RAIL MANUFACTURING STRATEGY FOR QUEENSLAND

JUNE 2021

Queensland Government

Downer Maryborough manufacturing workers

Copies of this publication are available on our website at www.rdmw.qld.gov.au and further copies are available upon request to:

Department of Regional Development, Manufacturing and Water

PO Box 15009, City East, Queensland 4002

Phone: 13QGOV (13 74 68)

Email: info@rdmw.qld.gov.au

Web: www.rdmw.qld.gov.au

COVER
The Queensland Tilt -Train fleet carries over 180,000 passengers a year between Brisbane, Bundaberg, Rockhampton and Cairns. Travelling at up to 160km per hour, these are some of the fastest trains in Australia.

Foreword

The Queensland Government is committed to strengthening, transforming and revitalising the rail manufacturing sector in Queensland.

Queensland has been building trains since 1873 and since then the rail manufacturing sector has expanded to be an essential element of our state's manufacturing industry. Queensland's rail manufacturing sector encompasses rollingstock manufacturing, maintenance and repair; rail infrastructure construction and maintenance; and operational systems technology supply chains. In 2018–19, the sector directly employed over 3,700 people, contributed around $600 million to the state economy and generated revenues of $1.7 billion.

The revitalisation of this sector supports investment in rail infrastructure and contributes to the Queensland Government's focus on economic recovery following COVID-19, creating more Queensland jobs across more Queensland industries. Regional communities, in particular, benefit from the important contributions made to the local economy where manufacturing, maintenance and rail suppliers form clusters of expertise. The regional centres of Maryborough, Rockhampton and Townsville, along with Ipswich, have concentrations of rail manufacturing expertise that provide economic benefits, supply chain opportunities and jobs for the local economies.

The government has affirmed its commitment to rail manufacturing and supporting regional manufacturing by announcing:

- A $1 billion pipeline of rail manufacturing and maintenance for Maryborough. The pipeline includes building 20 new trains in Maryborough costing $600 million to service Cross River Rail and the $385 million pipeline of existing work to maintain Queensland Rail's suburban passenger fleet over the next decade.
- Rail manufacturing will be revitalised in regional areas such as Rockhampton. The government plans to secure land at the former Aurizon Rockhampton workshops site to support a rail maintenance, manufacturing and logistics centre. Rockhampton and regional manufacturers will have the opportunity to supply components for the 20 new trains such as electrical looms and fibreglass forming.

This strategy recognises substantial benefits to be derived from the local manufacture of rail rollingstock and local content in rail infrastructure projects. It also takes into account future growth opportunities presented to the sector by Industry 4.0, and the substantial state and national pipeline of rollingstock and rail infrastructure projects.

To this end, the strategy provides a framework for government and industry to work collaboratively to further strengthen the rail manufacturing sector, help create jobs, support a high performing workforce, build a strong ecosystem and accelerate the adoption of new technologies associated with advanced manufacturing.

Through the strategy, government and industry are working cooperatively towards addressing the peaks and troughs in demand for rail rollingstock and infrastructure projects by developing a sustainable pipeline of work.

Government has worked with rail manufacturing sector leaders to identify four key focus areas and 10 related actions. The four focus areas are:

- developing a sustainable rail manufacturing sector
- optimising local content
- building on existing specialisations, capabilities and skills
- strengthening Queensland's rail manufacturing ecosystem to drive investment and exports.

Rail manufacturing is a key element within Queensland's broader transport manufacturing sector and our united economic response to COVID-19. Queensland has Australia's largest heavy vehicle manufacturing precinct between Ipswich and Brisbane with extensive expertise in truck, bus and defence vehicle manufacturing and maintenance. Building its rail manufacturing will further strengthen Queensland's transport manufacturing expertise.

The Queensland Government will continue to work with stakeholders to transform Queensland's manufacturing industry to create jobs for Queenslanders and ensure economic growth for our state.

The Hon. Glenn Butcher MP

Minister for Regional Development, Manufacturing and Water

The Hon. Mark Bailey MP

Minister for Transport and Main Roads

A GT42 locomotive in Downer's Maryborough heavy lift shed

Contents

Foreword 1

About the strategy 4

Vision 6

SECTION 1 – INVESTED IN RAIL MANUFACTURING 8

Rail manufacturing – a snapshot 9

Current ecosystem 10

Future opportunities 14

A 21st century advanced manufacturing sector 18

Skills development 22

SECTION 2 – TRANSFORMING QUEENSLAND'S RAIL MANUFACTURING SECTOR 28

Focus Area 1. Developing a sustainable rail manufacturing sector 29

Focus Area 2. Optimising local content 30

Focus Area 3. Building on existing specialisations, capabilities and skills 32

Focus Area 4. Strengthening Queensland's rail manufacturing ecosystem to drive investment and exports 34

Action plan 40

Measuring success 42

About the strategy

A new era of expansion in rail infrastructure is now unfolding and Queensland's rail manufacturers have the opportunity to participate in multi-billion-dollar rail projects.

Developing a Rail Manufacturing Strategy for Queensland (the strategy) is an initiative under the Queensland Government's *Advanced Manufacturing 10-Year Roadmap and Action Plan* (the Roadmap). The strategy has two major sections:

Section 1: Invested in rail manufacturing

Queensland has national strengths in rail manufacturing. The sector has historical and current capabilities and a sophisticated supply chain across three segments: railway rollingstock manufacturing, maintenance and repair; rail infrastructure construction and maintenance; and operational systems technology.

Fifteen key manufacturing, maintenance and repair facilities and major suppliers make substantial contributions to the state economy. Four research centres with rail manufacturing expertise and TAFE Queensland's Rail Centre of Excellence complement these rail manufacturers to round out the state's current rail manufacturing ecosystem.

Expertise in rail manufacturing and construction is located across the state with concentrations in Brisbane, Ipswich, Maryborough, Rockhampton and Townsville highlighting the importance of rail manufacturing to these regional economies.

As is the case across Australia and internationally, there are strong drivers for growth that are stimulating expansion in Queensland's rail transport sector: population growth, urban transport congestion and the trend toward rapid and frequent public transport services.

Industry estimates suggest that there is a $155 billion pipeline of rail infrastructure projects across the nation in the coming 15 years.[1]

Queensland is home to several of these high-value projects: the $5.4 billion commitment to the Cross River Rail project, the Queensland component of the $14.5 billion Melbourne to Brisbane Inland Rail (Inland Rail) project, the $634 million European Train Control System Inner City project and major upgrade projects such as the $551 million commitment towards the Beerburrum to Nambour rail line project.

Substantial benefits can be realised from local participation in rail projects. With rollingstock, for example, in addition to direct employment, it is estimated that at the national level the sector generates 1.4 additional indirect jobs for first-order suppliers, creates highly-skilled jobs and contributes to regional communities.[2] It is estimated that for every $100 million of output from rollingstock manufacturing around: $61 million of inputs are from other Australian industries and $19 million of inputs are from local labour and capital.[3]

The government has announced a $1 billion pipeline of rail rollingstock manufacturing and maintenance work for Maryborough. Twenty new trains costing $600 million will be built in Maryborough to service Cross River Rail in addition to the $385 million existing pipeline of work in Maryborough to maintain Queensland Rail's South East Queensland passenger trains. Rail industry supply chains will be strengthened to support suppliers and jobs across the state, including in Cairns, Townsville, Redbank and revitalising the former Aurizon workshops in Rockhampton.

The pipeline of projects in Queensland provides rail manufacturers with outstanding opportunities to participate in major new work. Major rail rollingstock and construction projects are, however, highly competitive. For Queensland suppliers to win a substantial share of the national pipeline, local manufacturers need to build on and expand their current capabilities.

This strategy identifies four specific focus areas and 10 actions and aims to strengthen, transform and revitalise Queensland's rail manufacturing sector to capture a substantial portion of the national rail market.

Queensland Rail train

Section 2: Transforming Queensland's rail manufacturing sector

To transform Queensland's rail manufacturing sector to be sustainable and competitively priced, industry leaders identified four focus areas to drive this transformation:

- developing a sustainable rail manufacturing sector
- optimising local content
- building on existing specialisations, capabilities and skills
- strengthening Queensland's rail manufacturing ecosystem to drive investment and exports.

These four focus areas identified in consultation with industry create the conditions for increased private sector investment and develop manufacturers' capabilities to revitalise the sector.

To guide revitalisation of the sector, a Rail Manufacturing Leaders Advisory Group will be formed to provide advice from stakeholders such as industry, unions, representation from people with disability and research institutions on implementing the strategy (Action 1).

This strategy recognises the need to meet network demand for rollingstock and rail infrastructure and simultaneously optimise local content. New capital expenditure will be encouraged by addressing two key issues:

- manufacturers' confidence in an ongoing pipeline of sufficient work to provide a return on the new capital investment, and
- manufacturers' capacity to meet the delivery schedules required in the procurement of rail infrastructure.

The actions directly address these two issues by: prioritising and scheduling strategic rail infrastructure and rollingstock projects and major procurements, supporting demand across time (Actions 2 and 3).

Local content is promoted in government and private procurement for rail projects along with enhanced buyer-supplier relationships and by harmonising rail manufacturing standards (Actions 4, 5 and 6).

Building rail manufacturing capabilities and skills is supported by creating a sustainable pipeline of work with specific areas of specialisation (Actions 7 and 8).

Rail rollingstock and construction projects are large and complex. Queensland's rail manufacturing ecosystem can be strengthened by encouraging manufacturers to collaborate and deliver on major local and export projects (Actions 9 and 10).

These actions taken together will assist in revitalising Queensland's rail manufacturing sector, attract investment and create jobs.

