SC - 2016 Implementation Assistance Program

Tools to Improve PCC Pavement Smoothness During Construction (R06E)

Seeking widespread adoption of the real-time smoothness (RTS) technology by contractors and agencies who routinely construct PCC pavements will be achieved through:

1. Equipment Loan Program
2. Showcase
3. Workshops
4. Case studies/results Documentation
5. Specification Refinement
6. Marketing & Outreach

SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

National Concrete Pavement Technology Center

SUMMARY REPORT: NATIONAL SHOWCASE

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO
The Voice of Transportation

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

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INTRODUCTION

The Federal Highway Administration (FHWA) has contracted with the National Center for Concrete Pavement Technology (CP Tech Center) for *Implementation Support for Strategic Highway Research Program II (SHRP2) Renewal R06E Real-time Smoothness Measurements on Portland Cement Concrete Pavements During Construction*. One of the tasks included in this contract is a national showcase. This task involves providing a showcase/open house in conjunction with a real-time smoothness equipment loan, with the objective of providing state departments of transportation and contractors with a better understanding of the benefits of using real-time smoothness equipment to improve the initial smoothness of concrete pavements.

This report summarizes the activities associated with the national showcase and contains the following information:

- Utah Real-time Smoothness Technology Showcase Agenda (Appendix 1)
- Utah Real-Time Smoothness Brochure (Appendix 2)
- Utah Project Descriptions for I-215 and I-15 (Appendix 3)
- Tech Brief on Real-Time Smoothness Measurements for Portland Cement Concrete Pavements (Appendix 4)
- Attendance Roster (Appendix 5)

RTS Showcase Summary

A national showcase for the implementation of real-time smoothness (RTS) technology for concrete pavements was held in Salt Lake City, Utah on August 9, 2016 (figures 1, 2 and 3). This event is a part of the SHRP2 implementation effort sponsored by the Federal Highway Administration. Attendees participated in a half-day workshop which included discussions on: transitioning to international roughness index (IRI) measurement, contractors' perspectives on the use of RTS equipment and best practices for implementing RTS equipment to achieve better initial smoothness for concrete pavements. Following the morning session, attendees were taken by bus to a project site where RTS equipment was demonstrated, and questions were answered.

State departments of transportation represented at the showcase included:

- Colorado
- Florida
- Georgia
- Louisiana
- Nevada
- New Mexico
- Oklahoma
- Utah
- Wyoming

Total attendance at the showcase was 58, representing FHWA, state DOT's, contractors and associated industry participants (Appendix 5).

Figure 1 – Real-Time Smoothness Showcase

Figures 2 and 3 – Utah Real-Time Smoothness Showcase, Attendees at the Project Site

Acknowledgements

The CP Tech Center team would like to thank the following for their voluntary contribution in making the National Showcase a success:

- UDOT
- FHWA
- Utah Chapter ACPA
- Geneva Rock Products, Inc.
- Ralph L. Wadsworth Construction Company, LLC

SHRP2 SOLUTIONS
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Real-time Smoothness Technology Showcase

August 9, 2016

Salt Lake City, Utah

Showcase Agenda

SHOWCASE OBJECTIVES

- To introduce agency and contractor personnel to real-time smoothness (RTS) technology for concrete pavement construction.
- To hear from users of RTS technology how it can help contractors achieve pavement smoothness requirements.
- To provide participants to observe RTS technology in action with site visits to concrete paving projects utilizing RTS systems.

SHOWCASE SCHEDULE

REGISTRATION – 8:00 a.m. – 9:00 a.m.

Morning Program

9:00 a.m. - Welcome from UDOT and FHWA
Randy Park, UDOT and Brigitte Mandel, FHWA Utah Division
9:15 a.m. Overview of RTS Technology and SHRP2 Implementation Program
Gary Fick and David Merritt
10:00 a.m. UDOT perspective on use of RTS technology and transition to IRI smoothness specification
Jason Simmons, UDOT
10:15 a.m. Break
10:30 a.m. UDOT/Contractor Overview of I-15 Project
Rod Terry and Jace Mecham, UDOT and Scott Preston, Geneva Rock
10:50 a.m. UDOT/Contractor Overview of I-215 Project
Jon Ogden, UDOT and Brian Spahr, Ralph L. Wadsworth
11:10 a.m. Lessons Learned from RTS Equipment Loans
Gary Fick and David Merritt
11:50 a.m. Q&A, Instructions for afternoon site visit

Afternoon Program

- Board buses at noon for site visits. Box lunch will be provided.
- ~~Site visit to I-215 project in Salt Lake City utilizing RTS equipment.~~ (canceled due to maintenance of traffic restrictions)
- Site visit to I-15 project north of Odgen utilizing RTS equipment.
- Return to hotel by 5:00 PM

FHWA/SHRP2 CONTACT

Stephen Cooper, FHWA
Stephen.J.Cooper@dot.gov
(410) 962-0629

FOR MORE INFORMATION

http://www.fhwa.dot.gov/goshrp2/Solutions/Renewal/R06E/Tools_to_Improve_PCC_Pavement_Smoothness_During_Construction

REAL-TIME SMOOTHNESS TECHNOLOGY SHOWCASE
AUGUST 9, 2016
SALT LAKE CITY, UTAH

Morning Workshop: Little America Hotel
500 South Main Street
Salt Lake City, Utah
Afternoon Showcase: I-15 work site (transportation provided)

INFORMATION and REGISTRATION

Sharon Prochnow
National CP Technology Center
515-294-3781
prochnow@iastate.edu
http://www.cptechcenter.org/RTSshowcase

SHOWCASE OBJECTIVES

This no-cost FHWA sponsored showcase hosted by the Utah DOT will introduce agency and contractor personnel to real-time smoothness (RTS) technology for concrete pavement construction. Attendees will have the opportunity to hear from users of RTS technology and how it can help contractors to achieve pavement smoothness requirements. Attendees will also have the opportunity to observe RTS technology in action with a site visit to paving project utilizing an RTS system.

