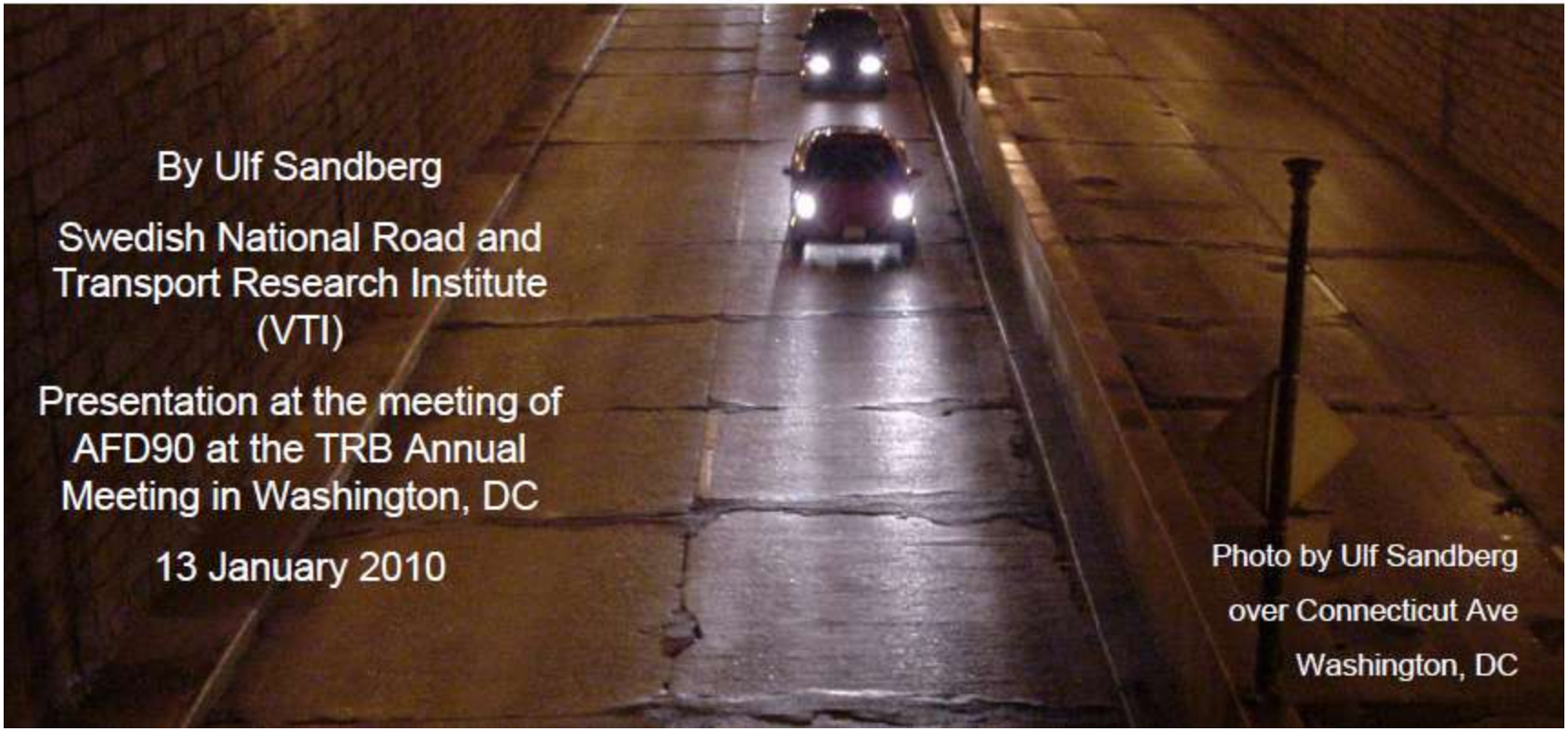
MIRIAM

Models for rolling resistance In Road Infrastructure Asset Management systems



By Ulf Sandberg

Swedish National Road and Transport Research Institute (VTI)

Presentation at the meeting of AFD90 at the TRB Annual Meeting in Washington, DC

13 January 2010

Photo by Ulf Sandberg over Connecticut Ave Washington, DC

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What is MIRIAM?

