Road Markings: An essential contributor to Road Safety

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12. November 2015

Road markings : one of the most cost-effective safety solutions

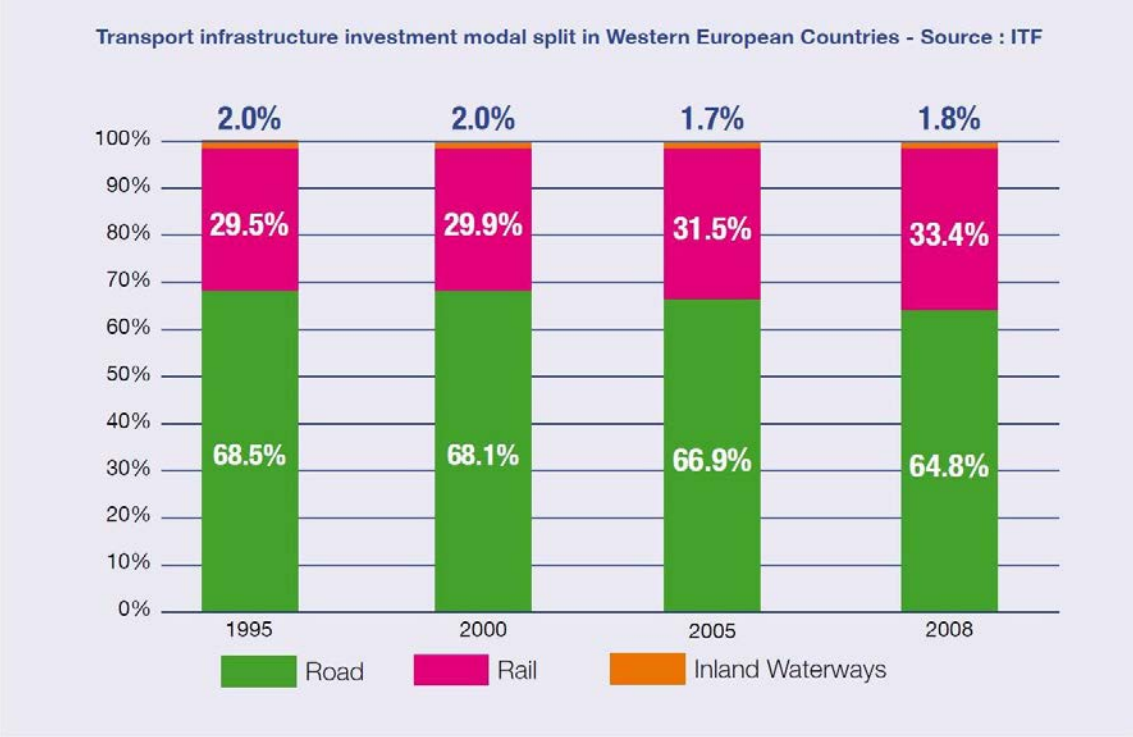
BUT

- Fiscal pressure on state budgets
- More focus on vehicle and driver's behaviour
- Declining quality of road markings
- Impact on safety and economy

Some critical issues

Declining investments into roads

Confirmed by the EC DG Move White Paper for Transport 2020-2050



Poor investments into roads

COURT OF AUDITORS REPORT 2011
GERMANY (Schleswig-Holstein)

- **Expenditures in road markings : ineffective**
- **Reasons: choice of marking types in tenders**
  - **Low performing paint (>75% of the cases)**
  - **Markings invisible in rainy conditions (85% of the cases)**

Declining quality of road markings

2012 VTI SURVEY (Sweden)

- **Percentage of road markings fulfilling requirement:**
  - **Less than 50 %** of markings for dry road markings
  - **21%** of markings for wet-road markings

