{vii} Although the industry covers three distinct sub-sectors, some jobs and skills have crossover between the sectors.

Revenues earned from the CHR industry are dominated by the oil and gas extraction sector. Oil and gas contributed 33% of total industry revenue in 2017–2018.^{viii} This sector is experiencing strong growth, which is anticipated to continue through to 2023. In states like Queensland, coal seam gas is becoming increasingly important.^{ix} In terms of business numbers, the iron smelting and steel manufacturing businesses are the most numerous (40% of the 2,852 businesses in the CHR sector).

All sectors of the industry are subject to stringent government regulations.

Business locations



Source: ABS 8165.0 Counts of Australian Businesses, including Entries and Exits.

Critical Workforce Challenges and Opportunities

Most industry sub-sectors are defined as being either mature or facing challenges. The industry is trade exposed and subject to global economic trends, including the impact of overseas competition and cheaper imports, international companies moving production offshore based on global decisions, continued uncertainty of energy pricing (especially on Australia's Eastern seaboard) and customers increasingly seeking green/environmentally friendly products.

Further challenges and opportunities include:

- The growing use of remote operations in the oil and gas sector.
- Job opportunities are emerging for workers displaced by automation in other parts of the manufacturing sector; although, workers with specific experience and/or defined skills may not transition easily into sectors requiring new competencies.^x
- CHR workers (along with other workers in the broader manufacturing sector) are ageing, e.g. plant operators are on average 46.5 years old. This creates further workforce challenges.^{xi}
- The Liquefied Natural Gas (LNG) industry sub-sector is growing and continues to provide future opportunities for skilled workers, especially in Western Australia.

Forecasting Skills Priorities

The level of government regulation in the sector means that there is a high degree of training undertaken right across the CHR industry. Future priorities for the sector and its skills needs will include:

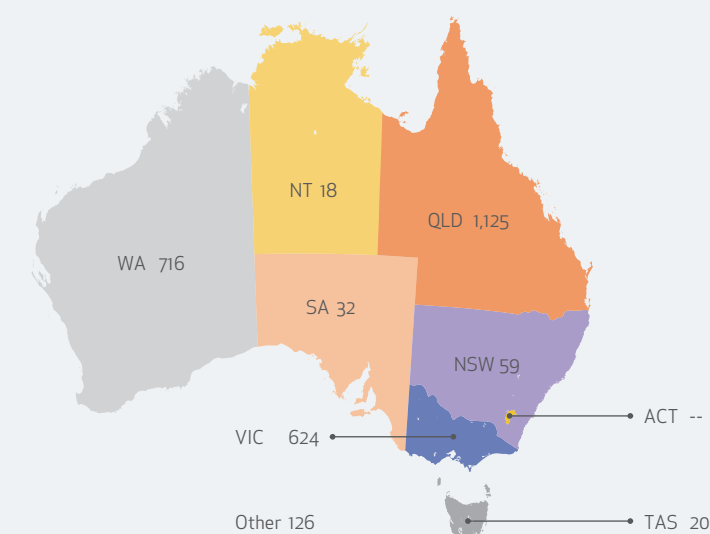
- a review of training package content, focusing on the two higher level qualifications in Process Plant Technology
- training for new industry entrants on: automation, troubleshooting, identifying, monitoring and understanding
- the importance of '5 whys', process safety, data analytics and productivity skills.

Training Package Priorities

The current priority for the PMA Chemical, Hydrocarbons and Refining Training Package is the completion of the Chemical, Hydrocarbons and Refining 2017 project. This project includes the redevelopment of three qualifications to ensure they align to current job role requirements in the Liquefied Natural Gas (LNG) Framework agreed by industry in late 2018.

