

MANUFACTURING IN THE **AEROSPACE AND DEFENCE INDUSTRIES**



A guide on how to use this Industry Pack

Resource for teachers and students

This industry pack is a resource designed to support the Manufacturing Careers Short Course. It connects classroom lesson plans, assessment tasks and the Manufacturing Matters website: manufacturingmatters.com.au.

COVER PAGE

Identifies the main manufacturing industry explored in this pack. Each industry pack is assigned an alphanumeric code, such as M4, to assist in identifying the industry pathway pack in various printed and digital outputs. There are 14 pathways in total.

» Use to identify workplaces or industries of interest for Assessment 1.

PAGE 1

Provides an overview of the specific manufacturing industry. It briefly explains where the industry operates and provides a basic understanding of relevant industry subject matter. **Supports Lesson 1 & 3.**

» Use to identify key interests or targeted questions for Assessment 1.

PAGE 2

Features images and descriptions of the manufacturing industry. These examples support further independent research by providing clear visual references for inspiration. **Supports Lesson 1 & 3.**

» Use to direct independent research to prepare targeted questions for Assessment 1.

PAGE 3

A career story offers real-life insight into an individual working in the manufacturing industry. It highlights variability in career pathways and offers real-world context of roles and progression within the sector. **Supports Lesson 3.**

» Use for Assessment 1 & Assessment 2 to understand pathways and core skills, attributes and knowledge.

PAGE 4

Includes:

- A map of Queensland to prompt a guided Google Maps research activity into where manufacturing industries are located.
- Industry specific search strings to assist further independent research into the industry.
- Links to job search platforms to research employment opportunities in the industry in Queensland.

Supports Lessons 8 to 13 & 16.

» Use for Assessment 1 & Assessment 2 to identify local industries and support independent research into job skills, attributes and knowledge gathering search terms.

PAGE 5

Provides an overview of educational training pathways and connects to the Career Bullseye highlighting roles at various Levels on the following page. **Supports Lessons 16 & 17.**

» Use for Assessment 2 to understand pathways into specific roles.

PAGE 6

An interactive Career Bullseye indicates roles within the industry at various Level (1 – 4) and allows for quick cross-industry comparisons on flexible career pathways. **Supports Lessons 1 & 3.**

» Use for Assessment 2 to understand pathways into specific roles and cross-industry relevance.

PAGE 7

Focuses on the first career pathway theme: **“Leading Teams”**.

Highlights the skills, qualities and attributes required for leadership roles and provides a list of examples to support further independent research. **Support Lessons 11, 18 & 19.**

Note: More detailed job descriptions are available on the Manufacturing Matters website. These may be made available as printed copies also.

Note: Additional videos are available to support this section exploring select “Leadership” and “On the Tools” occupations.

» Use for Assessment 2 to identify skills, attribute, knowledge and/or experience as pathways into specific roles in interested manufacturing industries.

PAGE 8

Focuses on the second career pathway theme: **“On the Tools”**.

Highlights the skills, qualities and attributes required for hands-on roles and provides a list of examples to support further independent research. **Support Lessons 2, 6, 11.**

Note: More detailed job descriptions are available on the Manufacturing Matters website. These may be made available as printed copies also.

Note: Additional videos are available to support this section exploring select “Leadership” and “On the Tools” occupations.

» Use for Assessment 2 to identify skills, attribute, knowledge and/or experience as pathways into specific roles in interested manufacturing industries.

PAGE 9

Provides an overview of the Future of the Industry and how technology is changing it. The section highlights skills needed for the future and growing trends in the industry. **Supports Lessons 12 & 13.**

» Use to identify targeted questions for Assessment 1 and for Assessment 2 for planning careers pathways and future skills, attributes and knowledge.

PAGE 10

Includes helpful online resources for further exploration of manufacturing industries. A matrix is provided that identifies all 14 core manufacturing industry pathways to discover!

» Use for Assessment 1 & Assessment 2 to expand independent research into pathways, core skills, attributes, and knowledge.

Understanding the Aerospace and Defence Industry in Queensland

The Aerospace and Defence manufacturing industry in Queensland represents a significant component of Australia's manufacturing sector and national security capabilities. This sector combines advanced engineering with cutting-edge manufacturing technologies to serve both civilian and military markets.

