MANUFACTURING SKILLS QUEENSLAND

M2

MANUFACTURING IN THE

CHEMICALS, HYDROCARBONS AND REFINING INDUSTRIES

Understanding the Chemical, Hydrocarbons and Refining Industry in Queensland

The Chemicals, Hydrocarbons and Refining industry in Queensland represents a significant component of Australia's manufacturing sector and industrial processing capabilities. This sector combines traditional chemical processing methods with advanced manufacturing technologies to serve both domestic and international markets.

CHEMICAL MANUFACTURING IN QUEENSLAND

Queensland's chemical manufacturing sector integrates bulk chemical production with sophisticated processing systems. In the industrial sector, manufacturers produce a comprehensive range of products including industrial gases, water treatment chemicals, and agricultural chemicals. Many manufacturers specialise in custom chemical formulations, with particular emphasis on mining and construction applications. Specialty chemical production has grown significantly, reflecting Queensland's diverse industrial requirements.

The commercial chemical sector serves diverse market segments including mining operations, agricultural enterprises, and manufacturing facilities. Queensland manufacturers have developed particular expertise in producing chemicals that meet the specific requirements of Australia's tropical and subtropical environments. This includes considerations for high-temperature stability and corrosion resistance in coastal areas.

HYDROCARBON PROCESSING IN QUEENSLAND

The hydrocarbon processing sector encompasses a broad range of specialised production activities. Fuel refining forms a substantial segment, with manufacturers producing petrol, diesel, aviation fuel, and specialised petroleum products suited to Queensland's industrial and transportation needs. Many of these manufacturers have developed niche markets by focusing on products adapted to specific industrial applications and requirements.

Specialised processing includes gas treatment, liquified natural gas (LNG) production, and lubricant manufacturing. These subsectors often combine traditional processing techniques with advanced technology, particularly in areas such as process control and quality assurance. Queensland's gas processing industry has evolved to incorporate digital technology while maintaining capabilities in traditional processing operations.

Manufacturing Support Industries

The industry is supported by a network of specialised facilities including storage terminals, testing laboratories, and environmental monitoring units. These support industries are crucial to the sector's success, providing essential services and quality control. Equipment suppliers and maintenance contractors form an integral part of the supply chain, often developing custom solutions for specific processing requirements.

Advanced Manufacturing Technologies

Contemporary chemical and hydrocarbon processing in Queensland relies heavily on advanced technologies. Automated process control systems and real-time monitoring equipment are now standard in most facilities. These technologies enable precise production methods while maintaining safety and efficiency. Quality control systems and environmental management procedures have been developed to meet international standards while addressing local regulatory requirements.

Skills and Workforce

The industry depends on a highly skilled workforce including chemical engineers, process technicians, and environmental specialists. Production supervisors and safety managers play crucial roles in maintaining operational excellence and regulatory compliance. The sector actively collaborates with training institutions to develop and maintain these essential skills.

Manufacturing Locations

Processing facilities are strategically positioned throughout Queensland, with significant concentrations in Gladstone's industrial precinct and Brisbane's port areas. The Townsville and Mackay regions have developed specialised processing capabilities, often focused on particular market segments or production requirements.

Sustainable Practices

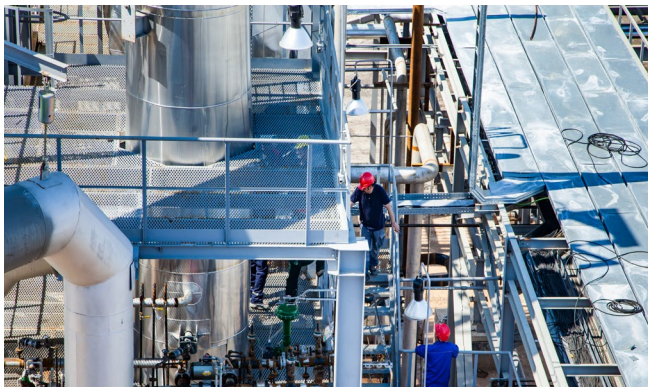
Sustainability has become increasingly important in the sector. Manufacturers are implementing energy efficiency measures, emissions reduction programs, and waste minimisation systems. Water recycling and resource recovery are becoming standard, reflecting both environmental concerns and operational efficiency requirements.

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

Vanadium, a naturally occurring element mined in Queensland. It is used to make long lasting batteries.

Liquified natural gas (LNG) plant on Curtis Island, Gladstone, Queensland. LNG is used for heating, generating electricity, manufacturing products and fuelling vehicles.

