Slurry Systems

Best Practices

A Quality Approach in Cold Weather Climates

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Definition

Laboratory designed mixtures of asphalt emulsion, aggregate, mineral filler, water and other additives accurately proportioned, mixed and uniformly spread over a properly prepared surface

Governing Specifications

	Slurry Seal	Microsurfacing
• ISSA	A 105	A 143
• ASTM	D 6372	D 3910
• FAA	P-626	P-635

- Department of Transportation (State)
- Special Provisions and Local Specifications

Two Primary Uses

- **Preventive Maintenance**
  - To prevent surface distresses in good pavements
- **Corrective Maintenance**
  - To correct surface distresses in older pavements

Capabilities

Slurry Seal

- Seals the surface (prevents further weathering of the underlying pavement)
- Restores surface texture(improved safety)
- Provides new durable wearing surface
- Fills cracks and voids
- Corrects other distresses
  - Raveling
  - Light flushing

Microsurfacing

- Seals the surface (prevents further weathering of the underlying pavement)
- Restores surface texture(improved safety)
- Provides new wearing durable surface
- Fills cracks and voids
- Corrects other distresses
  - Leveling Course
  - Rut Filling

Cold Weather Applications

Steep grade

Four Lane Roadway

Slurry Micro

Residential Inter City

Slurry Micro

Residential and Two Lane

Slurry Micro

Parking Lots

Slurry Micro

Airports

Slurry Micro

WHY BEST PRACTICES




Cold Weather Applications

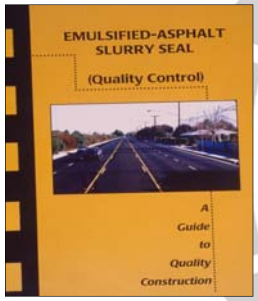
French Alps

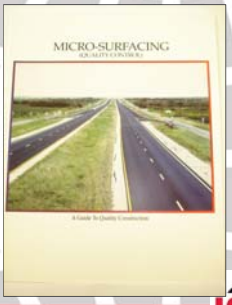
L'iseran Pass: second highest pass in Europe
Altitude :2769 m
Temperature: 5 °C

MeadWestvaco

Inspector's Manual

Reference Guides





ISSA A105 & A143

DESIGN

Calibration

Unit No. _____ Date _____

CALIBRATION SUMMARY

1. Lbs. of Emulsion per count of aggregate belt. (page 2) Em.P.C. _____

2. Lbs. of cement per count of cement counter. (page 2) Cm.P.C. _____

3. Calibration by percent - % residual asphalt:
Find the lbs. of aggregate per count (Agg. P. C.) based on % residual asphalt. (R.A.) from the mix design.

Em.P.C. _____ x R.A.Em. _____ ÷ % R.A. Reqd. _____ = Agg.P.C. _____

4. Calibration by percent - % emulsion.
Find the lbs. of aggregate per count (Agg. P.C.) based on % emulsion (Em.) from the mix design:

Em. P.C. _____ ÷ % Em. Reqd. _____ = Agg.P.C. _____

5. Find the count per minute of aggregate (C.P.M. Agg.) from desired production. (Lbs. Agg. P.M.)

Lbs. Agg. P.M. _____ ÷ Agg.P.C. _____ = C.P.M. Agg. _____

6. Find the lbs. of cement per minute required (Cm.P.M.) from the mix design.

Agg.P.M. _____ x % Cm. Reqd. _____ = Cm.P.M. _____

7. Find the count per minute of cement required. (Cm.C.P.M.)

Cm.P.M. _____ ÷ Cm.P.C. _____ = Cm.C.P.M. _____

Note: Always use % expressed in decimal equivalent.
Examples: 12.0% use 0.12
7.2% use 0.072

Crack Half Filled

CRACK FILL

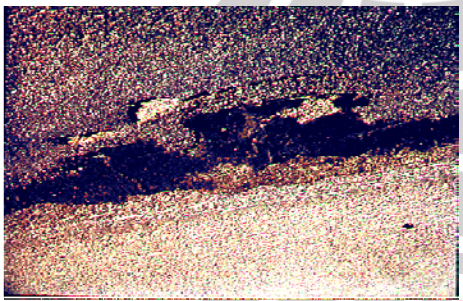
Cold Weather Application
Kaysville, Utah