AEROSPACE MANUFACTURING IN QUEENSLAND

Queensland's aerospace manufacturing sector integrates precision engineering with modern production technologies. In the civilian sector, manufacturers produce a comprehensive range of products including aircraft components, maintenance equipment, and aviation systems. Many manufacturers specialise in custom-built components, with particular emphasis on aircraft maintenance and modification. Space industry manufacturing has grown significantly, reflecting Queensland's expanding role in the aerospace sector.

The military aerospace sector serves diverse market segments including defence aviation, military training facilities, and aerospace research centres. Queensland manufacturers have developed particular expertise in producing equipment that meets the specific requirements of Australia's defence forces. This includes considerations for tropical conditions and coastal operations.

DEFENCE MANUFACTURING IN QUEENSLAND

The defence manufacturing sector encompasses a broad range of specialised production activities. Land systems form a substantial segment, with manufacturers producing military vehicle components, protective equipment, and specialised military hardware suited to Australian conditions. Many of these manufacturers have developed niche markets by focusing on products adapted to specific military requirements.

Specialised defence manufacturing includes electronic warfare systems, communication equipment, and military training systems assembly. These subsectors often combine traditional manufacturing techniques with advanced technology, particularly in areas such as radar systems and electronic countermeasures. Queensland's defence electronics manufacturing industry has evolved to incorporate digital technology while maintaining capabilities in traditional defence equipment production.

Manufacturing Support Industries

The industry is supported by a network of specialised facilities including precision engineering operations, metal fabrication workshops, and advanced electronics units. These support industries are crucial to the sector's success, providing essential services and components. Component suppliers and systems manufacturers form an integral part of the supply chain, often developing custom solutions for specific defence requirements.

Advanced Manufacturing Technologies

Contemporary aerospace and defence manufacturing in Queensland relies heavily on advanced technologies. Computer-Numerical Control (CNC) machinery and Computer-Aided Design (CAD) systems are now standard in most facilities. These technologies enable precise production methods while maintaining high security and quality standards. Quality control systems and inventory management procedures have been developed to meet international military specifications while addressing local defence needs.

Skills and Workforce

The industry depends on a highly skilled workforce including aerospace engineers, defence systems specialists, and CNC programmers. Production supervisors and quality assurance specialists play crucial roles in maintaining standards and security. The sector actively collaborates with training institutions to develop and maintain these essential skills.

Manufacturing Locations

Manufacturing facilities are strategically positioned throughout Queensland, with significant concentrations in Brisbane's aerospace precinct and Ipswich's defence manufacturing zones. The Townsville and regional areas have developed specialised manufacturing capabilities, often focused on particular defence requirements or production specialties.

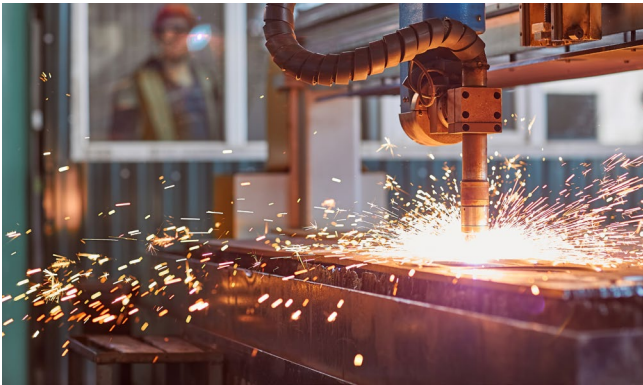
The industry provides significant employment opportunities and contributes to Queensland's defence capabilities while supporting related sectors such as military maintenance, aerospace research, and defence technology industries. This manufacturing network ranges from large-scale defence contractors to specialised component manufacturers, creating a diverse and strategic industry sector.



