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The potential application of the TfL Direct Vision Standard in UNECE regulation – The LDS and TfL position

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Research Sponsored by Transport for London

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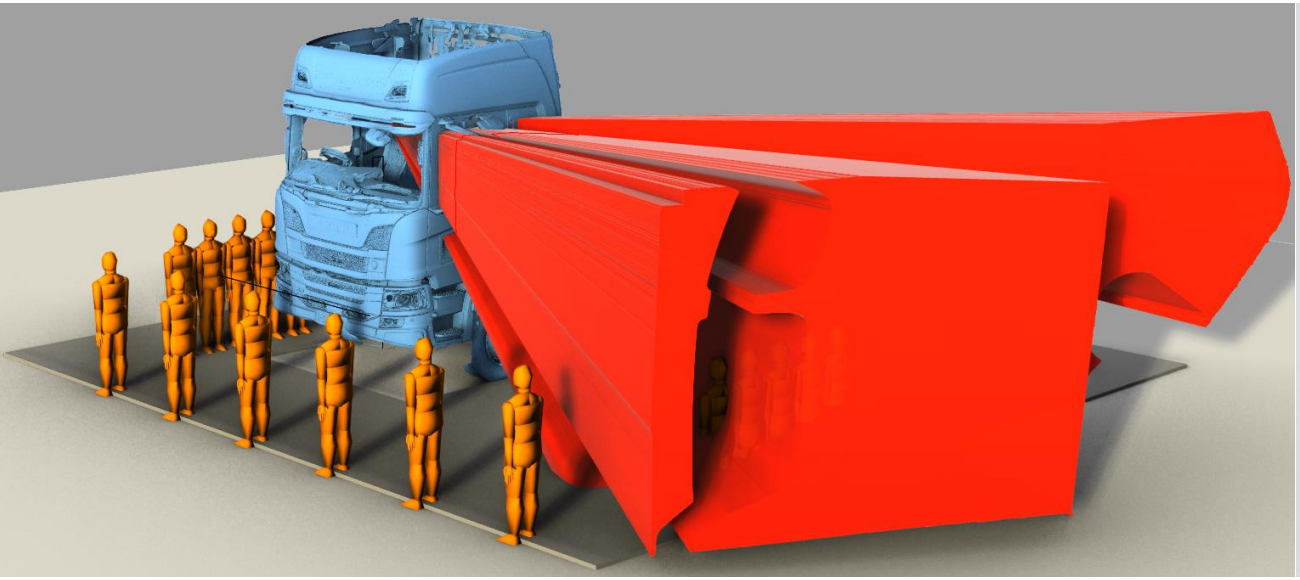

