European Transport Safety Council

ETSC position on Longer and Heavier Goods Vehicles on the roads of the European Union

Background

Heavy goods vehicles have to conform to maximum dimension and weight limits if they want to cross European internal borders. Currently, the maximum permitted length is 16.50 metres for articulated vehicles and 18.75 metres for road trains, with a total combined weight of 40 tonnes[1].

Longer and heavier vehicles (LHVs) (also known as Gigaliner, EuroCombi, EcoLiner, innovative commercial vehicle, mega-truck, etc…) are trucks typically measuring 25.25 metres in length and weighing up to 60 tonnes.

Longer and heavier vehicles were already permitted in Finland and Sweden since before these Nordic countries joined the European Union in 1995. Directive 96/53/EC allows Member States to use such vehicles at national level under the concept of the European Modular System (EMS). However, LHVs are not allowed to cross borders. Some Member States, including the Netherlands, Denmark and Germany have carried out trials, some of them for several years, allowing such vehicles to run on the national road network. In these cases, a special temporary permission is given, in line with the EU legislation allowing for exemptions, and the vehicles can be operated under prescribed conditions on certain parts of the national road network.

The haulage industry has shown a vivid interest in loosening current restrictions and enabling LHVs to cross international borders. During recent political debates, the advocates of those vehicles conceded to restrict the weight to only 50 or even 40 tonnes while keeping the maximum length at 25.25 meters. Still, such a vehicle would be as long as six passenger cars and a little shorter than, but weighing as much as, a fully loaded Boeing 737-300.

Public opposition to LHVs has been on the rise for several years. Nowadays, some 212 organisations from 24 countries oppose them, usually on environmental grounds.

A great number of studies have been produced evaluating the impact of LHVs on the transport system. Beside a set of national reports, the OECD has set up a task force to summarise up-to-date knowledge available on the impact of LHVs on the transport system. The OECD study represents a starting point for ETSC's position on the likely safety impact of such vehicles[2].

[1] Directive 96/53/EC on the maximum dimensions and weight of heavy goods vehicles and Directive 92/106/EC on the provisions for combined transport operations.

[2] http://www.internationaltransportforum.org/jtrc/infrastructure/heavyveh/heavyveh.html

Considerations

While considering all major aspects of the impact of LHVs on the safety of the transport system, the European Transport Safety Council (ETSC)[3] calls for a careful consideration of the safety aspects listed below when discussing various scenarios of changes to the EC Directive on the maximum dimensions and weight of HGVs. The safety impact of LHVs is determined by the aspects listed in this paper which are grouped under likely negative and likely positive ones.

Likely negative impacts

Direct impact

Roadside and lane separation barriers of all kinds should nowadays be designed to cope with lateral forces caused by an impact from vehicles complying with regulations on mass and dimensions. However, barriers are still overrun in many collisions involving today's HGVs, which then leave the road or run into the opposite direction of divided roads.

Fire safety is a concern for all HGVs in tunnels, in particular those transporting inflammable goods. An increased volume of goods together with higher capacity of petrol tanks of LHVs would lead to an increase in the energy released during the fire (potential heat, usually expressed in GJ). Thus there could be a serious concern for LHVs' safety in road tunnels. Alpine regions, among others, are bound to be particularly affected by this.

A vehicle that has rolled over in a crash may be the cause of secondary crashes, especially if the speed of the other vehicles is high and there is little space for overtaking manoeuvres. The LHV, due to its greater length, is more likely than current goods vehicles to block the entire clear width of traffic lane(s). Moreover, the time required to clear the site of a crashed LHV may very well be longer, thus increasing the probability of a secondary crash.

Several aspects should be considered in relation to the impact of an LHV on the traffic flow: its ability to accelerate and come to a complete stop, the visibility restriction it creates for other road users, the possibility of being safely overtaken by other vehicles and the threat to vulnerable road users in blind spot areas. Another concern is the clearing time required at crossroads and railway level crossings. For the latter, the maximum railway crossing speed is prescribed in many EU countries, and the increased length of the LHV would mean a considerably longer clearing time is necessary.

