



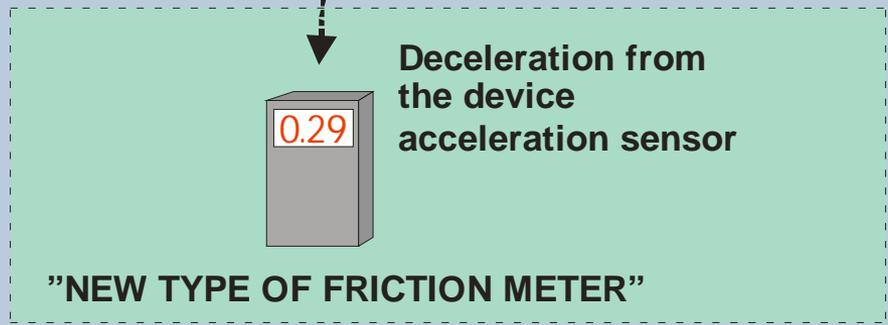
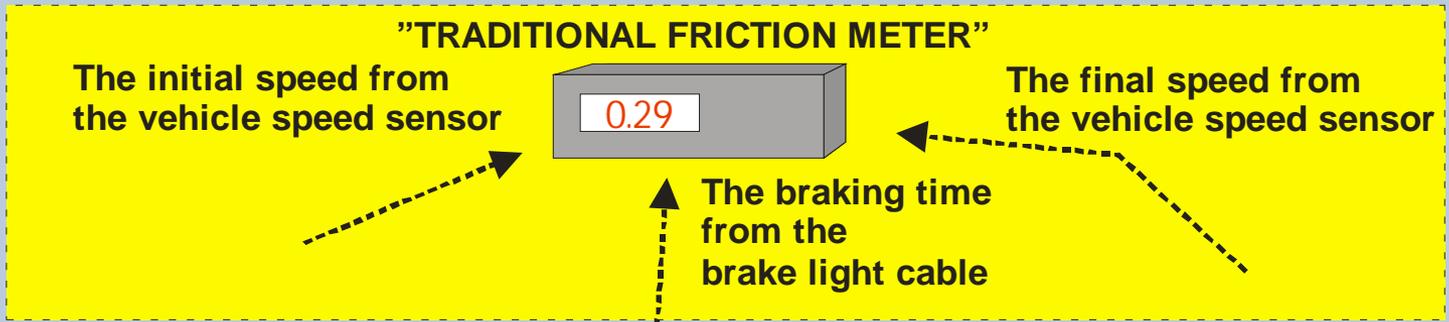
Mikko Malmivuo

FRICTION METER COMPARISON STUDY 2011

BACKGROUND

- ✘ *The friction requirements are an essential part of the winter maintenance quality requirements in public roads in Finland.*
- ✘ *The road authorities determine the methods and devices to be used in friction measurements.*
- ✘ *In the early spring 2011 the Traffic Agency financed a test series for two main groups of meters:*
 - ✘ *A: Friction meters to be used when braking*
 - ✘ *B: Other friction meters*
- ✘ *The group A meters are accurate enough for winter maintenance quality control. The group B meters were designed e.g. for road weather monitoring.*
- ✘ *The devices were tested both on the road and on the special test tracks.*

GROUP A: FRICTION METERS TO BE USED DURING BRAKING



MAIN RESULTS FOR THE GROUP A METERS

TRADITIONAL FRICTION METER (Eltrip-45n)

- + less sensitive to the braking time
- + less sensitive to the human (user) mistakes
- complicated installation (needs professionals)
- unable to measure friction on hills