SHOWCASE OVERVIEW

Morning Program

- Agency and contractor perspectives on transitioning to IRI acceptance criteria
- Use of real-time smoothness equipment to improve initial pavement smoothness
- I-15 project discussion and details from Utah DOT and the contractor
- Real-time smoothness — lessons learned from equipment loans

Noon: Board buses for site visit. Box lunch will be provided.

Afternoon Program

- Site visit at the I-15 site north of Ogden, Utah
- Observe project construction and real-time smoothness equipment
- Return to hotel; arrive no later than 5:00

REGISTRATION

There is no cost for the workshop and showcase, but registration is required. Please register at: http://www.cptechcenter.org/RTSshowcase
Please bring hard hats and safety vests; they are required at the work site.
A block of rooms is available until July 9th at $108 (government rate) or $139/per night.

Little America Hotel
500 South Main Street
800.437.5288
Room block: RTS Showcase.

Travel assistance for State Department of Transportation representatives is available on a limited basis. Contact the National CP Tech Center:

Sharon Prochnow or	Denise Wagner
515-294-3781	515-294-5798
prochnow@iastate.edu	dfwagner@iastate.edu

SHOWCASE SPONSORS

UDOT Keeping Utah Moving
Geneva Rock
SHRP2 Solutions – Tools for the Road Ahead
National Concrete Pavement Technology Center
U.S. Department of Transportation
Federal Highway Administration

For more information on Real-Time Smoothness technology, please visit the website:

http://www.fhwa.dot.gov/goshrp2/Solutions/Renewal/R06E/Tools_to_Improve_PCC_Pavement_Smoothness_During_Construction

Project contact for *SHRP2 Renewal R06E Real-time Smoothness Measurements on Portland Cement Concrete Pavements during Construction:*

Gary Fick
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405.823.2313

David Merritt
DMeritt@TheTranstecGroup.com
512.451.6233

I-215 PROJECT (Reconstruction Project)

<u>Existing Pavement</u>: 4-lane interstate constructed in 1976; 10" JPCP on 4" lean concrete base

<u>New Pavement</u>: Constructed 2016-2017; 11" JPCP on 3" HMA base (widening into median)

<u>Contractor</u>: Ralph L. Wadsworth Construction Company

<u>Quantities</u>: 11" JPCP – 472,200 S.Y. (Mainline)

10" JPCP - 52,113 S.Y. (Ramps)

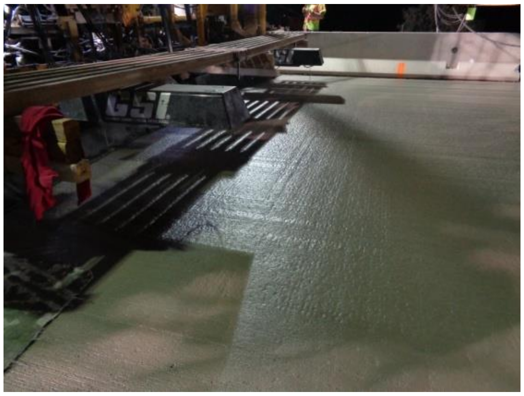
<u>Specifications</u>:

Table 1

Incentives and Disincentives for Category 1 Pavements		
MRI Range (inches / mile) By Pavement Section)	Dollars/Pavement Section	
	Asphalt Materials	Portland Cement Concrete
≤ 40.0	$750	$1500
40.1 – 50.0	$500	$1000
50.1 – 60.0	$250	$500
60.1 – 70.0	$0	$0
70.1 – 80.0	-$250	-$500
80.1 – 90.0	-$500	-$1000
>90.0	Corrective Action	

Table 2

Localized Roughness Limits	
Roadway	MRI w/base length of 25 ft. (in./mile)
Interstate including ramps	≤ 140
Non-interstate	≤ 160
Urban roadways with speed limits less than 45 mph	≤ 160
Shoulders and Bike Lanes	≤ 190 (IRI for single trace)

