# Crack Treatment

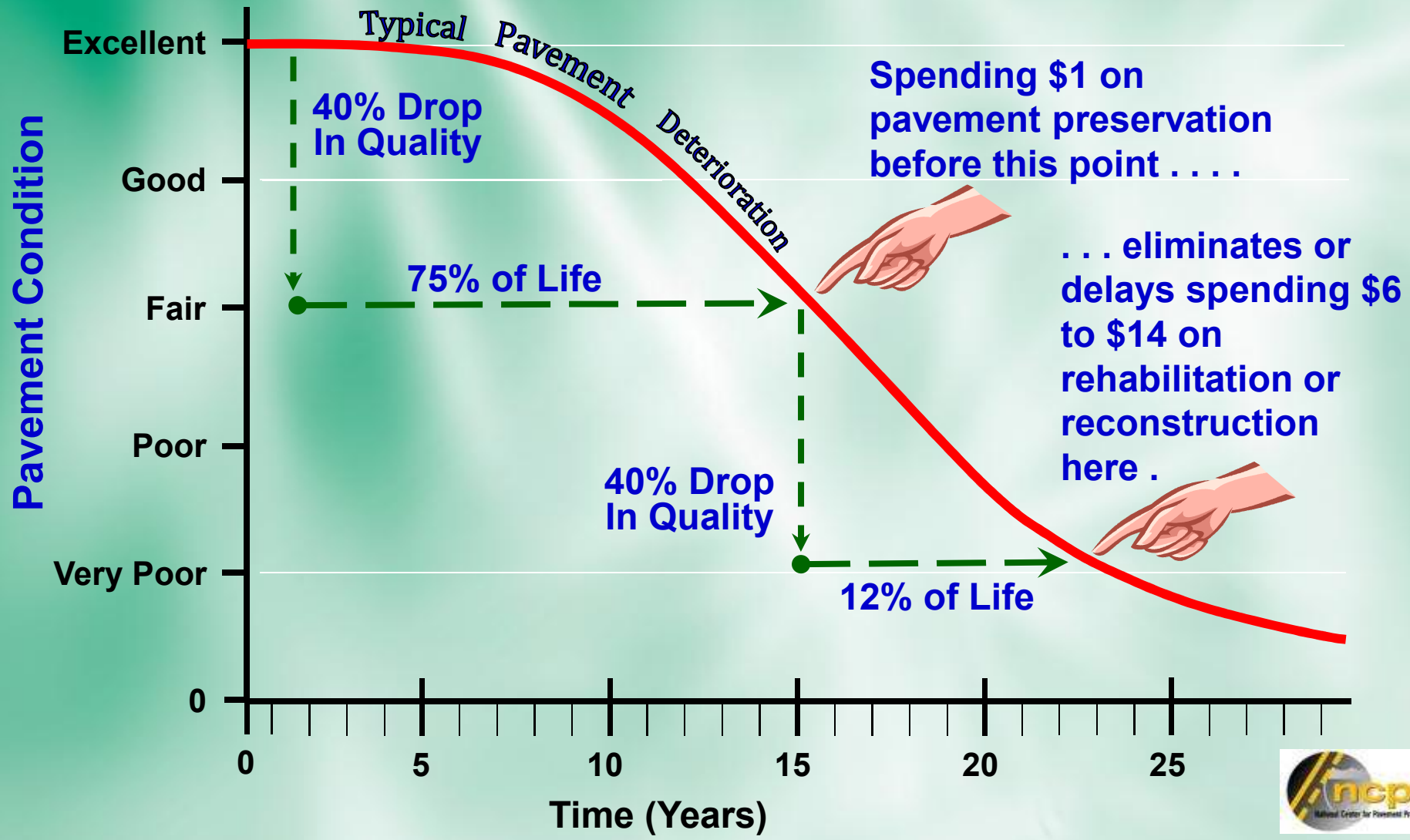
## (Crack Sealing & Crack Filling)