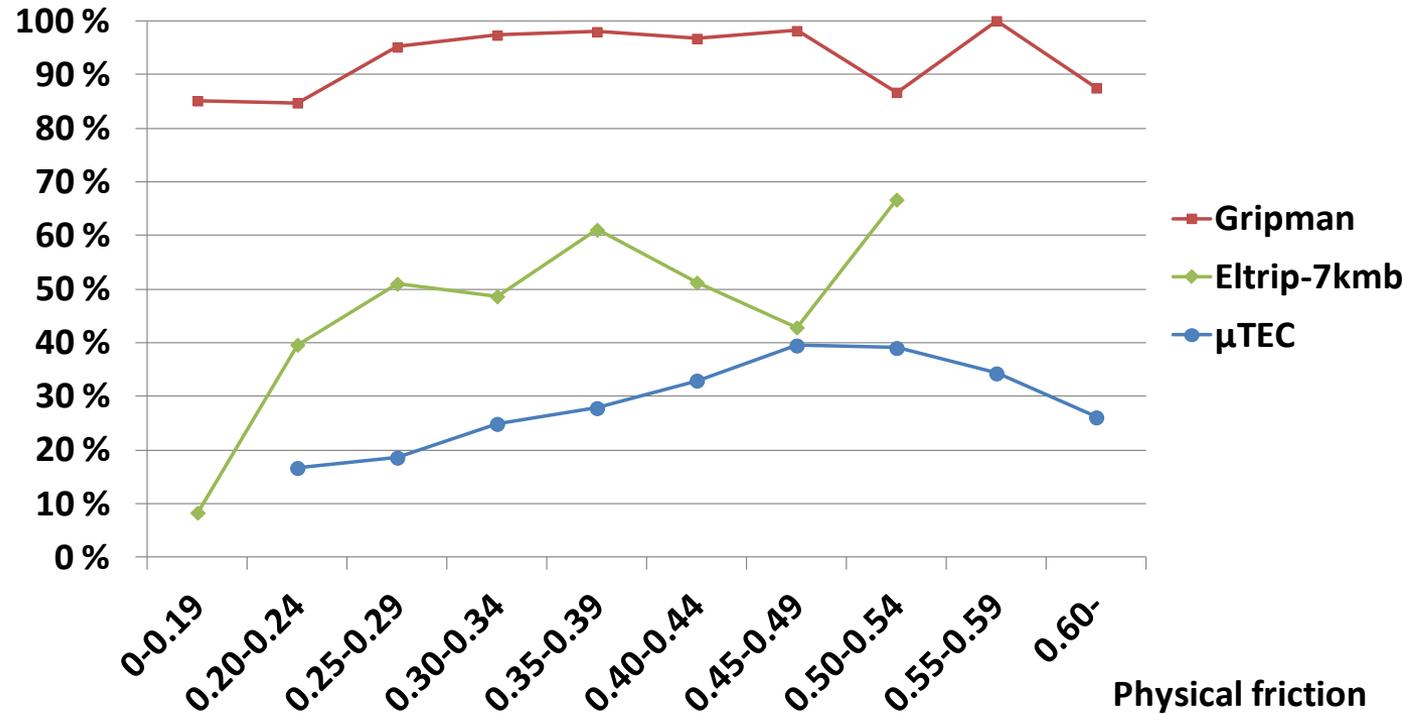
FRICTION METERS USING ACCELERATION SENSOR (Gripman, μ TEC, Eltrip-7kmb)

- + easy to install
- + Gripman and μ TEC were able to measure friction on hills
- Loose attachment or position changes after calibration affect to the result

