



AUSTRALIAN  
MANUFACTURING  
WORKFORCE

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**AMGC**   
ADVANCED MANUFACTURING  
GROWTH CENTRE LTD

# AUSTRALIAN MANUFACTURERS WORKFORCE CHALLENGES

## Manufacturing delivers a significant contribution to the Australian economy



\$113.7B  
to the economy



11%  
of the Australian  
workforce (~952K  
Directly, ~316K  
indirectly)



\$102 Million  
in Gross Value Add is contributed per hour worked

## ...but there are challenges with workforce shortages for manufacturers



15.4%  
of the Manufacturing  
workforce leaves every year



48 of 145  
manufacturing related ABS  
occupations are estimated  
to be in shortage

## ...and a growing concern about attracting new talent to manufacturing.



62%  
of Australians disagree that  
manufacturing jobs are  
available and accessible or  
are simply unsure



36 of 48  
occupations ABS  
occupations in  
shortage, are NOT on  
the NSC priority list



Ranks 14th  
out of 19 industries in relation for gender balance

## Workforce challenges were identified through broad consultation across Australia\*



## These insights have identified potential solutions to close the gaps\*

### Expand Industry Support

- Adopt new skill shortage measures for manufacturing
- Expand support beyond apprentices

- Offer industry leadership support

- Expand skill migration

### Change Training

- Modify Manufacturing/Engineering Training Package
- Reskilling efforts with micro-credentials

# AUSTRALIAN MANUFACTURERS FACE SOME CLEAR WORKFORCE CHALLENGES THAT CAN BE OVERCOME WITH COLLABORATION ACROSS INDUSTRY, EDUCATION AND GOVERNMENT

\* Stakeholders engaged include Manufacturers (n=160), industry organisation (n=8), education system (n=10), and government (n=9), complimented ith a perceptions survey sent to Australians (n=2,000) and Australian students (n=1,000).



— Industry — Government — Education/Training

## 2

### Shift Mindsets

- Subsidies/Scholarships for high demand/growth jobs
- Recognise prior trade experience

- Develop and share & accurate and current industry information
- Consistency in representation

## 3

### Lift Business Focus

- Recognise manufacturing at Department level
- Dedicated manufacturing awareness campaigns

## 4

- Offer ongoing training & mentoring
- Expand recruitment methods
- Focus on company culture and benefits
- Invest in technology

# EXECUTIVE SUMMARY

## A SNAPSHOT OF AUSTRALIAN MANUFACTURING WORKFORCE

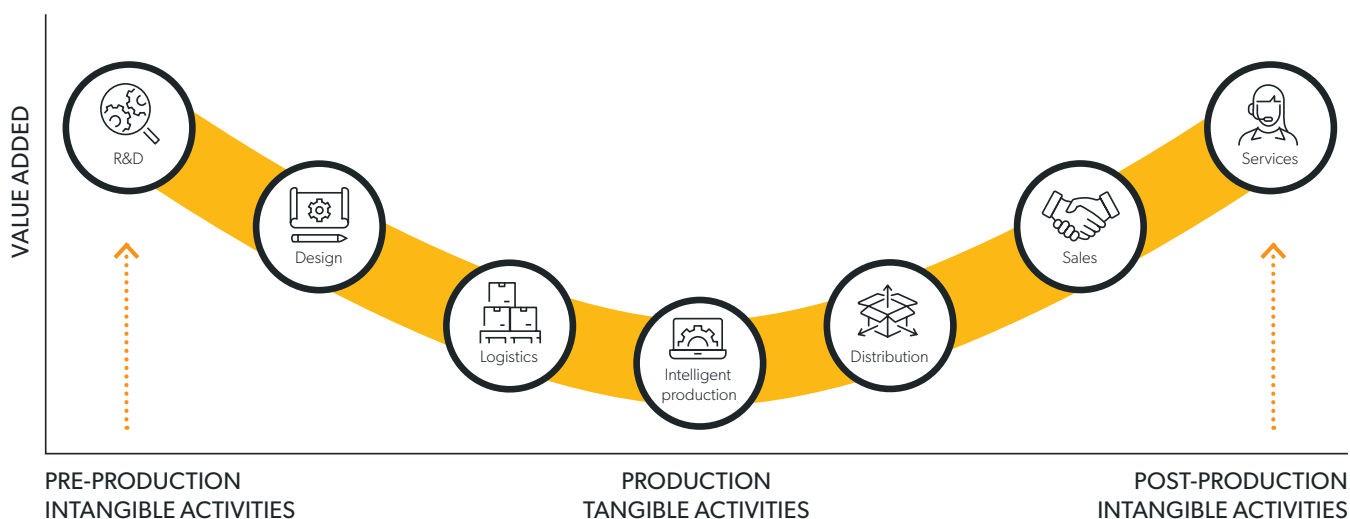
Manufacturing is a capability and thus a cornerstone of Australia's prosperity. Contributing \$113.7 billion a year to the nation's gross domestic product<sup>1</sup> it has remained resilient through recent disruption. Labour productivity continues to trend upwards as the industry embraces digital technologies and automation.<sup>2</sup> Manufacturing demonstrates strong economic linkages with other lead industries such as mining, agriculture, healthcare and construction.