Project started in 2009 by 11 partners from Europe, incl two from USA

Pooled, internal funding (so far)

Aims at providing a sustainable, environmentally friendly road infrastructure …….

by reducing rolling resistance – hence lowering CO_2 emissions and increasing energy efficiency

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Justification

Road transport is the second largest contributor to Green House Gas emissions (GHG)

Passenger cars, for example, have a significant impact on climate change in Europe: approx. 12 % of total CO_2 emission

Emissions from transport in the EU have increased by 26% from 1990 to 2004

EU Commission focuses on reducing the GHG by tighter regulations for vehicles through regulations Euro 5 and 6 for cars and Euro VI for trucks

The rolling of tires is one of the major sources of energy losses in road vehicles; thus must be part of a policy aiming at reducing energy and GHG emissions

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Overall objectives of the project

- To help providing a sustainable and environmentally friendly road infrastructure
- To develop an integrated methodology for improved control of road transport CO_2 emissions
- To implement the methodology in road asset management systems, to optimize the reduction of CO_2 emission related to the interaction vehicle/tire/pavement
- To optimize pavement quality and condition in relation to CO_2 emission and energy consumption
- To provide better quality of life for society in general

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More concrete objectives

To develop models for:

The sources

Rolling resistance model, as related to pavement properties, with consideration of tires and vehicles

The effects

Model for energy consumption and CO_2 emissions due to rolling resistance

Integration and implementation

Transport infrastructure operation and management as related to rolling resistance

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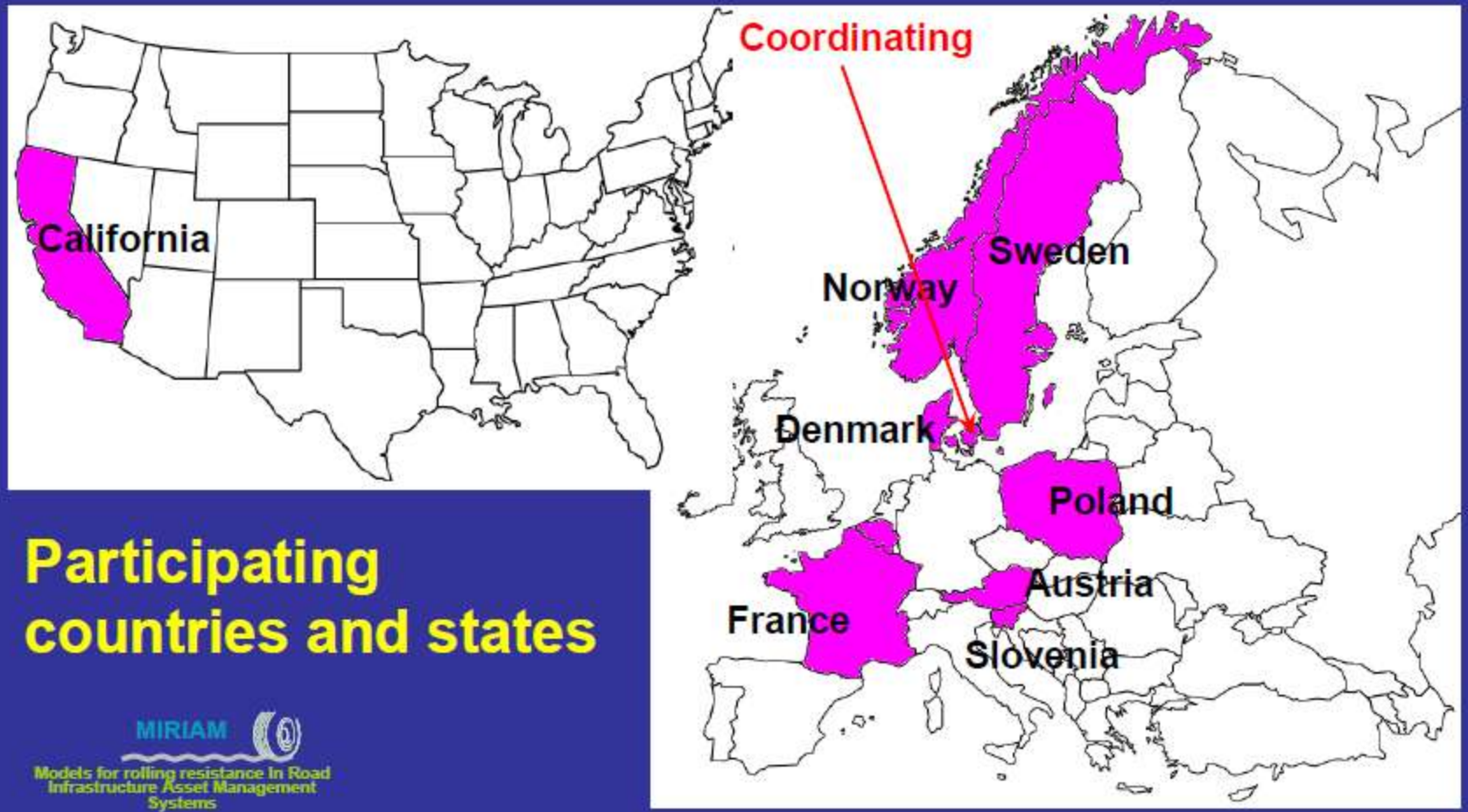