Before

After

De-Bonding

Animal Carcass

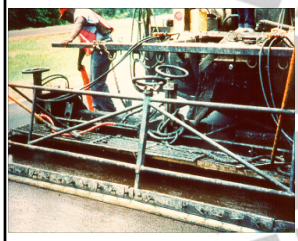


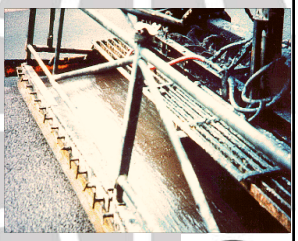
Roadway Contaminant

Stock Pile

Machines

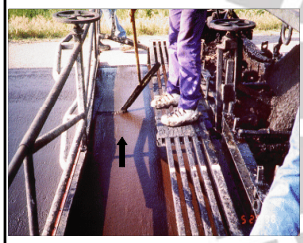
Secondary Strike Off Changing Texture



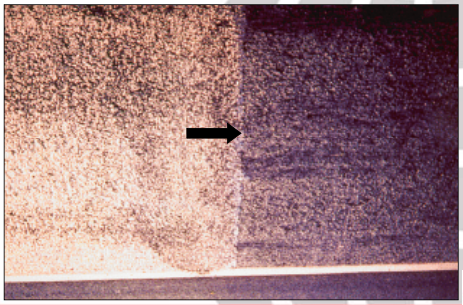


Cutting Straight Edge Making Good Joint

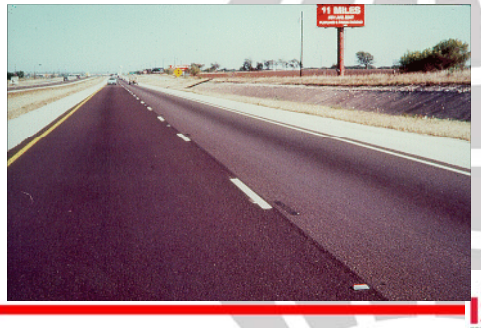
Removing Drag Marks



Start - Stop Joint



Good Longitudinal Joint



Joints

Feathering Center Joint

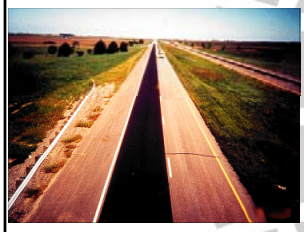
Good Edge

Feathered Edge

Missed Center Joint
Excessive Overlapped Center Joint

Expandable Box

Good Straight Longitudinal Lines
Good Acceptable Edge Lines



Finished Edge

Good Rut Work

Correct Patching Method

Extra Traffic Control Dusting Intersection

Successful Construction



Successful Construction

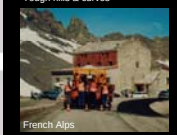


Successful Construction

Cold Weather Applications

Cold Weather Applications

Tough hills & curves



MeadWestvaco

Successful Construction

Cold Weather Applications

24 hours after application

French Alps

After 3 years, road reported to be in acceptable shape.

MeadWestvaco

Cold Weather Application Kaysville, Utah

Before **After**

Can you use Slurry & Micro to hold a road?

(Buying time/reactive maintenance)

- YES!
- When doing so make sure all parties involved know what the project objectives are
- Have realistic expectations

What Is The Difference between Slurry and Microsurfacing?

- Specifications
  - Materials (capabilities) → Slurry designed for one stone thickness. Micro allows stone stacking
  - Construction Process → Nighttime applications with Micro
    Micro is generally quicker traffic system
  - Mix Design Requirements → More stringent performance criteria for Micro
  - Application Equipment → Conventional Slurry equipment can only apply Slurry. Micro equipment can apply both Slurry & Micro

Average cost of Maintenance

• 1 1/2" HMAC	$95,000.00 - $103,500.00
• Milling – Less than 3"	$23,500.00 – $40,000.00
• Slurry Seal	$19,500.00 - $23,500.00
• Micro Surfacing (single)	$24,000.00 - $27,000.00
• Micro Surfacing (double	$48,000.00 - $54,000.00
• Chip Seal	$18,000.00 - $25,000.00

Per mile at 20' wide

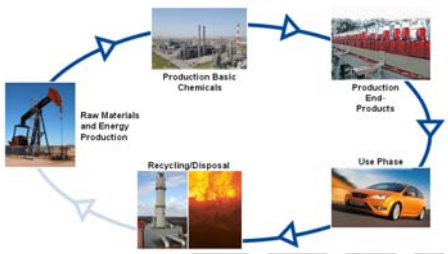
Contributing Cost Factors

- Location of project
- Quantity of Work
- Mobilizations required
- Traffic Control
- Production constraints
- Materials & Freight
- Warranties
- Bid timing

