MANUFACTURING SKILLS QUEENSLAND

M6

MANUFACTURING IN THE

GENERAL MANUFACTURING AND ENGINEERING INDUSTRIES

MANUFACTURING SKILLS QUEENSLAND

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 General Manufacturing and Engineering Industry in Queensland

The General Manufacturing and Engineering industry in Queensland represents a cornerstone of Australia's manufacturing capabilities, combining traditional metalworking expertise with advanced manufacturing technologies. This sector serves diverse markets including mining, construction, agriculture, and defence industries.

GENERAL MANUFACTURING IN QUEENSLAND

Queensland's general manufacturing sector integrates traditional metalworking with contemporary production methods. The industry produces a comprehensive range of products including structural steel components, metal fabrication, sheet metal products, and precision engineered parts. Many manufacturers specialise in custom fabrication, with particular emphasis on mining equipment and agricultural machinery. Heavy engineering production has grown significantly, reflecting Queensland's robust resources sector.

The commercial and industrial segments serve diverse market sectors including mining operations, infrastructure projects, and manufacturing facilities. Queensland manufacturers have developed particular expertise in producing equipment and components that withstand the challenging conditions of tropical and subtropical environments. This includes considerations for corrosion resistance and durability in coastal areas.

ENGINEERING AND ADVANCED MANUFACTURING

The engineering sector encompasses a broad range of specialised activities. Mining equipment forms a substantial segment, with manufacturers producing processing equipment, conveyor systems, and specialised machinery suited to Queensland's mining operations. Many manufacturers have developed niche markets by focusing on products adapted to specific industry requirements.

Specialised engineering includes precision machining, industrial equipment manufacturing, and automated systems integration. These subsectors often combine traditional engineering principles with advanced technology, particularly in areas such as robotics and process control. Queensland's engineering industry has evolved to incorporate digital manufacturing while maintaining capabilities in traditional metalworking.

Manufacturing Support Industries

The industry is supported by a network of specialised facilities including foundries, heat treatment operations, and surface finishing units. These support industries are crucial to the sector's success, providing essential services and materials. Metal suppliers and industrial equipment providers form an integral part of the supply chain, often developing custom solutions for specific manufacturing requirements.

Advanced Manufacturing Technologies

Contemporary metal manufacturing in Queensland relies heavily on advanced technologies. Computer-Numerical Control (CNC) machinery, robotic welding systems, and Computer-Aided Design and Manufacturing (CAD/CAM) systems are now standard in most facilities. These technologies enable precise production methods while maintaining cost-effectiveness. Quality management systems and production monitoring procedures have been developed to meet international standards while addressing local industry needs.

Skills and Workforce

The industry depends on a highly skilled workforce including engineers, metal fabricators, welders, and CNC machinists. Metallurgists and quality assurance specialists play crucial roles in maintaining product integrity and production efficiency. The sector actively collaborates with TAFE Queensland and universities to develop and maintain these essential skills.

Manufacturing Locations

Manufacturing facilities are strategically positioned throughout Queensland, with significant concentrations in Brisbane's industrial areas and regional centres such as Townsville and Gladstone. The Mackay and Rockhampton regions have developed specialised manufacturing capabilities, often focused on serving the mining and agricultural sectors.

Sustainable Practices

Sustainability has become increasingly important in the sector. Manufacturers are implementing energy-efficient processes, metal recycling programs, and waste reduction initiatives. Advanced coating systems and environmental management practices are becoming standard, reflecting both environmental concerns and workplace safety requirements.

The industry provides significant employment opportunities and contributes to Queensland's economic growth while supporting related sectors such as mining, construction, and agriculture.

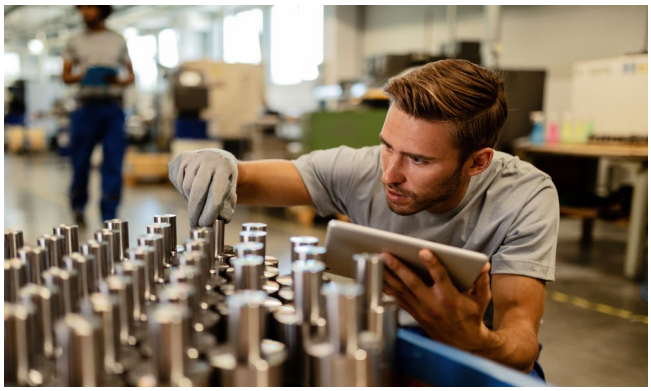
Machine Operator at the control panel, operating a high-precision Computer-Numerical Control (CNC) machine.