Participating countries and states

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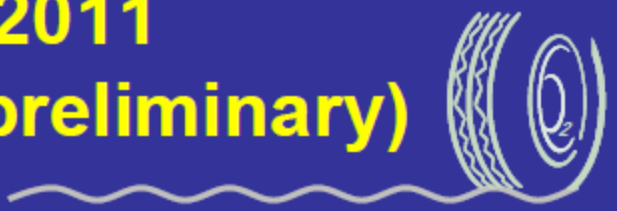
Phase 1: 2010-2011
Sub-projects (preliminary)



1 Measurement methods and source model(s) (Leader: VTI, Sweden)

2 Influence of pavement characteristics on energy efficiency (Leader: AIT, Austria)

3 Importance of Rolling Resistance on efficiency within an LCA framework (Leader: UC Davis, USA)

4 Constraints / Requirements to implementation in Asset Management and LCA systems (Leader: DRI, Denmark)

5 External funding and raising awareness (Leader: DRI, Denmark)

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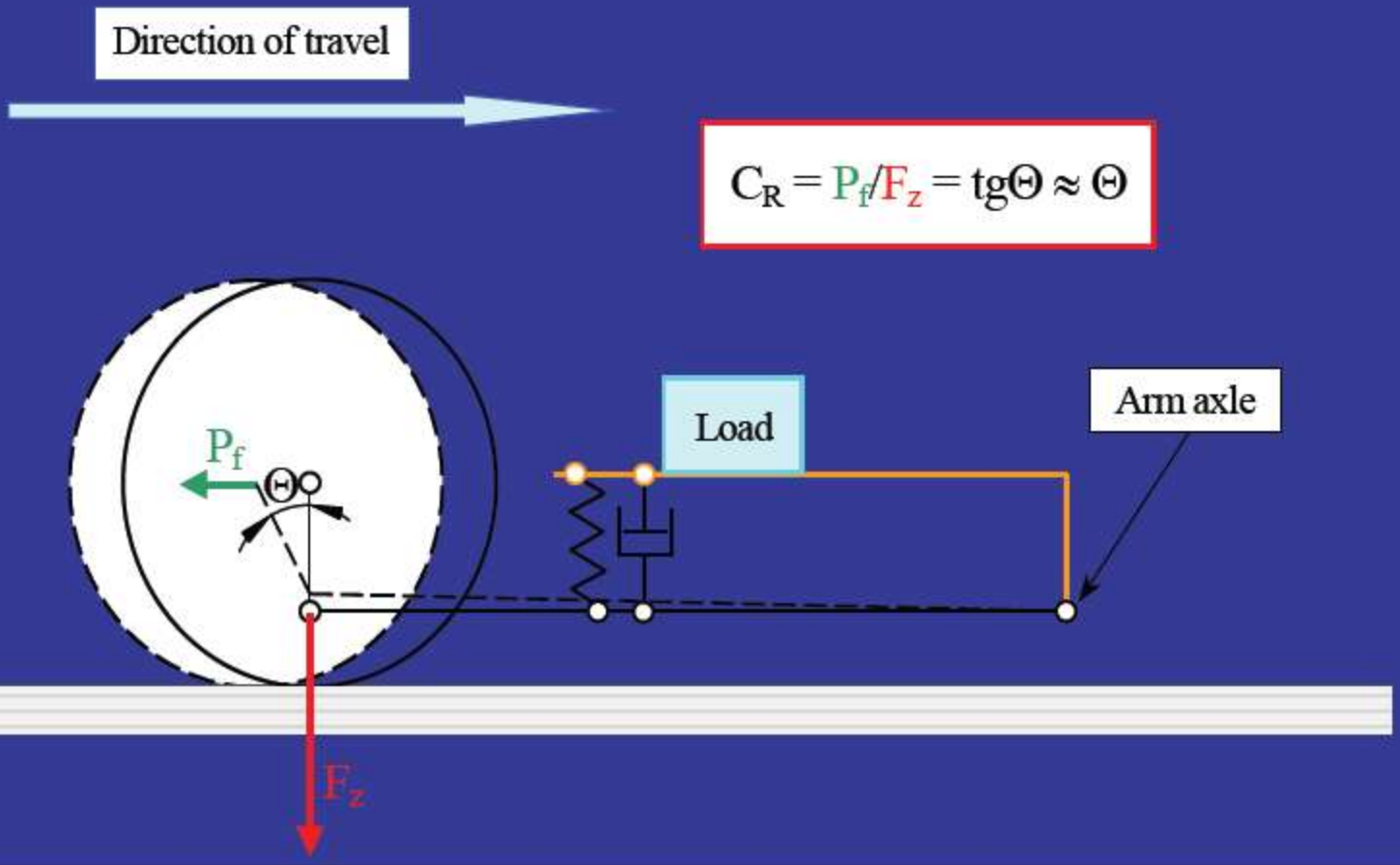
What is rolling resistance?



