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INTERNATIONAL VEHICLE PERFORMANCE BENCHMARKING (OECD STUDY)

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LCPC Laboratoire Central des Ponts et Chaussées
L'esprit de recherche au cœur des réseaux

OECD/International Transport Forum Joint Transport Research Centre Working Group Project

- *Heavy vehicles: regulatory, operational and productivity improvements*
  - Vehicle benchmarking – how do heavy vehicles from various countries compare?
    - 1) vehicle dynamics
    - 2) Productivity / efficiency

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Defining the vehicles for study

- Each country or region submits vehicle data on three separate vehicles
  1) Workhorse vehicle
  2) Higher capacity vehicle
  3) Very high capacity vehicle

Data includes weight and dimension data suitable for simulation.

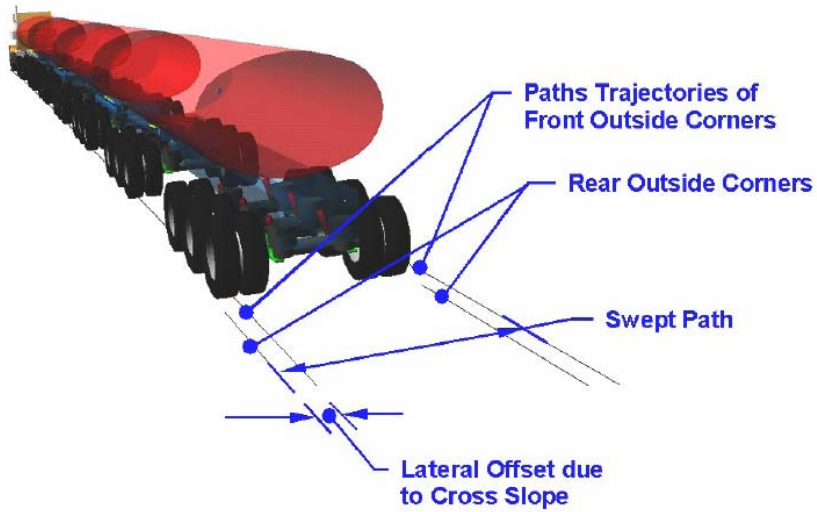
Performance measures

- Tracking Ability on a Straight Path (TASP)
- Low Speed Swept Path (LSSP)
- Steer Tire Friction Demand (STFD)
- Static Rollover Threshold (SRT)
- Rearward Amplification (RA)
- Load Transfer Ratio (LTR)
- High Speed Transient Offtracking (HSTO)
- Yaw Damping Coefficient (YDC)

Tracking Ability on a Straight Path (TASP)

- To characterise lateral variations when travelling at high speed on straight roads with uneven surfaces.

- The vehicle must traverse a road segment of length not less than 1000 m, (with crossfall variations and road surface unevenness) at not less than 90 km/h.



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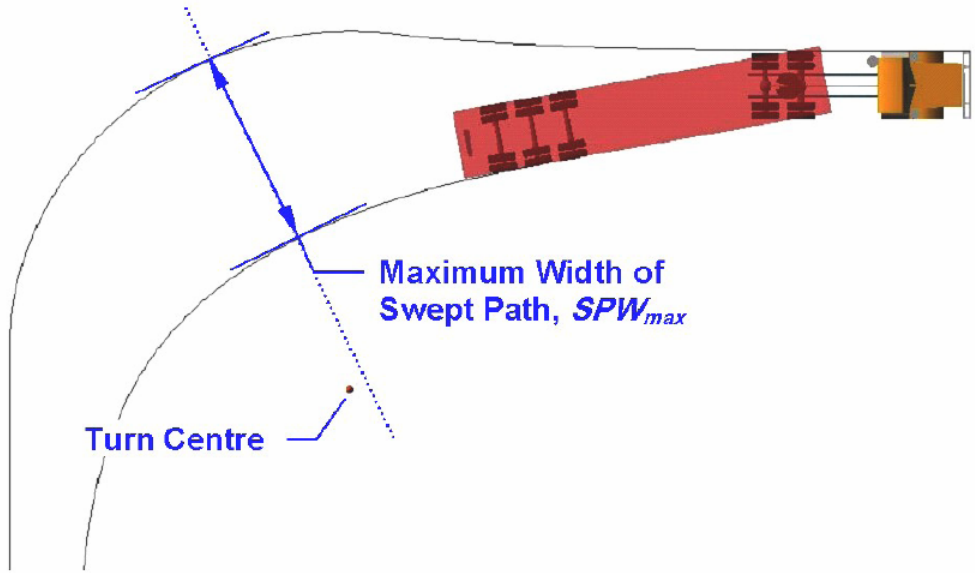
Low-Speed Swept Path (LSSP)