Road markings not replaced as needed

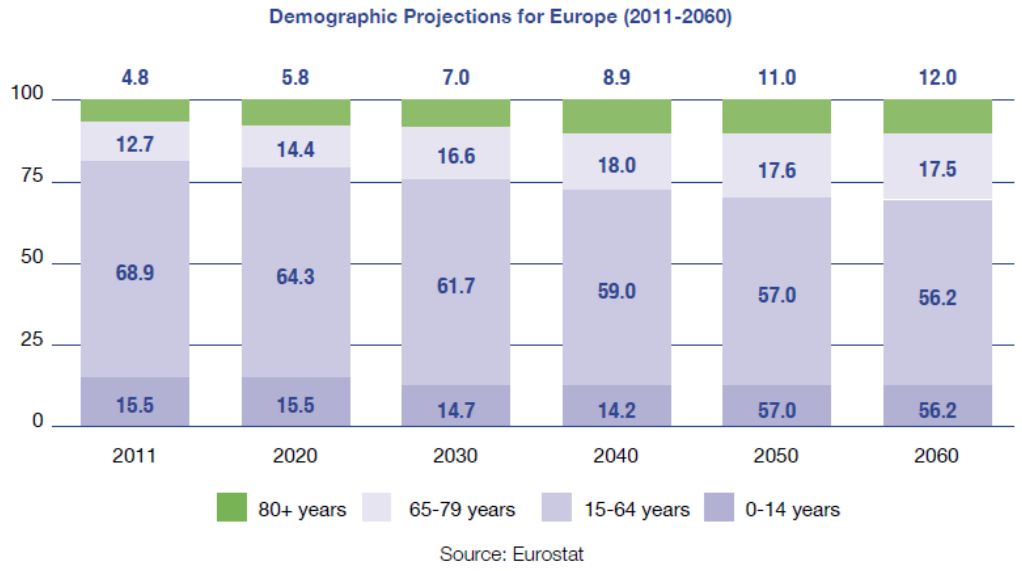
2012 RSMA extensive survey / 7250 km of roads (England, Scotland and Wales)

CONCLUSIONS

- **Immediate replacement required on:**
  - **40% markings on Scotland motorways and dual carriageways**
  - **40% markings on dual carriageways in Wales**
- **Immediate or scheduled repair required on:**
  - **38% markings on dual carriageways maintained by HA in England**
  - **25% markings on HA single carriageway (19% scheduled)**

Ageing Population in Europe

- Growing part of the population
- More mobile
- Reduced vision capacities / Longer reaction times
- Specific requirements for better quality markings



A Road that a car cannot read

- **Lane departure Warning Systems can provide significant benefits… if the markings are visible**

SOLUTIONS EXIST

Case studies

Case Study – Cheshire County Council (2007)