One of the prime sources of concern is that of overtaking manoeuvres between LHVs or other vehicles trying to overtake LHVs. The time needed to overtake such vehicles is bound to be longer than for current goods vehicles, while at the same time driver

[3] The European Transport Safety Council (ETSC), founded in 1993, is a Brussels-based independent non-profit making organisation dedicated to reducing the numbers of deaths and injuries in transport in Europe. ETSC seeks to identify and promote research-based measures with a high safety potential. It brings together 45 national and international organisations concerned with transport safety from across Europe (www.etsc.eu).

visibility would be reduced when performing the manoeuvre. On rural roads other than motorways, characterised by opposing traffic flows with different vehicle types, this concern is particularly relevant.

The increased size of the vehicle will result in increased visibility problems, not only for the driver of an LHV, but also for other road users. This is due to enlarged blind areas as well as wider swept paths. To avoid blind spots, new equipment would have to be added, such as video cameras and lane assist systems. An additional problem is the effect of strong side-winds for LHVs, e.g. over bridges, and for other smaller vehicles while overtaking LHVs due to the slipstream.

Due to more weight, the performance of an LGV on ascending slopes could cause problems. This can be solved technically with more powerful engines. However, the availability of such engines is limited due to the technological limits and constraints imposed by the existing regulations on emissions. In many countries, the motorway gradient could be up to 6 per 100 and even current HGVs have difficulties in coping with this, with their speed falling below the minimum prescribed speed on given roads. The current technologies and tough emission standards may not allow engines to compensate for the increased weight.

Carriage of liquid goods could influence the dynamic stability of LHVs. It is more difficult with LHVs to assure an equal distribution of goods loaded over the trailer, thus the centre of gravity may shift and cause dynamic instability.

Impact on infrastructure

Operating LHVs on the existing road network would require infrastructure to be adapted to the manoeuvring capacity of those vehicles, their static and dynamic load, and their impact forces during a collision.

Adaptation of certain infrastructural elements may indirectly increase risk for other road users. In particular, some lanes would have to be widened, roundabouts realigned and some elements of traffic calming removed. Work zones on the roads could become particularly dangerous. Such engineering measures were developed in order to slow the road traffic down, so removing or rebuilding them will often lead to increased speed of all vehicles, and more frequent and more severe collisions involving all kinds of road user.

Main through-roads in villages or small towns would have to be re-designed in such a way that LHVs are able to pass through them. Outside urban areas, these types of roads are especially dangerous at intersections and junctions. The area of carriageway required for left turning lanes must be adapted to the length of these vehicles.

The lack of homogeneity in the speed of travelling vehicles leads to a higher risk of collision. Currently HGVs travelling on roads with a steep gradient may not be able to travel at the desired speed due to the insufficient power of their engines. On alpine motorways with a gradient of 6 to 100, the current vehicles may not even be able to travel above the minimum speed required for all vehicles on motorways. Without additional new lanes for uphill stretches of road, collision risk would increase due to the heterogeneity in travelling speeds.

Another concern arises in relation to parking, resting and refuelling facilities, where conflicts with other road users are likely. Similarly, existing truck safety infrastructure facilities, such as runaway truck ramps (truck arrester beds), lay-bys (too short, especially in tunnels) or emergency lanes are not designed for LHVs.

If clearance and weights increase, the barriers on bridges and traffic separating barriers would generally have to be adapted. The impact resistance of barriers on bridges crossing above railways may not be sufficient to prevent a crash between a LHV and a train. Such crashes may have very serious consequences, even thought they may be unlikely events. Similarly, multiple lane undivided roads would need to be equipped with median barriers to prevent deadly head-on collisions. Heavier LHVs may well cause more harm to head on crash opponents.

While the static loading of LHVs on bridge structures could be similar to that of HGVs (where the load is distributed over more axles), the dynamic impact could aggravate the condition of such structures over time. The same applies to pavements, which are likely to suffer from wearing down in a shorter time frame. Wearing down contributes to aquaplaning and lateral instability for travelling vehicles. An Austrian study[4] investigated the need for immediate infrastructure investments on Austrian motorways in order to adapt them for LHV traffic. Costs for Austria were identified to be in the order of 5.4 Billion Euros, largely for the reconstruction of bridges.

<u>Indirect impact</u>

The amount of travel is the single most important predictor of the number of vehicle collisions. LHVs are more effective for transporting goods compared to current HGVs, due to their higher goods capacity in weight and volume, which would increase their competitiveness among other transport modes. Various forecast studies estimate that there could be an increase in freight transported by roads resulting from the additional shift of freight transport to roads[5]. An exact impact on the modal shift for goods transport would be determined by the operating conditions for these vehicles such as road type restrictions and operating costs through e.g. road toll setting. Combined transport across Austria could be shifted back to the road by up to 74% - and practically 100% of the “rolling highway”[6].