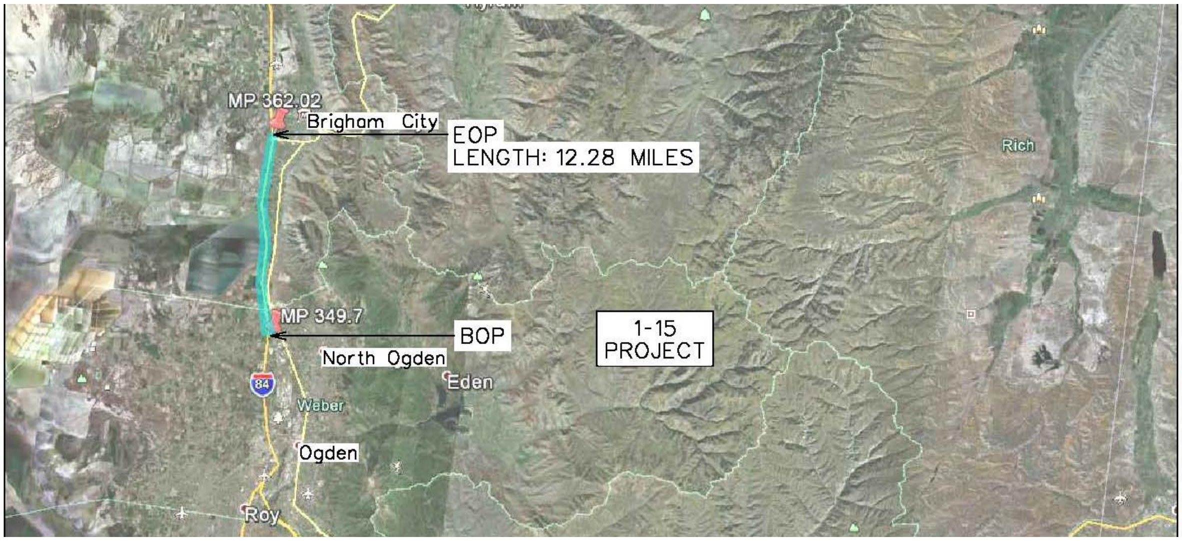



I-15 PROJECT (4-lane Interstate Widening Project into Median)

Widening Section: 9" JPCP on 3" HMA base (widening into median)

Contractor: Geneva Rock Products

Quantities: 300,000 S.Y.



Specifications:

Table 1

Incentives and Disincentives for Category 1 Pavements		
MRI Range (inches / mile) By Pavement Section)	Dollars/Pavement Section	
	Asphalt Materials	Portland Cement Concrete
≤ 40.0	$500	$1000
40.1 – 50.0	$300	$500
50.1 – 60.0	$150	$250
60.1 – 70.0	$0	$0
70.1 – 80.0	-$150	-$250
80.1 – 90.0	-$300	-$500
>90.0	Corrective Action	

Table 2

Localized Roughness Limits	
Roadway	MRI w/base length of 25 ft. (in./mile)
Interstate including ramps	≤ 140
Non-interstate	≤ 140
Urban roadways with speed limits less than 45 mph	≤ 160
Shoulders and Bike Lanes	≤ 175 (IRI for single trace)

Tech Brief on Real-Time Smoothness Measurements for Portland Cement Concrete Pavements

Introduction

Pavement smoothness is one of the most important factors affecting user (driver) satisfaction. As far back as the AASHO Road Test it has been recognized that road users judge the quality of a road primarily based on its ride quality. However, initial smoothness of a portland cement concrete pavement (PCCP) also has a direct impact on the life of the pavement. According to the findings of Perera, et al. (*1*), "… pavements that are built smoother will provide a longer service life before reaching a terminal roughness value, compared to pavements having a lower initial smoothness level." Therefore, from both a user and a life cycle cost perspective, it is desirable to construct smooth PCC pavements. The use of real-time smoothness equipment can assist the contractor in improving the initial smoothness of PCCP.

Real-Time Smoothness (RTS) Systems

There are currently two systems commercially available for measuring PCCP smoothness in real-time: Ames Real-Time Profiler (RTP) (Figure 2), and Gomaco Smoothness Indicator (GSI). Both are configured similarly with sensors mounted to the back of the paver to measure the pavement profile and send it to the data collection hardware and software for processing and display in real-time (figure 1). The primary difference between the systems is the sensor technology used, the GSI uses acoustic (ultra-sonic) sensors and the RTP uses lasers. When mounted to the back of the paver, both systems capture profile data by measuring the height of the sensor relative to the fresh pavement directly behind the paver (typically 6" to 12" behind the pan or trailing pan). Both systems use a combination of height, slope and distance data which is continuously fed to the software where it is converted to a real-time profile and smoothness statistics (IRI, PI, must grinds and localized roughness). Distance data is collected using a calibrated bicycle wheel, a wheel mounted to a paver track or an internal encoder.

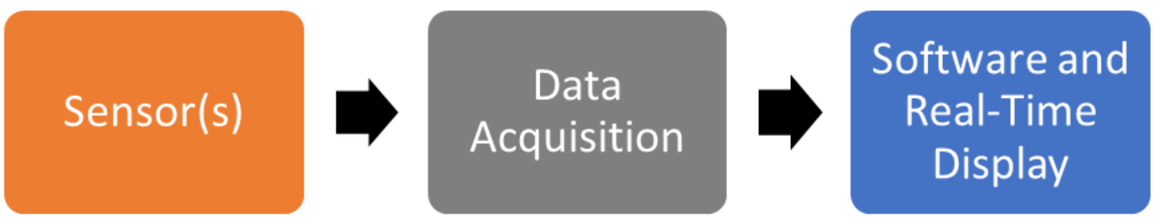


Figure 1. Diagram of a Real-Time Smoothness System

Ames Real-Time Profiler (RTP)

The Ames unit is a laser based sensor combined with a ruggedized laptop (figure 2).