Metal Engineering Process Worker operating a hydraulic steel plate bending machine.

Boilermaker roll bending a large sheet of steel.

Welding Supervisor welding two metal sections.

Project Engineer coordinating the project, ensuring timelines are met.



Quality Engineer performing quality control of precision manufactured products.

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
Quality Manager

As a Quality Manager in the general manufacturing and engineering sector based in Queensland, I oversee quality systems and production optimisation. Our company specialises in steel processing, forming, and shaping services, manufacturing steel pipes and liners primarily for civil infrastructure. Our supporting work extends into renewables, transport and machinery, and process plant operations.

The reach of our products is extensive - they're used in transport corridors through our pile casings, in vehicles and plant equipment we manufacture parts for, and even in amusement park rides relying on our structural products. Looking to the future, Fused Deposition Modelling has the potential to disrupt our steel-forming services, particularly for smaller, intricate parts. Additionally, the trend towards more affordable, user-friendly CNC machinery could see our traditional customer base become more vertically integrated.

From my personal journey, I entered this industry from a corporate retail background with zero manufacturing knowledge. I was seeking a career change that offered growth and learning potential - a decision that has proved rewarding. My pathway to quality management began in sales before progressing through production, demonstrating that routes into quality roles can be diverse. These positions best suit those who can apply system-oriented thinking informed by first-hand technical and process knowledge.

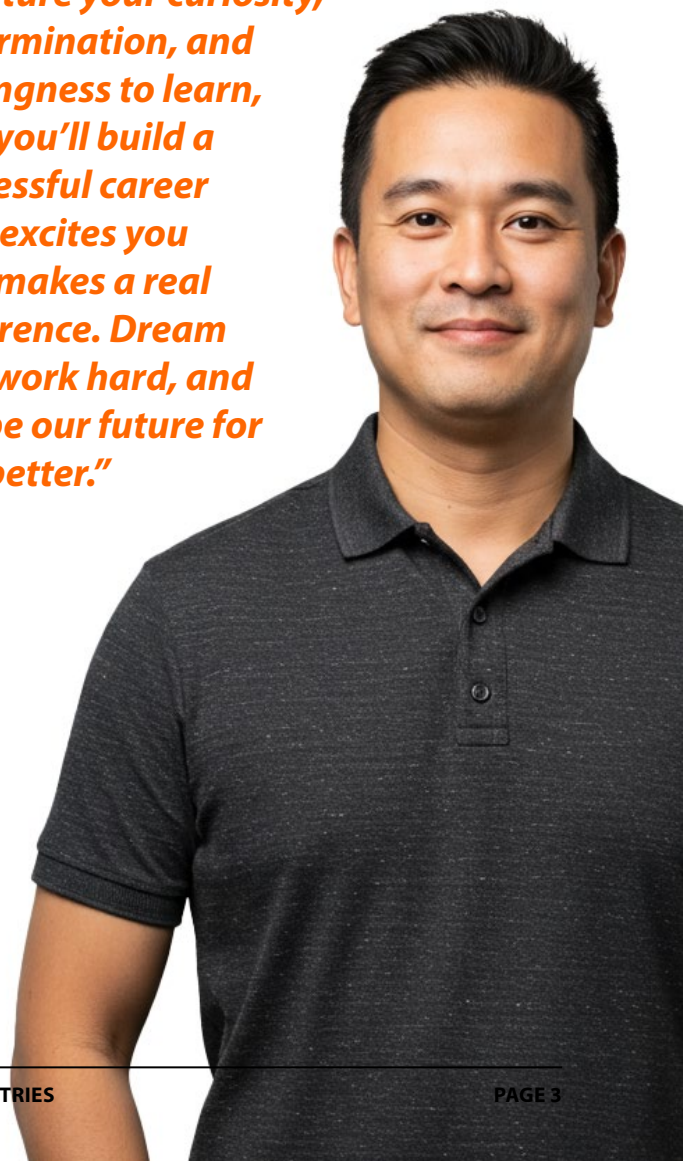
My typical day involves quality system maintenance and administration, records compliance verification, and frequent interaction with production teams to facilitate continuous improvement of processes and procedures. While I didn't bring specific industry knowledge initially, my technical aptitude, logical approach, and desire to learn proved invaluable. Over time, I've gained extensive knowledge of steel-forming techniques, welding, and fabrication processes.

