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Victoria's Future Industries
Transport Technologies Discussion Paper
Submission by Rail Manufacturing CRC

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Executive Summary

- Rail manufacturing is acknowledged as a key industry sector in Victoria and the State of Victoria is a major customer for rail businesses with more than $2 billion allocated in the 2015-16 State Budget for train and tram building and maintenance;

- Levels of R&D and innovation in local rail manufacturing are low and require strategic policy intervention to drive adaptation of an advanced manufacturing production model and the incorporation of new technology to ensure sustainable industry growth, increased productivity and global competitiveness;

- Rail manufacturing in Victoria (and nationally) has a viable and indeed, exciting future with potential for expansion and greater export opportunities of products and expertise into the Asia Pacific marketplace – but this is not guaranteed unless industry recognises and responds adequately to the challenges of advanced manufacturing;

- The rail industry supply chain is currently characterised by significant inefficiencies and missed opportunities. This is to the detriment of the large number of small and medium sized firms that make up 90% of the total number of businesses in the rail industry and for SMEs from other manufacturing sectors (such as auto) seeking to adapt their product to rail;

- There is currently no industry or government body in Victoria that has a mandate for the strategic development of rail manufacturing that harnesses the public benefit to be gained from linking procurement, economic and employment growth targets and the integration of new technology and advanced manufacturing.

- Therefore, a new body (a '**Rail Innovation Hub')** is needed to secure the long term future of rail in Victoria – 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 in Victoria.

Introduction

Victoria has already identified transport as a potential industry for future economic growth and job creation for the State's economy through the $200 million Future Industries Fund which includes the sub-sector of transport, defence and construction technology.

Given the significance of the Victorian investment in rail and rail-related infrastructure and the public policy objective – shared by RMCRC – of supporting the development and expansion of Australian rail manufacturing sector, RMCRC is pleased to have this opportunity to contribute to the Transport Technologies Discussion Paper.

RMCRC agrees with the *Future Industries Transport Technologies Discussion Paper* that the transport equipment sector must evolve to prosper or face decline.

With rapid advances in technology and manufacturing systems underway, the rail industry in Australia faces significant challenges to incorporate new, advanced manufacturing technologies into their businesses. RMCRC's experience is that the rail industry is not moving as quickly as it could to adequately address this challenge.

With growing export opportunities into Asia-Pacific and a highly skilled workforce with manufacturing expertise, Victoria is well-placed to strategically develop its rail transport technology expertise and become a centre of excellence for rail manufacturing.

RMCRC also notes (and agrees with) the analysis done by the Boston Consulting Group in 2015 which identified that a high growth scenario for the transport, defence and construction sector could lead to an incremental increase of $1.3 billion and 42,000 jobs for the Victorian economy.

Rail manufacturing is already a critical industry in Victoria with a strong pipeline of state investment of more than $2 billion in new, locally made trains and trams approved. In addition, Victoria has committed to the construction of new rail infrastructure projects such as the Melbourne Metro Rail and Mernda rail extension.

In making this submission, RMCRC is particularly focused on responding to Questions 6-8 posed in the *Transport Technologies Discussion Paper* concerning:

- how Victoria can effectively build networks and foster relationships to support innovation and business growth in the transport sector, in particular with small to medium enterprises;
- how manufacturers can capitalise on the strong research base in Victoria; and
- how Victoria's transport manufacturers can incorporate innovative manufacturing technologies into their businesses.

It is the view of RMCRC that a dedicated **Rail Innovation Hub** could provide the necessary linkages between industry, research and government which would help address many of the challenges posed by these questions.

RMCRC believes that the establishment of a new **Rail Innovation Hub** in Victoria, is the logical next step needed to anchor the rail manufacturing industry in Victoria and foster efficient industry development to ensure that rail manufacturing continues to be a viable state industry and takes advantage of opportunities to expand and develop as a key part of the state's economic future.

Since its inception in 2014, Rail Manufacturing CRC has worked intensively with rail manufacturing businesses in Victoria and other states across Australia to bring the benefits of R&D, innovation and new technology into the rail manufacturing sector in Australia.

As a Cooperative Research Centre, RMCRC's remit from the Federal Government has a focus on liaising intensively with rail sector businesses in Australia to develop research-based projects that benefit the rail industry sector.

