

**February 24, 2017**

**Senate Rural and Regional Affairs and Transport References Committee  
Inquiry into Australia's Rail Industry  
Submission**

**Rail Manufacturing CRC**

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## Executive Summary

In making this submission, the Rail Manufacturing CRC addresses how government procurement can be utilised to break down some of the barriers to growth and productivity through the increased integration of advanced manufacturing principles and the application of new technology.

Our analysis of the state of the Australian rail industry emphasises the need for national coordination and leadership to assist rail businesses to take advantage of the increased demand for rolling stock by re-capitalising, moving towards global rail manufacturing standards and investing in R&D through the suite of government co-funding programs on offer.

The following recommendations summarise our submission:

### **RECOMMENDATION 1**

The Rail Manufacturing CRC recommends that a Rail Industry Advisor position is established to drive innovation and global competitiveness in the Australian rail industry.

### **RECOMMENDATION 2**

The Rail Manufacturing CRC recommends that a White Paper is required to fully explore the state of the Australian rail industry and develop the specific policy initiatives that are needed to set industry on the trajectory to growth.

### **RECOMMENDATION 3**

The Rail Manufacturing CRC recommends that the Federal Government seeks an 'innovation dividend' from all rail procurement contracts.

### **RECOMMENDATION 4**

The Rail Manufacturing CRC recommends the creation of a national Rail Innovation Hub to coordinate the adoption of new technology and innovation, to assist the industry with strategic growth opportunities and to facilitate enhanced supply chain operation to benefit niche manufacturing businesses.

### **RECOMMENDATION 5**

The Rail Manufacturing CRC recommends that the Rail Industry Advisor (or equivalent function) is tasked with progressing national rail standards for rolling stock in the Australian market.

## Introduction

Since its formation in 2014, the Rail Manufacturing CRC has worked closely with leading proponents of the Australian rail industry to increase R&D and innovation in rail manufacturing.

A strong, efficient and modern rail industry is an important element of Australia's transport infrastructure future. With our vast geography and distance from the sites of resource production to ports, coupled with high levels of urban congestion in our growing cities, Australia's future prosperity and productivity is dependent on a strong rail industry sector.

However, rail as a future nationally-significant industry faces some critical challenges to modernise and increase innovation – at the same time as the urgency for more transport infrastructure projects is gaining attention.

With a rapidly growing population, expected to reach 30 million by 2031, and with growth focused on Sydney, Melbourne, Brisbane and Perth, government decisions to facilitate infrastructure projects that will ease congestion in our cities and provide a better freight interface between road, rail and ports are becoming urgent priorities.

The Rail Manufacturing CRC believes that the Australian rail manufacturing sector itself is at a critical juncture. Given the right policy settings, backed by government investment and business willingness to take advantage of these, Australia could have a strong and sustainable rail industry that will serve its population well regarding job creation and economic development. This scenario hinges on rail businesses seizing the opportunity afforded by a strong pipeline of investment to modernise and increase their competitiveness during this period of likely rail transport expansion.

The alternative, less positive outlook for rail is a continuation of the status quo: with ad hoc government tenders, grants and programs keeping industry focussed on short term survival strategies. This ultimately makes it increasingly difficult for domestic rail manufacturers to invest in capital expansion, innovation and R&D, and creates a barrier for these businesses competing on a global stage.

For a modern and competitive rail manufacturing industry to materialise, this depends, to a large degree, on the Australian, State and Territory Governments working together on a National Strategy for the Australian Rail Industry, led by a dedicated Federally-funded and co-ordinated Rail Industry Advisor.

## The innovation opportunity

Rail manufacturing is a strategically important industry that could play a significant role in building Australia's transport infrastructure future. With iconic rail projects like High Speed Rail and Inland Rail edging closer, coupled with strong growth in the construction of urban rail projects in our growing cities, the demand for new railway infrastructure and rolling stock is gaining momentum.

With rapid advances in technology and advanced manufacturing production principles underway, the rail manufacturing sector in Australia faces an urgent challenge to rapidly incorporate new manufacturing technologies and processes into their businesses.

The opportunities for Australian manufacturers in adopting these new technologies are significant. With rapid change comes opportunity, and the present economic factors, including a lower

exchange rate on the Australian dollar, and increasing local demand for rolling stock, provide domestic industry with a golden opportunity to re-capitalise and invest in innovation.