Measurement methods and equipment

Four main methods in our work:

Rolling resistance: Measurement on drum (ISO 18164)

Fuel consumption: Measurement with instrumented car

Rolling resistance: Measurement with test tire on trailer

Rolling resistance: Coast-down with car or truck

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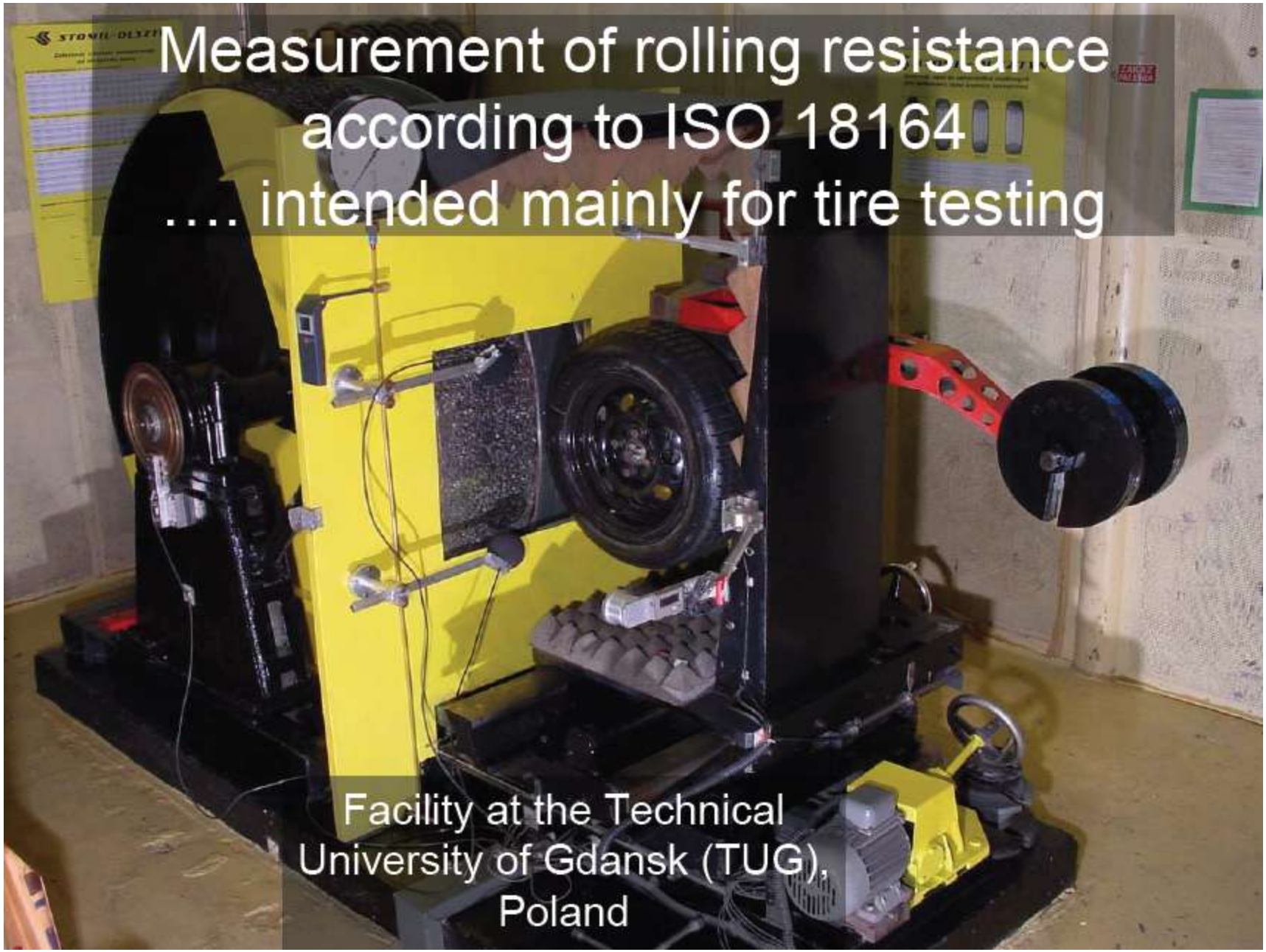
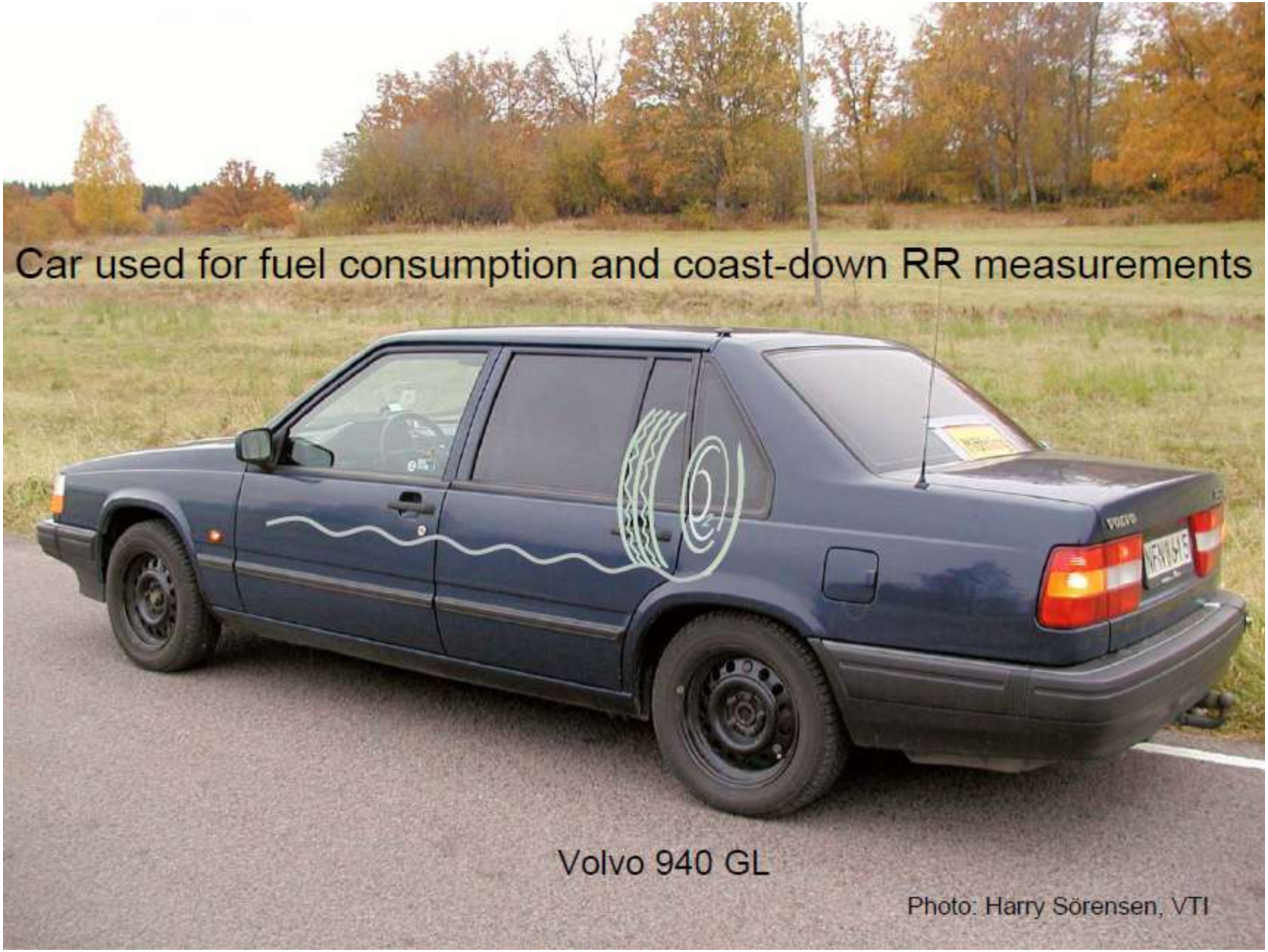

Measurement of rolling resistance according to ISO 18164
…. intended mainly for tire testing
Facility at the Technical University of Gdansk (TUG), Poland