- Purpose is to manage the safety risk associated with turns at intersections by limiting the road space required
- The vehicle is simulated driving through a 90º arc of 12.5 m radius at a speed of 5 km/h



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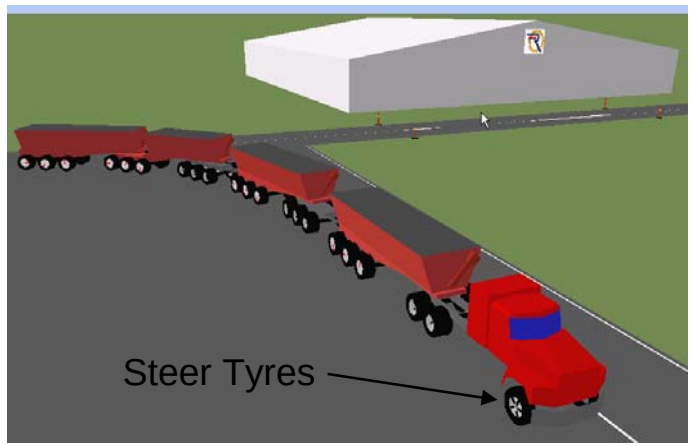
Steer Tyre Friction Demand (STFD)

- Definition: The maximum friction level demanded of the steer tyres of the hauling unit in a prescribed 90° low speed turn

PBS Performance Targets

- Not greater than 80% of the maximum available tire/road friction limit



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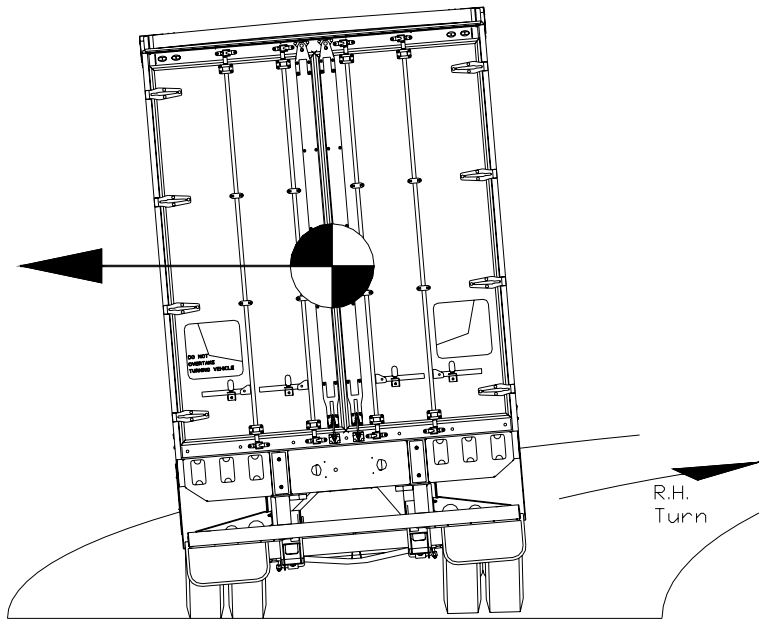
Static Rollover Threshold (SRT)

- Rollover stability is an important stability performance measure for heavy vehicles because it has been strongly linked to rollover crashes.
- The vehicle must be driven along a specified circular path, increasing the speed of the vehicle at a slow, steady rate until the point of rollover.



