

Benchmarking dynamic performance

Workshop OECD/ITF International Study on Truck Safety, Productivity, and Sustainability

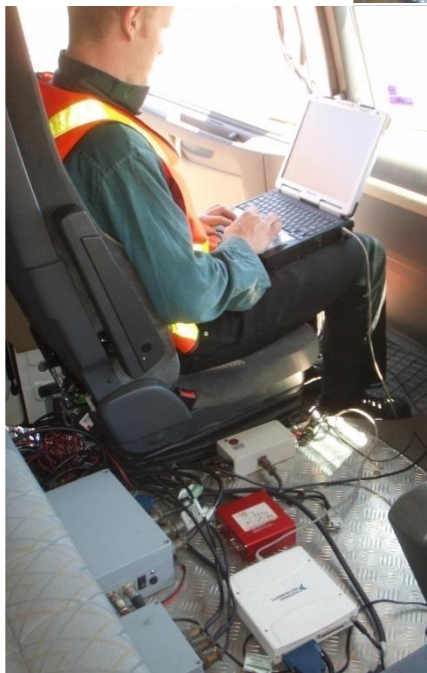
Transportation Research Board 89th Annual Meeting

Washington DC

10 January 2010

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Australian Road Research Board

Australian experience - vehicle testing

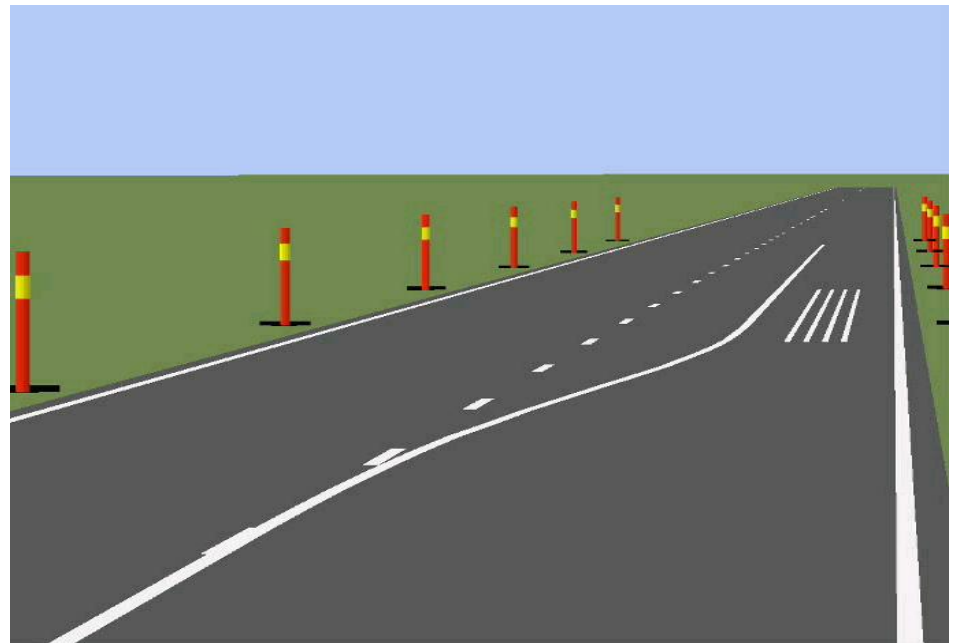


Testing / simulation

Left screen shows a vehicle undergoing a full 'lane change manoeuvre' during an ARRB testing program. The driver must follow the yellow markers.



Left screen shows the same manoeuvre using computer simulation. The four white lines represent the maximum "off-tracking" permitted for each level. Note this vehicle does not exceed Level 1 (0.6m).

