Surface Preparation: What's the best way?

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Definition

The mechanical or chemical treatment of a surface prior to the application of the new material

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Purpose

- To improve the bond between the repair material and the substrate

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Isolate and Prepare the Surface Perimeter

- Repair areas should be modified to provide simple layouts
- Layouts should be designed to reduce the perimeter length and complex edge conditions
- Keep it simple!

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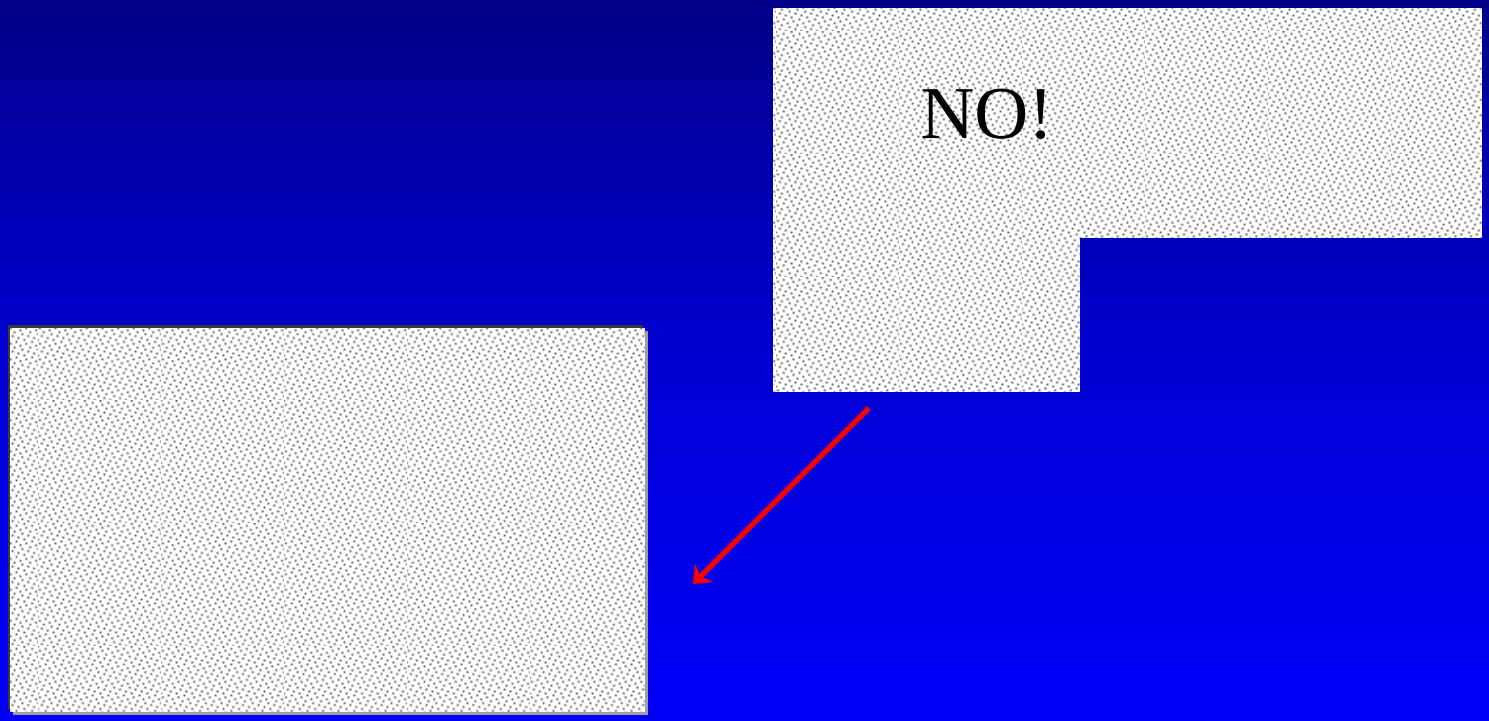
Layout

Keep it Simple!



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Surface Contaminants

- Dirt
- Oil
- Grease
- Curing compounds
- Sealers
- Paint
- Surface treatments

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Surface issues

- Laitance
- Fractured aggregates
- Cracks
- Spalls, pitting, scaling etc.
- Voids

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Common Surface Preparation Methods

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Shotblasting

- Removal Depth
  - 10 mils to 1/4 inch (6 mm)
- Pattern
  - As depth increases, the shape and size of the coarse aggregate is exposed
- Profile
  - ICRI CSP 2-8
- Limitations
  - Generates debris containing shot, contaminants and materials being removed which must be removed

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Hydro blasting (spin jetting)

- Removal Depth
  - 1/4 to 3/4 inch (6 mm to 19 mm)
- Pattern
  - Exposes fine to coarse aggregate and erodes surrounding cement paste
- Profile
  - ICRI CSP 6-9
- Limitations
  - Improper pressure or nozzle selection can severely etch sound concrete