Early adopters to the advanced manufacturing paradigm in the Australian rail supply chain will have an opportunity to transition to become world-leading and to secure their long term future. The numerous free trade agreements that Australia has signed up to mean that our manufacturing industries are now irretrievably open to global competition.

Governments can support this transition by ensuring that tenders for the procurement of rolling stock are weighted towards driving this innovation imperative in rail and that Australian rolling stock moves increasingly towards a build that applies global standards.

Despite a strong suite of grant programs available to support collaboration between industry and research organisations, bolstered by the Australian Government's \$1.1 billion *Innovation and Science Agenda* and other State and Federal government programs (including Cooperative Research Centres), there remains a reluctance in rail manufacturing businesses to seize the opportunity to invest in innovation.

The Rail Manufacturing CRC has had the opportunity to explore these issues and make recent submissions to the Victorian Government on issues pertaining to innovation and industry policy in rail manufacturing.<sup>12</sup> These Discussion Papers have been particularly relevant since the Victorian Government provides a significant boost to the domestic rail industry through its Industry Participation Policy, a policy of 50 percent local content in rolling stock purchases and a strong pipeline of investment in rolling stock.

Through its *Transport Technologies Sector Strategy*, Victoria has recognised that the rail industry has the potential to deliver jobs and economic growth in the future. In other states, initiatives to advance the application of smart technology to transport challenges are also evident including the NSW *Future Transport Strategy* and through *Advance Queensland*. This attention to transport technology complements the goals of the Rail Manufacturing CRC.

The Rail Manufacturing CRC believes that tenders for rolling stock should mandate a level of innovation in the procurements sought, in exchange for supportive government procurement policies and local content requirements, as well as significant investments through grant programs.

This approach seeks an 'innovation dividend' from government procurements, which the Rail Manufacturing CRC believes will help drive industry to greater collaboration on the development of new technology in rail manufacture, thereby increasing those businesses' capacity to compete on the global stage.

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<sup>1</sup> Victoria's Future Industries Transport Technologies Discussion Paper, [submission by Rail Manufacturing CRC](#), January 2016;

<sup>2</sup> Review of Victorian Industry Participation Policy Discussion Paper, [submission by Rail Manufacturing CRC](#), November 2015;

## RECOMMENDATION 1

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## Rail manufacturing in Australia

Rail manufacturing in Australia is slowly evolving from the production of an end-to-end rolling stock product, as characterised in traditional manufacturing, moving increasingly towards an advanced manufacturing model which is a low-volume, high-value production.

This transition can be seen in an analysis of the size of the various segments of rail manufacturing. The 2015 IBISWorld report into this sector identified that end-to-end manufacture now comprises only 6.8 percent of rail production. Other segments of the rail industry are increasingly more significant such as repair and maintenance at 21.3 percent, passenger railcars fit out at 20.8 percent, locomotive components at 19.5 percent and freight wagons at 10.7 percent.<sup>3</sup>

Given this changing industry profile, governments have already accepted a role in supporting the process of transition in traditional industries, such as rail manufacturing, towards the adoption of more modern manufacturing practices that characterise advanced manufacturing.

The challenges for government in assisting Australian manufacturers in adopting the principles of advanced manufacturing were set out in a CEDA report, *Advanced Manufacturing: Beyond the production line*.<sup>4</sup> This report outlined the characteristics of successful advanced manufacturers as innovative and technologically cognisant.

Importantly, CEDA also identified that government has a role to introduce public procurement policies aimed at innovative products and incentivising innovation.<sup>5</sup>

As the *On Track to 2040 Roadmap* identified, the Australian rail industry has the opportunity to contribute to the growing demand for rail products in the Asia-Pacific region and to leverage Australian skills, expertise and experience for these new markets as urbanisation spreads. However, without increased application of innovation, the Australian rail industry will not keep pace with the application of new technology to global platforms.

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<sup>3</sup> IBISWorld Industry Report C2393, *Railway Equipment Manufacturing and Repair in Australia*, May 2015.

<sup>4</sup> CEDA, *Advanced Manufacturing: Beyond the production line*, April 2014.

<sup>5</sup> *Ibid*, p.8.

At present, Australia is a net importer of rail equipment. According to IBISWorld, in 2014-15 the value of imports was \$1.4 billion whereas the value of exports was \$98.8 million.<sup>6</sup> While imports of rail equipment are expected to grow at around 13.1 percent over the next five years, exports are smaller and are expected to remain close to the annual rate of 2.9 percent consistent with the past five years.