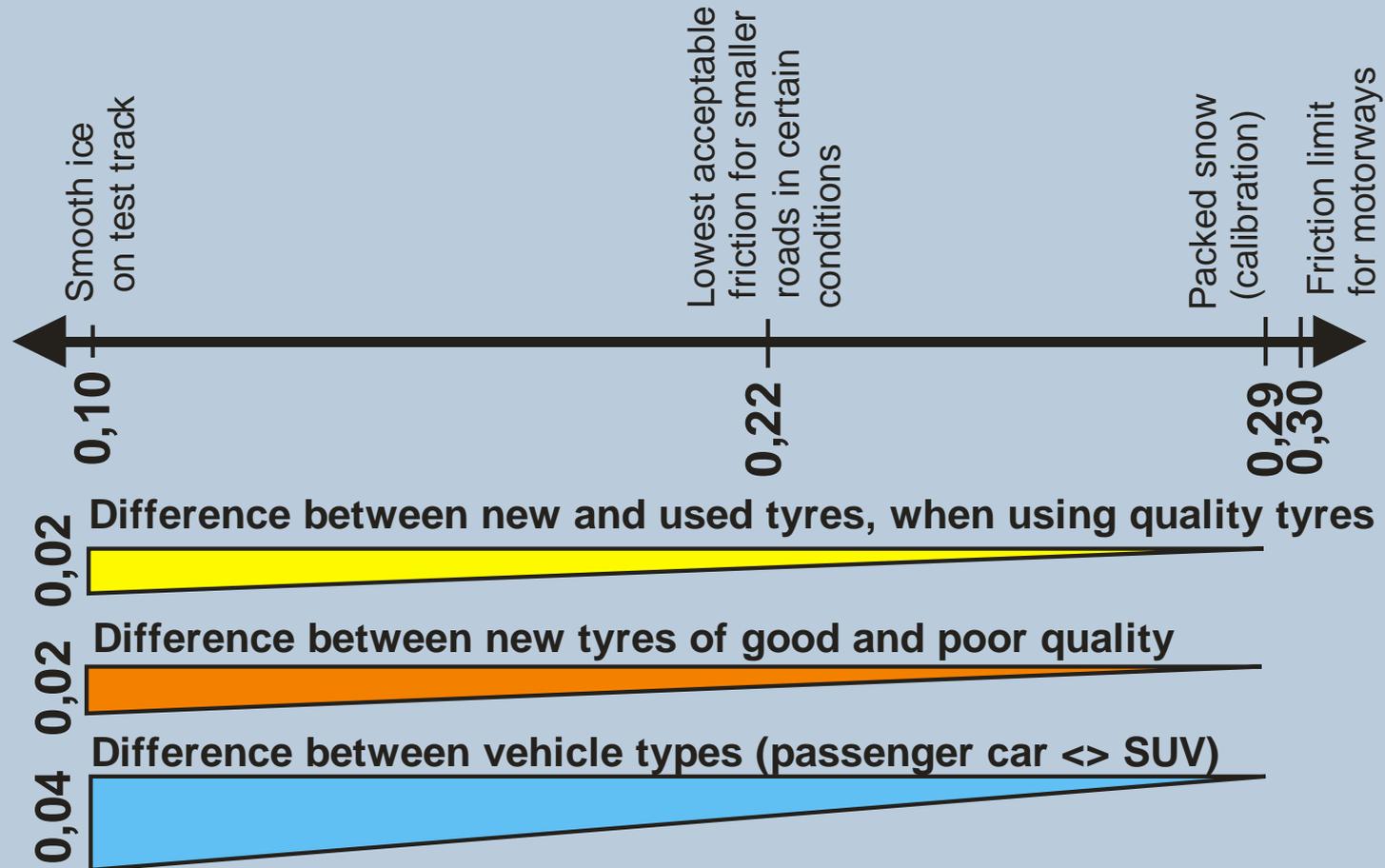


MAIN RESULTS FOR THE GROUP A METERS

The share of measurements, in which the difference between two meters is equal or less than 0,02