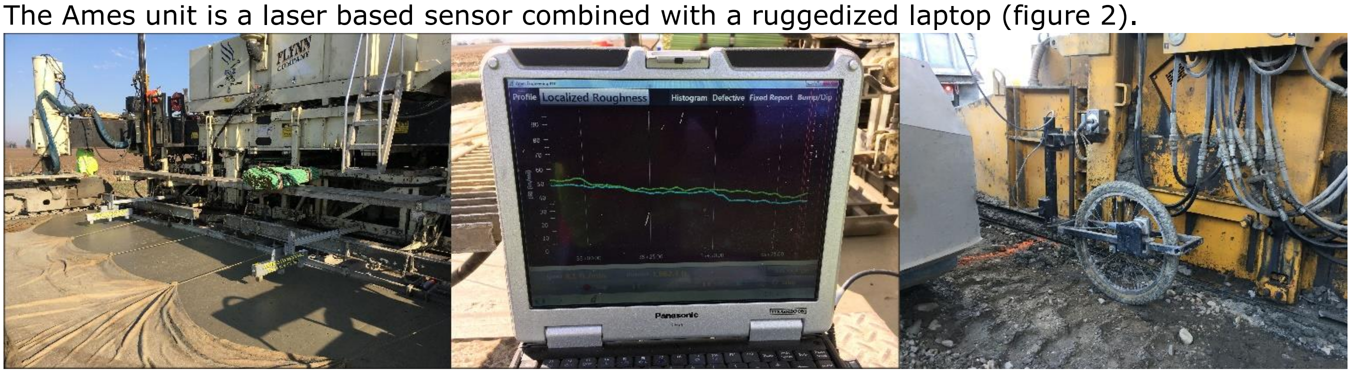


Figure 2. Ames RTP System Installed on a Paver (from the left: RTP sensors mounted at the back of the paver, computer showing real-time smoothness information and bicycle wheel collecting distance data)

Gomaco GSI

The Gomaco unit uses sonic sensors and a dedicated computer (figure 3).

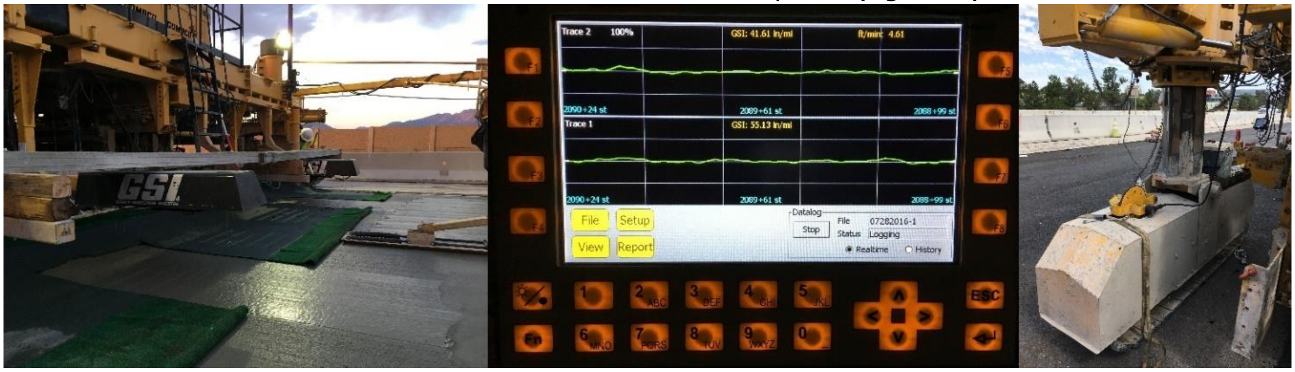


Figure 3. Gomaco GSI System Installed on a Paver (from the left: GSI sensors mounted at the back of the paver, computer showing real-time smoothness information and wheel mounted to the paver track collecting distance data)

Each of these systems underwent a thorough independent evaluation as part of the SHRP2 R06E project *Real-Time Smoothness Measurements on Portland Cement Concrete Pavements During Construction* (*2*). Findings from this project concluded that both systems demonstrated their value as a quality control (QC) tool for the contractor in assessing initial pavement smoothness and providing real-time feedback for process adjustments. Based on these findings, the Federal Highway Administration (FHWA) nominated this technology for SHRP2 implementation funding. In cooperation with FHWA, The National Concrete Pavement Technology Center (CP Tech Center) has been involved in furthering the implementation of real-time smoothness by exposing contractors to the technology through equipment loans and through workshops designed to help contractors realize the benefits of this tool for improving the initial smoothness of PCCP.

Benefits of Using Real-Time Smoothness Systems

When properly implemented into the contractor's paving operation, real-time smoothness systems provide valuable feedback which allows the contractor to adjust their processes to improve the initial smoothness characteristics (overall smoothness and localized roughness) of the new PCCP. While profilographs and lightweight inertial profilers have traditionally been used for quality control and quality assurance (acceptance level) smoothness measurements. The pavement must have adequate strength and all sawing must be completed before they can be operated on the pavement surface, resulting in a minimum 12 to 24 hour delay in the feedback on smoothness numbers. Real-time smoothness systems provide the same profile information as the profilograph and inertial profiler, but in real-time during paving. It should be noted that these systems are not intended for and should not be used for acceptance measurements. (See Real-Time IRI vs. Hardened IRI for further details – Page 4). However, having this information in real-time allows the contractor to make process adjustments sooner and allows for corrections to be made during finishing, providing the contractor the opportunity to construct smoother pavements.

The primary process adjustments that can be validated by use of these systems include but are not limited to:

- Tuning the paver – there are numerous adjustments and operational characteristics of slipform pavers which impact pavement smoothness (see the following section for more detail).
- Mixture adjustments aimed at improving the overall workability and/or edge stability.

