



WP3 Experts Workshop on Contributory Factors

Skid resistance introductory presentation
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Overview

- The purpose of this introductory presentation is to set the scene for the discussion section that follows.
- It will review briefly what we already know about factors that influence skid resistance
 - So that we have a common starting point for our discussion
 - And avoid re-inventing the wheel!

What do we know?

- To start, we need to distinguish between ***road/tyre friction*** and ***skid resistance*** Used

Road/tyre friction

- Affects **vehicle manouevres**
- Describes the forces generated between a road and a tyre.
- Is unique to a particular situation.
- Under particular local conditions.
- At a particular time.
- In a particular place.
- With a particular vehicle.
- With particular tyres.
- At a particular speed.

Skid resistance

- Used to assess the **road surface**
- A standardised measure of the contribution made by the road to tyre/road friction.
- It is assessed using standardised friction measurement techniques.
- Under standardised conditions.

What do we know?

- In TYROSAFE we are mainly concerned with the road's contribution
 - i.e. skid resistance
 - and how that is measured and managed.
- But we are also considering optimising this with two other aspects
 - rolling resistance and noise
- So we cannot ignore tyres.

What do we know?

- Skid resistance has been studied at many institutes for over three-quarters of a century.
- Many factors relating to the road surface that influence skid resistance are well known.
 - If not always well understood.

What do we know?

- The tyre industry places considerable emphasis on “wet grip” performance.
- Properties of tyres that influence tyre/road friction are well known within the tyre industry
 - But do not always take account of road surfacing properties.
- Tyre properties are not generally well understood by road engineers.

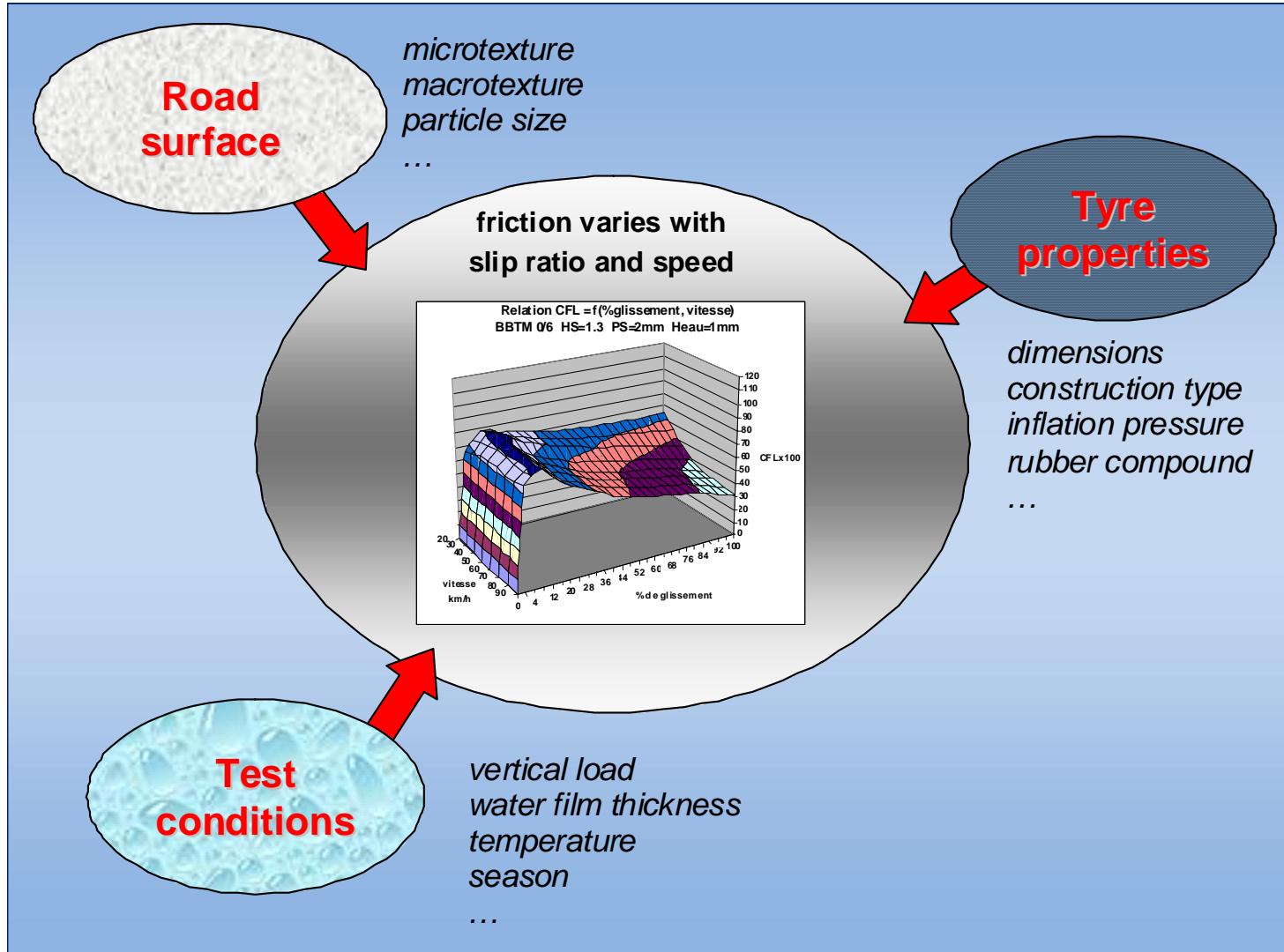
What do we know?

