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ReLIXER®, a green bio-based oil elixir, marketed by Sripath Technologies®, has been successfully used as an asphalt rejuvenator or RAP recycling agent in high-RAP mixes on roadways around the globe. *All photos courtesy of Sripath Technologies*

# AUSTRALIA TRIALS HIGH-RAP WITH REJUVENATOR

**BY MELISSA INTRONE**

Increasingly, industry experts and regulatory agencies worldwide are urging or mandating the use of high-RAP mixes with the intent to maximize the recycling of reclaimed asphalt pavement (RAP) and minimize the need for virgin liquid asphalt cement (AC) and fresh aggregates.

It is well recognized that for high-RAP mixes with greater than 25 to 35% RAP, a rejuvenator or recycling agent is frequently

needed. An ideal recycling agent restores the functional properties of the aged binder, aids workability and compactability of the asphalt mix, delivers the required roadway performance and durability, and reduces the need for virgin binder.

ReLIXER, a proprietary blend of bio-based oils, marketed by Sripath Technologies®, is engineered to incorporate all the characteristics of an ideal recycling agent. It has been vetted, tested, and approved/listed by authorities and paving contractors around

the world. Recently, high-RAP mixes dosed with ReLIXER were used on roadway trials in Queensland, Australia. One trial was conducted in Brisbane City and the other in the City of Gold Coast.

In preparation and support for these trials, ReLIXER was extensively evaluated and tested by Associate Professor Filippo Giustozzi and his team at the Royal Melbourne Institute of Technology (RMIT) in Melbourne.

“ReLIXER is very effective in restoring the functional properties of aged bitumen





in mixes using recycled asphalt pavement (RAP) material,” Giustozzi said. “It is highly dosage efficient and provides long-term rejuvenation for sustainable infrastructure projects.”

Fulton Hogan, a leading asphalt pavement contractor in Australia, partnered with the Brisbane City Council in Queensland to evaluate the incorporation of high levels of RAP in paving mixes. A successful roadway trial was completed in June 2022, where a high-RAP mix was dosed with ReLIXER to pave a 0.7-lane-kilometer stretch of the Old Cleveland Road in Brisbane.

A trial mix based on a multi-grade binder, M1000, contained 40% RAP, 3.1% binder, ReLIXER and aggregates. It was paved for comparison against a standard mix of M1000 binder with 15% RAP.

“The high-RAP trial mix was easy to manufacture at our plant and easy to pave and



High-RAP mixes with ReLIXER on roadway in Brisbane City, Queensland, Australia

compact,” said Laszlo Petho, pavements manager at Fulton Hogan.

Chris Lange, technical manager at Fulton Hogan, stated, “We have been very interested in green technologies, such as incorporating higher RAP content into mixes. We believe that this trial has provided us with a viable path forward.”

The Marshall properties of a M1000 with 40% RAP and ReLIXER are summarized in Table 1. Also included in this table are the binder properties of the no-RAP mix, the standard mix and the trial mix. A dosage level of 3.24% ReLIXER, as percent of total binder weight, was used for the trial mix to achieve properties comparable to the standard mix. The  $CT_{Index}$  value for the trial mix was determined to be 242 compared to a value of 182 for the standard mix.

The Brisbane City trial demonstrated that ReLIXER is an effective recycling agent for the city. It rapidly penetrated RAP particles and rejuvenated the aged binder. It further helped reduce the amount of virgin bitumen and aggregates needed; thus, reducing the overall cost of the mix.

“We really enjoyed working with Brisbane City Council, Fulton Hogan and RMIT in preparation for and during this trial,” stated Ravi Rajagopalan, general manager at Sripath Asia-Pac. “It was an extremely well-organized trial, thanks to the Fulton Hogan team.”