As a result of intensive engagement with rail manufacturing businesses, RMCRC has identified a need for a new industry organisation focused on rail (the **Rail Innovation Hub**) to build the networks that will support adaptation of new technology and innovation and also lead to improved functioning of the rail industry supply chain to benefit access to Tier 1 manufacturers for small and medium sized enterprises.

RMCRC has also identified a keen interest from small and medium enterprises currently operating outside of rail, in seeking government support in adapting their business products, skills and technology, to the rail industry.

As currently constituted, it is outside of the remit of RMCRC to provide this broad-based industry support and facilitation, even though it would be of significant benefit to the overall rail sector, particularly in Victoria. However, RMCRC has built up significant expertise and networks in the rail sector that could readily be applied on a project basis within Victoria.

While the Industry Capability Network (ICN) has played an important role in facilitating business to business opportunities, there is currently no industry or government body that has a strategic growth mandate for rail manufacturing with the required policy and funding levers. If not rectified, this omission will have long term consequences for the rail industry and continue to operate as a detriment to small manufacturing business development and jobs growth in the many rail SMEs.

Nationally, the rail transport also benefits from the policy advocacy of the Australasian Railway Association (ARA) in particular and the leadership on rail related matters that this organisation provides on industry-related matters.

Why a Rail Innovation Hub?

Despite the good work of a number of industry related bodies, RMCRC has identified that there remains a gap in the operation of the market for rail and that this could be addressed by the establishment of a Rail Innovation Hub in Victoria to assist the transport industry to build the necessary networks and relationships to take this sector to the next level of manufacturing growth and excellence.

A dedicated Rail Innovation Hub could act as the coordination body to assist the development of the rail supply chain and at the same time, ensure the integration of innovative manufacturing technologies into production processes.

As is noted above and as set out in the Victorian Government's *Rolling Stock Strategy: Trains, Trams, Jobs 2015-2025*, rail manufacturing is already a critical industry in Victoria with state investment of more than $2 billion in new, locally made trains and trams and maintenance, as well as new rail infrastructure projects such as the Melbourne Metro Rail and Mernda rail extension underway.

RMCRC also notes the existing support of the Australian and Victorian governments for advanced manufacturing through programmes like the *Next Generation Manufacturing Investment Programme*, which recently awarded $3.2 million to Bombardier Transportation to support the installation of assembly lines for robotic welding. In addition, the grant of $3.312 million through the

Geelong Region Innovation and Investment Fund to Air Radiators Pty Ltd, will also significantly benefit the rail manufacturing sector.

A Rail Innovation Hub could enable Victoria to use its considerable investment in rail to leverage greater integration of innovative manufacturing technologies and ensure greater public and industry benefit from policies including the *Victorian Industry Participation Policy* through the enhanced access of SMEs and overall growth in industry expertise.

As is outlined in the *Transport Technologies Discussion Paper*, the transport sector is under pressure to improve its environmental performance which includes better fuel efficiency and new technologies and manufacturing processes that, for example, utilise lightweight materials.

The looming economic challenge of transformed industrial production driven by new technology and advanced manufacturing means that existing, traditionally-based businesses that do not grasp this challenge and act quickly to increase their R&D capacity and investment will face declining competitiveness and viability.

Indeed, grants of public money to businesses that do not take advantage of government supported opportunities to incorporate greater innovation may have only a short term horizon. RMCRC believes that on their own they are inadequate in ensuring local businesses capitalise on Victoria's strong research base and incorporate innovation into their production processes.

While ad hoc investments in the rail industry are crucial to assist the immediate industry needs, they do not address the long term challenges of the industry that are raised in the *Future Industries Transport Technologies Discussion Paper*.

The model for a **Rail Innovation Hub** is based on similar principles found in other dedicated industry growth organisations (including the Cooperative Research Centre model) where government provides seed funding for collaborative industry and research projects which, in turn, deliver a public benefit from the commercialisation of applied research and consequent improved manufacturing processes.

A Rail Innovation Hub should also be able to utilise the levers of state government procurement and funding program grants to seek an innovation and sustainable growth dividend from its considerable investment in rail businesses.

As was outlined by The Boston Consulting Group, a high growth future for transport, defence and construction relies on a new government initiative to support SMEs to access the global supply chain and facilitating and encouraging the better application of R&D and technology across industries.[1]

RMCRC believes that the formation of a **Rail Innovation Hub** is the most effective means of achieving this goal and can attest to the need for both of these actions to take place if the rail manufacturing industry is to be maintained in long term competitiveness and viability.

