Twenty Sixth Road Pavement Forum
CSIR International Convention Centre, Pretoria, Gauteng
5 & 6 November 2013
HIGH-MODULUS ASPHALT
HiMA
MANUFACTURE AND CONSTRUCTION

presented by

WYNAND NORTJE

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Much Asphalt

vna

TLC

RAUBEX

Together we can...

The South African National Roads Agency SOC Ltd Eastern Region

eThekwini Municipality

sabita

CSIR our future through science

Naidu Consulting Civil & Structural Engineering Consultants

Royal HaskoningDHV Enhancing Society Together

SNA Civil and Structural Engineers (Pty) Ltd

OVERVIEW

- Manufacturing
- Construction
- Trials
- Full-scale Implementation
- Conclusions

MANUFACTURING

- BASIC SOUND PRINCIPALS – STILL APPLY
- **HiMA**
- HMA
- WMA

MANUFACTURING
IMPORTANT THINGS TO MONITOR

- Keep bitumen tank temperature constant within 5°c of target temperature
- Keep mixing temperature constant within 5°c from target. this may influence compaction uniformity
- Make sure hauliers know the route to the site to prevent unnecessary delays
- Monitor aggregate moistures and temperatures

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MANUFACTURING
PLANT CALIBRATION

- Binder content selection done at design stage.
- Remember slight shift between lab mix and plant mix.
- Calibrate the mix through the plant using a standard binder to ensure the grading are on design target - 10 to 15 tonnes
- Once the grading is confirmed calibrate binder feed mix - 5 to 10 tonnes and determine BC. calculate correction for plant trial
- 60 ton plant trial - mix at varying binder contents using the 10/20 binder.
- Finalise the grading target and binder target.

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CONSTRUCTION

- **HiMA LAYER THICKNESS**

D (mm)	Average thickness (mm)	Minimum thickness (mm)
10	60 to 80	50
14	70 to 130	60
20	90 to 150	80

Principal structural layer – layer thickness critical

Generally thinner than conventional asphalt base

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CONSTRUCTION

- Tack Coat important – good bond
- Meet all specs - grading, binder type and binder content;
- Mixing temperature 160 - 180°C
- Compaction temperature >140°C
- Ensure stiff substrate for good compaction

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CONSTRUCTION

- Ensure so that the specified thickness is achieved;
- Apply surfacing to guard against thermal cracking due to day/night temp variations
- Longitudinal construction joints for the various layers should not coincide with the wheel-path, and joints in different layers should be staggered and stepped;
- Ensure thorough, uniform compaction *in-situ* voids do not exceed 6%. target 4% field voids

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TRIALS

- South Coast Road Durban – HiMA 20 with 20% RA- September 2011
- Main Road 448 / M7 Durban – Hybrid HiMA 20 & 10 with 20% RA -November 2012
- R104 Rayton to Bronkhorstspruit – HiMA 14 with 15% RA – June 2013

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SOUTH COAST ROAD TRIAL

- Presentation on this trial at the November 2011 RPF
- After two years the section is performing very well.
- Long-term monitoring of the section by CSIR - 20 month report is available on the Sabita website.

SOUTH COAST ROAD TRIAL

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SOUTH COAST ROAD TRIAL

MAIN ROAD 448 / M7 TRIALS

- Main link roads between the Durban harbour and the N3 going in-land.
- Naidoo Consulting undertook the pavement design.
- 10/20 binder not available alterative binder – 35/50 base binder modified with 5% EVA
- Same grading as used on South Coast Road
- HiMA 20 used as base mix and HiMA 10 for the surfacing layer