Despite the current low level of exports in the rail manufacturing sector, the Rail Manufacturing CRC believes that the rail manufacturing industry in Australia, with its close proximity to the growing Asia-Pacific markets, is well placed to integrate into the global supply chain that will service the expanding markets driven by increased urbanisation in the region.

The location of global rail manufacturing companies including Bombardier Transportation, UGL, Downer, and Faiveley Transport in Australia creates a strong foundation for developing greater export opportunities into the Asia-Pacific region as these companies leverage Australian manufacturing expertise into growing markets.

In the long term, the Australian rail manufacturing industry will not be able to maintain its viability unless it increases its export offerings. Increased innovation is key to increased competitiveness and expanding on this export opportunity.

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### Barriers to innovation in rail manufacturing

In recent decades, the rail manufacturing industry sector has been shaped by the lack of a strong pipeline of investment in rolling stock. This lack of investment certainty (vividly described in defence manufacturing as the 'Valley of Death') has also been evident in the rail manufacturing sector and is one factor contributing to low levels of innovation.

To date, the ad hoc and uncoordinated approach to rolling stock orders creates uncertainty through a 'stop-start' cycle of production. This short-term horizon represents a disincentive for businesses to invest in expensive capital equipment and the application of increased R&D.

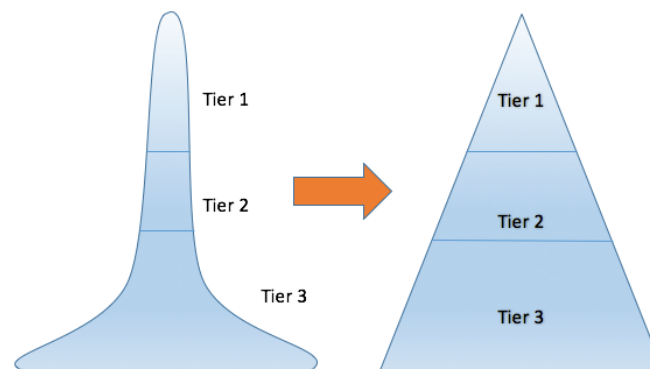
While there is now evidence of a continued strong pipeline of projects and a renewed interest in rail transport to address urban congestion and future environmental challenges, business confidence is still lagging.

Rail manufacturing in Australia is unevenly distributed between large Tier 1 businesses and smaller Tier 2 & 3 SMEs. Tier 1 businesses generate 88 percent of the revenue in the rail manufacturing sector – but 90 percent of businesses are SMEs in Tiers 2 & 3. This distorted supply chain means that all the risk of investment in innovation lies with Tier 1 businesses.

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<sup>6</sup> IBISWorld, *ibid*, p 16.

This figure (below) outlines the current distribution of rail manufacturing between Tiers 1, 2 and 3:



As set out in the figure above, the ideal scenario is moving from the current situation (on the left) to the more pyramid shaped distribution model (on the right).

Creating a more even distribution of work, through an integrated supply chain, would be of great benefit to the efficiency of rail manufacturing by spreading risk and building expertise in niche industry suppliers. The key to delivering this more balanced distribution throughout the rail industry supply chain is through an increased pipeline of rolling stock orders combined with a more integrated supply chain that results in a more even demand curve.

Lacking certainty about future contracts has led to an understandable lack of confidence about investing in new technology. The Rail Manufacturing CRC has identified a lack of in-house R&D expertise in rail manufacturing businesses that are receptive to the innovation imperative. This is borne out in a 2011 report into the Australian rail industry that found less than one per cent of employees in the rail sector are scientists or researchers.<sup>7</sup>

This lack of expertise in R&D in rail businesses creates barriers to innovation and represents a critical challenge to governments that seek to promote and encourage innovation.

The innovation challenge in public policy for existing, traditional industry sectors like rail has been less of a focus than it requires. While traditional businesses do not have the cache of a start-up, they nevertheless have a proven track record and strong future prospects – but may need different drivers to achieve the optimum innovation outcome.

It would be a tragedy for the Australian rail manufacturing industry if the rolling stock to run could not largely be produced by Australian rail manufacturers by the time the iconic High Speed Rail and Inland Rail projects are realised.

If supported now by minimum requirements for local content of manufacture, materials, skills and innovation in all states and territories, Australian rail manufacturing could transform to become a strong and sustainable domestic industry, as well as an export success story able to take increasing advantage of urban development in the Asia-Pacific region.