Likely positive impacts

Road transport carries 45% of the goods traded within the EU and contributes strongly to total transport in the EU. By considering land transport alone, road transport counts for more than 80%. LHVs can result in fewer vehicle-kilometres travelled for a given amount of freight transported. In other words, if higher capacity trucks substitute for a

[4] Long and Heavy Vehicles (LHV) (2009) – Auswirkungen auf das Autobahnen- und Schnellstraßennetz, KfV in cooperation with Technical University Vienna, Baumann+Obholzer ZT-GMbH, Kirsch-Muchitsch & Partner ZT-GmbH.
[5] TIM Consult (2006). Competitive Impact of the Implementation of Gigaliners on Combined Transport in Europe, TIM Consult.
[6] Der Gigaliner – Auswirkungen auf den kombinierten Verkehr in Österreich (2009), Verkehrsplanung Käfer GmbH.

larger number of smaller vehicles their use may, in the short term, improve road safety overall[7]. However, the effect may not be long lasting, due to the increase in freight transported by road resulting from the additional shift of freight transport to roads or from increased demand by customers already using the roads to move their goods. Furthermore, the prospects of the EU economy and broader regulatory issues could influence the external conditions determining road freight demand.

The risk of death to LHVs occupants in a collision with another vehicle may be lower than for HGV occupants because of the higher weight of the LHV, but this difference will only be appreciable if the other vehicle in the collision is also heavy, and then the risk of death to that vehicle's occupants will be increased.

A comparative analysis of the dynamic stability, geometric performance, payload efficiency and infrastructure impact of current HGVs and higher capacity vehicles, using computer simulation, revealed major differences between these vehicles. The study demonstrated the potential value of this tool for optimising truck design and vehicle standards. The analysis indicates that, on key performance measures, higher capacity vehicles often perform better than the workhorse vehicles used to transport the majority of road freight around the world today[7]. However, the TML Report[8] indicates that certain LHV truck-trailer combinations could have driving dynamics that are unfavorable or in some cases unacceptable in terms of safety. This is based on an assessment of handling characteristics of different configurations.

The stopping distances for trucks are considerably longer than for passenger cars and their braking capacity is a serious issue. Higher mass does not necessarily cause longer braking distances. The maximum forces between tire and road are proportional to the vehicle mass. Hence, braking forces within the capacity of the braking system increase in the same proportion as the mass. Braking distance is therefore almost independent of vehicle mass for similar axle loadings. However, new technical regulations for brakes and mirrors would be needed to cope with the new dimensions and weights of LHVs. Driver assistant systems are able to minimise risks, if they are introduced in a widespread manner. LHVs could contribute to the penetration of new vehicle technologies into the HGVs fleet. This could be encouraged through tougher regulations and relatively lower prices for these technologies.

[7] OECD (2010). Moving Freight with better trucks, Improving safety, productivity and sustainability. OECD, Paris.

[8] De Ceuster, G. et al: Effects of adapting the rules on weights and dimensions of heavy commercial vehicles as established within Directive 96/53/EC; TRANSPORT & MOBILITY LEUVEN, 2008.

Conclusions

ETSC has serious concerns about the impact of LHVs on transport safety in general, and road safety in particular. Depending on the operational conditions, several safety aspects would need to be addressed at high societal costs in order to maintain the current level of risk in road traffic of these vehicles and of other road traffic participants. As long as all safety issues are not properly addressed, and in the absence of evidence that likely positive impacts are outweighing negative ones, ETSC would not recommend the modification of the Directive on the maximum dimensions and weight of HGVs which would allow LHVs to circulate across national borders in the EU.

The renewed 50% EU reduction target for road deaths requires a substantial increase of current efforts in order to be achievable by 2020. The likelihood of an increase in the number of collisions posed by LHVs and the severity of such collisions is a serious concern that could slow down progress during the next decade and therefore clashes with current policy expectations.

Investments that would need to be made in adapting the existing road infrastructure are likely to decrease the budget available for addressing other safety aspects for all road users.

At the national level, on certain roads, it could be feasible to create operational conditions under which LHVs could be allowed to operate without negative road safety impacts. However, this cannot be achieved without addressing all negative aspects listed in this paper.

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