Plastic sleepers under test by QR

ANDREW ROSE

Plastic railway sleepers produced by a Mildura, Victoria manufacturer are being tested by Queensland Rail (QR) as part of its plan to roll out alternative 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, polyester, 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 trial site is between Heldon 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 Aurtrak and Sekisui (a Japanese manufacturer).

Aurtrak Duratrack is the only one with recycled plastic content.

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

The type approval granted by QR and MTM for field trials follows 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 are 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 used 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 damping capabilities compared with concrete sleepers would be investigated during the second stage of the research funding for MTM and the Level Crossing Removal Authority (LCRA).

The Authority is overseeing the removal of 75 dangerous and congested level crossings across Melbourne and regional Victoria by 2025. Mr Webster said LCRA 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 Keve said the organisation was committed to pursuing sustainable options for its rail infrastructure.

"I have confirmed QR was currently undertaking field testing to determine if 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 15-20 years."

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

"Engineers are conducting regular testing and are continuously monitoring the performance of the sleepers at Gatton, Heildon, 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."

"QR already uses composite sleepers at key sections of its network, including on the Murrin Murrin Bridge which connects the north and south of Brisbane, and is considering ways to further strengthen this 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 plastic sleepers;
- develop and test different recycled plastic materials in the Duratrack sleepers beyond the current formulation that was used on tourist and heritage railway lines; and
- analyse the performance of these sleepers with the goal of achieving commercialisation to meet different railway operator standards.

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

For every kilometre of rail track sleepers laid approximately 2500 kilogrammes of steel is saved, 540 kilogrammes of plastic will be used. This includes 1500 of recycled polyethylene and a 1500 kilogrammes of steel will be saved. This includes 750 of recycled polyethylene and 750 kilogrammes of steel will be saved. This includes 750 of recycled polyethylene and 750 kilogrammes of steel will be saved.

"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."

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

Further research and development is required to provide an understanding of the impact of the increase in the use of plastic in rail infrastructure, including the potential for reduced noise and vibration.