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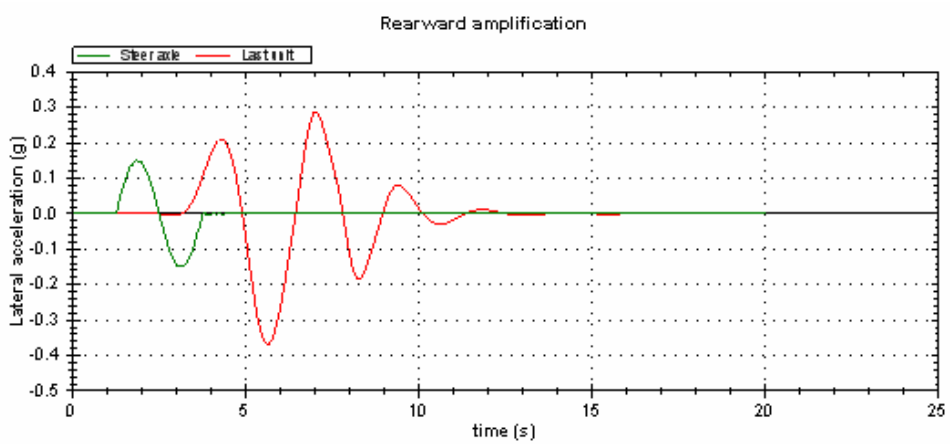
Rearward Amplification (RA)

- RA describes the tendency for the trailing units to experience higher levels of lateral acceleration than the hauling unit during a dynamic manoeuvre. It is a serious safety issue in rapid path-change manoeuvres as it can lead to rear-trailer rollover.

- The vehicle must execute a single lane change manoeuvre as specified by ISO14791:2000(E) at 88 km/h



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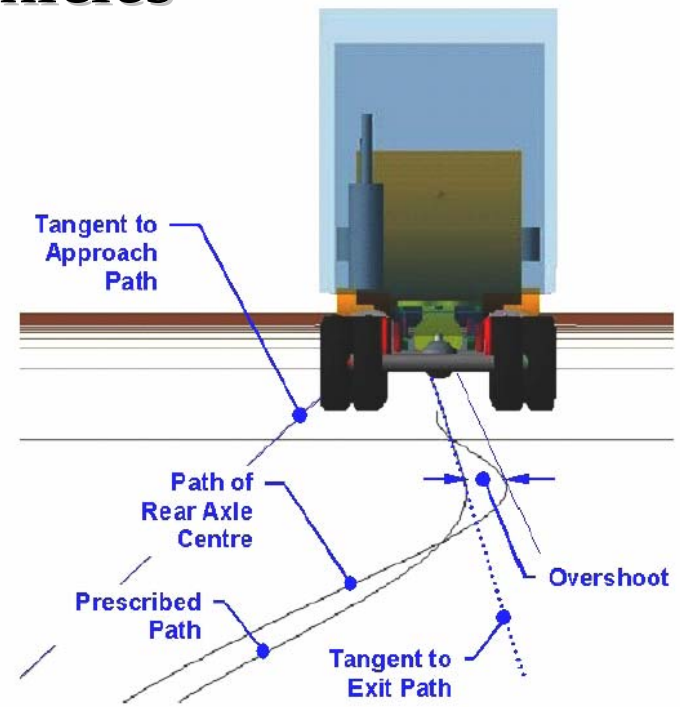
High-Speed Transient Offtracking

- The lateral displacement of the rear end of the last trailer of an articulated vehicle may overshoot the final path of the front axle of the hauling unit and can interfere with passing vehicles

- The vehicle must execute a single lane change manoeuvre as specified by ISO14791:2000(E) at 88 km/h