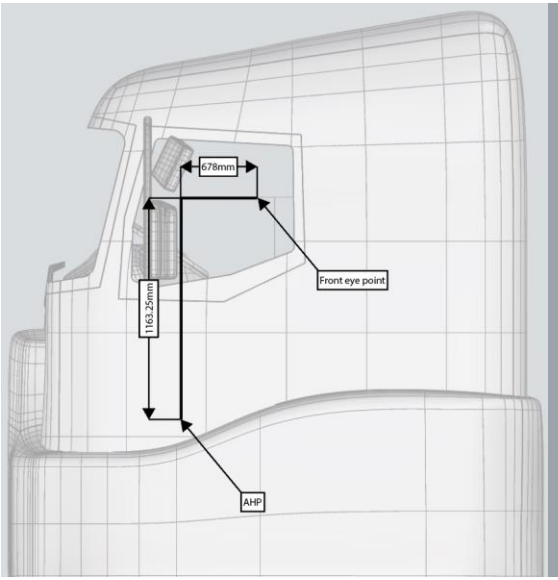

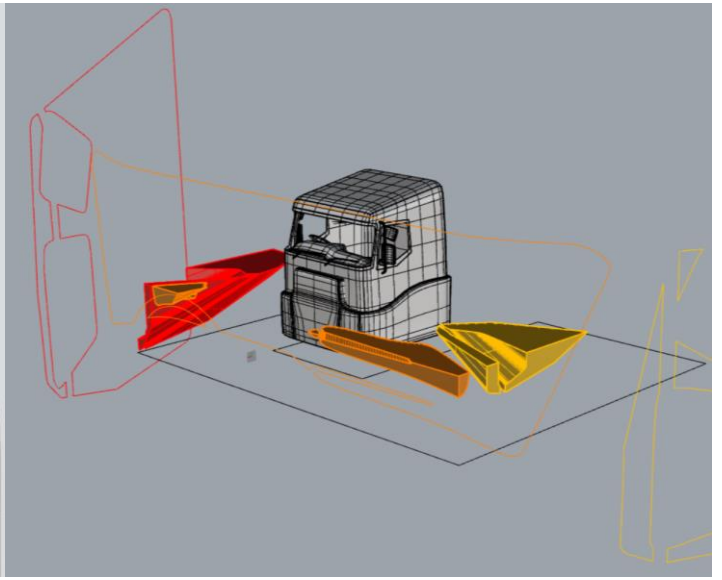

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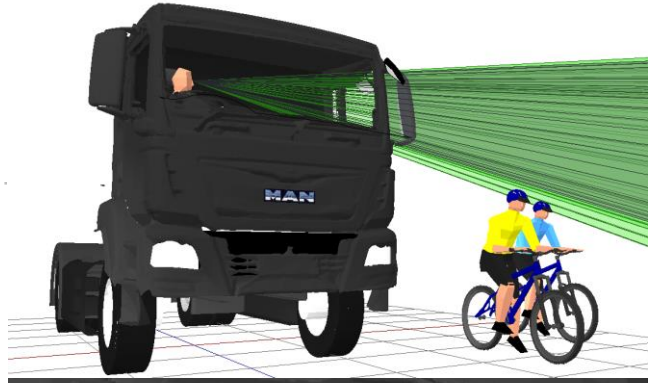
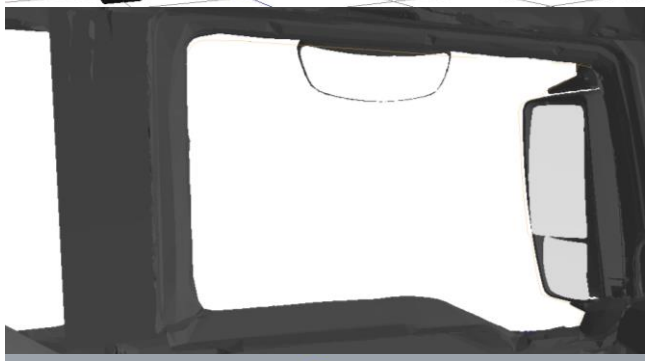
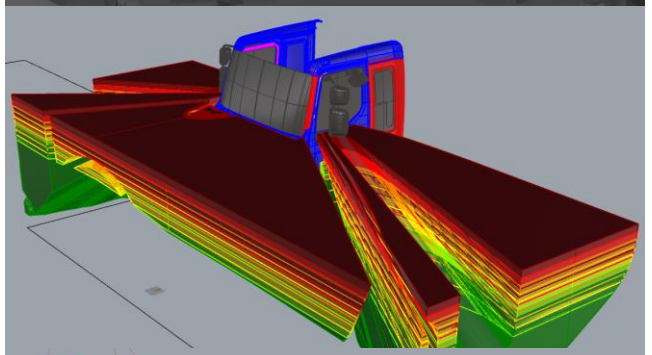
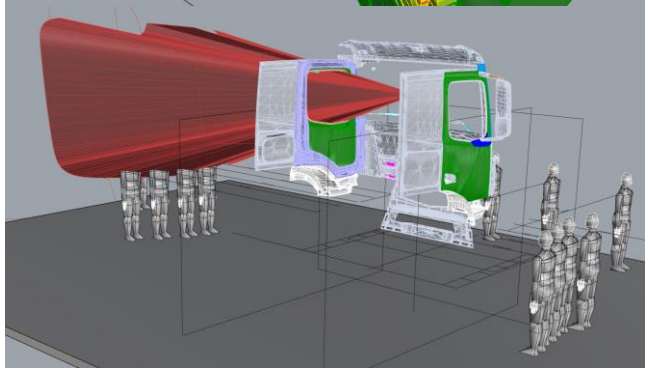
Further detail will be added for the Osaka meeting