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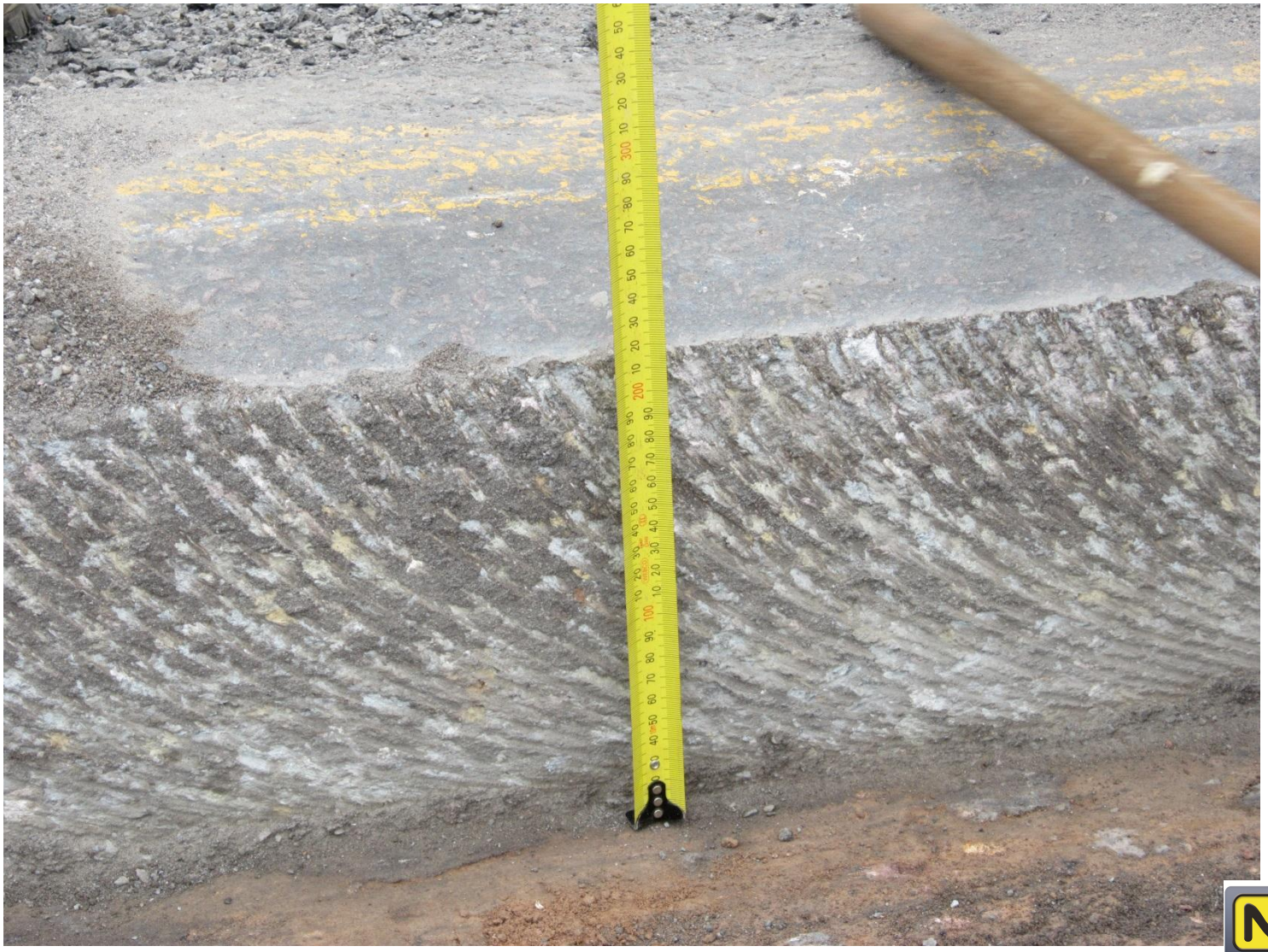
MAIN ROAD 448 / M7 TRIALS

MAIN ROAD 448 / M7 TRIALS



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MAIN ROAD 448 / M7 TRIALS

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R104 – RAYTON TO BRONKHORSTSPRUIT

- **SANRAL LTPT SITE**
- **Two sections**
  - Section one 100mm thick
  - Section two 150mm thick
- HiMA 14 with 15% RA - design by Much Asphalt mixed by National Asphalt at Benoni for Much asphalt
- Paved by National Asphalt northern operations
- Constructed during **June 2013 --- winter**
- Hauling distance 60km – time laps from manufacturing to construction avg. 3 hours

R104 – RAYTON TO BRONKHORSTSPRUIT

- Mixing temperature 180°c and on site 165°c
- Average temperature behind the paver 145°c
- Target BC 5.0% - avg. recorded BC 4.9%
- Avg. density 95.9% of Voidless density

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R104 – RAYTON TO BRONKHORSTSPRUIT

R104 – RAYTON TO BRONKHORSTSPRUIT

FULLSCALE HiMA IMPLEMENTATION

Project Scope

- N3 Candela Road to Paradise valley four lanes both carriageways 74000 tonnes night work.
- The two outer lanes on both carriageways mill 110mm.
- The HiMA 14 was selected to enable two layers HiMA 20
- The two inner lanes mill 60mm crack seal if necessary one layer HiMA
- 20mm UTFC overlay
- Contract period 21 months

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FULLSCALE HiMA IMPLEMENTATION

- Design
- Calibrate
- Manufacture
- Night work a concern
- No problems with compaction on cool evenings
- Very lively under the rollers at first, but stiffen up – HiMA characteristic.

