



# THE DESIGN OF THE UNECE HGV DVS FOR TECH NEUTRAL CAB DESIGN

## OPTION 3 OR OPTION 4?

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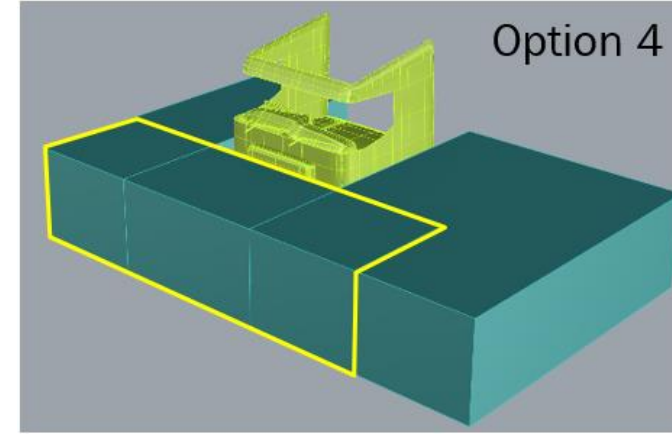
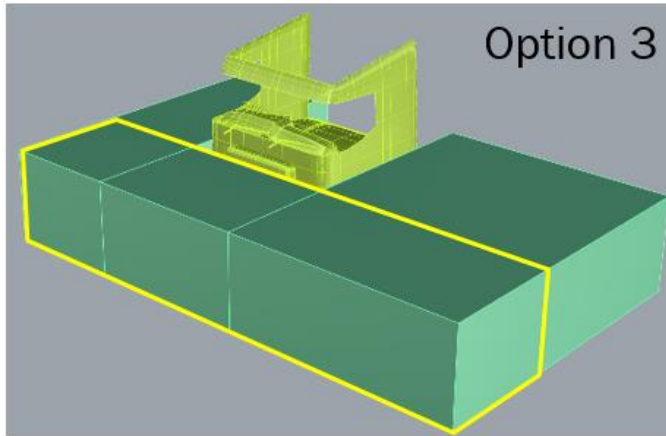
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# CONTENT

- In response to issues raised by ACEA in the Task force meetings
  1. When using option 4, manufacturers would get little benefit by changing dash board designs.
  2. Real world demonstration of VRU position indicates that it is valuable to see VRUs beyond the option 4 coverage zone
  3. Summary of our support for option 4