UNECE VRU Proxy meetings – our position

Our position has been consistent throughout the UNECE VRU Proxy meetings that have been attended by TfL and LDS members

1. The TfL Volumetric assessment is an accurate method that all manufacturers are currently applying, with results being validated with the LDS version of the test. Manufacturers are using the test now
2. It assesses direct vision to the 'Area of Greatest Risk' which has been defined by an accident data analysis and testing has shown that the area of greatest risk is currently only visible through indirect vision in many trucks.
3. It is our position that assuming that a driver can effectively use six mirrors and a minimum of three windows to maintain situational awareness is in many scenarios likely to be not possible, which is again bourn out by the accident data which showed the causation factor "Blind spot" or "did not look" as being the most common in accidents between VRUs and trucks
4. The work of Richard Wilkie highlighted the issues with indirect vision in comparison to direct vision which included the following findings;
    1. The perception from pedestrians, cyclists and drivers, that making eye contact with a VRU/Driver is important, therefore the driver must be able to see the head of the VRU
    2. That reaction time for indirect vision is 0.7seconds higher when compared to direct vision (truck would travel 14m at 15 MPH in that time)
    3. http://content.tfl.gov.uk/road-safety-benefits-of-direct-vs-indirect-vision-in-hgv-cabs-technical.pdf
5. The combination of the accident data analysis and the work of Richard Wilkie highlights that direct vision is an important factor in reducing accidents between VRUs and trucks, and EU parliament has voted in agreement with this position
6. We have made the assumption that the head is the minimum requirement for identification based upon interactions with Psychologists in the context of recognising a human

Further detail will be provided at the Osaka meeting

Our response to the ACEA VRU DVS proposal on the 16th of January 2020

- Adopting a VRU simulation with a stature of 1600mm is not valid because it automatically excludes anyone shorter than this, which would be difficult to justify to the lay person i.e.
  - 28% of UK female adults
  - 44% of French female adults
  - 38% of German female adults
  - 45% of Italian females adults

- Using an assessment method which only assesses performance at the edge of the mirror coverage area is poor in that is does not allow performance inside the "area of greatest risk" that is defined by the TfL project accident data analysis. This allow for improving performance over time
- The TfL approach defines a scale of performance in terms of star ratings that measure the ability to see the "area of greatest risk" and allows a progressive standard to be defined with improved performance limits over time, it is questionable that this is possible with the ACEA method
- It is not acceptable in our view to allow any part of the VRU simulation to be seen to allow detection. There is no scientific data available to support this assumption. The work of Richard Wilkie supports our definition of the requirement to see the head.

