



Plastic sleepers under test by QR

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Plastic railway sleepers produced by a Mildura, Victoria, manufacturer are being tested by Queensland Rail (QR) as part of its plan to roll out alternatives to traditional infrastructure.

Integrated Recycling has developed the Duratrack composite recycled plastic sleeper using a mix of flexible and rigid plastics such as agricultural film, polystyrene, pipes, drums and bottles.

Integrated Recycling's general manager Stephen Webster said 150 sleepers were installed at two QR mainline locations in October and November.

"The first trial site is between Helidon and Gatton on the Brisbane side of the Toowoomba Range and the other trial site is between Chinchilla and Miles on the western side of the range," Mr Webster said.

"QR wanted locations representing a variety of freight services to include different train frequencies and commodities. It also wanted the trial sites to be easily accessible for monitoring on tangent track and a horizontal curve and to

be representative of the regional network where the replacement sleepers would be used following a successful trial."

Results from the testing are expected to confirm whether Duratrack will be suitable for the QR network and will provide a lead for other railways across Australia.

QR intends to replace 700,000 timber sleepers over five years once testing has been completed.

Integrated Recycling is one of three companies that have reached the final in-track testing stage. The others are Austrak and Sekisui (a Japanese manufacturer). The Duratrack sleeper is the only one with recycled plastic content.

Mr Webster said Duratrack had also received provisional approval from Metro Trains Melbourne (MTM), with sleepers ready to be installed at several sites across the city.

The type approvals granted by QR and MTM for field trials follow extensive testing of the sleepers by Monash University's Institute of Railway Technology (IRT). The in-track trials will take between 12 and 18 months.

"Work is continuing with Monash IRT and we were able to assist them to secure further research funding from Sustainability Victoria to carry out in-track monitoring of the trial sleepers," Mr

Webster said. "Monash IRT has received a \$200,000 grant from Sustainability Victoria for the next stage of research and development."

In the first stage of research and development, funding granted to Monash University by Sustainability Victoria was to find ways for flexible plastics to be used in commercial products.

Integrated Recycling put forward Duratrack.

This next stage will validate the laboratory testing during in-track trials.

Mr Webster said Duratrack's noise and vibration dampening capabilities compared with concrete sleepers would be investigated during the second stage of the research funding for MTM and the Level Crossing Removal Authority (LXRA).

The authority is overseeing the removal of 75 dangerous and congested level crossings across Melbourne and regional Victoria by 2025. Mr Webster said LXRA faced "huge costs" to install noise walls.

"If they can find a sleeper material that attenuates noise and vibration that may be of benefit to them," he said.

Integrated Recycling has also supplied replacement sleepers to Red Cliffs Railway, just south of the manufacturing plant, and the Bennett Brook Railway in Western Australia.



"We are talking to many other tourist railways that are looking at replacing worn timber sleepers or installing new track," Mr Webster said. "We've had our sleepers in seven tourist and heritage railways in Victoria for more than three years.

"The sleepers have had three million gross tonnes of Puffing Billy trains going over them without any variation in gauge or any issues at all so we feel reasonably comfortable."

Mr Webster said he was confident Duratrack would appeal to other rail operators as it was locally produced and recycled plastics made up about 85 per cent of the content of the sleeper.

"There is a lot of interest in the Duratrack sleeper among other major rail operators and we expect there will be further trials conducted during 2019 by key operators around Australia," he said.

QR executive general manager Chris Keye said the organisation was committed to pursuing sustainable options for its rail infrastructure.

He confirmed QR was currently undertaking field testing to determine a suitable vendor to supply composite sleepers for use on its statewide network.

"Since 2014 QR has introduced three types of plastic railway sleepers on its network, including composite sleepers which are made of plastic components.

"They can last up to 50 years as opposed to traditional timber sleepers, which are required to be replaced every 10-20 years."

Seven potential vendors were initially identified following an expression-of-interest process in 2016. They were short-

listed to submit design packages in January 2018.

"From this shortlist three companies were selected to proceed to the final field testing stage, which has seen QR purchase 150 composite sleepers from each vendor and install them in-track at selected points across the network in October-November 2018," Mr Keye said.

Engineers are conducting regular testing and closely monitoring the performance of the sleepers at Gatton, Helidon, Chinchilla and Miles. Those studies will continue for the next 12-18 months.

"It is anticipated final testing will be complete by the end of 2020 and companies with an approved product will then be invited to tender for a supply contract," Mr Keye said.

"QR already uses composite sleepers at key sections of its network, including on the Merivale Bridge which connects the north and south of Brisbane, and is considering ways to further strengthen its commitment to sustainability by rolling out this durable and long-lasting infrastructure more widely across its network."

Sleeper research co-funded

Sustainability Victoria and the Australian Packaging Covenant Organisation co-funded the initial research on the Duratrack sleepers at Monash University's Institute of Railway Technology.

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 tourist and heritage rail lines; and

- analyse the performance of these sleepers with the goal of achieving commercialisation to meet different railway operators' standards.

Sustainability Victoria said there were several advantages of using recycled plastic in rail sleepers, including improved life, a more resilient product and use of a significant volume of plastic.

For every kilometre of Duratrack sleepers laid (approximately 1500 per kilometre), 54t of recovered plastic will be used. This includes 10t of recovered polystyrene and means 300-750 trees will not need to be felled to produce timber sleepers.

The results of the initial research project showed the revised Duratrack sleeper could use various recovered plastics in its make-up and be adopted for commercial use across Australia.

Overall, the results showed the revised Duratrack sleeper had met the specifications of rail operators including QR and the Victorian tourist and heritage rail sector.

Further research and development is required to provide an understanding of other benefits such as noise and vibration, increasing opportunities for use of the Duratrack in other rail applications across Australia.

"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," Mr Webster said. **T+S**