VSC Victorian Skills Commissioner

Sector Snapshot

Victoria's Metals and Equipment Manufacturing Sector

January 2021

This document provides a snapshot of skills demand for the metals and equipment manufacturing sector in Victoria. For the purposes of this snapshot, the metals and equipment manufacturing sector includes those involved in primary and fabricated metal product manufacturing, equipment manufacturing and transport equipment manufacturing.

VICTORIA
State Government

Foreword

This document provides a snapshot of skills demand for the metals and equipment manufacturing sector in Victoria. For the purposes of this snapshot, the metals and equipment manufacturing sector includes those involved in primary and fabricated metal product manufacturing, equipment manufacturing and transport equipment manufacturing. This snapshot provides a genuine understanding of the current and future (1-3 year horizon) skills and training requirements of the sector, with a focus on the element of the workforce using VET courses and their career pathways. It also considers the impact of the COVID-19 pandemic on the future jobs and skilling needs of the sector.

The success of this work relied on insights from experienced employers within this sector to provide a sector-wide view of skills requirements and workforce challenges. A small representative group of employers, spanning a range of services and market segments, were engaged in an employer roundtable to develop this snapshot. Insights from public data on the metals and equipment manufacturing sector were presented and validated with participants.

The roundtable provided the opportunity for metals and equipment manufacturing employers to input their view of priorities and requirements from the VET system in addressing sector skills issues. As such, this presents a picture of the demand side of the training market. This snapshot can be used by TAFE and training providers to better understand the metals and equipment manufacturing sector's priorities in terms of occupation and skill demand to ensure the supply side responds appropriately to VET opportunities.

The Victorian VET system aims to deliver 'real training for real jobs' by providing up to date training for new challenges in the sector. This report is part of a series of sector snapshots which are being developed by the Office of the Victorian Skills Commissioner (OVSC). The set of snapshots complements the Commissioner's Regional Skills Demand Profiles to provide a richer picture of the skills needs of Victorian employers. Insights from consultations will inform Government decisions around funding for accredited training. A collaborative effort between Government, employers and training providers is required to address these challenges.

This snapshot represents a summary of the views of consulted employers and sector representatives on the foreseeable current and future skilling needs of the metals and equipment manufacturing sector. As such, the OVSC has prepared the report with care and diligence, based on information provided through consultations. Information in the snapshot has not subsequently been independently verified or audited.

Acknowledgments

The OVSC would like to acknowledge the time, contribution and insights of participating employers and the Australian Industry Group in supporting this process. The findings in this report would not be possible without their shared knowledge, openness, generosity, expertise and commitment.

Table 1: Participating Employers

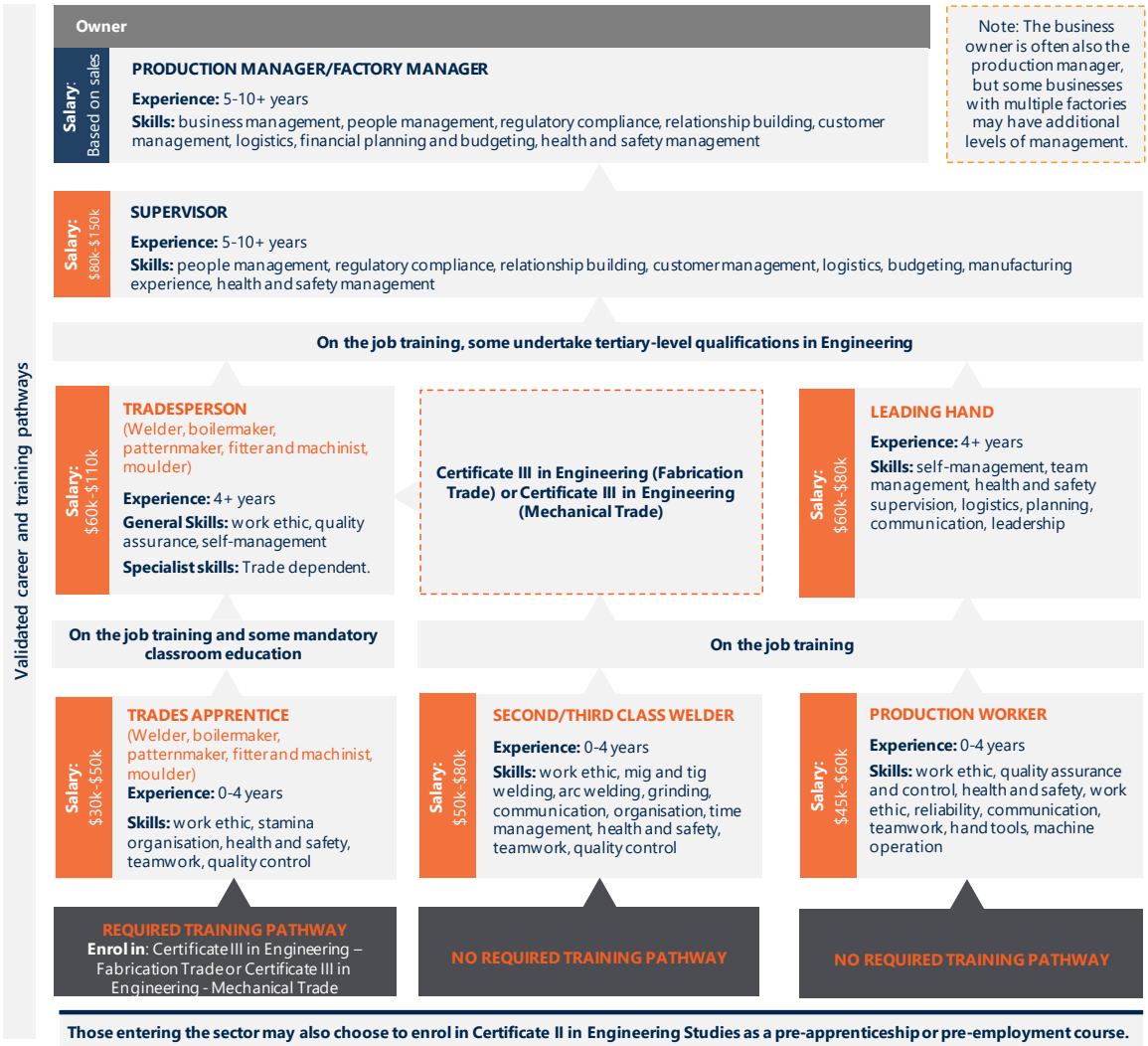
Member	Organisation
David Johnson	Keppel Prince
Roger Lumley	AW Bell
Todd Hartley	Hilton Manufacturing Pty Ltd
David Colasante	FLSmidth Australia
Brent Bruns	KEECH