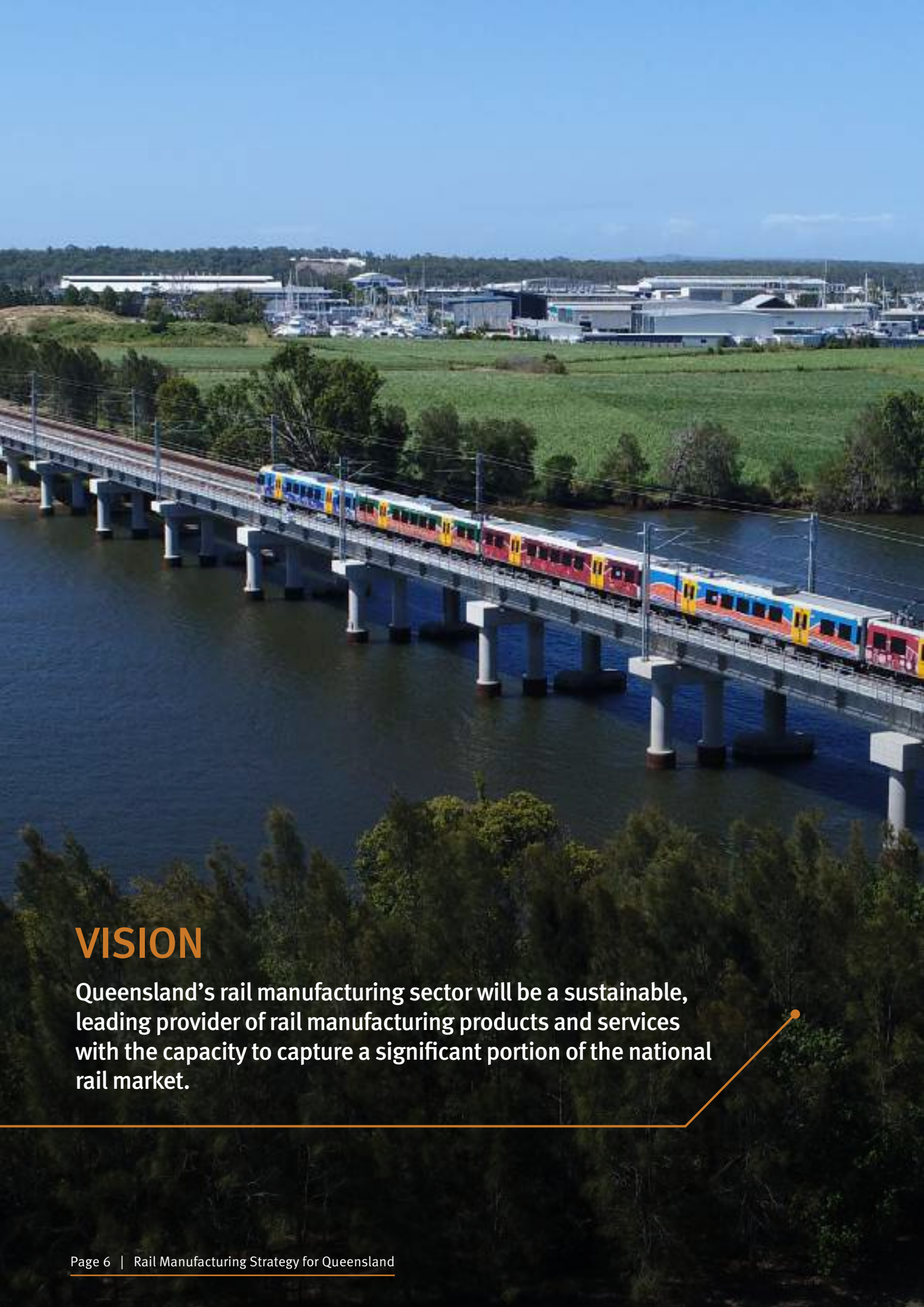
10 ACTIONS FOR GROWTH

1	Establish a Rail Manufacturing Leaders Advisory Group
2	Reduce fluctuations in strategic rail infrastructure and rollingstock projects and major procurements
3	Influence the implementation of the National Rail Action Plan
4	Optimise local content
5	Enhance buyer-supplier relationships
6	Harmonise manufacturing standards
7	Build on existing areas of specialisation
8	Build on existing skills and capabilities
9	Increase connectivity and collaboration
10	Attract investment, promote the industry and drive export opportunities

The government will work together with industry, unions, TAFE Queensland and research institutions in the rail manufacturing ecosystem to implement the actions in this strategy to build a sustainable rail manufacturing sector in Queensland

CONSULTATION WITH INDUSTRY AND STAKEHOLDERS

Government has worked closely with industry and union leaders to develop this strategy. The Rail Manufacturing Leaders Group (RMLG) was formed to capture sector specific expert advice needed to inform development of the strategy. The RMLG brought together senior industry representatives from Aurizon, the Australian Manufacturing Workers' Union (AMWU), Alstom Transport Australia, CPB Contractors, Downer Group, Laing O'Rourke and Queensland Rail to contribute to and guide preparation of the strategy and actions for growth. The Manufacturing Ministerial Council was also consulted during the entire process from conception to completion of the strategy.



VISION

Queensland's rail manufacturing sector will be a sustainable, leading provider of rail manufacturing products and services with the capacity to capture a significant portion of the national rail market.

The strategy positions Queensland as a leading provider of high performing, reliable and cost-effective rail manufacturing products and services that meet the current and future requirements of Australia's rail industry.

Queensland Rail train

SECTION 1

INVESTED IN RAIL MANUFACTURING

Queensland Rail maintenance workshop in Mayne, Brisbane

Rail manufacturing – a snapshot

RAIL MANUFACTURING SECTOR

3,700 jobs | $600m value-added | $1.7b in revenue

RAILWAY ROLLINGSTOCK MANUFACTURING, MAINTENANCE AND REPAIR

RAIL INFRASTRUCTURE CONSTRUCTION AND MAINTENANCE

OPERATIONAL SYSTEMS TECHNOLOGY

These three segments play a major role in manufacturing, maintaining, refurbishing, repairing and supporting the broader rail transport and construction sector.[4]

Railway rollingstock manufacturing, maintenance and repair — companies that manufacture, refurbish, maintain or repair railway locomotives and rollingstock including rail carriages, tram cars and wagons for passenger, freight and light rail.

Rail Infrastructure Construction and Maintenance

Construction — companies and contractors that construct, reconstruct and repair railway tracks including track laying, platform construction, tramway construction, tunnelling, overhead powerline and signalling construction.

Maintenance — companies that maintain and repair rail lines including capital works, track maintenance, tramway maintenance and signalling equipment maintenance.

Operational systems technology — companies that construct or maintain signalling equipment and systems above and below rail. This technology segment incorporates high voltage, telecommunication, security and signalling systems. Major technological advances are taking place in this segment relating to:

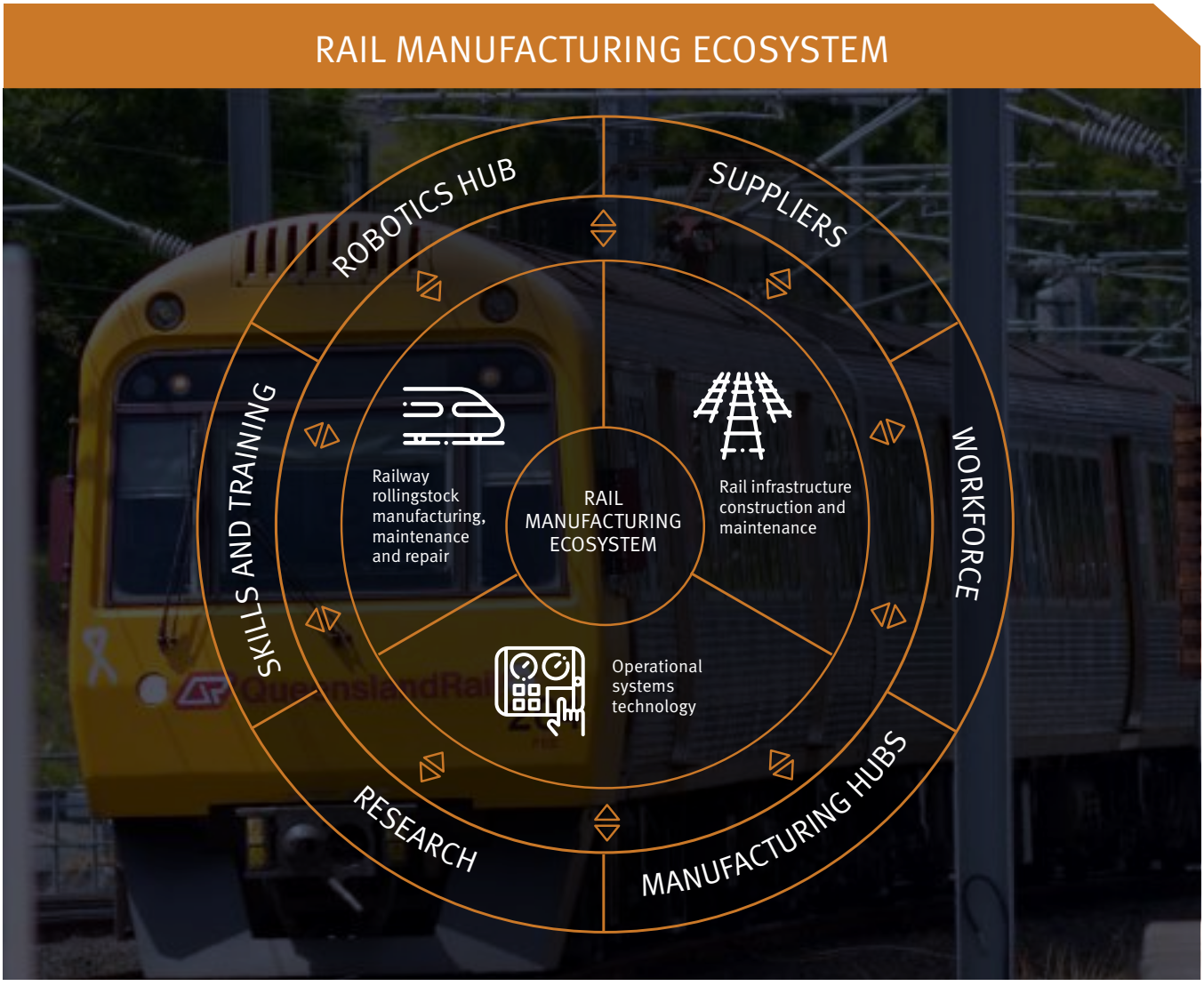
Automatic Train Control Systems — a range of computer-based systems that assist in controlling the movement of trains.

Automated Conditioning Monitoring Systems — enable remote access to collect and analyse data and facilitate real-time diagnostics.

Automated Visual Inspection Systems — advanced scanning technology providing extensive data on the condition of train fleets to improve efficiency and quality of maintenance diagnostics.

Current ecosystem

The rail manufacturing ecosystem provides a major contribution to the Queensland economy and regions.



ECOSYSTEM

Increasing collaboration, building a highly-skilled workforce, improving supply chain management and implementing advanced manufacturing technologies and business models will maximise capabilities, production efficiencies and quality improvements which in turn drive increased productivity, international competitiveness and employment growth.

Place is important in industrial ecosystems. Queensland has concentrations of rail construction and manufacturing expertise in Brisbane, Ipswich, Maryborough, Rockhampton and Townsville where it is a key contributor to the economy and jobs.

MARYBOROUGH

Maryborough is host to the Downer rail manufacturing, refurbishment, repair and maintenance centre. Downer's Maryborough Service Delivery Centre is the only facility with the current capability to manufacture passenger train car sets in Queensland. The facility has a 150-year history of

manufacturing and has delivered over 1000 passenger rail cars and 1000 locomotives to customers around Australia.

There is also a substantial network of capable local suppliers including Alstom, Global Manufacturing Group, CQMS Razer, Dix Welding Works, Vickers Aluminium, ISM Manufacturing, Steelrite, Bearing Service Centre, Bendpro, Olds Engineering and Chrome Engineering.

ROCKHAMPTON (CENTRAL QUEENSLAND)

Rockhampton region in Central Queensland has substantial expertise in rail manufacturing. Aurizon has maintenance facilities in Rockhampton, Callemondah (Gladstone) and Jilalan (Sarina). Queensland Rail has a maintenance facility in Gracemere, Pacific National has a maintenance facility at Nebo and Central Queensland University (CQUniversity) in Rockhampton hosts the Centre for Railway Engineering (CRE).

There are also significant rail manufacturing suppliers in Central Queensland (Rockhampton, Gladstone and Mackay) including Berg Engineering, Rhomberg Rail Australia, Schwarz Excavations, Siemens, SMW Group and voestalpine VAE Railway Systems. Rockhampton is also home to the Manufacturing Hub which has a focus on rail manufacturing.

IPSWICH

The region around Ipswich has a well-developed concentration of rail manufacturing expertise including:

- Alstom's Wulkuraka New Generation Rollingstock Maintenance Centre (Wulkuraka facility) to maintain the fleet of 75 six car New Generation Rollingstock passenger trains
- Progress Rail's major remanufacturing, rebuilding, repair and maintenance centre at Redbank
- Queensland Rail's maintenance facility in Ipswich
- Key suppliers to the rail manufacturing sector including Bend-Worx, and HVAC.

The Redbank facility was operated by Aurizon as a major refurbishment workshop for freight locomotives and historically refurbished passenger rail cars for Queensland Rail. Progress Rail has a substantial site at Redbank that strips down and completely remanufactures freight locomotives for freight operators such as Aurizon, Pacific National and Queensland Rail.