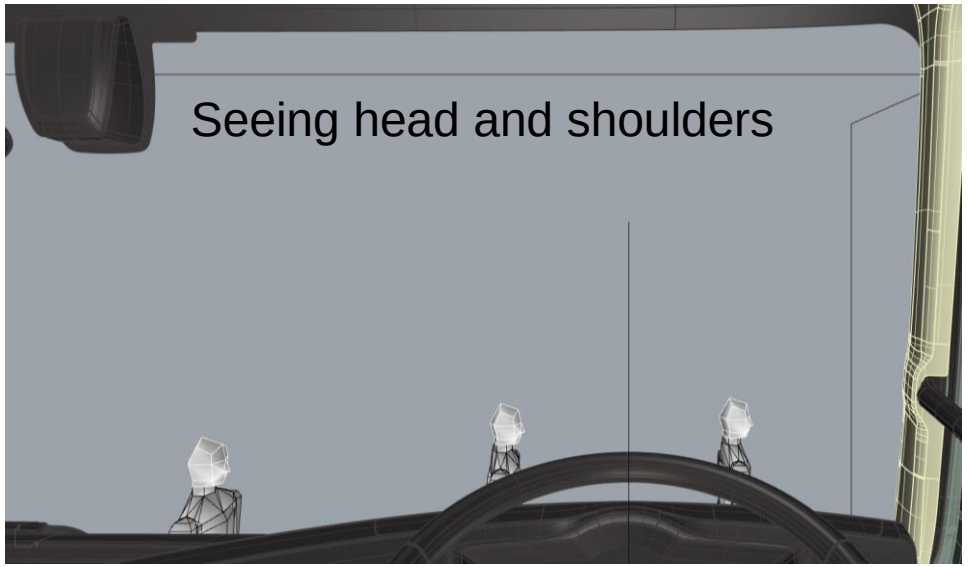
- Further detail will be provided at the Osaka meeting

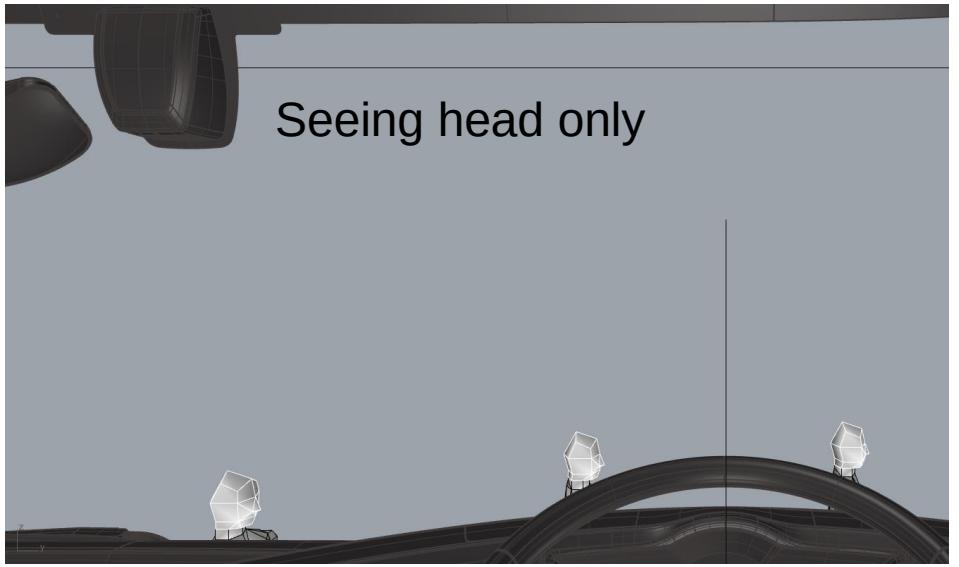
Reducing the minimum part of the human that must be visible in the correlation between the VRU distance and the Volumetric score

- The LDS team attended a meeting at the ACEA offices on the 16th of January 2020 where the alternate ACEA VRU method was detailed. At this meeting the LDS team agreed to explore the potential of reducing the portion of the VRU simulation that must be visible to allow a pass of the DVS minimum requirement

- This reduction was from being able to see the head and shoulders of the VRU, to being able to see the head only