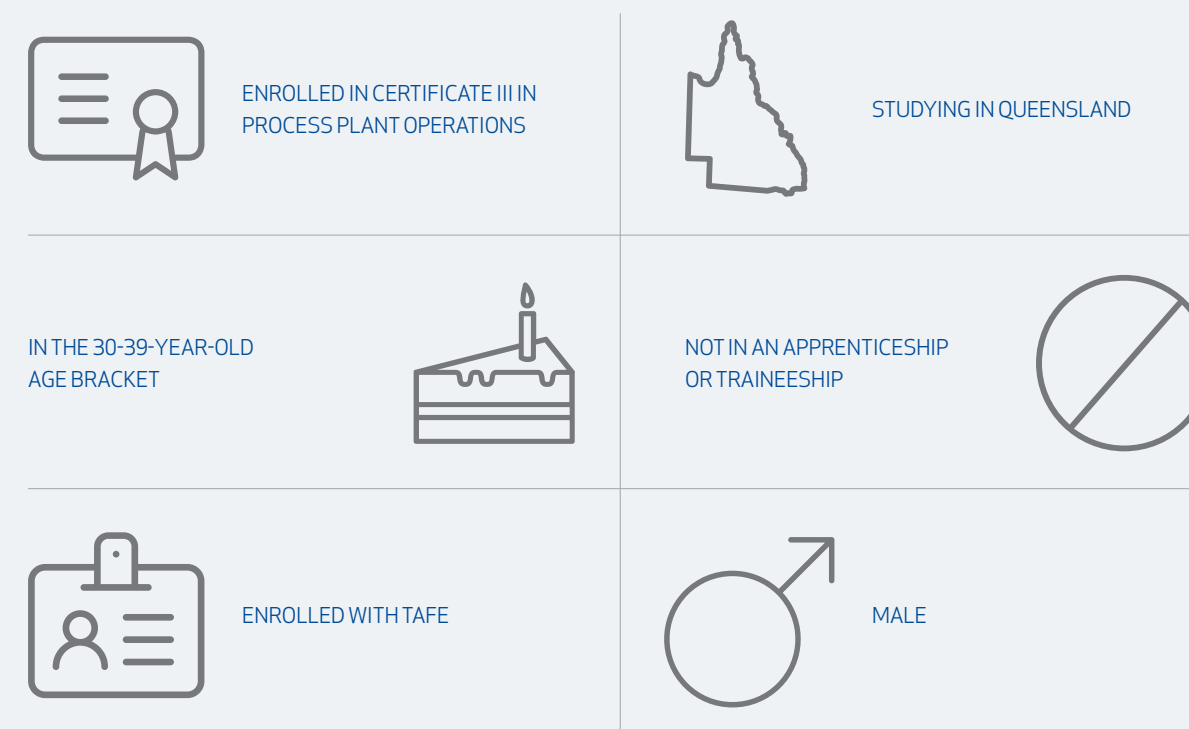
Program enrolments in PMA Chemical, Hydrocarbons and Refining qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in a PMA Chemical, Hydrocarbons and Refining qualification was:



PMB Plastics, Rubber and Cablemaking Industry Skills Forecast

What are the Plastics, Rubber and Cablemaking Industries?

Plastic, Rubber and Cablemaking (PRC) manufacturers in Australia typically make one of two different types of products:

- high volume, lower cost, standardised products (for the building and medical industry and in the production of items like plastic packaging, e.g. plastic bottles and recyclable plastic bags)
- low volume, higher cost, niche products with a high degree of technical specificity (often supplying to the electrical and mining sectors).

The most significant sub-sector within the industry is plastics, which comprises almost nine out of every ten businesses in the sector. There are many sub-sectors that manufacture plastics, due to its versatility, durability and low cost compared to products from alternative material.^{xii} These sub-sectors include: key items manufactured using polymer films and sheets; polymer filler products; and fibreglass products.

In the cablemaking sector, companies manufacture fibre optic cables rather than, or in addition to, electric or telephone cable, wire or strip. Fibre optic is now the preferred method for network communication. As well as being used for internet and telephone transmission, a range of other industries such as medical surgery, dentistry, lighting decorations and illuminations have all benefitted from the technology.

Looking across the sector, businesses involved in higher volume production are under significant threat from lower cost imports. In addition, many businesses are being impacted by technological change and are looking to introduce new technologies to deal with competition. Electricity costs are a significant cost driver.

Critical Workforce Challenges and Opportunities

Technological advances in the PRC industry have been rapid. Stakeholders have acknowledged that there continues to be a need for language, literacy and numeracy (LLN) skills within their current and future workforces.

In October 2018, the European Union agreed to ban the ten most prevalent 'single use' plastic items by 2021 and agreement was also reached that 90% of plastic bottles would be recycled by 2025.^{xiii} While these changes still need to be enacted by individual parliaments and there have been no similar moves yet in Australia, it is clear that the plastics industry will need a clear and ongoing focus on environmental issues.