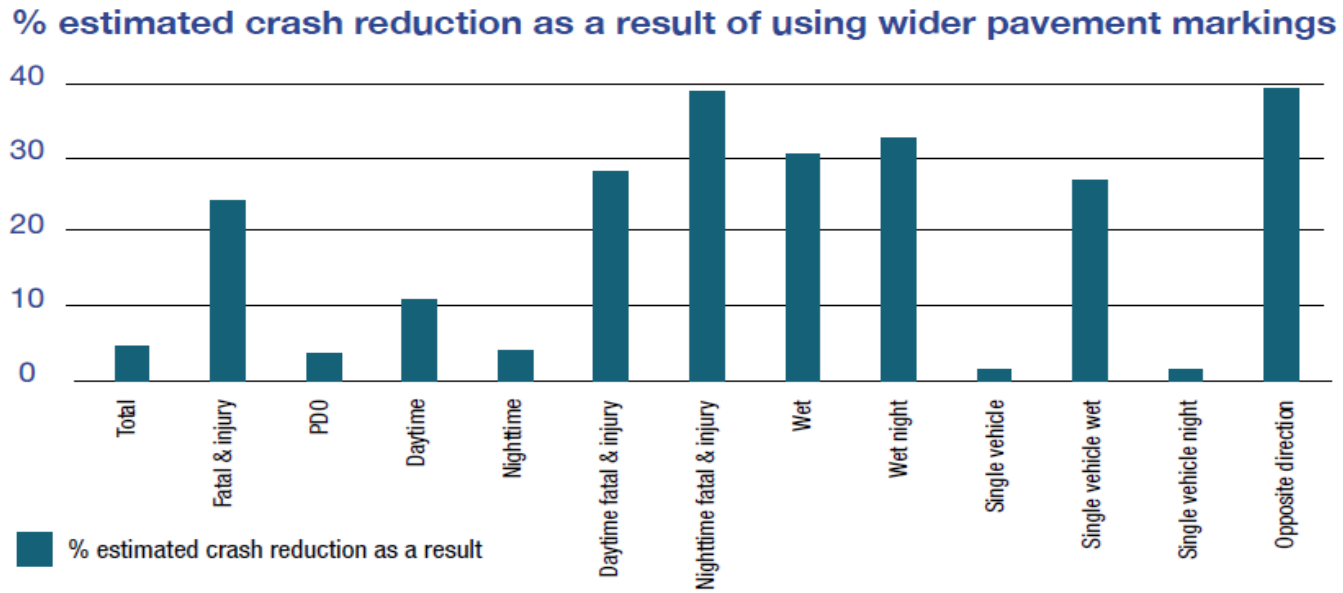
- Highway section (A556)
- 16 personal injuries during the 3 previous years
- Estimated societal cost: 1,4 M £
- Application of wet-night visible road markings

Accidents before and after application of wet-night visible product

Status	Total Accidents	Serious accidents	Slight accidents	Wet-Dark accidents
Before treatment	16	2	14	4
After treatment	6	0	6	0

Case Study – Michigan (2006)

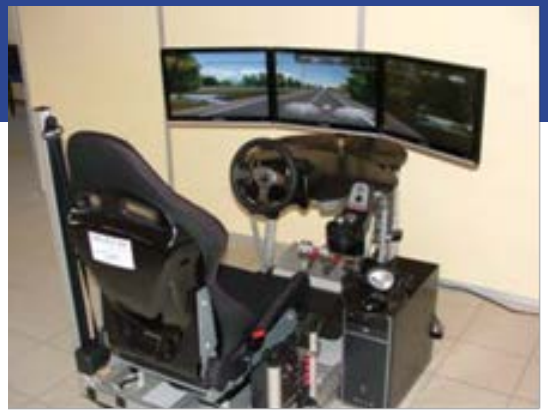
- Study to assess benefit of wider road markings
- Before (2001 – 2003) / after (2005 – 2006) analysis



RainVision

- EU funded project (2013 -2015)
- Driver impact study to understand the effectiveness of reflective road markings : Dry – Wet – Rain
- One step further than COST 331.
- Compare Age and Gender

- Consortium :
  - ERF European Union Road Federation
  - 3M Germany (Lab)
  - Aximum France (Develter Driver Simulator)
  - Test &Training Austria (Track Test)
  - Road Safety Marking Association (RSMA) UK (Road Tests)



RainVision

Milestones :

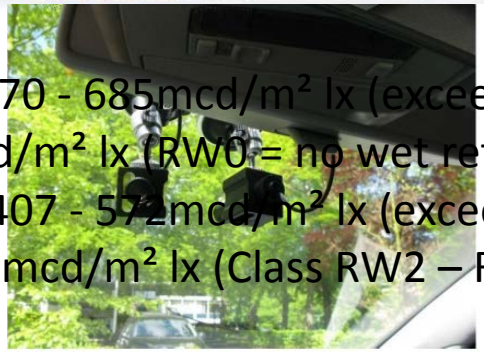
- **Driver Simulator : Establish wet-night visibility levels with significant impact on driving behaviour (age and gender)**
- **Test Track : Reproduce the findings towards towards real-life situations**
- **Improve high accident areas using different road markings – monitor speed and incidents.**

