New method for evaluating wear resistance on concrete parking decks
Outline

• Background
• **SBUF** project
• Test fields
• Test methods
• Results
• Conclusions and further work
Background

- Concrete quality
- Concrete cover layer
- Deicing salt (chlorides)
- No protection system
Different types of coating

Bitumen based (30 mm)

Polyurethane based (3-8 mm)

Mastic asphalt on bitumen sheet, Malmö Stadium

Polyurethane, Deckshield ED, Medborgarplatsen, Stockholm
Different types of coating

Epoxy based

City garage Stockholm, 2001

Acrylate based

S:t Eriksplan Stockholm, 2009
Type of damage

epoxy

acrylate

polyurethane

polyurethane

mastic asphalt
SBUF project

Purpose

- Developing guidelines/specifications för concrete floor protection systems and cathodic protection in parking garages
- Focusing on resistance to studded tyres
SBUF project

Wear resistance
Test fields
• Two garages

Laboratory testing
• Resistance to Scuffing, modified prEN 12697-50
• Prall, EN 12697-16
• RWA, SS EN 13892-5
Test fields

Kville – Gothenbourg
November 2013

Åkeshov – Stockholm
August 2014

9 systems

6 systems
Type of product system

Kville – 9 systems
- Mastic asphalt (1)
- Concrete (1)
- Polyurethane (5)
- Acrylate (1)
- Polyurea (1)

Åkeshov – 6 systems
- Concrete (2)
- Polyurethane (1)
- Acrylate (2)
- Polyurea (1)
Application work
Test slabs applied

- Resistance to Scuffing, modified prEN 12697-50
- Prall, EN 12697-16
- RWA, SS EN 13892-5
Scuffing resistance

Test equipment

Example of test result
Example of test results

Polyurethane 1

Hard concrete

Wear (g)

Time (min)
Results after 3,5 hours
Prall

Equipment

Test results - Kville

Lower row before testing
RWA

Equipment

Example of test result
## Comparison

<table>
<thead>
<tr>
<th>Coating system</th>
<th>Scuffing wear after 3.5 h</th>
<th>Prall</th>
<th>RWA</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>gram</td>
<td>mm</td>
<td>Ranking</td>
</tr>
<tr>
<td>Mastic asphalt</td>
<td>385</td>
<td>3.5</td>
<td>4</td>
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<tr>
<td>Hard concrete</td>
<td>77</td>
<td>0.5</td>
<td>2</td>
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<td>Polyurethane 1</td>
<td>272</td>
<td>1.6</td>
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<td>Polyurethane 2</td>
<td>725</td>
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<td>&gt;5 *</td>
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<td>2.8</td>
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<td>Polyurea</td>
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<td>0.5</td>
<td>1</td>
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<tr>
<td>Acrylate</td>
<td>480</td>
<td>3.2</td>
<td>6</td>
</tr>
</tbody>
</table>

### Graphs:

- PRALL / RWA
- PRALL / Scuffing
- RWA / Scuffing
Conclusions

• The modified scuffing resistance method seems promising for testing wear resistance of coatings intended for the protection of concrete parking decks.
• The method differentiates well between different products.
• Testing time 3.5 hours is deemed sufficient, and may eventually be reduced.
• Wear on the studded tires studs (in the equipment) seems low and is not expected to have affected the test results significantly.
• Results from testing according to the modified scuffing resistance test, with studded tires, do not correlate with the corresponding results according Prall or RWA.
Future work

- Further evaluation of laboratory test results for products applied at Åkeshov.

- Test data, according to the modified scuffing resistance test, with studded tires, will be compared and verified against real wear on the test fields in parking garage Kville and Åkeshov.

The follow-up is expected to occur for at least a 3 year period, from 2014 to 2016.
Thanks for your attention!

Dr Ylva Edwards