

INSTRUMENTATION

HVSIA MEETING

25 August 2005

CONTENT

- Gautrans instrumentation project background
- Phase 1 – Parameters
- Phases 2 and 3
- Some current Gautrans HVS instruments

Gautrans instrumentation project background

- Regular evaluation of current instrumentation
- Evaluate
 - Parameters to be observed
 - Appropriate instruments
 - Appropriate data analysis and use

Phase 1 – Parameters

- Objective to identify parameters to be monitored
- Evaluate, agree and continue with selection of appropriate instruments

Phase 1 - Parameters

PARAMETER	APT	LTPP	ACCURACY	RANGE
ENVIRONMENTAL PARAMETERS				
Temperature Air, surface, in-depth	x	x	$\pm 0.5^{\circ}\text{C}$	-5°C to 70°C
Humidity / Moisture Air, surface, in-depth	x	x	$\pm 1\%$	0% to 100%
Rainfall	x	x	± 1 mm	NA
Wind	x		$\pm 1^{\circ}$; ± 1 m/s	NA
Solar radiation (irradiance)	x		± 10 W/m ²	0 to 1 000 W/m ²

Phase 1 - Parameters

PARAMETER	APT	LTPP	ACCURACY	RANGE
MATERIALS RELATED PARAMETERS				
In situ strength (DCP)	x	x	±0.1 mm/blow	NA
In situ density	x	x	±1 kg/m ³	NA
In situ moisture content	x	x	±1 %	0 to 100 %
Suction / Permeability	x	x	In accordance with standard test methods	
Stiffness (field measured)	x	x		
Standard engineering and materials properties – laboratory tests ¹	x	x		

Phase 1 - Parameters

PARAMETER	APT	LTPP	ACCURACY	RANGE
PAVEMENT STRUCTURE PARAMETERS				
Permanent surface and in-depth deformation	x	x	±0.05 mm	0 to 50 mm
Elastic surface and in-depth deflection	x	x	±0.001 mm	0 to 5 mm
Concrete shrinkage and creep	x		±0.05 mm	0 to 5 mm
Crack / joint width	x	x	±0.01 mm	0 to 5 mm
Crack / joint activity / movement	x	x	±0.01 mm	0 to 5 mm
Visual condition	x	x	NA	NA
Water table	x	x	±0.1 m	0 to 2 m
Material loss		x	±1.0 mm	1 to 50 mm
Surface texture	x	x	±0.01 mm	NA
Riding quality		x	±1 mm/m IRI	1 to 16 mm/m IRI
Dust / spray		x	± 5% opacity	0 to 100 %
In situ stress	x	x	±0.01 kPa	NA
In situ strain	x	x	±100 µε	NA

Phase 1 - Parameters

PARAMETER	APT	LTPP	ACCURACY	RANGE
TRAFFIC / LOAD RELATED PARAMETERS				
Wheel load	x		±1.0 kN	0 to 200 kN
Tyre inflation pressure	x		±1 kPa	0 to 1 500 kPa
Tyre-pavement contact stress	x	x	±0.1 MPa	0 to 2 MPa
Wheel speed	x		±0.5 m/s	0 to 10 m/s
Wheel position	x		±0.1 m	0 to 8 m
Traffic characterisation		x	WIM ²	WIM ²
Traffic noise		x	±5 dB	0 to 150 dB
Tyre temperature	x		±1 °C	0 to 100°C