TOWNSVILLE

A concentration on rail manufacturing is also present in Townsville. Aurizon has approximately 60 employees at its maintenance facilities at Stuart:

- a locomotive maintenance depot provides regular maintenance and repair services for approximately 70 locomotives
- a separate wagon depot maintains and repairs 1,780 wagons, including wagons owned by Aurizon and other freight customers
- these facilities maintain rollingstock operating on the Mt Isa Line, the North Coast Line and other rail corridors in Queensland.

The Wulguru Rail Maintenance facility is privately owned by the Wulguru Group which maintains and refurbishes rollingstock wagons, bogies, wheels and axles. The purpose built facility has over 15,000m2 of workshop space and the company also provides off site maintenance services.[5]

There is a network of local suppliers that provide inputs for these facilities.

BENEFITS TO QUEENSLAND

- **3,700** direct jobs[6]
- **15** key manufacturing, maintenance and repair facilities
- **$600m** gross value added per year[6]
- **$392m** forecast to be spent by Queensland Rail on below rail network maintenance in 2019-20[7]
- **4** universities with extensive rail expertise and **1** TAFE Queensland Rail Centre of Excellence
- **1.4** additional indirect jobs for every direct rail rollingstock job[8]
- **MULTIPLE** industry suppliers across a range of sectors
- Around **10,000** kilometres of railway line to be maintained[9]

ECONOMIC BENEFITS FOR QUEENSLAND

Rail manufacturing provides substantial flow-on benefits for related industries and the wider economy.

Analysis undertaken by Deloitte Access Economics, using Australian Bureau of Statistics Input-Output Table 2016-17 data, indicates that, at the national level, for every $100 million of output from the rail rollingstock manufacturing segment, there is: $61 million in inputs from other Australian industries, $19.2 million of labour and capital, $18.8 million of imports from overseas and $1 million in taxes.[10]

These results are considered indicative (i.e. a reasonable proxy) for Queensland given the state has a significant share (around 22 per cent) of the national total rail rollingstock manufacturing segment and employment in the sector.

Economic activity in the rail manufacturing sector provides a driver for other important industry segments. Of the $61 million in inputs from other industries, there are substantial inputs from sectors including:

- Manufacturing $30.1 million
- Professional, scientific and technical services $6.8 million
- All other services $14.5 million
- Wholesale trade $3.4 million.[10]

Rail manufacturing also provides important opportunities for high value added exports to other Australian jurisdictions and international markets.

The Downer and Bombardier (now Alstom) partnership has built 48 two-car and 78 three-car rail sets of the TransPerth A- and B-series fleets at the Maryborough manufacturing facility for Western Australia's Public Transport Authority.

Harsco Rail is another manufacturer that builds and exports rail equipment from its Brendale facility in Brisbane. Harsco specialises in manufacturing equipment used in track construction and maintenance such as heavy vehicle rail grinders and Track Geometry Inspection Vehicles as shown below.

ECONOMIC VALUE OF $100 MILLION OF RAIL ROLLINGSTOCK MANUFACTURING OUTPUT, AUSTRALIA[10]

Harsco Rail's Track Geometry Inspection Vehicle (TGIV) – built in Brendale, Brisbane for export to South Africa

DOWNER'S MARYBOROUGH FACILITY

150 YEARS OF MANUFACTURING IN MARYBOROUGH

Downer's historic Maryborough Service Delivery Centre (SDC) has been operating for over 150 years and employs over 250 Queenslanders. The first casting in January 1869 marked the start of manufacturing at the site established by John Walker - and the site has maintained a long and proud history since then.

DOWNER'S MARYBOROUGH CAPABILITIES

Maryborough is a major rollingstock manufacturer, overhaul, repair and refurbishment centre, delivering over 1000 passenger rail cars and 1000 locomotives to customers around Australia. Today the complex extends over 11 hectares, including a 4.5 hectare customised workshop fully equipped for fabrication, machining and component overhaul.

The Maryborough facility has manufactured heavy passenger rail car sets, light rail trams and locomotives for operation in Queensland and Western Australia.

EMU / IMU160 / SMU260 fleet — a total of 228 train sets for Queensland Rail's suburban and interurban network. Downer partnered with then Bombardier to deliver 64 of these trains between 2006 and 2011.

Transperth B series — in partnership with then Bombardier, Downer manufactured 78 three-car sets of new B-Series trains for Perth's Public Transport Authority at the Maryborough facility. Delivery of these rail cars commenced in 2004 and was completed in June 2019.

Cairns Tilt Train — two, innovative, diesel-powered, nine-car vehicles were manufactured in Maryborough, including fabrication of the bodyshells and bogies as well as full assembly, testing and commissioning. A third nine-car set, the Sunlander, was delivered in 2014.

Current overhaul projects — work for Queensland Rail includes the L-Series Passenger carriage and the 1700/2400 Class freight locomotives overhauls.

QUEENSLAND NEW GENERATION ROLLINGSTOCK

In 2019 Downer was awarded a $85 million contract by then Bombardier for modification of Queensland's New Generation Rollingstock (NGR) fleet in Maryborough. Alstom acquired Bombardier in January 2021 and Downer is delivering accessibility upgrades to 75 trains with work continuing until 2024.

DOWNER AND GOVERNMENT WORKING TOGETHER

The Queensland Government is working with Downer to support rail manufacturing in Queensland. Government invested $10 million in infrastructure improvements at the Maryborough facility to support accessibility upgrades on the NGR trains and has also awarded $278 million in major rail projects since 2016 for Downer's Maryborough operations. On 6 December 2019, a Memorandum of Understanding was signed at Maryborough that commits to a $300 million pipeline of manufacturing in Maryborough over the next decade.[11]

Downer locomotive and B-Series passenger train for export to Western Australia

Future opportunities

Major changes are taking place across the globe in the rail transport industry. Increased demand for rail transport and more flexible, customer-focused transport systems and new technologies are driving increased growth in rail infrastructure and manufacturing.

TRANSPORT MANUFACTURING IN QUEENSLAND

Queensland's rail manufacturing sector plays a vital role in the state's broader transport manufacturing industry.

Queensland has Australia's largest heavy vehicle manufacturing precinct in the corridor between Ipswich and Brisbane with heavy vehicles and defence vehicle manufacturing facilities. Volvo Group is Australia's largest manufacturer of heavy duty vehicles building Volvo and Mack trucks at its Wacol facility and Rheinmetall Defence Australia will be building the next generation of military combat reconnaissance vehicles for the $5 billion LAND 400 Phase 2 project for the Australian Defence Force.[12] Bustech is one of the leading bus manufacturers in the country building Transit Australia Group (TAG) buses at Burleigh Heads.[13]

Queensland is in a unique position to capitalise on this transport manufacturing expertise to access emerging domestic and international markets, grow the sector and create jobs.

New technology will play a major role in transforming rail and heavy vehicle transport in the future. Renewable energy technologies to power trains and road vehicles are being developed across the world ranging from hydrogen fuelled trains (e.g. Alstom in Germany) to hydrogen fuelled trucks (e.g. Toyota and 7-Eleven trucks in Japan). Alstom's Brisbane office is responsible for Alstom's hydrogen train strategy across the Asia Pacific region. Through the Queensland Government's Hydrogen Industry Strategy, the state is well-positioned to realise the potential of these technologies to generate economic growth and create jobs.[14]

MAJOR RAIL CONSTRUCTION PROJECTS[15]

Cross River Rail for Brisbane

- **Queensland has committed $5.4 billion to the transformational Cross River Rail project**
- **A new 10.2 kilometre rail line from Dutton Park to Bowen Hills, which includes 5.9 kilometres of tunnel under the Brisbane River and CBD**

Melbourne to Brisbane Inland Rail

- **Estimated total cost of around $14.5 billion with a substantial component in Queensland**
- **The largest freight rail infrastructure project in Australia**
- **A once-in-a-generation 1,700 kilometres project connecting the national freight network between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland**

Beerburrum to Nambour upgrade

- **$550 million committed to the project**
- **Rail line upgrade to 40 kilometres on the North Coast line between Beerburrum and Nambour stations**

Rail infrastructure upgrade projects

- **$725 million in other rail upgrade projects included in the 2019-20 budget**
- **$634 million European Train Control System - Inner City implementation**

RAIL MANUFACTURING OPPORTUNITIES

There is a major revival in rail transport around the world, including light rail, metro, heavy rail and high speed rail. The national pipeline of rail infrastructure projects is estimated to be $155 billion over the next 15 years.[16]

The pipeline of multi-billion dollar rail infrastructure and rollingstock projects presents a significant opportunity for Queensland's rail manufacturing sector where we have specialist capability.

This strategy provides a framework for rail manufacturers to capitalise on current and emerging rail transport and infrastructure projects.

Civil works such as tunnels and bridges are a major component. These projects have the potential to create significant demand for rail-related goods and services, grow jobs and act as a catalyst to regional economic development.

Demand for public transport in Queensland is increasing. Across the public transport sector as a whole, about 550,000 trips per day were taken in South East Queensland (SEQ) in 2017. It is estimated that by 2050, there will be a threefold increase to around 1.6 million passenger transport trips per day in SEQ.[17] Passenger rail comprises a substantial part of public transportation. Around 55 million passenger trips were taken on Queensland Rail's Citytrain network in 2018-19, which is an increase of 4.3 per cent over 2017-18.[18]

With respect to freight, around 15 billion gross tonne kilometres were hauled on the Queensland Rail network in 2017-2018.[19] Rail accounted for an estimated 32.5 per cent of Queensland's freight task in 2016-17 and it is anticipated that the rail freight task will increase by over 20 per cent in the next 10 years.[20]

Government initiatives will provide further opportunities for rail manufacturing in regional areas in Rockhampton, Cairns, Townsville as well as in Ipswich. Twenty new passenger trains will be built in Maryborough for Queensland Rail. The former Aurizon workshops will be revitalised as a rail maintenance, manufacturing and logistics centre and components such as electrical looming and fibreglass forming for the 20 new trains will provide opportunities for local suppliers in the Rockhampton region. Upgrades will be made to the Queensland Rail Portsmith rail maintenance facility in the Cairns region; Queensland Rail's maintenance facility in Townsville will be maintained and additional work will be undertaken at the Redbank workshops in Ipswich.

Murrumba Downs Railway Station, one of the six new rail stations included in the estimated $1 billion Moreton Bay Rail Link construction project undertaken by CPB Contractors

QUEENSLAND RAIL

Founded in 1866, Queensland Rail employs more than 7,300 people with fixed assets valued at $7.8 billion, maintaining and operating over 6,500 kilometres of train track with 222 stations across Queensland.[21]

Queensland Rail operates the following core services :

- Citytrain
- Travel and Tourism
- Regional Network and Freight.

More than 50 million customer journeys are undertaken on the Citytrain Network per year, while 700,000 customer journeys are undertaken on the Travel and Tourism trains per year.

Queensland Rail continues to invest significantly in constructing and maintaining infrastructure to improve the performance of its network in terms of reliability, safety and value for money.

Queensland Rail manages and maintains over 6,500 of Queensland's 10,000 kilometres of mainline rail track.[22]

This includes 855 kilometres of mainline track as part of the Citytrain network and 5,760 kilometres of mainline track as part of the regional network.

Of Queensland Rail's total employment, more than 2,400 employees are in its Network team to manage and maintain its extensive network of track and assets.

Major projects underway in 2019–20 on the network include:

- Toowoomba Range Clearance Upgrade
- Toowoomba Range Slope Stabilisation
- North Coast Line Capacity Improvement
- Yeppoon Rail Line Upgrade.

Network maintenance involves planned preventative maintenance, corrective maintenance and staged inspections across all Queensland Rail assets.

HITACHI RAIL STS AUSTRALIA

INNER CITY EUROPEAN TRAIN CONTROL SYSTEM PROJECT

Hitachi Rail STS Australia is part of the Hitachi Group which is a major global corporation with almost 300,000 employees in March 2019.

