MANUFACTURING SKILLS QUEENSLAND

M7

MANUFACTURING IN THE

PHARMACEUTICAL AND MEDICAL TECHNOLOGY 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 Pharmaceutical and Medical Technology Industry in Queensland

The Pharmaceutical and Medical Technology manufacturing industry in Queensland represents a vital component of Australia's advanced manufacturing sector and healthcare capabilities. This sector combines cutting-edge research with sophisticated manufacturing processes to serve both domestic and international markets.

PHARMACEUTICAL MANUFACTURING IN QUEENSLAND

Queensland's pharmaceutical manufacturing sector integrates advanced chemistry with modern production technologies. In the pharmaceutical sector, manufacturers produce a comprehensive range of products including prescription medicines, over-the-counter medications, and complementary medicines. Many manufacturers specialise in specific therapeutic areas, with particular emphasis on tropical medicine and dermatological products suited to Queensland's climate. Contract manufacturing has grown significantly, reflecting Queensland's position as a key hub in the Asia-Pacific region.

The medical products sector serves diverse market segments including hospitals, community healthcare facilities, and specialised medical centres. Queensland manufacturers have developed particular expertise in producing pharmaceutical products that maintain stability in tropical and subtropical environments. This includes considerations for temperature control and humidity resistance in storage and transport.

MEDICAL TECHNOLOGY MANUFACTURING IN QUEENSLAND

The medical technology manufacturing sector encompasses a broad range of specialised production activities. Medical devices form a substantial segment, with manufacturers producing diagnostic equipment, surgical instruments, and therapeutic devices suited to modern healthcare delivery. Many of these manufacturers have developed niche markets by focusing on products adapted to specific medical procedures and requirements.

Specialised product manufacturing includes orthopaedic implants, dental products, and medical consumables. These subsectors often combine precision engineering with advanced materials technology, particularly in areas such as prosthetics and medical imaging equipment.

Manufacturing Support Industries

The industry is supported by a network of specialised facilities including materials testing laboratories, sterilisation facilities, and quality control units. Raw material suppliers and packaging manufacturers form an integral part of the supply chain, often developing custom solutions for specific pharmaceutical and medical device requirements.

Advanced Manufacturing Technologies

Contemporary pharmaceutical and medical technology manufacturing in Queensland relies heavily on automated systems. Clean room facilities and advanced production lines are now standard in most facilities. These technologies enable precise production methods while maintaining regulatory compliance. Quality management systems and batch tracking procedures have been developed to meet international standards while addressing stringent regulatory requirements.

Skills and Workforce

The industry depends on a highly skilled workforce including biomedical engineers, pharmaceutical scientists, and quality assurance specialists. Regulatory affairs professionals and production technicians play crucial roles in maintaining compliance and efficiency. The sector actively collaborates with universities and research institutions to develop and maintain these essential skills.

Manufacturing Locations

Manufacturing facilities are strategically positioned throughout Queensland, with significant concentrations in Brisbane's biomedical precincts and the Gold Coast Health and Knowledge Precinct. The Sunshine Coast and Townsville regions have developed specialised manufacturing capabilities, often focused on particular therapeutic areas or medical device categories.

Sustainable Practices

Sustainability has become increasingly important in the sector. Manufacturers are implementing energy-efficient processes, waste reduction programs, and environmentally responsible packaging solutions.

The industry provides high-value employment opportunities and contributes significantly to Queensland's export earnings while supporting related sectors such as healthcare, research, and biotechnology industries.

Mining Bauxite in Weipa, Queensland. Bauxite is an aluminium ore and is used across many industries to make anything from a soft drink can to aircraft.

Chemical Technician developing new products.

Pharmaceutical Technician overseeing the transfer of medicine to bottles on a conveyor belt.

Mass production of healthcare labels for use in pharmaceutical and healthcare applications.

Computer-aided design (CAD), 3D printer and milling machine.

Additive manufacturing lab. Additive Engineers work with 3D printing technologies to produce new and creative objects.

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

As Managing Director, I specialise in providing accounts and system support services for manufacturers. Our company offers accounts support, software implementation, and software development. We primarily operate in the Gold Coast/Logan region, providing consulting and training services to floor staff on technology platforms used by manufacturers. While our core focus is metal manufacturing and engineering, we also work across chemicals, food and beverage, meat processing, pharmaceuticals, renewables, and textiles sectors.