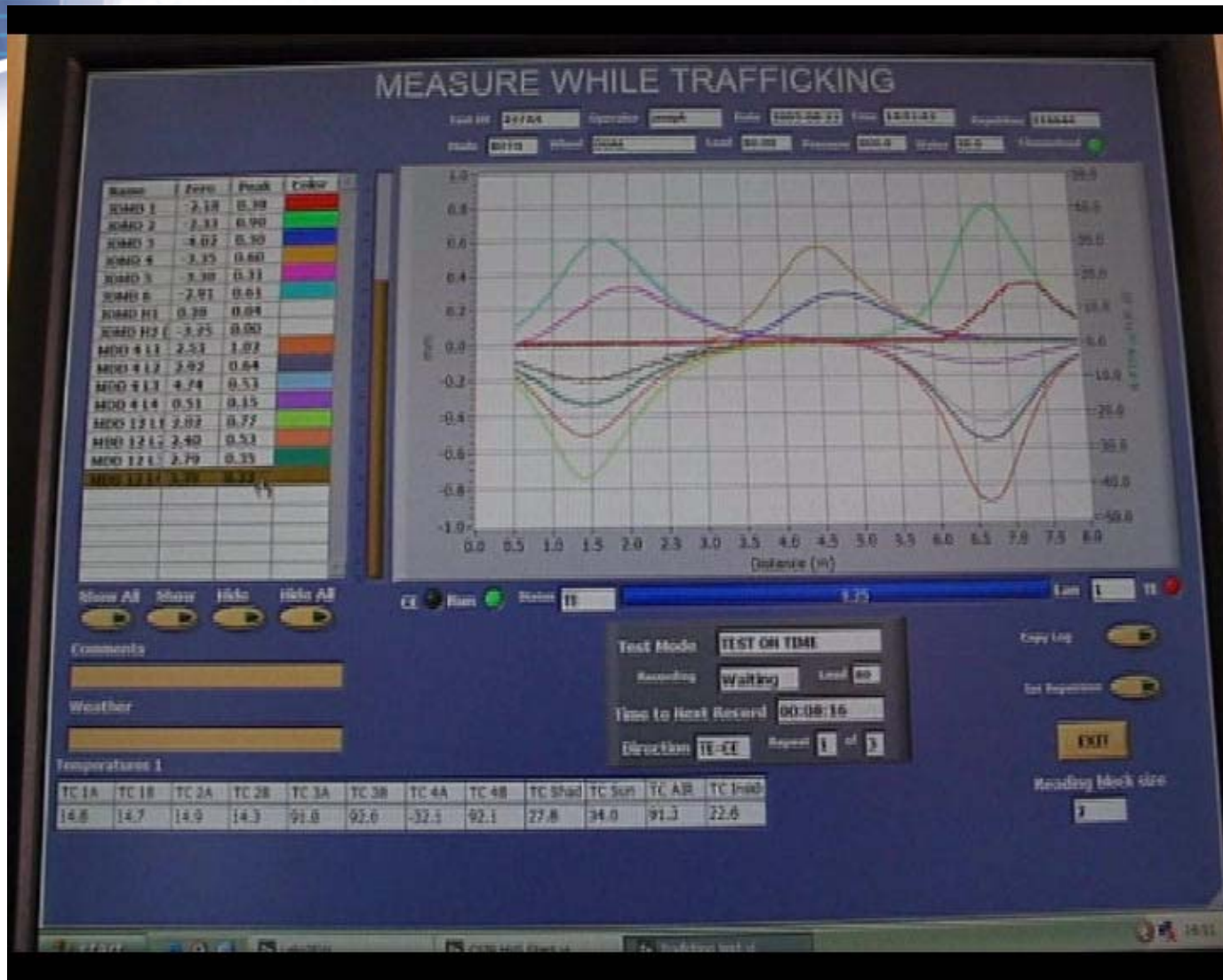
Phases 2 and 3

- **Phase 2: Evaluation of current and new instruments to meet needs**
 - Model list of instrumentation for APT and LTPP experiments, listing instruments used both locally and internationally.
- **Phase 3: Recommendations for developments and / or procurement on instrumentation**
 - Recommendations on the most appropriate suite of instruments for APT and LTPP experiments, including guidelines on the availability and requirements for development of instruments.