Hitachi Rail STS is one of the world's major rail signalling and rail transport providers producing a wide range of railway lines and rollingstock from freight locomotives, to light rail, heavy passenger rail through to high-speed trains.

Hitachi Rail STS Australia provides specialist engineering services, systems integration and turnkey project delivery of signalling, communications and control systems for metro, light rail, passenger and heavy freight railways throughout the world.

BRISBANE OFFICE OF HITACHI RAIL STS AUSTRALIA

Inner City European Train Control System Project

Hitachi has been announced as the preferred supplier for the $634 million Inner City ETCS project. The ETCS will allow trains to travel safely with reduced times and distances between trains to enable more trains on the network at the same time which reduces bottlenecks and congestion.

Global Centre of Excellence in Freight Solutions and Freight Automated Dispatching Systems

The Brisbane centre also hosts Hitachi's Freight Solutions operations which is responsible for Rio Tinto Iron Ore's driverless freight train system. The project involves 130 trucks in the Pilbara iron ore operations being controlled remotely about 1,500 kilometres away in Perth. Hitachi has provided the advanced technology signalling systems to enable this driverless capability to operate.[23]

Laing O'Rourke deployed a helicopter to assist in installation of the overhead power lines for the Bauhinia rail line

A 21st century advanced manufacturing sector

Queensland's rail manufacturing sector is adopting advanced manufacturing technologies and practices which will result in an improved competitive position.

Queensland's rail manufacturing sector is addressing the changing global environment of the rail transport industry by embracing advanced manufacturing such as new technologies, effective supply chain management and providing high value-added customer-focused services.

Advanced manufacturing and Industry 4.0 are being championed by rail manufacturers across the supply chain and industry leaders have identified that a major transformation is taking place in the operational systems technology segment. New technologies are revolutionising train signalling, train control, condition monitoring and automation in this segment as outlined in the following section.

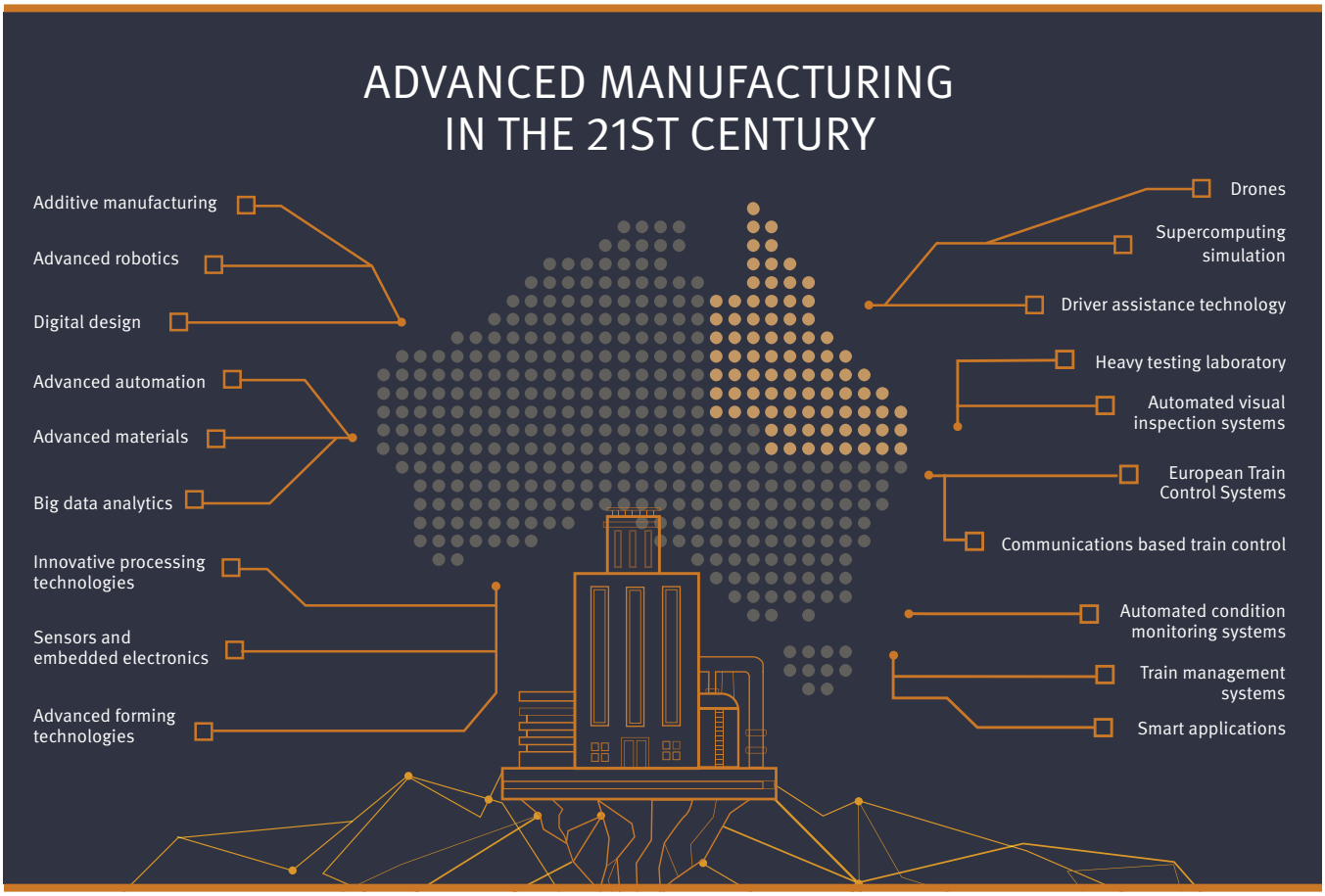
Industry 4.0 is a key enabler for advanced manufacturers, connecting big data and analytics with automation and robotics, cloud computing and system/software integration to create 'smart factories'.[24]

OPERATIONAL SYSTEMS TECHNOLOGY

New technology in rail signalling will enable additional capacity on congested rail networks, reduce equipment failures and provide greater reliability for passenger and freight networks.[25] Automated monitoring technologies will use sensors, drones and big data to analyse the condition and performance of rail rollingstock and railway lines, enabling repairs to be anticipated and undertaken before faults occur.

Advanced technology is playing a major role in the transformation of rail transportation and manufacturing around the globe and in Queensland. New technologies are transforming the operational systems technology segment of the rail industry.[26] These include:

- automatic train control systems
- driver assistance technology
- automated conditioning monitoring systems
- automated visual inspection systems.



AUTOMATIC TRAIN CONTROL SYSTEMS

Automatic Train Control Systems are revolutionising signalling and train control operations across the globe.

Queensland is adopting the European Train Control System (ETCS) as a primary protection system overlay for signalling and train control. ETCS uses trackside equipment in conjunction with a European Vital Computer and equipment installed within the train cab. Safety is enhanced and the ETCS effectively eliminates the occurrences of signals passed at danger. The system enables shorter distances between trains which allows more trains to use a particular part of the network in a given time period. ETCS Level 2 continuously calculates distances between trains and train speeds through a radio block centre to allow trains in the network to operate at the maximum safe speed.[27]

Queensland will be well-placed for the further deployment of ETCS on the passenger rail network. It is intended that the ETCS L2 system in the Cross River Rail project will alleviate bottlenecks and allow additional capacity on congested parts of Brisbane's network to improve reliability and reduce journey times.[28]

In addition to the ETCS system, other proprietary train control systems deployed include Communications Based Train Control (CBTC).[29]

DRIVER ASSISTANCE TECHNOLOGY

These new technologies enable increased train movements, improved stopping precision and timing to allow more trains to operate on the line safely in a given time. These technologies include computer-based driver assistance technologies allowing the train driver to concentrate on core tasks.

Driverless metro trains are in operation for passenger transport internationally and domestically (e.g. Barcelona, Copenhagen, Dubai, Paris, Sydney, Vancouver) along with auto haul iron-ore freight trains in the Pilbara, Western Australia.[30]

Queensland has the opportunity to develop capabilities and skills to support the introduction of automatic train protection technologies and adopt driver assistance technologies to benefit train drivers.

AUTOMATED CONDITION MONITORING SYSTEMS

Automated Condition Monitoring Systems are cost effective train inspection systems that support condition-based maintenance. These systems can be used to inspect a range of train systems and components including brake pads, wheels, pantographs (overhead power units) and graffiti detection.

Predictive condition monitoring systems deliver accurate information to the maintenance management system to allow planned maintenance and deliver benefits such as:

- assets remotely monitored in real time
- maintenance schedules created dynamically based on the predicted condition of each single component
- improved reliability through early detection of worn material
- reduced damage to infrastructure (overhead lines, tracks)
- reduced maintenance, labour and vehicle downtime
- savings in materials costs by accurately assessing the remaining life of components.

Train information is available remotely allowing for real-time remote diagnostics, improved response times and providing valuable information for optimising the maintenance process.[31]

AUTOMATED VISUAL INSPECTION SYSTEMS

Automated Visual Inspection Systems can provide extensive data on the condition of carriages, providing accurate diagnostic data of critical maintenance issues including on the braking system, wheel profile, bearing temperature, the condition of roof-mounted pantographs and any exterior faults including graffiti.[32]

AURIZON IN THE FOREFRONT OF DEVELOPING ETCS IN QUEENSLAND

Aurizon is a major rail freight corporation headquartered in Brisbane with $3.1 billion revenue and 4,900 full-time equivalent employees across Australia in FY2020.

The company has below and above rail operations which include hauling coal, minerals and bulk freight with rail maintenance facilities in, for example, Gladstone, Jilalan, Toowoomba and Townsville.

Aurizon's operational trial of ETCS technology

Aurizon is developing a new train control solution that utilises ETCS Level 2 to support heavy-haul freight operations within the Central Queensland Coal Network (CQCN). An operational demonstration of this ETCS solution was completed in 2020. Aurizon will now proceed with deploying the ETCS solution, known as TrainGuard, in the CQCN, commencing with the deployment on the Blackwater mainline (Callemondah to Bluff).

Aurizon's TrainGuard Project represents a novel and less capital-intensive application of ETCS technology as a signalling overlay solution that would provide significant benefits. Under this application, line side signals will be retained and utilised together with ETCS Level 2.

ETCS is a high safety-integrity system that provides engineering control to improve safety by guarding against the scenarios of trains travelling too far or too fast. Eliminating these scenarios from a railway's operations significantly reduces the risk of incidents and accidents. The effectiveness of the controls and the associated data also provides opportunities for productivity improvements. It is expected that this novel application of ETCS as a signalling overlay solution will offer safety and productivity benefits to other rail infrastructure owners and operators.

Internet of things

Aurizon has deployed a prototype narrow band internet of things (NB-IoT) Telstra solution to measure rail temperature to better target temperature related speed restrictions, to reduce the number and area of wide area restrictions. This solution will be rolled out across the network in key areas in the near future. Solutions using Long Range Wide Area Network (LoRaWAN) gateways for high device density areas are also being considered, offering the potential for efficiency improvements.[33]

CPB CONTRACTORS

CPB Contractors is the Australasian construction company of the CIMIC Group

CPB designs and builds infrastructure rail, roads, tunnelling, defence, building and resources infrastructure. Rail experience includes delivering track, overhead line equipment and rail systems supported by expertise in civil works, bridge structures, buildings and tunnelling to provide complete infrastructure solutions.

CPB has delivered heavy and light rail construction projects that support the social and economic fabrics of cities and regions across Queensland. In 2018 CPB delivered Stage 2 of the Gold Coast Light Rail project ahead of the Commonwealth Games. CPB also delivered the Moreton Bay Rail project to link Queensland Rail transport infrastructure with communities, local road connections and shared-use paths in the Moreton Bay region. In regional Queensland, CPB has delivered significant rail projects to support the resources sector. Projects include 69km of civil works to link two of Queensland's major coal systems, a balloon loop and rail spur at Caval Ridge Mine and rail duplication between Rocklands and Stanwell to connect mines in Central Queensland to the export terminal at the Port of Gladstone.

