



ASPARI

Paving the way forward

# PAVING THE WAY FORWARD

The Asphalt Process Newsletter

Vol 3 - December 2015

## 3rd in this year ...

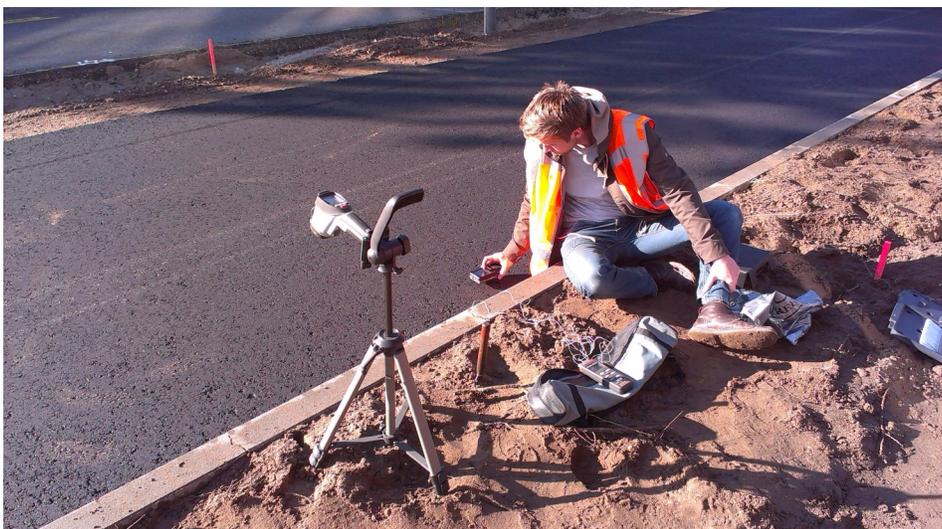
This is the third in a series of short newsletters compiled to update our ASPARI founders and partners on what is happening within the research unit. We will in the near future broaden the newsletter to include short articles from students and founders on topics that may be of interest to all.



KWS



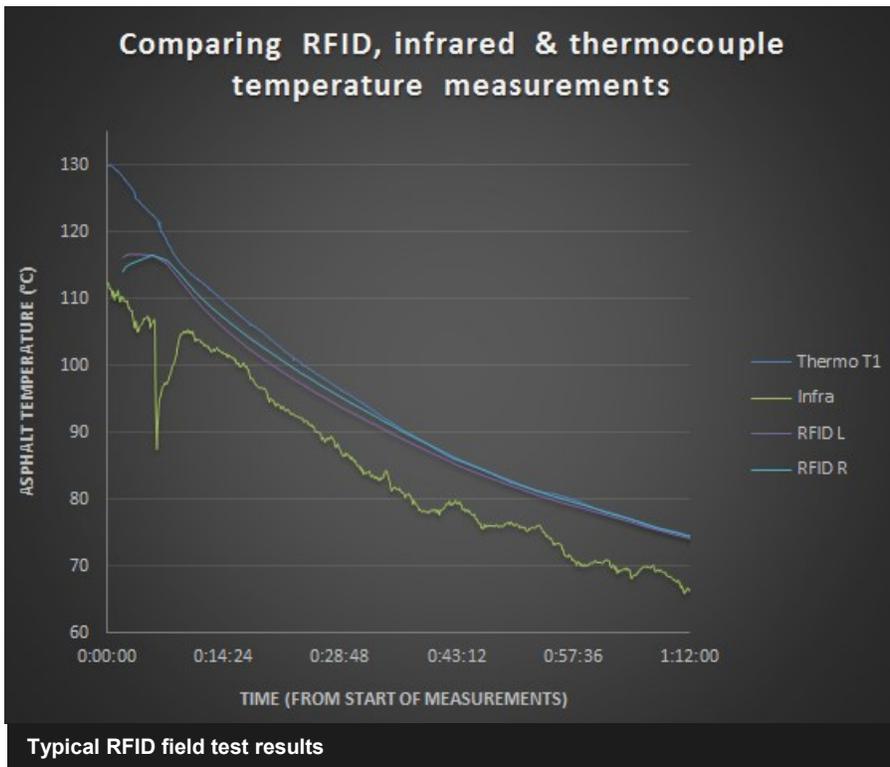
*“The passive RFID sensor technology can be used to monitor Warm Mix Asphalt temperature during construction and afterwards during the life cycle of the asphalt. However, there are a few limitations ....”*



RFID sensor readings taken next to the Cooling Curve Calibration Unit

## In This Issue

- Testing RFID sensors
- PDEng projects update
- Recent PQi's
- Working with machine manufacturers
- ASPARI awarded another 3TU project
- ASPARI symposium



## Testing RFID sensors is a success, but ...

Our 2015 RFID sensor project has been successfully rounded off. This 3TU Lighthouse project awarded to ASPARi, set out to prove that Radio Frequency Identification (RFID) sensors can be used to monitor, to begin with, compaction temperature and pressure during the asphalt construction process and afterwards during a typical life cycle of the paved asphalt layer. Several RFID sensor manufacturers have suggested that the technology is robust enough to be applied in the rather harsh asphalt construction environment. If it is and if sensors become small enough (“smart dust”), it will become possible to store all relevant composition, construction and performance data on sensors in the asphalt. It could revolutionize pavement management by having the information available “on the spot”. By having car sensor data linked to pavement locations and sensors, a smart road that actually signals when repairs are needed becomes feasible.