Today, manufacturing is Australia's seventh-largest industry for employment, supporting approximately 1.47 million direct and indirect jobs – equivalent to 11 per cent of the nation's workforce.<sup>3</sup> Seven per cent of these workers (an estimated 952,000) are employed directly, with another four per cent employed indirectly.<sup>4</sup> About 49,000 businesses in Australia directly employ manufacturing workers, with most located along the eastern seaboard. Eighty seven per cent are small businesses with 19 or fewer employees. The industry is dominated by men, particularly technician and trade professions, who fill 72 per cent of direct jobs. Considerable untapped capacity therefore exists to attract women, young Australians, people of Aboriginal and Torres Strait Islander background and other key talent from around the world

## DIVERSIFYING BEYOND PRODUCTION ROLES

The global transformation of manufacturing truly offers a place for everyone. Once dominated by traditional production workers, manufacturing today is defined by capabilities much broader than producing finished goods on a factory floor. A competitive manufacturer might specialise in an activity at a pre- or post-production stage of the value chain, such as R&D, design, distribution, logistics, sales, or customer support. A firm might deliver a component, solution, or service, operating virtually or in person. They might utilise automated production techniques or leverage maturing technological capabilities such as 3D printers, artificial intelligence and digital twins. While it has always mattered 'what' a firm makes, it is increasingly important 'how' they make it. The full manufacturing value chain, known colloquially as the 'smile curve', is depicted below.

**Figure 1: The smile curve, a breakdown of value added by manufacturing activities**



- 1 Australian Bureau of Statistics (ABS) 2021, 'Table 5 – Gross Value Added (GVA) by Industry', 5204.0 Australian System of National Accounts, accessed June 2021, <https://www.abs.gov.au/statistics/economy/national-accounts/australian-system-national-accounts/latest-release>.
- 2 ABS 2021, 'Table 1', 6291.0.55.001 – EQ06 – Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards, data from August 2021, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed-quarterly/latest-release>.
- 3 6291.0.55.001 – EQ06 – Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards. Released at 11:30am (Canberra Time) 23 September 2021. Table 1. Data from August 2021. Australian National Accounts: Input-Output Tables, 2018–19. Table 5. Data from Table 5 and 20. Note: used projection modeling for 2021 data as input-output table has not yet been released.
- 4 ABS 2021, 'Data Cube 10: Businesses by industry division by Local Government Area (LGA) by employment size ranges', 8165.0 – Counts of Australian Businesses, including Entries and Exits, June 2017 to June 2021, <https://www.abs.gov.au/statistics/economy/business-indicators/counts-australian-businesses-including-entries-and-exits/latest-release>

More than 50 per cent of direct Australian manufacturing jobs today are outside production roles. Based on current workforce trends, an export-oriented large manufacturer might increasingly employ staff across the entire value chain.<sup>5</sup> Smaller firms are more likely to outsource niche functions, or hire workers who are versatile enough to assist the business across multiple areas (for example, a mechanical engineer with design skills who can also conduct sales and customer service functions). Higher skilled jobs, typically requiring a diploma, bachelor's degree or higher qualification, are especially prevalent both pre- and post-production.

