Sealing Methods

- Crack Sealing
- Deck Sealing
- Crack and Deck Sealing
Crack Sealers

- Epoxy and methacrylate most popular
- Epoxy stronger, more durable
- Methacrylate less viscous
  - deeper penetration
Deck Sealers

- Flood coat of epoxy, methacrylate, linseed oil, silane, or siloxane

- Silane and siloxane best performing

- Solvent based and higher percent solids generally better
Deck Sealers

- Penetrating
- Film Forming
Objective

- Evaluate effectiveness
  - products
  - application/reaplication
- Extend bridge deck service life
## Products

<table>
<thead>
<tr>
<th>Crack Sealers</th>
<th>Deck Sealers</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image of Crack Sealer]</td>
<td>![Image of Deck Sealer]</td>
</tr>
<tr>
<td>Sikadur 55 SLV (epoxy)</td>
<td>Hydrozo Silane 40 VOC (silane, solvent)</td>
</tr>
<tr>
<td>Dural 335 (epoxy)</td>
<td>Enviroseal 40 (silane, H₂O)</td>
</tr>
<tr>
<td>Degadeck Crack Sealer Plus (methacrylate)</td>
<td>Linseed Oil</td>
</tr>
</tbody>
</table>
Purdue Macrocells
Specimen Cracking
Service Load Stress

- Simulate stress in deck caused by traffic
- Restress specimens to $\sim \frac{2}{3} f_y = 40$ ksi
Restressing
Testing

- Connecting Wire
- Resistor
- Rebar
- Data Acquisition Wire
Sealant Combinations

Uncracked
- Deck Sealer

Cracked
- Crack Sealer Only
- Crack and Deck Sealer
- Deck Sealer Only
Additional Test Variables

• Surface Preparation
  – Before applying sealer, as per manufacturer’s recommendations

• Resealing Intervals
  – “traffic wear” both pre- and post-application

• Epoxy-Coated Reinforcement
  – 2% induced damage

• Surface Tining
Uncracked Specimens

Evaluate Deck Sealers
Control

Total Corrosion

Time (days)

G23 Specimen1 (#90)
G23 Specimen2 (#91)
G23 Specimen3 (#92)
Silane

Total Corrosion

Time (days)

G20 Specimen1 (#60)
G20 Specimen2 (#61)
G20 Specimen3 (#62)
Traffic Abrasion

Typical

Traffic Abrasion
Control - Sandblasted

Total Corrosion

Time (days)

Total Corrosion (C)

G30 Specimen1 (#69)
G30 Specimen2 (#70)
G30 Specimen3 (#71)
Silane: Sandblast then apply
Silane – Apply then sandblast
Cracked Specimens

Evaluate Crack & Deck Sealers
Control – No repair
Sikadur 55SLV
Hydrozo Silane 40VOC

![Graph showing total corrosion over time for different specimens.](image)
Sikadur and Silane

Total Corrosion

Time (days)

G3 Specimen1 (#10)
G3 Specimen2 (#11)
G3 Specimen3 (#15)
Dural 335

Total Corrosion

Time (days)

G4 Specimen1 (#13)
G4 Specimen2 (#18)
G4 Specimen3 (#36)
Enviroseal 40

[Graph showing total corrosion over time for different specimens labeled G5 Specimen1 (#7), G5 Specimen2 (#12), and G5 Specimen3 (#42).]
Dural and Enviroleal

Graph showing Total Corrosion over time (days) for different samples:
- Blue line: G6 Specimen1 (#14)
- Red line: G6 Specimen2 (#16)
- Green line: G6 Specimen3 (#49)

Inset images show samples of Dural and Enviroleal materials.
Linseed Oil

Total Corrosion

-10000
-5000
0
5000

Time (days)

G7 Specimen1 (#46)
G7 Specimen2 (#47)
G7 Specimen3 (#51)
Preliminary Findings: Deck sealing

- Silane products dried fastest
- Metered sprayer needed
  - uniform deck sealer application
- Evidence of effectiveness
- Effective after abrasion
- Extended exposure needed
Preliminary Findings: Crack sealing

- Several stripings necessary
- Crack filling
  - Epoxy – large crack widths
  - Methacrylates – small crack widths
- Bond strength - Sikadur 55 SLV
- Epoxy and methacrylate both effective
- Deck sealers ineffective
- Potential incompatibility between sealers