SUMMARY

VICTORIA'S METALS AND ENGINEERING MANUFACTURING SECTOR

Approximately 92,000 workers across Victoria	Moderate impact of COVID-19 on the sector outlook	Shortage of young talent in some trades	3 validated pathways to employment	Potential for high earnings for talented workers	New apprentices are in high demand

CAREER PATHWAYS AND TRAINING



SECTOR WORKFORCE PRIORITIES

- Explore levers to increase interest and enrolments in mechatronics related TAFE courses.
- Test the feasibility of expanding the independent apprenticeship signoff process to manufacturing trades.
- Provide clearer communication to prospective students about the specific purpose of the various Certificate II qualifications in Engineering and investigate the role of each qualification in the national training system.
- Investigate the value of offering specific skillsets outside of schools to address the needs of employers, including Computer-Assisted Design (CAD), Metallurgy and Interpreting Hydraulics Schematics, and promote the availability of these skillsets in schools

1 Sector overview

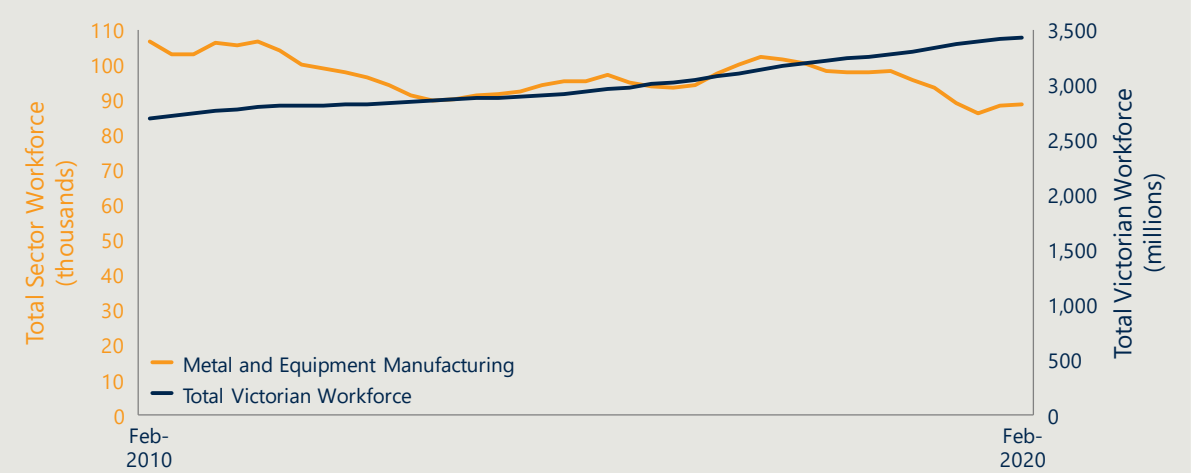
The metal and equipment manufacturing sector has contracted over the last 10 years