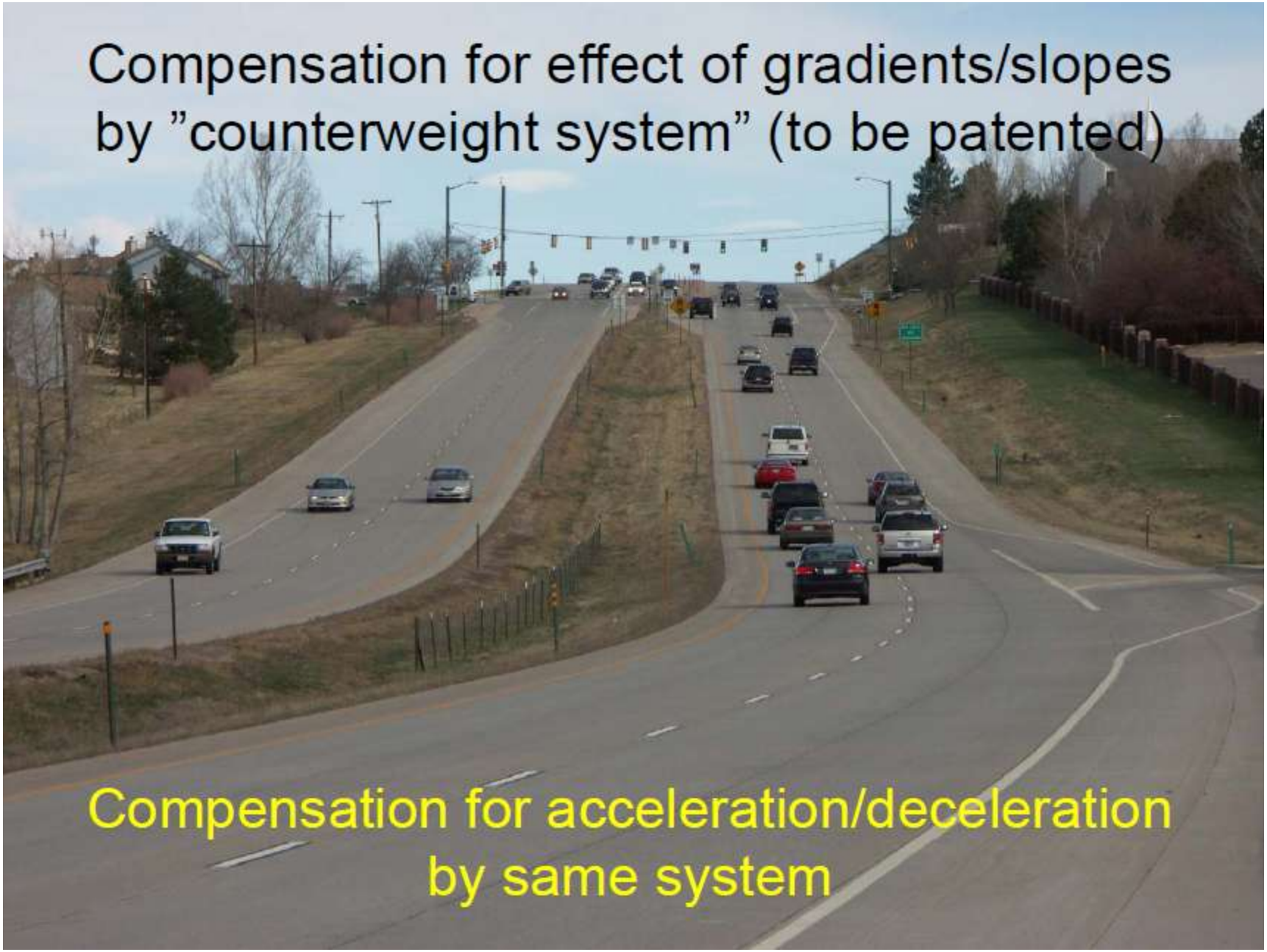

Car used for fuel consumption and coast-down RR measurements
Volvo 940 GL
Photo: Harry Sörensen, VTI


