ROADCRACK™ – MEASURING MORE THAN CRACKS

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Overview

- A brief introduction to RoadCrack
- The upgrade
- The concept of co-creation
- The offspring (co-creation at work)
- Some benefits
RoadCrack

- Developed by RMS NSW in conjunction with CSIRO in mid 1990s
- Real time crack measurement system
- Designed and proven to measure 1mm+ cracks on all surfaces
- > 20,000 km surveyed annually
CSIRO Volvo truck installation
Cameras and lighting
Camera configuration

- 4 x line-scan cameras, single transverse scan every 1mm
- 1mm per pixel, longitudinally and transversely
- Exposure adjusted for surface reflectivity, 4 – 20 µS
- Packaged into 500mm long frames
Lighting

- 8 x 1500W quartz iodide lamps with reflectors
Importance of angled lighting

Lamp with reflector

Crack Width

Shadowing produces high contrast images
High intensity line illumination
Only as much power as a...
Pavement images
The upgrade – why?

- Successfully used for 15 + years
- Several components no longer available
- Desire to collect data for a minimum of 5 years more
The upgrade - specifics

- Replace 13 DEC Alpha computers with one PC
- Migrate crack detection software from UNIX operating system to Windows OS
- Replace and upgrade CSIRO camera interface modules
Sample images - concrete

New

Old
Sample images – asphalt

New

Old
Staged upgrade

- Single channel upgrade & evaluation
- Successful comparison with historical results
- Multi channel upgrade evaluation
Co-creation definition:

A business strategy focusing on customer experience and interactive relationships, which allows and encourages a more active involvement from the customer to create a value rich experience.

(http://www.businessdictionary.com/definition/co-creation.html#ixzz1wKDgi4pZ)
The offspring

- 4 channel RoadCrack™ system in 5th wheel trailer
- Integrated with Hawkeye data acquisition platform
- Data analysis and reporting included in single software package
5th wheel trailer variation
Repeatability

Transverse, longitudinal and crocodile cracking
Crack width histogram
Images

- Images saved as JPEGs or uncompressed
- Save all images or only those with cracks
- JPEG compression ~80 kB per image (per 500mm)
- Say 10% total cracked, 64 MB per km. (4 cameras)
- Uncompressed 243 MB per km
Comparison with 3D system
Comparison with 3D
Major benefits

- Immediate results. No post processing and data handling
- Accurate and repeatable
- High precision provides confidence in network performance analysis
- Independent of analysis subjectivity
Additional benefits

- All data synchronised through Heartbeat and analysed in Hawkeye Processing Toolkit
- Capacity to integrate additional systems: roughness, rutting, texture, geometry, asset cameras, line marking retro-reflectivity etc.
Trailer with integrated profiler

- Multi point laser beam fitted to front of trailer capable of measuring roughness, rutting and texture.
Verification of results
Verification of outputs

- **Internal repeatability, \( r^2 \)**

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<th>Run No.</th>
<th>Roughness</th>
<th>Rutting</th>
<th>Texture (passenger)</th>
<th>Texture (centre)</th>
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Verification of outputs

- Reproducibility, $r^2$

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<td>Trailer versus profiler</td>
<td>0.985</td>
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Direct benefits to RMS NSW

- Single pavement condition survey (cracking plus other parameters)
- Significant cost savings
- Fully integrated data sets
Summary

- RoadCrack time proven technology
- Successfully upgraded
- Trailer platform a product of co-creation
- Now measuring more than cracking
Thank you

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