MAIN RESULTS FOR THE GROUP A METERS



GROUP B FRICTION METERS



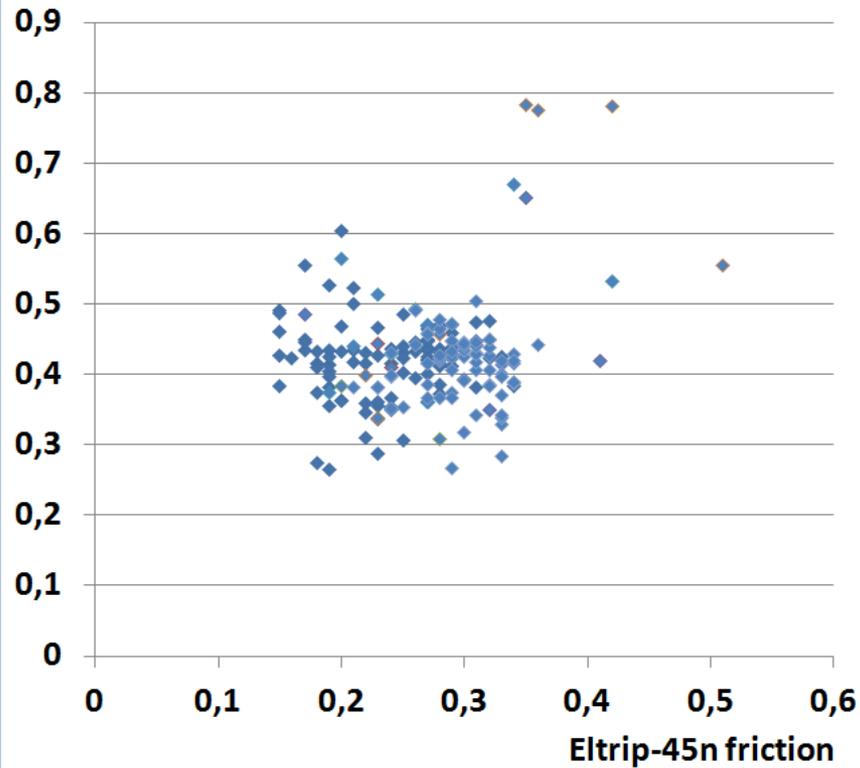
DSC111

RCM411

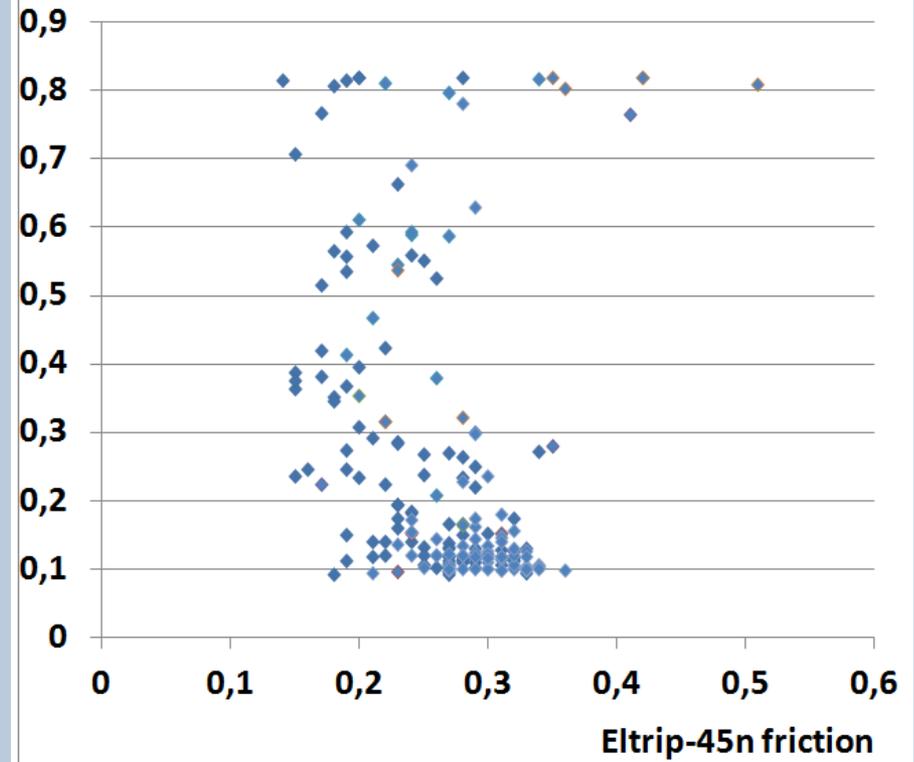
MAIN RESULTS FOR THE GROUP B METERS

Results from the road

RCM411 friction average ± 15 sek.



DSC111 friction average ± 15 sec.



CONCLUSIONS

- ✘ *The friction meter testing is important before using them more widely. Both the Finnish tests and the tests in other nordic countries have revealed weaknesses, the manufacturers have repaired afterwards.*
- ✘ *The quality requirements for friction meters has been made in the basis of the tests carried. In the future, the friction meter manufacturer needs to present a report card of the conformity with the quality requirements, if they want their meters to be used in the winter maintenance quality control in Finland.*
- ✘ *The best acceleration sensor meters have achieved the level, which is good enough for winter maintenance quality control.*
- ✘ *The best optical meters seems promising. Their role in the road weather monitoring will increase in the near future, but they are still too unreliable for the winter maintenance quality control.*