New Pavement Solution Technology

Antigo INTERNATIONAL INC.

Concrete Pavement Rehabilitation

Existing deteriorated concrete pavement can be effectively modified to create an in-situ structural layer ready to accept an asphalt or rigid overlay.

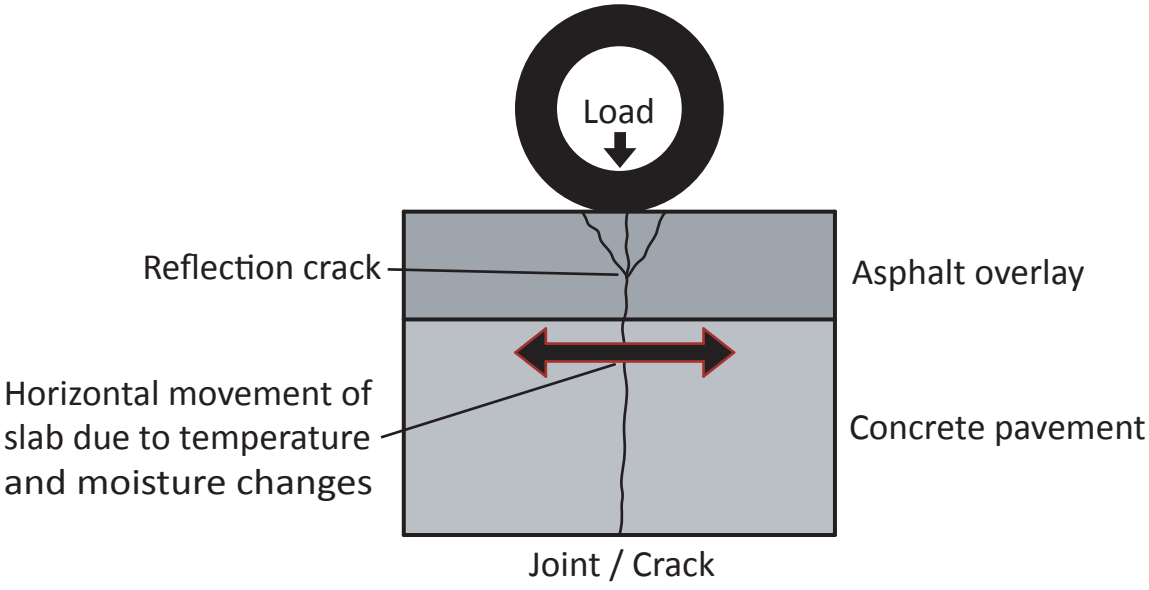
Advantages of in-situ recycling options

- 100% of in-place materials recycled
- Reduction in new materials for the reconstructed pavement
- Savings in material cost and construction time
- Fast track solutions resulting in less disruption
- Reduced construction traffic movements
- Reduced carbon footprint / environmentally friendly

Antigo International Inc. offers the following solutions for airport & road concrete pavement rehabilitation:

Cracking & Seating

Cracking & Seating modifies the existing characteristics of a rigid pavement into a more flexible structure while retaining much of the pavement's structural strength. The design thickness of the asphalt overlay will generally be less than that over a rubblized layer or granular base layer of similar thickness.



Principle of Cracking & Seating

The technology requires inducing fine vertical cracks in the existing concrete pavement to create specified segment sizes while maintaining aggregate interlock. This reduces horizontal slab movement caused by temperature and moisture changes thus reducing strains at the bottom of the asphalt overlay which lead to reflection cracking. This process has proven to delay the onset and substantially reduce the extent and severity of reflection cracking.

Cracking & Seating Sequence

Typical airport cracking operation using an 8600 Badger Breaker®

Fine vertical crack, induced with a single strike of the 8600 guillotine blade

Typical pneumatic rubber tyre roller utilized for the seating operation [min weight 20 tons]

Typical grid cracking pattern
The grid can be varied to control the amount of structural strength retained in the cracked pavement in order to meet the design requirements.

Rubblization

Rubblization eliminates reflection cracking by breaking the existing concrete pavement into small particles thus minimizing the horizontal movement at existing joints and cracks due to temperature and moisture changes which lead to reflection cracking. Rubblization is often specified when a concrete pavement reaches the end of its service life and is applicable for jointed reinforced, continuously reinforced, and non-reinforced concrete pavement. The design thickness of the asphalt overlay will generally be greater than that over a cracked & seated layer of similar thickness because of a greater reduction of the pavement's structural strength.

Typical Applications for Rubblization

MHB Badger Breaker® rubblizing an airport runway

MHB Badger Breaker® rubblizing a motorway

Rubblized Pavement Behavior

"A rubblized and compacted PCCP is an assemblage of PCC segments that form a tightly keyed, interlocked, high-density material layer. A rubblized PCCP layer is fractured, lacks continuity, and cannot sustain flexural stress. However, it possesses high shear strength and rutting resistance. It is not a typical granular material."

From "Hot-Mix Asphalt Overlay Design Concepts for Rubblized Portland Cement Concrete Pavements", Marshall R. Thompson, Transportation Research Record 1684, Paper No. 99-0922

Examples of Pavements Rubblized with a MHB Badger Breaker®

Jointed reinforced concrete pavement

Continuously reinforced concrete pavement

Non-reinforced concrete pavement, 21-inch (530mm) thick airport runway

3 Phases of Thick Airfield Pavement Rubblization

Phase 1

Pre-breaking using an 8600 Badger Breaker® (may be required depending on thickness and strength of existing concrete and base layers)

Phase 2

Rubblization using a MHB Badger Breaker®

Phase 3

Grid Roller produces uniform surface particles and begins seating the rubblized layer

Breaking for Removal

Although Cracking & Seating and Rubblization are now widely used, full-depth reconstruction of deteriorated concrete pavements is still common. Badger Breakers® are well-suited for this application as the first step in the process of recycling the old concrete pavement.

The 8600 Badger Breaker® has successfully broken pavements as thick as 36 inches (900mm). The hammer impact spacing and the drop height are adjusted to produce the desired particle sizing and degree of reinforcement debonding. The broken concrete is then removed and loaded in trucks for hauling to a crusher or in some cases loaded directly into an on-site, portable crusher. If the concrete is continuously reinforced, the rebar is raked out of the broken concrete and recycled prior to removing the concrete.

The MHB Badger Breaker® is often used for removal breaking when small concrete particles are desired or if mesh reinforcement is to be removed from the broken concrete prior to recycling the concrete. The MHB is also used in urban and other sensitive areas because the 16 lighter hammers produce lower vibration levels than the single, heavier 8600 hammer.

The 8600 and MHB are also used in tandem when the thickness and strength of existing concrete and base layers require the "hard hit" of the 8600 for full-depth breaking and the multiple hammers of the MHB for the production of smaller broken concrete particles.

8600 breaking airport runway for removal

Excavator removing broken jointed reinforced concrete

MHB breaking continuously reinforced concrete to allow for rebar removal

Excavator raking rebar out of the broken concrete

What can Antigo do for you?

In addition to providing quotations and answering any questions you may have, Antigo is prepared to provide a wide range of information on concrete pavement rubblizing, cracking/ breaking & seating, and breaking for removal. Examples of available materials are videos of various breaking processes and project scenarios, lists of owner and contractor contacts familiar with Antigo's capabilities, long-range pavement performance surveys, rubblizing and cracking/breaking & seating specifications, and project histories.

Antigo's experienced staff is always available to provide consultation to owners, engineers, and contractors as they plan concrete pavement rehabilitation and reconstruction projects.

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