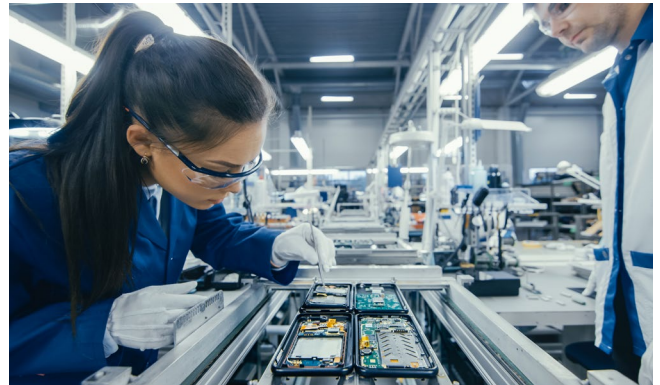
Carbon fibre composite raw material. Used widely in defence and aerospace products due to its exceptional strength-to-weight ratio.



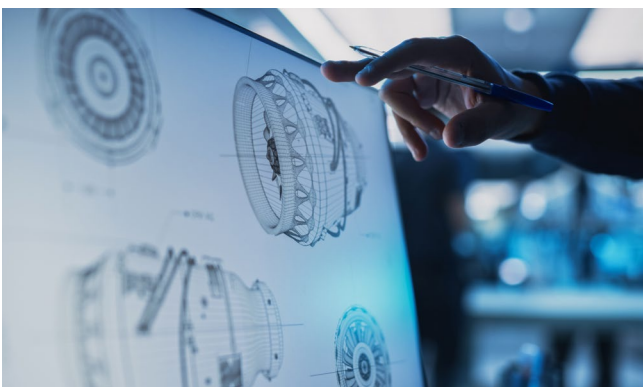
A Maintenance Engineer performing a routine inspection on an aircraft component.



A Factory Worker (in the background) operating a CNC laser plasma.



Electronics Factory Workers assembling circuit boards.



Industrial Engineer designing a jet engine prototype using computer aided design (CAD) software.



An Engineer checks the aerodynamics of a new drone using a wind tunnel.

Images in this document have been supplied by Manufacturing Skills Queensland and industry partners. Additional images have been sourced through Adobe Stock or generated using Adobe and Google AI software. Design layout by Liveworm, Queensland College of Art and Design, Griffith University.

Career Stories

Managing Director

I'm a Managing Director of a manufacturing company based in Wacol. Our operation is well-supported with material and tooling suppliers readily available nearby, and we maintain sustainable practices by selling our metal waste to dealers. My company specialises in metal manufacturing and engineering, with operations extending into aerospace and defence. Our core work involves machining and chemical surface treatments, producing precision components for defence, aerospace, medical and other sectors. The products we make are used in aircraft and medical equipment like laser eye surgery machines.

In our industry, I'm seeing 3D printing, robotics and AI emerging as significant trends, with programming skills becoming increasingly vital. We face various challenges in workforce diversity - while gender representation is moderate, we need improvement in ethnic and social diversity. We're still developing our position on environmental targets and sustainable development goals.

My role involves leadership, business development and strategic planning. Each day starts early tackling operational issues, typically personnel matters affecting customer deadlines. I spend time reviewing emails about enquiries, managing information requests, and evaluating opportunities that align with our strategy. My day involves prioritising tasks, checking progress with team members, maintaining customer relationships, and handling countless other responsibilities.

My journey here began as an apprentice in the Royal Australian Air Force, and I've worked my way up through various supervisory and managerial positions in both small and corporate businesses. Manufacturing was a natural choice for me - my father was a fabrication tradesman, so I grew up familiar with tools, though not so much with systems. I've always enjoyed making things with my hands, which drew me to this industry.

I came to this role with diverse experience in sales, maintenance, production, customer service and engineering. Since taking on my current position, I've gained deep knowledge of the defence industry ecosystem - understanding the organisations involved, their structure, and how to achieve results. The role has strengthened my leadership abilities and developed my resilience and adaptability.

My biggest challenges are managing government policy changes, finding dedicated employees, and competing against low-cost offshore manufacturers. However, I find

great satisfaction in having the authority to implement what I believe is important.

For students considering this career path, I recommend focusing on key subjects. Technical subjects like Aerospace Systems, Engineering, Chemistry, and Mathematics are crucial. Business studies are also valuable. In terms of applied subjects, I'd suggest Engineering Skills, Industrial Technology Skills, Essential Mathematics and English, and Business Studies.

