Surface Roughness Effects on Bond Strength

May 27th, 2004

Objectives:
Determine an optimum surface roughness for concrete accepting carbon fiber reinforced polymers (CFRP) sheets to allow for the most efficient stress transfer between the concrete surface and the CFRP sheet.

Background:
Bond between the substrate and FRP is crucial in the development of the stress transfer between them. This study is examining the effects of surface roughness as well as using different techniques for roughening the concrete surface.

Method:
Two phases of study were introduced. Phase I examined the effectiveness of a rotary grinder to roughen the concrete surface. Phase II examined the effectiveness of water jet technology and created varying roughness levels and textures.

Iₐ Ranges:

<table>
<thead>
<tr>
<th>UNIT</th>
<th>Average is Value</th>
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<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>9.35</td>
</tr>
<tr>
<td>3</td>
<td>9.41</td>
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<td>9.51</td>
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<td>5</td>
<td>9.57</td>
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<tr>
<td>6</td>
<td>10.10</td>
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</tbody>
</table>

Ranges:
1. 6.35
2. 9.35
3. 9.41
4. 9.51
5. 9.57
6. 10.10

ICRI Standard Roughness Index

Surface Roughness Made by Water-Jetting

Roughness Measuring Equipment

ICRI Standard Roughness Index

Phase I

Phase II Direct Shear Bond Test