"Crack Sealing Best Practices"

THE STATE OF THE ART
BEST PRACTICES FOR CRACK SEALING
THOMAS KELLY, VICE PRESIDENT CRAFCO, INC.
NCHRP 784
NCHRP 784 Best Practices for Crack Treatments, Dale Decker 2014

- Surveys, Interviews, Literature Searches
- Report Sections
  - Introduction
  - State of the Art
  - State of the Practice
  - Best Practices
  - Recommendations
NCHRP 784
Major Finding

CRACK TREATMENT
State of the Practice
does **NOT** reflect
State of the Art
Why do cracks need to be sealed?

To seal out water. Water entering the ground below the pavement softens the soil, creating a pocket for the water to collect. Next the weight of traffic on the pavement will displace the water. This is how potholes are created. **Stopping water from entering into and under the pavement keeps the base stable and the pavement strong.**
Why do cracks need to be sealed?

All Cracks Move!

Untreated cracks continue to deteriorate. Oxidizes of the crack edges leads to erosion. Thermal movement of cracks filled with rocks, sand, dirt and other now flexible things cause the cracks to grow in size. This deterioration is natural and left untreated continues to destroy the pavement.
Does Sealing Cracks Work?

- National Center for Asphalt Technology, Auburn University
- 2012 Preservation Study Lee Road 159
  - 25 Treatments placed in summer 2012
  - Crack sealing reduced development of interconnected cracking, and reduced subgrade moisture levels
  - Crack Sealing as pretreatment improved chip seal and microsurfacing treatment results
Section L3 Control

Cracking in Section L3's Control on Lee Road 159 as a Percentage of Cracking If No Treatment Had Been Applied

Treated Cracking / Untreated Cracking (%)

- Aug-2012
- Dec-2012
- Apr-2013
- Sep-2013
- Jan-2014
- May-2014
- Oct-2014
Section L5  Crack Seal

Cracking in Section L5’s Crack Seal on Lee Road 159 as a Percentage of Cracking If No Treatment Had Been Applied

- 100% Less Cracking compared to Control Section
- ~75% Less Cracking compared to Control Section
Section L6 Chip Seal
(No Crack Seal pre-treatment)

Cracking in Section L6's Chip Seal on Lee Road 159 as a Percentage of Cracking If No Treatment Had Been Applied

MORE cracking compared to Control Section
Section L7 Chip Seal (Over Crack Seal pre-treatment)

~100% Less Cracking compared to Control Section!!
Section L9
Double Chip Seal

~75% less cracking compared to Control Section

Chip Seal w/ CS performed better
Section L11 Micro Surfacing

Cracking in Section L11’s Micro Surface on Lee Road 159 as a Percentage of Cracking If No Treatment Had Been Applied

~50-15% Less Cracking compared to Control Section
Section L 12
Micro over Crack Seal

Cracking in Section L12’s Micro Surface with Crack Sealing on Lee Road 159 as a Percentage of Cracking If No Treatment Had Been Applied

~90-60% Less Cracking compared to Control Section
What is crack sealing vs filling?

• **Crack Sealing:**
  – Placement of *specialized treatment materials (sealant)* above or into cracks using unique configurations to **prevent** the intrusion of water and incompressible materials into the crack

• **Crack Filling:**
  – Placement of *ordinary treatment materials* into low-moving cracks to **reduce** infiltration of water and to reinforce the adjacent pavement
    – PG GRADE ASPHALT
    – EMULSIONS & EMULSION/SAND MIXES
    – REJUVINATORS
Crack Sealing Best Practices
- Sealant Choices-

This first factor to know is the project specification requirement.

This trumps all the choices in most cases.
Crack Sealing Best Practices - Sealant Choices

Climate Factors
- Crack sealants need to remain functional over the range of anticipated pavement temperatures
- Determine temperature ranges by using LTPPBind

Pavement Factors
- Traffic loadings (Volume)
- Type of Traffic – Traveling/Parking
- Lateral and Vertical Movements
- Pavement Age/Life Expectancy
- Type of Cracking
  - Transverse Thermal
  - Longitudinal
  - Block (Age)
  - Fatigue (Load)
- Density of Cracking
Crack Sealing Best Practices - Sealant Choices

ASTM SPECIFICATION

- D5078
  - MAINTIANCE SEALANT
  - WIDE DEFINITION OF PROPERTIES OFTEN MODIFIED FOR SPECIFIC CLIMATES

- D6690 TYPE 1
  - WARM TO MODERATE CLIMATE
  - LOW MOVEMENT IN COOLED CLIMATES

- D6690 TYPE 2
  - MODERATE TO COLD CLIMATE
  - MOVING CRACKS

- D6690 TYPE 3
  - MODERATE TO COLD CLIMATE
  - MOVING CRACKS
  - AIRFIELDS

- D6690 TYPE 4
  - COLD & EXTREMELY COLD CLIMATE
  - MOVING CRACKS
  - BEST USED WITH A RESERVOIR
Crack Sealing Best Practices - Sealant Choices

OTHER SEALANTS

» FIBER MODIFIED SEALANTS
  » PG GRADE ASPHALTS
  » POLYMER MODIFIED SEALANT

» LOW RESILIANCE SEALANTS
  » DESIGNED TO RELAX

» PARKINGLOT SEALANTS
  » APPROPRIATE FOR FOOT TRAFFIC
  » WITH STANDS STEERING SCUFFS
  » RESISTS TRACKING ON HOT TIRES

» DIRECT FIRE MELTER APPROPRIATE
  » POOR AGITATION
  » LESS SENSITIVE TO OVER HEATING
Crack Sealing Best Practices
- Sealant Choices-

IF YOU GET TO CHOOSE ASK FOR HELP FROM SOMEONE YOU TRUST AS KNOWLEDGABLE.

