

# AIRPORT PAVEMENT PRESERVATION

## Crack Treatments and Patching for Airfield Pavements

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# Pavement Repair and Maintenance

Pavement repairs are critical  
to a safe flying environment

Crack Treating and Patching  
are important maintenance  
tools

Proper materials and repair  
techniques are important



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## Crack Treatments - Overview

- Why, when?
- Pavement evaluation
- Determine if Crack Sealing (working cracks) or Crack Filling (non-working cracks) treatment is needed
- Determine pavement temperature (high/low extremes)
- Select product
- Proper application/equipment

# Why Crack Treatments?



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## Why Crack Treatments?

*Untreated Cracks Will Become:*

- Pot Holes
- Dips
- Bumps
- Protect your largest investment
- Pavement failure imminent
- Crack treatments are cost-effective, up to 9 years of (75% effectiveness) performance

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## All Pavement Preservation Systems Should Start With “Crack Treatments”

In The Pavement Life Cycle, Crack  
Treatments Become An Important Part Of  
Fog Seal, Micro Surfacing, Slurry Seal, Chip  
Seal & Overlay Procedures



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## **When Should I Treat Cracks?**

Within One Or Two Seasons After  
Cracks Occur Because Sub-Base  
Deterioration Begins When Cracks  
Appear

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## What cracks to treat?

- All cracks soon after they appear...  
any crack opening will allow moisture penetration into pavement foundation (subbase)
- At minimum all cracks greater than 1/8"

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Not recommended



**Crack Treating Of  
Highly Distressed  
Pavement Is Not  
Good Use Of Your  
Time and Money**

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## Crack Treatments

- **Crack Filling**
  - Lower level operation with lower quality sealant and little preparation
  - Applicable only to non-working cracks
- **Crack Sealing**
  - Higher level operation with higher quality sealant and more preparation
  - Working cracks

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## Crack Treatment Categories

- **Crack Fillers**

- AC/Emulsion And Sawdust/Sand (Mfg & State Spec)
- Rubberized Emulsion (Mfg & State Spec)
- AC And Fiber (Mfg & State Spec)
- Hot Asphalt Rubber (Mfg & State Spec)