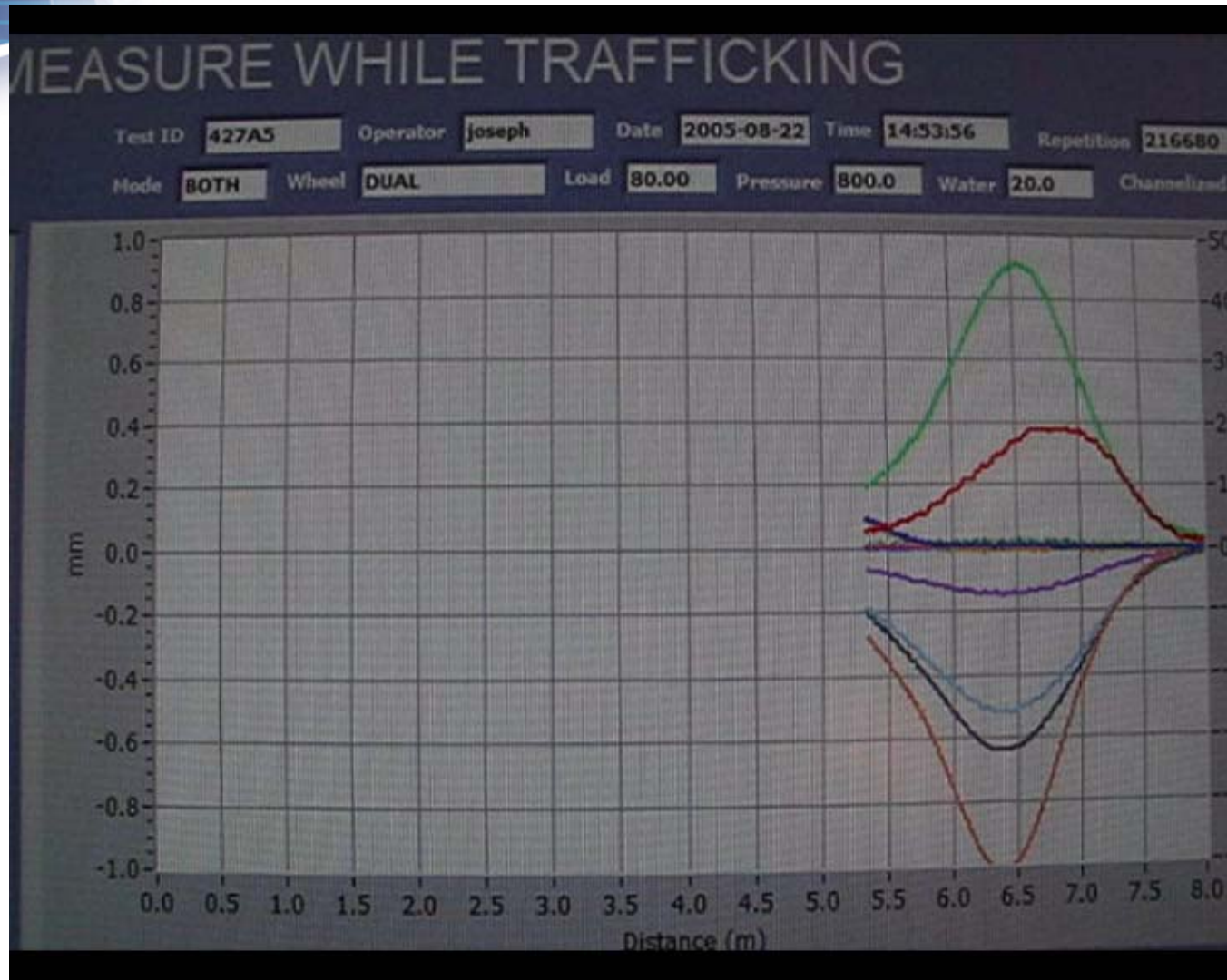
Some current SA HVS instruments

- New DAS
- Humidity buttons
- Magnifying glass
- Thermography

New DAS



New DAS

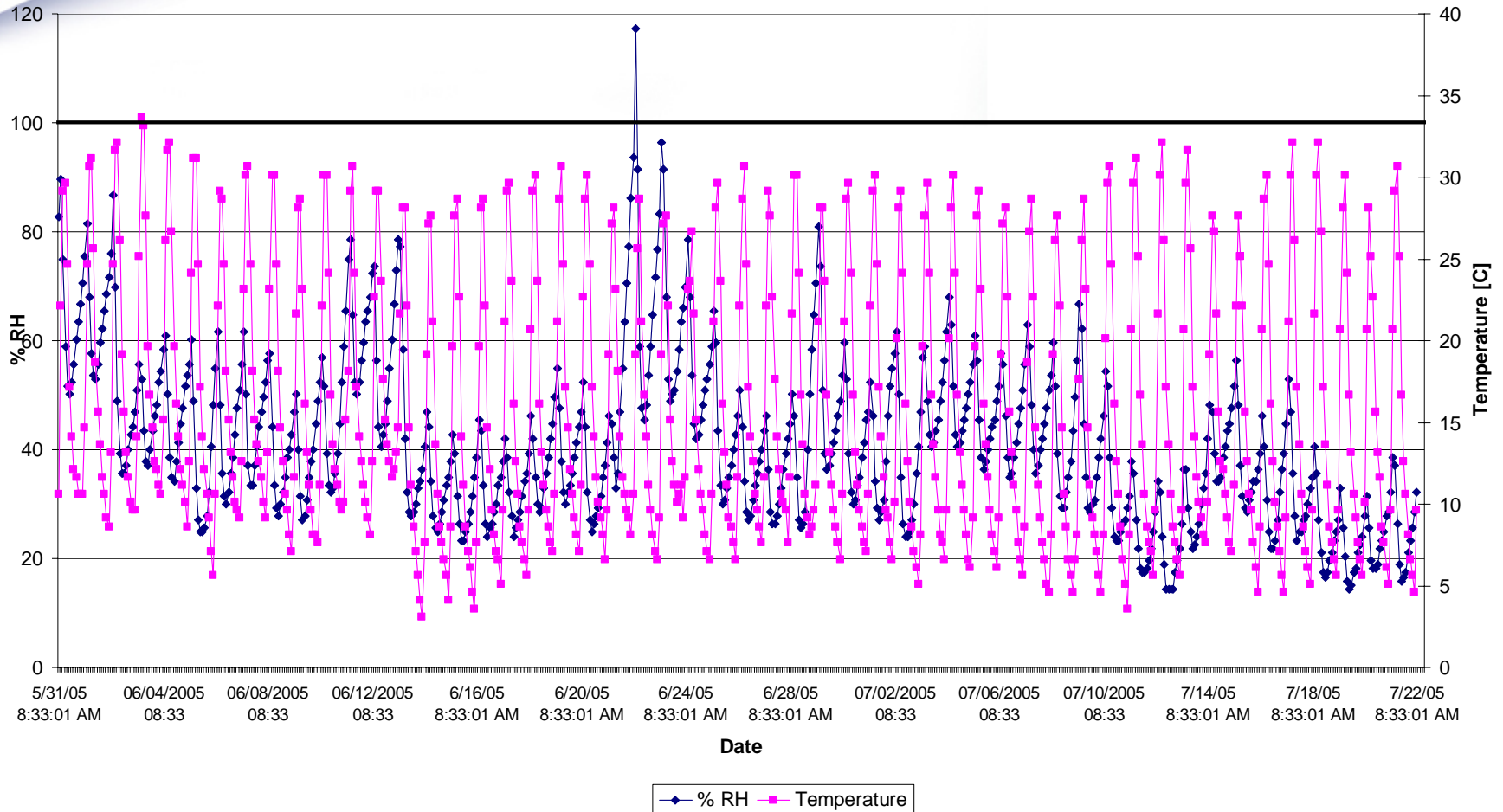


Humidity buttons