Victoria's overall manufacturing industry is broad, covering everything from process manufacturers in the food and beverage industry to highly specialised equipment manufacturers. This snapshot focuses on metals and equipment manufacturing, a sector of this industry that contains similar skilling requirements. Businesses in this sector include those engaged in metal product manufacturing, fabricated metal manufacturing, transport equipment manufacturing, and machinery and equipment manufacturing. Transport, machinery and equipment businesses manufacture a wide variety of products, including: defence equipment; recreational equipment such as caravans and motorhomes; logistical equipment such as truck components or trailers; and a wide variety of other products. Primary metal and pre-fabricated metal product manufacturers produce items such as cast iron, rail components, aluminium and copper products, forged chains, horseshoes, pipe fittings, structural steel and metal containers such as tanks. There are two main types of businesses in this sector: process manufacturers, that make a high volume of the same product; and specialised manufacturers, that may make a lower volume of bespoke items or parts.

At February 2020, this sector of the manufacturing industry employed approximately 92,000 Victorians, or 2.7% of the state-wide workforce. However, over the past 10 years this sector has been contracting. The size of the workforce in most subsectors of manufacturing covered in this snapshot has decreased, with per annum growth rates of -0.6% in primary metal product manufacturing, -4.0% in transport equipment manufacturing and -2.5% in machinery and equipment manufacturing. The only subsector to grow over this period was fabricated metal product manufacturing, at 0.9% per annum. This contrasts with the overall Victorian workforce, which grew at 2.4% per annum over the same period. The workforce is spread relatively evenly across sub-sectors with primary metal manufacturing (19,500 workers) the smallest and machinery and equipment manufacturing (29,000 workers) the largest.

Figure 1 | Manufacturing sub-sector workforce sizes, 2010-2020 (12-month rolling average)

Source: ABS Labour Force Survey, August 2020



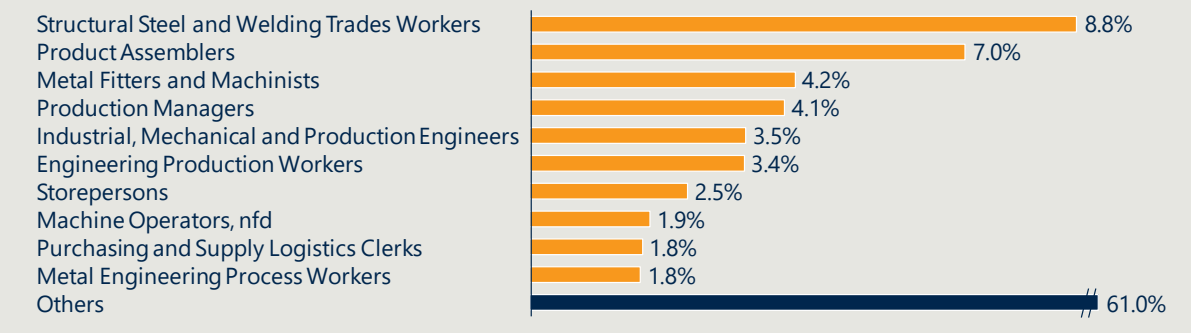
The main driver of growth in metals and equipment manufacturing is demand for equipment and metal products. However, the supply chain in manufacturing is complex and interrelated. Manufacturing has a tiered supply chain and many manufacturers are so specialised that they only produce a single part, which is then sold to other manufacturers. These manufacturers are known as lower tier manufacturers. The specific tier depends on the industry – some industries have 3-4 tiers (such as automotive manufacturing),

while others may only have 1-2. The recipient manufacturer (the next tier) may then combine that part with several others, and again send the assembled parts to another tier or to the Original Equipment Manufacturer (OEM). The OEM takes parts from Tier 1 manufacturers and assembles them into a finished product, although in some cases they receive the finished product. The OEM is then responsible for marketing and distribution. Because of the interconnected supply chain in manufacturing, demand for upstream products made by tier 3 and 4 manufacturers is driven by demand for products sold by the eventual OEM. In some cases, manufacturers may look to pivot their business model to follow changes in demand. This can happen at any point in the supply chain, but lower tier manufacturers are often driven to pivot as a result of changes made by upstream manufacturers. Due to the complex and expensive equipment used by most manufacturers, pivoting to a new product can take up to two years. This transition can be easier and faster for specialist manufacturers and more difficult for process manufacturers.

Businesses favour simple organisational structures

There are approximately 9,000 Victorian metals and machinery manufacturers. In 2019, 81% had a turnover of less than $2m, while 9% turned over between $2m and $5m, 4% between $5m and $10m and a further 6% had a turnover of $10m or more. There is a diversity of roles across these businesses, depending on the manufacturer. Figure 2 shows the top 10 occupations across the whole metals and equipment manufacturing industry, with structural steel and welding trades workers and product assemblers the most common roles. These top 10 roles only account for 39% of the workforce and there are many other important roles such as electricians, forklift drivers and office staff. The key roles shift according to the subsector: structural steel and welding trades workers, as well as engineering production workers and metal fitters and machinists, are important for primary metal product manufacturing and fabricated metal product manufacturing. Meanwhile, product assemblers are the most common workers in transport equipment manufacturing and machinery and equipment manufacturing.

