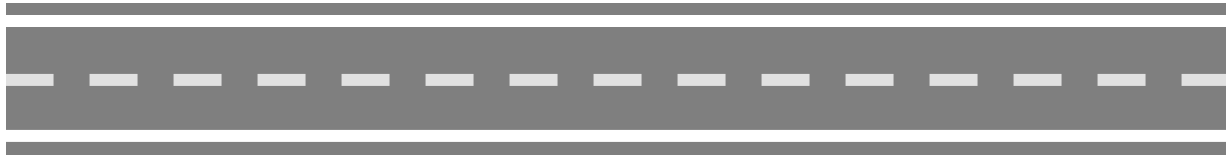


# Enhancing Road Safety with Effective Road Marking



**IRF Regional Conference, 3 - 5 Oct. 2013**

# LET'S START WITH THE BASICS



## Two main objectives

- It clearly defines the lane for the drivers
- To avoid frontal collision

- **1911** : First road marking in Michigan,USA
- **1965** : Retro-reflective road marking introduced

## ...AND NOWADAYS .....



### **FUNCTIONS**

- To guide
- To Prescribe
- To Alert
- To Organize

### **CHARACTERISTICS**

- Visible at night & day
- Under standable
- Homogeneous
- Consistency



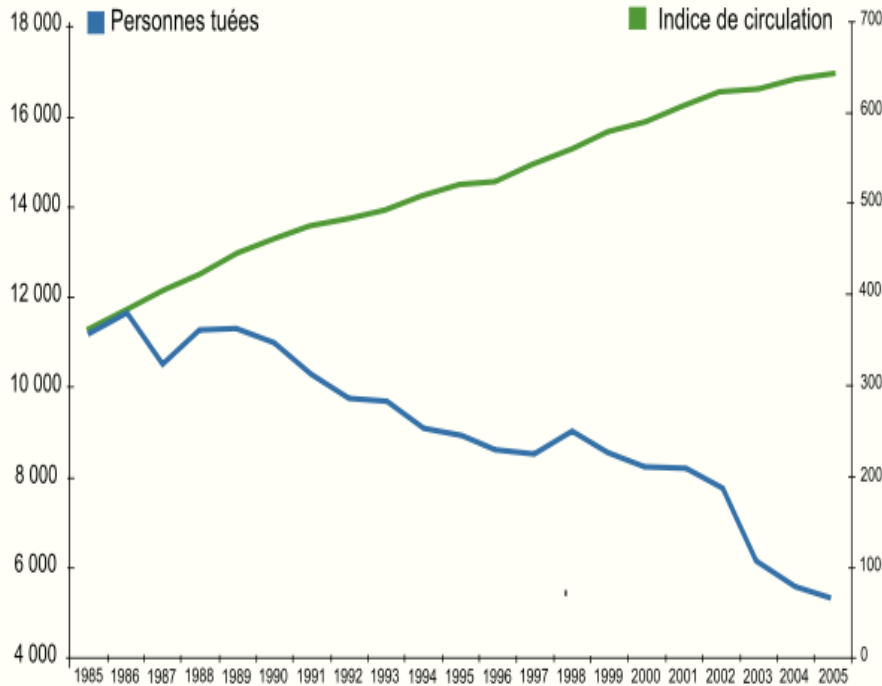
## ROAD SAFETY : A SOCIAL AND ECONOMIC PROBLEM



- According to WHO vehicle crashes are responsible for 1.3 million people killed and 50 million injured in the world
- India : Annual loss due to accidents is 40 billion USD



# ROAD MARKING AS PART OF ROAD SAFETY POLICY



## 4 MAIN ACTIONS TO DECREASE FATALITIES

- Infrastructure
- Driver 's Behaviour
- Car
- Road Equipment

**In France** : Last 20 years , fatalities reduced by half with a circulation multiplied by two

## WHAT IS THE REAL EFFICIENCY OF ROAD MARKING ?

In 2007, Road Safety Marking Association (RSMA) published the report « **White Lanes Save Lives** » which provided a cost-effectiveness Analysis of new road markings in selected counties. Eg : Cheshire Country County decided to apply a wet-night visible marking on a section of the A556 highway which had recorded 16 personal injury accidents during the last three years at an estimated cost of 1.4 m £