A Rail Innovation Hub could provide some or all of the following:

- Promote the application of R&D, new technology and advanced manufacturing;
- Identify and facilitate access to emerging technologies, both local and international;
- Assist supply chain integration by providing networking of innovation drivers, suppliers and purchasers.

[1] Boston Consulting Group 2015, *Transport, Defence and Construction Technology Fact Pack*, 27 February 2015;

- Links to R&D organisations such as the Rail Manufacturing CRC, Advanced Manufacturing Industry Growth Centre, CSIRO and other research institutions, both public and private.
- Provide industry development through seminars and best practice innovation approaches;
- A point of access and engagement for SMEs wanting to engage in the rail manufacturing supply chain;
- Capacity to better link government procurement and funding grants with the incorporation of applied research and new technology;
- Coordination with other rail industry bodies including ICN, ARA etc;
- Provide assistance on commercialisation and intellectual property issues.

RMCRC notes the analysis of Germany's Fraunhofer Society in the *Transport, Defence and Construction Technology Fact Pack* produced by the Boston Consulting Group,[2] which has identified a measurable increase in growth in that country's manufacturing output, as a result of significant government investment linked with applied research and industry co-contributions.

The Fraunhofer Society model of industry development is very similar to that of the Cooperative Research Centre Programme, in that it fosters co-funded applied research projects between government and the private sector, albeit in Germany on a significantly higher level of funding.

This model is proven to be a highly effective tool of strategic industry growth and development. A **Rail Innovation Hub** is therefore essential to the economic future of rail manufacturing in Victoria.

About Rail Manufacturing CRC

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 6 years from 1 July 2014 onwards. The CRC program supports industry-driven research partnerships between publicly funded researchers, business and the community 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 a number of federal government programs that support increased innovation in Australian industry.

Essential Participants in RMCRC include Australia's leading rail manufacturers such as Bombardier Transportation, OneSteel, Downer and Faiveley Transport, as well as a number of SMEs contributing to the sector.

The formation of 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.[3]

[2] Ibid, Boston Consulting Group 2015.
[3] 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

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 Commonwealth 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. RMCRC's three strategic research themes which are informed by this priority list are Power and Propulsion; Materials and Manufacturing; and Design, Modelling and Simulation.

RMCRC is actively pursuing the industry priorities as identified in the Roadmap by adopting the priorities set out in *On Track to 2040* as a means to guide strategic investment in the industry and support knowledge transfer across industry and science-based disciplines.

RAIL MANUFACTURING CRC'S STRATEGIC RESEARCH THEMES		
1. Power and Propulsion	**2. Materials and Manufacturing**	**3. Design, Modelling and Simulation**
Research aim: energy and cost efficiency and improved competitive performance in advanced rail manufacturing through research, development and commercialisation, including in: •Energy Regeneration and Storage •Advanced Braking Systems •Electronic Motors and Systems	Research aim: competitive cost, durability and performance in advanced rail manufacturing through research and commercialisation including in: •High performance materials for heavy haul •Advanced Manufacturing •Advanced, lightweight materials •Low Cost Manufacturing Systems	Research aim: safety and efficiency in advanced rail manufacturing to enhance industry competitiveness through research and commercialisation including in: •Advanced Design and Simulation •Automated Health Monitoring •Advanced Data Analysis and Information Systems •Advanced Operations Management Systems •Energy Use Management Tools

As a result of the *On Track to 2040* process, the rail industry has itself 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 a body such as RMCRC to help put this into effect, in RMCRC's view, the challenge still remains as to how to effectively drive the adoption of innovation and R&D into rail businesses.

The role of RMCRC in supporting innovation in rail manufacturing

RMCRC's brief from the Australian Government is to foster innovation in our national rail manufacturing industry and to facilitate links between research and industry. To that end, a number

of co-funded projects are already underway, which we believe will benefit the rail sector and increase innovation in Australian rail products.

These projects include collaboration between rail manufacturing companies and Victoria's excellent public research institutions, including CSIRO, Monash, Deakin, Swinburne and RMIT Universities.

However, RMCRC believes that more can be done to drive Australian manufacturing to greater innovation and adoption of the principles of advanced manufacturing.

Unlike many other industry sectors, procurement of rail products is an activity which is dominated by public procurement principles. That is, 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 RMCRC has located that identifies the level of innovation in rail manufacturing businesses, RMCRC's anecdotal experience in liaising with rail businesses on R&D projects correlates with the broader picture for manufacturing and suggests that the rail manufacturing sector needs both financial incentives and a strategic policy framework to drive the required increase in the adoption of R&D and innovation.