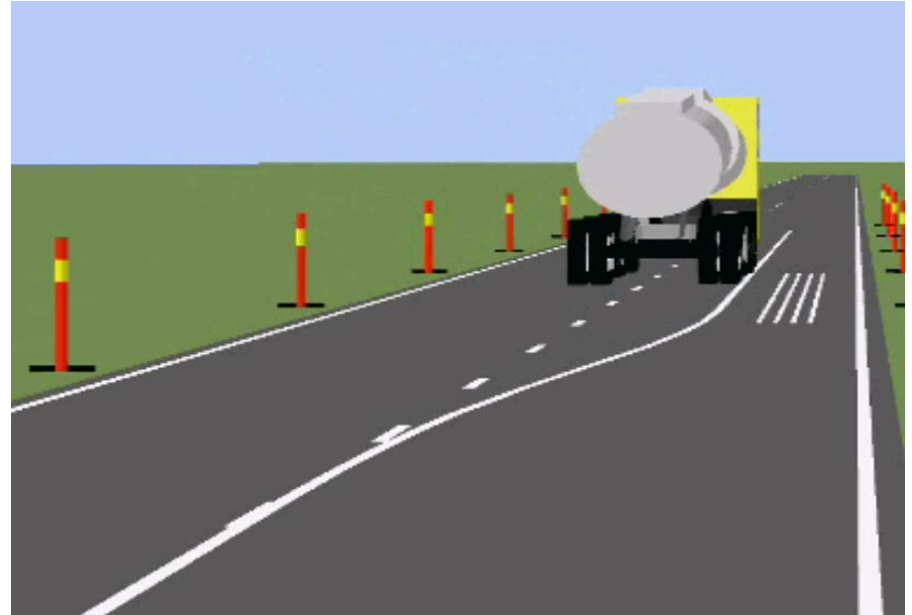


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Safety assessment via simulation

40 vehicle configurations across 10 OECD countries



Classification of vehicles

Workhorse vehicle: < 50 tonnes and < 22 metres, the vehicle most commonly used for long haul transport.

Higher capacity vehicle: < 70 tonnes and < 30 metres, typically operated under restricted access conditions.

Very high capacity vehicle: ≥ 72 tonnes and ≥ 30 metres typically operates under permit conditions and often in rural or remote areas.

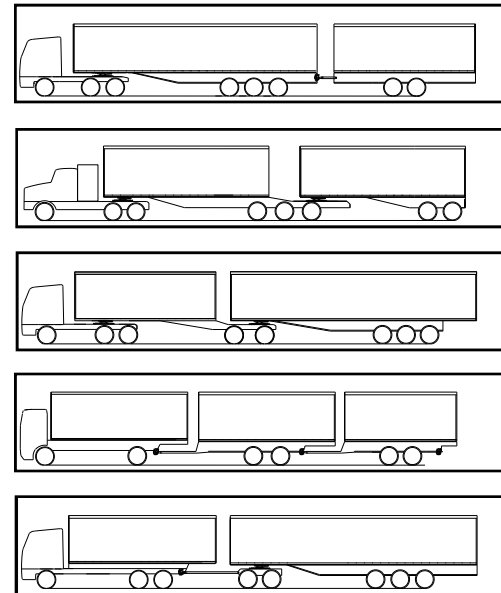
Workhorse vehicles (22 in total)

- Australia (1)
- Belgium (1)
- Canada (2)
- Denmark (3)
- Europe (4)
- Mexico (3)
- South Africa (2)
- United Kingdom (3)
- United States (4)



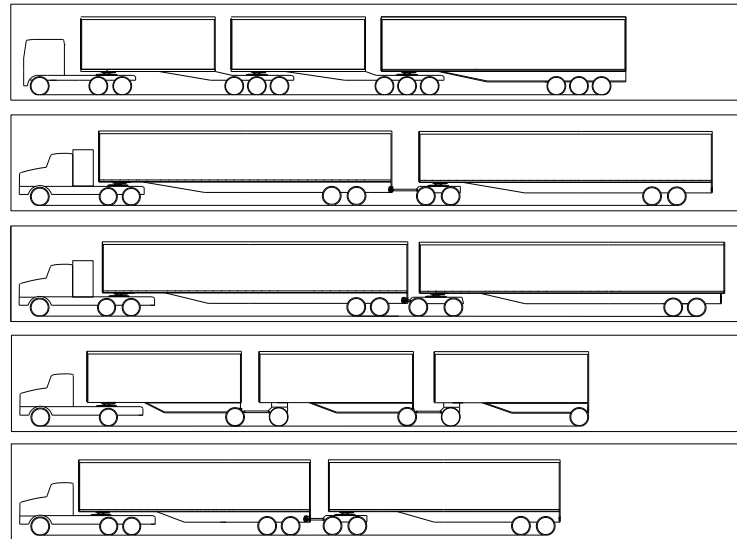
Higher capacity vehicles (13 in total)

- Australia (1)
- Belgium (1)
- Canada (1)
- Denmark (2)
- Germany (1)
- Netherlands (3)
- South Africa (2)
- United States (2)



Very high capacity vehicles (5 in total)