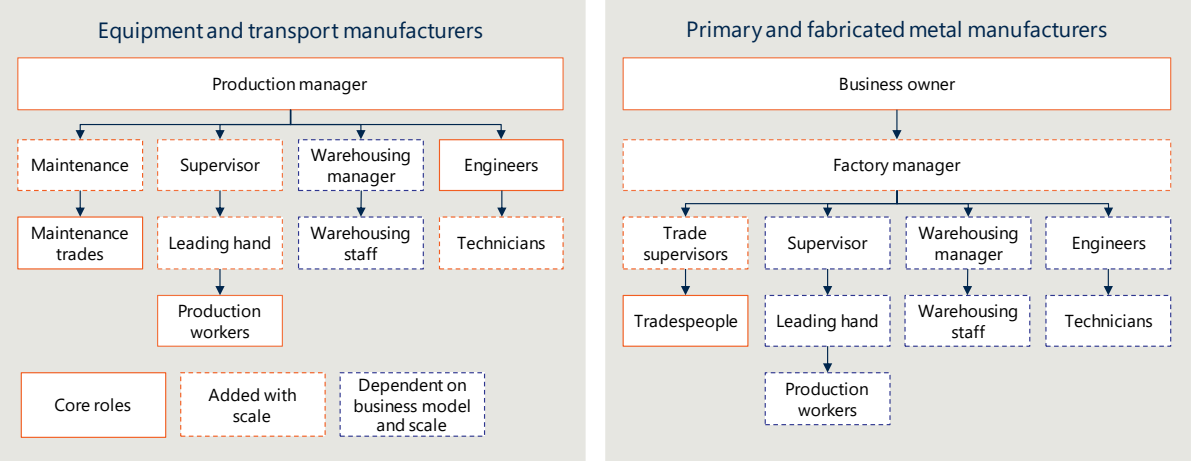
Figure 2 | Most common occupations in metals and equipment manufacturing
Source: ABS Census 2016



Entry level production roles are relatively unskilled, and most learning is done on the job. Entry level staff are broadly called "production workers" but their specific title may vary depending on the employer, such as "product assemblers". They make up 50-60% of the workforce and typically work in teams of 5-15 under a leading hand, who reports to the production manager, unless the company is large enough to have other supervisory levels. A further 5-10% of the workforce is comprised of warehousing staff, made up of roles such as forklift drivers and those in storage and dispatch. Another 10% of employees are tradespeople. Most factories will have at least one electrician per shift and two maintenance fitters. According to industry leaders, factories with more than 20-30 employees will have boilermakers and welders in fabrication roles and will also have fitters and machinists in maintenance. The remaining non-administrative or management staff are technicians, such as engineers or paraprofessionals who undertake design work of equipment, products and processes. Companies also employ administrative staff in roles such as finance, marketing, HR and sales, and the whole factory is overseen by a production manager.

The general ratios above are highly variable across businesses. As shown in Figure 3, the structure of the organisation shifts with scale, but also adjusts based on the product being manufactured. For instance, a patternmaker may have just two workers: a business owner and another patternmaker. In equipment manufacturing, the workforce is comprised mostly of machinists, while in fabricated metal manufacturing businesses the key occupations are welders and boilermakers, and in foundries the main occupation is a coremaker. For primary metal and fabricated metal manufacturers, the head of production is typically a factory manager, while in some process manufacturers they are called a production manager. In process manufacturing businesses, most of the tradespeople are fitters and electricians and are generally part of the maintenance team. Across all subsectors, some businesses choose to warehouse stock and employ a warehousing team, while others have a more sophisticated procurement function and operate on a "just in time" model. This model involves careful planning and ordering of materials and equipment in advance of when they are needed so it arrives when needed. Done well, this mitigates the need for storing materials.

Figure 3 | Indicative organisational structure



Labour is typically sourced through conventional means, such as online job advertisements. However, informal avenues are also common, such as personal recommendations and existing relationships. According to industry representatives, roughly 30% of the workforce is casual, many of whom are long-term casual workers, but many are also employed on a short-term basis to manage peaks in demand. Some companies also utilise labour hire to bolster the workforce as demand ebbs and flows.

The workforce is older than average and concentrated in Melbourne's outer suburbs

The manufacturing workforce is older than the Victorian average, with a higher proportion of workers between the age of 35 and 65, and a much lower proportion under 35. The workforce is concentrated in metropolitan areas, particularly in the northern and south eastern suburbs, with 13.6% of workers in the Greater Dandenong area and a further 9.4% in Hume. The workforce is comprised mostly of men (82.5%).

