The first Australian use of asphalt in rail

Boral Australia's National Technical Manager – Asphalt, Ryan Jansz, spoke with *Rail Express* about the benefits of asphalt as an alternative to ballast in track construction.

ALREADY USED FREQUENTLY ON railways in countries like Austria, Japan and Germany, asphalt has applications as a base layer across multiple rail formats.

Boral says its Railpave Asphalt solution can offer a surprisingly effective alternative to a traditional track construction in several cases.

In Australia, Boral sees commercial applications for Railpave on bulk railways, freight projects like Inland Rail, and regional and urban passenger rail – particularly in the construction of rail sidings and turnouts.

"Sidings and turnouts tend to be a little bit more structurally involved, so they're often quicker and easier to build using asphalt than a classic ballast structure," Jansz explains. "But the product has applications throughout every level of the rail industry and is very relevant to its future."

An alternative to classic ballasted track

Classic ballasted track has been the most common method of below rail infrastructure construction since the 1800s, because in a time of massive demand for new railways, it allowed even a relatively unskilled workforce to install track quickly, using material that has been readily available, and cheap.

But over the lifetime of the rail track, asphalt begins to compete with classic ballast solutions.

This is because asphalt benefits from increased structural capacity, less vibration (with Boral offering the option to incorporate rubber or polymer to assist), reduced erosion, offset ballast fatigue, and no fouling or contamination.

"As a pure cost proposition, the European experience is asphalt starts to break even with

> ***"In track construction, RailPAVE optimises asphalt mix for rail loading while taking into account any environmental conditions"***

In this application at Branxton, Boral's Railpave Asphalt sits atop the hydraulic bonded layer, and acts as the base layer for the track infrastructure. The lateral pre-cast element sits above that, supporting the rail.

ballast as part of the rail structure after about 20 to 25 years, because it saves resources and overall maintenance benefits accrue," Jansz says.

"Over time ballast fouls, it is choked by dust from the environment and contamination from the freight travelling above it. Combined with damage due to cyclical loading, the ballast becomes less effective and it has to be replaced."

Jansz points out asphalt doesn't have to be used to replace ballast entirely – it can be used instead to provide a base layer below the ballast, meaning a track owner will have less ballast to replace in the long term.

"Even if we adopt Austrian and Japanese approaches of just replacing part of that ballast by putting asphalt beneath – as a sub-ballast – then part of that ballast is replaced with asphalt on a more permanent basis."

Jansz says when asphalt, a bound material, is used as a sub-ballast, it can provide a higher level of stability to the unbound ballast above it. This can improve the overall stability of the below track infrastructure, improving lifetime costs.

"As trains run over ballast, over time the vibrations can cause the ballast to shift, because that material is unbound. What asphalt brings is a bound component to it, that can reduce the amount of ballast movement and rail fatigue."

The role of transportation costs

Jansz says asphalt becomes even more viable as part of track construction when work takes place a long way from the nearest quarry.

Ballast, being crushed rock, is a relatively cheap commodity, meaning transportation costs make up a significant portion of overall installation costs.

For asphalt, which is more expensive, transportation costs make up a lower portion of overall costs, and the commodity can therefore become more competitive against crushed rock, when it is being moved a long way to the construction site.

"In Europe they've found that, generally, if you're about 70 to 80 kilometres from a quarry, the cost of introducing asphalt starts to get towards that break-even point," Jansz explains, "mainly because the component of the cost related to transport increases, relative to the cost of the raw material."

Australian first in the Hunter

Working on a project for the ARTC in late 2017, Boral incorporated its Railpave Asphalt into a non-ballast rail track – the first time asphalt has formally been used as an integral pavement component in rail construction in Australia.

Jansz will be joined by Rhomberg Rail Australia's Henrik Vocks at AusRAIL to present a paper on the construction, reflecting on observations and findings from the track's installation and first year of operation.

Conditioning of the Railpave Asphalt layer at the Branxton site for ARTC.

The project took place across multiple shutdowns at Branxton, in the Hunter Valley, on a section of track frequently used by coal trains with axle loads of 30 tonnes.

Railpave was installed as part of the base layer of track, and track slab was installed above it. The early strength and fast accessibility of asphalt made it a useful material for construction within a short window.

"Asphalt … provides the expedience of not requiring extended curing periods, and ability to rapidly access the Railpave platform to complete the rest of the track construction with minimum shutdown time," the paper explains.

"In track construction, Railpave optimises asphalt mix for rail loading while taking into account any environmental conditions."

Jansz and Vocks will present the paper 'Experiences after one year of Railpave and IVES in Australia' at AusRAIL at 3pm on Tuesday, November 27, during the RTAA technical stream.

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