MORETON BAY RAIL

CPB delivered the design and construction for the Moreton Bay Rail Project, a greenfield project which included a 12.6km dual track passenger line, six new rail stations and stabling yard at Kippa-Ring. The new stations maintain customer accessibility and increase efficiency, while provision of a shared path for cyclists and pedestrians offers local amenity, corridor connectivity and improved access to all stations.

GOLD COAST LIGHT RAIL

Stage 2 of the Gold Coast Light Rail creates a one-transfer journey between the Gold Coast and Brisbane's CBD, delivering a world-class integrated public transport solution. The new light rail station at Helensvale provides the main link between the light rail system and South East Queensland's passenger train network.

ALSTOM TRANSPORT AUSTRALIA

Alstom Transport Australia (Alstom) is a key rail industry partner in Australia with over 1500 employees nationally following Alstom's global acquisition of Bombardier Transportation in January 2021.

Uniquely positioned, Alstom designs, engineers, manufactures and maintains rollingstock to its customers across Australia, as well as providing signalling, rail equipment, asset management and through-life support. Globally, Alstom offers the full spectrum of rail solutions ranging from passenger rail cars, propulsion, signalling and infrastructure (CBTC and ETCS) and complete turnkey rail transport systems. Passenger rollingstock products range from metro, trams and light rail to mainline urban, regional and high-speed trains.

Over the last five decades, Alstom has built an extensive and diverse portfolio of rail mobility solutions in Queensland. Projects range from supplying Queensland's first electric trains fleet in the late 1970s, to the supply and maintenance of 75 trainsets for the New Generation Rollingstock (NGR) Project as well as 18 light rail vehicles (LRVs) and Core Rail Systems for Stages 1 and 2 of the Gold Coast Rapid Transit System. Alstom is focused on making mobility more efficient, sustainable and inviting in Queensland than ever before.

Alstom 's current Queensland activities support 100 local jobs at Downer's Maryborough facility in addition to the 150 Alstom employees at the dedicated Wulkuraka Maintenance Facility and Gold Coast Light Rail depot.

The Wulkuraka Maintenance Facility was purpose built for the maintenance, service and repair of the NGR fleet and was completed in 2016. Key features of the facility include 10 rail roads for stabling, maintenance, repairs and overhauls, a dedicated wheel lathe, in-floor train lifting jacks, retractable overhead lines and roof gantries, train cleaning and decanting facilities, and an Automated Visual Inspection System. Servicing of the NGR fleet in the Wulkuraka facility will occur 24 hours a day, 7 days a week for the next 27 years.

Alstom purpose-built Wulkuraka Maintenance Centre near Ipswich

Skills development

In 2019-2020, the Queensland Government invested approximately $2.4 million in subsidised training for qualifications relevant to the rail sector.

The Queensland Government is committed to working with the state's rail manufacturing industry to develop a highly-skilled workforce.

A highly-skilled workforce will underpin the transformation of Queensland's rail manufacturing sector into a sustainable, leading provider of rail manufacturing products and services.

The rail manufacturing sector provides career paths and opportunities for skilled Queenslanders and currently provides jobs for 3,700 Queenslanders.

OUR TRAINING INFRASTRUCTURE

The state's current training infrastructure focuses on providing the skilled workforce required, supporting job creation, and economic growth with a focus on the regions.

Planning for our future workforce will reflect the rapidly changing environment within which industry operates, to ensure better access to skilling, reskilling, and upskilling pathways.

SKILLING THE NEXT GENERATION

It is widely recognised that science, technology, engineering and maths (STEM) skills are a vital pre-cursor to advanced manufacturing. Building capability in partnership with industry, vocational and educational training (VET) and universities will help meet the increasing demand for STEM skills in the rail manufacturing industry.

The Queensland Government Gateway to Industry Schools Program (GISP) Advanced Manufacturing, is a practical initiative that is helping to achieve this goal.[34]

FOCUS ON SKILLS

Each of the skills plans provides a strategic framework and aims to target skills shortages in the manufacturing industry, including Queensland's rail centre.

2016

Queensland Rail and TAFE open Rail Centre of Excellence, Acacia Ridge

2018

JULY 2018
The Advancing Manufacturing Skills: A Skills Training and Workforce Development Strategy was released which directly supports the Advanced Manufacturing 10-Year Roadmap and Action Plan

NOVEMBER 2018
Premier's Future of Work: Skills and Industry Summit held (28 November)

NOVEMBER 2018
The Queensland Government established the Manufacturing Skills Working Group comprising of key government, industry associations, unions, vocational education and university to develop the Skills Implementation Plan for Advanced Manufacturing

2019

JULY 2019
The Skills for Queensland - Great Training for Quality Jobs Strategy (Skills for Queensland) was released

DECEMBER 2019
The Skills Implementation Plan for Advanced Manufacturing was released

The Queensland Government's overarching strategy for skills, the Queensland Skills Strategy, *Skills for Queensland - Great training for quality jobs*, acknowledges the growing need for higher level skills, different skills and a knowledge-based economy to support participation by individuals in quality jobs.[35]

The Advanced Manufacturing GISP is steered by the Queensland Reference Group – Manufacturing and Engineering, which comprises government and non-government school representatives and industry professionals representing a range of manufacturing sectors.

There are a number of gateway hubs within GISP including a Gateway Hub for Advanced Manufacturing in Maryborough, focusing on rail, timber and sugar manufacturing.

PRIORITISING APPRENTICESHIPS AND TRAINEESHIPS

Queensland apprenticeships and traineeships in rail related trades such as electrical, mechanical, carriage building, painting, carpentry, administration and warehousing are a critical component of the sector's workforce.

RAIL CENTRE OF EXCELLENCE

To encourage more people to pursue a career in the rail industry the Government established the Rail Centre of Excellence in 2016.[36] The centre is a partnership with Queenland Rail and TAFE Queensland operating at the TAFE Queensland SkillsTech's Acacia Ridge campus.

There are three training rooms, 200 metres of track for testing, signalling, maintenance and safety equipment and a rail bridge.

With available courses in rail traction, distribution overhead, and transmission overhead, Queensland Rail and TAFE Queensland support new and existing workers through apprenticeships and accredited and/or non-accredited training. Areas of learning and possible pathways within the rail industry include:

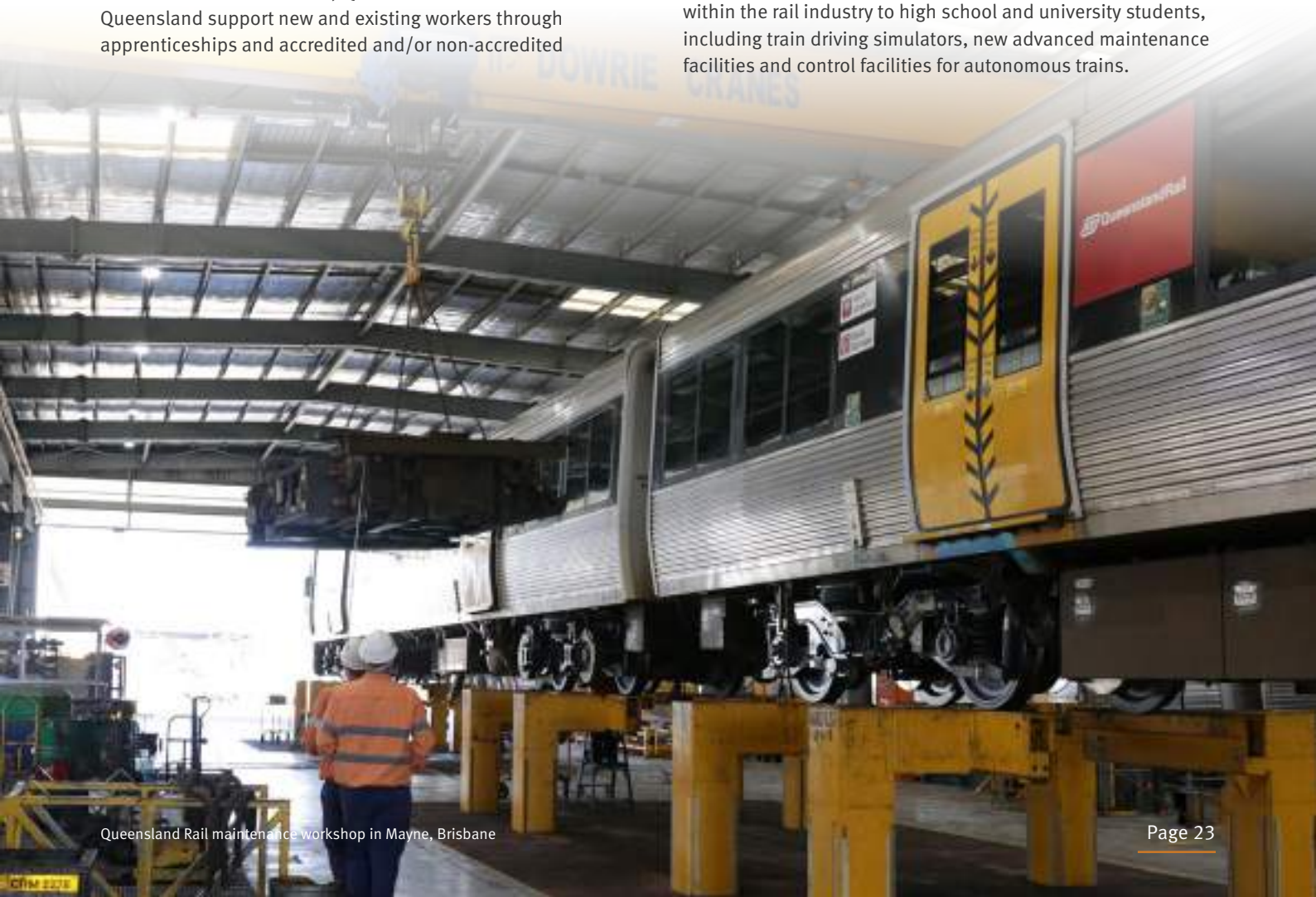
- rail infrastructure and rollingstock design
- rail communications and networks
- rail infrastructure construction
- rail operations management
- rail infrastructure and track maintenance
- rollingstock maintenance
- rail logistics and supply chain management
- rail safety management
- signalling design and maintenance.

UNIVERSITY PATHWAYS

While engineering degrees within Queensland universities lead to opportunities within the rail manufacturing sector, the Australasian Railway Association, in its *Skills Capability Study – Skills Crisis: A Call to Action*, November 2018, recommends

> *'The rail industry should work with universities and institutes in promoting rail-oriented professional skills development at the tertiary level, including expanding the number of rail engineering courses.'*[37]

The report further recommends promoting new technologies within the rail industry to high school and university students, including train driving simulators, new advanced maintenance facilities and control facilities for autonomous trains.



Queensland Rail maintenance workshop in Mayne, Brisbane

REGIONAL MANUFACTURING HUBS — LINKING MANUFACTURERS TO UNIVERSITIES, VET AND SCHOOLS

Regional manufacturing is being supported by government including through the $38.5 million initiative which established hubs in Cairns, Townsville, Rockhampton and Gladstone regions with new hubs to be established in Mackay and the Gold Coast. The hubs were created following consultation with local businesses, governments, unions and educational institutions to capitalise on local strengths and opportunities to drive innovation, growth and jobs.

The hubs work closely with universities, VET and schools to develop a workforce with strong skills in STEM.

The Rockhampton hub, in conjunction with The Centre for Railway Engineering (CRE) in Central Queensland University (CQUniversity), specialises in engineering, advanced manufacturing and innovation in the rail sector.

