WHERE THE RUBBER HITS THE ROAD

INDUSTRY UPDATE

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Australia currently generates 56 million used tyres per annum, with only 10 percent of these used tyres being recycled and nearly 30 per cent exported for re-use. The rest are disposed to landfill, stockpiled, or illegally dumped.

As a material, end-of-life tyres crumb rubber boasts a number of environmental benefits as a recycled product. These benefits are increasingly being realised across a number of industrial sectors, including our roads.

Old tyres contain valuable engineering compounds that can be beneficial to bituminous binder performance – namely from natural rubber and carbon black. The latter is an antioxidant, which retards the properties of a conventional binder viscosity (resistance to flow) and elasticity. The digestion of crumb rubber in bitumen comprises of three different stages.

Stage 1: The rubber particles absorb some of the lighter aromatics in the bitumen and starts to swell and increases the resilience of the binder.

Stage 2: Over time the rubber changes into a gel-like phase which is responsible for the increased viscosity and softening point of the modified binder.

Stage 3: Finally, after a period of digestion the gel-like phase changes to an oil-phase with improved durability and flexibility characteristics.

Source: South African Bitumen Association (SABITA 2009)

Crumb Rubber Seals - Available Long-Haul

There is a proven history of crumb rubber bitumen providing improved performance compared to conventional bituminous binders when used in sprayed seals or asphalt.

Australia’s earliest trial with Crumb Rubber Bitumen (CRB) in spray sealing was carried out in New South Wales in 1951. Since then it has been predominantly used in sprayed seals, with take up predominantly occurring since the 1970’s.

However, the use of preblended CRB binder has traditionally been limited to areas within close proximity to the point of manufacture, restricting its application for remote projects. Given the sheer size of Australia, this poses a major issue for our roads servicing our remote regions.

The difficulty of long distance travel is that the crumb rubber particles can settle out at the bottom of the road tanker.

With that particular challenge in mind, SAMI bitumen developed a technique to produce a CRB binder that meets the Austroads Standard, that has greater storage stability during prolonged heating and transportation.

In the summer of 2016-17, SAMI supplied approximately two million litres of this CRB binder to a Safer Roads Scooner roads rescaling contract for the Queensland Department of Transport and Main Roads (TMR), across multiple sites in the south western district of Queensland.

The material was transported from SAMI’s Pinkenba facility in Brisbane – up to 1100 kilometres away – without the rubber particles dropping out of suspension or the binder properties degrading during transport.

Previously, if CRB binder was to be used it would need to be blended within 300 kilometres of the point of use. The newly formulated CRB binder overcomes this limitation, and is aided by the use of specially modified road tankers and special handling protocols during the material’s transportation.

Last year, SAMI was awarded the 2017 National Australian Asphalt Pavement Association Innovation Award for the preblended CRB binder used on the project.

The award recognised that the innovation which now allows remote Australian roads to derive the sustainability benefits of crumb rubber.

This is an exciting innovation that will promote affordable more durable roads for remote Australians.

Queensland rubber hitting the road, long haul.

This initiative follows the joint research being undertaken by:

- Queensland Department of Transport and Main Roads (TMR)
- Australian Road Research Board
- Tyre Stewardship Australia and
- Queensland Department of Environment and Science

In collaboration with industry through the Australian Asphalt Pavement Association, Main Roads Western Australia and Austroads exploring the potential for the increased use of crumb rubber.

Three phases are being explored:

Phase 1. spray seals
Phase 2. open-graded asphalt; and
Phase 3. gap-graded asphalt.

TMR has recently changed its sealing specification to allow use of crumb rubber in binders, as an alternative to polymer-modified binders.

Crumb rubber use in open grade demonstration projects are currently being assessed where it is expected the outcome will be longer lasting product, due to thicker binder films, which are less prone to oxidisation.

With the assessment of crumb rubber gap graded asphalt (GGA) to commence soon. There is no specification for GGA with high viscosity CRB binders available in Australia, which means that the benefits of this technology cannot readily be utilised by local road jurisdictions - yet.

This work, partnered with industry innovation as shown by SAMI Bitumen, is paving a new era of sustainably in the roads sector.