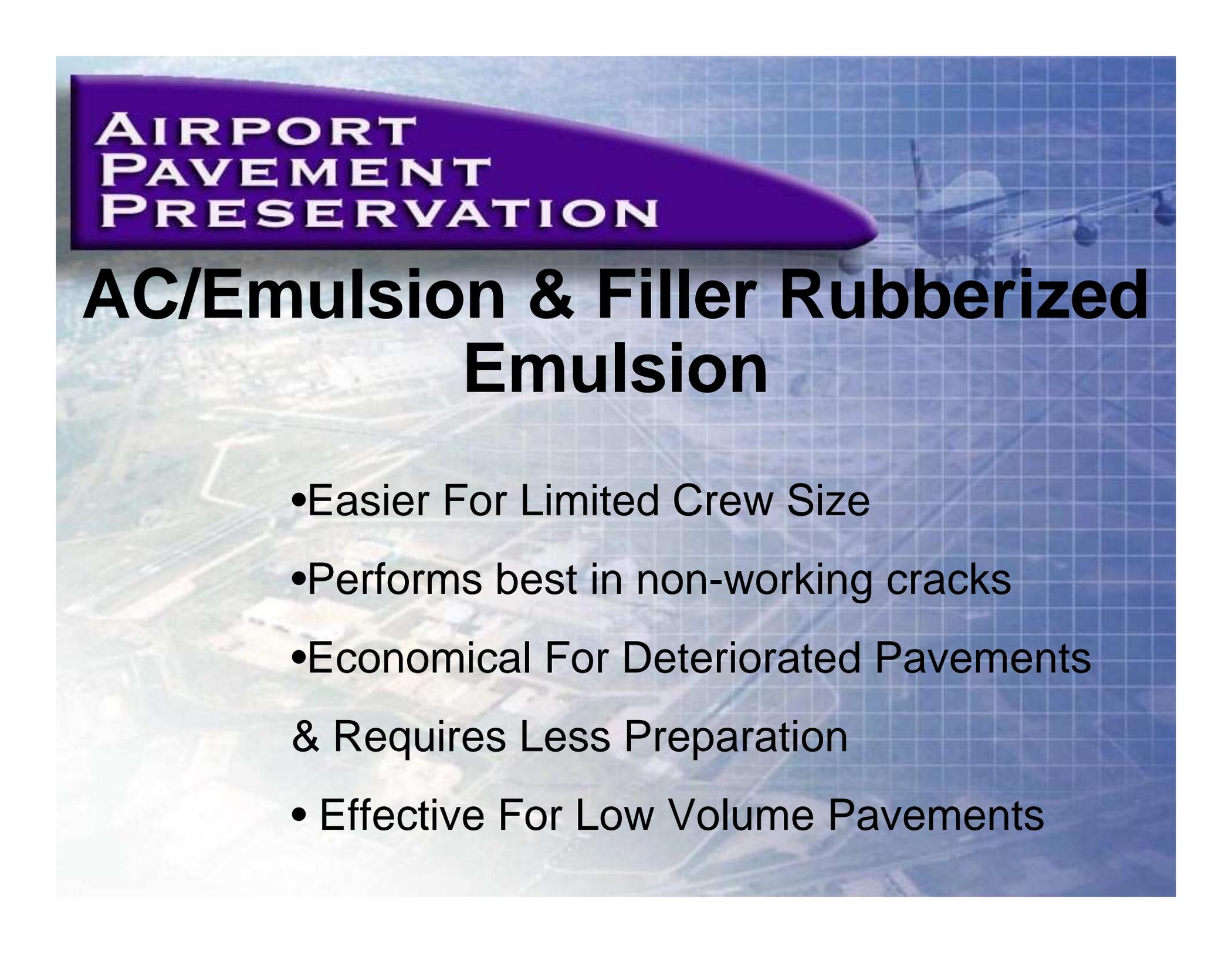
- **Crack Sealers**

- Modified Hot Asphalt Rubber (ASTM D6690 Type I or Type II)  
and/or Polymer Composition

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## When to Seal By Sealant Type

- AC/Emulsion & Filler -Annually
- Rubberized Emulsion -1/8" +
- AC & Fiber -Prior to Surface Treatment
- Hot Rubber -Route @ 1/8" Or 1/4"+



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## AC/Emulsion & Filler Rubberized Emulsion

- Easier For Limited Crew Size
- Performs best in non-working cracks
- Economical For Deteriorated Pavements  
& Requires Less Preparation
- Effective For Low Volume Pavements

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## AC and Fiber

- Performs best prior to surface treatment  
chip seal, slurry seal, micro-surfacing
- Minimal preparation required
- Cost effective on deteriorated pavements



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## Hot-Applied Rubberized Asphalt

Is The Most Commonly Used &  
Cost-Effective Sealant Nation Wide  
When Pavement Life Cycle Is  
Considered (Per SHRP H106)

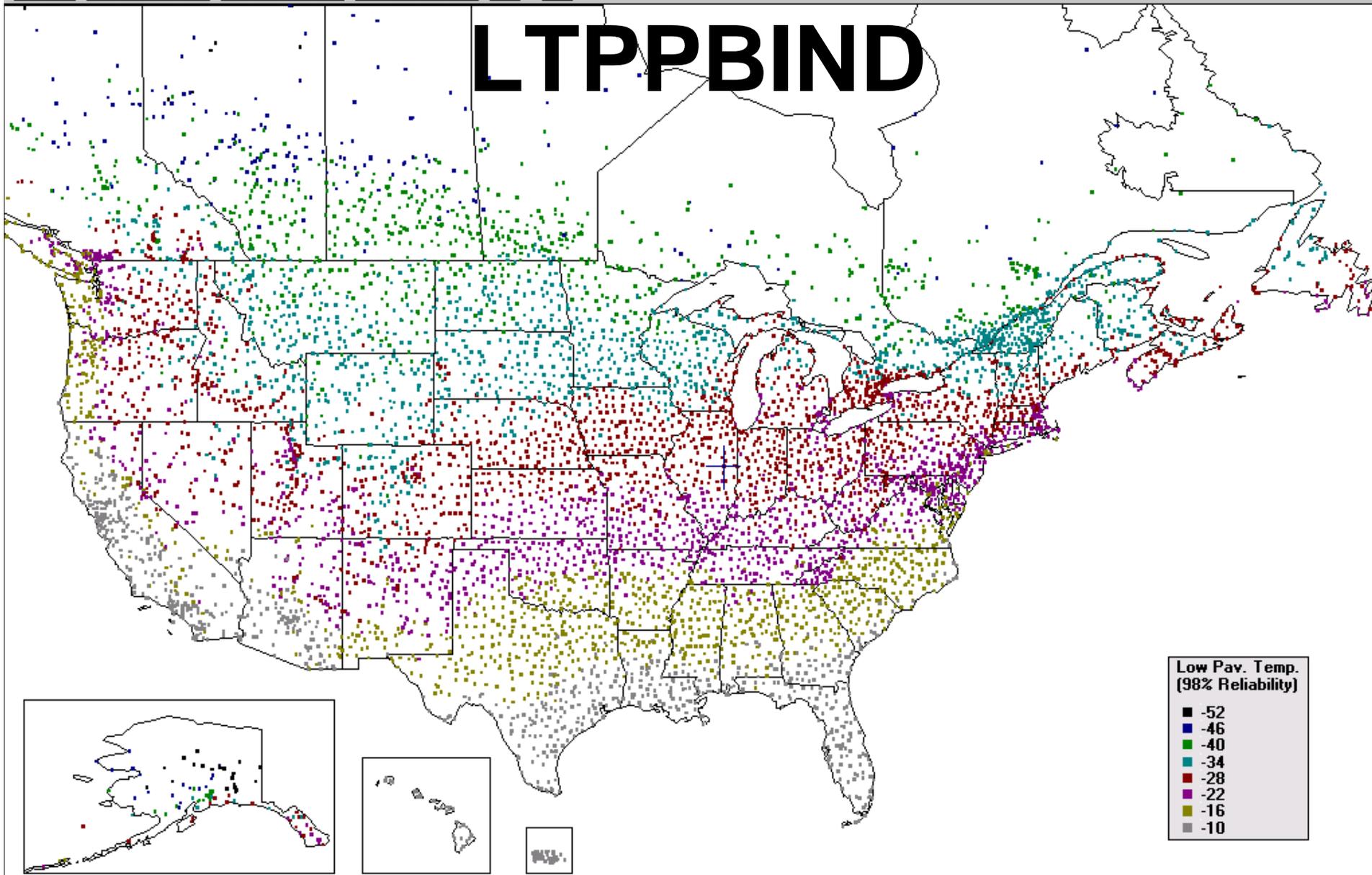
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## What Hot Rubber Sealant Should I Use?