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Scabbeling (bush hammering)

- Removal Depth
  - 1/8 to 3/4 inch (3 mm to 19 mm)
- Pattern
  - Irregular surface with fractured coarse aggregate
- Profile
  - ICRI CSP 7-9
- Limitations
  - Causes micro-cracking which reduces bond strength
  - Post-preparation needed to eliminate micro-fractures

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Scarifying (planers, millers, rotary cutters)

- Removal Depth
  - 1/4 to 3/4 inch (6 mm to 19 mm)
- Pattern
  - Parallel, striated pattern
- Profile
  - ICRI CSP 4-9
- Limitations
  - Causes micro-cracking which reduces bond strength
  - Post-preparation needed to eliminate micro-fractures

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Grinding

- Removal Depth
  - 1/16 to 1/8 inch (1.5 mm to 3 mm)
- Pattern
  - Random, evenly distributed craters around coarse aggregate with orange peel texture
- Profile
  - ICRI CSP 5-8
- Limitations
  - Causes micro-cracking which reduces bond strength
  - Post-preparation needed to eliminate micro-fractures

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Chemical

- Solvent wipe
- Acid etching
- Chemical strippers etc.
- Primers / tack coats

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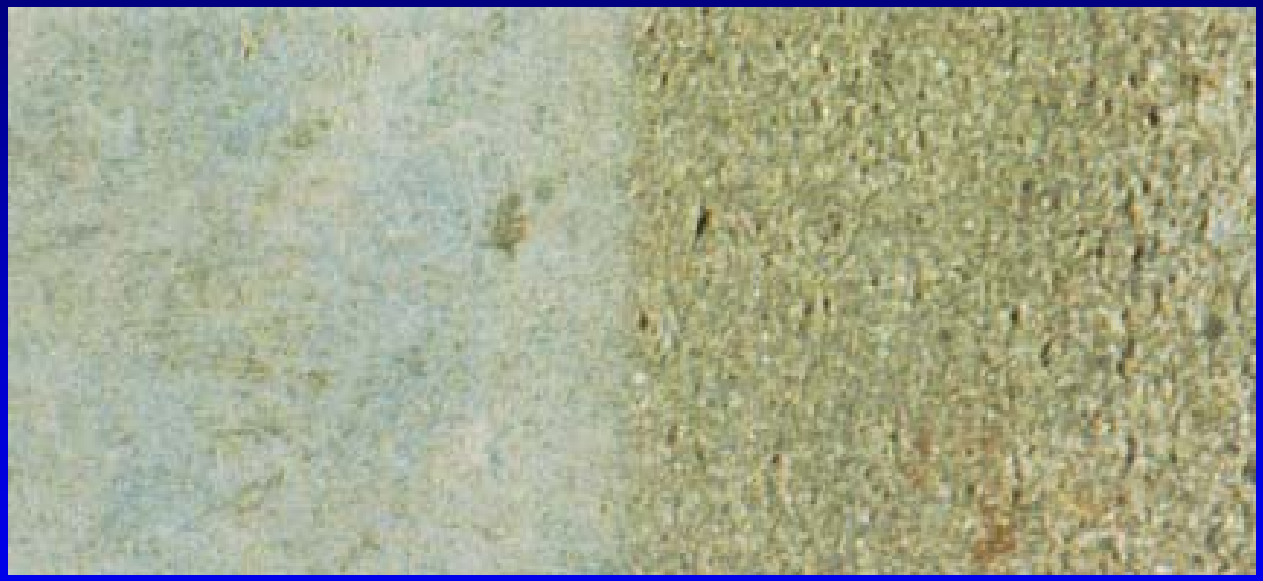
Sample surface

Before **After**



Pores Opened

Surface should look like 150 to 300 grit sandpaper

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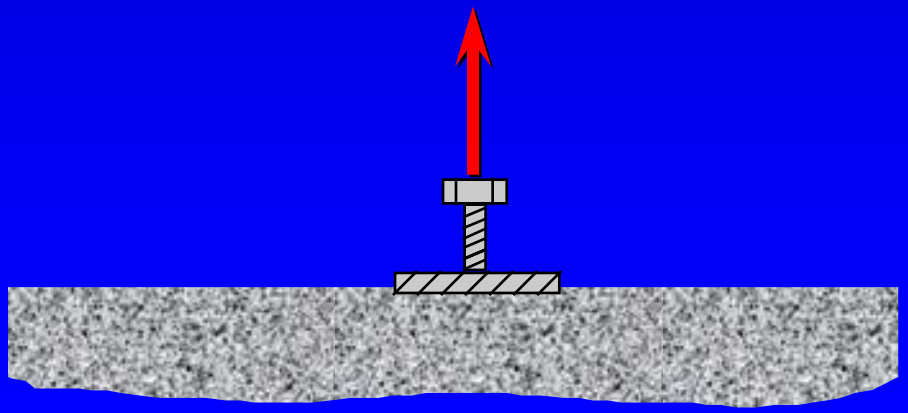
Evaluate the Surface

- The integrity of the bonding surface cannot be determined visually
- Evaluating the tensile strength of the substrate after preparation is a good indicator of bonding performance- absence of micro-fractures etc.