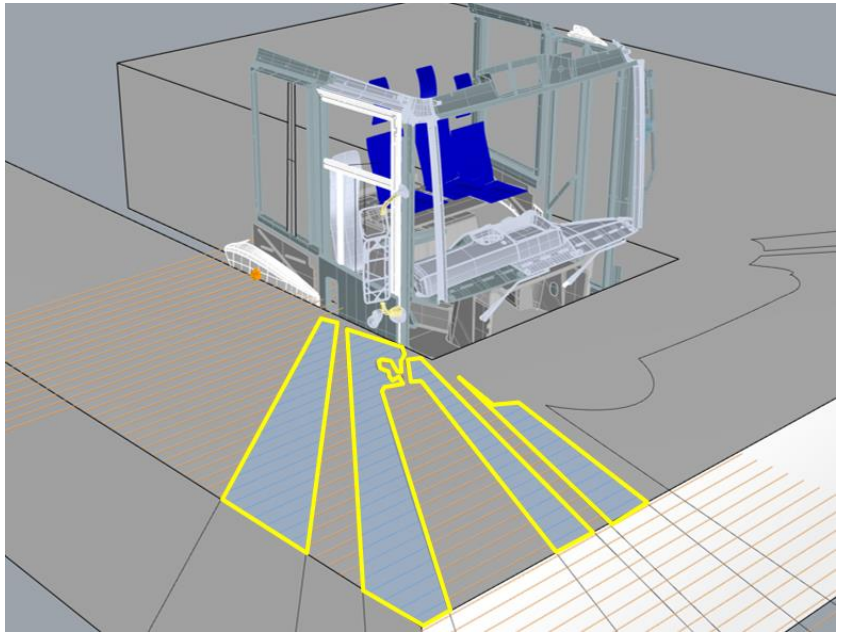
- This work is currently ongoing (27/01/2020) but initial indications highlight that this will move the minimum boundary to include more vehicles than when using the head and shoulders version. In effect more vehicles would be 1 star, and a vehicle just on the 1 star boundary in the head and shoulders version, would now be on the 2 star boundary in the head only version. These results will be confirmed at the Osaka meeting and should be considered provisional only at this stage





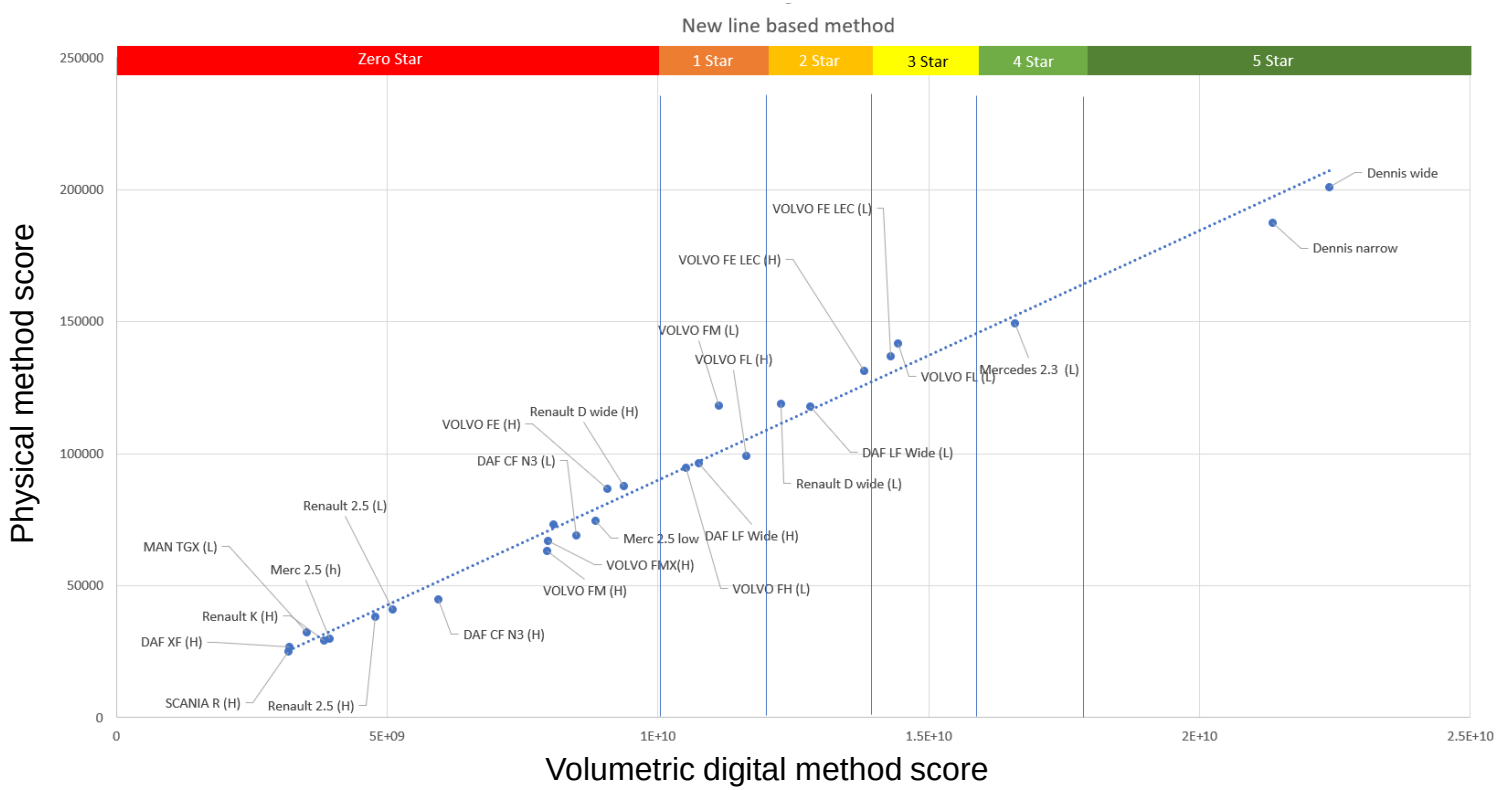
Further work on the physical test to compliment the digital DVS