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<sup>7</sup> ACIL Tasman, "Railway Manufacturing Industry: a profile of the railway manufacturing industry in Australia" prepared for the Department of Innovation, Industry, Science & Research; July 2011; page 15.

#### RECOMMENDATION 4

**The Rail Manufacturing CRC recommends the creation of a national Rail Innovation Hub to coordinate the adoption of new technology and innovation, to assist the industry with strategic growth opportunities and to facilitate enhanced supply chain operation to benefit niche manufacturing businesses.**

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#### Lack of harmonisation in the rail industry

Industry competitiveness dictates that rolling stock in Australia increasingly moves towards being built to a global standard.

Like other manufacturing sectors in Australia, the market for rail manufacturing in Australia is on a smaller scale when compared to Europe and USA. As a smaller market, optimising the scale and volume of rail production is a necessity – with one of the key barriers hindering Australian rail manufacturers being the lack of harmonised standards between Australian States and Territories.

This lack of standardisation (or harmonisation) is one of the historical legacies that characterise the Australian rail manufacturing industry and which reflects the fact that the market for rolling stock is comprised of a customer base of Australia's six States and two Territories.

This lack of standardisation at once operates as a de facto barrier to competition from export competitors – but more significantly, it operates as a barrier to achieving scale and volume within the domestic rail rolling stock production industry.

Resolving this issue is a crucial step to assisting industry become more globally competitive. Progress to date has been incremental and this is ultimately limiting the capacity and capability of rail manufacturing industry to move from low volume, high labour, niche production paradigms to global production paradigms.

#### RECOMMENDATION 5

**The Rail Manufacturing CRC recommends that the Rail Industry Advisor (or equivalent function) is tasked with progressing national rail standards for rolling stock in the Australian market.**

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#### The Rail Manufacturing CRC's role in supporting innovation

The Rail Manufacturing CRC's brief from the Australian Government is to foster innovation in the rail manufacturing industry by facilitating collaborative research projects between Industry and Research participants. To that end, a number of co-funded projects are already underway in areas such as passenger information systems, energy efficiency and automation.

These projects, consistent with our three research themes of *Power and Propulsion*, *Materials and Manufacturing*, and *Design, Modelling and Simulation*, will benefit the rail sector and increase innovation in Australian rail products.



These projects entail collaboration between rail manufacturing companies and Australia's excellent public research institutions, including CSIRO, University of Technology Sydney, CQ University, University of Queensland, University of Wollongong, Queensland University of Technology, Monash University, Deakin University, Swinburne University and RMIT.

The Rail Manufacturing CRC has also reached out to manufacturers who may not currently be part of the rail supply chain by creating a 'Rail Innovation Gateway Program' to offer to facilitate co-funded projects with a broader range of manufacturing businesses.

Increasing innovation in the rail industry is a critical challenge in a similar way to other manufacturing industries in Australia, such as defence and steel, where industry and R&D are strongly interconnected. Manufacturing is both dependent on, and facilitates the development and implementation of R&D and innovation.

Despite these positive beginnings, the Rail Manufacturing CRC believes that the imperative of bringing more innovation to rail manufacturing extends beyond the mandate and capacity of the Centre's and state government policy initiatives, requiring a nationally coordinated approach from the Australian Government.

The Rail Manufacturing CRC argues that a greater effort is required from the Australian Government to drive 'traditional' Australian manufacturing, like rail, to greater innovation and adoption of the principles of advanced manufacturing.

Unlike many other industry sectors, procurement of rail products for passenger and the bulk of freight transport is an activity which is dominated by public procurement principles. The market for rail products is dominated by passenger rail, tram and freight rail operators – mainly governments, with their accompanying public policy objectives.

While there is no data that the Rail Manufacturing CRC has located that outlines the level of innovation in rail manufacturing businesses, the Centre's experience in liaising with rail businesses on R&D projects reinforces the broader picture for manufacturing, whereby the sector would benefit from an increased adoption of R&D and innovation.

Governments can offer incentives to adopt innovation, such as the co-funding of projects through CRCs but for public policy levers to all be focused in the same direction, the Rail Manufacturing CRC believes that public procurement policy is necessary to reinforce this objective by including criteria that give weighting for the adoption of innovation to assess tenders for future rail-related procurement.

As the Australian economy transitions towards knowledge-based industries, the low level of innovation in rail is a key challenge for the rail manufacturing sector that needs to be addressed by both rail businesses and in government procurement policies.