## MODELLING CURRENT WORKFORCE DEMAND

In this report, AMGC has conducted new research into the precise roles and skillsets that Australian employers are seeking to hire. Two industry sources – the Internet Vacancy Index and Burning Glass – complemented by a custom-built data source, have been analysed to create a comprehensive dataset of 100,000 online job advertisements lodged by more than 18,000 manufacturing companies as of April 2022.<sup>6</sup> Among the key findings:

- 】 Job advertisements for non-production roles are growing faster than for production roles.
- 】 Small- and medium-sized manufacturers are especially focused on hiring technical and specialist workers, such as electricians, engineering technicians and ICT managers.
- 】 Larger manufacturers are most frequently seeking to fill roles in areas such as sales, advertising, administration and logistics, highlighting widening ambitions as they scale.
- 】 Measuring changes in job advertisement data between 2016–17 and 2020–21, IT, business, sales, and supply chain and logistics skills are being demanded most frequently by employers, while demand for engineering skills is growing the fastest.
- 】 Demand for baseline or 'soft' skills such as communication, planning and problem-solving tends to be consistent; however, many manufacturers increasingly require specialised technical skills.

<sup>5</sup> See Chapter 2, section 2.5, for further details.

<sup>6</sup> In Purpose Bureau dataset, a company is classified as a manufacturer if it is 1) a member of the Advanced Manufacturing Growth Centre or 2) reported to Workplace Gender Equality Agency with its ANZSIC Division as 'Manufacturing'; or 3) the firm has an entity that has a facility registered with the National Pollutant Inventory or 4) any firm with more than 10 job ads on a marketplace over last year and at least 10% of those job advertisements were related to an ANZSCO that concurred with the ANZSIC Division 'Manufacturing'. In Burning Glass, a manufacturer is identified by their main activity.

# EXECUTIVE SUMMARY

## MODELLING CURRENT AND FUTURE SKILLS PRIORITIES

Employers consistently report their difficulty to AMGC in recruiting sufficiently trained and experienced people. The occupations firms are struggling to hire have often differed from the official measurement of skills shortages under the National Skills Commission (NSC) Skills Priority List. This has prompted AMGC to investigate additional ways to support and complement the current framework, which relies heavily on the vacancy fill rate.<sup>7</sup> In this report, AMGC's proposed methodology, specific to manufacturing, incorporates 11 real-world economic indicators that bear on labour market demand (such as vacancies) and labour market tightness (such as wages growth). Among the key findings:

- ▶ 48 of the 148 manufacturing occupations analysed were identified to be in short-term shortage, 36 of which are not currently listed on the NSC 2021 Skills Priority List.<sup>8</sup>
- ▶ In higher skilled roles, high priority shortages include software programmers, database administrators, ICT test engineers and advertising managers.
- ▶ In lower skilled roles, high priority shortages include machinists, machine operators and drivers, sales workers and other labouring roles.

Next, AMGC has forecasted occupational and skill areas where manufacturing employers will encounter shortages in the future. Among the key findings:

- ▶ Shortages will be especially prevalent for specialist managers (combining technical and business skills), and certain technician, trade and labouring roles.
- ▶ For example, in 2032, an estimated 102,300 jobs from the production cluster will be required to fill shortages in specific skills. Example skills include welding, machine-tools and computer-aided manufacturing.
- ▶ This points to a future overall shortage, not so much of professionals, but technicians and labour roles in production that may involve higher or specialised skills. Production will always remain important to manufacturing and this should not be forgotten; however, the type of production may change.