A GOOD SUPPLIER WILL WALK YOU THROUGH SEVERAL CHOICES AND GIVE YOU HELP IS FINDING THE CORRECT SPECIFICATION FOR YOU JOB AND CLIMATE.
Application options and how to choose the best.

There are two basic options for crack sealing. Creating a reservoir in the pavement to accept the sealant or capping the crack; filling the existing crack opening and applying a cap of sealant on the pavement surface.

Both of these applications have their place and can provide a quality seal for the crack. The science of making the right choice of which to choose is what we are going to review.
Two Primary Applications:

- **Rout & Seal**
  - Transverse Cracks
  - “Working Cracks”

- **Clean & Seal**
  - “Capping” or “Overband”
    - Longitudinal Cracks, High Crack Density or Cracks >3/4” and <1½”
    - Non Working Cracks

Working Cracks are cracks that open and close with temperature changes. By definition the movement is greater than 3MM.

Non Working Cracks are cracks that experience very lesser effects from temperature changes. By definition the movement is less than 3MM.
Application options and how to choose the best.

Non Working Cracks are cracks that are longitudinal cracks or closely spaced cracks from age, or fatigue.

The Overband or Capping Application is often the best choice for these cracks.
What is a quality crack Overband /Capping application to seal the pavement?

Don’t over do it!

Approximately 1/8 inch of sealant on the pavement surface and only 1 inch wide than the crack on each side is all that is required.

Over application of sealant does not improve the results.
Application options and how to choose the best.

With Working Cracks Capping/Overband sealing needs some better preparation.
Application options and how to choose the best.

Creating a reservoir in the pavement to accept the sealant is how you assure that the movement that the sealant is subjected to is within the range that the sealant is designed to preform.
Application options and how to choose the best.

Using LTPPBIND review the temperature range for your area. Based on the Temp Grade Range (difference between high and low) these are recommended reservoir design dimensions.

<table>
<thead>
<tr>
<th>Temp Grade Range</th>
<th>Reservoir Width</th>
<th>Reservoir Depth</th>
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</thead>
<tbody>
<tr>
<td>80°C or Less</td>
<td>1/2”</td>
<td>3/4”</td>
</tr>
<tr>
<td>86°C</td>
<td>3/4”</td>
<td>3/4”</td>
</tr>
<tr>
<td>92°C</td>
<td>1 1/8”</td>
<td>1/2”</td>
</tr>
<tr>
<td>98°C or Greater</td>
<td>1 1/2”</td>
<td>1/2”</td>
</tr>
</tbody>
</table>
Reservoir Sealing Best Practice

- Good Pavement
- Well Defined Cracks
Reservoir Sealing Best Practice

- Well Maintained Equipment
- Cutters in Good Condition

- Worn Pins
- Worn Spacers
- Worn Cutters
Cutting a reservoir is cleaner!
Reservoir Sealing Best Practice

- Centered over the crack

This rout was next to the crack placing all the stress on one side of the sealant.
Reservoir Sealing Best Practice

- Hit the crack

Crack
Rout
Sealed
Recap Keys to Success when Reservoir Sealing:

- Design The Reservoir for the Climate
- Good Workmanship
  - Centered over the crack
- Well maintained equipment
- Good quality pavement
- OTHERS TIPS
  - Router thru minor overlays into sound pavement
  - If you get extreme spalling when routing STOP!
    Your pavement is not a good candidate for a reservoir
Sealant Application Best Practice

• **Key to Success**
  – Clean
  – Dry
  – Correct Temperatures
    • Pavement
    • Sealant
  – Tidy Application
Sealant Application Best Practice
CLEAN!

100 PSI
Leaf Blowers are for leafs
Heated 100 PSI
Sealant Application Best Practice
WEATHER ADJUSTMENTS!
A quality hot air lance can be used to:

- Warm the pavement to an appropriate temperature
- Remove surface moisture such as dew
- Remove chemical residue

- It should not be used to dry the pavement.
Sealant Application Best Practice

SEALANT TEMPERATURE!
Sealant Application Best Practice

STRIKE IT OFF!
Sealant Application Best Practice
Blot or Detackify for immediate traffic
What is most important?
Summery

- **Do a quality job by evaluating the pavement first.**
  - Choose the right treatment
    - Sealing (keeping out the water) or Filling (taking up the space)
  - Choose the most appropriate Sealant
    - Climate, Pavement Condition, Traffic & Application Choice
  - Pick the best application
    - Capping or Designed Reservoir
  - Watch all the temperature
    - Material & Pavement
  - Never seal wet or dirty cracks
  - Keep your sealant application tight
    - Max 1/8” Thick Cap, No wider than necessary
A FEW LAST THOUGHTS FOR YOU

- Sealing Cracks will improve the life of the pavement and save money.

- What is the most expensive crack sealing project?
  - The project you have to do again! Do it right and save money even if it cost a little more.
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
www.conexpoconagg.com
www.ifpe.com