Key strengths of the Rockhampton hub include:

- continuing rail related career paths through CQUniversity together with the vocational education and training centre
- combining rail-based industry participants to develop supply chain capability
- utilising advanced manufacturing to develop rail improvements
- local reference group enabling improved industry outcomes
- promoting Industry 4.0 in the rail industry.

RAIL RELATED RESEARCH INSTITUTIONS IN QUEENSLAND

The rail manufacturing skills ecosystem in Queensland is strengthened by research institutions which have a focus on rail related issues. Queensland currently has four universities with expertise in rail that provide strong links with industry. There are also rail manufacturing related institutions and associations across Australia with which Queensland manufacturers and researchers interact.

While Queensland has substantial capabilities, expertise and integrated rail manufacturing supply chains, more can be done to drive sustainability, growth and development in the sector. The current context of expansion in rail transport infrastructure and services provides a rich opportunity to enhance the rail manufacturing sector.

Centre for Rail Engineering, CQUniversity

The CRE is an industry-focused research centre hosted by CQUniversity and located in Rockhampton. CRE is a well-established and internationally recognised research organisation founded in 1995 and boasts extensive rail expertise and impressive research infrastructure. CRE provides applied engineering research and consulting to rail operators and manufacturers in areas of mechanical, civil and electrical engineering.

Queensland Rail trains

Harsco Rail's track ballast regulator

Rail track construction at night

Key capabilities include:

- railway engineering
- product development and smart devices
- field testing with smart devices
- heavy testing laboratory
- advanced simulation, software and coding
- supercomputing — High Performance Computer (HPC) cluster of 560 CPU cores.

Further details on the Centre for Railway Engineering are provided in the case study below.

Science and Engineering Faculty Queensland University of Technology (QUT)

The Faculty of Science and Engineering at QUT has expertise in operations research and mathematical sciences with a focus on optimisation of planning and scheduling in the rail sector. QUT researchers have a strong background and expertise in train scheduling, network capacity analysis and rail operations simulation.

The expertise at QUT has applications that can support the development of scheduling systems including the ETCS. QUT's expertise in computational optimisation can run thousands of computer designed scenarios to find an optimal configuration with the potential to provide a more efficient deployment of the computer based train control systems.

Transport Research Group, Cities Research Institute, Griffith University

The Griffith Transport Research team includes some of Australia's leading transport researchers. Current projects include world leading research on how blockchain technology can be used in supply-chain logistics.

The University of Queensland School of Mechanical and Mining Engineering

The University of Queensland School of Mechanical and Mining Engineering researchers are working extensively with Alstom on maintenance for next generation rollingstock. Research areas include modelling and predicting how the rail track and the bearings of the vehicles degrade.

CENTRES OF RAIL MANUFACTURING EXPERTISE IN AUSTRALIA

In addition to rail related research centres in Queensland, industry can draw on national expertise such as:

- The Australasian Railway Association (ARA) is the peak body for the rail industry in Australia and New Zealand. Key initiatives include preparing reports to promote a National Rail Industry Plan for Australia and identify the critical skill needs that the rail industry will face across the next 10 years.
- The Australasian Centre for Rail Innovation, based in Canberra, conducts targeted research to address issues such as improving productivity, sustainability and the development of the rail industry.
- The Rail Industry Safety and Standards Board (RISSB) is wholly owned by its funding members and is responsible for the development and management of rail industry standards, rules, codes of practice and guidelines. RISSB has offices in Brisbane and Melbourne.
- The University of Wollongong is hosting the Industrial Transformation Training Centre for Advanced Technologies in Rail Track Infrastructure (known as ITTC Rail) bringing together rail track infrastructure expertise from all sectors of the rail industry, with eight universities and 11 national and international industry partners taking part.

THE CENTRE FOR RAILWAY ENGINEERING

CENTRAL QUEENSLAND UNIVERSITY

The Centre for Railway Engineering (CRE) is an industry focused and internationally recognised research centre hosted by Central Queensland University (CQUniversity) in Rockhampton.

CRE provides innovative solutions and advice to solve the railway industry's most complex challenges and delivers long-term value to its customers. It has research expertise in train dynamics, wagon and bogie dynamics, wagon/track system dynamics, simulation, instrumentation and field testing. The CRE also has a unique laboratory that was purpose designed for full-scale testing of bogies, wagons, locomotives and civil infrastructure components.

Capabilities include engineering new solutions, optimising existing methods, developing improved processes, helping organisations meet safety obligations. World-class research and consultancy are provided in areas of engineering including:

- product design and development
- infrastructure inspection and maintenance
- simulation and supercomputing
- energy analysis
- condition monitoring
- machinery dynamics
- use of drones
- internet of things.

CRE connects experts across multiple disciplines to deliver transformative outcomes. It has demonstrated expertise in developing new technology that offer new opportunities for additional savings or exports.

Product development — CRE can manage the entire life cycle of developing new technological devices – including data systems, controllers and internet of things devices for 'Big Data' systems. Specialisations include ultra-low power systems suitable for autonomous long term and wireless operation, supported with in-house print circuit board design and assembly.

Heavy testing laboratory — CRE's state-of-the-art heavy testing lab has substantial force capability to proof test or destructively test new products or analyse existing products. The laboratory has impressive testing capability up to 400-tonne force. Recent work includes fatigue testing of draft gear couplers and evaluation of concrete sleepers.

Advanced simulation and optimisation — CRE can simulate operational scenarios and evaluate outcomes before committing large budgets. Infrastructure maintenance and asset renewals can be simulated to identify future replacement dates and optimised maintenance plans. Simulations running on a cluster of high performance computers can quickly evaluate options and provide data for optimisation studies.

Railway worker at Centre for Railway Engineering, Central Queensland University

RAIL CENTRE OF EXCELLENCE

QUEENSLAND RAIL AND TAFE QUEENSLAND - ACACIA RIDGE CAMPUS

The Rail Centre of Excellence was established in 2016 in Acacia Ridge and has been developed in partnership between TAFE Queensland SkillsTech and Queensland Rail.

The Centre spans 1.5 hectares and consists of four training tracks (traction and overhead, signalling, and track maintenance training), two sand pits including boom gates and bridging structures, and three training rooms. The recent addition of a rail bridge allows the Centre to deliver specialised bridge structure training.

Key features

- The Rail Centre of Excellence is a partnership between Queensland Rail and TAFE Queensland and provides the only simulated rail work environment in the state.
- Training delivered to Queensland Rail, third party rail contractors, commercial supply chain organisations, and international students and organisations.
- Training offered to new industry entrants, providing the rail industry with a pool of work-ready employees to meet their skills' needs.
- The Centre supports multimode delivery including face-to-face, recognition of prior learning, gap training and workshop access.

Training opportunities

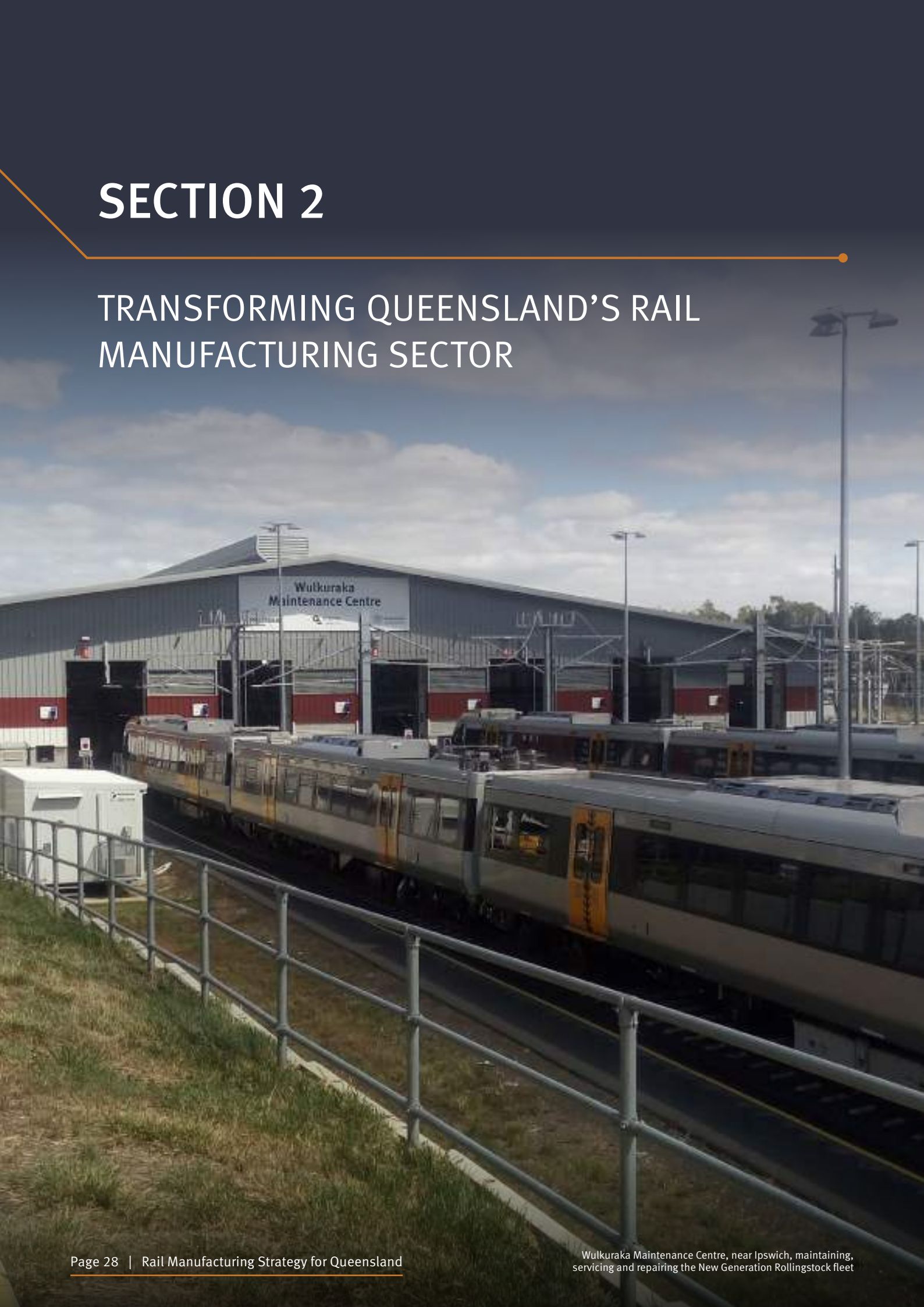
The Rail Centre of Excellence is suitable for many types of rail and rail related training and assessment and meets demand across a wide range of training packages. The Centre allows for rail-specific fields of expertise to be introduced and will also support existing trade training requirements in areas such as electro-technology, engineering, metalwork and fabrication.

At the Acacia Ridge Training Centre, Queensland Rail and TAFE Queensland currently deliver a range of rail related courses including Certificate II in Rail Infrastructure, Certificate III in Mechanical Rail Signalling and Certificate IV in Electrical Rail Signalling, utilising the Rail Centre of Excellence for practical components of the training.

Rail Centre of Excellence, Acacia Ridge

SECTION 2

TRANSFORMING QUEENSLAND'S RAIL MANUFACTURING SECTOR



Wulkuraka Maintenance Centre, near Ipswich, maintaining, servicing and repairing the New Generation Rollingstock fleet

FOCUS AREA 1:

Developing a sustainable rail manufacturing sector

A key priority to support the rail manufacturing sector is to build a sustainable pipeline of ongoing work for major rail rollingstock and rail infrastructure projects. This will help to build and sustain manufacturing facilities, capabilities and skills.