ncpp
National Center for Pavement Preservation

# INTRODUCTION

# Pavement Preservation is Cost Effective



# Function of Crack Treatments

- Reduce water penetration into underlying pavement layers, thus maintaining base strength near the crack
- Reduce incompressibles, thus reducing crack growth and raveling

ncpp
National Center for Pavement Preservation

# Function of Crack Treatments


ncpp
National Center for Pavement Preservation

# Effect of Crack Treatment

- Slows pavement deterioration
- Prevents future roughness increase
- Reduces potholes
- Slows crack spalling
- Extends pavement life from 1 to 4 years

ncpp
National Center for Pavement Preservation

# Crack Treatment Timing

- All cracks soon after they appear… any crack opening will allow moisture penetration into pavement foundation (subbase)
- At minimum all cracks ≥1/8” (≥ 3mm)

ncpp
National Center for Pavement Preservation

# Crack Formation

- Cracking occurs when the asphalt mixture can no longer flow to accommodate stresses/ strains from traffic loadings and temperature changes.

ncpp
National Center for Pavement Preservation

# Crack Growth

- Cracks widen with age of approximately 10% of annual movement per year
- Crack face deterioration causes raveling
- Asphalt mixtures dry and shrink
- Incompressible intrusion accelerate crack growth

ncpp
National Center for Pavement Preservation

# Cracks Deteriorate Pavement

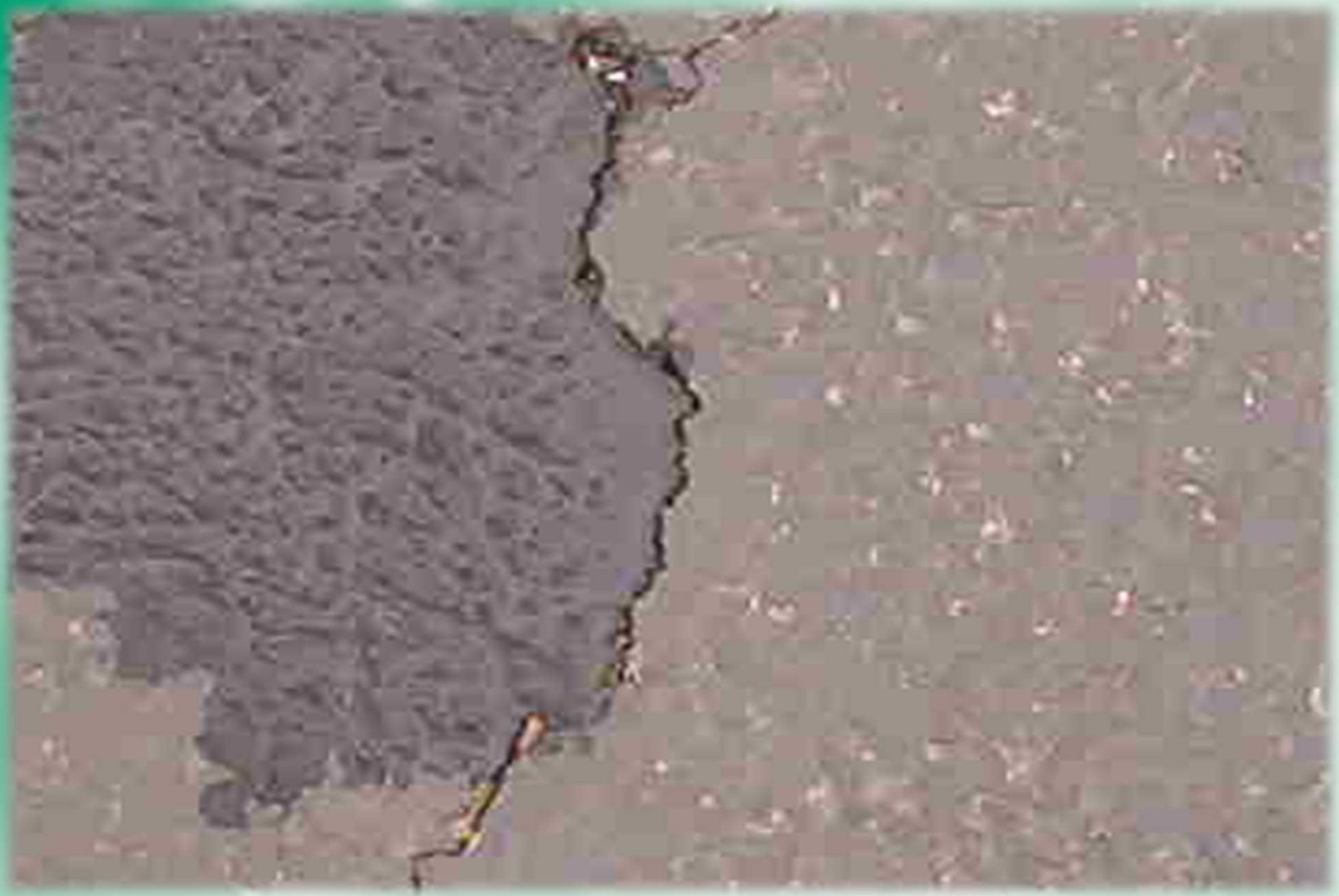
- **Water intrusion weakens subgrade**
  2% increase in water content causes 100% strength reduction