My advice to any Year 10 student thinking about manufacturing is simple: identify what you enjoy doing and what you're good at, then talk to different people about how those skills could be applied in the industry.

"I've always enjoyed making things with my hands, which drew me to this industry."



Industry Map



FINDING INDUSTRY NEAR YOU

Want to see what Industry is around you? Here's how to do it on Google Maps!

Start by going to:

maps.google.com

Quick tip: Sign in if you want to save places for later!

Begin finding Pathways to Industry by typing what you're looking for using the knowledge you have, and include where you want to find it, for example:

"aerospace manufacturer QLD"

For this specific industry here are some terms to try:

- Aerospace/Defence manufacturers
- Aerospace composites
- Defence systems
- Military manufacturer

Add "industrial" or "commercial" before terms

Use "facility" or "factory" to find manufacturing sites

Use "manufacturer" rather than "maker" for industrial results

Try "fabricator" to find custom manufacturers

Some general search tips:

- Always include both "QLD" and "Queensland" in separate searches
- Add your postcode or "near me" to find stuff nearby
- Moving around the map? Click "search this area" to find new places
- Want to see how big a place is? Switch to Satellite View!
- Use Street View to get a closer look
- Found something interesting? Save it to your lists

Don't forget to check regular Google Search too! Sometimes you'll find different results there.

EXTENDING YOUR INDUSTRY KNOWLEDGE ONLINE

Here are some useful web search queries to find out more about this industry:

- aerospace composites materials
- defence component manufacturers
- aircraft integration platforms
- propulsion engine technology
- military electronics types
- armoured and autonomous defence vehicles
- additive manufacturing in aerospace
- automated systems in aerospace
- quality control in aerospace
- Queensland defence facilities and manufacturing

EXPLORING INDUSTRY PATHWAYS ONLINE

Search for manufacturing jobs in Queensland using platforms like Seek, Indeed, and LinkedIn. Filter results by location and experience level to find opportunities ranging from production line work to engineering roles. Use specific keywords like "advanced manufacturing careers" to discover industry trends and requirements.

seek.com.au

au.indeed.com

linkedin.com

Industry Pathways

In Queensland, an industry training pathway blends secondary school education with hands-on vocational training, allowing students to gain practical skills and qualifications while completing their high school certificate.

These pathways often involve partnerships between schools, TAFEs (Technical and Further Education), and industry, providing students with apprenticeships, traineeships, or work experience in their chosen field.

This combination of classroom learning, and real-world experience gives students a head start in their careers and helps them transition smoothly into the workforce or further tertiary education.

What does an industry training pathway look like?

The four education and training levels serve as a general guide and represent the most common educational and/or entry-level requirements for these roles.



LEVEL 1

Typically requires skills equivalent to the completion of Year 10, a Senior Secondary Certificate of Education, or a Certificate I or II. Australian Apprenticeships may be available at this level.



LEVEL 2

Typically requires skills equivalent to a Certificate III or IV, or at least three years of relevant experience. Australian Apprenticeships may also be available at this level.



