Crack Seal:
Key to Chipseal Success

Presented by:
Tom Shamberger – Field Representative, Albina Asphalt
Brett Rankin – Territory Manager, Crafco Inc

Introduction

- What is Crack Sealing
  - Common Issues
  - How it Works
  - Best Practices
  - Improper Install
  - Importance of Early Intervention
- What is Chip Sealing
  - Synergy between Chip and Crack Seal
  - Case Study
  - Why Chip Seal
  - Common Issues
  - Best Practices
  - Economic Benefits
  - Future Trends

What is Crack Sealing?

Definition: Crack sealing is a method used to prevent water and debris from entering cracks in pavement

Materials: Typically involves the use of high-quality hot-applied rubberized sealants

How does this differ from Crack "Filling"?
- Crack filling is a temporary repair technique used to fill cracks with non-rubberized materials that do not adhere as strongly as sealing materials
- Materials: Often uses cold-applied fillers that are less flexible than sealants

Purpose:
- Crack Sealing: Long-term solution that prevents moisture and debris from causing further damage
- Crack Filling: Short-Term fix to reduce water filtration

Common Pavement Issues that benefit from Crack Sealing

- Longitudinal Cracks
- Transverse Cracks
- Block Cracks
- Edge Crack

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

How Crack Sealing works

Adhesion to Crack Walls: The heated rubberized sealant is applied into the crack and adheres to the sidewall of the crack, filling the gap.

Flexibility: The sealant is designed to remain flexible after curing allowing it to expand and contract with temperature changes.

Waterproofing: By sealing the crack, the sealant prevents water from seeping into the pavement. Water will degrade the base layer and allows additional damage during the freeze-thaw cycle

Prevents Debris Accumulation: Sealant also keeps dirt, stone and debris out of the crack.

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Best Practices for Crack Sealing

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Weather Considerations

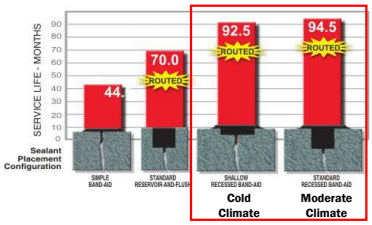
Weather Considerations:
- Wind
- Temperature
  - 40° F (4° C) and rising
  - Hot air lance in cooler conditions
  - Cloud coverage and shade
  - Rain

Ideal Conditions:
- Moderate to warm temperatures
- Little to no wind
- Spring and Fall

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Appropriate Reservoir Configuration



CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Crack Cleaning

- Compressed Air
- Vacuum in combination with compressed air
- Hot Air Lance
- Wire Brushing
- **Cleaning operations should take place immediately before crack sealing*

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Clean Crack

- Surfaces Need To Be Clean
- Pavement Surface and Crack Wall Free From Dirt and Debris
- Dirt Prevents Proper Adhesion

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Improper Cleaning

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Proper Over Band

- Narrow
- Tight to Pavement
- Pavement Texture Visible through sealant

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

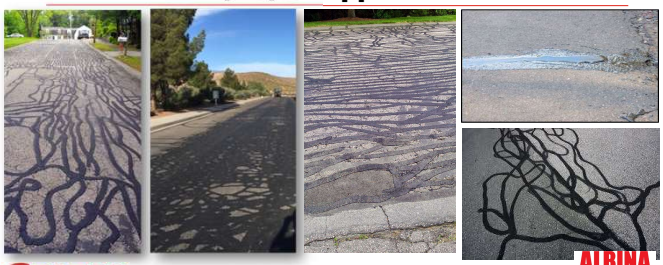
Good applications are achieved by:

1. Meeting the project design configuration: (Flush, Over bands, Reservoirs, Combination)
2. Performing good, clean applications free from drips, puddles, and excess sealant

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Improper Application



CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Mastic for cracks over 1.5”

- Pre-Packaged; No Mixing
- Flowable/Pourable
- Aggregate Filled
- Flexible
- Bulkable
- Durable/Resilient
- Waterproof
- Highly Adhesive
- Rapid Set
- Voidless Repair

Importance of Early Intervention

- Prevents water infiltration
- Extends Pavement life
- Cost-Effective Maintenance
- Improves Safety
- Prevents Progressive Damage
- Minimizes Disruptions to the Public
- Protects the Publics investment

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

What is Chip Sealing?

Application of emulsion oil on a prepared asphalt surface followed by an application of aggregate embedded into the oil as a wearing course

The emulsion oil is designed to fill small cracks to seal moisture out of the road base and to add oil back into oxidized pavement

Equipment utilizes a computerized rate control system that applies a measured amount of oil and aggregate.

CRAFCO

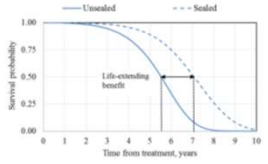
ALBINA ASPHALT
Improving the road ahead.

The Synergy of Crack And Chip Sealing

- Studies have shown extended service life of a road when crack sealed followed by a chip seal

- If crack sealing or filling is used in combination with a chip seal, the life-extending benefit was similar in both travel lanes regardless of the differences in traffic loading and sealing technique. The benefits shown in Table 2, which range from 1.4 to 2.0 years, are only for the crack treatment and do not include the additional benefit provided by the chip seal.

- The lack of statistical significance in sections that combined micro surfacing with crack sealing or filling was surprising. Nonetheless, these findings are tied to the way that condition categories are defined in the analysis. Particularly, for the "poor" condition category, which has a lower bound of 20%, both sections reached failure at around the same time, although the average pretreatment cracking percentage was 21.4% for the micro surfacing section and 41.9% for the micro surfacing with crack seal/fill. This suggests that there is a benefit that could not be captured statistically, but as mentioned earlier, the condition ranges were selected to be consistent with the FHWA performance criteria.