Test tire used in this application
Michelin Energy MXT
185/65R15 88 T

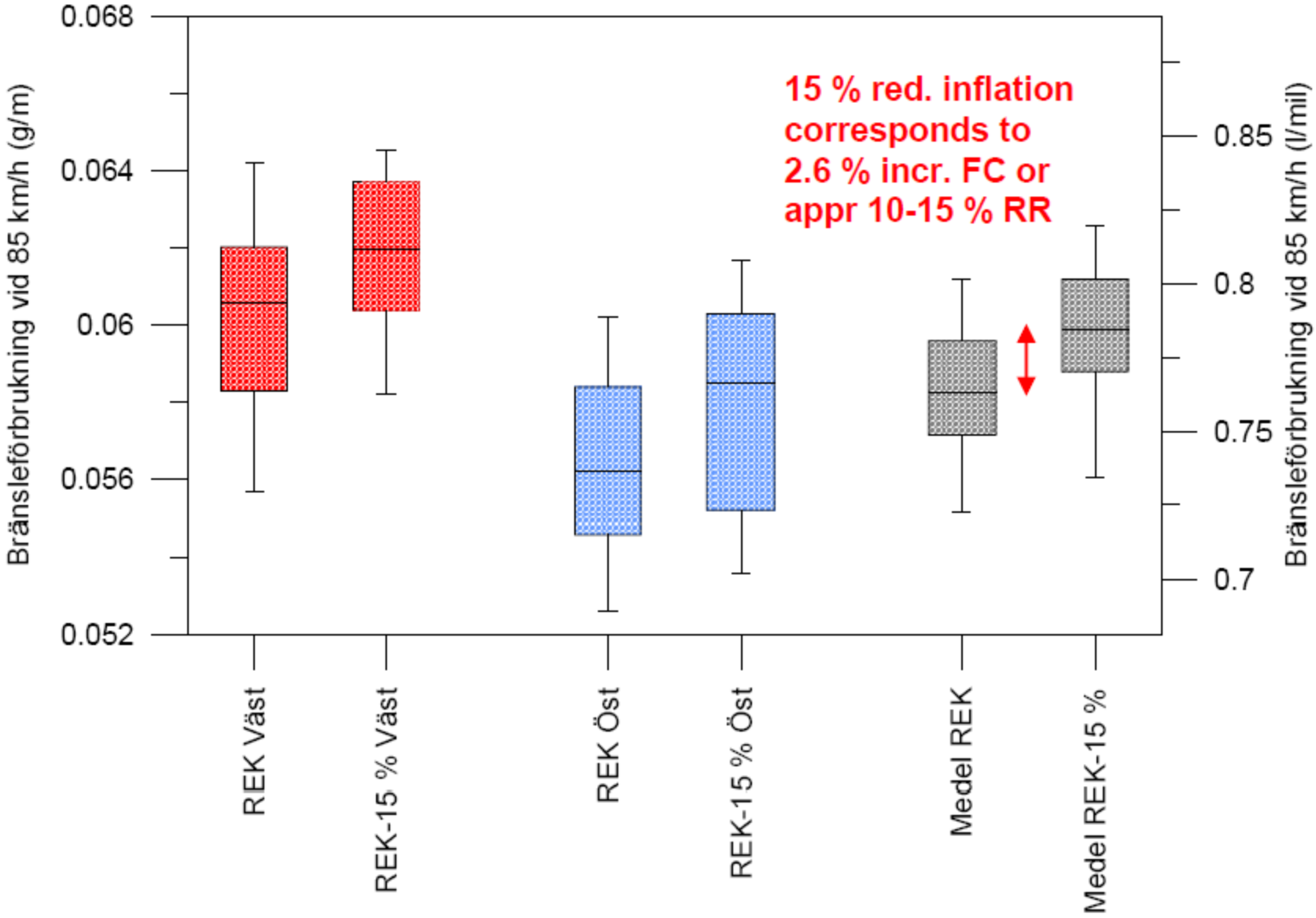
VTI's truck "RDT" performing coast-down measurements