The most challenging aspect of my role is staying current with evolving client requirements, including standards and specification compliance. However, it's incredibly satisfying when our business is optimally positioned to exceed client expectations, particularly when we successfully tackle unexpected challenges as a team.

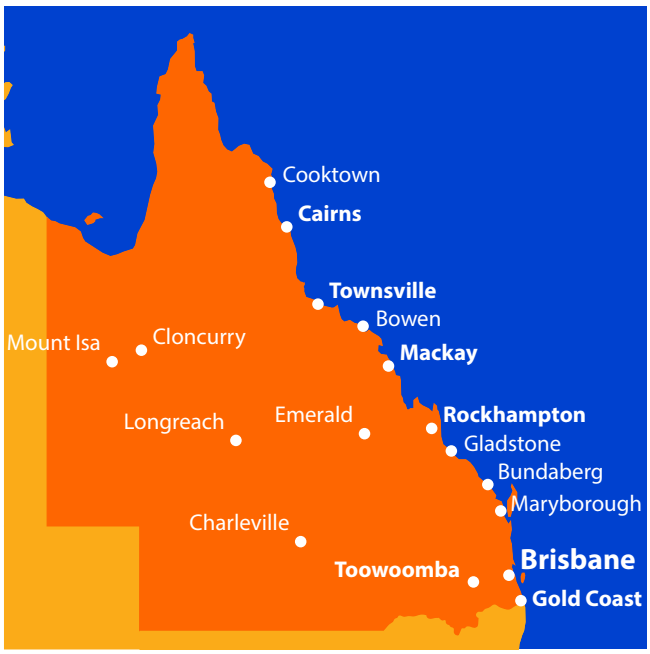
For students considering this career path, I recommend focusing on subjects like mathematics, science, and design. The beneficial general subjects include Engineering, Design, and General Mathematics, while Applied subjects such as Essential Mathematics, Industrial Graphics Skills, and Industrial Technology Skills provide practical foundations.

To Year 10 students considering manufacturing careers, I would say: "Australia's manufacturing industry is the perfect place for creativity to join with technology and build the future. With established and emerging industries, many at the worldwide forefront of innovation, it's a field full of opportunities - and as a Year 10 student you're in the perfect position to begin launching your career. Focus on subjects like maths, science, and design, and seek out hands-on experiences through practical classes, work experience, or even hobbies that challenge you to create and problem-solve. It's not just about making things – it's about solving problems and shaping a better, greener world, one puzzle at a time.

"Nurture your curiosity, determination, and willingness to learn, and you'll build a successful career that excites you and makes a real difference. Dream big, work hard, and shape our future for the better."



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:

"metal fabrication Townsville"

For this specific industry here are some terms to try:

- Steel fabrication
- Metal fabrication
- Metal Manufacturing
- Sheet Metal
- CNC machining
- Industrial engineering
- General Engineering
- Component Manufacturer

Look around major centres like "Townsville", "Mackay", "Toowoomba"

Add "industrial estate" or "industrial park" to location names

Include terms like "fabrication" and "machining"

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:

- advanced metallurgy techniques
- smart factory systems
- precision machining technology
- additive manufacturing innovations
- automated quality control
- metal forming technology
- surface treatment innovations
- laser cutting applications
- industrial IoT systems
- predictive maintenance technology

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

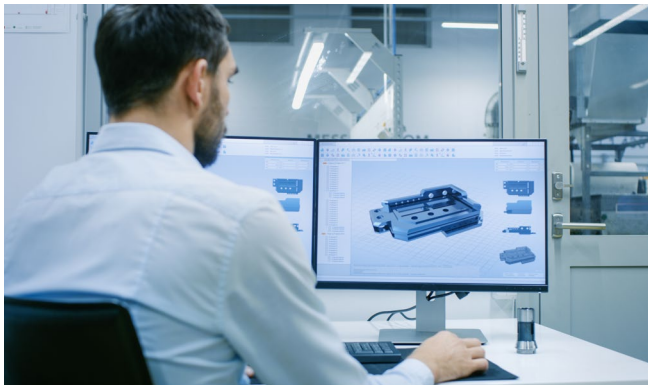
Typically requires skills equivalent to the completion of Year 10, a Senior Secondary Certificate of Education, or a Certificate I or II. Australian Apprenticeships may be available at this level.