- **Water causes damage to asphalt mat**
  Approximately 1 m each side of crack may reduce effective thickness up to 50%

- **Water in the pavement structure will increased deflections from traffic**
  Causes potholes and secondary cracking

ncpp
National Center for Pavement Preservation

# Water Intrusion



# Water Intrusion

# Incompressible Intrusion

# Cohesive failure:

# Adhesive failure:

# Improper Selection

# DESIGN PROCESS

# Crack Treatment Design Process

- Pavement Evaluation
- Project Selection
- Temperature Ranges
- Material Selection
- Installation Geometry

ncpp
National Center for Pavement Preservation

# Pavement Evaluation & Selection

- Consider overall pavement condition
- Determine crack type, severity and extent
- Applicable at PCI of 60-90, but varies with climate, traffic, and other factors
- Treating poor pavement condition is not cost-effective

ncpp
National Center for Pavement Preservation

# Configurations

- **Recessed Fill**

  leave approx ¼ inch low in the crack

- **Flush Fill**

  fill to flush with the pavement surface

ncpp
National Center for Pavement Preservation

# Configurations

- **Slight overlap**
  - ✓ Slight overfill with approx ¼ - ½ inch overlap on each side of crack
- **Overband**
  - ✓ ⅛ inch by approx 4 inches wide band centered over top of crack
  - ✓ Considered best performing in SHRP SPS-3 Study

ncpp
National Center for Pavement Preservation

# Proper Overband Appearance
## (Non-Rout / Clean & Fill)

# MATERIALS

# Crack Sealing Materials

- **Asphalt Binders (hot applied)**
- **Asphalt Emulsions (cold applied)**
- **Asphalt Cutbacks (cold applied)**
- **Modified Asphalts (hot applied)**
  - ✓ Fiber, rubber, polymers
- **Polymeric**
  - ✓ Urethanes, silicone, epoxy