In addition, localized roughness caused by major profile events (e.g. loss of vertical control, paver stops, etc.) resulting in dips and bumps which need to be corrected by hand finishing, can be identified using real-time smoothness systems. The effectiveness of the correction made by hand finishing is a matter of workmanship, there is no real-time verification for this process.

The power of these systems to improve the initial smoothness of PCC pavements lies in the timely use of profile information. No improvement to smoothness occurs by installing a system on a paver; improvements are only possible when the crew members embrace the technology and act on the feedback provided in real-time.

Using Real-Time Smoothness Systems

Through the experience gained from the equipment loans, the CP Tech Center team has developed recommendations for contractors who are interested in using these systems. This four step implementation process includes:

1) Establish a baseline – monitor the process.
    a. Install a real-time smoothness system.
    b. Monitor results for 1 to 2 days.
    c. Keep processes static, but make ordinary adjustments (mixture, vibrators, paving speed, head, etc.).
    d. Observe typical responses to the ordinary adjustments and make notes or add event markers in the RTS.
2) Eliminate large events – actively utilize the real-time system to reduce the impact of major profile features.
    a. Stringline/stringless interference.
    b. Paver stops.
    c. Padline issues.
    d. Other mixture or process impacts.
3) Fine-tune the paving process – utilize the real-time feedback when making intentional adjustments to the processes.
    a. Paver adjustments.
        i. Maintaining/adjusting concrete head in the grout box.
        ii. Adjusting the angle of attack of the paver – setting the longitudinal profile of the slipform mold as flat as practical relative to the roadway profile.
        iii. Hydraulic and stringless sensitivities.
        iv. Vibrators (height and frequency).
        v. Paving speed.

    b. Concrete mixture adjustments to improve overall workability, finishing properties and/or edge stability.
        i. Aggregate proportions.
        ii. Admixture dosages.
        iii. Water:cementitious materials (w/cm) ratio (note: w/cm should never be adjusted above the approved mix proportions).
        iv. Total mass of cementitious materials.
        v. Ratio of supplementary cementitious materials to portland cement.

4) Identify repeating profile features using the power spectral density analysis (PSD) in ProVAL and use the real-time system to mitigate the roughness from these features. The PSD function of road profiles is a statistical representation of the importance of various wavelengths. It provides valuable information regarding what repeating wavelengths are contributing to pavement roughness.
    a. Doweled joints.
    b. Dumping/Spreading loads.
    c. CRCP bar supports.

Lessons Learned from Real-Time Smoothness Equipment Loans

Six real-time smoothness equipment loans have been completed by the CP Tech Center as part of the SHRP2 Technology Implementation program. A sampling of the lessons learned from utilization of the real-time smoothness systems on these projects in Idaho, Iowa, Nebraska, Michigan, Pennsylvania and Texas shows the potential benefit of utilizing real-time profile feedback.

Pennsylvania

This real-time smoothness equipment loan took place in October/November of 2015 on the northbound lanes of I-81 near Pine Grove, PA (figure 4), the Gomaco GSI was utilized. Paving was 24' wide and consisted of two typical sections: 8" thick JPCP unbonded overlay and 13" thick JPCP reconstruction sections.

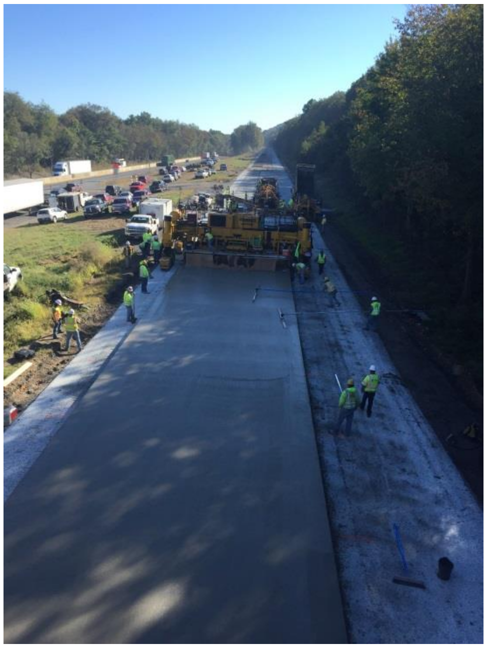


Figure 4. Paving on I-81 in Central PA

Real-Time IRI vs. Hardened IRI

It should be noted that for multiple reasons and in almost all cases, the IRI measured by real-time smoothness equipment will be higher than when the hardened slab is measured by an inertial profiler. This difference does not invalidate the real-time measurements, users should simply focus on making the real-time IRI lower and the hardened IRI will follow (initial pavement smoothness is improved). The project on I-81 provided good examples of the properties of real-time and hardened profiles.

Figure 5 shows the profile data for a section of I-81 from September 28, 2015 where the real-time IRI is 20 in/mile greater than the hardened IRI measured using a lightweight inertial profiler. Even though the IRI results between real-time and hardened profiles are different, the data shows that they parallel each other closely, indicating that the difference is not entirely due to RTP measurement error.