<sup>7</sup> The NSC uses a number of sources to support their assessment of occupations in shortage as part of the Skills Priority List. The primary source is the vacancy fill rate collected as part of the SERA, and this is supplemented by a model that predicts vacancy fill rate for occupations that are not covered as part of the survey. These data sources are complemented by industry engagement and a range of other information from Departments and media/industry. The approach adopted by the AMGC is designed to complement this process by focussing on 11 indicators of labour market demand and tightness that are different to the NSC sources. Given the NSC focus on survey data and industry consultation, as an example, the indicators selected by AMGC focus on expressions of demand by industry (such as vacancies and advertisements) as well as signals of tightness such as growth in hours worked, growth in wages, and movements between occupations/to other industries.

<sup>8</sup> These indicators are designed to complement the existing NSC Skills Priority List, rather than seek to compete or conflict.

## SCENARIO ANALYSIS: SHIFTING FROM 'LUCKY TO SMART'

AMGC is further concerned to tackle the question of whether addressing skills shortages to satisfy a 'business as usual' trajectory is enough of an ambition for Australia? What workforce expansion would be required for Australia to 'shift from lucky to smart' – achieving parity with leading manufacturing nations which already adhere to an industry workforce strategy? In this report, AMGC forecasts the growth of Australian manufacturing employment between now and 2032, coupled with a scenario analysis to ascertain what Australia would need to shift its job mix towards the United States and Germany.<sup>9</sup> Among the key findings:

- ▶ Manufacturing direct employment is forecast to remain fairly consistent. Projected growth occupations include ICT engineers and security specialists, software programmers, computer professionals, technicians and designers.
- ▶ Specialist production and labouring roles are expected to decline, including machine operators, glaziers, carpenters and joiners, producing some of the future skills shortage areas identified in Chapter 4.
- ▶ To shift to the job mix of the United States, Australia would require another 300 chief executives and general managers, 350 design and engineering professionals, 15,400 engineering and automotive trades workers, 1,900 construction trades workers, 2,700 electrotechnology and telecommunications trades workers, 1,320 more sales representatives and agents, 10,900 more machinery and plant operators and 5,700 other labourers.
- ▶ To match Germany, Australia would need another 1,200 design and engineering professionals, 1,400 engineering and automotive trades workers, 1,000 construction trades workers, 1,700 electrotechnology and telecommunications trades workers, 3,400 more sales representatives and agents, 4,000 sales support staff, 4,200 machinery and plant operators, 4,000 construction and mining labourers and 11,600 other labourers.
- ▶ There is a direct link between filling skills shortages today and lifting competitiveness tomorrow; a failure to do so will create a 'double whammy' that causes Australia to fall further behind by 2032.

## BARRIERS TO MANUFACTURING WORKFORCE GROWTH

Drawing on focus group discussions with firms and AMGC's extensive research, there are several fundamental workforce challenges that must be addressed for Australian manufacturing to shift from lucky to smart.

- ▶ **Inaccurate measurement:** current official measurements of manufacturing are producing an incomplete picture of the industry's size and contribution to the economy. Specifically, classifications under the Australian and New Zealand Standard Industrial Classification (ANZSIC) code recognise manufacturers on the basis of single products when many are diversifying into multiple lines of business. Product lists are outdated and do not include new priority areas such as aerospace, defence and clean energy. There is also limited recognition of manufacturing beyond production. The NSC Skills Priority List is not sufficiently aligning with actual industry experience of skills shortages, yet remains a key input to skilled migration policies, and government funding for training and apprenticeships.
- ▶ **Narrow support:** skilled migration is failing to keep up with the needs of employers, particularly in fields like engineering where 70 per cent of new supply is from overseas. Pandemic border closures and the loss of foreign work visa holders has left huge workforce vacancies. In NSW alone, there is a projected shortfall of 304,000 employees by 2025–26. Only four of the 48 manufacturing positions identified in this report are on Australia's Priority Migration Skills Occupation List, where employer-sponsored nominations and visa applications gain priority processing. Manufacturers also report the migration process is too lengthy and expensive. Grants and subsidies are too often tied to occupations aligned with apprenticeships, rather than those in shortage.

<sup>9</sup> United States and Germany were selected as comparative countries due to culture comparisons, manufacturing industry practices, and their high economic complexity scorings.