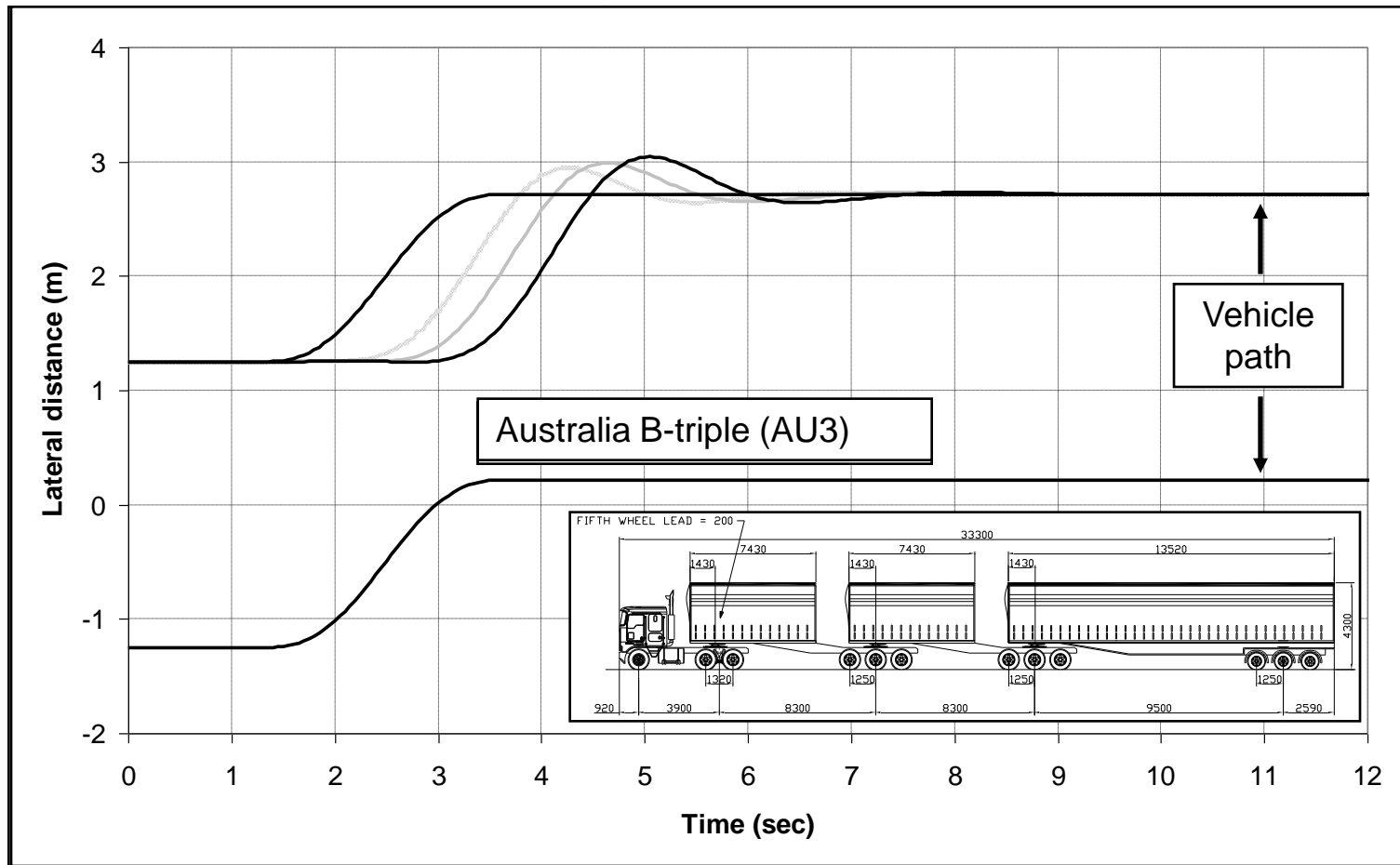
- Australia (1)
- Canada (1)
- Mexico (1)
- United States (2)



