SURF 2008

Pavement prediction performance models and relation with traffic fatalities and injuries

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Context of the study

o **French road management policy = regular measurements of road characteristics**

➜ **lot of data available**

o **A part of accidents are due to infrastructure characteristics (skid resistance, geometry…)**

➜ **correlations?**

➜ **threshold values?**

Objectives

o **Determining evolution laws**

➔ predict road skid resistance evolution with time

➔ increase management efficiency

o **Correlations with accidents**

➔ detect threshold values of skid resistance

How to do that?

Methodology

o **Extensive literature review**

o **Creation of a database**

- roads with traffic > 10 000 veh./day

- 5 types of pavement surfaces

- $\approx$ 500 km (path = 20 m)

- SFC and MPD

- Geometry (radius…)

- Accidents data (2000 – 2006)

Methodology

Methodology

o **Statistical analysis and correlations**

- SFC evolution laws depending on age and traffic

- Inclusion of geometry in the analysis

- Comparison with accidents occurrence

o **Next steps to complete the study**

Evolution laws (1)

o **Global analysis and analysis for each pavement type**

o **Non-linear regressions depending on:**

- Age (months)
- Total Traffic (TT = 30*ADT*AGE)
- NE (equivalent axles 13t = 365*TRA*AGE*CAM)

o **Global decrease of SFC with a logarithmic shape of the curves**

Evolution laws (2)

Thin asphalt concrete

$y = -7.03\ln(x) + 90.26$

$R^2 = 0.50$
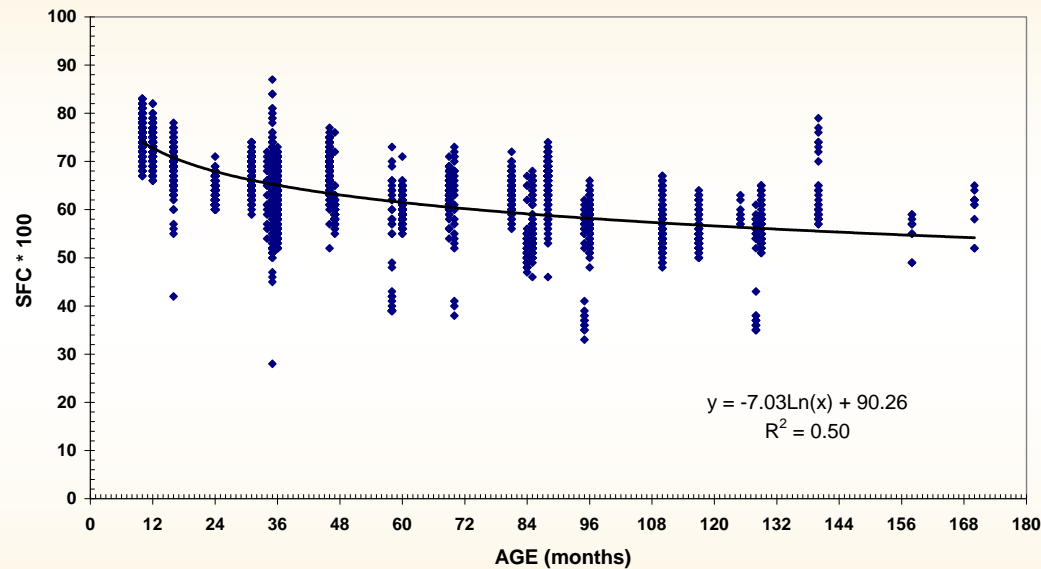
o **Coefficients of regression variable (0,09 – 0,50)**

Evolution laws (3)

o **Important seasonal effects ➜ corrections?**

- Roads of the database covers a wide area
- Lack of reference surfaces

➜ **way of improvement**

o **Geometry included: straight lines / curves**

- Data merged by considering classes of radius (0-150 m, 150-300 m, 300-600 m, > 600 m)
- Classes chosen with safety studies

Evolution laws (4)

o **Similar work ➔ similar results with geometry**

- Global decrease of SFC with a logarithmic shape of the curves in straight lines and in curves

- Coefficients of regression weak

➔ is the test tracks the same in curves (especially with low radius of curvature)?

➔ is SFC adapted to analysis in straight lines?

Link with accidents (1)