Age group	20-40 years		41-60 years		61 years and over	
	male	female	male	female	male	female
n=88 (90)	17 (15)	15 (15)	15 (15)	16 (15)	15 (15)	10 (15)

	Condition		
	baseline	marking material I	marking material II
Group A	test day 1	test day 2	test day 3
Group B	test day 3	test day 1	test day 2

RainVision : Test Track

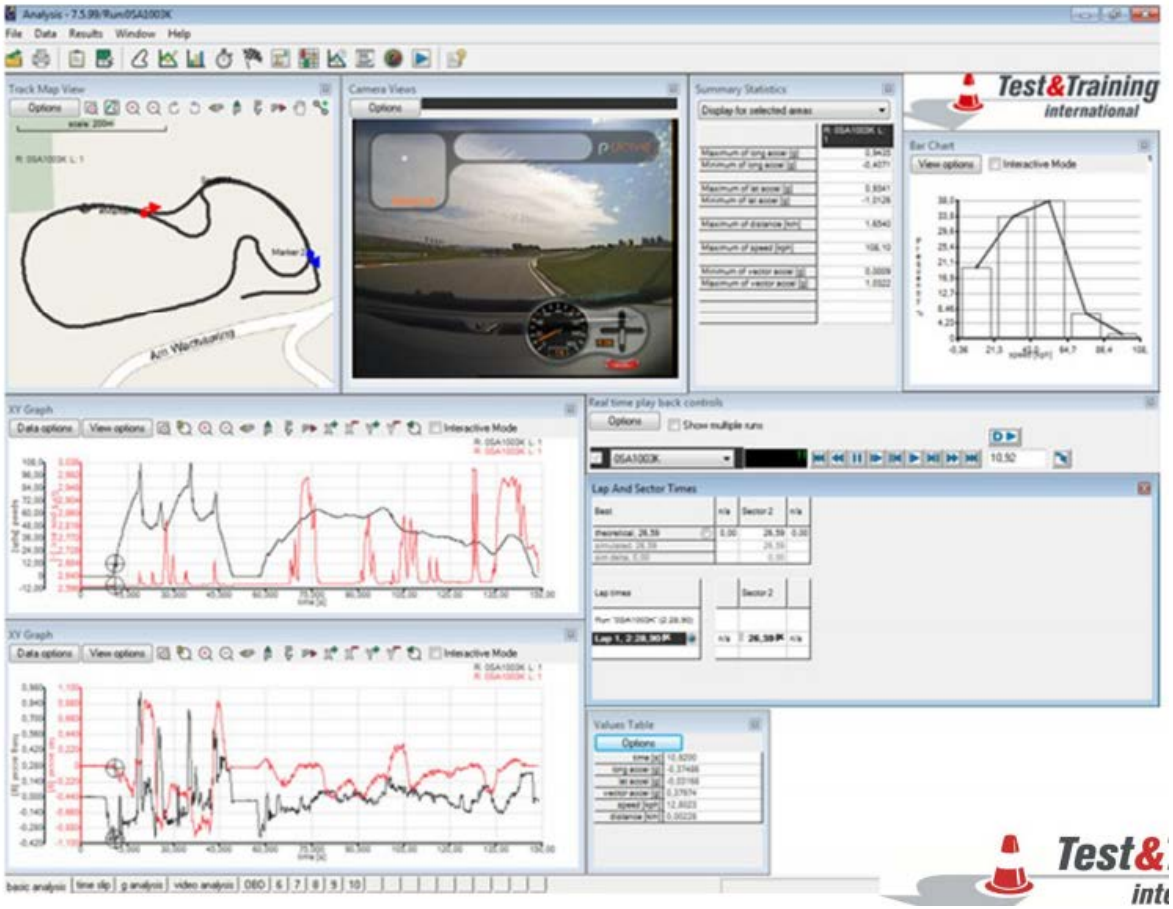
MMI = RL (dry) 570 - 685mcd/m² lx (exceeding Class R5 in EN 1436)
RL(wet) 3 -12mcd/m² lx (RW0 = no wet reflectivity performance according to EN 1436)
MMII = RL (dry) 407 - 572mcd/m² lx (exceeding Class R5 in EN 1436)
RL (wet) 43 - 112mcd/m² lx (Class RW2 – RW4)