Forecasting Skills Priorities

Training enrolments have declined dramatically since 2014; however, industry stakeholders are confident that with a new PMB Plastics, Rubber and Cablemaking Training Package, new skills will enhance workers' capabilities and the industry will benefit from training that is work-appropriate.

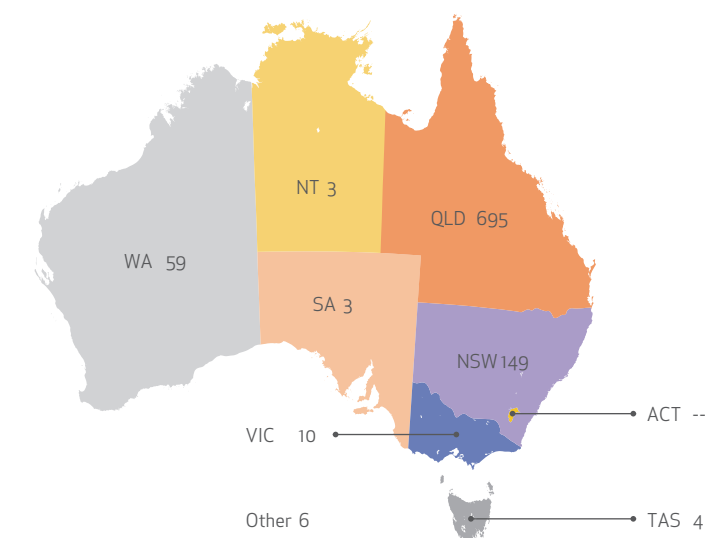
Stakeholders have indicated that declining enrolments in the PMB Plastics, Rubber and Cablemaking Training Package are due to the composition of the units of competency and qualifications no longer being relevant to meet the needs of industry. The work underway on the *Skills for the Polymer Industry* project is intended to allow for skills priorities to be identified and addressed.

Training Package Priorities

Due to the work underway on the *Skills for the Polymer Industry* project, which involves the redevelopment of all qualifications and units in the PMB Plastics, Rubber and Cablemaking Training Package, the Process Manufacturing, Recreational Vehicle and Laboratory IRC has agreed that a Proposed Schedule of Work not be submitted in the 2019 Industry Skills Forecast.

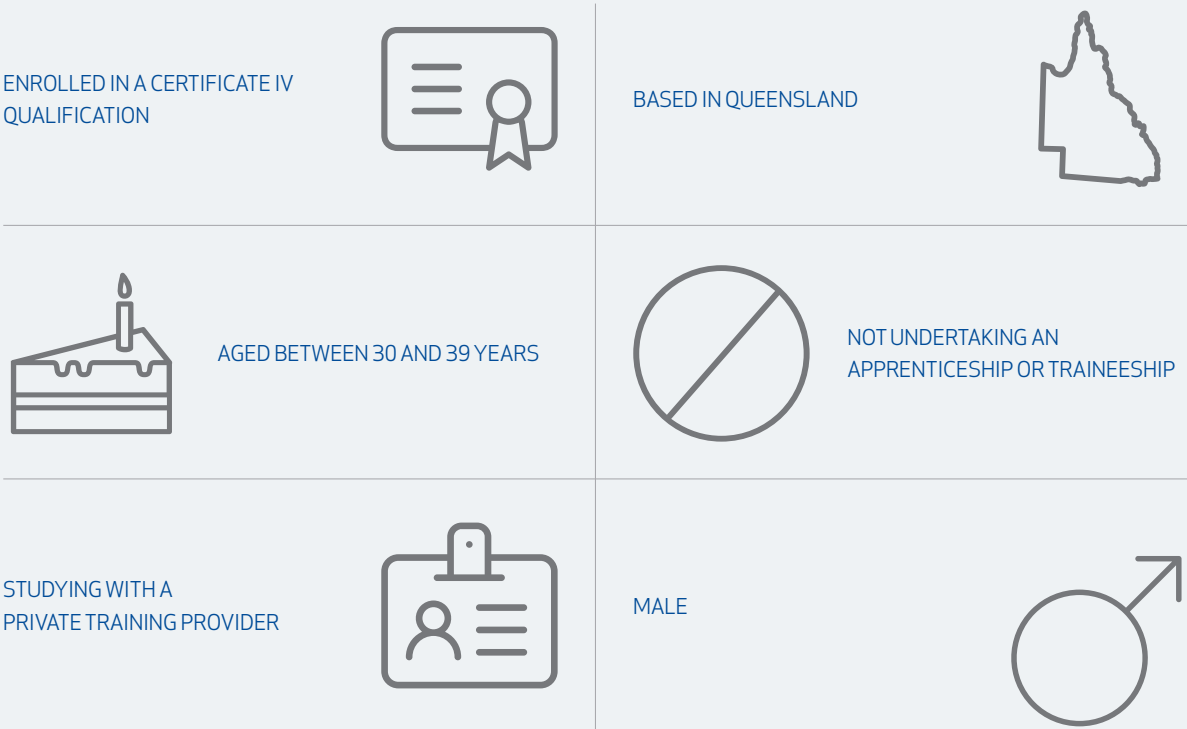
Program enrolments in PMB Plastics, Rubber and Cablemaking qualifications by state/territory of student residence