Advantages

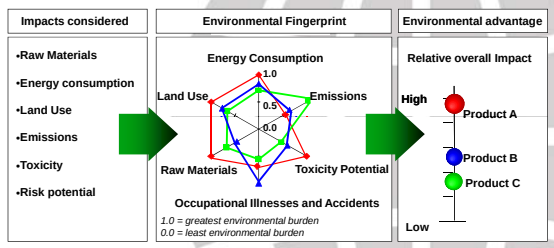
- 1/4 to1/3 cost of Hot Mix
- No milling required
- No build up at curb line
- Utility casting adjustment not necessary
- Minor inconvenience to traveling public
- High production levels leads to less time on project
- **Eco-Friendly (cold technology)**
- Hot Mix appearance
- Has high friction surface
- Minimal loose aggregate
- Protects underlying pavement (5-8 years)
- Extends pavement life
- Excellent wearing course
- Proven performer
- Corrects minor surface distresses

Eco-efficiency Analysis:
Life Cycle Approach to Balancing Costs and Environmental Impacts



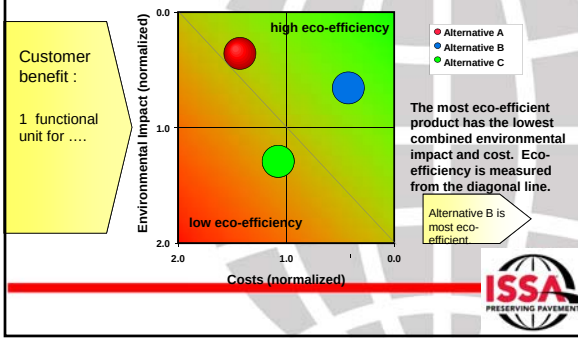
Eco-Efficiency

Assessing Environmental Impacts

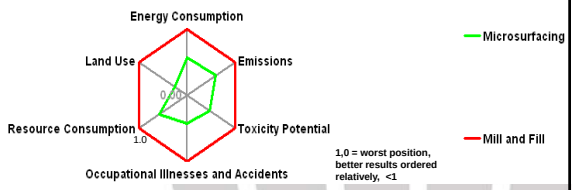


Life-cycle data is gathered in six environmental categories and depicted on an environmental fingerprint. The data are then weighted, aggregated and normalized to obtain an overall environmental impact.

Balancing Costs and the Environment



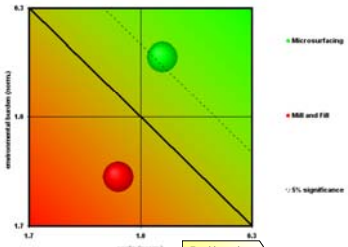
Environmental Fingerprint: Micro surfacing study



Microsurfacing clearly demonstrates lower environmental burden in all impact categories relative to the Mill and Fill (HMA) alternative.

Eco-efficiency Portfolio

•Preventive maintenance of a 1 mile stretch of a 12 foot lane of an urban road to a similar profile and performance using best engineering practices over a 40 year period



For this study, the microsurfacing alternative is the most eco-efficient.

Conclusions

Microsurfacing is the more eco-efficient pavement preservation technology !

- Microsurfacing shows clear ecological advantages in all 6 impact areas.
- Microsurfacing has the lowest life cycle cost.
- Based on the 1 mile stretch of a 12 ft urban lane, microsurfacing relative to Mill and Fill will:
  - require over 1.2 million pounds less material
  - save energy and reduce dependence on fossil fuels
    - savings equivalent to annual consumption of energy in 110 US homes
    - 288 barrels of oil less for every lane-mile
  - significantly reduces waste and material sent to landfill (34 tons)
    - equivalent to waste produced by 1 person over the same 40 years
  - have a smaller carbon footprint. Reduction equivalent to:
    - equivalent uptake of 3 acres of forest over the same 40 years
    - taking over 20 cars off the road for 1 year.

Keys To Success

- Proper site selection
- Good specifications (enforced)
- Proper roadway preparation
- Proper equipment (match equipment to project)
- Accurate equipment calibration
- Material consistency (use materials with history of past performance)
- Contractor performance (use seasoned workforce)
- Quality project inspection
- Agency – Industry Partnering
- Information

Sources of Information

International Slurry Surfacing Association

www.slurry.org

Asphalt Institute

www.asphaltinstitute.org

BASF Corp

www.basf.com/asphalt

Learn from the mistakes of others -- you won't live long enough to make them all yourself. . .

Questions?

Thank You!