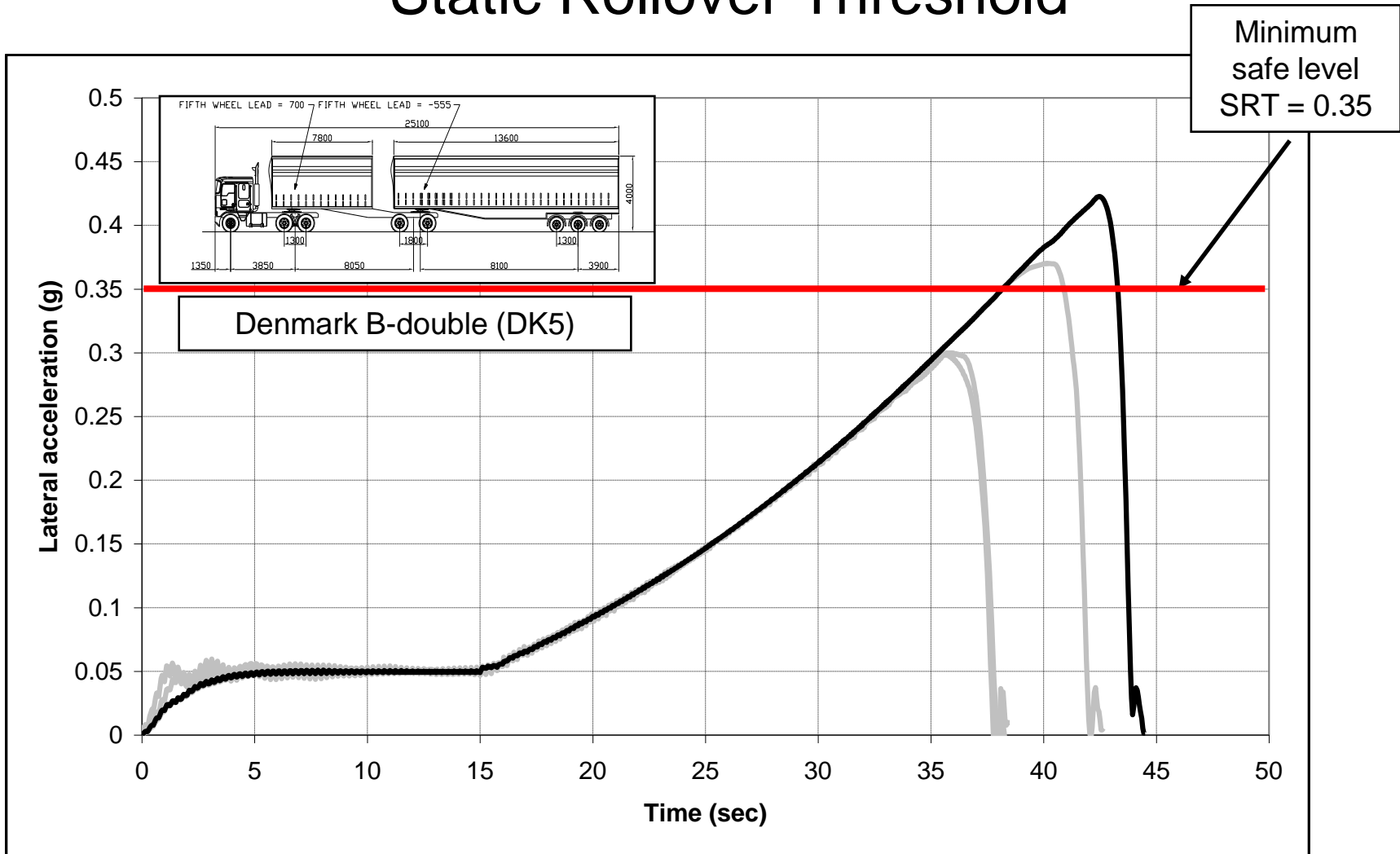
Benchmarking measures

- Tracking ability on a straight path (TASP)
- Low speed swept path (LSSP)
- Static rollover threshold (SRT)
- High speed transient off-tracking (HSTO)
- Rearward amplification (RA)
- Load transfer ratio (LTR)
- Yaw damping coefficient (YDC)

