Today’s Specifications

• Hamburg Wheel (Rut Resistance)
  – Design and Production Specification
  – Potentially a forced shutdown for failures
  – Applies to all mixes (except for N30s)
  – We purchased Equipment in 2012
  – Started testing all everything in both Design and Production in 2013
  – Learned a lot about sample preparation
Hamburg Wheel
Hamburg Wheel
Todays Specifications

- **Illinois Flexibility Index (IFIT) – (Crack Resistance)**
  - We started testing in 2016
  - Design and Production Specification (currently being phased in)
  - Potentially a forced shutdown for failures
  - Applies to all mixes (except patching and incidentals)
  - Aging Protocol currently being rolled out for surface
  - Will be used as a part of the “Indefinite Mix Designs Process”
I-FIT

• Considerations for IFIT in a QC Lab
  – Contractors are not required to Perform IFIT Testing (or Hamburg)
  – Space – We are already maxed out
  – Saws – Precision / Messy
  – Saw Blades are critical
  – Cutting Jigs (skill / art)
  – Temperature Control
  – Time
  – Already doing QC testing (QCP / PFP)
IFIT
IFIT
Various Mixes

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>Gyrations</th>
<th>AC Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Binder</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-28</td>
</tr>
<tr>
<td><strong>Fine Graded Level Binder</strong></td>
<td>50</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td></td>
<td>64-28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>Gyrations</th>
<th>AC Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C Surface</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td><strong>D Surface</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td>64-28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>64-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-28</td>
</tr>
<tr>
<td><strong>E Surface</strong></td>
<td>90</td>
<td>70-22</td>
</tr>
</tbody>
</table>
Where Do We Stand?

• Where do your mixes fall?
• How do we make them better (Higher FI)?
  – *Without hurting Hamburg*
• Are there simple adjustments that can be made?
• How Does the Aging Protocol play into things?
Binder Mixes (Design Data)

Flexibility Index (FI)

Increasing ABR %

- 58-28
- 64-22
- 70-22
Surface Mixes (Design Data)

Flexibility Index (FI)

Increasing ABR %

- 58-28
- 64-22
- 70-22
Surface Mixes (Design Data) - with Aged Samples

- 58-28
- 64-22
- 70-22

Increasing ABR %

Flexibility Index (FI)

- 58-28 Aged
- 64-22 Aged
- 70-22 Aged
What Next?

• What influences the IFIT value of a mix?
  – Mix Size / FG vs. CG Mix / AC Grade / Raw Materials / ABR / AC Content?

• What can we change and hope to see an effect?
  – Don’t forget about the Hamburg Wheel

• Will reasonable adjustments be enough?
  – Still need to collect information and “connect the dots”
Next Steps / Lessons Learned

• Can we do this in a QC Lab?
  – Yes but not required

• Where do our mixes stand now?
  – Aging protocol will change things (don’t assume anything)
  – Start testing your mixes (IDOT / Consultants)
  – You need to know where you are
Next Steps / Lessons Learned

- Can we make an adjustment?
  - Possibly – How much is enough?
  - Need to look at materials
  - Need to look at modifiers
  - Need to look at field variability
  - How will Aging Protocol effect produced mix?
  - What to do when low values occur?
- Currently looking at Lab Prepared Samples for Ideas
Final Questions or Comments?

Thank You!