RECYCLED PLASTICS IN RAILWAY SLEEPERS

Recycled plastic railway sleepers are used across the world, however they are not commonly used in Australia. A research project was conducted to assess the use of recycled flexible plastic in the formulation of an Australian made recycled plastic sleeper.

Project background

Railway sleepers used across Australia are typically made from virgin materials, including timber, concrete or steel. Integrated Recycling has developed the Duratrack composite recycled plastic railway sleeper as an alternative to traditional sleepers at its Mildura factory. The Duratrack sleeper is produced from a mix of flexible and rigid plastics including agricultural films, polystyrene, pipes, drums and bottles. The Duratrack sleepers have been installed in seven tourist and heritage rail lines across Victoria since 2015, including the famous Puffing Billy Railway in Melbourne's South East.

This research project was co-funded by Sustainability Victoria and the **Australian Packaging Covenant Organisation** and began in 2017. Monash University with the support of its Institute of Railway Technology, the premier track and vehicle railway research centre in Australia, led the research project. The purpose of the project was to:

- Develop and strengthen a new market for recycled flexible plastics by using it in the formulation to make rail sleepers
- > Test different recycled plastic materials in the Duratrack sleepers, beyond the current formulation that was used on the tourist and heritage rail lines
- Analyse the performance of these sleepers with the goal of commercialisation to meet different railway operator's standards

The revised Duratrack sleeper formulation containing recycled flexible plastics has been approved for in-track trials with Queensland Rail in 2018 with the intention to commence supply to Queensland Rail in 2019; if the trial meets performance requirements.

SNAPSHOT

ORGANISATION

Monash University Industry partner: Integrated Recycling

PROJECT

Assess the use of recovered flexible plastic formulations in an Australian made recycled plastic rail sleeper.

OBJECTIVES

- Develop and strengthen a new market for recovered flexible plastics and increase the use of recycled content in rail sleepers
- Test different recycled plastic materials in the Duratrack sleepers, beyond the current formulation that is installed on tourist and heritage rail lines
- Analyse the performance of these sleepers to meet different railway operator standards

OUTCOMES

The results from this research project show that the revised Duratrack sleeper could use various recovered plastics in its make up and be adopted for commercial use across Australia.

What are recycled plastics and why are they a problem?

Recycled plastic is post-consumer waste and can be broadly categorised as either flexible or rigid; both are used in producing Duratrack. Several challenges for plastic recovery include the lack of available quality feedstocks, the price of collection, transport and processing into quality products when compared to items made from virgin plastics.

Benefits

There are several advantages of using recycled plastic in rail sleepers, these include:

- Improved product life Duratrack has 50-year product life; reducing the replacement cycle of more traditional timber sleepers (approximately every 15 years)
- More resilient product the Duratrack sleeper is resistant to termites; water rot, fungal infection and end splitting, issues that adversely affect timber sleepers
- > Uses significant volumes of plastics, which Sustainability Victoria has identified as a priority material based on its increasing use in the community and low recovery rate
- Increases employment opportunities in regional Victoria

For every kilometer of Duratrack sleepers laid (approximately 1,500 per km):

- > 54 tonnes of recovered plastic will be used
- > 10 tonnes of recovered polystyrene will be used
- > Between 300-750 trees will be saved from felling to produce a timber sleeper.



Research Results

Overall the results showed that the revised Duratrack sleeper has met the specifications of rail operators, including Queensland Rail and the Victorian Tourist and Heritage rail sector. Further research and development is required to understand other benefits such as noise and vibration, increasing opportunities for use of the Duratrack in other rail applications across Australia.

Opportunities

Integrated Recycling will now undertake in-track testing as part of Queensland Rail's 700,000 timber sleeper replacement program to validate the laboratory testing in a real-world application. Results from the testing will confirm whether Duratrack will be suitable for the Queensland Rail network and other railways across Australia.

Initial research and product development has also provided Integrated Recycling the opportunity to work with Victorian rail authorities, including Metro Trains Melbourne and V-Line, to trial the product in rail networks outside of the tourist and heritage lines. There is also significant opportunity for this research to support Integrated Recycling to supply this product to international markets.

Research Team

Emeritus Professor Rhys Jones, AC Centre of Expertise for Structural Mechanics, Department of Mechanical and Aerospace Engineering, Monash University

Professor R. K. Raman Singh, Department of Mechanical and Aerospace Engineering, Monash University

Daren Peng, (PhD) Monash University, Department of Mechanical and Aerospace Engineering, Monash University

Graham Tew, Research Manager, Institute of Railway Technology, Monash University

Stephen Webster, General Manager, Integrated Recycling

"This project has created a strong relationship between Integrated Recycling and Monash University that has validated the Duratrack sleepers in-track performance and has accelerated the acceptance of a new product for trialling by rail operators." – Stephen Webster, General Manager, Integrated Recycling



Further information

For more information contact Resource Recovery Strategies and Programs on 03 8626 8700 or visit www.sustainability.vic.gov.au/research-development-grants



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