Hot In-Place Recycling
A Rehabilitation Alternative
3 Types of HIR

**Surface Recycling:**
Recycle to a depth of ¾” to 1” followed by surface treatment or HMA overlay

**Surface Repaving:**
Recycle to a depth of 1”- 2”, placing 1”- 2” new HMA on top of recycled material in one pass for a total depth of 3”

**Remixing:**
Recycle existing pavement and mix it with new HMA by as much as 20 – 90 lbs. new HMA per sq yd paving it in one lift
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 Cost of Timely Maintenance

Each $1 spent during the first 40% drop in quality will cost $4-5 if delayed until pavement loses 80% of its original quality.
The Surface is the Critical Area

Aging of asphalt pavement occurs most rapidly at the surface

**Surface Defects**

- Ruts, Shoves & Bumps
- Patches & Utility Costs
- Reflective & Shrinkage Cracks
- Weathering, Bleeding & Raveling
- Pavement Geometry
Surface Recycling

Heating, reworking and rejuvenating the top one inch of an existing asphalt pavement in preparation of either a seal coat, micro-surfacing or overlay
Dustrol’s HIR Operation

KDOT recycles up 3 million sq. yd. annually
Use several pre-heaters to gradually heat pavement.
Recycling agent is mixed with scarified materials
Recycled Mat Prior to Compaction
KDOT Requires HMA Overlay or Surface Treatment within 10 Days after HIR
Gallagher Asphalt’s Equipment working in an urban Chicago environment

Surface Recycling Process
Designed to heat and scarify pavement, windrow the scarified material, heat the next layer, scarify and windrow again, and repeat the heating and scarifying in increasing the recycle depth up to 2”
Surface 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
Heats, scarifies, applies recycling agent and lays new wearing course in one pass
3 Pre-heaters Achieve 1-1/2” Depth

SH 119
Longmont, Colorado
Carbide tipped teeth controlled with the air actuated diaphragm scarifying the heated softened pavement
Application of the recycling agent to loosened, scarified material (application rate is geared to the forward speed)
Two screeds: 1\textsuperscript{st} lays the recycled material
2\textsuperscript{nd} lays the wearing course
Two screeds working in conjunction with each other, the recycling screed laying the recycled mix and the two screed laying the virgin material immediately on top of the recycled layer.
Joints are overlapped by 2 - 6”
96% compaction can be achieved at longitudinal joints
SH 6 Grand Junction, CO
2005 CAPA Award Recipient for Smooth Pavement

One pre-heater is always used
In situations for depths greater than 1”
more pre-heaters can be used

Cutler’s PCV (Pre-Heater Conveying Vehicle)
Urban Applications

- Curb line milling may be necessary
- Traffic easily controlled in work zone
- Environmental considerations
Milling in an urban setting to maintain curb heights
Paving new hot mix over recycled layer with 4-section screed, which crowns every 30” making it easier to pave 1/4 crowns in the urban environment
I-Drive Orlando, FL
Compacting the recycled and new HMA together to form a 2” combined surface: 1” of recycled and 1” of new HMA
HIR
I-Drive Orlando, FL
Final Product
Surface Repaving in front of Sea World, Florida
Remixing

1) Heat, rework, and rejuvenate the top 1 to 1½” of existing asphalt pavement
2) Add new HMA and mix it with recycled HMA in a twin shaft pug mill
3) Pave and compact new mix
Wirtgen’s
Remixer
Remixer uses heat to soften and scarify pavement, but the new and recycled material mixed together in a twin shaft pug mill.
Much more mix design work has to be done when remixing as you have to be more concerned with the virgin ad mix and how it will blend with the recycled material.
Pre-heater Using Hot Air to Heat Pavement Surface
Initial Milling
Center Milling Drum
Rejuvenator Spray Bar
Mixing and Milling
Pick up and Final Mixing
Laydown
Hot In-Place Recycling

- Treats surface to a depth of 1”
- A hot process
- Adds additional binder/modifier
- Adds additional hot mix asphalt
- Increase structural coefficient
Project Considerations

- Environment
- Types of pavement distress
- Traffic
- Asphalt properties
  - Asphalt content (bleeding)
- Presence of Chip Seals
- Depth of existing HMA
- Uniformity
Decision Making Process of Public Agency

- Filed Samples
- Field tests
- Analysis
- Evaluation (pavement history)
- Options
Potential HIPR Benefits

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