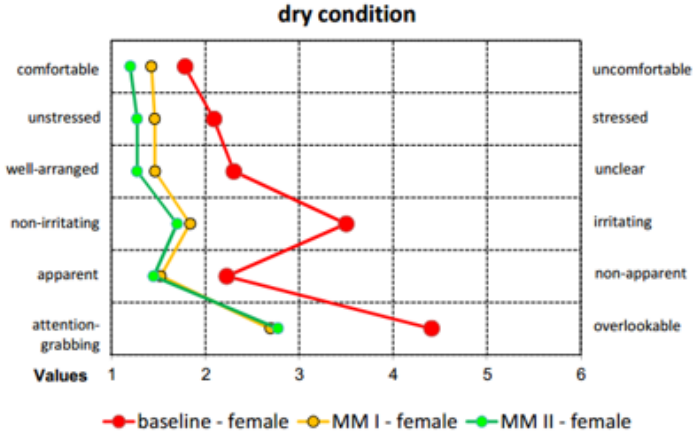
Cameras – e.g. behind rear mirror

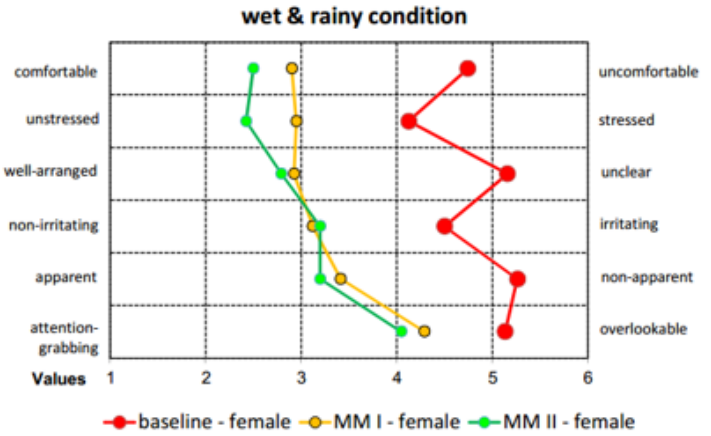
Data logger (pdrive) - under seat

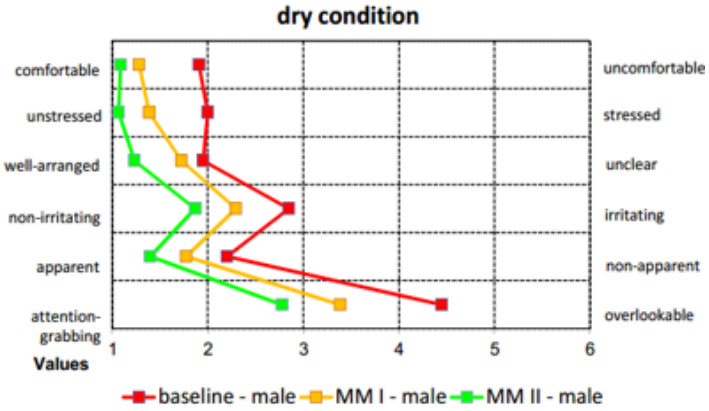