- Over the years, many devices have been developed to measure skid resistance.
 - TYROSAFE has identified at least 24 currently in use in Europe (deliverable D04 describes them).
 - and there have been others that are now no longer used.
 - Four basic techniques
 - Slider, angled wheel, slipping wheel, locked wheel
 - Test condition range from very low slip speeds through to locked-wheel
 - But difficult to harmonise.

What do we know?

- Using these devices we have learned much about the road and what influences skid resistance.
 - And something about tyres as well.

What do we know?



What do we know generally?

- Dry road/tyre friction is high
- Wet road/tyre friction is much less
 - And is affected by speed, decreasing as speed increases.
 - Especially with deep water films or smooth tyres.
- In the braking cycle
 - friction increases, reaching a peak level as the tyre begins to slip over the road surface.
 - Then decreases to give “sliding friction” when wheel locks or vehicle yaws.
 - So measurement methods are affected by slip ratio

What do we know about the road?

- Microtexture
 - Dominates low-speed friction and important at all speeds
 - Influenced by aggregate
 - Polishing by traffic
 - Seasonal variation
 - Cannot measure directly (yet)

What do we know about the road?

- **Macrotexture**
 - Important to limit decrease in wet friction with increasing speed
 - Too much generates noise and (perhaps) rolling resistance
 - Difficult to measure
 - Current techniques do not provide enough information for all the interaction with the tyre
 - Different texture forms may have same measured depth but different effects on noise and skid resistance

What do we know about the tyre?

- Tyre compound has major influence on friction developed
 - Interaction between adhesion and hysteresis
- Tyre loading has an effect
 - Greater load reduces friction
- Tyre tread can be analogous to road texture
 - Less effective when average depth <2 mm

What do we know about other factors?

- Temperature can affect tyre rubber
 - Hence available friction (and skid resistance measurements)
- Ice and snow?
 - Make roads slippery!
 - Studded tyres
 - Can “retexture” roads to remove effects of summer polishing every year

Aims of the discussion session

- To follow on from this presentation and
 - Identify any other factors that have or may have an influence on skid resistance
- To discuss what we know in order to:
 - Identify gaps in knowledge that could be improved by further study.
 - Identify areas where greater coordination or collaboration would enhance knowledge or application of research.