

### **Preliminary results from UK project on Bus and Coach Manoeuvrability**

OICA presented a paper (Trans/WP29/Grsg 2003/5, May 2003EC ) which amalgamated the EC Directive 2001/85 (so-called "Bus Directive") with UN-ECE Reg 107. In order to do this effectively it was necessary to introduce manoeuvrability criteria. The UK reminded the delegates that we and Portugal had obtained a derogation to the manoeuvrability test procedure which was proposed by OICA (based on EC Directive 2002/7) and that there is an obligation on the EC to report/carry out tests to address our concerns about safety before that derogation comes up for review in 2005.

The UK offered to prepare, for the 85<sup>th</sup> Session of GRSG, a brief summary of progress in the research project on manoeuvrability that we are conducting. This Informal document presents that summary.

### **Background**

In 2002 the EU agreed that the "free movement between member states" directive relating to dimensions and manoeuvrability of buses (96/53/EC) be changed to allow the length of rigid buses to be increased from 12m to 15m. The change in length was also accompanied by a change to the method of assessing manoeuvrability. The new, "drive in", method was taken from UN-ECE Regulation 36. The vehicle is driven up to a 12.5 m radius circle marked on the ground and the degree of steering is adjusted until the vehicle's outer front corner is tracing out that 12.5 radius circle. In this method the outswing of the rear outer corner of the vehicle is measured relative to the 12.5m radius. The limit of acceptable outswing is 0.8m for 12m vehicles.

Previously, manoeuvrability was measured according to EC Directive 97/27/EC. This Directive specified a method in which the vehicle starts off with the steering set so that the front outside corner of the vehicle describes a circular path of 12.5m radius. The outswing is measured over the tangent line to the circle that is drawn parallel to vehicle side at the start of the manoeuvre. Although the acceptance limit is still 0.8m (for 12m vehicles), this test is more severe because the outswing is measured before the rear wheels have begun to tract onto the "undercutting" path that all rear wheels describe relative to the path of Ackerman-steered front wheels.

Rear outswing is related to rear overhang of vehicle body beyond the rear axle. As an empirical rule, the longer the vehicle the longer the rear overhang and its associated outswing. The UK has set up a research project to determine the effect of increasing the length of rigid buses/coaches from 12.5m to 15m.

### **Summary of UK Research Project**

This research project involved simulation of six manoeuvres:

1. Full lock
2. "Steady state" turning circle – EC Directive 97/27/EC
3. "Drive in" turning circle – UNECE Regulation 36

4. Pulling away from bus stop on full lock
5. Left turn at a restricted junction
6. Lane change

The vehicles utilised were two actual 15m vehicles, one with three axles and one with four axles, both with rear steering axles.

The influence of the rear steering was assessed by creating computer models where the rear steering was fixed in the straight-ahead position.

A current 12 metre design was assessed for comparison.

The computer modelling of the 12 metre and 15m vehicles was validated by test driving the vehicles on the research organisation's road system and research track. The objective "steady state" turning circle showed good correlation with an accuracy within 10% for both the 12m and 15m vehicles.

The ranking of vehicles (best performer to worst performer) does not change with the turning circle methodology ( item 2 and item 3 above) chosen to assess the outswing. However, the "drive in" method greatly reduces the magnitude of outswing recorded and accentuates the difference between the best performing vehicle and the worst. **None of the 15m vehicles assessed passed the "steady state" outswing requirement of 1.2m.**

The results of the tests were combined with infrastructure design standards, transport and accident statistics to estimate the risk to other road users. The analysis suggests that allowing vehicle lengths to increase, without continuation of the UK's derogation to Directive 2002/7/EC, will result in an increase in injury risk, albeit that the total number of injuries is likely to remain small. However, the risk may be strongly affected by the design of infrastructure; for example, width of pedestrian pavements. Therefore, the increase in risk may be greater in specific areas where the infrastructure does not meet current UK new build standards.

### **Conclusion**

The UK will continue, therefore, to operate its derogation, and awaits the publication of the EC's Report.