RMCRC's observation is that many rail businesses lack management resources and expertise in R&D adoption and also lack dedicated R&D resources to act as a liaison with research providers. Our experience also is that there can be disconnect between the commercial market pressures for rail businesses and the realistic timeframes for delivery of research project outcomes. This anecdotal lack of R&D expertise in rail is borne out in a 2011 report into the Australian rail industry found that less than one per cent of employees in the sector are scientists or researchers.[4]

RMCRC believes that although the rail industry has recognised the need for innovation through the *On the Track to 2040* roadmap that rail businesses need to allocate more resources to R&D to facilitate the implementation of this important industry roadmap and to enable rail to compete in the advanced manufacturing paradigm of the future.

Innovation in Australian Businesses

It is widely recognised that Australian businesses across the spectrum of sectors have a low level of adoption of R&D and innovation. For example, the *2015 Global Innovation Index* ranked Australia 17th out of 141 economies for innovation capabilities and performance but only 72 for innovation efficiency.

The latest *Australian Innovation System Report* of the Australian Government Office of Chief Economist found that Australian businesses of all sizes do poorly on new to market innovation and that our large businesses rank only 21st in the OECD for innovation.

In addition, the OECD *Science, Technology and Industry Scoreboard 2013* found that Australia ranked the lowest in the OECD for collaboration on innovation with public research institutions.[5]

[4] Australian Government Department of Innovation, Industry, Science and Research, "Railway Manufacturing Industry: a profile of the Railway Manufacturing Industry in Australia" prepared by ACIL Tasman, July 2011, p. 15.

[5] OECD (2013), OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth, http://dx.doi.org/10.1787/sti_scoreboard-2013-en

Analysis like this consistently identifies that there is a significant gap between the world class innovation that is taking place in Australia's research institutions and the transfer of that knowledge and research to business. This is a key public policy challenge that requires a multi-channel approach to address.

The benefits of innovation to business are clearly articulated in the *Australian Innovation System Report*. Innovation leads to greater wealth creation, employment growth and more efficient production. Innovative Australian businesses are 31 per cent more likely to increase income and 46 per cent more likely to report increased profitability. This report also found that the scale and impact of innovation in Australia appears to be hampered by a poor management culture of innovation and collaboration and shortages in a range of skills.[6]

This lack of innovation in manufacturing comes at a time when industry is rapidly shifting to increased automation. A recent Bank of America Merrill Lynch (BOAML) report into the impact of the robotics industry identified that Australia's manufacturing sector used only 80 robots for every 10,000 employees, less than half the number used in South Korea, Japan, Germany and Sweden and significantly less than the United States and Canada.

Rail Manufacturing in Australia

Rail manufacturing in Australia is increasingly evolving from the production of end-to-end products that characterise traditional manufacturing and increasingly towards advanced manufacturing which involves low-volume, high-value production.

This transition can be seen in an analysis of the size of the various segments of rail manufacturing. The most recent IBISWorld report into this sector identified that end-to-end manufacture now comprises only 6.8% of rail production. Other segments of the rail industry are increasingly more significant such as repair and maintenance at 21.3%, passenger railcars fitout at 20.8%, locomotive components at 19.5% and freight wagons at 10.7%.[7]

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

The challenges for government in assisting Australian manufacturing in adopting the principles of advanced manufacturing were set out in a CEDA report, *Advanced Manufacturing: Beyond the production line*.[8] 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.[9]

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,

[6] Australian Government, Department of Industry, Office of Chief Economist, *Australian Innovation System Report 2014*, www.industry.gov.au/OCE/innovationreport.
[7] IBISWorld Industry Report C2393, *Railway Equipment Manufacturing and Repair in Australia*, May 2015.
[8] CEDA, *Advanced Manufacturing: Beyond the production line*, April 2014.
[9] Ibid, p.8.

without increased application of innovation, the Australian rail industry will not keep pace with the application of new technology to global platforms.

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.[10] While imports of rail equipment are expected to grow at around 13.1% over the next five years, exports are smaller and grew slower at an annual rate of 2.9% over the past five years.

RMCRC 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, Downer, UGL and Faiveley Transport in Australia creates a strong foundation for developing greater export opportunities into the Asia-Pacific region as these companies can 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 seizing this export opportunity.

[10] Ibid, p.16.