There will always be fluctuations in demand, however, actions can be identified to smooth these fluctuations. When major procurement plans are in place, then the rail manufacturing sector is able to mitigate peaks and troughs in demand for rail rollingstock and rail infrastructure.

This strategy aims to balance two important objectives for both rail infrastructure construction and maintenance projects and for rollingstock procurements:

- ensuring the delivery of rail construction projects and new train sets to meet network service requirements, while simultaneously
- prioritising and scheduling major rail infrastructure and rollingstock to assist in providing a sustainable pipeline of work, optimising local content and encouraging private capital investment.

Rollingstock delivery schedules that are achievable for Queensland manufacturers will support growth in the rail manufacturing sector.

By planning rail projects with a staged completion over time, the government will create conditions that support increased private sector investment. This allows local manufacturers to gear up for and deliver on largescale production, while simultaneously planning rail projects to meet critical rail services.

To this end, the government announced a $1 billion pipeline of rollingstock work for Maryborough. This pipeline involves $600 million of work to build 20 new passenger trains for Cross River Rail and $385 million to maintain Queensland Rail's suburban fleet over the next decade. Suppliers from other regions such as Rockhampton will have opportunities to manufacture components for the new trains.

The Australian Government has released the National Rail Action Plan (the Plan) which recognises the challenge of having rail construction capability to match demand from new projects. Under the Plan working groups were established to address skills, common standards and interoperability issues to improve delivery of rail infrastructure and improve the safety and productivity of rail operations.

The Queensland Government will work at the national level to influence the implementation of the Plan and work collaboratively with the Australasian Rail Association to support the identification and prioritisation of a national pipeline of rail infrastructure projects.

ACTIONS FOR GROWTH

Forward planning to smooth demand, together with contract delivery timeframes that are achievable for local suppliers, can support continued investment in large-scale, heavy engineering facilities.

The Queensland Government working with industry on these actions will support the growth of a more sustainable rail manufacturing sector:

1. **Establish a Rail Manufacturing Leaders Advisory Group –** to guide the transformation and revitalisation of the sector.
2. **Reduce fluctuations in strategic rail infrastructure and rollingstock projects and major procurements –** to meet network service requirements and provide a pipeline of opportunities for local firms including Queensland manufacturers.
3. **Influence the implementation of the National Rail Action Plan**—and work collaboratively with the Australasian Rail Association to support the identification and prioritisation of a national pipeline of rail infrastructure projects.

FOCUS AREA 2:

Optimising local content

Government is working with industry to build the international competitiveness of local manufacturers through the strategies being implemented in the Advanced Manufacturing 10-Year Roadmap and Action Plan.

These strategies include increasing the adoption of leading-edge design, Industry 4.0 processes, innovation and technologies to assist in transitioning manufacturers to advanced manufacturing. Building the capabilities and capacity of local manufacturers will improve productivity and strengthen their competitiveness, positioning them to win domestic and internationally competitive rail infrastructure and rollingstock projects.

Strengthening Queensland's rail manufacturers' capabilities will have long-term benefits for the industry to win contracts for the manufacture and maintenance of rollingstock assets which can have a structural life of up to 35-40 years. Similarly, local companies accessing contracts for operational systems technologies, such as the ETCS, will have an advantage and the opportunity to further support the ongoing development of the sector.

The Queensland Procurement Policy mandates principles to enhance local content including a focus on economic benefits to Queensland and putting Queenslanders first when securing value for money.[39]

The Queensland Procurement Policy recognises the Queensland Government's commitment to supporting increased levels of locally manufactured goods and related services in government procurements.

For the majority of major rollingstock manufacturing projects there will be a mix of imported and locally produced componentry, and local content targets can be included as part of the assessment in major government procurements.

Manufacturing rail goods and services locally will have benefits in terms of providing: 1.4 additional indirect jobs with first-order suppliers,[40] high-skilled and well-paid jobs and important economic contributions to regional economies.

Connecting buyers and suppliers early in a project can increase local content levels. Buyers gain confidence in local capabilities and suppliers gain an understanding of how best to meet project requirements.

To increase visibility of Queensland's rail capabilities, an industry directory such as the Industry Capability Network (ICN) could be used to increase the visibility of capable local suppliers to buyers.

Divergent rail manufacturing standards across Australia provide challenges for manufacturers to supply across jurisdictions. The strategy supports the harmonisation of rail manufacturing standards to assist in opening markets across Australian jurisdictions.

The Government will work collaboratively with industry to develop local content targets in Government funded rail procurements.

ACTIONS FOR GROWTH

Local content can be enhanced by proactive policies that are championed by the Queensland Government, private sector buyers and the rail manufacturing sector.

4. **Optimise local content** — The Queensland Government will work collaboratively with industry to develop initiatives to increase local content in public and private sector rail procurement, including local content targets for government funded projects.
5. **Enhance supply chain management and relationships** — through a suite of tailored supply chain development initiatives to meet the requirements of the rail manufacturing sector.
6. **Harmonise manufacturing standards** — to simplify rail manufacturing standards to increase efficiency, reduce production costs, facilitate export of rail rollingstock across state boundaries and enable co-design of rail products for end users to address accessibility issues.

Aurizon Wayside Condition Monitoring System, Rockhampton

FOCUS AREA 3:

Building on existing specialisations, capabilities and skills

Rail is a globally contested industry with a high and increasing level of technological intensity. By continually reinvesting in and transforming their capabilities, Queensland rail manufacturers can enhance their potential to win local and international rail contracts.

The ability to win construction and rollingstock contracts will facilitate suppliers' ability to secure additional or whole of life maintenance contracts and enhance the sustainability of the sector over time.

Industry analysis suggests that whole of life rail rollingstock maintenance contracts can exceed the value of initial rollingstock manufacturing contracts.[41] There are opportunities for suppliers to participate in substantial refurbishment and upgrade programs of work after the initial build has been completed.

Queensland's rail manufacturing sector has existing areas of expertise that provide a strong base for specialisation including narrow-gauge passenger train sets, operational systems technology and shorter lifecycle train management systems.

Building capabilities in specialised products and systems in Queensland can assist manufacturers to supply to other local, Australian and international export markets.

Further investment in capabilities and skills will support Queensland rail manufacturers to adopt Industry 4.0 technologies and practices. Rail manufacturers face the challenge of managing and retaining a highly skilled workforce through fluctuations in rail project demand.

The ability to retain a skilled workforce - through sustained jobs and skills investment - creates the capability needed for the sector to win and deliver major rail contracts in Queensland and in other Australian states. These skills are also needed for expanding Queensland rail exports in specialised areas targeting niche growth rail markets in South East Asia, Middle East and the United States of America.

The investment in skills will help the sector compete for skilled workers and attract new entrants to the rail manufacturing supply chain in Queensland.

The transformation to advanced manufacturing capabilities will also assist Queensland rail manufacturers to explore opportunities for diversification.

ACTIONS FOR GROWTH

The development of Queensland's rail manufacturing sector into a sustainable and leading provider can be accelerated by focusing on forward-looking specialisations such as:

7. **Build on existing areas of specialisation** — by developing a pipeline of work and leveraging off specialisations in:
   - the assembly and fit-out of narrow-gauge passenger train sets
   - operational systems technology including ETCS (Level 2)
   - shorter lifecycle train management systems and componentry to provide ongoing work after the initial build.
8. **Build on existing skills and capabilities** — to attract, retain and develop a highly-skilled workforce to meet the requirements for future work in the sector including Indigenous business owners and workers.

Queensland's existing specialisations in rail manufacturing can be transformed to develop leading expertise in:

- manufacturing narrow-gauge passenger train sets
- shorter lifecycle train management systems to support whole of life rail asset management and provide an ongoing pipeline of work
- operational systems technology including ETCS (Level 2)
- advanced technology, Industry 4.0 and automation

LIFECYCLE OF TRAIN MANAGEMENT SYSTEMS AND COMPONENTRY

8 Years
Bogies (wheels, axles)

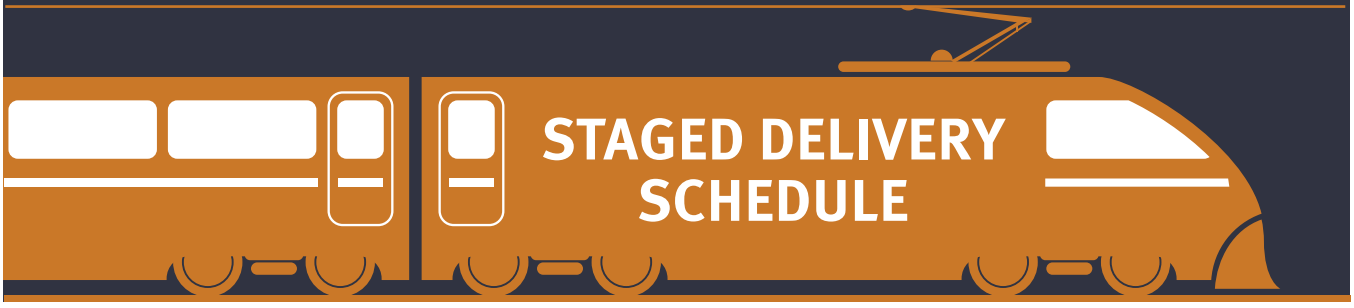
8 Years
Interiors (windows, seats, coatings, floor coverings)

8 – 10 Years
Operational Systems Technology (European Train Control System, automated condition monitoring systems, automated visual inspection systems)

8 – 10 Years
Traction set (motor system and software)

35 Years
Rail car total asset life

Design rollingstock delivery schedules to facilitate local manufacturing



FOCUS AREA 4:

Strengthening Queensland's rail manufacturing ecosystem to drive investment and exports

Rail rollingstock and rail infrastructure supply chains are large and complex and are led by globally competitive lead contractors and their technology providers

Queensland manufacturers can enhance their competitiveness by connecting and collaborating with major rail corporations and supply chain businesses within the state's rail manufacturing ecosystem to win major domestic and export contracts.

Existing regional expertise can be strengthened through increased collaboration within the ecosystem.

Strengthening collaboration will involve manufacturers working together to secure and deliver on rail projects and will also assist in the dissemination of new technologies across the ecosystem.

TAFE Queensland, research and industry rail expertise is substantial and will help position Queensland as a global leader in advanced robotics and design-led manufacturing. The newly established Advanced Robotics for Manufacturing Hub will enable rail and other manufacturers to effectively complement design, robotics and autonomous systems.

Revitalising Queensland's rail manufacturing sector can have beneficial effects to articulate its value proposition to encourage new investment and expansion projects. The Queensland Government has been successful in attracting new manufacturing investment and supports new investment through a range of initiatives including the $150 million Advance Queensland Investment Attraction Fund and through extensive activities of Trade and Investment Queensland.

Revitalising the sector can also contribute to expanding Queensland's rail exports. Leveraging off specialisations in manufacturing narrow-gauge passenger train sets, operational systems technology, train management systems and advanced rail manufacturing can enhance the sector's value proposition.

Rail export opportunities for SMEs have been enhanced through the recently announced Rail Haulage Supply Chain Export Hub (Export Hub) by the Australian Manufacturing Technology Institute Limited. The Export Hub enables rail and haulage SMEs to develop the knowledge, capability and capacity to export to new and bigger international markets.

ACTIONS FOR GROWTH

A strong rail manufacturing ecosystem will drive investment and export opportunities

9. **Increase connectivity and collaboration** — linking industry, TAFE Queensland research centres, Manufacturing Hubs and the Advanced Robotics for Manufacturing Hub to deliver on major rail infrastructure and rollingstock projects that might not otherwise have been achievable.
10. **Attract investment, promote the industry and drive export opportunities** — to create jobs, stimulate private capital investment and develop regions.