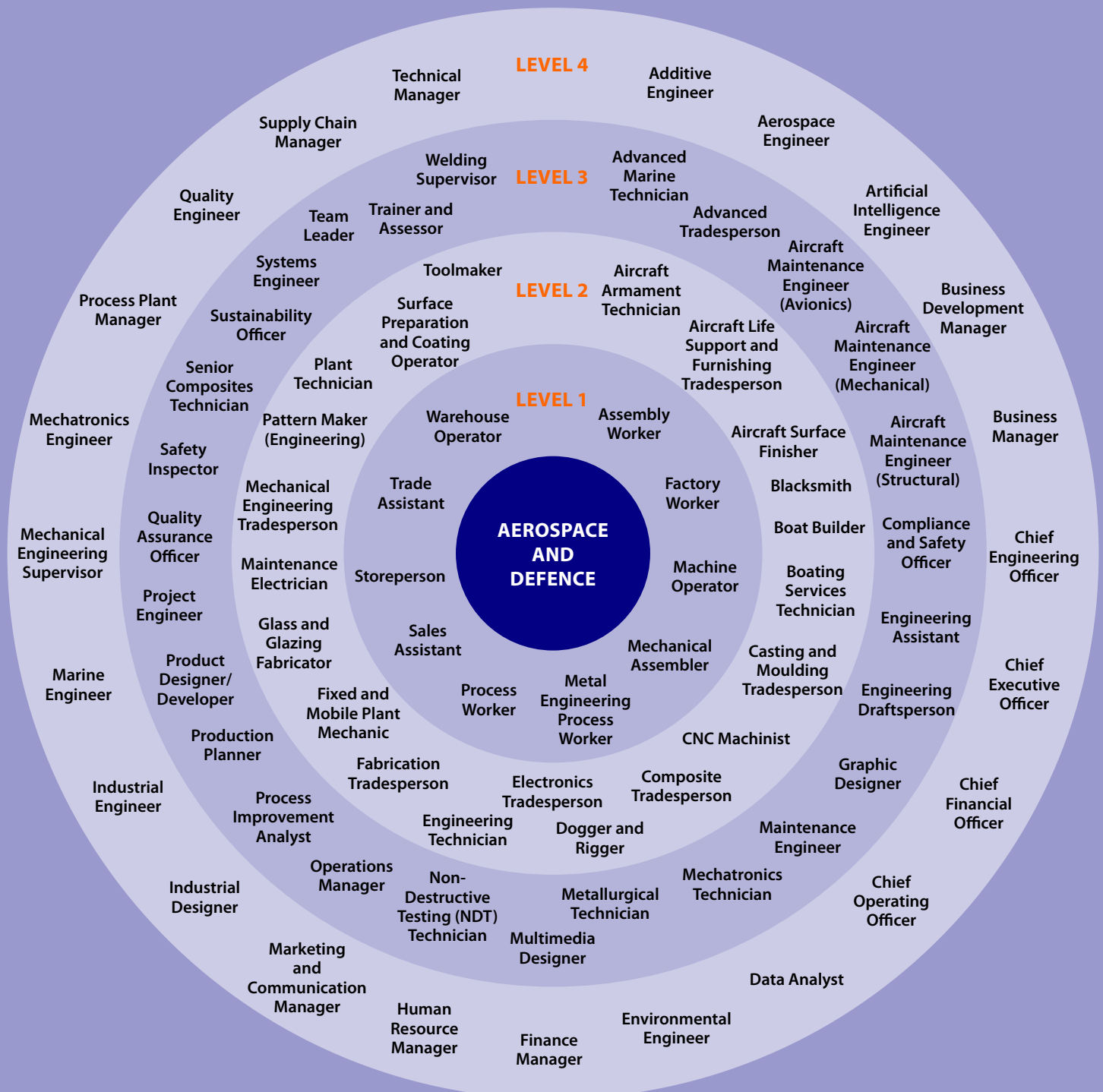
LEVEL 3

Typically demands a level of expertise equivalent to a Diploma or Advanced Diploma, often gained through TAFEs or Registered Training Organisations. Some universities also offer programs at this level.



LEVEL 4

Typically requires qualifications equivalent to a Bachelor's Degree or higher. This level of education is usually pursued at a university.



CORE INDUSTRIES

Aerospace and Defence
Chemicals, Hydrocarbons and Refining
Food and Beverage
Furniture and Other Products
Meat and Seafood Processing

General Manufacturing and Engineering
Pharmaceutical and Medical Technology
Polymers, Plastic and Rubber
Printing and Graphic Arts

Pulp, Paper and Packaging
Renewables
Textiles, Clothing and Footwear
Timber and Wood
Transport Equipment and Machinery

SUPPORTING INDUSTRIES

Laboratory Operations
Process Plant Operations
Sustainable Operations

For further information, visit:

manufacturingmatters.com.au/careers

Industry Pathways - Leading Teams



Leading a team is about more than just managing tasks; it's about inspiring, motivating, and guiding a group of individuals towards a shared goal. A good team leader fosters a collaborative and supportive environment where everyone feels valued and empowered to contribute their best.