RainVision : Test Track

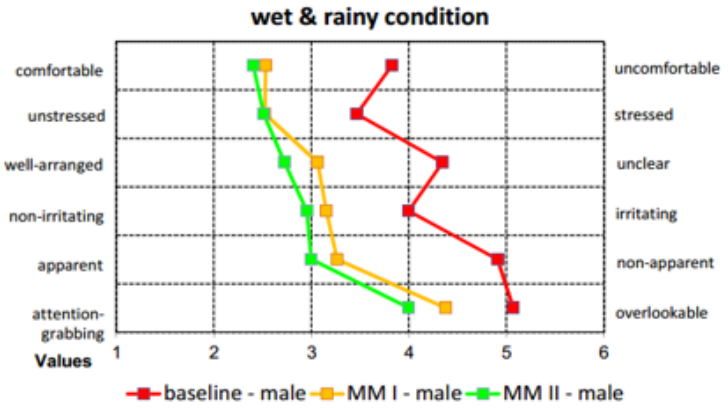


RainVision : Test Track : Experience



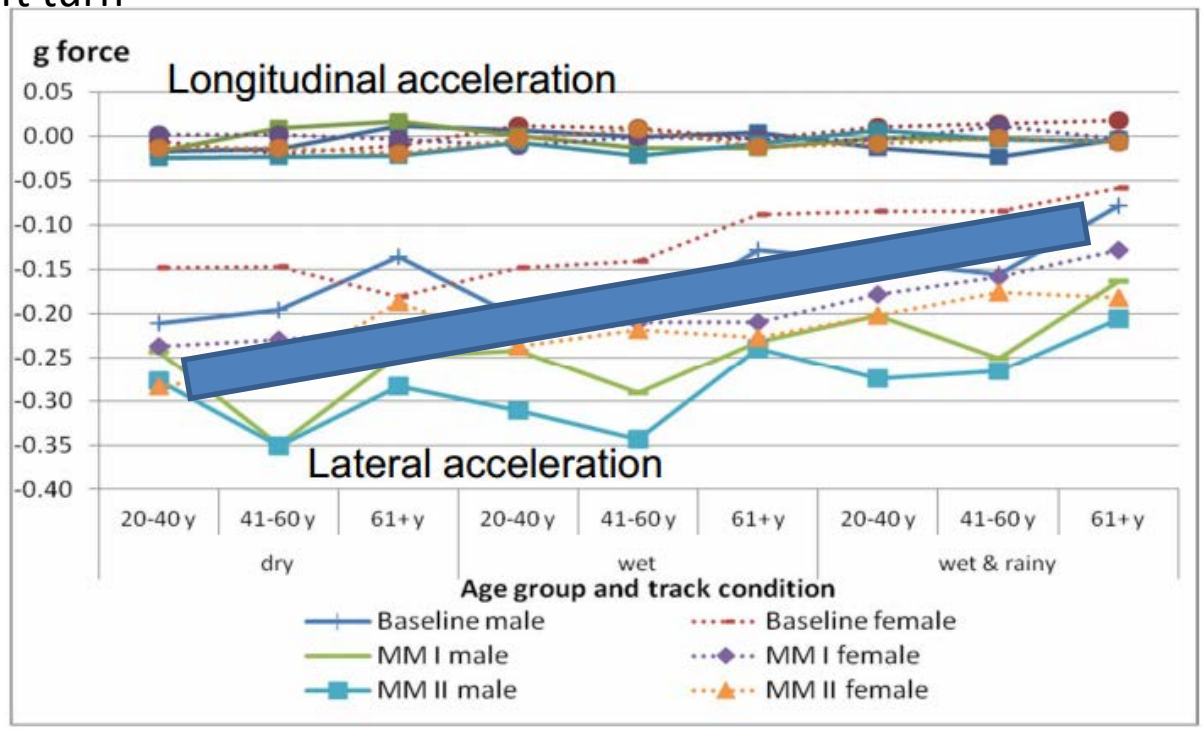


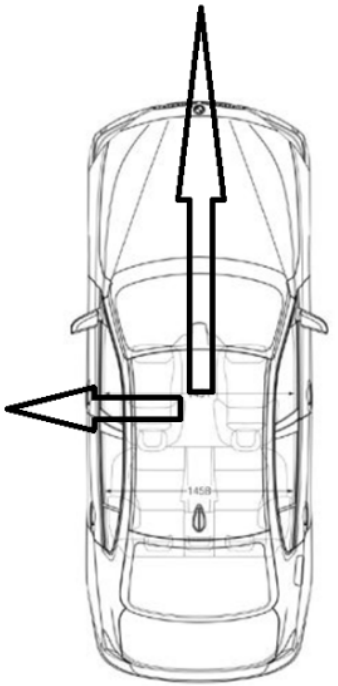