# EXECUTIVE SUMMARY

- › **Lack of adequate training:** Challenges in Australian universities and VET involve resourcing, qualification structures and content. Many TAFEs and tech schools are unable to afford modern technology and machinery. Focus groups also make clear that Australia's education and training system is not pivoting quickly enough to support new occupations using data analytics, artificial intelligence, robotics, 3D-printing, virtual and augmented reality, and other advanced technologies. This includes those necessary to speed the transition to electric, hybrid and hydrogen vehicles. Concerns with the school curriculum include an inadequate emphasis on STEM (science, technology, engineering, and maths), and shortage of technical teachers. The most recurring piece of feedback to AMGC is that incoming entry-level workers lack practical work experience and accurate job-relevant skills.
- › **Difficulty attracting and retaining talent:** Competition for talent with other industries can be intense. Manufacturers in regional areas face unique challenges convincing well-trained people to relocate. AMGC's *2021 Australian Manufacturing Perception Survey*, summarised in this chapter, also finds widespread misperceptions and lack of awareness of manufacturing's ongoing strength and potential, even as the industry transforms. Young people and women in particular are more likely to associate with manufacturing with being a 'dirty' or 'dangerous' industry focused on production. Manufacturing also has a serious talent retention problem. AMGC estimates that about 65,000 new workers enter the industry each year; however, 15.3 per cent of talent is lost annually. Other studies have shown manufacturing falling short in areas such as workplace culture, diversity and inclusion.

## RECOMMENDATIONS AND ACTION PLAN

There is an incredible opportunity for Australian manufacturing to harness disruption and technological change to its advantage, positioning for a globally competitive, export-oriented future. Investing in the manufacturing workforce will be a key element of this transformation. This will ensure employers have the workers they need today, and that talent and career pathways exist for the industry to meet its ambitions tomorrow. AMGC wishes to emphasise that Australian manufacturing can aim high over the next decade. To not simply settle for a 'business as usual' trajectory but one modelled on the world's great manufacturing nations. Chapter 5 sets a workforce goal that should be seen as completely realistic as the nation reorients from a lucky country to a smart one.

Industry, government, and the nation's educational institutions must work together to ensure Australia is equipped with the manufacturing workforce to help reach its potential. Based on the detailed qualitative and quantitative research findings in this report, AMGC recommends a collective focus on four action areas.

- › **Refine industry support:** Government initiatives can be better targeted to support Australia's manufacturing workforce needs and promote growth.
- › **Adapt training:** Education and training can be made more vocationally relevant and integrated with the everyday needs of industry.
- › **Shift mindsets:** Clearly communicating the strength, dynamism and incredible career opportunities offered by manufacturing will help correct misperceptions about the industry at all levels.
- › **Business-led change:** Manufacturing firms can address workforce challenges by improving internal strategy and practices.

For a full list of recommendations please see Chapter 7.

**Figure 2: Manufacturing Workforce Action Plan**

**Governments need to refine industry support to target select manufacturing needs and promote growth**

- Correct and shorten skilled migration process G
- Sharpen subsidies and grants for select manufacturers G
- Refine measurement of manufacturing G

**Training needs to be adapted to be more responsive and integrated with industry, and easier to upskill**

- Modify Manufacturing and Engineering Training Package E
- Standardise micro-credential reskilling E
- Formally recognise prior trade work experience E
- Target subsidies of training and scholarships G
- Dual education model (select local ecosystems) G E I



**Businesses need to focus on internal business strategy and practices**

- Offer ongoing training and mentoring I
- Focus on company culture, diversity and benefits I
- Expand recruitment methods I
- Invest in technology I

**Businesses, Governments and education need to work together to shift mindsets and perceptions of manufacturing**

- Consistency in reputation, policy, and programs G E I
- Truly understand manufacturing at a government level G
- Launch dedicated manufacturing awareness campaigns G E

**I** = Industry      **G** = Government      **E** = Education/Training



Australian Government  
Department of Industry,  
Science and Resources

Industry  
Growth  
Centres