ncpp
National Center for Pavement Preservation

# EQUIPMENT

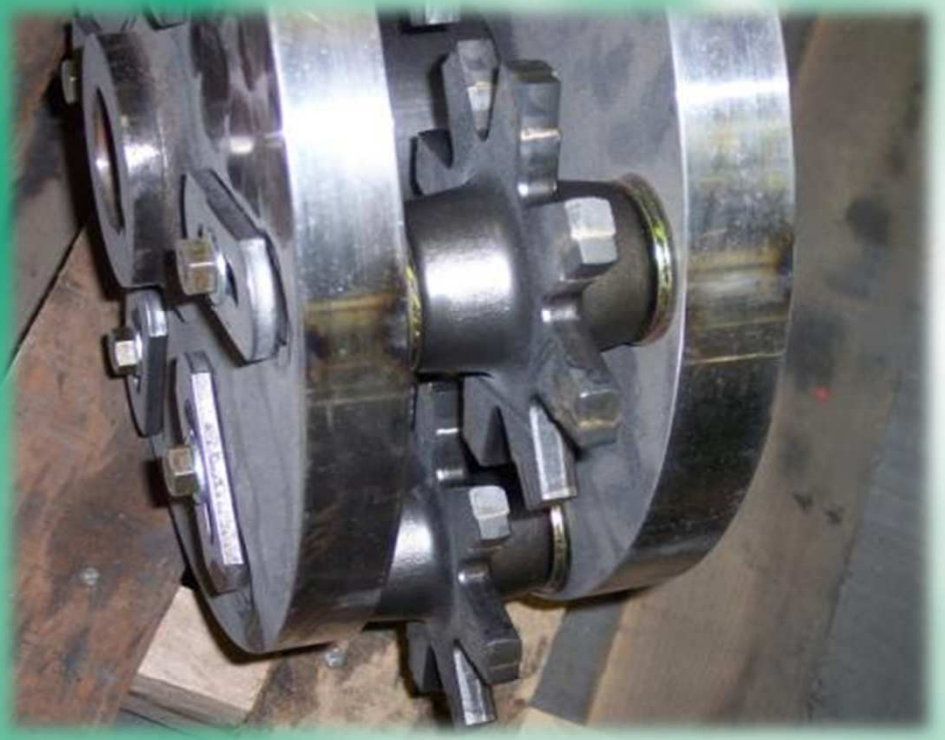
# Router

- Rout at least ⅛” from each crack face
- Keep centered over crack
- Reduce spalling by using as many cutters as possible