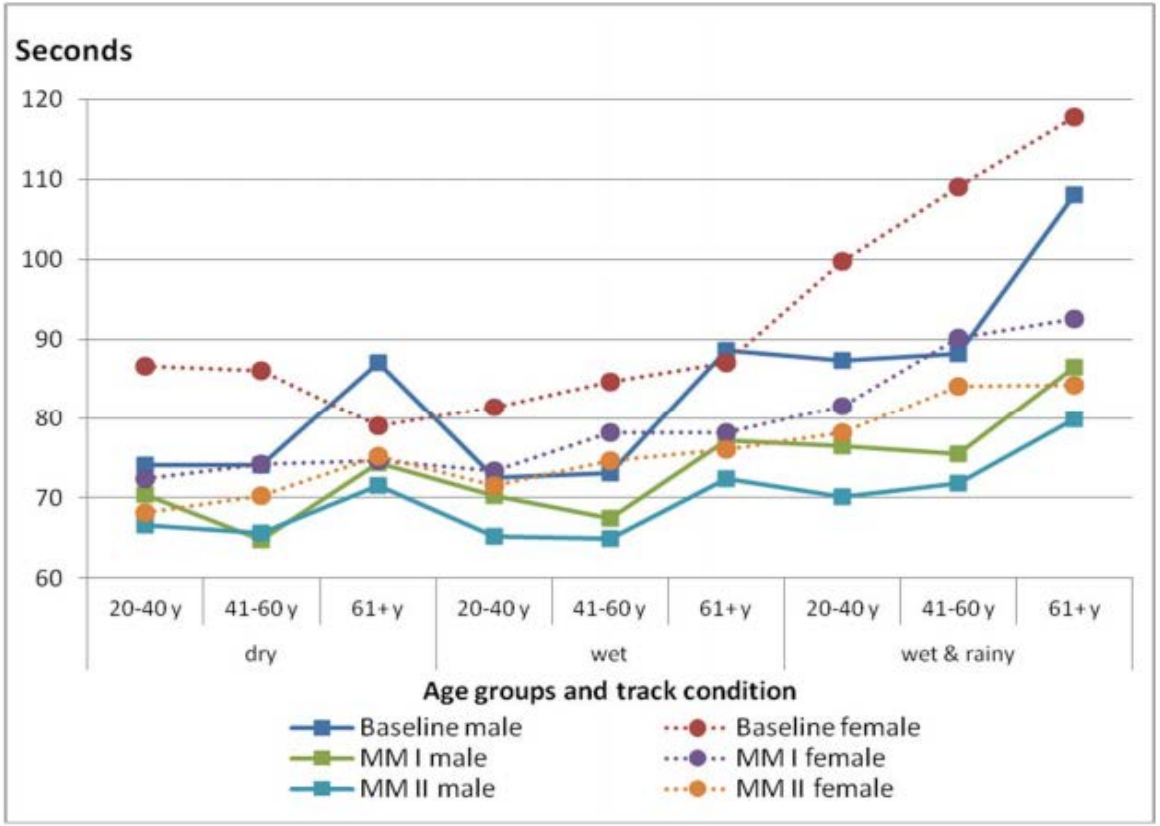
RainVision : Test Track : Behaviour

Left turn





RainVision : Test Track : Speed



Up to 30% faster but still save speed.

Less differences by age group or gender.