Asphalt Technology News – Spring 2020

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

The Synergy of Crack Sealing and Chip Sealing

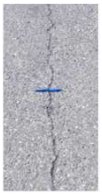
- Crack sealing as a pretreatment improves the effectiveness of other surface treatments
- Crack sealing has demonstrated to have the highest benefit to cost ratio
- In a study pavement went from 25% more cracking at year 2 with just a chip seal to 100% less cracking with a chip seal over a crack seal as a pretreatment
- National Center for Asphalt Technology and Minnesota DOT study found the MTTF (Median Time To Failure) was extended 6.8 yrs to 9.1 yrs with single lift chip and additional 1-3 yrs. when crack sealed as a pretreatment

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

The Synergy of Crack Sealing and Chip Sealing

- Crack sealing ahead of a chip seal is recommended if cracks are greater than 3/8”
- When cracks in the existing surface exceed 3/8” in width, crack sealing them in advance of chip sealing will help keep water from intruding deeper into the pavement structure after the cracks reflect through the new wearing surface.



CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Why Agencies Chip Seal

- New pavement will degrade over time
- Most roads will eventually need some kind of surface treatment
- Factors that can affect longevity of a road area – road base, traffic loading and weather
- Crack sealing to keep moisture from degrading the road base
- Roads with lower PCI, would benefit from multiple layers of chip seal

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Common Pavement Issues that Benefit from Chip Sealing

- Surface Wear
- Oxidation
- Raveling
- Minor Surface Cracks

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Economic Benefits

- Preventative maintenance strategy reduces cost of maintaining a road and extends its service life
- Crack sealing followed by a single layer chip seal when road are in that 80-65 PCI range will keep roads in good condition
- These treatments are usually 70-80% less than the cost of new asphalt
- Can usually crack seal/chip seal about 4-5 miles of road compared to repaving 1 mile of road for the same cost
- As budgets continue to get tighter these surface treatments are the only preventative maintenance treatments some agencies can afford
- In small cities, crack seal followed by a single lift chip seal does not trigger required ADA ramp installation/improvements

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Increased Pavement Lifespan

- Some agencies will repeat preventative maintenance treatments of crack seal/chip seal every 6-10 years up to three times before a grind and inlay or overlay with new asphalt
- If roads are allowed to deteriorate without some type surface treatment, costs of bringing it back to good condition increase substantially

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Best Practices for Chip Sealing

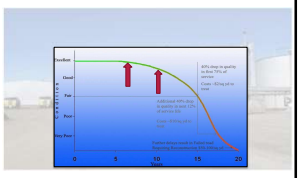
- Make road selection a least a year in advance
- Gives time to get road prepped – crack seal and asphalt patching
- Select emulsion oil that best fit's location, traffic and weather
- Aggregate must have a minimum of 2 fractures faces
- Have aggregate tested for compatibility with selected emulsion oil
- Consider using the Mcleod chip seal design method to determine emulsion and aggregate rates
- Select warmest, dries months (May-August)
- Earliest chip seals have best results due to summer traffic on the seal

CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Best Practices for Chip Sealing

- Optimum surface temperature of 70 degrees and rising up - to maximum of 140 degrees
- Appy aggregate to the binder as soon as practical before binder breaks
- Utilize haul trucks for initial aggregate embedment – trucks split their tracks
- Use enough rollers - aggregate embedment critical to a successful chip seal
- Use one steel wheel roller if possible – focus on meet line and edges of pavement
- Lower binder shot rate in areas of high amount of turning movement
- Consider clean choke material on the fresh the chip seal
- Consider applying a fog seal

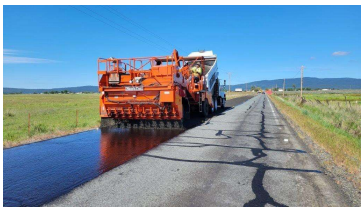


CRAFCO

ALBINA ASPHALT
Improving the road ahead.

Timing and Sequence

- Crack sealing should be done in the spring or fall ahead of a chip seal to allow crack seal to cure
- Chip sealing is best done during the warm dry summer months of May through August
- Crack sealing can be done post chip sealing if can not be done before



CRAFCO

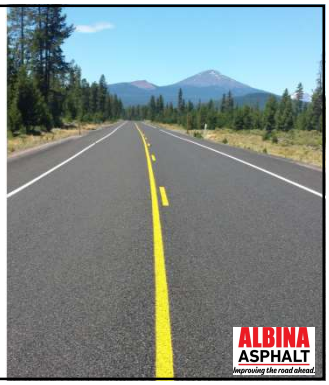
ALBINA ASPHALT
Improving the road ahead.

Future Trends in Pavement Maintenance

- Improvement in emulsion oils that work during hotter summer weather- harder pin asphalts such as PMCRS-2H
- Development of emulsion oils that allow for sweeping the same day of application –CVRS-2P and CRS-3P
- Work being done to develop quicker breaking fog seals

Summary

- Pavement preservation is a cost-effective way to keep good roads in good condition
- When crack seal and chip seal best practices are followed these pavement preservation tools can extend the service life of pavement by 7-10 years
- Crack sealing has the most benefit to cost ratio of any pavement preservation tool
- Most potholes develop from unsealed cracking in pavement
- Crack sealing followed by a chip seal is the best way to seal a road surface from water intrusion into the road base



Q&A