*The Type Of Sealant To Use  
Varies Based On:*

- Pavement Type & Condition
- Climate - Missouri?
- Desired Performance
- Traffic Volume

# LTPPBIND



**Low Pav. Temp. (98% Reliability)**

■	-52
■	-46
■	-40
■	-34
■	-28
■	-22
■	-16
■	-10

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## Hot Applied Asphalt Sealants



### NON FUEL RESISTANT

- ASTM D-6690:
  - Type I - ASTM D1190
  - Type II - ASTM D 3405
  - Type III – Low Modulus
  - Type IV - Fed Spec SS-S-1401C
- P 605 - ASTM D-6690
- State Specifications
- Unique Specifications



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## Hot-Applied Asphalt Sealants

- Modified Asphalt Based Sealants
- 2 to 7 Year Life Cycle
- Asphalt and Concrete Pavements
- Different Grades available

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## Two Basic Types Of Hot Rubber Sealant

- ASTM D3405 (6690 II)-Designed for Concrete Time Proven Performance, Excellent Lab Performance
- ASTM D1190 (6690 I)-Designed for Asphalt Low Resiliency, Forgiving, Long Life

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## Modified Sealant

- The Best Of D3405 & D1190
- Low Resiliency 20-60%
- Great Cold Weather Performance
- Excellent Bonding Performance
- Forgiving During Application
- Designed For Asphalt!!!!!!

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## What Size Cracks Should I Treat?

- ***Small and Medium Sized Cracks***
  - Crack width greater than 1/4"
  - Crack width less than 1 1/2 "
  - "Hairline" cracks (<1/4") are too small to to be filled effectively
  - "Large" cracks (> 1 1/2 ") too large to be filled with crack sealant: *(use modified patching materials, ie. Grafo PolyPatch)*

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## How Should I Prepare The Cracks?

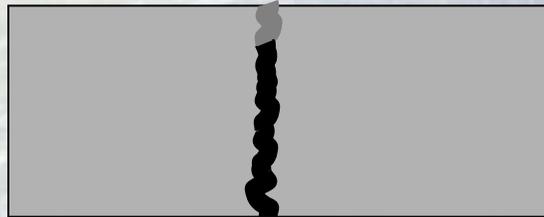
- Cracks Must Be Clean & Dry
- Use Compressed Air Minimum 90CFM

*Note: Be Sure The Compressor Is Equipped  
With A Moisture Trap*

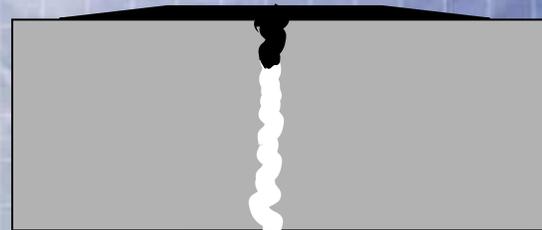
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## Placement Configurations

### Cracking Filling

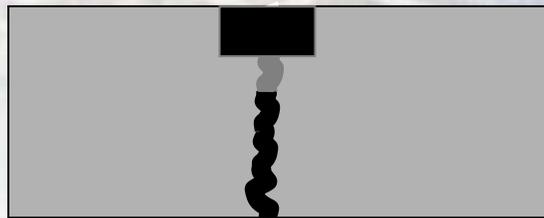


Flush-Fill

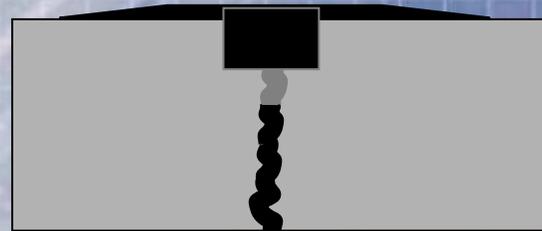


Overband

### Crack Sealing



Reservoir



Combination

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## Cleaning Methods

- Compressed air - sufficient pressure and velocity
- Vacuum - in combination with compressed air
- Heat lance - used to warm pavement when needed
- Routing - cuts new bonding surface

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## Routing



- Rout at least 1/8" from each crack face
- Keep centered over crack
- Reduce spalling by using as many cutters as possible
- Routing Will Add At Least 50% To The Sealant Life At A 10% Added Cost