Technology deployed in manufacturing businesses is far more complex than basic email, word processing, or spreadsheets. Manufacturing enterprises require different systems and technologies to achieve different goals. Being competent in using different systems will set staff apart from others on the floor.

My role involves providing clients with actionable insights from data, enabling them to make decisions that support business growth. In a typical day, I travel and talk to different manufacturers to understand their problems and gaps, exploring ways to close these gaps and solve problems.

I started my first job as a graduate accountant for a manufacturer and have remained in the industry since. While I graduated with a business degree, it's not essential to have one for entry-level accounting positions. Before entering the industry, I knew nothing about manufacturing, but my grandfather, an entrepreneur who operated a metal fabrication business, influenced my career choice.

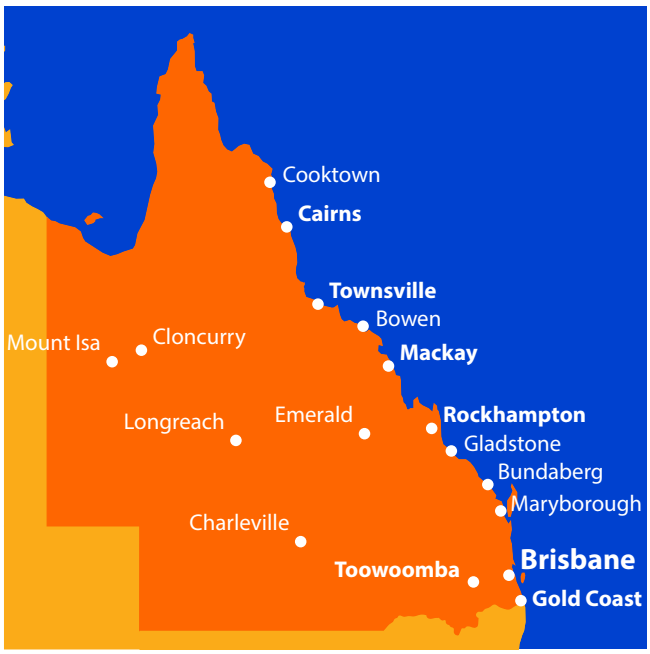
Over time, I've accumulated extensive knowledge and experience in the manufacturing sector regarding operations, supply chain, and manufacturing accounting unique to the industry. This enables me to provide expertise in finance, systems, purchasing, and warehousing - core elements of manufacturing operations. Recently, I've started learning to read drawings for sheet metal fabrication.

The most challenging aspect of my role is clearly understanding clients' needs and converting them into solutions. However, it's incredibly rewarding to help clients achieve results beyond their expectations. The key skills I've developed are problem-solving, leadership, and effective communication.

For students considering this career path, manufacturing operates in a dynamic environment unlike any other business. The enterprise-like business model enables students to explore many different fields of knowledge for career development.

"My role involves providing clients with actionable insights from data, enabling them to make decisions"

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:

"medical device engineers QLD"

For this specific industry here are some terms to try:

- Pharmaceutical manufacturer/developer
- Industrial pharmaceutical company
- Medical device manufacturing
- Medical technology developer
- Medical equipment developer
- Medical device engineers
- Medical disposables manufacturer

Include terms like "facility" or "laboratory"

Try both "manufacturer" and "developer"

Add "industrial" or "commercial" for better results

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:

- pharmaceutical process innovation
- continuous manufacturing systems
- drug delivery technologies
- bioprocessing advances
- aseptic manufacturing methods
- pharmaceutical testing automation
- controlled release technology
- medical device innovations
- cleanroom technology
- bioavailability enhancement

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.

