Introduction to Crack Treatments
The Crafco Way

Greg Sharp, Crafco, Inc.
Introduction to Crack Treatments

Crack treatment overview

- Why treat cracks
- When to treat cracks
- Selecting a Treatment
  - Selecting Sealant
  - Proper equipment
Why treat cracks

“Cracks are inevitable, and neglect leads to accelerated cracking and potholing, further reducing pavement serviceability.”

(FHWA-RD-99-147)
Prevents water intrusion into the sub-base.
Why treat cracks

Prevents incompressible intrusion.
Improves ride quality smoothness.
When to treat cracks

- Soon after they appear... any crack opening will allow moisture penetration into pavement foundation (sub-base).
- At minimum all cracks ≥1/8”.
Why & When?

- Protect one of your largest investment, Roads
  - *Pavement failure is imminent!*

- Extends pavement life.
  - *Crack treatments are cost-effective, up to 9 years of performance.*

- Throughout the life cycle of your pavement.
  - *Early, Middle, End*

Crack Sealing **will Reduce:** Pavement Life Cycle Cost, Traffic Interruptions, Worker’s Exposure to Traffic
Selecting a Treatment

Pavement evaluation to pick the right treatment.

There are two categories for cracks.

“Working” (high movement)
- ≥ 3mm movement
- Thermal

“Non-working” (low or no movement)
- < 3mm movement
- Longitudinal
- Block
- Fatigue
Moving cracks formed by temperature related pavement/subgrade movement. Generally in transverse direction. (perpendicular to center line)
Generally full width of street or road. Generally >20 foot spacing.
Considered “working” cracks - ≥ 3mm movement.
Will develop in 2-7 years on most new pavements, 1-3 years on overlaid concrete.

“Working” cracks - [10% of cracks]
Working Crack Treatment

“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)

Crack Sealing
Crack Sealing

- In thermal cracks.
- Routed reservoirs.
- Pavements in good condition - >20’ transverse crack spacing, minor other cracking.
- Sealants that are flexible and extensible at lowest temperatures encountered.
Type 2
Non Working Cracks

In longitudinal, block, fatigue and closely spaced transverse cracks (< 20’ spacing).
In wheel paths and high traffic areas.
Stiffer more “traffic resistant” product.
Routed or non-routed reservoirs (use discretion), over-band application.
Pavements in fair to poor condition.

Non-working "cracks" - [90% of cracks]
Non Working Cracks

“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)

Crack Filling
Definition:

- Can develop in 2-5 years along with thermal cracks.
- Occur in longitudinal (parallel to center line) direction.
- Caused by thermal movement, construction joints and edge joints.
- Considered low movement, “non-working” cracks - < 3mm movement.
Crack Type - “Fatigue (alligator)”
Non Working Cracks

Definition:

Caused by repeated traffic loading
Occurs in heavy traffic areas and wheel paths.
Cracks form in closely spaced, interconnecting block patterns.
Sure sign of pavement structural failure.
Considered low or no movement “non-working” cracks- < 3mm movement.
What cracks to treat?

All Cracks - With the right treatment.
Proper Equipment

Tools depend on what you are doing.

- Rout or Not
  - Size of Rout

- Cleaning
  - Air
  - Heat Lance

- Flush Fill / Overband
Proper Equipment – Routing
PAVEMENT CUTTER
Proper equipment - Routing

Worn Cutters will not provide a good reservoir.
MOST OPERATORS WANT TO WORK UPHILL
THE MACHINE WILL PULL ITSELF
AND YOU DON’T HAVE TO FIGHT IT
ROUTE FROM CENTERLINE TO THE EDGE OF THE ROAD
DO NOT LET THE MACHINE PUSH YOU INTO TRAFFIC
DUST MASKS OR VENTILATORS ARE HIGHLY RECOMMENDED
CHOOSE YOUR WORKING CRACKS
FOLLOW THE CRACK AS BEST AS YOU CAN
Cleaning Methods

- Compressed air - sufficient pressure and velocity
- Vacuum - in combination with compressed air
- Heat lance - used to warm pavement when needed
SOMETIMES PART OF THE CRACKS ARE MISSED

WHILE THE ROUT MIGHT NOT COVER IT, THE OVERBAND FILLER SHOULD
WHAT DO YOU DO WITH WEEDS?
SOME WEEDS CAN BE LEFT BEHIND

THEY SHOULD BE REMOVED BY

- THE HIGH PRESSURE AIR
- OR THE HEAT LANCE
THIS ROUT IS AFTER A NEW SET OF BLADES IS INSTALLED – NOTICE THE CLEAN EDGES
THE EDGES ARE NOT ONLY SQUARE, BUT THE BOTTOM OF THE ROUT IS ALSO SQUARE, INCREASING ADHESION OF THE FILLER
THE TOP EDGE CAN ALSO BE RAGGED IF YOU ALLOW THE ROUTER TO ADVANCE TOO QUICKLY
NOTE THAT THE BOTTOM INSIDE EDGE IS STILL QUITE SQUARE.
THIS IS THE SAME CRACK, AFTER IT HAS BEEN BLOWN CLEAN
THIS IS THE RESULT OF WORN BLADES
A closeup shows how a poor rout can be rounded and chewed up.
This is not good for long term adhesion.
SOME ROUTS ARE QUITE NARROW
THIS DEPENDS ON THE OWNER’S REQUIREMENTS
ROUTER MAINTENANCE