2017 Total VET Activity



Learner Training Profile

In 2017, the typical learner enrolled in a PMB Plastics, Rubber and Cablemaking qualification was:



End notes

i Department of Jobs and Small Business, Occupational reports – Engineering trades, ANZSCO 2131–11, 12 Aircraft Maintenance Engineers, March 2018.

ii United Sustainable Development Goals, <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

iii Revenue aggregate from IBISWorld Industry Reports A0521, C1310, C1320, C1331, C1332, C1333, C1340, C1351A, C1351B, C1351C, C1351D, C1352, M6924, S9491 and S9531.

iv Industry group figure compiled from 2018 IBISWorld Industry Reports for A0521 Cotton Ginning (p. 3), C1310 Synthetic and Natural Textile Manufacturing (p. 3), C1320 Leather and Leather Substitute Product Manufacturing (p. 3), C1331 Carpet and Textile Floor Covering Manufacturing (p. 3), C1332 Rope Cordage and Twine Manufacturing (p. 4).

v This figure does not include data for businesses in ANZSIC code 1334 Textile Finishing and Other Textile Product Manufacturing. The industry group is figure compiled from 2018 IBISWorld Industry Reports for C1333 Cut and Sewn Textile Product Manufacturing (p. 4), C1340 Knitted Product Manufacturing (p. 3), C1351A Men's and Boys' Wear Manufacturing (p. 3), C1351B Women's and Girls' Wear Manufacturing (p. 3), C1351C Sleepwear, Underwear and Infant Clothing Manufacturing (p. 4), C1351D Tailoring and Clothing Accessories Manufacturing (p. 4), C1352 Footwear Manufacturing (p. 3).

vi Industry group figure compiled from 2018 IBISWorld Industry Reports for M6924 Specialised Design Services (p. 14), S9491 Clothing and Footwear Repair (p. 3), S9531 Laundry and Dry-Cleaning Services (p. 4).

vii Australian Apprenticeships Pathways, Industry Information, <https://www.aapathways.com.au/industries/chemical-hydrocarbons-and-refining>, accessed on 30 September 2018.

viii Ibid.

ix <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Demand-Forecasts/Electricity-Forecasting-Insights/2017-Electricity-Forecasting-Insights/Key-component-consumption-forecasts/Business-consumption/CSG>

x Dr Tanya Carney and Dr Jim Stafford, Advanced Skills for Advanced Manufacturing: Rebuilding Vocational Training in a Transforming Industry (Australia: The Centre for Future Work at the Australia Institute, June 2018) p 10.

xi Australian Government, Job Outlook, <https://joboutlook.gov.au/occupation.aspx?code=3992>, accessed on 5 October 2018.

xii World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, The New Plastics Economy – Rethinking the future of plastics (2016, <http://www.ellenmacarthurfoundation.org/publications>), p 24.

xiii <https://www.thecourier.com.au/story/5721330/eu-moves-to-ban-10-single-use-plastics/?cs=10230>

Acknowledgements

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www.ibsa.org.au

manufacturing@ibsa.org.au

Level 11, 176 Wellington Parade
East Melbourne, Victoria, 3002

Call (03) 9815 7099