ROLE OF A TEAM LEADER

- **Setting a Vision:** Clearly define goals and objectives, and communicate them effectively to the team.
- **Providing Direction:** Guide the team's efforts, ensuring everyone understands their roles and responsibilities.
- **Motivating and Inspiring:** Encourage and support team members, recognising their achievements and fostering a positive work environment.
- **Facilitating Collaboration:** Promote teamwork, open communication, and constructive conflict resolution.
- **Delegating Effectively:** Assign tasks based on individual strengths and skills, empowering team members to take ownership.
- **Monitoring Progress:** Track the team's performance, providing feedback and making adjustments as needed.
- **Developing Individuals:** Support the growth and development of team members through mentoring, coaching, and training opportunities.

QUALITIES AND ATTRIBUTES OF A GOOD TEAM LEADER

- **Strong Communication Skills:** Clearly and effectively convey information, actively listen to team members, and provide constructive feedback.
- **Integrity and Trustworthiness:** Act with honesty and ethical principles, building trust and respect among team members.

- **Emotional Intelligence:** Understand and manage their own emotions and those of others, fostering empathy and positive relationships.
- **Decisiveness:** Make informed and timely decisions, even in challenging situations.
- **Accountability:** Take responsibility for the team's performance, both successes and failures.
- **Problem-Solving Skills:** Identify and analyse challenges, develop creative solutions, and guide the team through obstacles.
- **Adaptability:** Adjust to changing circumstances, embrace new ideas, and remain flexible in their approach.

JOB TITLE

Industry roles where qualities of leadership, effective communication and specialist knowledge are valued.

- Chief Executive Officer
- Chief Operating Officer
- Chief Financial Officer
- Chief Engineering Officer
- Process Plant Manager
- Technical Manager
- Mechanical Engineering Supervisor
- Supply Chain Manager
- Human Resource Manager
- Finance Manager
- Marketing and Communication Manager
- Business Manager
- Business Development Manager
- Operations Manager
- Welding Supervisor
- Team Leader
- Production Planner
- Safety Inspector

For further information, visit:

manufacturingmatters.com.au/careers/

Industry Pathways - On the Tools



Jobs involving hands-on work with technology are increasingly common, blending technical expertise with manual dexterity and problem-solving skills. These roles often involve building, repairing, installing, or maintaining technological equipment and systems.

QUALITIES NEEDED FOR THESE ROLES:

- **Manual Dexterity:** Skilled and precise use of hands and tools to manipulate small components and perform intricate tasks.
- **Technical Knowledge:** Understanding of the technology they work with, including its principles, operation, and maintenance.
- **Problem-Solving Skills:** Ability to diagnose issues, identify solutions, and apply critical thinking to resolve technical challenges.
- **Attention to Detail:** Accuracy and precision in their work, ensuring that equipment is assembled and functioning correctly.
- **Patience and Persistence:** Ability to work through complex tasks methodically and remain focused, even when facing setbacks.
- **Communication Skills:** Clearly explain technical issues to colleagues or clients and work effectively in a team.
- **Physical Stamina:** May involve lifting, bending, and standing for extended periods.
- **Up-to-date Knowledge:** A willingness to learn and stay current with rapidly evolving technologies.
- **Adaptability:** Adjust to changing circumstances, embrace new ideas, and remain flexible in their approach.

JOB TITLE

Industry roles that can be considered 'on the tools' which requires different levels of training and specialist knowledge.

- Aerospace Engineer
- Industrial Engineer
- Industrial Designer
- Mechatronics Engineer
- Marine Engineer
- Quality Engineer
- Artificial Intelligence Engineer
- Additive Engineer
- Data Analyst
- Environmental Engineer
- Advanced Marine Technician
- Senior Composites Technician
- Aircraft Maintenance Engineer (Mechanical)
- Aircraft Maintenance Engineer (Avionics)
- Aircraft Maintenance Engineer (Structural)
- Sustainability Officer
- Process Improvement Analyst
- Quality Assurance Officer
- Product Designer/Developer
- Maintenance Engineer
- Project Engineer
- Mechatronics Technician
- Metallurgical Technician
- Engineering Draftsperson
- Non-Destructive Testing (NDT) Technician
- Systems Engineer
- Compliance and Safety Officer
- Trainer and Assessor
- Multimedia Designer
- Electronics Tradesperson
- Boat Builder
- Boating Services Technician
- Composite Tradesperson
- Aircraft Life Support and Furnishing Tradesperson
- Aircraft Surface Finisher
- Aircraft Armament Technician

