INDOT Pavement Preservation
- Crack Sealing/Filling
### Crack Filling

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### Crack Sealing

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Pavement selection is a critical element in determining the success or failure of a crack sealing program.

The best candidates for crack sealing are newer pavements that are beginning to form cracks.
• Always begin a crack sealing program by sealing the best or newest roads first. A good rule of thumb is to monitor roadways that have been resurfaced, and consider crack sealing within three to five years following the resurfacing.

• If the road has alligator cracking, high density, multiple cracking, poor sub-base drainage, or structural damage, then crack sealing will not solve the problem.
Effective?
Good Crack Seal?
Figure 1: Fatigue Cracking

Figure 2: Longitudinal Cracking
(Direction of Travel →)
Figure 3: Transverse Cracking

Figure 4: Block Cracking
Figure 5: Reflection Cracking

Figure 6: Edge Cracking

Figure 7: Slippage Cracking
Crack Fill vs. Crack Seal

- **Emulsion (AE-90 or AE-90S)**
  - More daily production (can cover more road)
  - Less durable (won’t last as long), typically 1-2 years
  - Useful on roads where there are majority of non-working cracks

- **Hot Pour (Crumb Rubber)**
  - Less daily production (takes longer to apply)
  - More durable, typical life 3-5 years
  - Useful for transverse (working) cracks
  - Routing cracks makes for most effective seal
1) “Working” cracks- **crack sealing** - “The placement of specialized treatment materials above or into working cracks using unique configurations to prevent the intrusion of water and incompressibles into the crack”  
(FHWA-RD-99-147)

2) “Non-working” cracks- **crack filling** - “The placement of ordinary treatment materials into non-working cracks to substantially reduce infiltration of water and to reinforce the adjacent pavement.” (FHWA-RD-99-147)
“Working” vs. “Non-Working” Cracks

- “Working” (high movement) - $\geq 0.1$ inches of movement
- “Non-working” (low or no movement) - $< 0.1$ inches of movement
Crack Sealing (209)

- Crumb Rubber (Asphalt Rubber Cement)
- Width of crack (0.2 – 1.0) inches
- Edge deterioration < 25%: Minimal to None
- Annual horizontal movement > 0.1 inches
- Working cracks:
  1. Transverse thermal
  2. Transverse reflective
  3. Longitudinal reflective
  4. Longitudinal cold-joint
Benefits

- Roads and bridges that are crack sealed last longer than those that are not.

- The benefits are realized in three to five years when it becomes obvious that the pavement has not deteriorated as quickly.

- Sealing prior to surface treatments and bituminous paving overlays enhances the treatment and further extends the pavement life.
Sealing Prep

- Preparation is key to successful use of crack sealants.

- Studies show that there is almost a 40 percent greater chance of sealant success if cracks are routed prior to sealing. (Connecticut Transportation Institute Technology Transfer Center)

- Cutting a reservoir also ensures that the proper amount of sealant penetrates the crack.
Spring and fall have the best weather for asphalt pavement crack sealing.
Temperature between 45 and 65 degrees
Cracks are normally at the middle of their working ranges.
Winter & Summer NOT the Right Time for Joint and Crack Sealing

Winter
Don’t Pour
Summer
Compression

Summer
Don’t Pour
Winter
Tension

Spring or Fall
Pour Joint
Summer
Compression (minimum)
Winter
Tension (minimum)
Common Failures

- **Adhesion loss**: The sealant does not adhere to the sides or bottom of the crack.
- **Cohesion loss**: The sealant fails in tension by tearing.
Crack Filling (207)

- Emulsion (AE-90, AE-90S, AE-150)
- Asphalt Cement (PG64-22)
- Width of crack (0.2 – 1.0) inches
- Edge deterioration < 50%: Moderate to None
- Annual horizontal movement < 0.1 inches
- Non-Working cracks:
  1. Longitudinal edge
  2. Longitudinal reflective
  3. Longitudinal cold-joint
  4. Distantly spaced block
Considerations

- Since non-working cracks do not change in width significantly with temperature, applications of crack filling treatments can proceed at any time of the year.

- Cracks greater than 1 in. in width should be considered for repair.
Best Practice: “V” Squeegee

Good practice of applying the crack fill material with a squeegee to create an over band over the crack.
# Troubleshooting

## Table 4: Trouble Shooting Crack Sealing and Filling Projects

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>All Seals</th>
<th>Re-Cracks Quickly</th>
<th>Bumpy Surface</th>
<th>Separation From Crack Sides</th>
<th>Emulsion Sealer Not Breaking</th>
<th>Emulsion Sealer Breaks Too Fast</th>
<th>Emulsion Sealer Washes Off</th>
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### Table 5: Common Problems and Related Solutions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
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| **Tracking**| - Reduce the amount of sealant or filler being applied.  
               - For hot applied materials, allow to cool or use sand or other blotter.  
               - Allow sufficient time for emulsions to cure or use a sufficient amount of sand for a blotter coat.  
               - Ensure the sealer/filler is appropriate for the climate in which it is being placed. |
| **Pick out of Sealer** | - Ensure cracks are clean and dry.  
                          - Increase temperature of application.  
                          - Use the correct sealant for the climate.  
                          - Allow longer cure time before trafficking. |
| **Bumps**   | - Check squeegee and ensure it is leaving the correct flush finish.  
               - Have squeegee follow more closely to the application.  
               - Decrease the viscosity of the sealer.  
               - Change the rubber on the squeegee. |
Good example of a crack seal job. The seal material is not painted on the roadway and is contained to the crack area.
Any Questions ????