Status	Total accidents	Serious accidents	Minor accidents	Wet-dark accidents
Before Implementation	16	2	14	4
After Implementation	6	0	6	0

**Cost of new Road marking : £ 20 000**

# WHAT IS THE REAL EFFICIENCY OF ROAD MARKING ?

**US Studies** :Eg : Carlson, Park (Texas Transportation Institute) and Andersen (Federal Highway Administration) published »**The benefits of Pavement Marking** » in 2008 ; they found that the presence of new lines had a positive effect by reducing the number of crashes

Action	Crash Reduction factor
Install lane lines on Urban roads	18
Install center lines	up to 36
Install center lines and Edge lines	up to 24
Install Edge lines	up to 66

# WHAT IS THE REAL EFFICIENCY OF ROAD MARKING ?

Study on 134 different places in US where left turn has been implemented

- Collisions : - 20%
- Personal injury : - 26%
- Rear-end collisions: - 38%





## WHAT ABOUT THE ROAD EQUIPMENT IN EUROPE ?

- The TC226 is in charge of the European normalisation concerning the road equipment according to the European Directive 89/106
- TC226 is organised in working groups
  - WG1 : restrain system
  - WG2 : horizontal signalisation
  - WG3 : vertical signs
  - .....WG10
- Experts are coming from national road authorities, from public laboratories, private companies, contractors ....
- Each WG prepares norms which are submitted to a public enquiry, followed by a vote
- After validation, the norm becomes compulsory for all EC countries



## OBJECTIVE OF THE EUROPEAN NORMALISATION

- To provide harmonized norms for road equipment at the European Community level and to develop a common understanding
- To insure that the equipment is « **fit for use** »
- To promote a fair competition on the European market



## The mandate M111 defines the Essential Characteristics:

- Day Visibility : luminance in mcd/lux/m<sup>2</sup>
- Night –time Visibility : Retro-reflectivity in mcd/lux/m<sup>2</sup>
- Chromatic Co-ordinates
- Skid resistance in SRT unit
- Durability

## 10 Standards to describe Road Marking activities :

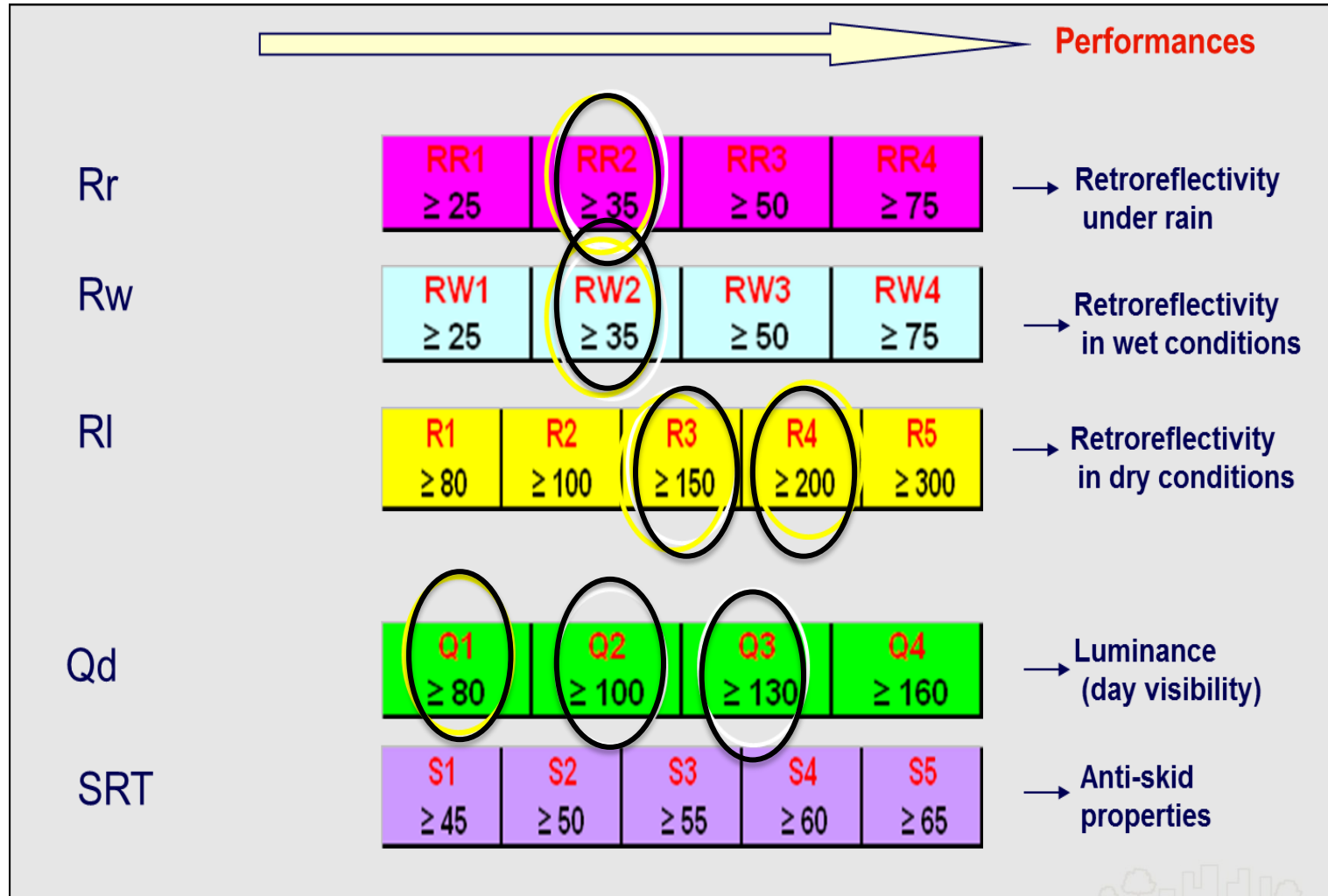
- 5 for products
- 1 for the performances in use
- 4 for FPC, durability test, composition analysis ....