- Routing width can be adjusted using spacers
- Keep router blades square and tight
NEW CUTTER IN EARLY STAGES OF WEAR
THIS BLADE IS ROUNDED AND NEEDS TO BE REVERSED
THIS ROUTER HAS ROUNDED EDGES ON THE INSIDE AND SHOWS HOW THEY WERE ROTATED TO PROVIDE A SQUARE OUTSIDE CUTTING EDGE
Proper Equipment - Cleaning

Compressed Air
- The crack needs to be clean and dry.
- Sometimes two passes are needed to clean both sides of the joint.
THE COMPRESSED HIGH PRESSURE AIR CLEANS THE CRACK OF DUST AND DEBRIS
THE GOAL IS TO KEEP THE DEBRIS FROM THE TRAVELING PUBLIC
Vacuuming is an alternative to blowing out cracks. This will contain dust and be PMIO compliant.
Cleaning Methods

HOT-AIR LANCE

Hot Air Lances should be used to dry slightly moist pavement or heat pavement up to 40°F.

THIS PAVEMENT IS TOO WET. HOT-AIR LANCE WILL NOT BE EFFECTIVE. MOISTURE WILL RE-ENTER CRACK BEFORE SEALANT IS APPLIED.
MOST HEAT/AIR LANCES PROVIDE COMPRESSED AIR ALONG WITH THE REQUIRED HEAT TO DRY THE CRACK AND PREP THE EDGES.
SOME APPLICATIONS REQUIRE COMPRESSED AIR ALONG WITH A HEAT LANCE. THE HEAT LANCES DRY DAMP CRACKS AND HEAT THE SURFACE OF THE ROUT TO ENHANCE ADHESION OF THE FILLER.
ONE PASS IS USUALLY SUFFICIENT – GO SLOW ENOUGH TO HEAT THE JOINTS - WITHOUT BURNING THE ASPHALT
Selecting Sealant

Crack sealants and crack fillers need to remain functional over the range of anticipated pavement temperatures. Determine temperature ranges with LTPPBind.

www.tfhrc.gov/pavement/ltpp/reports/03080/
www.tfhrc.gov/pavement/ltpp/ppt/bind.ppt
www.fhwa.dot.gov/pavement/ltpp/bind/dwnload
Selecting Sealant

Temperature

HIGHS

- 52°C
- 58°C
- 64°C
- 70°C
Selecting Sealant Temperature LOWS

-10°C
-16°C
-22°C
-28°C
-34°C
-40°C
-46°C
Material Selection

CRAFOCO INC
420 N. Roosevelt Ave. • Chandler AZ 85226
1.800.528.0242 • (480) 276-0400 • FAX (480) 964-0513
www.crafo.com

GENERAL
Crafo RoadSaver 211 is a hot-applied asphalt based product which is used to seal and fill cracks and joints in asphalt or portland cement concrete pavements in moderate climates. RoadSaver 211 is supplied in solid form which, when heated and properly applied, forms an adhesive and flexible compound that resists cracking in the winter and is resistant to flow at summer temperatures. RoadSaver 211 is used in highways, streets, and surfaced parking areas and is applied to pavement cracks and joints using either pressure feed meter applicators or pour pots. At application temperature RoadSaver 211 is a free flowing, self-leveling product. RoadSaver 211 has been an excellent performing quality Crafo product for 25 years. VOC = 0 g/L

USAGE GUIDELINES
RoadSaver 211 pavement temperature performance limits are 64-10 for crack sealing and 64-77 for crack filling. Usage recommendations are shown in Crafo pavement temperature grade charts shown at the right. Refer to Crafo Product Selection Procedures to determine sealed or filled use and pavement temperature grades.

SPECIFICATION CONFORMANCE
RoadSaver 211 meets all requirements of ASTM D6906 (AASHTO M234), Type I, “Joint and Crack Sealants, Hot-applied, for Concrete and Asphalt Pavements”, (formerly ASTM D1930, AASHTO M173) and Federal Specification SS-S-164. Specifications are as follows:

<table>
<thead>
<tr>
<th>Test</th>
<th>Type I Spec. Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Penetration</td>
<td>70 max.</td>
</tr>
<tr>
<td>Flow</td>
<td>5 mm max</td>
</tr>
<tr>
<td>Softening Point</td>
<td>170°F (77°C)</td>
</tr>
<tr>
<td>Bond, 6°F (1°C), 50% ext.</td>
<td>Pass 5 cycles</td>
</tr>
<tr>
<td>Asphalt Compatibility</td>
<td>Pass</td>
</tr>
<tr>
<td>Minimum Application Temperature</td>
<td>380°F (193°C)</td>
</tr>
<tr>
<td>Maximum Heating Temperature</td>
<td>400°F (204°C)</td>
</tr>
</tbody>
</table>

INSTALLATION
The unit weight of Crafo RoadSaver 211 is 10.7 lbs. per gallon (1.28 kg/L) at 60°F (16°C). Prior to use, the user must read and follow Installation Instructions for Hot-Applied RoadSaver, PolyFare, Parking Lot and Asphalt Rubber Products to verify proper product selection, heating methods, pavement preparation procedures, application geometry, usage precautions and safety procedures. These instructions are provided with each pallet of product.