The results of this project show that the passive RFID sensor is a feasible technology to monitor temperature progression during construction albeit for asphalt having an upper temperature threshold of approximately 125°C. It is therefore suitable to monitor temperature progression during the construction of Warm Mix Asphalt. Despite this limited temperature range and an awkward data retrieval method using a hand-held reader, it also appears feasible for monitoring asphalt temperature during winter periods when freeze-thaw cycles may damage and reduce the performance of the asphalt layer. The insertion of more RFID sensors in the Enschede area will continue in the first few months of 2016. The purpose is to study whether the sensors are robust enough to withstand the harsh winter freeze-thaw cycles.

## New educational materials project underway

Janine Profijt and Tracey Olde Rikkert’s projects in “Developing innovative course materials for Road Construction Education at the MBO and HBO levels” are proceeding steadily.

They have until now, interviewed ASPARi members, industry experts and current MBO and HBO teachers with the aim of developing technologically innovative course and instructional materials for Road Construction.

Tracey has completed the System Engineering and Creative Thinking Techniques courses and is currently busy with the subject Science Education and Communication, is undertaking an extensive literature review and various tasks related to her project.

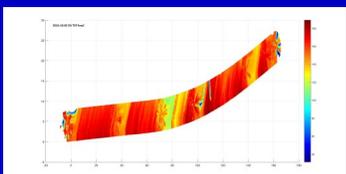
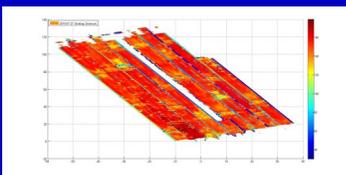
Janine has also completed System Engineering, is presently undertaking an extended literature study and a capita selecta subject. She is also working closely with MBO teachers based at the ROC Twente in Hengelo.



**Tracey (left) and Janine (right)**

## 5 more PQi's done in 2015

- TWW studied a Low Temperature asphalt mix at their GJ Van Heekstraat project in Enschede.
- Dura Vermeer undertook a PQi exercise in Belgium where they placed their Micro-pave and Nobelpave mixes at 2 different locations.
- Ballast Nedam undertook two PQi's during this period. The first at Thailandlaan, Aalsmeer where they monitored two mixes viz. a Bind 0/16 and a Base 0/22 mix. The second exercise involved the monitoring of their Coolfalt trail mix at the N210's Parallelbaan.
- BAM undertook a night-time PQi at their Lange Amerikaweg project for Gemeente Apeldoorn.



## Reaching out ...

The outreach activities continued in the past few months with ASPARi being invited to present, speak and advise at various forums including:

- An invitation to visit Wirtgen in Germany for a second time this year. You may recall that Boskalis conducted a PQi on the A67 where Berwich Sluer compared the temperature homogeneity produced by two Material Transfer Vehicles. The two units were successfully compared using a combination of linescanner data and Statistical Process Control techniques. Berwich, Seirgei and André were subsequently invited to talk about the results and possible further formal cooperation in the future.
- The German Road Federation currently sponsors a project called the SMART SITE. The working group is made up of the road agency, universities, machine manufacturers and other technology partners. Their project is aimed at developing high-end solutions for asphalt construction. ASPARi was invited to talk about our experiences here in The Netherlands with a view to sharing and learning from each other.
- The annual RWTH Aachen University Strassenbau Symposium took place on 26 & 27 November. ASPARi was invited to present our PQi model and explain what benefits there are to monitoring actual asphalt construction projects. The presentation was well received and there is a keen interest from Aachen University to cooperate on joint projects. The Netherlands was well represented at the event including Peter van Hinthem, Gerbert van Bochove (Heijmans) and Jan Voskuilen (formerly Rijkswaterstaat) attending the event.

## Real-time process control going ahead ...

As part of his ASPARi introduction and getting to know the PQi methodology, Denis Makorov followed four PQi monitoring exercises with TWW, Dura Vermeer and Ballast Nedam (twice) and was also involved in the testing of sensors. He will continue to do this given his aim of setting up a Real-time Process Control System for paving and compaction.



The PDEng program has a 50% coursework component and Denis has completed the subjects System Engineering, Design of Software Architecture (partial completion since it needs to be upgraded to post-MSc through an additional assignment), Wireless Sensors Networks (partial completion), Research Data Management and Scientific Information. He is currently busy with the Data Science course (two parts - 'XMLDB' and 'Data Mining') and preparing for Phase 1 of his prototype development.

# ASPARi awarded 3TU Lighthouse project for 2016

Further good news is that we applied for another 3TU Lighthouse grant at the end of November and were awarded a small grant where we can continue our work in finding appropriate sensors that can be used successfully in asphalt construction!

Work will soon commence on the 2016 project “Developing a prototype smart sensor system to monitor the asphalt condition during and after construction”.

Given the limitations of RFID sensors, we aim to test and apply fibre optic or similar sensors to automatically measure asphalt cooling and density progression during- and post-construction.

Our partners in this venture are TU Delft’s Civil Engineering and Geosciences and the Pervasive Systems unit of the University of Twente.

## Contact Us

Give us a call for more information about any of the topics in this issue.

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**Visit us on the web at [www.aspari.nl](http://www.aspari.nl)**

**André Dorée**

ASPARi—Paving the way forward

## Mini-symposium a success

The mini-symposium held on 16 December at the UT’s DesignLab was well-received. Janine Profijt, Tracey Olde Rikkert, Denis Makarov, Marjolein Galesloot, Ruben Olthof and Sjon van Dijk presented their projects with ASPARi members asking some interesting and thought provoking questions. The presentations can be viewed at [www.aspari.nl](http://www.aspari.nl)