Figure 4 | Age and geospatial distribution

Source: ABS Census 2016

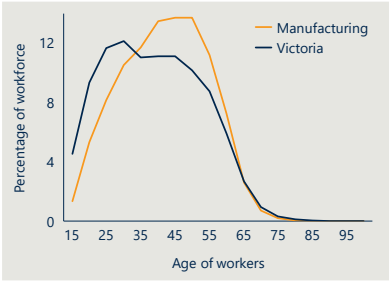
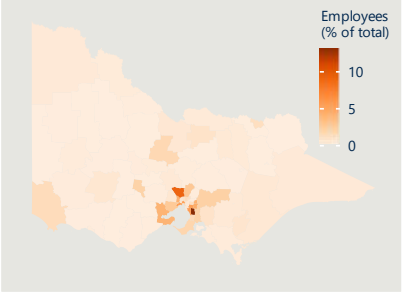


Figure 5 | Geographical distribution



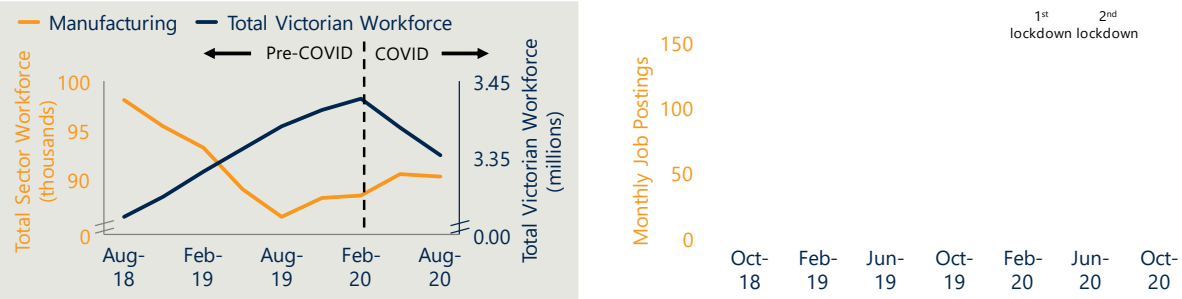
2 Sector outlook and workforce implications

The impact of the COVID-19 pandemic has varied across sub-sectors

Demand for manufacturing workers has not grown substantially in the last 10 years and has been quite volatile. Production workers and 2nd/3rd class welders are often sourced quickly to respond to peaks in demand for products, which means the size of the workforce can grow and contract rapidly.

The impact of the COVID-19 pandemic on the broader manufacturing sector has been pronounced, with the Australian Performance in Manufacturing Index (PMI) dipping to 46.7 in the September quarter (where a score below 50 indicates an industry in contraction). Impacts were worst in Victoria, where the PMI reached 37.6 in September, by far the lowest mark among all states and territories[1]. 32% of Victorian manufacturers reported some sort of business impact solely because of COVID restrictions[2]. Despite this, the size of the broader manufacturing workforce was steady post-COVID, as shown in Figure 6, potentially reflecting the impact of the JobKeeper wage subsidy.

Figure 6 | 12-month rolling average workforce size (total manufacturing)

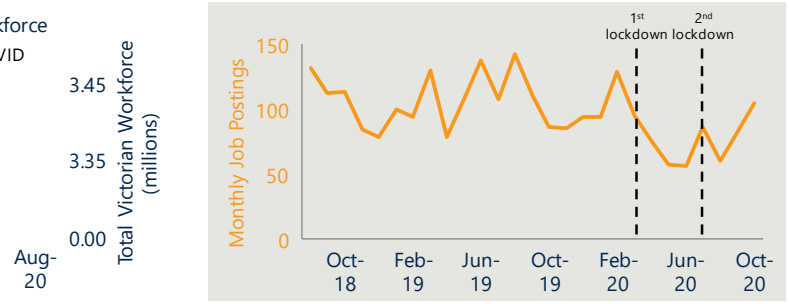


Within the metals and equipment manufacturing sector, performance through COVID was mixed. At a sub-sector level, the national performance of metal product manufacturing showed a contraction with a PMI of 48.6 in September. Machinery and equipment manufacturing grew, with a PMI of 53.8[1]. However, the specific impacts were likely different in Victoria and across subsectors of these industries. Some Victorian machinery and equipment manufacturers are operating on long-term contracts or in essential service sectors, meaning demand remained strong. In addition, demand in some sub-sectors has been bolstered by broader economic changes as a result of the COVID-19 pandemic. As large retailers experienced high demand for online trading, many needed to invest in more sophisticated equipment including conveyer systems and sorting machinery, resulting in increased demand for metal machinery. Other subsectors that were not listed as essential by the Victorian government were more heavily disrupted by lockdowns, such as some transport equipment manufacturers. These employers were shut down during Stage 4 restrictions, and as such received no revenue beyond JobKeeper. The impact of the first lockdown in March had begun to taper off for most businesses by July, but the second lockdown brought further negative impacts for some. Most companies reported a sharp decline in demand at the onset of each lockdown due to heightened levels of uncertainty and disruption to both domestic and international supply chains. Some employers noted a particular impact on the availability of specialist materials.