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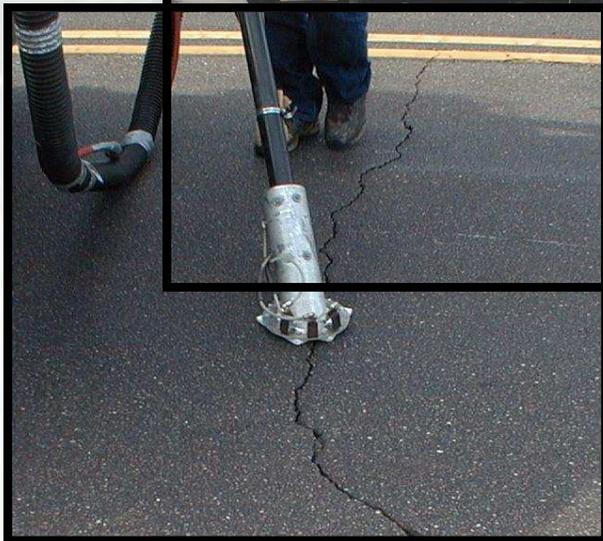


## Routing Provides:

- Clean Pavement For Good Adhesion
- Cracks Are Cut Back To Sound Pavement Structure
- The Routed Reservoir Provides Protection From Sealant Wear

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## Crack Vac



- Reduces dust
- No post job clean up
- Healthier work environment
- Safer work environment
- PM 10 air regulation compliant

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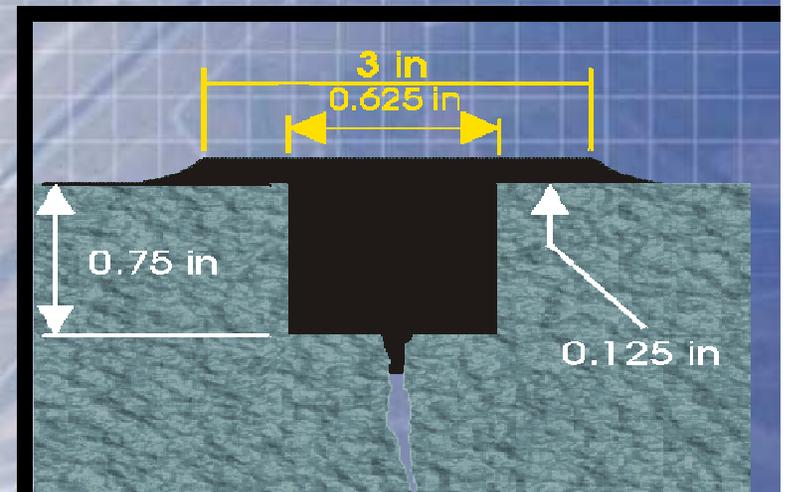
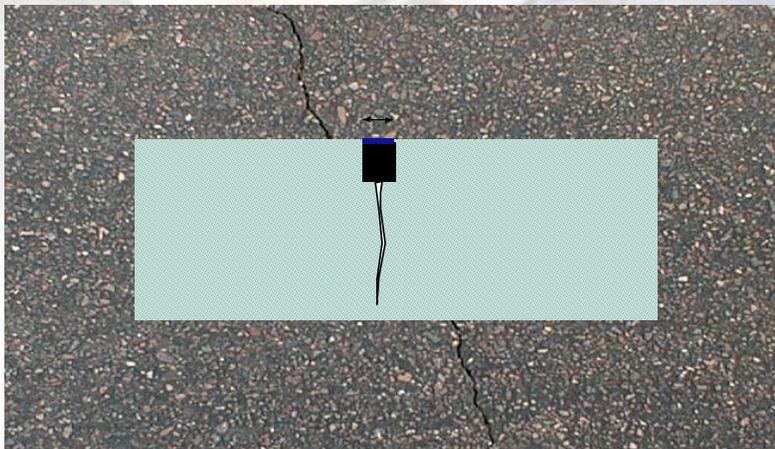
## Clean cracks



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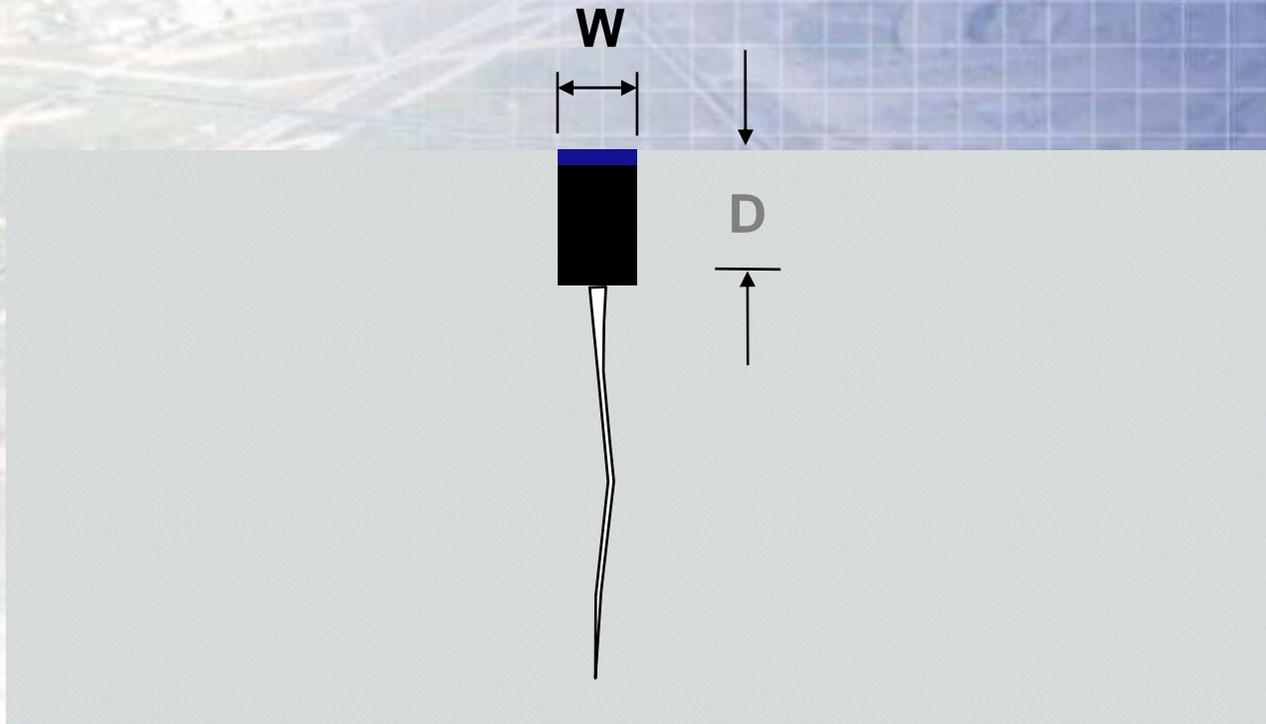
## Rout Size Recommendation