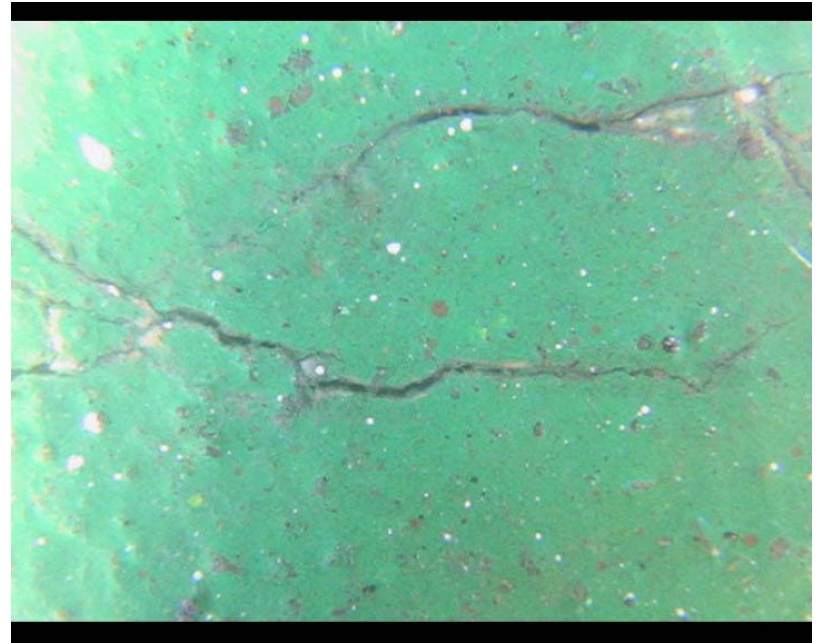
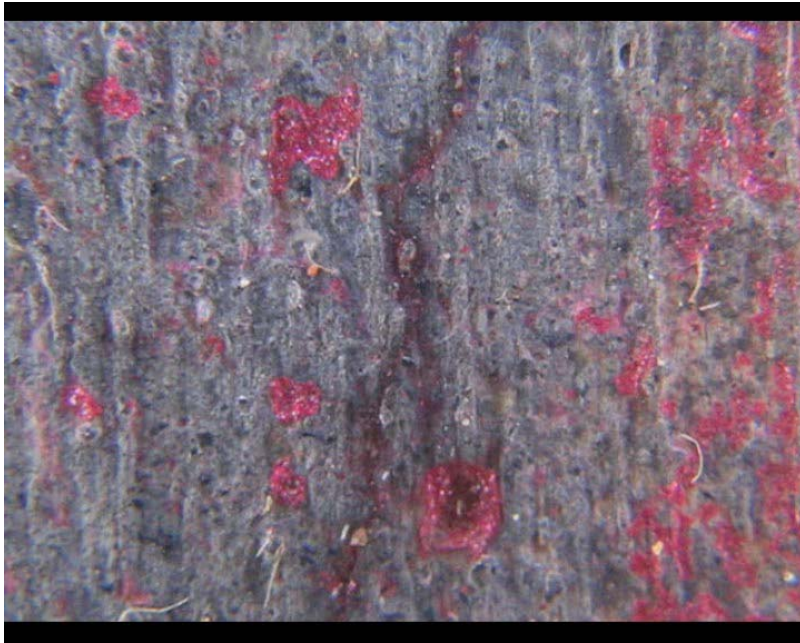


Humidity buttons

Humidity button data - Vereeniging



Magnifying glass



Digital camera – video clips



Thermography