[1] AI Group, *Performance of manufacturing index,* September 2020
[2] AI Group, *Business Experiences of the COVID-19 Pandemic,* September 2020

Job listings in metals and equipment manufacturing confirm that demand dipped after each lockdown, but October job postings suggested a post lockdown recovery and some employers reported that they expected they would continue to recruit.

Figure 7 | Monthly Job Postings (metals and equipment manufacturing)



Workforce growth is uncertain but there is a clear need for more young people in the workforce

The longer-term outlook for the metals and equipment manufacturing sectors is dependent on several external factors. As with many sectors, governmental stimulus will play an important role. To date, employers report that the Federal Government's instant asset write-off scheme has bolstered demand, incentivising many businesses such as transport companies to order new and replacement equipment such as trailers or truck components that can be written off. This scheme is currently planned to cease in June 2022, and some employers mentioned that they expect a downturn in demand to follow the cessation of this scheme. Another important factor is the performance of various global markets. Most manufacturing companies operate within a complex supply chain which often involves offshore components or materials. How these countries choose to invest in mining, manufacturing and exports will affect the cost of components and materials that are important to the supply chain of many Australian manufacturers. Similarly, the status of international borders and governmental regulations on receiving shipped goods throughout the pandemic will also affect the cost and availability of important materials. Each of these factors will influence the demand for manufactured products and the capacity of manufacturers to meet this demand quickly, which will in turn determine the future workforce needs.

Many employers need skilled workers to meet spikes in demand, such as a recent increase in caravan or camping equipment purchases related to restrictions on international travel. Manufacturers in this industry are unable to hire skilled welders quickly enough to meet this demand. Other sectors have also seen a sharp uptick in demand and are performing strongly. Manufacturers of machinery that supports online trading continue to see high demand. Across the broader sector, many employers reported that it can be challenging to find skilled or capable employees at short notice. Others, however, mentioned that there are often many "walk-in" applicants leaving resumes for entry level roles, and these individuals are among the first contacted when demand begins to ramp up. Beyond some difficulty managing peaks in demand, employers also expect workforce shortages will arise because of reduced migration. Migrant workers are commonly employed as 2nd/3rd class welders or process workers, roles that will need to be filled with Australian capability until immigration reaches pre-COVID levels.

Several employers also identified that apprentices can be hard to find. They believe this may at least in part be a result of persistent perceptions surrounding employment in the manufacturing industry among young people. Some observed that schools do not always encourage students to seek a career in manufacturing. Employers agreed that this was true across most of the important trades for manufacturing companies, such as welders, fitters, machinists, boilermakers and patternmakers. Long term challenges with recruiting quality apprentices means the workforce is ageing. Employers are continually forced to rely on older workers with knowledge and experience, and without young staff or apprentices to

train there will be a significant skill shortage in the near future, as the existing workforce continues to age. Government and industry have attempted to mitigate this in the past and have seen some success, such as through the Careers in Manufacturing program. This was an industry taster program that allowed students to visit factories and learn about what they do. The program ran alongside VET in Schools and was successful in gathering interest from young people. More recently, the approach to school engagement has been more ad-hoc and competitive, and therefore less effective.

Skilled young workers are in demand across a variety of roles

Employers listed several roles for which it can be challenging to find skilled workers. Of particular interest to some employers were individuals with capability handling advanced equipment, such as robot operators and setters. For new entrants to have these skills, TAFEs must ensure they provide students with access to contemporary equipment used in modern factories. Employers are also seeking skilled workers that can operate computer numerical control (CNC) sheet metal equipment such as a laser, press brake or a turret punch. This requires similar investment from TAFEs in modern training equipment. Trades that were noted to be in the most demand were fitters, fabricators and welders. For welders, this was true for the whole range of capability, from third-class welders to qualified welders. On the semi-technical side, some employers found it challenging to find capable non-destructive testing (NDT) staff. This varied based on geography and the training arrangements in the employer's local area. Employers are seeking staff in these roles and others that have the managerial and leadership skills or potential to become leading hands or site supervisors.

Employers also mentioned various skill sets they believe are lacking in young employees that would put them in good stead to gain employment in the industry. The main skill employers referenced was competency in Computer-Assisted Design (CAD) and Computer-Aided Manufacturing (CAM). Employers stated that entry-level workers with some CAD training were immediately employable in the sector, presenting a promising career pathway. Employers also mentioned skills such as metallurgy are often in short supply, which limits new workers' understanding of the materials they are working with. Entry level workers are encouraged to have a basic understanding of materials to improve the quality of their work. This is often captured through the apprenticeship pathway, but avenues should also be available for non-tradespeople to develop this knowledge. Writing and interpreting hydraulic schematics was also perceived as a gap for some employers.