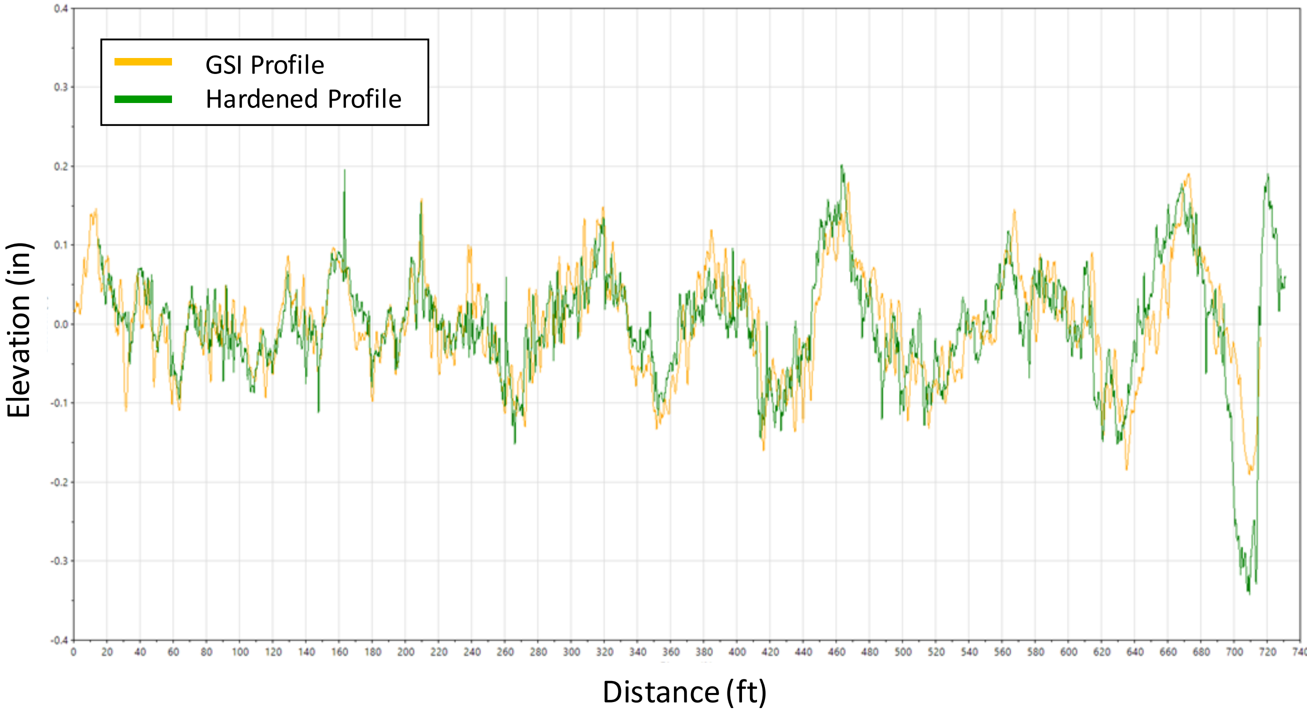


Figure 5. Comparison of Real-Time Profile (GSI) and Hardened Profile (I-81)

Building upon the previous observations a power-spectral-density (PSD) plot from 28SEP2015 (figure 6) shows differences between the wavelengths contributing to roughness in the passing lane for the GSI real-time data and hardened data. Peaks shown in PSD plots identify the wavelengths associated with pavement roughness and do not correlate directly to IRI values. The following observations can be made from this PSD analysis:

i. Shorter wavelength roughness in the hardened profile is likely from macrotexture (burlap drag and tining) applied behind the GSI sensors.
ii. Real-time roughness at the 5’ wavelength was significantly reduced by hand finishing.
iii. Joint spacing had a larger influence on roughness in the hardened profile than in the real-time profile, this is likely a result of curling and warping of the slabs.
iv. The source of roughness present in the hardened profile at longer wavelengths needs additional investigation.

For this project, the majority of the differences between real-time and hardened profiles can be attributed to hand finishing, measurement error and slab curling/warping. Each project is unique, these differences should be analyzed to help identify areas for improvement on a project-by-project basis.

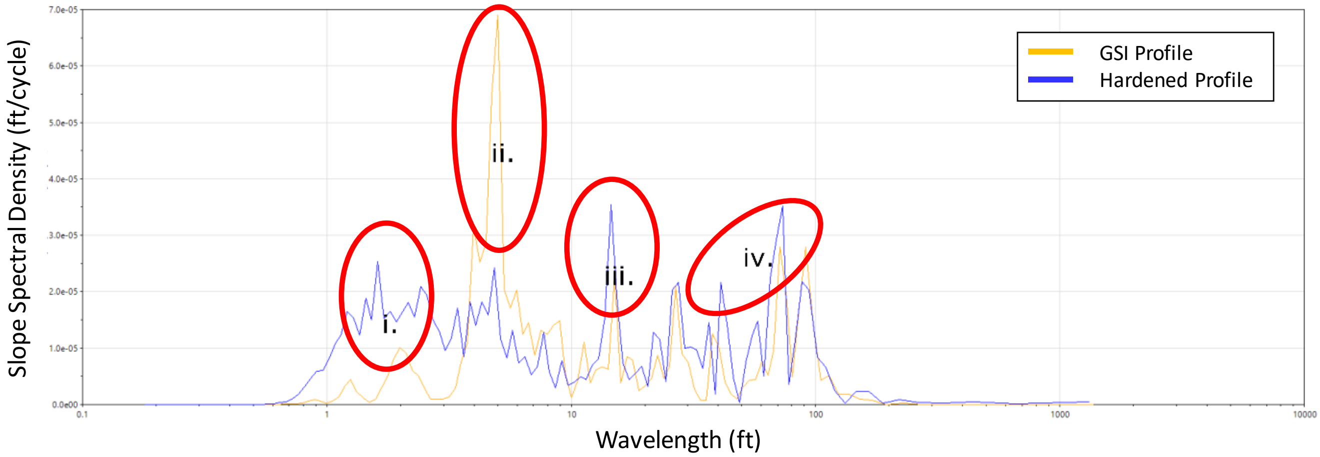


Figure 6. PSD Analysis of Real-Time Profile (GSI) and Hardened Profile

Idaho

Taking place in April of 2015, this equipment loan utilized an Ames RTP on I-84 in Boise, Idaho. The typical section was 12" thick JPCP, paving was 24' wide (figure 7).