o **Accident rate:**

- number of accidents per year for 10^8 vehicles.km on an itinerary

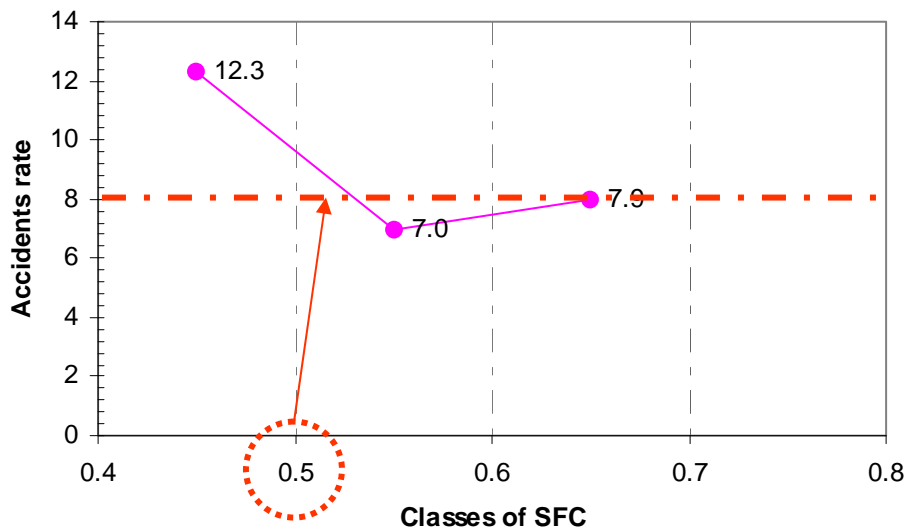$$\tau_{acc} = \frac{n_{acc}}{n_{veh} \, \Delta t.L} \times 10^8$$

- Wet surfaces considered

o **SFC values grouped in classes of 0.10 SFC units**

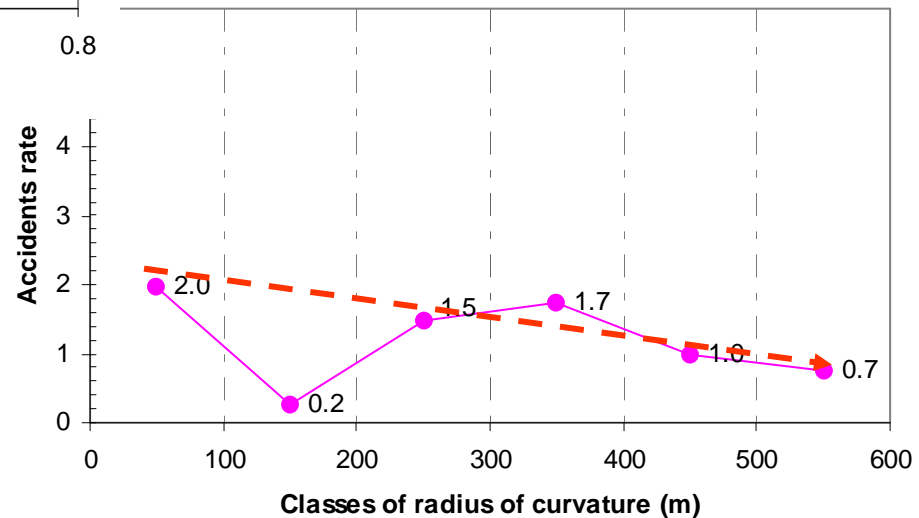o **Radius grouped in classes of 100 m units**

Link with accidents (2)
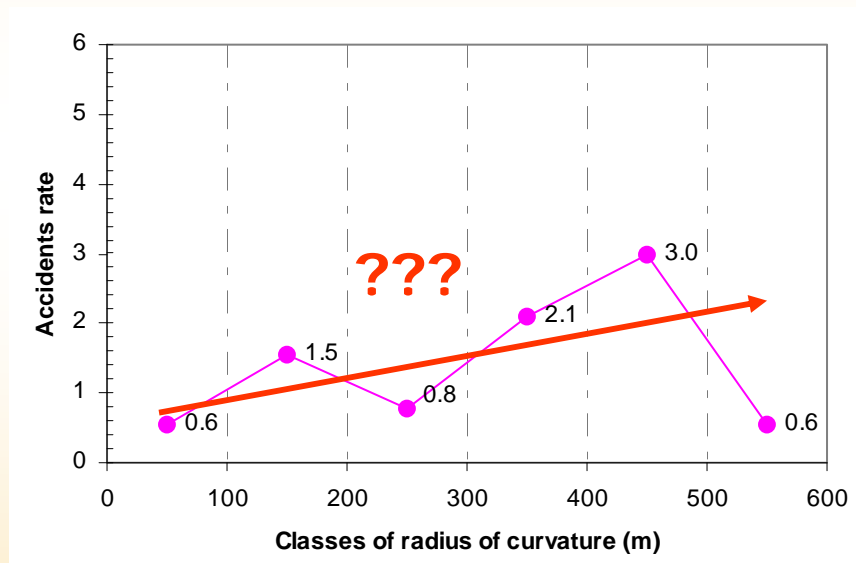
o **Some correlations**

- Rural roads

- Average daily traffic around 37 000 veh./day

Threshold value for SFC = 0,5

Link with accidents (2)

o **Special results…**

• Rural roads

• Average daily traffic > 45 000 veh./day

➔ accidents are mainly due to human behaviour

Concluding remarks

o **First part of the study presented in SURF 2008**

o **Next steps:**

- Increase the database size with roads having traffic < 40 000 veh./day

- References surfaces: seasonal effects corrections

- More complex statistical methods

- Use other safety indicators (accidents on wet surfaces compare to accidents on dry surfaces…)

THANK YOU FOR YOUR ATTENTION…

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