- No wider than  $3/4$ "
- Never less than  $3/8$ " depth
- Recommended prior to overlay



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## Crack Treating for Air Carrier Airports



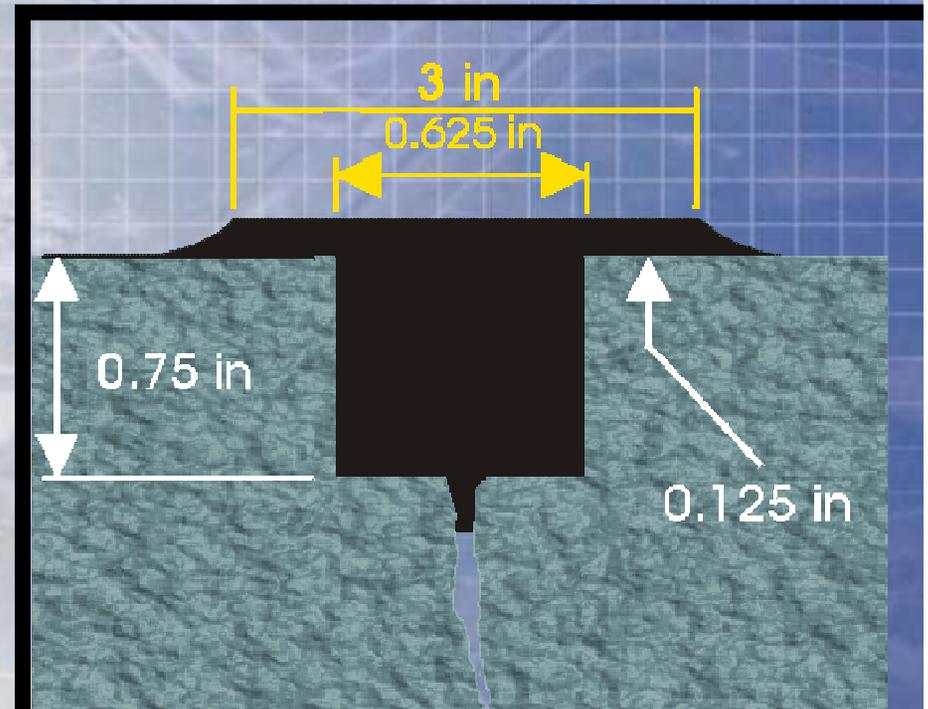
Do not flush fill the reservoir  
Recess sealant by approximately 1/8" below surface

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## How Should Sealant Be Applied?

**Proper sealant application is critical for a successful project**

Follow the specifications and manufacturer's recommendations for the given circumstances of the project





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## Proper Equipment

Sealant Must Be Applied At  
Recommended Application Temperature  
(380°F- 410°F or 180°C - 210°C)