Figure 7. Paving on I-84 in Boise, ID

Truck Load Influence

On April 21st, the RTP picked up a ~10.5' feature that was determined to be related to concrete load spacing which averaged 10.6' (with a standard deviation of 2'). This feature was also reflected in the hardened profile, and was more dominant than the joint spacing in the PSD plot. This content was not noticeable for any of the other days of paving. A PSD analysis from first part of April 21st is provided in Figure 8.

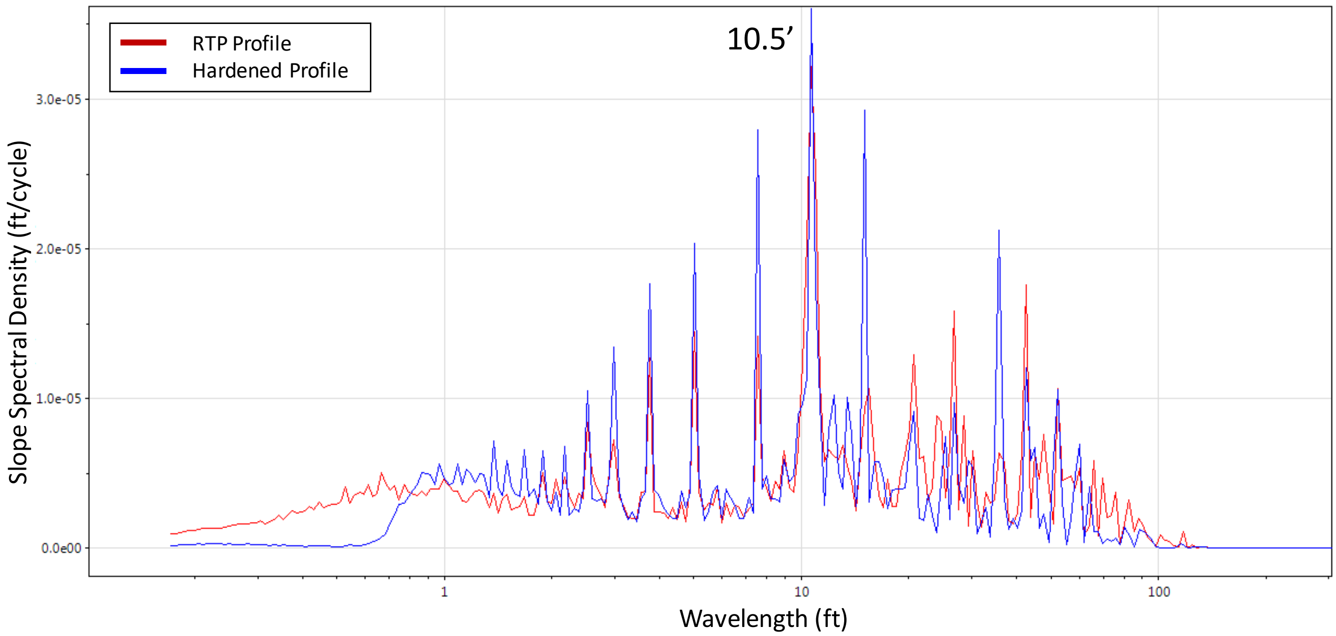


Figure 8. PSD Analysis of Real-Time Profile (GSI) and Hardened Profile

Nebraska

A project on I-80 on the west side of Lincoln, Nebraska utilized an Ames RTP for a real-time smoothness equipment loan. The typical section consisted of 13” thick JPCP, paving was 24’ wide (figure 9).

Figure 9. Paving on I-80 in Lincoln, NE

Influence of Concrete Head

May 11th was the first day of paving on I-80 where the RTP was used. As a matter of practice, the CP Tech Center team requests that the contractor leave their operations unchanged for the first day while they familiarize themselves with operating the RTP. The next day of paving was May 13th, and the contractor made an effort to maintain a consistent and smaller head of concrete in front of the paver than was observed on May 11th. Figure 10 shows continuous IRI results (25’ segment length) for both days (the red line is an arbitrary action limit of 125 in/mi). The results from May 13th showed a 20% reduction in IRI despite the fact that it was only 400’ long.

