Hot In-Place Recycling
Best Practices

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ASPHALT RECYCLING & RECLAIMING ASSOCIATION
ARRA 1976

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Hot In-Place Recycling

A Rehabilitation Alternative

The 3 Types of HIR

**Surface Recycling:**
Heating, reworking and rejuvenating the top one-two inch of an existing asphalt pavement in preparation of either a seal coat, microsurfacing or overlay

**Repaving:**
Heating, reworking and rejuvenating the top one inch of an existing asphalt pavement and simultaneously applying an overlay while the temperature of the recycled layer is 200°F

**Remixing:**
Heating, reworking and rejuvenating the top 1 to 2 inches of an existing asphalt pavement adding virgin aggregate and/or admix and mixing the newly recycled material in a pug mill mixing plant prior to laying, either as a binder or surface course
The Bottom Line Question

• How can I maximize the return on my investment in asphalt pavement rehabilitation funding?

Answer

• By repairing your asphalt pavement during the first 40% drop in quality
The Savings of Timely Maintenance

Each $1 spent during the first 40% drop in quality will cost $5-$7 if delayed until pavement loses 80% of its original quality.

Pavement Condition

<table>
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<th>Years (Time Varies for each Road Section)</th>
<th>75% time</th>
<th>1st 40% drop in quality</th>
<th>2nd 40% drop in quality</th>
<th>12% time</th>
<th>Total Failure</th>
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Remixing 2”
Green Roads Recycling, Ltd
Fernie, British Columbia
Surface heated to approximately 275°F

The 1” HIR Process

Surface heated to approximately 275°F
The HIR Process

- Softened pavement scarified to depth of 1”
Gallagher Asphalt Corporation
Thornton, Illinois
The Process

Continuous Process with Self-Contained Train
- Asphalt Surface Heated
- Heated Pavement Milled in ½” to ¾” increments
- Engineered Emulsion Added at Design Content
- Materials Mixed and Windrowed
- Recycled Mix Placed by Paver with Vibratory Screed
- Mat Compacted
- Surface Applied
  - Such as UBAWS, Micro, Polymer Chip Seal, Thin HMA overlays
Continuous with Self-Contained Train

Mobile Asphalt Recycling Train

- Asphalt pre-heaters and milling heaters working in front of the asphalt recycling unit. Several pre-heaters and heater millers can be used to achieve the specified heating depth.
Milling Heater

- Milling Heater cutting ½” of heated material. The milling heads are capable of milling 15’ wide.
Milling Heater

- Milling heater's windrow of material. This material is being processed between 200 and 275 degrees F.

Tunnel Heater

- Windrow of material from milling heater going under a tunnel heater. Heat is transferred into underlying pavement and into windrow.
Multiple heaters and heater mills used as needed.

- Milling drum on main unit mills additional depth and adds emulsion. The milling drums extend to process width up to 15 feet.
The Process

- Combination – Heater Unit and Milling Section
- Engineered Emulsion Metered at Design Content

The Process

- Side view of Wind-Row
Recycled Asphalt Laydown

- Windrowed 100% recycled material is picked up and paved in a conventional paver to the specified width

The Process

Recycled Asphalt Mix Placed with Paver and Vibratory Screed. Minimum temp at screed 190 F
The blended recycled material is compacted using conventional rollers.

Finished material after lay-down and compaction. The road can be opened to traffic after a cool off period similar to an asphalt paving operation.
This safe, water-based emulsion replaces the chemical constituents of the asphalt that have oxidized. ARA-1P emulsion also contains polymer modified asphalt, which further improves elasticity and coating. Moisture, rutting, and crack resistance are also improved.

Surface Repaving

Heating, reworking and rejuvenating the top 1 to 2 inches of an existing asphalt pavement and simultaneously applying an overlay while the temperature of the recycled layer is 200°F
Self Contained Pre-heater

First Step: Heat the Pavement

Main Heating Unit of Repaver
First Step: Heat the Pavement

Underside of Heating Hood

Using Multiple Pre-heaters
Using Multiple Pre-heaters

First Step: Heat the Pavement

Second Step: Scarify the Pavement

Scarifier System
Second Step: Scarify the Pavement

Third Step: Apply & Mix Emulsified Recycling Agent

Liquid Application System
Third Step: Apply & Mix Emulsified Recycling Agent

Recycling Agent Applied

Rotary Auger distributes recycled material into windrow

Moldboard Gathers Recycled Material Into Recycled Windrow

Third Step: Apply & Mix Emulsified Recycling Agent
Third Step: Apply & Mix Emulsified Recycling Agent

Moldboard and Recycled Windrow

Recycled Windrow
Fourth Step: Lay Recycled Material With Recycling Screed

Recycled Material Distributed

Recycled Material Laid

Recycling Screed

Recycled Windrow

Leveling Course

Paving Screed
Fifth Step: Lay Virgin Hot Mix Over Recycled Material

New Hot Mix Wearing Course Laid
Fifth Step: Lay Virgin Hot Mix Over Recycled Material

Paving 17 Feet Wide

SH 150 Alamosa, CO Project

Proven Performance
Results

International Roughness Index (IRI)
Normal Improvement Expectation: 25-30%

Southbound Lane
- Original IRI: 88.5” / mile
- New IRI: 58.4” / mile
- Improvement: 56.61%

Northbound Lane
- Original IRI: 89.4” / mile
- New IRI: 58.9” / mile
- Improvement: 55.48%

Urban Applications

- Curb line milling may be necessary
- Traffic easily controlled in work zone
- Environmental considerations
Project Considerations

- Uniformity
- Depth of existing HMA
- Presence of Chip Seals
- Asphalt content (bleeding)
- Asphalt properties
- Traffic
- Types of pavement distress
- Environment
Potential HIR Benefits

• Repairs Distress
• Extends Life
• Improves Ride Quality
• Improves Friction Coefficient
• Improves Appearance
• Improved Bonding
• Work completed in a single pass

HIR Cost

• Surface Recycling $2.00 PSY
• Surface Repaving $3.00 plus cost of surface material
• Remixing $4.00 plus cost of the surface
Thanks for your Participation

Please complete the evaluation to provide your feedback on this session and suggest topics for future events.

Remember to mark these upcoming events on your calendar!

March 7-11, 2017
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