An industrial sulphuric acid plant in Mount Isa, Queensland. Sulfuric acid is a highly corrosive chemical used in the manufacuring of fertilisers, batteries, and detergents.



Engineers and workers adjust equipment at a sulphuric acid plant.

Factory Worker washes plates of cathode copper to make copper wire, cable, sheets, tubes, and alloys.

Industrial Engineer at a chemical plant, producing organic fertiliser.

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
Chief Executive Officer

I serve as CEO of an industry association in the chemicals, hydrocarbons and refining sector, based in Chermside. Our members process and manufacture a broad range of chemical products, from raw hydrocarbons to refined materials and specialty chemicals. At its core, our business is chemical processing and refinement. While we're directly connected to raw material processing, we operate across multiple manufacturing sub-industries, including industrial chemicals, petroleum products, polymers, plastic and rubber, industrial gases, and sustainable operations.

Students interact with our products daily, from the fuel in their family vehicles to the countless chemical-based products in their homes and schools. The industry faces significant technological trends, particularly the drive towards cleaner processing methods and sustainable chemical manufacturing. However, we face unique challenges due to Australia's geographic spread and the need for efficient distribution networks. There's constant government intervention and industry regulation, but this also creates numerous opportunities for innovation.

My role involves advocating for those in our industry with government and ensuring they understand the effects of proposed policies. A typical day includes flights, site visits, meetings, visits to parliament house, emails, discussions with members, and board meetings. My pathway here involved obtaining a Bachelor of Business and previously running a chemical processing operation. Interestingly, before entering the industry, I had almost no knowledge about manufacturing - I didn't even realise the extensive impact of chemical processing in everyday life.

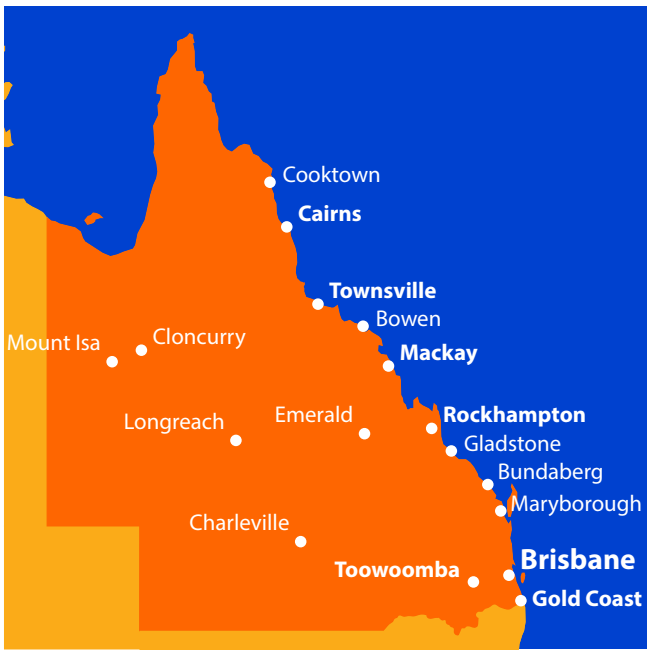
I love the variety of my job and the people I encounter, particularly explaining complex concepts in plain English. My background in running a chemical processing business provided valuable commercial knowledge, and I've since gained broader expertise across different sectors like industrial chemicals, refinement processes, and specialty products. The most challenging aspect is dealing with people who don't understand wanting to make changes that won't fix problems they have perceived incorrectly. However, seeing people working in great chemical manufacturing jobs and achieving good outcomes for the industry in Queensland is incredibly rewarding.

For students considering this career path, I recommend studying subjects like accounting, biology, business, chemistry, earth and environmental science, economics, engineering, English, general mathematics, and languages. Applied subjects that would be beneficial include business studies, engineering skills, essential English, essential mathematics, industrial technology skills, information and communication technology, and science in practice.

My advice to Year 10 students considering a career in manufacturing? "Go for it, you'll be home in time for dinner each night and you can leave your stress at the office."

"…before entering the industry, I had almost no knowledge about manufacturing - I didn't even realise the extensive impact of chemical processing in everyday life."