Technical University of Gdansk

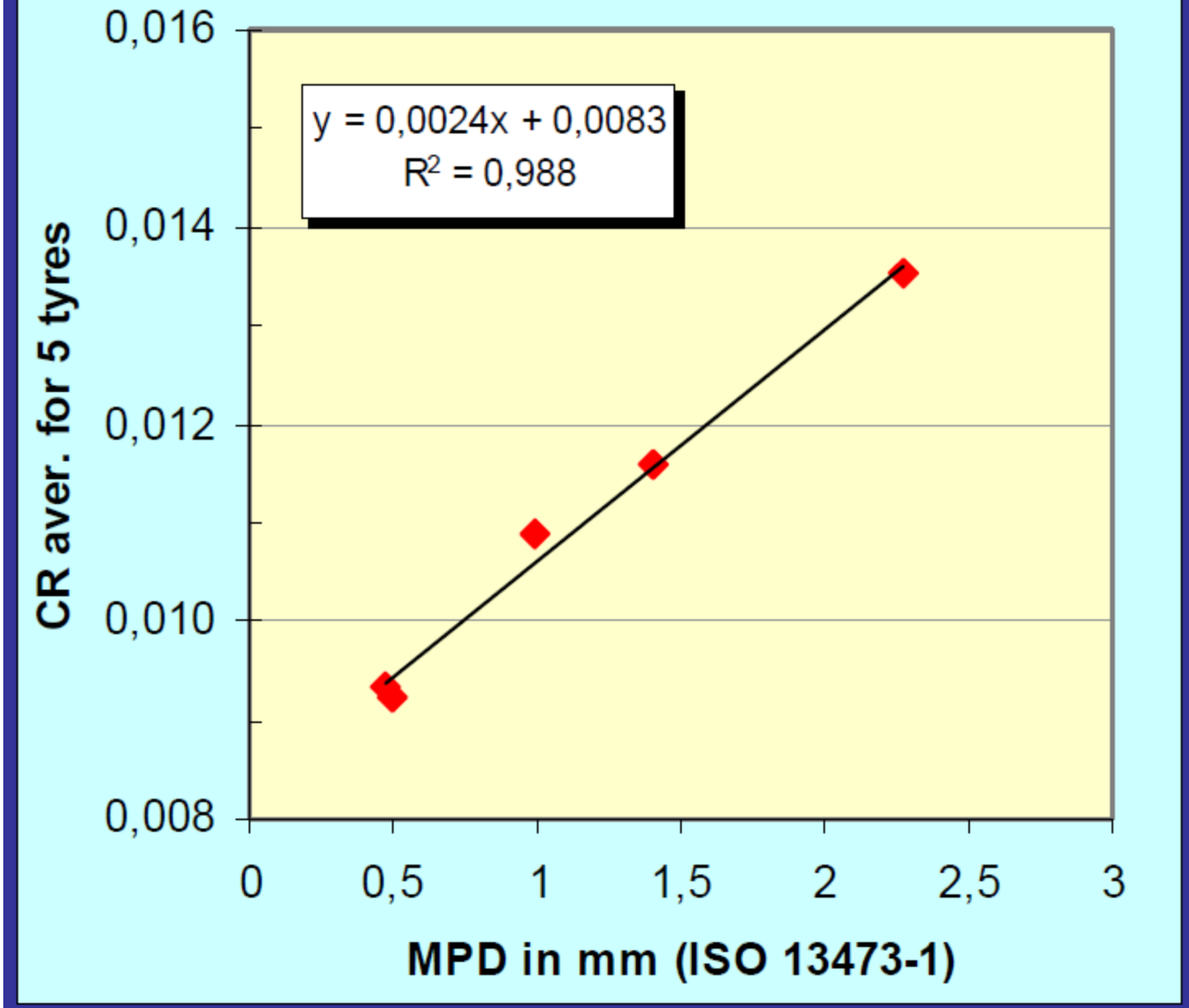
Trailer constructed at TUG used for measurements at VTI in Sweden


Compensation for effect of gradients/slopes
by ”counterweight system” (to be patented)
Compensation for acceleration/deceleration
by same system

Effect on fuel consumption of tyre inflation pressure



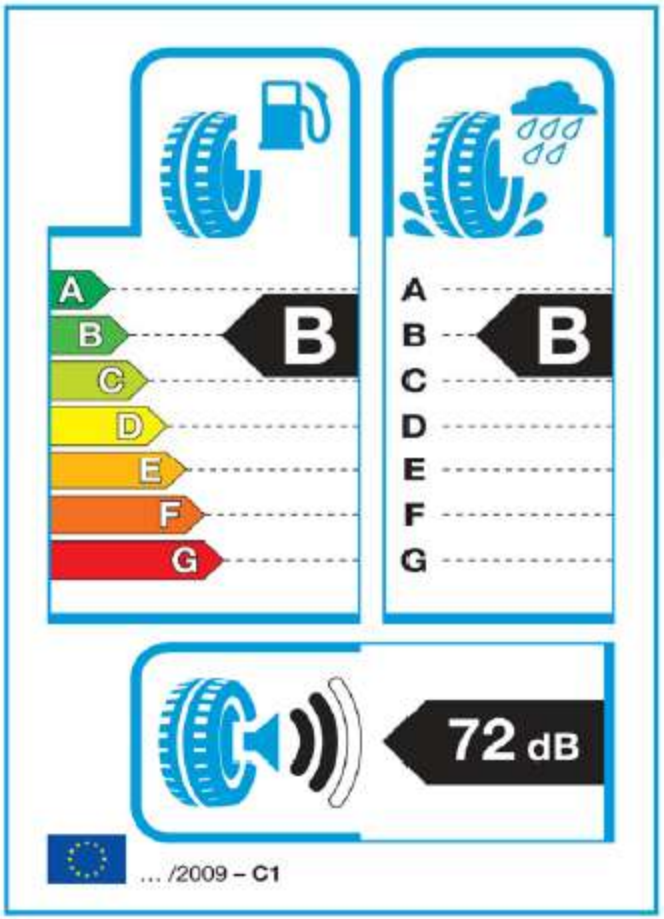
Correlation between rolling resistance and pavement texture



Some recent advances in Europe with respect to rolling resistance

REGULATION (EC) No ???/2009

Labelling of tyres with respect to fuel efficiency and other essential parameters



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