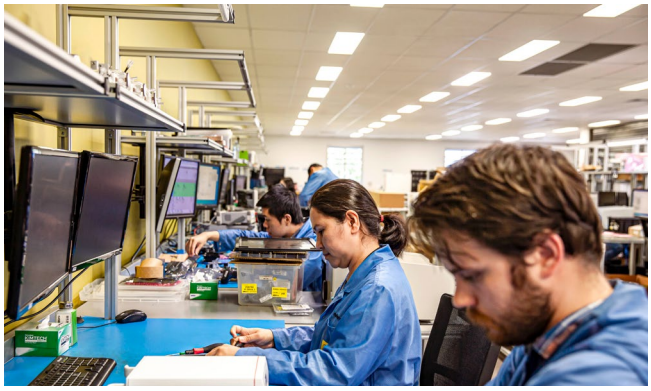
This combination of classroom learning, and real-world experience gives students a head start in their careers and helps them transition smoothly into the workforce or further tertiary education.

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

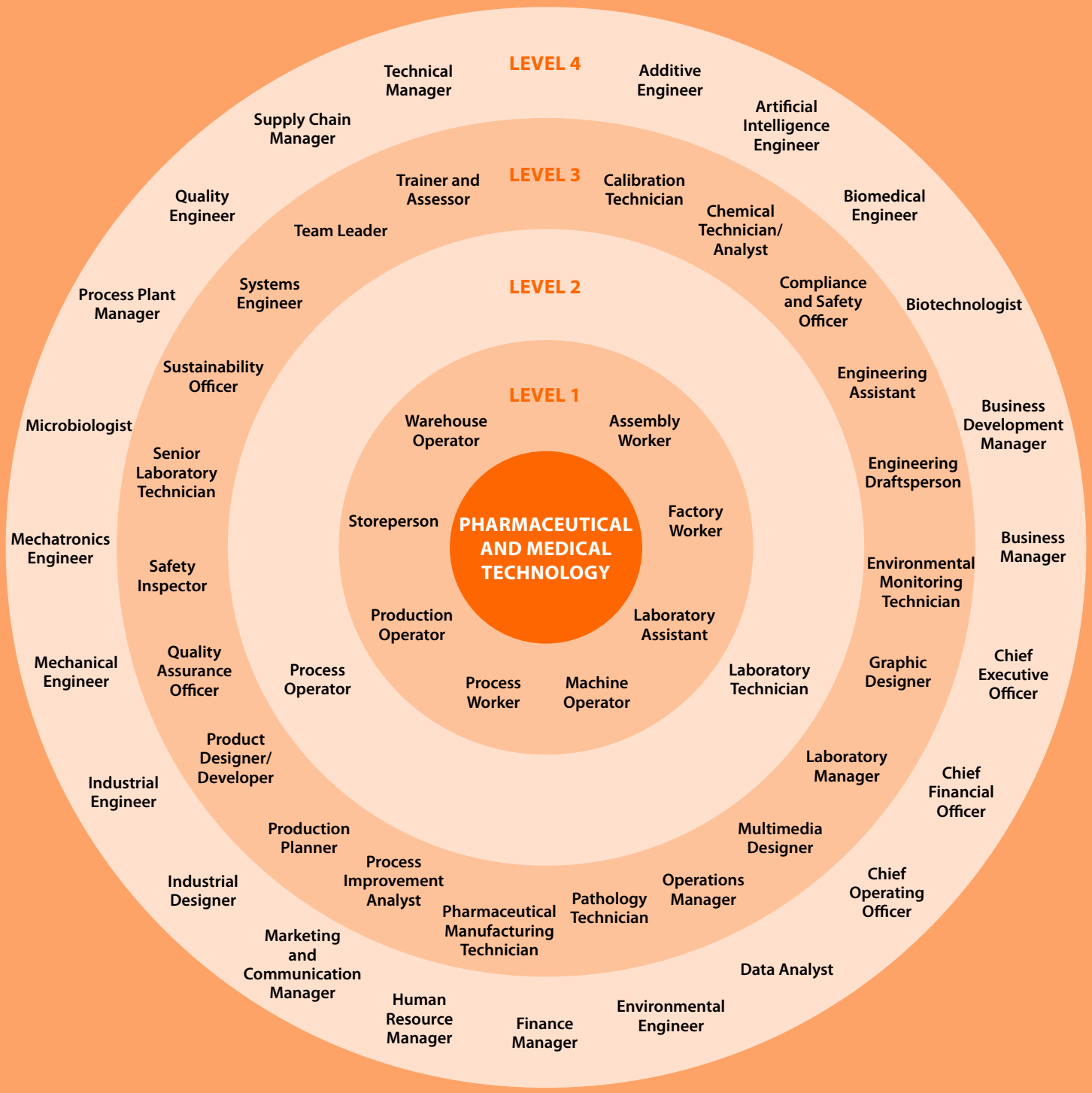
Typically requires skills equivalent to a Certificate III or IV, or at least three years of relevant experience. Australian Apprenticeships may also be available at this level.