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:

"oil refinery QLD"

For this specific industry here are some terms to try:

- Chemical Processing
- Solvent manufacturer
- Gas Processing Plant
- Refinery/Oil Refinery
- Oil Processing
- Coal refinery
- Resource Refinery

Try variations of "processing" and "manufacturing"

Use "plant" or "facility" for more specific 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:

- advanced refining technologies
- chemical process optimisation
- catalytic conversion methods
- hydrocarbon processing innovations
- industrial chemical synthesis
- refinery automation systems
- molecular separation techniques
- chemical reactor design
- continuous flow chemistry
- green chemical processing

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

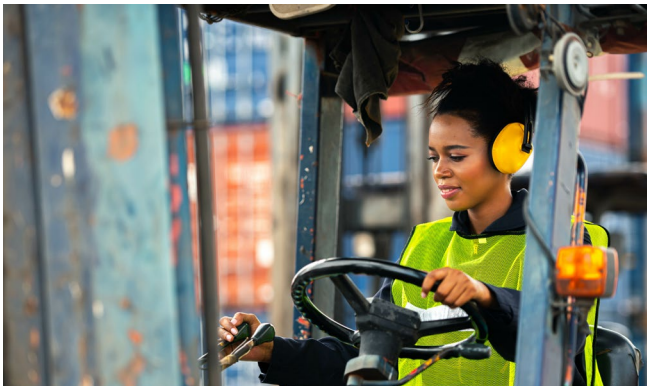
In Queensland, an industry training pathway blends secondary school education with hands-on vocational training, allowing students to gain practical skills and qualifications while completing their high school certificate.

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
- Operations Manager
- 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.

- Chemical Engineer
- Industrial Engineer
- Renewable Energy Engineer
- Biotechnologist
- Metallurgist
- Quality Engineer
- Artificial Intelligence Engineer
- Additive Engineer
- Composite Engineer
- Data Analyst
- Environmental Engineer
- Senior Laboratory Technician
- Process Plant Technologist
- Sustainability Officer
- Process Improvement Analyst
- Quality Assurance Officer
- Engineering Draftsperson
- Engineering Assistant
- Calibration Technician
- Chemical Technician/Analyst
- Environmental Monitoring Technician
- Non-Destructive Testing (NDT) Technician
- Systems Engineer
- Compliance and Safety Officer
- Trainer and Assessor
- Laboratory Technician
- Process Operator
- Process Plant Operator
- Plant Technician
- Process Worker
- Factory Worker
- Storeperson
- Warehouse Operator
- Machine Operator
- Laboratory Assistant
- Assembly Worker

For further information, visit:

manufacturingmatters.com.au/careers/

Future Industry

FUTURE TRENDS AND INNOVATION

The future of Queensland's Chemicals, Hydrocarbons and Refining industry aligns with Australia's national economic priorities, particularly in sustainable manufacturing, emissions reduction, and advanced process development. These changes support the Future Made in Australia plan's goals of strengthening sovereign manufacturing capabilities and developing advanced processing technologies.

KEY TRENDS INCLUDE:

Digital Manufacturing: Integration of artificial intelligence and digital twin technology in chemical processing, enabling real-time optimisation and predictive maintenance. This includes advanced process control systems that maximise efficiency and product quality.

Green Chemistry: Development of sustainable chemical processes and bio-based products, aligned with the growing demand for environmentally responsible manufacturing. This includes renewable feedstock utilisation and carbon capture technologies.

Advanced Processing Technologies: Implementation of smart sensors and automated control systems in chemical processing, supported by industry-specific digital skills training programs.

Sustainable Manufacturing: Adoption of circular economy principles, including waste-to-resource technologies and advanced recycling systems for chemical products and materials.

FUTURE ROLES IN THE INDUSTRY

Leadership Roles:

- Sustainable Chemistry Director: Oversees green chemistry initiatives
- Digital Operations Manager: Leads smart factory implementation
- Environmental Compliance Manager: Coordinates emissions reduction programs
- Innovation Leader: Implements advanced processing technologies

Technical Roles:

- Process Technology Specialist: Maintains advanced control systems
- Digital Systems Engineer: Programs automated processing equipment
- Green Chemistry Specialist: Develops sustainable chemical processes
- Emissions Control Technician: Monitors environmental systems
- Industry 4.0 Coordinator: Supports workforce digital transition

FUTURE SKILLS FOCUS

Emerging skills requirements across all levels include:

- Digital process control and data analytics
- Sustainable chemistry practices
- Environmental monitoring and compliance
- Advanced process optimisation
- Cross-disciplinary communication

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 digital skills in traditional chemical processing 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

nrmmrrd.qld.gov.au/manufacturing

BUSINESS QUEENSLAND

business.qld.gov.au/industries

REGIONAL DEVELOPMENT AUSTRALIA

rdabrisbane.org.au

ADDITIONAL GOVERNMENT LINKS

Chemicals and plastics manufacturing

energy.gov.au

Trade Investment Queensland, Biofuels and Biochemicals

tiq.qld.gov.au

INDUSTRY ASSOCIATIONS

Chemistry Australia, Manufacturing and supply chains

chemistryaustralia.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