ncpp
National Center for Pavement Preservation

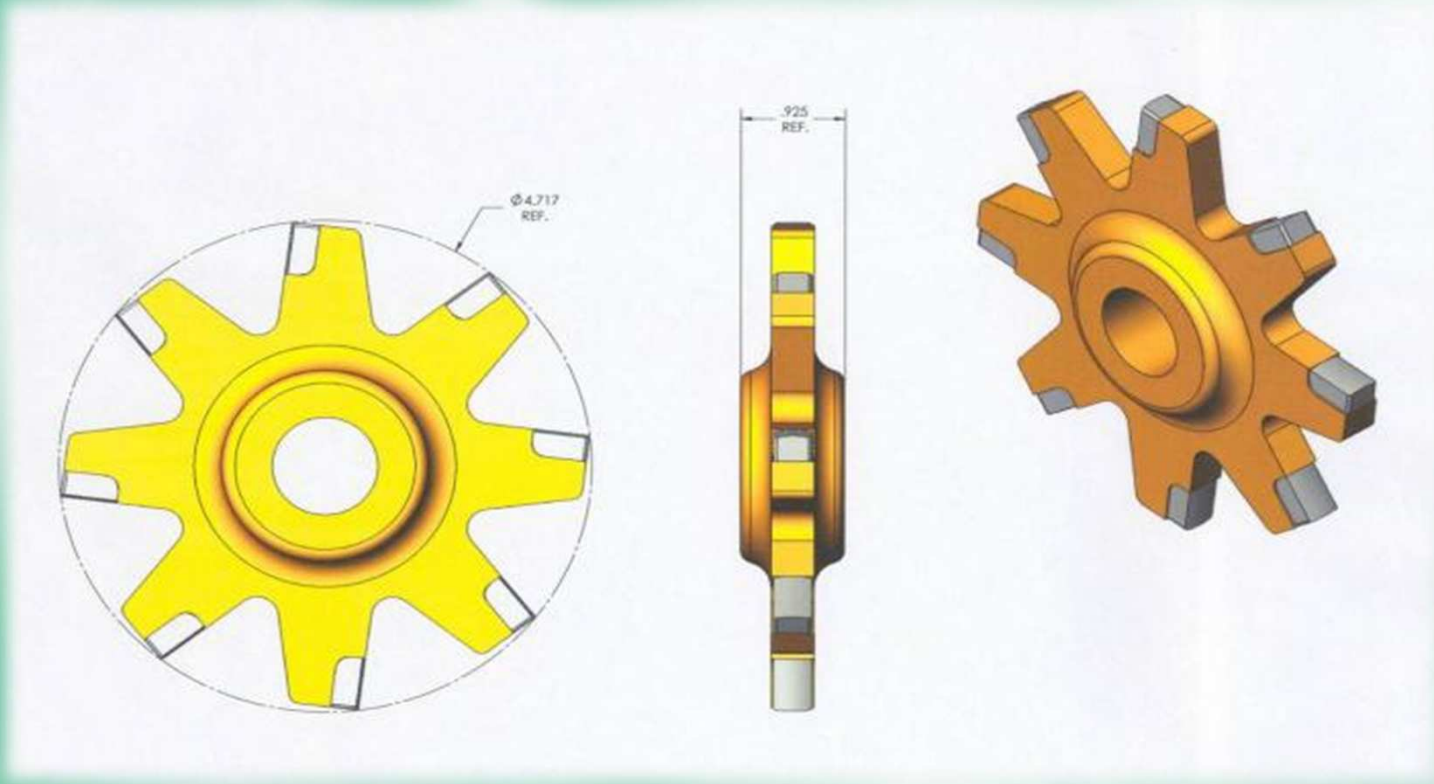