The Rail Manufacturing CRC's observation is that many rail businesses lack management expertise in R&D adoption and also lack dedicated R&D resources to act as a liaison between production systems and research development, further highlighted in a 2011 report into the Australian rail industry that found that less than one per cent of employees in the sector are scientists or researchers.<sup>8</sup>

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<sup>8</sup> ACIL Tasman, *ibid.*

The Rail Manufacturing CRC believes that although the rail industry has recognised the need for innovation (through the *On the Track to 2040* roadmap), rail businesses need to allocate more resources to R&D to enable rail to compete in the advanced manufacturing paradigm of the future.

### About the Rail Manufacturing CRC

The Rail Manufacturing CRC has been funded by the Australian Government Department of Industry, Innovation and Science through the Cooperative Research Centres (CRC) Programme to operate for six years, beginning 1 July 2014. The CRC program supports industry-driven research partnerships between publicly funded researchers and business to address major long term challenges.

The objective of the CRC Programme is to foster links between leading research experts and industry to benefit business outcomes, efficiency and productivity. The CRC programme is one of several Federal Government programs that support increased innovation in Australian industry.

The formation of the Rail Manufacturing CRC arose out of a detailed consultation process within the rail industry sector, the findings of which are set out in the subsequent report, *On Track to 2040 – Preparing the Australian Rail Supply Industry for Challenges and Growth*, a project to map the future needs of the rail manufacturing sector in Australia, launched in 2012.<sup>9</sup>

*On Track to 2040* was commissioned by the former Department of Innovation Industry Science and Research (DIISR), through the Rail Supplier Advocate. The project was funded by the Federal Government, the State Governments of New South Wales, Victoria and Queensland and the Australasian Railways Association (ARA) on behalf of industry.

*On Track to 2040* identified 80 opportunities for technological development in the rail manufacturing sector. That list was then organised into broad themes and ranked into priorities by the industry. Derived from this list are the Rail Manufacturing CRC's three strategic research themes of focus; *Power and Propulsion, Materials and Manufacturing, and Design, Modelling and Simulation*.

The Rail Manufacturing CRC is actively pursuing these industry priorities as a means to guide strategic investment in Australian rail manufacturing and support knowledge transfer across industry and science-based disciplines.

Participants in the Rail Manufacturing CRC include Australia's leading rail manufacturers such as Bombardier Transportation, OneSteel, Downer, UGL and Faveley Transport, as well as a number of SMEs actively contributing to the Centre.

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<sup>9</sup> Department of Industry, Innovation & Science, "On Track to 2040 – Preparing the Australian Rail Supply Industry for Challenges and Growth", 2012, downloaded at <http://industry.gov.au/industry/IndustryInitiatives/AustralianIndustryParticipation/SupplierAdvocates/Documents/OnTrackTo2040-Roadmap.pdf>

<b>RAIL MANUFACTURING CRC'S STRATEGIC RESEARCH THEMES</b>		
<b>Power and Propulsion</b>	<b>Materials and Manufacturing</b>	<b>Design, Modelling and Simulation</b>
<p><b>Research aim:</b> energy and cost efficiency and improved competitive performance in advanced rail manufacturing through research, development and commercialisation in:</p> <ul style="list-style-type: none"> <li>• Energy Regeneration and Storage</li> <li>• Advanced Braking Systems</li> <li>• Electronic Motors and Systems</li> </ul>	<p><b>Research aim:</b> competitive cost, durability and performance in advanced rail manufacturing through research and commercialisation in:</p> <ul style="list-style-type: none"> <li>• High performance materials for heavy haul</li> <li>• Advanced Manufacturing</li> <li>• Advanced, lightweight materials</li> <li>• Low Cost Manufacturing Systems</li> </ul>	<p><b>Research aim:</b> safety and efficiency in advanced rail manufacturing to enhance industry competitiveness through research and commercialisation in:</p> <ul style="list-style-type: none"> <li>• Advanced Design and Simulation</li> <li>• Automated Health Monitoring</li> <li>• Advanced Data Analysis and Information Systems</li> <li>• Advanced Operations Management Systems</li> <li>• Energy Use Management Tools</li> </ul>

The rail industry has identified the specific areas where innovation and greater R&D input is needed in order to secure the economic sustainability of the rail manufacturing sector.

With the priorities established and the inception of the Rail Manufacturing CRC to assist putting this into effect, the challenge still remains as to how to effectively drive the adoption of innovation and R&D into rail businesses.