Routine measurements of pavement surface cracks

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The data collection system

- Light
- Coordinates
- Distance
- Images
- Front images
- Texture lasers

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The measurement technique - PAVUE

More than 200 000 km of production measurements.

Combined system design and measurement service

Changing into “off the shelf” technology

Example:

• Changing into digital storage

Leading to:

• Less re-measurements with in-field quality indicators

• Enhancing the production speed noticeably
More measurement technique

Change from the original illumination into red LED lighting.

Leading to a lighter system with less power consumption

The system is flexible for other technologies
The analysis technique - AIES

- Off the shelf technology
- Flexible analysis system for surface damages/cracks
- High analysis speed (4 times increased)
- Iterative process prior to production analysis
The general steps in AIES

1. Collected surface image
2. Polygons
3. Grid map (CS)
Speeding up the analysis & enhancing the results simultaneously in AIES

By good planning and preparation

Example:

• Using pavement type categories (texture) with fixed analysis settings

Leading to:

• Human intervention only when changing disks (every 500-700 km of measurements)

• Increasing the image processing speed & the overall quality
Quality = \{\text{production Q} + \text{meas. tech.} + \text{analysis tech.}\}

A good quality in the results can only be gained with high QUALITY through the entire process.
The production technique

By good preparation, planning and training

Example:

• Verification of measurement systems

• Operator training and verification program

Leading to:

• Increased analysis speed

• High quality of the production technique

• Minimising risk of re-measurements
Combine cracks with ravelling

Ravelling or cracking? Typical SMA problem

Solution:

Five texture lasers for analyse of ravelling.
Surface classification – texture example

Histogram RRMS
Typical Distributions

- Dense Asphalt
  - Minor Ravelling
- Dense Asphalt
  - Extensive ravelling
- Porous Asphalt
  - Extensive Stone loss

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Verification

Validation against human eye prior to production

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Quality – repeatability & reproducibility

Reproducibility Cracked Surface

Amount if 100m values (%)

Abs. diff CS total

95 and 50 Percentile CS Total

Target Values

High target values, met and further enhanced

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Post processing – data presentation

Crack map using the grid model

CROW classification example

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Better use of the results

Data viewers combine data from profile, AIES, road data, images and maps.

Result

• Better use of collected data.
• More efficient road management.
• Focus on the data user.
• Reduce amount of data.

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The future… ...is now

We constantly:

• secure repeatability and reproducibility

• enhance the image analysis in AIES

• look for new technologies

• add new applications for the technology

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