# Router

# Router



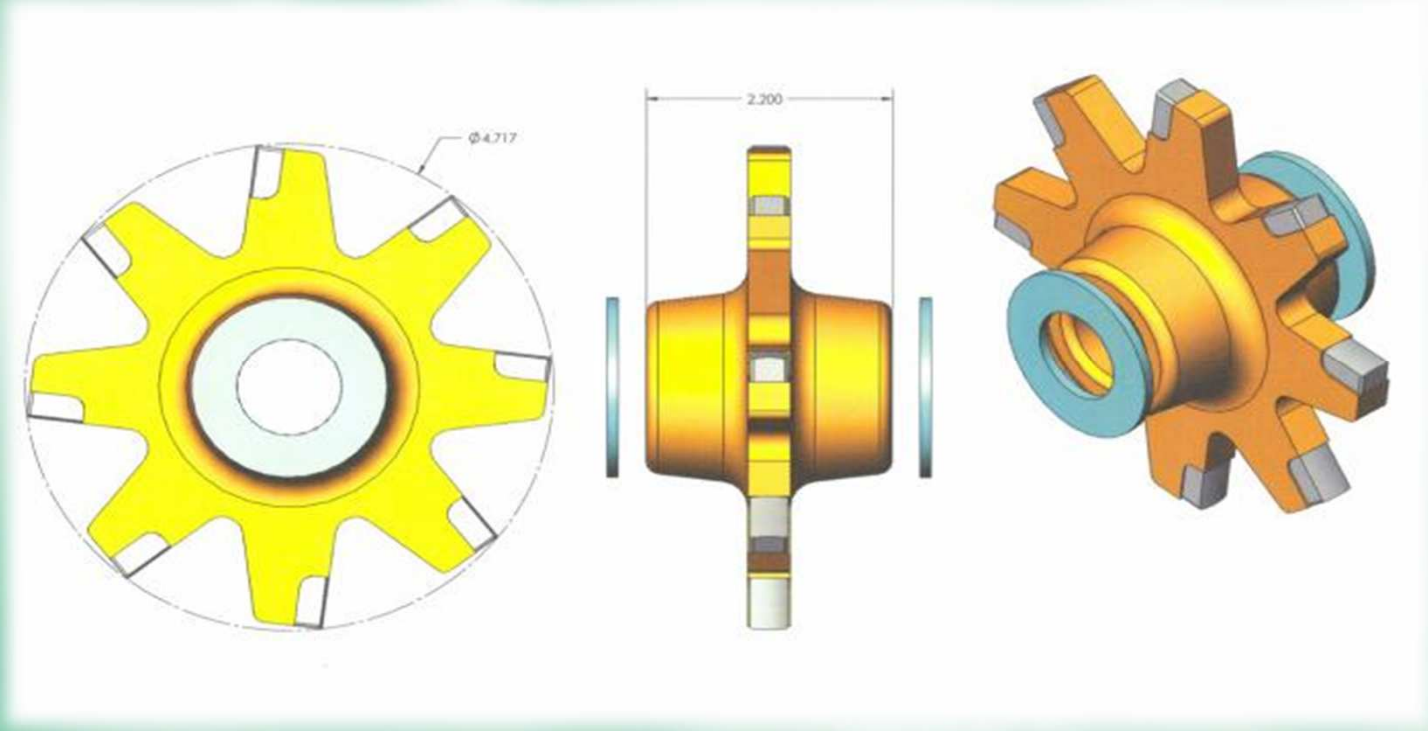
National Center for Pavement Preservation