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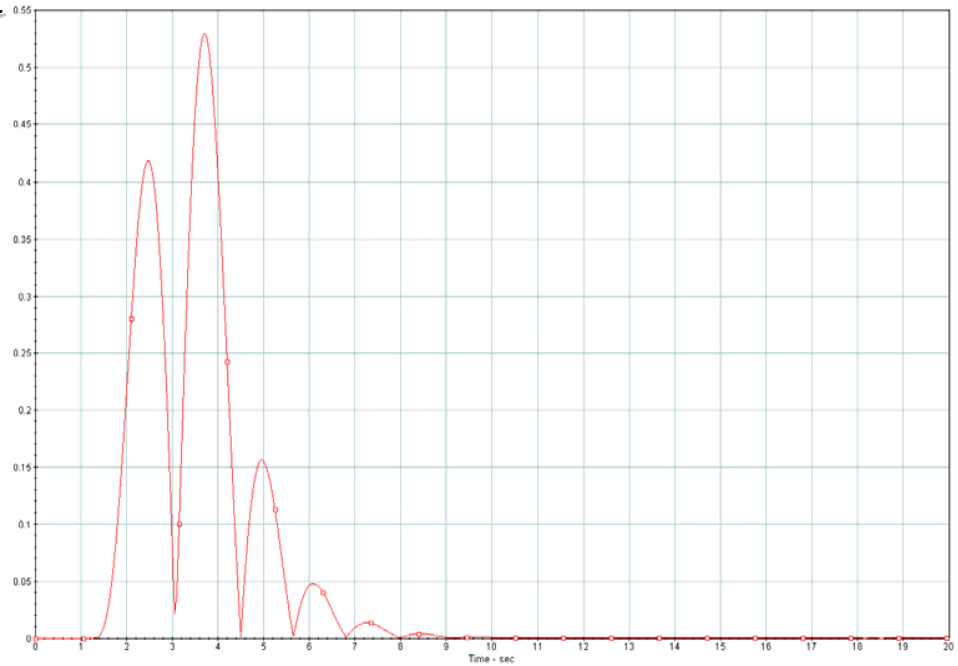
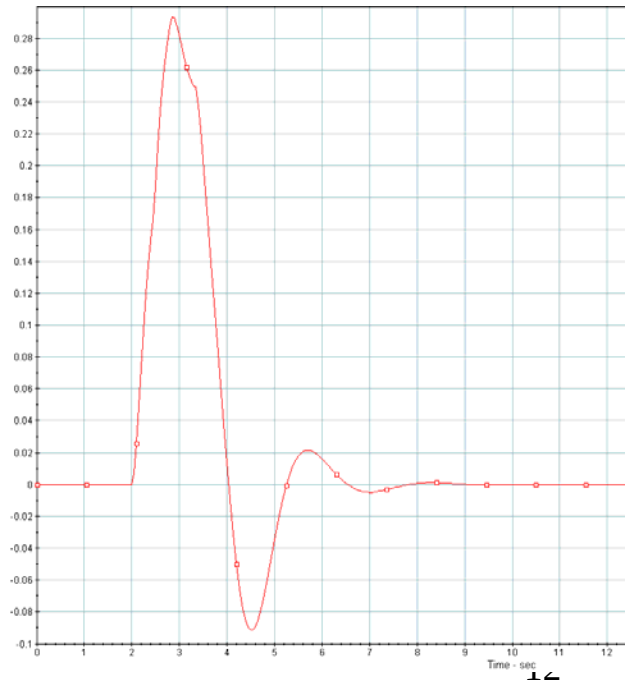
Load Transfer Ratio

- Definition: The proportion of load on one side of a vehicle unit transferred to the other side of the vehicle during a sudden evasive manoeuvre



Yaw Damping Coefficient

- Definition: The rate at which “sway” or yaw oscillations decay after a short duration steer input at the hauling unit
- The steering wheel is turned rapidly to one side and then back to the centre and held. The steering impulse should take around 0.6 s to complete and result in a steer tyre movement of at least 3.2 degrees.



Vehicle benchmarks

- Comparisons based on
  - Vehicle dynamic performance
  - Equivalent single axle load (pavement)
  - Equivalent cargo volumetric efficiency *fn(energy, emissions, CO_2)*
  - Equivalent cargo mass efficiency *fn(energy, emissions, CO_2)*