B Series passenger train built at Downer's Maryborough facility for export to Western Australia

LAING O'ROURKE

For more than 40 years Laing O'Rourke has delivered rail infrastructure services in urban, rural and remote locations in Queensland, across Australia and internationally.

Projects range from high-speed urban commuter service upgrades to cross-country heavy haul rail lines involving civil engineering and tunnelling, track installation, electrification services, signalling, rail systems and maintenance services.

NEW GENERATION ROLLINGSTOCK MAINTENANCE FACILITY

Laing O'Rourke delivered a purpose-built train maintenance centre at Wulkuraka near Ipswich, as part of the Queensland Government's New Generation Rollingstock Project. Key aspects of the maintenance facility project included all infrastructure and utilities, stabling yards, maintenance building, other buildings, and track, signalling, electrification and overhead wiring.

BAUHINIA AND GOONYELLA ELECTRIFICATION PROJECT

The Bauhinia Electrification Project involved 110 km of rail electrification, linking Rolleston Coal Mine to the Wiggins Island Coal Export Terminal. The project supports the longer term development of local mine operations and boasted two Australian firsts, demonstrating Laing O'Rourke's commitment to innovation in the rail industry:

- The design and construction of two 18MW static frequency converters (SFC), the first time SFCs were used in the Australia rail industry
- The use of helicopters to deliver and place overhead wiring masts and feeder wires in the hard to access areas.

The Goonyella Corridor program was part of Aurizon's ongoing upgrade and expansion of the Central Coalfields network to accommodate increasing volumes of exported coal. Laing O'Rourke provided essential overhead wiring and infrastructure services to various projects across the Goonyella rail network.

Laing O'Rourke electrification works on the Goonyella rail network

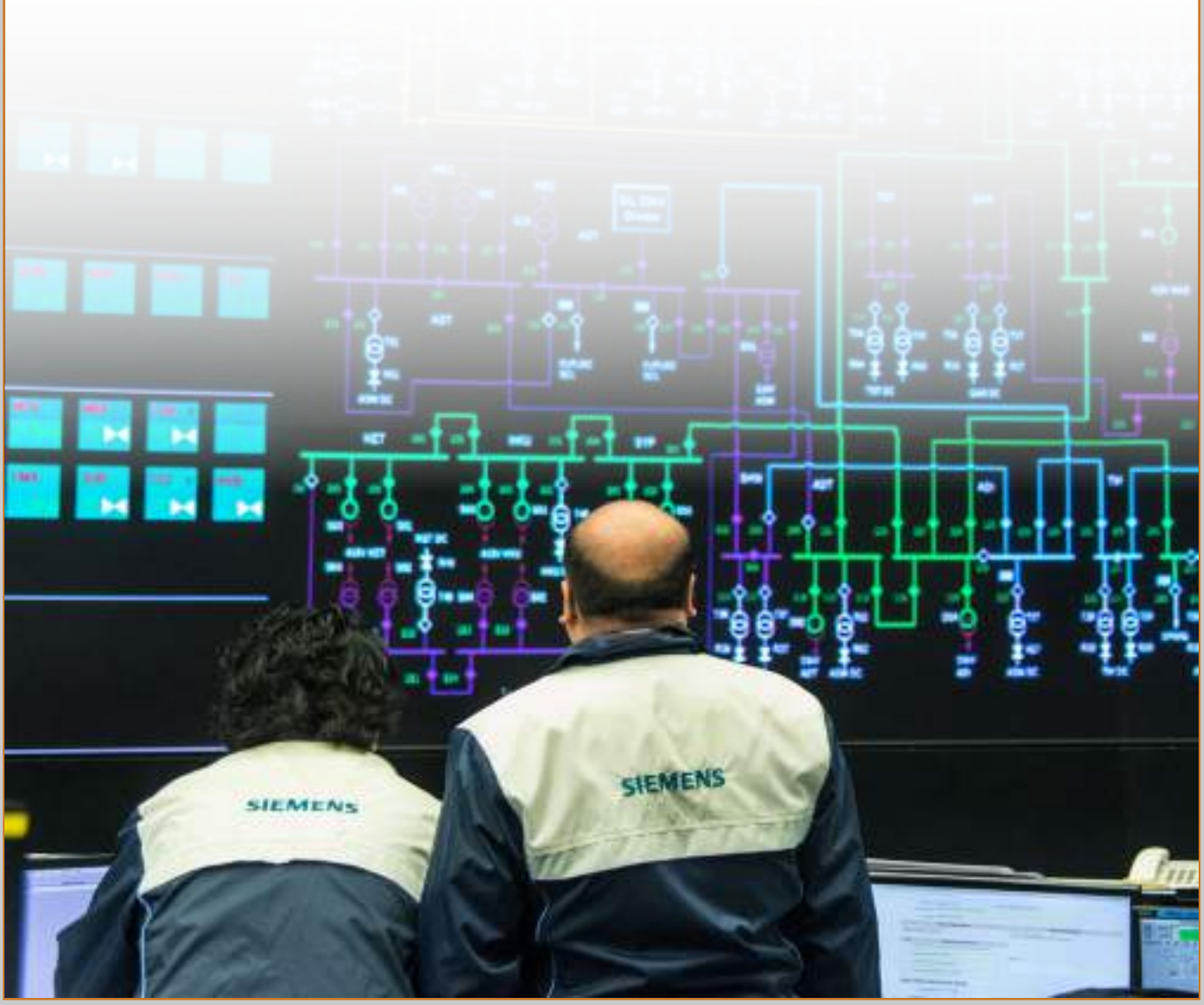
SIEMENS ETCS CENTRE OF COMPETENCE IN QUEENSLAND

Siemens is one of the world's largest corporations in the electronics and electrical engineering industry sector with global revenue of approximately $133 billion and a 379,000 global workforce.

The company has a 100-year history in Queensland commencing with a telephone exchange in South Brisbane in 1916.

In 2018, Siemens Mobility Division invested $4.8 million into a European Train Control System (ETCS) Competence Centre in Brisbane specialising in ETCS rail signalling and control technology. Siemens Mobility employs over 110 staff in Queensland. The ETCS Competence Centre provides signalling systems for Queensland rail operators and also exports services to other Australian states and overseas. Additionally, Siemens has two substantial systems operating in Hong Kong's Mass Transit Railway:

- The Integrated Communications and Control System serving the East Rail Line with 600,000 passengers daily. The system covers radio communications, voice announcements, passenger displays, data communications systems and the power system.
- The Power Remote Control and Environmental Control system serving three metro lines which carries over 2.5 million passengers daily and covers power supply to both trains and stations. It also controls the air-conditioning equipment in underground stations, catering for emergency situations during fires and evacuation, in both stations and tunnels.



Siemens engineers working on the Mimic Project panel

Aurizon train alongside the Wayside Condition Monitoring System, Rockhampton

VISION, STRENGTHS, FOCUS AREAS AND ACTIONS

VISION

Queensland's rail manufacturing sector will be a sustainable, leading provider of rail manufacturing products and services with the capacity to capture a significant portion of the national rail market.

FOCUS AREA 1

Developing a sustainable rail manufacturing sector

1. **Establish a Rail Manufacturing Leaders Advisory Group –** to guide the transformation and revitalisation of the sector.
2. **Reduce fluctuations in strategic rail infrastructure and rollingstock projects and major procurements –** to meet network service requirements and provide a pipeline of opportunities for local firms including Queensland manufacturers.
3. **Influence the implementation of the National Rail Action Plan –** and work collaboratively with the Australasian Rail Association to support the identification and prioritisation of a national pipeline of rail infrastructure projects.

FOCUS AREA 2

Optimising local content

4. **Optimise local content –** the Queensland Government will work collaboratively with industry to develop initiatives to increase local content in public and private sector rail procurement, including local content targets for government funded projects.
5. **Enhance supply chain management and relationships –** through a suite of tailored supply chain development initiatives to meet the requirements of the rail manufacturing sector.
6. **Harmonise manufacturing standards –** to simplify rail manufacturing standards to increase efficiency, reduce production costs, facilitate export of rail rollingstock across state boundaries and enable co-design of rail products for ends users to address accessibility issues.

STRENGTHS

- Well-developed rail manufacturing sector and mature supply chain contributing $600 million directly to the state economy and directly supporting 3,700 jobs.
- A strong foundation in advanced manufacturing in rail rollingstock and infrastructure provides the basis for leveraging off specialisations in narrow-gauge rail manufacturing, operational systems technology, train management systems.
- An ecosystem of rail manufacturing, infrastructure construction, maintenance, refurbishment and repair that can be enhanced to build a network organisation and facilitate winning major rail rollingstock and infrastructure projects.
- Government, industry, suppliers, workforce/unions and research centres working collaboratively to transform the sector into a leading provider of rail manufacturing goods and services.

FOCUS AREA 3

Building on existing specialisations, capabilities and skills

7. **Build on existing areas of specialisation –** by developing a pipeline of work and leveraging off specialisations in:
   - **the assembly and fit-out of narrow-gauge passenger train sets**
   - **operational systems technology including ETCS (Level 2)**
   - **shorter lifecycle train management systems and componentry to provide ongoing work after the initial build.**
8. **Build on existing skills and capabilities** — to attract, retain and develop a highly-skilled workforce to meet the requirements for future work in the rail manufacturing sector including Indigenous business owners and workers.

FOCUS AREA 4

Strengthening Queensland's rail manufacturing ecosystem to drive investment and exports

9. **Increase connectivity and collaboration –** through improved collaboration linking industry, TAFE Queensland research centres, Manufacturing Hubs and the Advanced Robotics for Manufacturing Hub to deliver on major rail infrastructure and rollingstock projects that might not otherwise have been achievable.
10. **Attract investment, promote the industry and drive export opportunities –** to create jobs, stimulate private capital investment and develop regions.

Measuring success

The aim of the strategy is to identify opportunities and actions to transform the rail manufacturing sector to be a leading provider of rail manufacturing products and services with the capacity to capture a significant portion of the national rail market.

A stakeholder advisory body will be established to provide expert advice and guide implementation of the 10 actions in the strategy. There are three levels of implementation for the 'Actions for growth': foundation actions, optimising local content and building capabilities to target new opportunities and growing market share. Performance measures have been developed against each of the actions to ensure delivery of the actions.

AIM > An increased share of rail project contracts secured by Queensland rail manufacturers

1. Foundation actions

Industry engagement covering rail buyers and rail manufacturers is vital for the success of the strategy. Industry support and engagement for the 'actions for growth' can be measured by:

- Rail Manufacturing Strategy for Queensland implemented with guidance of a Rail Manufacturing Leaders Advisory Group
- local rail manufacturing companies have visibility of scheduled strategic rail infrastructure projects, rollingstock projects and major procurements
- positive outcomes for Queensland as a result of the Queensland Government's influence on the implementation of the National Rail Action Plan.

2. Optimising local content and building capabilities to target new opportunities

The success of rail manufacturing capability building can be measured by:

- increased local content in procurement contracts
- delivery of tailored supply chain development initiatives to enhance supply chain management and relationships
- positive outcomes for Queensland as a result of the Queensland Government's influence on harmonising rail manufacturing standards
- increase in the range and depth of rail specialisations in Queensland
- a reduction in rail skills shortages over time.

3. Growing market share

Achieving increased sales for rail manufacturers will improve the sustainability of the sector. Measures of success include:

- evidence of increased involvement of Queensland businesses in project bid teams
- increased private investment in Queensland rail manufacturing and related industries.

Work being undertaken on the Caval Ridge Balloon Loop Rail Spur rail infrastructure construction project by CPB Contractors.

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Aurizon employee performing network rail maintenance

Department of Regional Development, Manufacturing and Water
PO Box 15009 City East Qld 4002 Australia
Phone: 13 QGOV (13 74 68)
info@rdmw.qld.gov.au

www.rdmw.qld.gov.au