Validation of the Rolling Straightedge Simulation Performed on Data Collected by an Inertial Profiler

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Use of Rolling Straightedge in Ohio
Instrumenting a Rolling Straightedge
Ohio DOT 10-ft Rolling Straightedge
Measuring Principle
Instrumented Rolling Straightedge

10-ft Rolling Straightedge
Instrumented Rolling Straightedge

Data Recording
Interval = 0.166 inches
Validating Data Collected by the Instrumented Rolling Straightedge
Validation of Data Collected by the IRS

- Collect data on the concrete section at the OH DOT profiler certification site with the IRS and SurPRO.
- Perform a Rolling Straightedge Simulation on the SurPRO data using ProVAL and compare output with the IRS data.
OH DOT Certification Site
SurPRO Rolling Profiler
IRS Data

Instrumented RS Output

Distance (ft)

RS Reading (in)
Smoothened IRS Data

Instrumented RS Output (10" Moving Average)
Compare IRS and RS Simulation on SurPRO Data by ProVAL
### Cross-Correlation Values

<table>
<thead>
<tr>
<th>Profiles being Compared</th>
<th>CC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS Simulation Surpro vs. IRS (Non-smoothened)</td>
<td>94.7</td>
</tr>
<tr>
<td>RS Simulation Surpro vs. IRS (Smoothened)</td>
<td>93.7</td>
</tr>
</tbody>
</table>
Compare IRS and RS Simulation on Profiler Data
Profiler Data Collection Interval = 1 inch
RS Simulation on Dynatest Data (2’ Butterworth)
Affect of a 2-ft Low-Pass Filter

Dynatest Profiler Data

RS Simulation on Profiler Data

RS Output (in)
Comparison between IRS and RS Simulation on Profiler Data
## Cross-Correlation Values

<table>
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<th>RS Profiles being Compared</th>
<th>CC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS Simulation on Profiler Data (No Filter) vs. IRS</td>
<td>92.6</td>
</tr>
<tr>
<td>RS Simulation on Profiler Data (Butterworth 2 ft) vs. IRS</td>
<td>92.3</td>
</tr>
</tbody>
</table>
Conclusions

- A rolling straightedge simulation performed on inertial profiler data provides data comparable to that obtained by a rolling straightedge.
- Using a 2-ft Butterworth filter during the RS simulation is recommended.