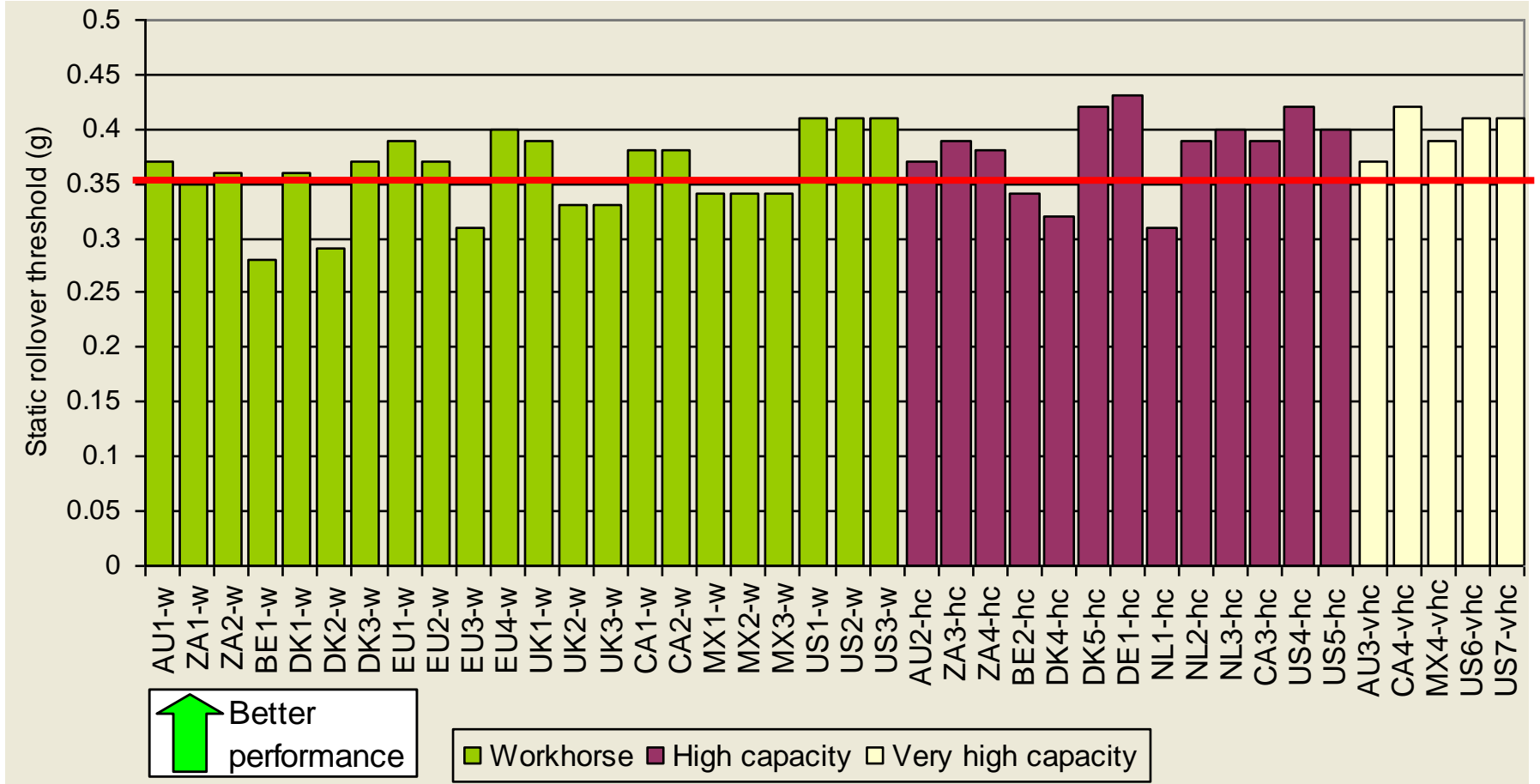
Offtracking (HSTO) during lane



Static Rollover Threshold

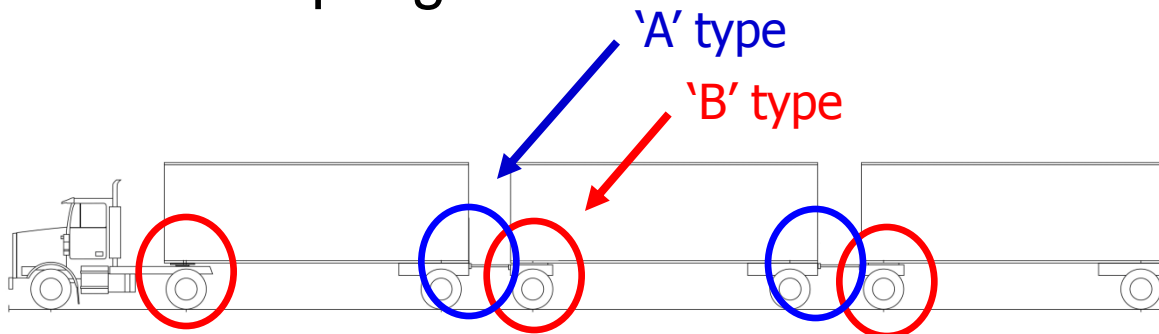


Static Rollover Threshold

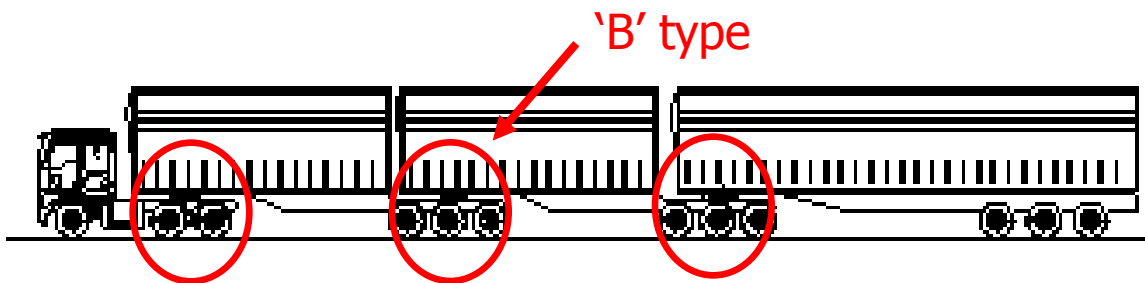


Data analysis

- Ratio of 'B' type couplings to number of total couplings