Several basic competencies and characteristics were cited as vital by employers for entry-level roles such as process workers. This includes skills such as literacy and numeracy, digital literacy, work ethic and reliability. Some mentioned that there is a high early attrition rate for new employees who may have underestimated the often intensely physical nature of the work.

Future skills needs and demand for workers will be driven by emerging trends

Governmental stimulus for the manufacturing sector will play an important role in its long-term prosperity. A roadmap for the sector should be in place to make clear to employers what the outlook for the sector may be beyond current policies such as the instant asset write-off scheme. The continued impact of COVID on international markets, international supply chains and international borders must also be monitored. In line with this, Australia's trade relationship with China will continue to be important to the manufacturing sector and demand for Australian products. Other factors also dictate demand for manufacturing in Australia, including the state government's local procurement priorities for major projects and a COVID-driven trend towards reaffirming Australian supply chains and Australian-made products.

The changing workforce supply and skills needs should be closely monitored as increased automation continues to play an important role in shaping the future of the manufacturing industry. Manufacturing robots can replace up to 1.6 jobs per robot, and a recent study found that the overall Victorian manufacturing workforce was the 2nd most exposed Australian regional workforce to this trend. This may

have a particularly pronounced impact on workers with "repeatable" roles, such as some process workers[3]. There will be a consequent growth in some skilled technician roles, but likely not in the same numbers as the previous production worker roles.

[3] ABC, *Robots set to take 20m jobs globally by 2030, SA and Victoria will be hard hit, warns report*, June 2019

3 The role of training

Entry and progression through the sector depend on occupation and subsector

The pathway into and through the manufacturing workforce is variable depending on the subsector and chosen occupation. Process workers are not required to come into the sector with much experience or formal training, and often there are no prerequisites, although some may come into the workforce having completed a pre-apprenticeship course through VET in Schools. After being hired, over the course of 2-5 years, a production worker may progress to become a leading hand and take on additional responsibilities. With further experience, the leading hand might eventually become a factory supervisor, which requires additional skills in people management, logistics, planning and occupational health and safety. Most of these skills are typically acquired on the job.

A tradesperson, such as a boilermaker, patternmaker, coremaker, welder, fitter and machinist or moulder will have a very different pathway. Some prospective apprentices will undertake a Certificate II in Engineering Studies as a pre-apprenticeship course, before then undertaking their apprenticeship in either a Certificate III in Engineering – Mechanical Trade or Certificate III in Engineering – Fabrication trade. The chosen certificate is dependent on the relevant trade. Some may choose to continue into further study to build a more specialised skill set, for instance in CAD, fluid power or robotics by undertaking a relevant Certificate IV, Diploma or bachelor's degree.

The pathway for welders varies. In many workplaces, 2nd or 3rd class welders are employed solely on competency and are not required to be formally qualified, sometimes because the customer might not recognise Australian qualifications and standards are instead set by the OEM. This is particularly true for international customers. However, if these customers are in highly technical industries such as critical infrastructure, typically only competent and experienced welders will be able to meet the required standards. Manufacturers in the mining industry prefer qualified welders. In other workshops, there will be a few qualified (first class) welders and a larger team of unqualified second- or third-class welders. This is the case for most manufacturers whose work is not usually subjected to non-destructive testing. Unqualified welders are expected to learn independently or on the job and progress through the sector by demonstrating their proficiency to their employer. Qualifications are mandatory for welders in other subsectors, such as those by the Australian Defence Force or medical companies.

On the job training is valued for all entry level roles and apprenticeships are required for new tradespeople

On the job training is preferred for process workers and unqualified welders, and hence employers value traits such as work ethic and reliability. All tradespeople are expected to complete an apprenticeship, which involves a significant amount of on the job training as well as some classroom-based learning.

Employers report different sentiment with regards to different TAFE models – some prefer students to spend as much time on-site as possible and study at TAFE for a short time each week, while others value employees getting the chance to go off-site and learn in blocks. One foundry employer noted that they currently have an arrangement with GoTAFE allowing students to undertake their studies online for ~3 hours a week while working. This flexible model is desirable to employers and providers because it is a thin market with few apprentices in some trades. A flexible model allows GoTAFE to deliver the course in a decentralised way without compromising the course's financial viability. Regardless of the model, employers value a positive, flexible and proactive relationship with the TAFE.