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
- Laboratory Manager
- Process Plant Manager
- Technical Manager
- Supply Chain Manager
- Human Resource Manager
- Finance Manager
- Marketing and Communication Manager
- Business Manager
- Business Development Manager
- Level 3
- Operations Manager
- Team Leader
- Production Planner
- Safety Inspector
- Quality Assurance Officer

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.

- Biomedical Engineer
- Microbiologist
- Mechanical Engineer
- Industrial Engineer
- Industrial Designer
- Mechatronics Engineer
- Biotechnologist
- Quality Engineer
- Artificial Intelligence Engineer
- Additive Engineer
- Data Analyst
- Senior Laboratory Technician
- Sustainability Officer
- Process Improvement Analyst
- Product Designer/Developer
- Calibration Technician
- Pathology Technician
- Chemical Technician/Analyst
- Environmental Monitoring Technician
- Systems Engineer
- Compliance and Safety Officer
- Trainer and Assessor
- Laboratory Technician
- Process Operator
- Pharmaceutical Manufacturing Technician
- Plant Technician
- Process Worker
- Factory Worker
- Machine Operator
- Laboratory Assistant
- Assembly Worker
- Production Operator

For further information, visit:

manufacturingmatters.com.au/careers/

Future Industry

FUTURE TRENDS AND INNOVATION

The future of Queensland's Pharmaceutical and Medical Technology manufacturing industry aligns with Australia's national economic priorities, particularly in advanced manufacturing, sovereign capability development, and medical innovation. These changes support the Future Made in Australia plan's goals of strengthening domestic manufacturing capabilities and developing critical medical supply chains.

KEY TRENDS INCLUDE:

Advanced Manufacturing Systems: Integration of continuous flow manufacturing and automated production lines in pharmaceutical processing, enabling precise control of drug formulation and reducing contamination risks. This includes advanced monitoring systems that optimise batch production and improve quality consistency.

Personalised Medicine Manufacturing: Development of new manufacturing platforms for personalised therapeutics and custom medical devices, aligned with the growing demand for patient-specific treatments. This includes 3D-printed medical devices and targeted pharmaceutical formulations.

Smart Factory Technologies: Implementation of artificial intelligence and Internet of Things (IoT) systems in production environments, supported by industry-specific digital skills training programs and regulatory compliance frameworks.

Sustainable Production: Adoption of green chemistry principles and circular economy practices, including energy-efficient processing and sustainable packaging solutions.

FUTURE ROLES IN THE INDUSTRY

Leadership Roles:

- Biologics Production Manager: Oversees advanced therapeutic manufacturing
- Digital Quality Systems Director: Leads regulatory compliance technology
- Sustainable Operations Manager: Coordinates green manufacturing initiatives
- Validation Systems Leader: Implements Good Manufacturing Practice (GMP) compliance programs

Technical Roles:

- Bioprocess Technology Specialist: Maintains advanced production equipment
- Clean Room Systems Technician: Programs environmental monitoring systems
- Advanced Materials Formulator: Develops new drug delivery systems
- Automation Control Engineer: Services production line systems
- Digital Compliance Trainer: Supports workforce Good Manufacturing Practice (GMP) transition

FUTURE SKILLS FOCUS

Emerging skills requirements across all levels include:

- Digital systems and data integrity
- Automated production operations
- Good Manufacturing Practice (GMP)
- Advanced materials handling
- Regulatory compliance and documentation

These emerging roles emphasise the integration of digital technologies and regulatory compliance processes. The industry offers new career pathways through technical training programs and specialised qualifications, with particular focus on developing GMP skills in advanced manufacturing environments.

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

QUEENSLAND'S BIOMEDICAL FUTURE

statedevelopment.qld.gov.au

INDUSTRY ASSOCIATIONS

Medical Technology Association of Australia (MTAA)

mtaa.org.au

Life Sciences Queensland, medical directory

lsq.com.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