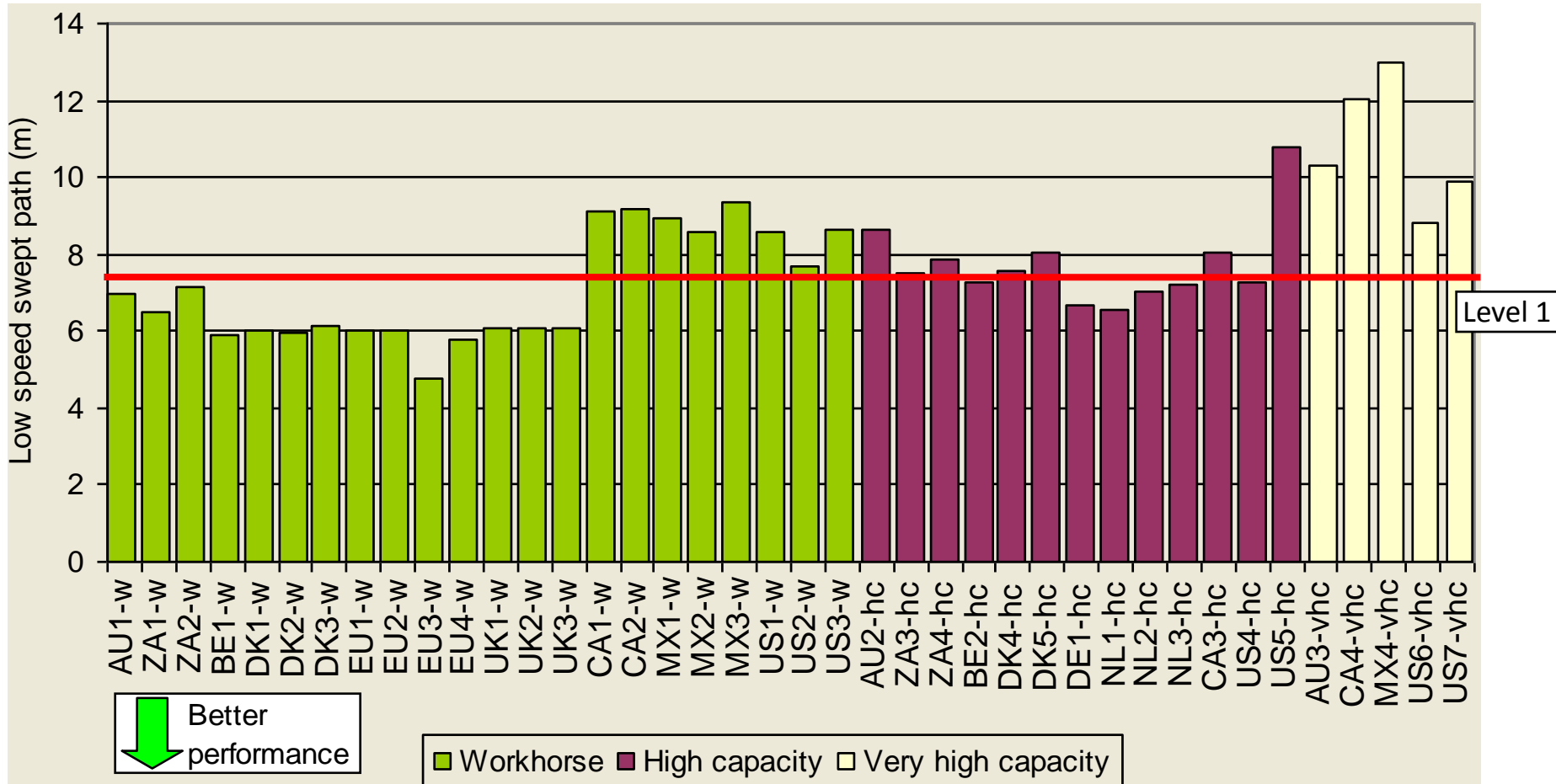


- US 6
 - 2 'A'
 - 3 'B'
 - Ratio of 0.6

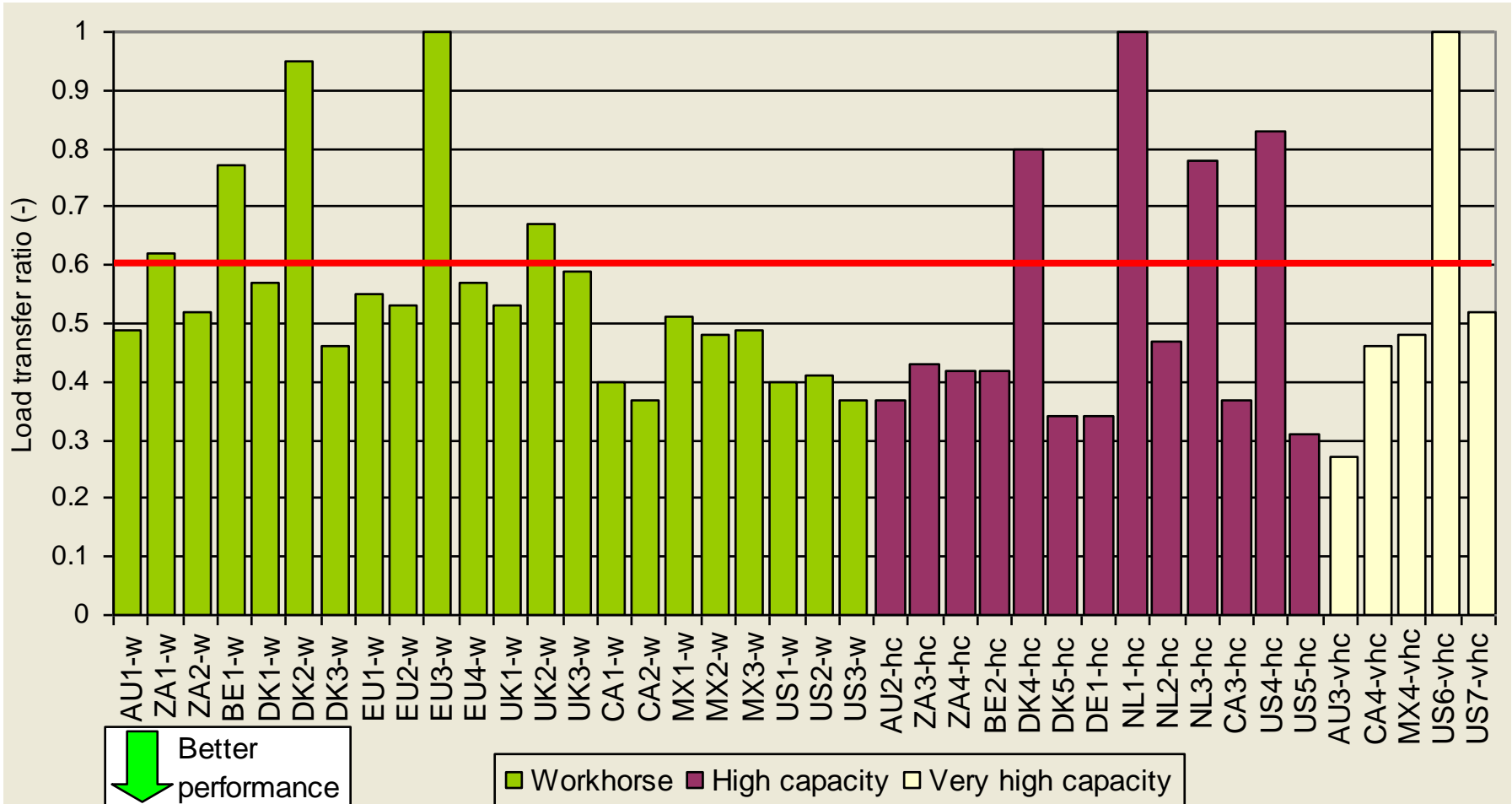


- AU 3
 - 0 'A'
 - 3 'B'
 - Ratio of 1.0

Low speed swept path



Load transfer ratio



Results summary

Low speed swept path

- Highest correlation with vehicle category
- Only measure where none of the very high capacity vehicles passed the Level 1 requirements
- Manoeuvrability would prevent very high capacity vehicles from accessing the entire road network (i.e. inner urban and city areas)

Results summary (cont)