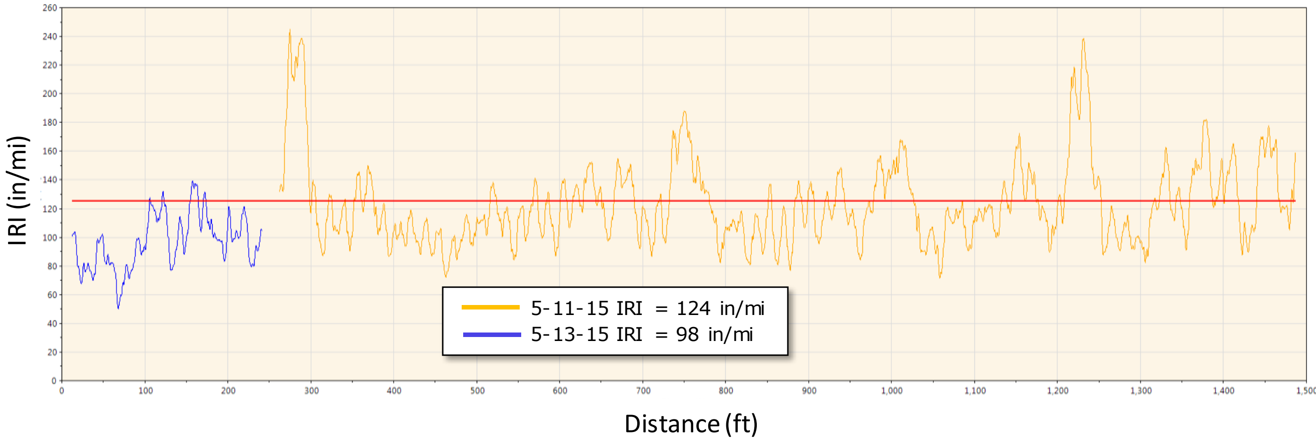


Figure 10. IRI Localized Roughness (25’ base length) Showing Smoother Pavement Related to a Smaller and More Consistent Head of Concrete.

Conclusion

Given that concrete pavements which are constructed smoother stay smoother longer, efforts should be taken to improve the initial smoothness of newly constructed PCC pavements. The use of real-time smoothness equipment during construction provides valuable information to the contractor regarding initial smoothness and because the feedback is instantaneous, this gives them confidence (lowers the risk) to adjust their processes to achieve smoother PCC pavements. Ultimately, the use of tools such as RTS will help contractors and agencies save money and improve the user satisfaction.

For more information, contact:

- Gary Fick, trinity construction management services, inc. – gfick@trinity-cms.com
- Dave Merritt, The Transtec Group, Inc. – David Merritt dmerritt@thetranstecgroup.com
- Stephen Cooper, Federal Highway Administration - Stephen.J.Cooper@dot.gov

References

1. Perera R., Kohn S., and Tayabji S., *Achieving a High Level of Smoothness in Concrete Pavements Without Sacrificing Long-Term Performance*, Soil and Materials Engineers, Inc. Final Report for FHWA project No. DTFH61-01-C-00030, FHWA, 2005.
2. Rasmussen R., Torres H., Sohaney R., Karamihas S., Fick G., *Real-Time Smoothness Measurements on Portland Cement Concrete Pavements During Construction*, The Transtec Group, Inc. Final Report for SHRP2 project No. R06E, TRB, 2013.

Appendix 5 – National Showcase Attendance Roster

Attendees for the Utah Real-Time Smoothness Showcase

#	First	Last	Organization	#	First	Last	Organization
1	Robert	Allred	Kiewit	30	L. Scott	Nussbaum	Utah DOT
2	Jennifer	Atkinson	Leidos	31	Jon	Ogden	Utah DOT
3	Steven	Anderson	Utah DOT	32	Robert	Orthmeyer	FHWA
4	Kelly	Barrett	Utah DOT	33	Randy	Park	Utah DOT
5	Gary	Black	Utah DOT	34	Robbie	Pope	Wadsworth
6	Jeremy	Bown	Utah DOT	35	Scott	Preston	Geneva Rock
7	Mark	Brenner	GOMACO	36	Eric	Prieve	Colorado DOT
8	Glen	Clark	Utah DOT	37	Matt	Romero	Oklahoma DOT
9	Zachary	Collier	Louisiana DOT	38	Bob	Rothwell	Wyoming DOT
10	Stephen	Cooper	FHWA	39	PJ	Roubinet	Utah DOT
11	Jeremy	Covington	Utah DOT	40	Kenny	Seward	Oklahoma DOT
12	Josey	Dewsnup	Ash Grove	41	Brady	Shakespear	Utah DOT
13	Danny	Erickson	Utah DOT	42	Jason	Simmons	Utah DOT
14	Gary	Fick	Trinity Construction	43	Mike	Smith	Forta Corp
15	James	Gallego	New Mexico DOT	44	Brian	Spahr	Wadsworth
16	James	Greene	Florida DOT	45	Scott	Strader	Utah DOT
17	Steven	Hale	Nevada DOT	46	Rod	Terry	Utah DOT
18	Richard	Hewitt	Florida DOT	47	Adam	Triolo	AUI Inc
19	Bryon	Jones	Oklahoma DOT	48	Abdul	Wakil	Utah DOT
20	Jon	Klatt	Ames Engineering	49	Jason	Waters	Georgia DOT
21	Gary	Kuhl	Utah DOT	50	Matthew	Wood	Ash Grove
22	Bryan	Lee	Utah DOT	51	Tom	Yu	FHWA
23	Brigitte	Mandel	FHWA	52	Paul	Ziman	FHWA
24	Jeff	Mann	New Mexico DOT	53	Robert	Stewart	Utah DOT
25	Lonnie	Marchant	Utah DOT	54	Steve	Park	Utah DOT
26	Mitzi	McIntyre	UT ACPA	55	Betty	Purdi	RLW
27	Jace	Mecham	Utah DOT	56	Cody	Preston	Genen
28	David	Merritt	Transtec	57	David	Gill	Utah DOT
29	Tim	Nash	Wirtgen America	58	Chris	Whipple	Utah DOT