Higher Production

Safe to Operate

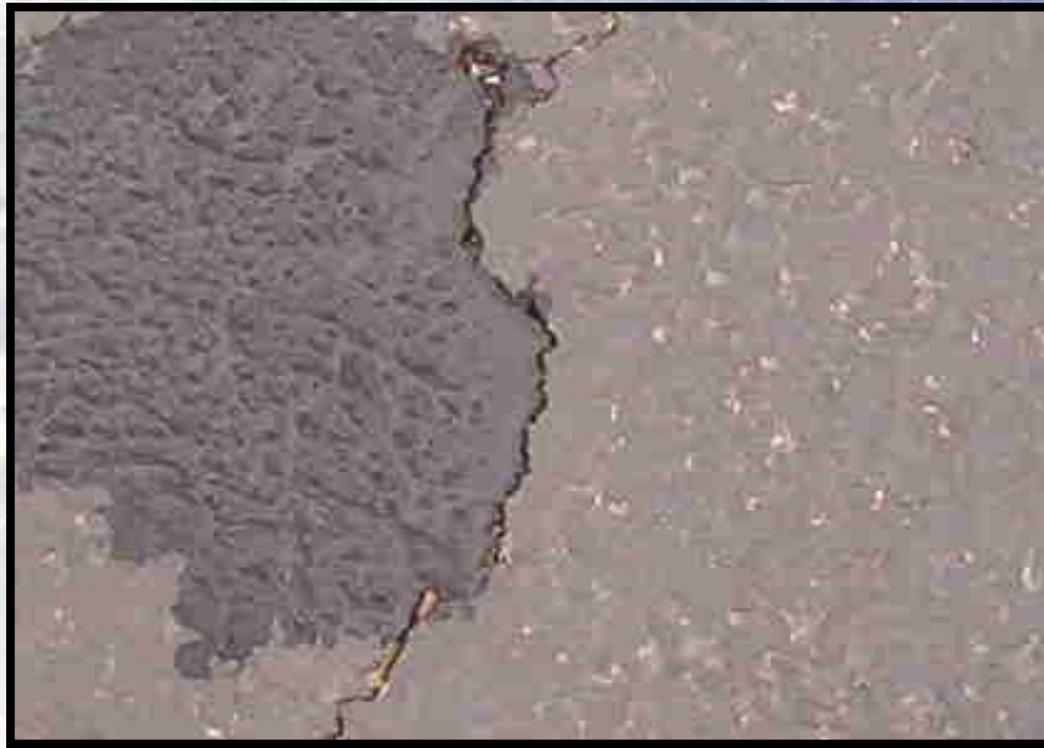
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## “Working” VS. “Non-working” cracks

- “Working” (high movement)
- more than 3mm movement
  - Thermal
- “Non-working” (low or no movement)
- less than 3mm movement
  - Longitudinal
  - Block
  - Fatigue

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Water intrusion



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## Incompressible intrusion



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Crack type- thermal



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## Crack type- “longitudinal” (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- less than 3mm movement

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Crack type- longitudinal



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## Crack type- fatigue



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Forget it!!



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## Cohesive failure



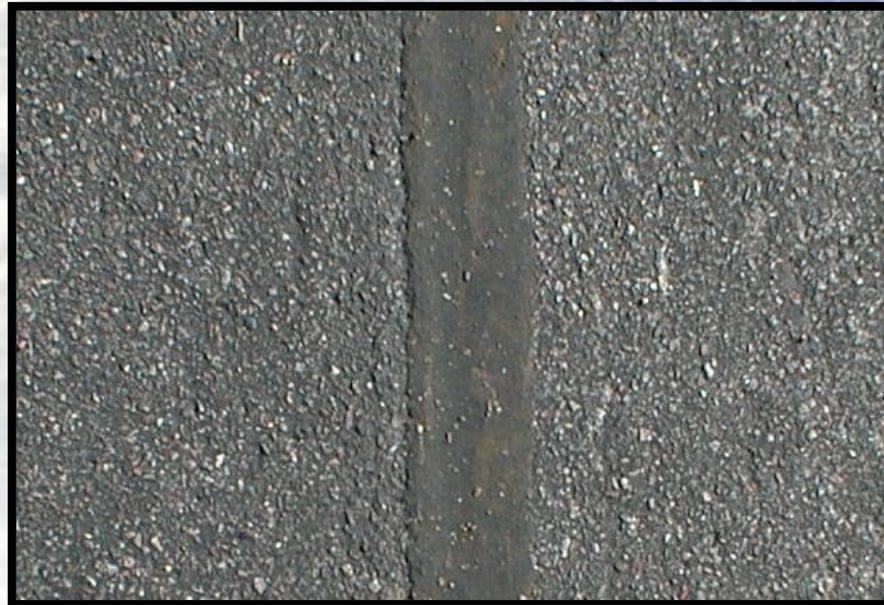
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## Adhesive failure



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Recommend Overband  
Appearance  
(Non-Rout/Clean & Fill)



# **AIRPORT PAVEMENT PRESERVATION**

**With Proper Application In A Timely  
Manner, You Can Expect:**

- 5-10 Years of Service Life
- Lower Maintenance
- No Pot Holes
- Improved Pavement Conditions
- A Smoother Pavement
- Less Pilot Complaints

A photograph of a weathered asphalt road surface. The pavement is heavily cracked and shows signs of significant wear and tear. A large, irregular pothole is visible in the center of the frame, filled with a shallow layer of greyish water. The surrounding asphalt is dark and textured, with numerous small cracks and pits scattered across the surface. The overall appearance is one of a neglected and deteriorating roadway.

**Are Crack Treatments  
Worth The Effort?**

**YES!**

An aerial photograph of an airport tarmac serves as the background. A large commercial airplane is visible on the right side. A purple banner with a white border is positioned at the top left, containing the text 'AIRPORT PAVEMENT PRESERVATION'.

**AIRPORT  
PAVEMENT  
PRESERVATION**

**Crack Treating Should  
Be Part Of All  
Pavement Treatments !**

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Large Cracks > 1 ½ ???