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Surface Preparation – Sealants

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Did you know that…..

- 97 % of Sealant failures occur from lack or loss of adhesion!

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Why Would A Sealant Not Adhere?

- Not compatible with the substrate
- Bad batch of sealant
- Poor joint design
- Contaminants
- Improper or poor surface preparation

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Porous Surfaces

- Concrete
- Masonry
- EIFS
- Marble / Granite
- Limestone

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Non Porous Surfaces

- Aluminum - Mill finish / painted
- Steel - Stainless / Galvanized
- Glass - Polycarbonate / Acrylic
- PVC - Varied Types
- Wood - Painted / Stained

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New Construction

- Lab Testing
- Structural Glazing

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Restoration

- On Site
- Some Lab Testing

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Surface Preparation Scenarios - Sealants

1. Exposed Aggregate Joints
   - What's the best preparation?

2. EIFS Joints
   - I'm supposed to do what?

3. Concrete to Concrete Joints
   - Now what do you want?

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Surface Preparation – Waterproofing

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The Scenario

Slab waterproofing replacement

- Is some membrane residue acceptable?
- Are waterproofing materials compatible?
- Will new material bond with old?
- Adjacent membrane (outside scope) is unbonded.
- Who makes the final call?

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Contractors perspective….

- Asphaltic membrane will bond to existing
- Elastomeric membrane will bond to existing
- If existing membrane is bonded why does it need to come off 100%?

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Engineer's perspective…..

- Take it all off!

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Engineer's perspective cont'd..

- Claim….What Claim???
- Dispute resolution on site (extra/no extra)

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Engineer's perspective cont'd..

- Get manufacturer involved – he ought to know about his goop

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Related discussion points

- What about tying in to unbonded adjacent material that is outside the scope of work?
- What is contractor liable for in the event of a failure at the interface?

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Conclusions…

- What is fair?
- It is not always Black or White
- How the substrate is prepared is as important as the product itself

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A Sampling of Industry Standards

- ASTM D4258-Standard Practice for Surface Cleaning Concrete for Coating
- ASTM D4259-Standard Practice for Abrading Concrete
- ASTM 4260-Standard Practice for Acid Etching Concrete
- ASTM D4262-Standard Method for pH of Concrete Surfaces

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In Summary….

- Condition Existing Surfaces
- Means of Contaminant Removal
- Bulk Concrete Removal
- Surface Cleaning, Preparation

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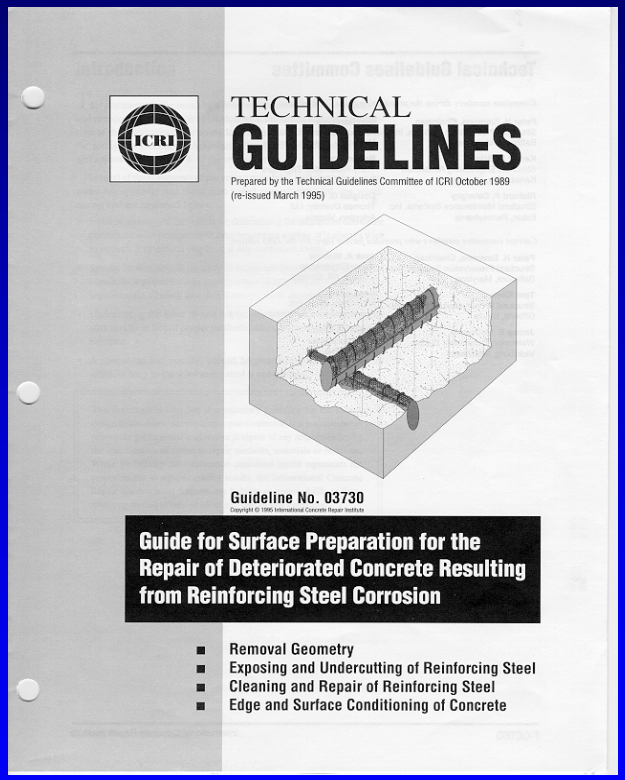
Technical Guidelines

International Concrete Repair Institute (ICRI) has a guide for surface preparation

No. 03732 Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

Available at www.icri.org



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