The Brisbane team had an idea the trial would be a success. In November 2021, the Australian Flexible Pavement Association (AfPA) had organized a webinar on “High RAP Asphalt Mixes & the Role of

Table 1. Data from Brisbane Trial

Marshall Properties 40% RAP + ReLIXER				Units	Mix Design	Specification Limits
% M1000 Binder				%	4.8	4.5 to 5.1
Stability				kN	13.0	7.5 min.
Air Voids				%	4.0	3.0 to 7.0
Flow				mm	3.0	2 to 4

M1000 Based Mixes	RAP %	ReLIXER %	Pen (0.1 mm)	Softening Point (°C)	Complex Viscosity @ 60 °C (Pa.s)	Jnr 3.2 @ 60 °C (kPa)	Continuous PG Grade (°C)
No-RAP	-	-	40	59	1178	0.75	77.1
Standard	15	-	36	63	2410	0.31	82.8
Trial	40	3.24	37	63	1627	0.4	81.1

Table courtesy of Sripath Technologies





AfPA rejuvenator trials on roadway in City of Gold Coast, Queensland, Australia

Rejuvenators,” where Krishna Srinivasan, president of Sripath Technologies, one of the presenters, talked about Sripath’s rejuvenator. As an extension of the webinar, AfPA organized a trial in Queensland to demonstrate the effectiveness of the three recycling agents featured in the webinar. The entire project was managed by Fulton Hogan in coordination with the City of Gold Coast.

“As part of the initiative to reduce carbon footprint and create a more sustainable future, AfPA, in coordination with Fulton Hogan, recently organized a national high-RAP rejuvenation trial, which consisted of paving one control mix and three trial mixes, each with a different rejuvenator, on a stretch of Hymix Road in Gaven, City of Gold Coast,” stated Anna D’Angelo, executive director, Technology & Leadership at AfPA.

The control mix for the trial was an AC14H Mix, based on an A15E polymer-modified bitumen (PMB) binder. One of the trial mixes consisted of the A15E binder mixed with 40% RAP and dosed

with ReLIXER. The properties of the control mix and the trial mix are summarized in Table 2. A dosage level of 4.9% ReLIXER was selected for the trial mix to achieve properties comparable to the control mix.

The City of Gold Coast trial demonstrated the effectiveness of Sripath’s ReLIXER as a viable recycling agent for high-RAP mixes in Australia.

“We greatly appreciate this opportunity to demonstrate the effectiveness of our recycling agent ReLIXER,” stated Deepak Madan, chief marketing & business development officer at Sripath. “Our thanks to the Fulton Hogan team and AfPA for including ReLIXER in this national trial and to the City of Gold Coast for supporting the trial.”

The team included additional experts devoted to environmental excellence.

Sripath Asia-Pac Pty Ltd, an affiliate of Sripath Technologies LLC, was established in Melbourne in early 2021, to market Sripath products to the paving industries in Australia, New Zealand, and the Asia-Pacific region.

“Sripath Technologies and Sripath Asia-Pac became members of AfPA soon after they set up an office in Melbourne,” D’Angelo said. “Sripath has already become an integral part of our paving community in Australia.”

**“THE HIGH-RAP TRIAL MIX WAS EASY TO MANUFACTURE AT OUR PLANT AND EASY TO PAVE AND COMPACT.”**  
—LASZLO PETHO

Sripath’s recycling agent ReLIXER is an environmentally friendly product, designed to be highly efficient at low dosing levels, non-hazardous, safe to handle and easy to incorporate in a mix plant.

Rajagopalan added: “ReLIXER helps reduce the carbon footprint and greenhouse gas emissions. In high-RAP mixes, it helps reduce the need for virgin bitumen and lowers the overall cost of the mix. ReLIXER has been tested, vetted and adopted by experts from around the world, now also in Australia.” [AP](#)

*Melissa Introne, owner of Introne Communications, is a freelance writer of articles and overview papers in the paving, roofing, building envelope and other industries.*

Table 2. Data from City of Gold Coast Trial

Mix	Binder	RAP %	ReLIXER %	Complex Viscosity @ 60 °C (Pa.s)	Jnr 3.2 @ 60 °C (kPa)	Continuous PG Grade (°C)
Control	A15E	-	-	1067	0.36	79.6
Trial	A15E	40	4.9	1164	0.48	79.8

Table courtesy of Sripath Technologies