# Standard Carbide Cutter




National Center for Pavement Preservation

# Carbide Cutter - 4 ¾" Wide Hub




National Center for Pavement Preservation

# Random Crack Saw

National Center for Pavement Preservation

# Melter and Applicator

- Oil-jacketed
- Thermostatic heat controls
- Continuous agitation
- Over-heating safety controls
- Heated hose and wand
- Right size tank capacity for operation
- Many commercially versions……

ncpp
National Center for Pavement Preservation

# Melter and Applicator


ncpp
National Center for Pavement Preservation

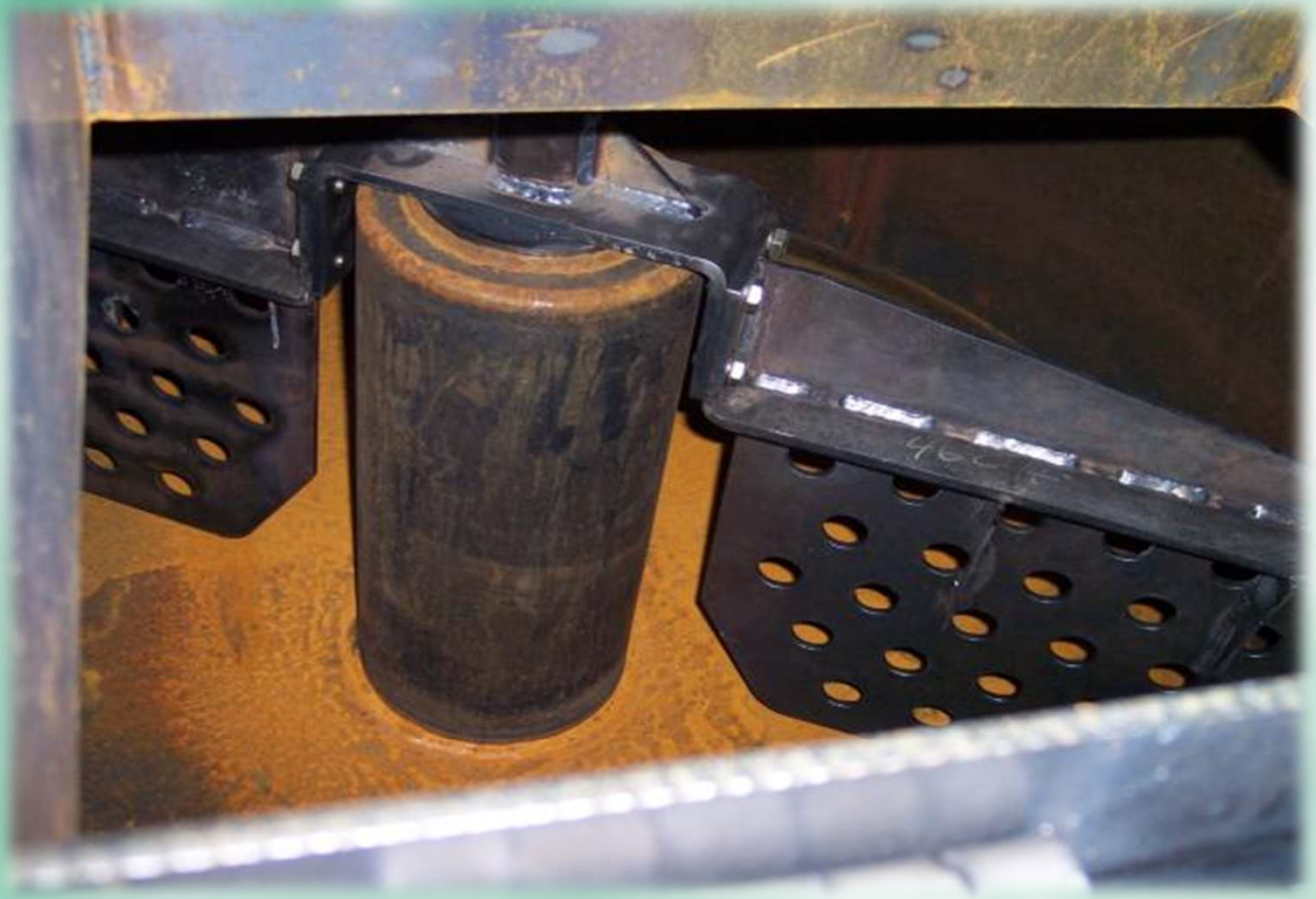
# Melter and Applicator


ncpp
National Center for Pavement Preservation

# Melter

ncpp
National Center for Pavement Preservation

# Melter



National Center for Pavement Preservation

# Swivel Applicator

National Center for Pavement Preservation

# Swivel Applicator


ncpp
National Center for Pavement Preservation

# Squeegees

National Center for Pavement Preservation

# Vacuum Debris Removal

- Reduces dust
- Eliminates after job clean up
- Healthier work environment
- Safer work environment
- Meets EPA Clean Air Act for Particulate Matter (PM 10)

ncpp
National Center for Pavement Preservation

# CONSTRUCTION PROCEDURES

# Minimum Installation Requirements

- Clean
- Dry
- Intact pavement
- Proper temperature
  - ✓ pavement ≥40°F
  - ✓ sealant 400°F

ncpp
National Center for Pavement Preservation

# Weather Conditions

- Minimum 40º F pavement temperature
- Dry pavement and cracks
- Rain is not imminent

National Center for Pavement Preservation

# Cleaning Methods

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

ncpp
National Center for Pavement Preservation

# Treating Edge Joints

# Edge Drops


NEW YEAR'S EVE
FREE
Fireworks Show!
2005
JANUARY 1-2
Water Entry

# Cleaning and Drying

- **Prepare a clean, dry, and intact crack face**
  - ✓ Dry Compressed Air at 100 psi minimum
  - ✓ Vacuum system for dust reduction
  - ✓ Heat Lance

ncpp
National Center for Pavement Preservation

# Crack Cleaning

## Not Clean

## Clean

# Preparation for Surface Treatments

- Crack filling is necessary to achieve optimum surface treatment performance
- Fill cracks 1/8” (3 mm) and larger
- When time permits, fill cracks 2-3 months prior to applying surface treatment

ncpp
National Center for Pavement Preservation

# Poor Application

# Prevent HMA Overlay Bumps

- Use a proven crack fill sealant
- Overband configuration should not exceed 2” beyond crack edge
- Overband should be 1/8” in thickness
- Best if crack fill is applied 6 months before overlay

ncpp
National Center for Pavement Preservation

# Prevent HMA Overlay Bumps

- Slow rollers (3-5 mph maximum speed)
- Use dual drive rollers or drive wheel leading
- Use polymer modified tack coat

ncpp
National Center for Pavement Preservation

# QUESTIONS ?

ncpp
National Center for Pavement Preservation