FULLSCALE HiMA IMPLEMENTATION

PAVING TRIAL RESULTS

- Mixing temperature 180°c
- Temperature on site 170°c
- Temperature behind paver 150°c
- BC 5.4% - target 5.6%
- Density section one 98.3%
- Density section two 96.3%

FULLSCALE HiMA IMPLEMENTATION

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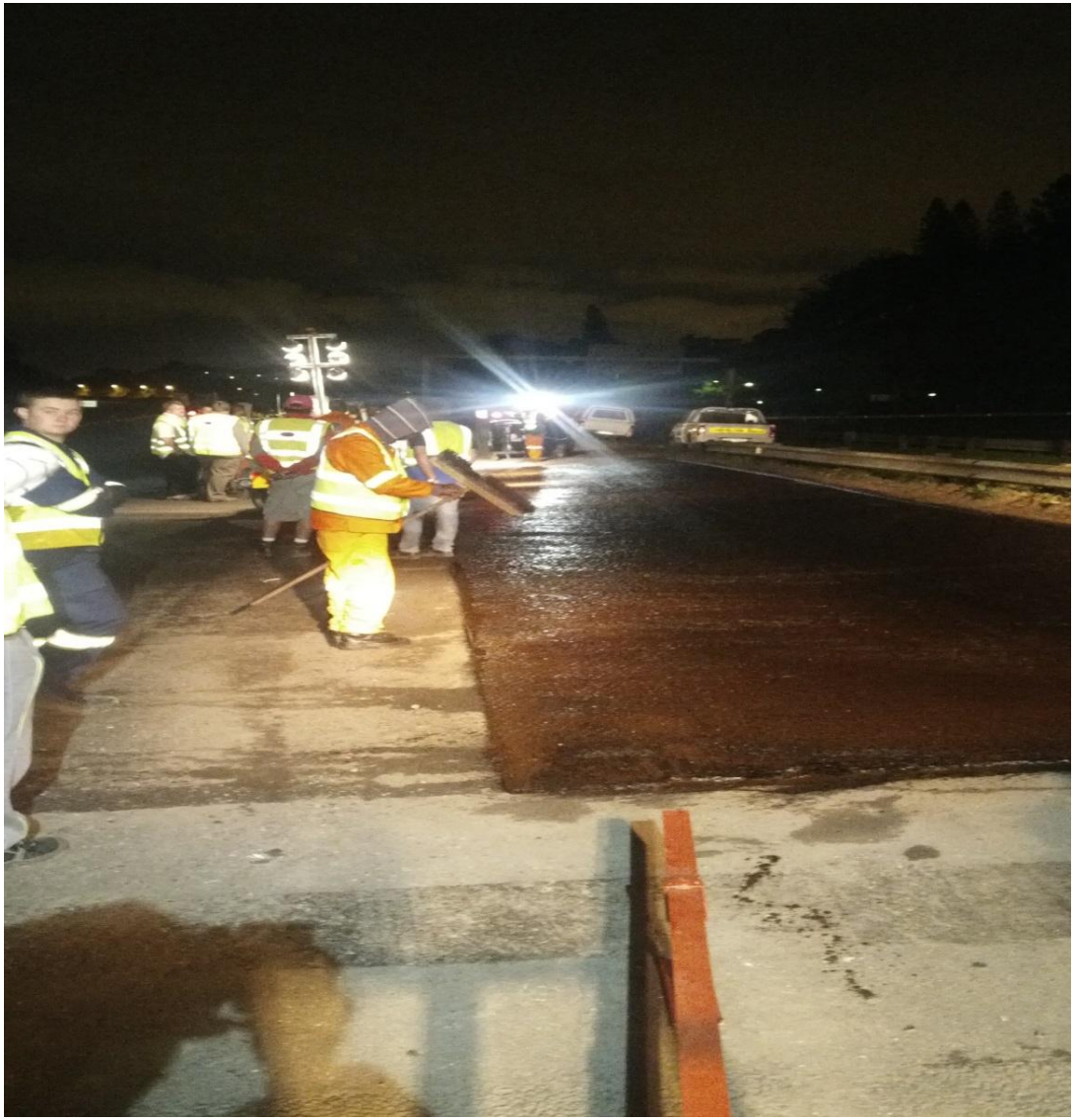
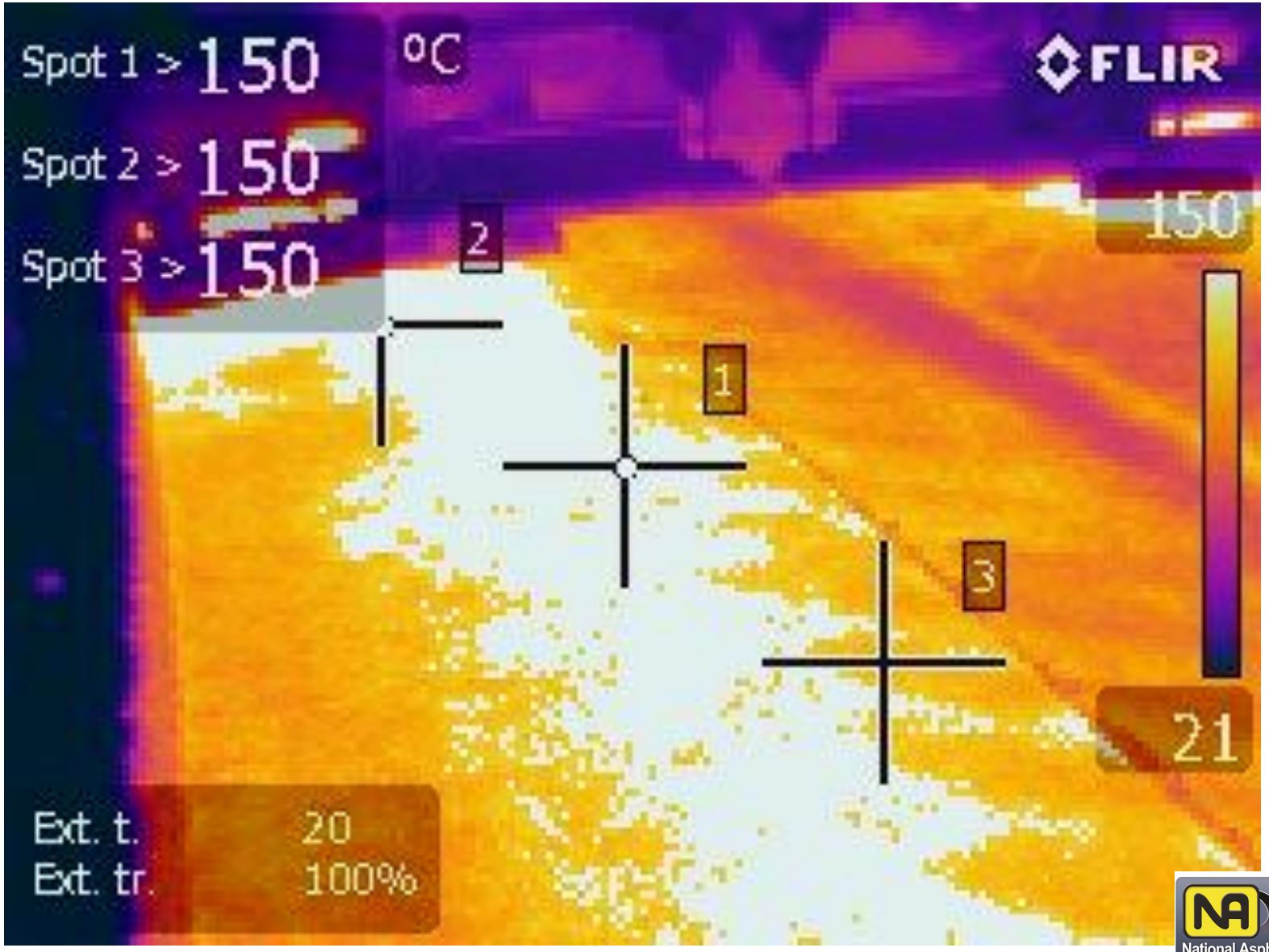