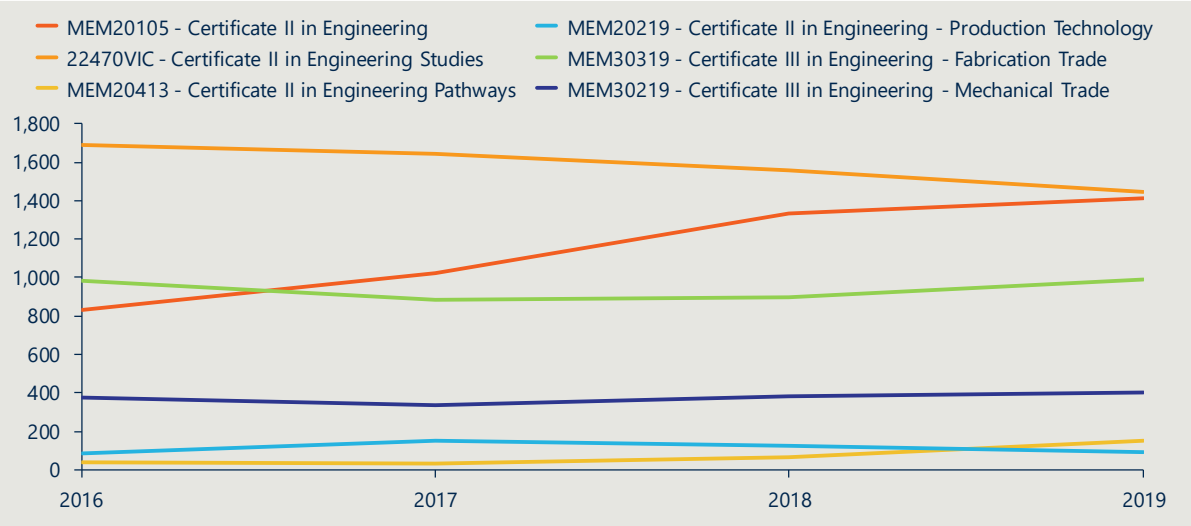
Prospective and current employees are presented with a range of education pathways. There are four different qualifications at Certificate II level, including two pre-apprenticeship course and two courses for employees already working in the industry:

- Certificate II in Engineering Pathways - MEM20413 (National) - designed for VET in Schools/TAFE delivery in an institutional setting as a pre-employment program or pre-apprenticeship program.
- Certificate II in Engineering Studies - 22470VIC (Victorian) - designed for VET in Schools/TAFE delivery as pre-employment/pre-apprenticeship program. The program was designed with Victorian employers.
- Certificate II in Engineering - MEM20105 (National) - designed for employed entry level production employees.
- Certificate II in Engineering Production Technology - MEM20219 (National) - designed for employed mid-level production employees. This builds on the Certificate II in Engineering and allows workers to achieve a higher level of pay.

Employees can further increase their skills and pay by completing either of the Certificate III's in Figure 8.

Training activity data in Figure 8 indicates enrolments in the Certificate II in Engineering is increasing, however the number of courses on offer at Certificate II level is potentially confusing to students. Training providers may market the Certificate II in Engineering as a pre-apprenticeship option, despite it only being designed for employees already working in the sector, which may cause further market confusion. Outside of the two Certificate III courses it is not clear which ones are valued by industry and whether they are being utilised as intended.

Figure 8 | Enrolments in manufacturing courses
Source: DET



There are opportunities for the current training landscape to better meet employers' needs

Apprenticeships are a critical pathway to employment in the manufacturing sector. However, employers raised concerns that the quality of apprentices has been in decline for various reasons. Some believe that negative perceptions about trades as a career has restricted the pipeline of quality applicants. These employers suggested working with schools or investing in an advertising campaign to showcase the appeal of a career in manufacturing. Other employers feel that there are some opportunities to improve the training process. In particular, employers emphasised the need for teachers with industry recency, contemporary equipment in training facilities, and regular dialogue with providers about student performance. In line with the rollout across the broader trades workforce, the effectiveness of independent assessment of apprenticeship completion in manufacturing should also be considered. A pilot scheme is currently underway, which could be expanded to include further manufacturing trades if it proves effective.

Employers also noted challenges accessing entry level workers across a range of roles. Employers highlighted the importance of skills in mechatronics and that there is potential to promote mechatronics courses to increase student interest and enrolments. Employers also mentioned several skill sets they believed were of increasing importance for which they would like to see training available, including CAD, materials and interpreting hydraulic schematics. Further, given its broad application across manufacturing and other sectors, employers identified potential for CAD training to be available as a foundational skill set that could support a broad variety of employment outcomes. This training is currently available through VET in Schools, but there is limited availability of this training outside of schools. Employers should be made more aware of students undertaking this course as potential employees, while providers should explore offering similar training outside of schools.

Finally, there is a need for clearer advice to be provided to prospective students about the specific aims of the four Certificate II qualifications in Engineering and the pathways they create for students, to ensure that students are enrolling in the qualification that will best meet their needs. More broadly, government should advocate for a national review of the Certificate II courses offered in manufacturing and their role in the training system. Some employers noted that four qualifications can confuse prospective employees, and the national training system should ensure the landscape meets employers' needs with as little complexity as possible.

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