RainVision : Overall Conclusions

- « MM II » Markings generally prefered by all drivers
- Better « wet-night visibility » assists all drivers and does not cause « unsafe » driving and speeding.
- All age groups benefit, especially elder drivers.

- Better visibility of the road network promotes more comfort and road safety.
- Technology exists – European Norms (EN1436) can by used to implement it today.

ERF Position Paper on Road Markings

THE ERF CALLS FOR:

- Establishing a minimum intervention and maintenance level for RM in EU
- Applying good road markings, i.e.:
  - Marking visible at all times
  - For both the driver and the intelligent vehicle
  - Irrespective of :
    - light conditions (day / night)
    - weather conditions (dry / wet / wet-rainy)
    - Driver's age (young > < old)

ERF Position Paper on Road Markings

THE ERF PROPOSAL:

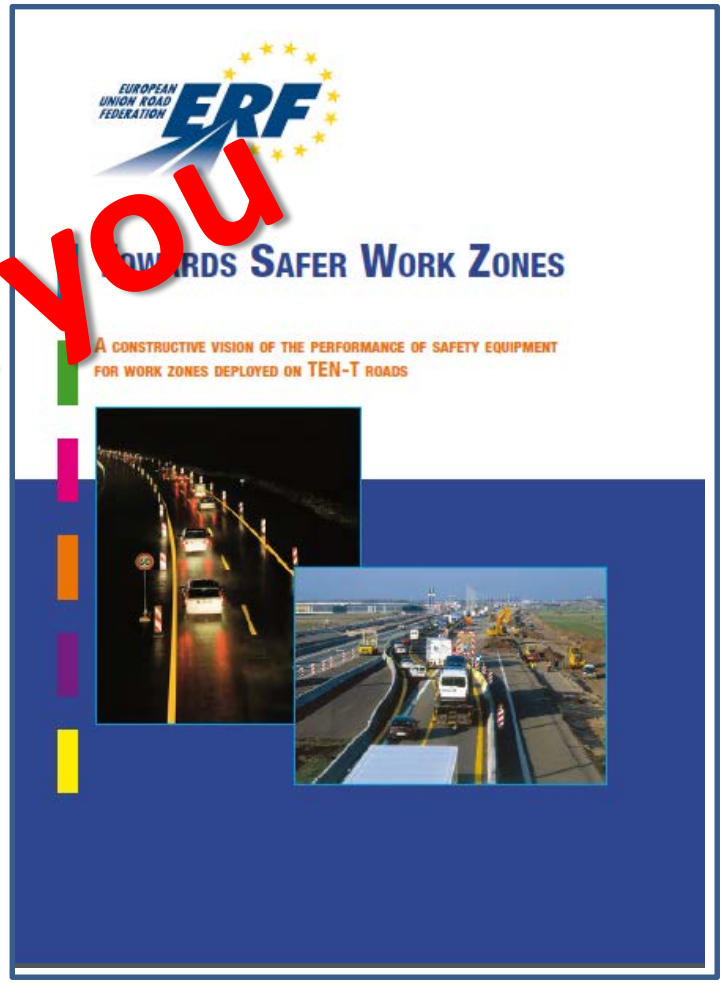
- Minimum intervention and maintenance policies
- Guarantee of visible horizontal signage all year round
- Minimum marking width: 150 mm
- Minimum Performance under dry conditions: 150 mcd/lux/m²
- Minimum performance under wet conditions: 35 mcd/lux/m²

ERF Position Paper on Road Markings

http://www.erf.be/images/ERF_Paper_on_Road_Markings_Released.pdf

Available in English, German, French & Italian


Improved Signage for Better Roads
An ERF Position Paper towards improving Traffic Signs in European Roads
STOP


A CONSTRUCTIVE VISION OF THE PERFORMANCE OF SAFETY EQUIPMENT FOR WORK ZONES DEPLOYED ON TEN-T ROADS

Thank you