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
- Project Engineer
- Maintenance Engineer

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.

- Agricultural Engineer
- Mechanical Engineer
- Electrical Engineer
- Industrial Engineer
- Marine Engineer
- Quality Engineer
- Additive Engineer
- Jewellery Designer
- Advanced Marine Technician
- Sustainability Officer
- Quality Assurance Officer
- Mechatronics Technician
- Metallurgical Technician
- Engineering Draftsperson
- Construction Materials Tester
- Non-Destructive Testing (NDT) Technician
- Compliance and Safety Officer
- Electronics Tradesperson
- Engineering Technician
- Jewellery Maker
- Boat Builder
- Boating Services Technician
- Watchmaker
- Refrigeration and Air Conditioning Mechanic
- Fixed and Mobile Plant Mechanic
- Toolmaker
- Pattern Maker (Engineering)
- Casting and Moulding Tradesperson
- CNC Machinist
- Surface Preparation and Coating Operator
- Glass and Glazing Fabricator
- Recreational Vehicle Manufacturing Technician
- Vehicle Body Builder
- Maintenance Electrician (manufacturing)
- Blacksmith
- Metal Engineering Process Worker
- Mechanical Assembler

For further information, visit:

manufacturingmatters.com.au/careers/

Future Industry

FUTURE TRENDS AND INNOVATION

The future of Queensland's Manufacturing and Engineering industry aligns with Australia's national economic priorities, particularly in advanced manufacturing, digital transformation, and sustainable production methods. These changes support the Future Made in Australia plan's goals of strengthening sovereign manufacturing capabilities and developing advanced manufacturing skills.

KEY TRENDS INCLUDE:

Advanced Manufacturing Systems: Integration of artificial intelligence and digital twin technology in production processes, enabling real-time monitoring and predictive maintenance. This includes smart sensors and Internet of Things (IoT) devices that optimise production efficiency and reduce downtime.

Industry 4.0 Integration: Development of connected manufacturing systems and cyber-physical systems, aligned with the growing demand for smart factories. This includes automated guided vehicles (AGVs) and collaborative robots (cobots) working alongside human operators.

Advanced Materials and Processing: Implementation of additive manufacturing (3D printing) and advanced materials processing, supported by research partnerships with Queensland universities and CSIRO.

Sustainable Manufacturing: Adoption of renewable energy systems, circular economy principles, and waste reduction technologies. This includes the development of green hydrogen applications and energy-efficient production processes.

FUTURE ROLES IN THE INDUSTRY

Leadership Roles:

- Advanced Manufacturing Director: Oversees smart factory implementation
- Digital Transformation Manager: Leads Industry 4.0 integration
- Sustainability and Innovation Leader: Coordinates green manufacturing initiatives
- Skills Development Coordinator: Implements advanced manufacturing training

Technical Roles:

- Robotics and Automation Specialist: Programs and maintains advanced manufacturing systems
- Digital Systems Engineer: Manages IoT and data analytics platforms
- Advanced Materials Technologist: Develops new manufacturing processes
- Predictive Maintenance Engineer: Monitors equipment health and performance
- Industry 4.0 Implementation Specialist: Supports digital manufacturing transition

FUTURE SKILLS FOCUS

Emerging skills requirements across all levels include:

- Advanced digital literacy and data analytics
- Robotics and automation systems operation
- Sustainable manufacturing practices
- Advanced materials processing
- Cross-disciplinary problem-solving
- Cyber-physical systems management

These emerging roles emphasise the integration of digital technologies and sustainable manufacturing processes. The industry offers new career pathways through technical training programs and micro-credentials, with particular focus on developing advanced manufacturing skills through partnerships with TAFE Queensland and universities.

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

nrmmrrd.qld.gov.au/manufacturing

BUSINESS QUEENSLAND

business.qld.gov.au/industries

REGIONAL DEVELOPMENT AUSTRALIA

rdabrisbane.org.au

FUTURE MADE IN AUSTRALIA

futuremadeinaustralia.gov.au

INDUSTRY ASSOCIATIONS

Manufacturing Australia

manufacturingaustralia.com.au

Engineers Australia

engineersaustralia.org.au/

Other Core Industries to Discover

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

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