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## Elastomeric, Load Leveling & Load Bearing Material

Pavement Preservation Large,  
deep cracks and joints; low to  
medium alligator cracking;  
leveling recessed transverse AC  
cracks; AC and PCC pavements

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## Features

- Polymer modified w/select light weight aggregate
- Load bearing, yet flexible
- Highly track resistant
- Quick set up time,  $\pm$  30 minutes
- Prepackaged, homogeneous blend

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## Features

- Can be reheated
- Pot-life 12-15 hours
- Skid resistance +/-50 British Pendulum test method when applied
- $\pm 10.5$  LB/gal.
- $\pm 35$  LB self-release kegs

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## Market Focus Distresses



- Large cracks
- Recessed transverse cracks
- Low to medium severity alligator cracks

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## Routed Transverse Crack- Fairbanks, Alaska



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## Milled Transverse Cracks



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## Filled Transverse Cracks





**Milling Head**



**Applicator  
P/N 44600**



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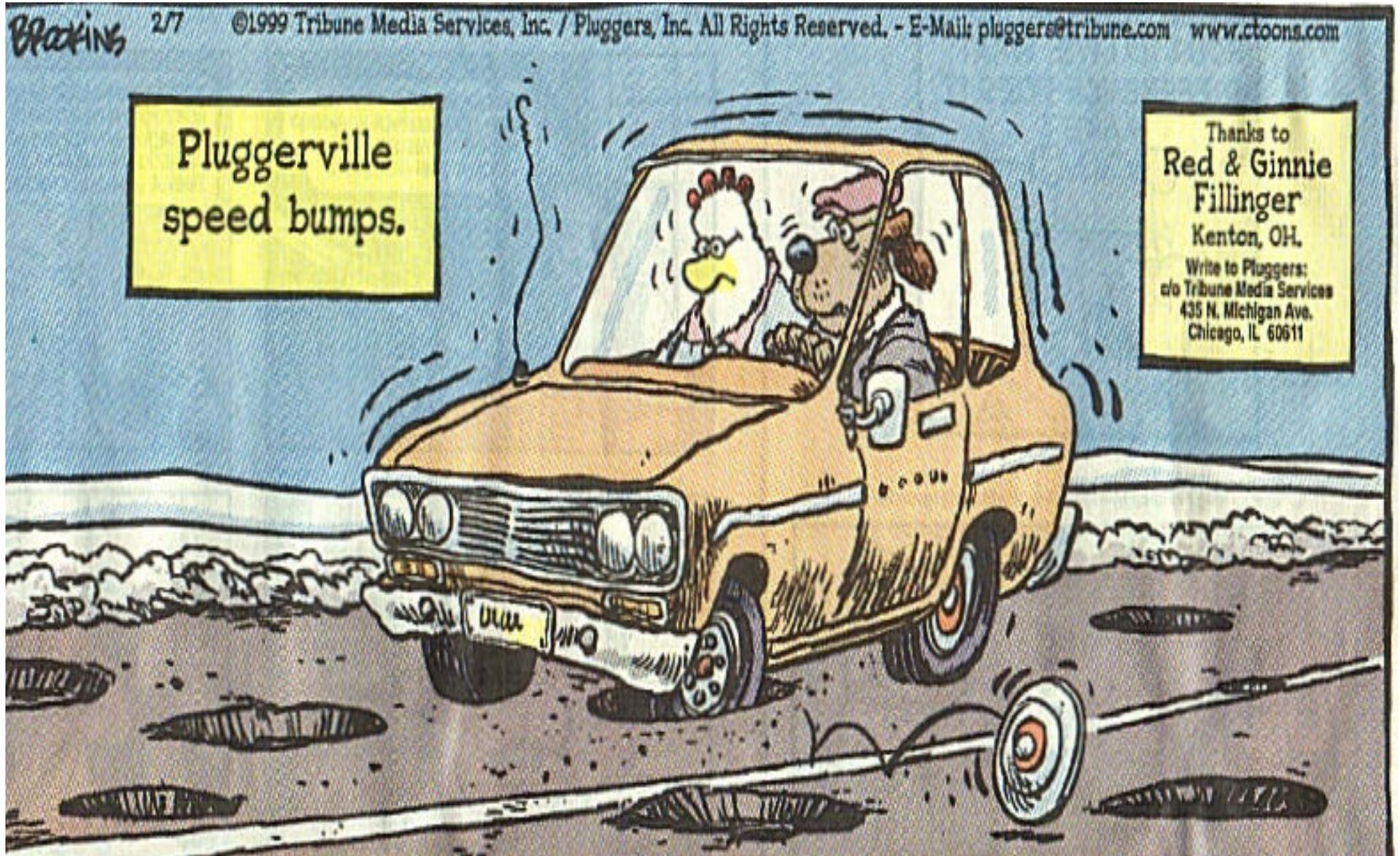
## Alligator Cracks- Flagstaff, AZ





**Skin Patches:**

# Pothole Advantages?





5/3/2001



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## Patching Localized Distress

- Identify area affected
- Remove to sound material
- Clean, tack edges
- Place patching mixture
- Compact
- Check level

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## Full Depth Patching

- Removal of materials in failed area
  - Old pavement
  - Aggregate base
  - Subgrade
    - Remove materials down to firm support
  - Removal should extend 1 ft beyond distressed area in all directions

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## Full Depth Patching

- Removal of materials (cont.)
  - Cut pavement with saw or jack hammer
  - Outline of area should be rectangular
    - Two faces perpendicular to traffic
  - Faces of excavation should be vertical, straight and solid
- Adequate drainage considerations
  - Wet base/subgrade corrections