PACKAGING
Packaging consists of individual boxes of product which are palletized into shipping units. Boxes contain a non- adherent film which prevents water intrusion of the product. Each pallet contains 72 boxes which are stacked six layers of 12 boxes per layer. The weight of product in each box does not exceed 49 lbs (22 kg) and pallet weight does not exceed 2,000 lbs. (900 kg). Pallets of product are weighed and product is sold by the net weight of product. Product boxes are manufactured from double wall kraft paperboard. Product meets the minimum bursting test characterization of 25 psi (172 N/cm) and moisture resistant adhesives. Boxes are tape closed and do not contain any staples. Boxes are labeled with the product name, part number, lot number, specification conformance, application temperature and safety instructions. Palletized units are protected from the weather using a three rail black plastic bag, a weather and moisture resistant cap sheet and a minimum of two layers of six month u.v. protected stretch wrap. Pallets are labeled with the product part number, lot number and net weight. Installation instructions are provided with each pallet in a weather resistant envelope.

WARRANTY
CRAFOCO, Inc. warrants that CRAFO products meet applicable ASTM, AASHTO, Federal or State specifications at time of shipment. Techniques used for the preservation of the cracks and joints prior to sealing or filling are beyond our control as we are the user and application of the product; therefore, Crafo shall not be responsible for improperly applied or maintained products. Remedies against Crafo, Inc., as agreed to by Crafo, are limited to replacing unsatisfactory product or refund of full or partial of purchase price from Crafo, Inc. All claims for breach of this warranty must be made within three (3) months of the date of use or twelve (12) months from the date of delivery by Crafo, Inc., whichever is earlier. There shall be no other warranties expressed or implied. For optimum performance, follow Crafo’s recommendations for product installation.

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Selecting Sealant

Flexible Sealant for colder areas

Stiffer Sealants for Warmer/Hotter areas
Selecting Sealant

Other Factors

Heavy Truck Traffic
Selecting Sealant

Other Factors

Heavy Traffic Volume
Selecting Sealant

Other Factors
Slow moving vehicle traffic and foot traffic
Selecting Sealant

Incorrect Sealant
Too soft for high temperature or traffic loading.
Selecting Sealant

Incorrect Sealant
Too stiff for low temperature
Proper Equipment - Melters

Melter Applicator

- Oil-jacketed
- Thermostatic heat controls
- Continuous agitation
- Over-heating safety controls
- Right size for operation
- Many commercial versions...

* Construction of HMA Pavements-Asphalt Institute
Proper Equipment - Melters

Applicator Tips:

Flush Fill
Proper Equipment - Melters

Applicator Tips: Overband
Applicator Tips: Squeegee
ALL FUNCTIONS CAN BE PERFORMED FROM ONE UNIT
YOU ONLY WANT TO DRIVE OVER THE LANE ONCE!

CHOOSE YOUR CRACKS WISELY
SOME JUST REQUIRE TOUCH UP
OR ARE POSSIBLY JUST BEYOND EFFECTIVE CRACK SEAL
APPLICATIONS
IN TRAFFIC AREAS AND INTERSECTIONS, USE DE-TACK TO KEEP THE FRESH SEALER FROM ADHERING TO CAR TIRES
SOME CRACKS ARE BEYOND THE EFFECTIVENESS OF OVERBAND AND ROUT AND SEAL

MASTIC WOULD BE A GOOD APPLICATION HERE
ANOTHER EXAMPLE OF A TIP THAT FILLS AND LEAVES A WIDE OVERBAND
USUALLY THE TARGE WIDTH IS 1” BEYOND EACH EDGE OF THE CRACK
YOU NEED TO CARRY PROPER FLOW TO THE PAVEMENT EDGE TO ELIMINATE OVERFLOW THAT COULD BE CAUGHT BY SNOWPLOWS
IT CAN BE MESSY

THIS IS NOT THE PROPER APPLICATION RATE
SOME CRACK PATTERNS CAN BE CHALLENGING
ROUTING & CLEANING IS VERY DO-ABLE
LEAVING AN EFFECTIVE PAVEMENT REPAIR
Fatigue cracking

Same street- slurry seal treatment two years later
Basic Needs Requirements

All Applications

- Clean
- Dry
- Intact pavement
- Proper temperature
  - Pavement > 40°F
  - Sealant 400°F
Crack Treatment Choices?

**Pavement Evaluation**
Determine if Crack Sealing or Crack Filling treatment is needed

**Select Product**
Choose Material for the Treatment, Longevity Desired & Climate

**Proper Application**
Do the job right the first time
Questions?