## EN Standards : E 1790, EN 1871, EN 1423

- **EN1790 : Preformed marking**
  - Tapes
- **EN 1871 : Road marking**
  - Paint : solvent borne, water borne, multi components
  - Cold plastic
  - Thermoplastic
- **EN 1423 : Drop on materials**
  - Glass beads
  - Anti-skid Aggregates

**EN Standards are based on performances in use rather  
recipe based**

# EN 1436 : TOOL BOX FOR ROAD AUTHORITIES



# DURABILITY ASSESSMENT

The turntable according to EN 13197



**Wear Simulator** : The rollover parameters are fixed and the tests do not take in consideration all other parameters for ageing

The field test according to EN1824



**Field test** : Performance measurements are made under real traffic (cars, trucks), UV exposure, climatic variation, day/night temperature variation

## Two Main Conditions :

- Strong National Regulation for all road Category ( Urban Roads , Highways , National Highways , Rural Roads etc.)
  - $RI = 80-150 \text{ mcd/lux/m}^2$
  - $Qd = 100-130 \text{ mcd/lux/m}^2$
  - $SRT = 0,45-0,55$
- A Certification Process based on Performance and Compostion Determination

**.... BUT REQUIREMENTS ON THE ROAD AND CERTIFICATION PROCESS NEED CONTROL ...**



## RETRO-REFLECTIVITY



**STATIC**



**DYNAMIC**

## LUMINANCE

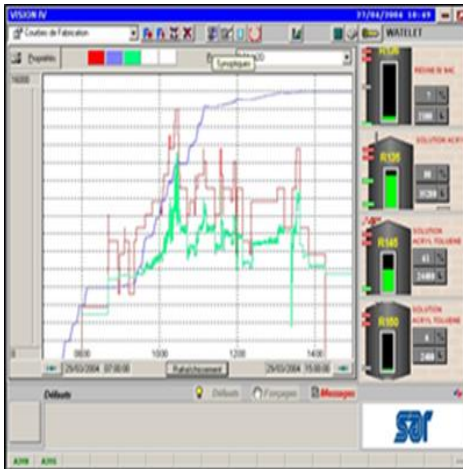


## ANTI-SKID PROPERTIES





# PRODUCTION CONTROL



- Physical Properties determines on each batch
- Yearly Audit of Road marking production by Certified body
- Random Collections of Samples at the customers storage or on the work site

## CONCLUSION

- **Road Safety cannot be improved without efficient marking**
- **Road Marking has to be understood as investment and Life cycle cost has to be calculated**
- **Maintenance Policy has to be built to have consistency**



A vertical graphic on the left side of the slide, resembling a road with a dashed center line and solid outer lines.

# Thank you