Static rollover threshold

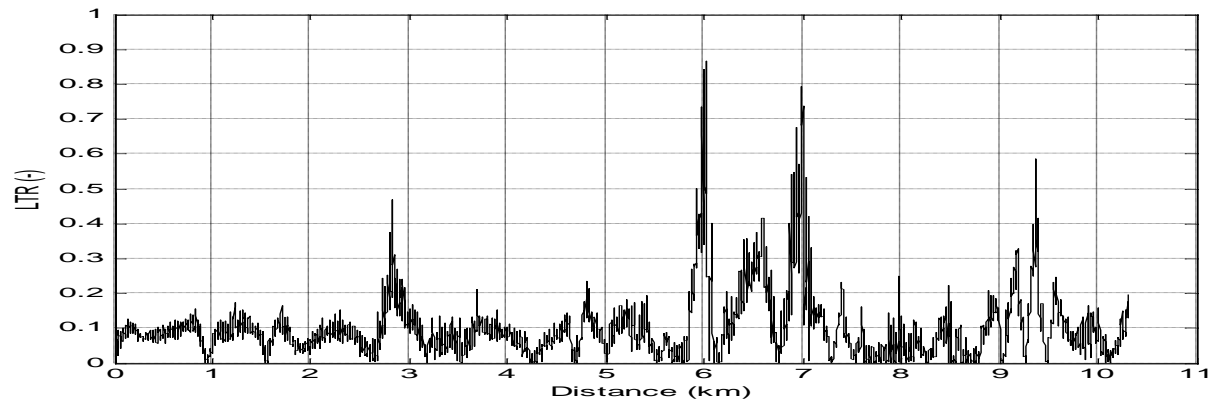
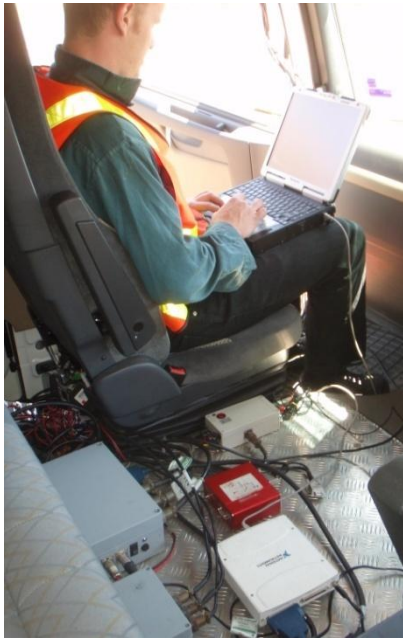
- Very high capacity and higher capacity vehicles were able to achieve better performance than workhorse vehicles in most instances.
- Typically the very high and higher capacity vehicles comprise more axles for the increase in capacity and have coupling types that improve roll stability.

Results summary (cont)

High speed dynamic performance

- The results were similar for all vehicle categories, indicating that very high capacity vehicles can perform equally or better than some common workhorse vehicles.
- One vehicle from each of categories (including workhorse) that reached critical instability (experiencing wheel lift off or rollover) during this manoeuvre.

Vehicle trials – acquire data during normal operation

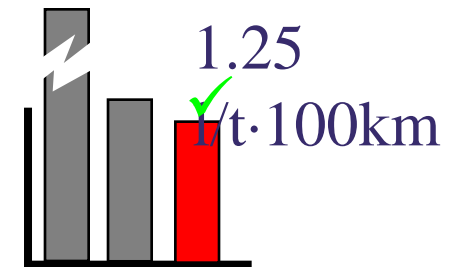
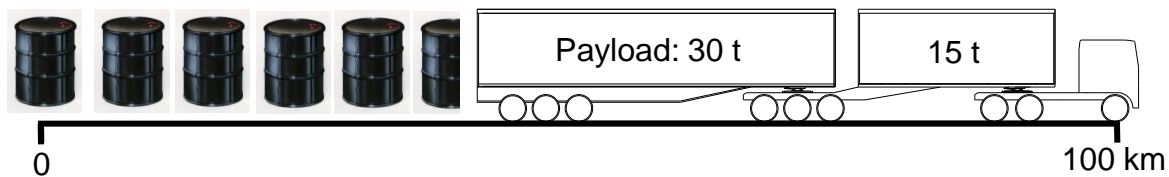
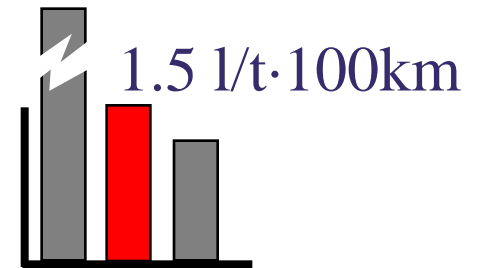
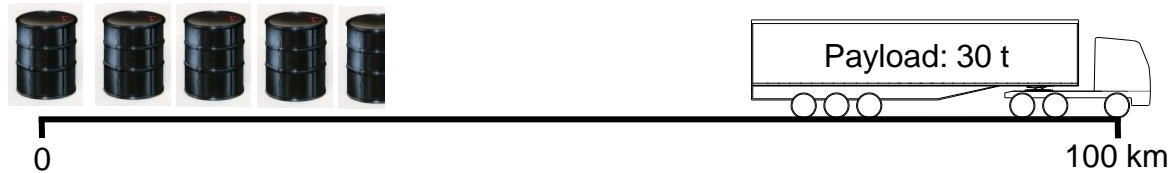


+13% efficiency



Renault trailer at Lyon Word Truck Forum, May 2009

Simulation example +16 % efficiency



Travel speed for all vehicles: 100 km/h

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