- Further work has been performed on the physical test that will be used to compliment the digital approach in the proposed method for type approval. This has included the addition of further vehicles to the sample, performing correlation with the digital approach and reducing the number of data capture points to determine if the high correlation coefficients are maintained. The graph below shows the correlation between the volumetric data and the simulated physical test for a range of vehicle models. The correlation coefficient is 0.992 where a score of 1 is perfect.
- Further testing has highlighted that this excellent correlation coefficient is maintained when the amount of data that is collected is halved (i.e. lines of data at every 200mm instead of every 100mm as shown in the image below) which is very promising. Detail has been supplied in previous meetings about how the physical test will work*. A draft protocol and further detail will be shown at the Osaka meeting.



Data in this image is shown as being captured at 100mm increments

200mm increments produce the same correlation with the volumetric scores. 300mm is currently being explored



*https://wiki.unece.org/display/trans/VRU-Proxi+12th+session

Summary

- This presentation will be augmented with the following information for review at the Osaka meeting;
  - Further data and discussion of the implications of reducing the visible area of the VRU to the head only for the process that defines the minimum safety requirement for the digital DVS
  - Improved detail on the testing procedure and protocol for the physical testing method that will be compatible with the change to the digital approach

- The LDS/TfL position has been consistent for all of the UNECE VRU proxy meetings. The Digital DVS is the most accurate and effective method for testing the direct vision capabilities of existing designs and new designs, and defines a simple to understand minimum safety requirement.
- That minimum safety requirement simply states that no truck should be allowed in an urban environment which allows VRUs to be hidden from both direct vision and indirect vision capabilities of truck drivers enabled by the cab designs
- Nearly half of the sample that we tested in the TfL DVS project were not able to meet that simple requirement. However, the real aim of the TfL DVS was to support direct vision of the “area of greatest risk” defined by our accident data analysis.
- Only vehicles which achieve a TfL DVS star rating score of 2 star or better are genuinely allowing more direct vision of the area of greatest risk, and therefore improving the ability of the driver to directly see the people in close proximity to the truck