*Courtesy, Fugro-BRE, Florida DOT*

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## Full Depth Patching

- **Replacing materials**
  - Apply Crafcoc joint tack adhesive to vertical edges
  - Prime the base
  - Fill area with asphalt mixture



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## Full Depth Patching

- **Replacing materials (cont.)**
  - **Spread mixture carefully**
    - **Avoid segregation**
    - **Place materials on edges first**
    - **Avoid pulling material from middle to the edges**
    - **Place proper quantity so finished patch is even with surrounding surface after compaction**

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## Full Depth Patching

- **Compaction**
  - Compact each lift thoroughly
  - Size of patch determines equipment required
    - Vibratory plate compactor - small patches
    - Vibratory roller - large patches, thick lifts
  - Compact edges first
    - Overlap 150 mm (6") onto patch
  - Compact low side to high side, same overlap
- **Straight edge the patch when completed**

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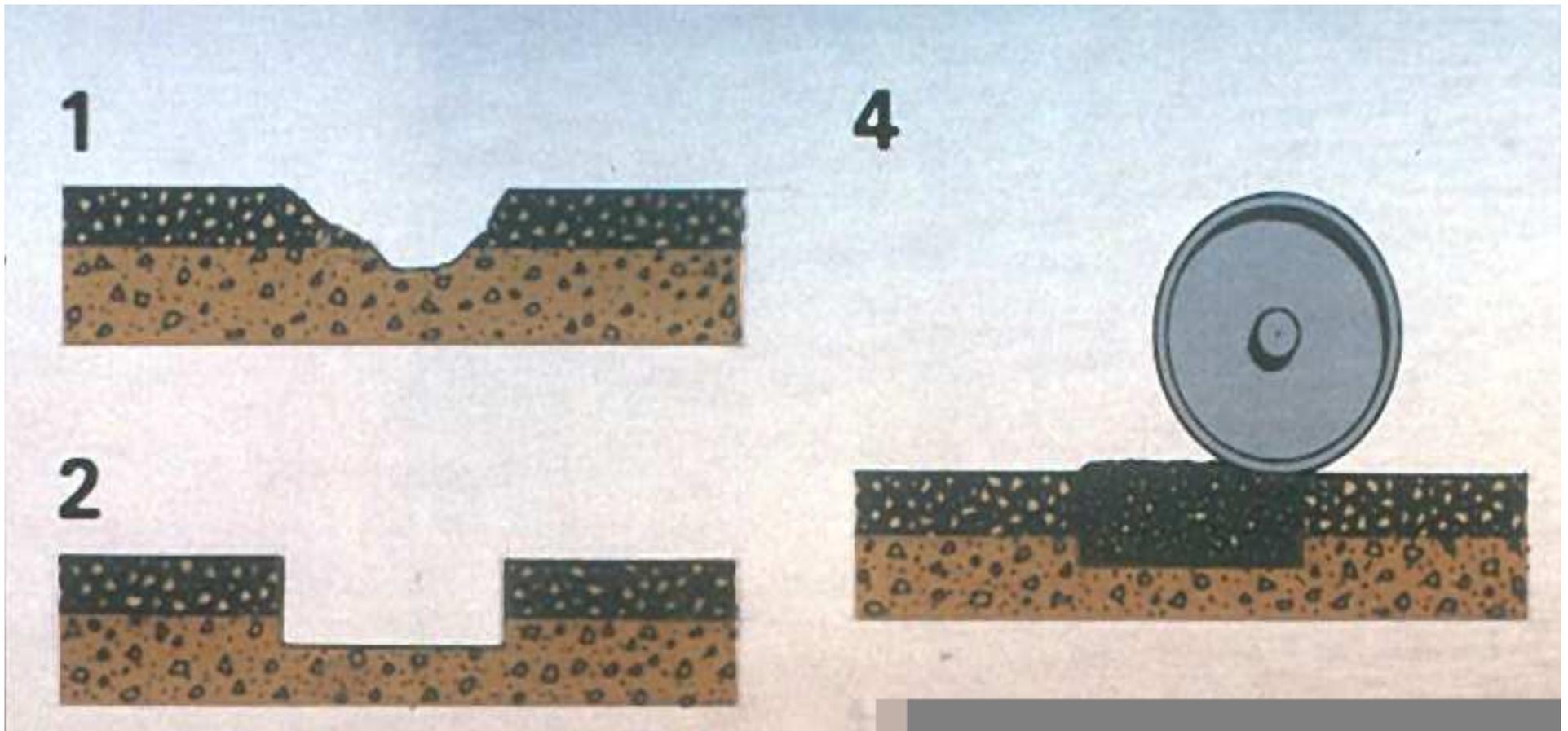


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## Straight Edge the Patch







# Full Depth Patching - Review

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## Corrective Actions-Summary

- Preparing for resurfacing:
  - Fill cracks (prefer recessed)
  - Patch structural distress (prefer HMA)
- Long-term repairs (w/o resurfacing)
  - Seal cracks
  - Full-depth patching w/HMA

Not on Airport Pavements!



An aerial photograph of an airport is the background, overlaid with a blue grid pattern. A purple banner with a white border is positioned at the top left. The text on the banner is in white, bold, uppercase letters. In the upper right, a large commercial airplane is visible on the tarmac.

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Thank you for your time!

Questions ?????