FULLSCALE HiMA IMPLEMENTATION



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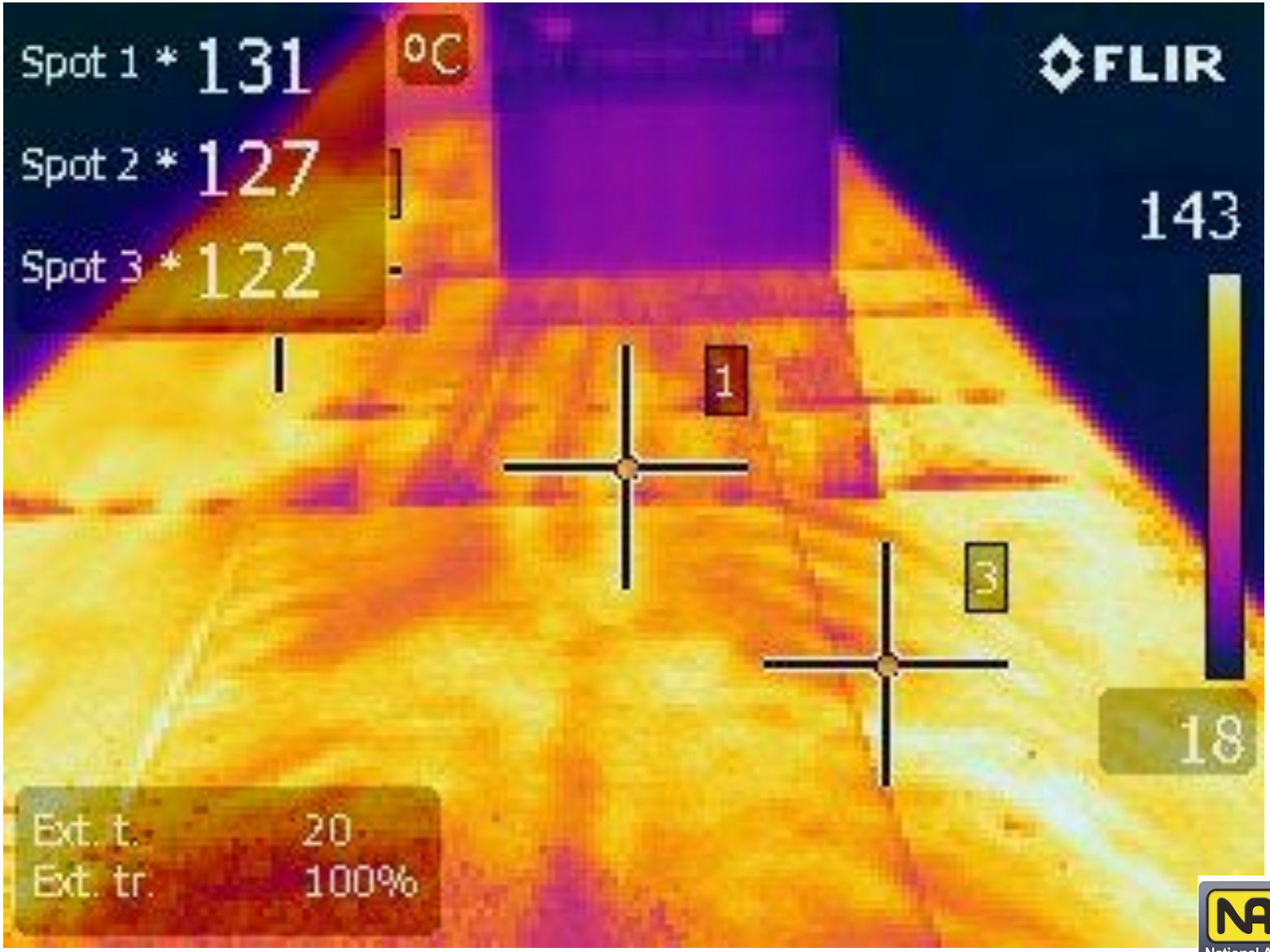

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CONCLUSIONS

- No coating problems experienced.
- Consistent mixing and supply temperatures.
- Potential exists for improvement on aggregate packing.
- Higher binder contents.
- Overall a very good mix with potential on a number of applications.
- Fairly easily compacted - can catch you out as it stiffen very suddenly

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THANK YOU

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