For further information, visit:

manufacturingmatters.com.au/careers/

Future Industry



FUTURE TRENDS AND INNOVATION

The future of Queensland's Aerospace and Defence manufacturing industry aligns with Australia's national economic priorities, particularly in sovereign capability development, digital transformation, and advanced materials manufacturing. These changes support the Future Made in Australia plan's goals of strengthening domestic defence capabilities and developing advanced manufacturing skills.

KEY TRENDS INCLUDE:

Digital Manufacturing: Integration of artificial intelligence and digital twin technology in aerospace component production, enabling precise manufacturing and quality control. This includes advanced simulation systems that optimise production processes and improve product reliability.

Advanced Materials: Development of new composite materials and advanced alloys for aerospace and defence applications, aligned with the growing demand for lightweight, high-performance materials. This includes carbon fibre composites and advanced metal alloy manufacturing capabilities.

Advanced Processing Technologies: Implementation of robotics and automated manufacturing systems in defence production, supported by industry-specific cybersecurity and digital skills training programs.

Space Technology Manufacturing: Expansion of space industry manufacturing capabilities, including satellite components, launch systems, and ground control equipment production.

FUTURE ROLES IN THE INDUSTRY

Leadership Roles:

- Defence Systems Production Manager: Oversees military equipment manufacturing

- Digital Security Operations Director: Leads cybersecure manufacturing implementation
- Space Technology Manager: Coordinates space manufacturing initiatives
- Skills Development Leader: Implements advanced manufacturing training

Technical Roles:

- Aerospace Technology Specialist: Maintains advanced manufacturing equipment
- Digital Systems Security Technician: Programs secure manufacturing systems
- Advanced Materials Specialist: Develops new aerospace composites
- Robotics Systems Engineer: Services automated production systems
- Defence Manufacturing Trainer: Supports workforce capability development

FUTURE SKILLS FOCUS

Emerging skills requirements across all levels include:

- Digital security and cybersecurity practices
- Advanced manufacturing systems operation
- Defence specifications and standards
- Advanced materials processing
- Cross-disciplinary project management

These emerging roles emphasise the integration of digital technologies and secure manufacturing processes. The industry offers new career pathways through technical training programs and micro-credentials, with particular focus on developing advanced manufacturing skills in aerospace and defence production roles.

Other Resources

For further information, visit:

MANUFACTURING MATTERS

manufacturingmatters.com.au

MANUFACTURING SKILLS QUEENSLAND

msq.org.au

QUEENSLAND STATE GOVERNMENT

Department of State Development, Infrastructure and Planning

statedevelopment.qld.gov.au/industry/critical-industry-support/industry-roadmaps

Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development

nrm.mrd.qld.gov.au/manufacturing

BUSINESS QUEENSLAND

business.qld.gov.au/industries

REGIONAL DEVELOPMENT AUSTRALIA

rdabrisbane.org.au

ADDITIONAL GOVERNMENT LINKS

Australian Government, Defence

defence.gov.au/business-industry

Trade Investment Queensland, Advanced Manufacturing

tiq.qld.gov.au

Queensland: Australia's next-generation defence supplier (video)

Other Core Industries to Discover

Check out these other core manufacturing industries to understand the similarities and differences between them!

M1

M2

M3

M4

M5

M6

M7

M8

M9

M10

M11

M12

M13

M14

M1 Aerospace and Defence

M2 Chemicals, Hydrocarbons and Refining

M3 Food and Beverage

M4 Furniture and Other Products

M5 Meat and Seafood Processing

M6 General Manufacturing and Engineering

M7 Pharmaceutical and Medical Technology

M8 Polymers, Plastic and Rubber

M9 Printing and Graphic Arts

M10 Pulp, Paper and Packaging

M11 Renewables

M12 Textiles, Clothing and Footwear

M13 Timber and Wood

M14 Transport Equipment and Machinery