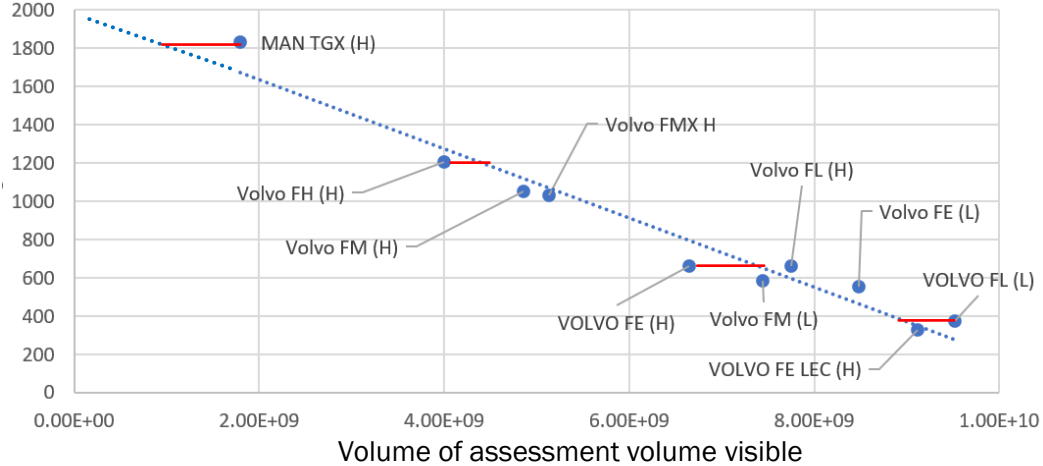
# USING FRONT AS EXAMPLES VRU-VOLUME CORRELATION GRAPHS



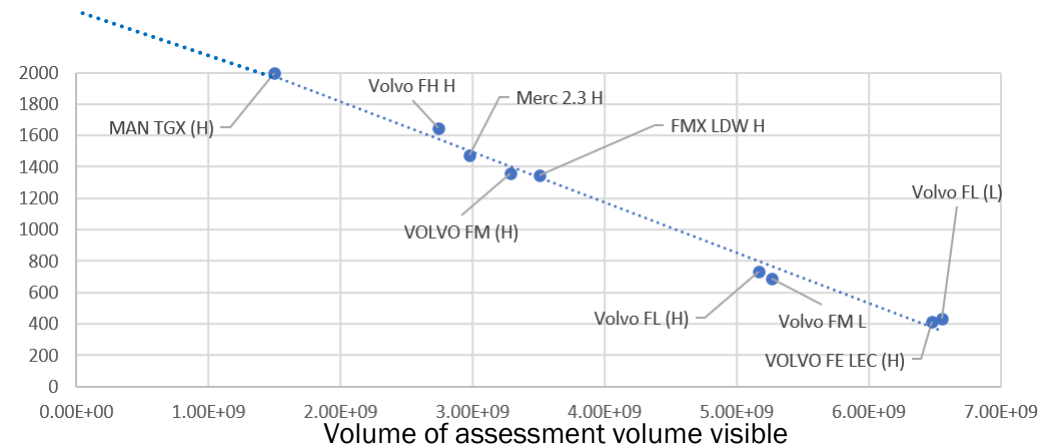
Correlation coefficient = -0.978

Correlation coefficient = -0.995

Average VRU distance



Average VRU distance



- Option 4 has the best correlation between VRU distance and volume with a correlation coefficient of -0.995
- The less error at this stage is desirable as we have to achieve equivalence, note the differences in deviation from the trend line in option 3 compared to option 4

## OPTION 3 OR OPTION 4 – ACEA EXAMPLE

- “Option 4 does not provide a reason for modifying the design”
  - The premise stated in the Task force meeting was that manufacturers have little incentive to lower the windscreen line and dashboard as per the image
- This is not correct in our view
- Let’s look at an example of a poorly performing vehicle in terms of direct vision

### DESIGN IMPACT OF OPTION 3 AND 4



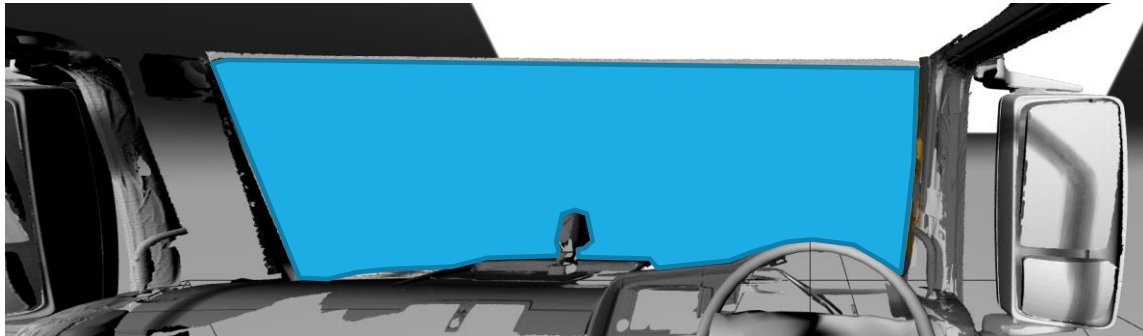
Optimized for Option 3



Optimized for Option 4

## OPTION 3 OR OPTION 4 – ACEA EXAMPLE

- Here we have taken one of the worst performing vehicles from the TfL DVS definition
- We have modified the dashboard and windscreen lower edge as per the ACEA example



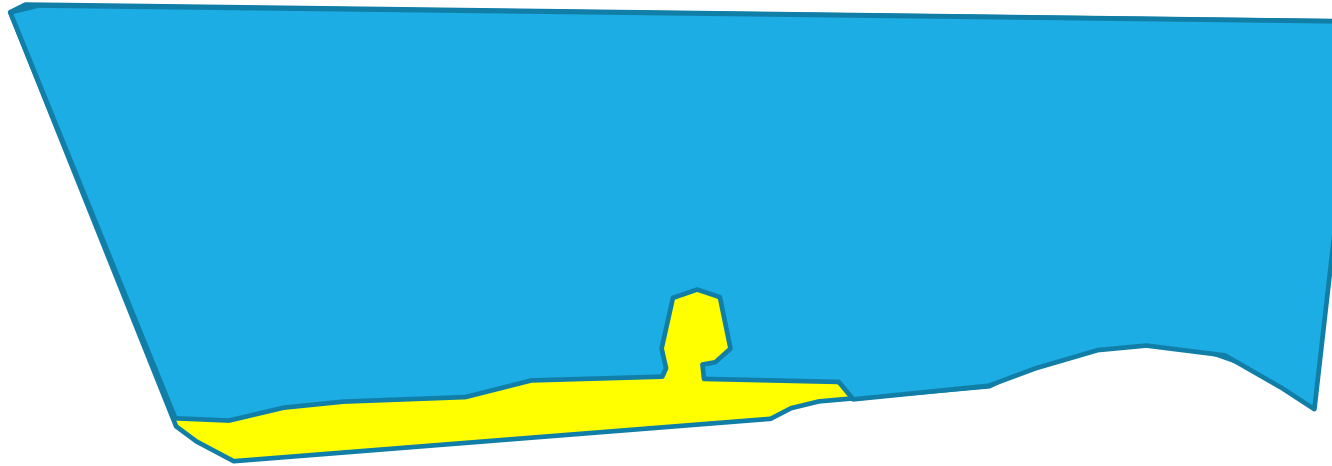
Original view through the windscreen



Improved view by lowering the dashboard



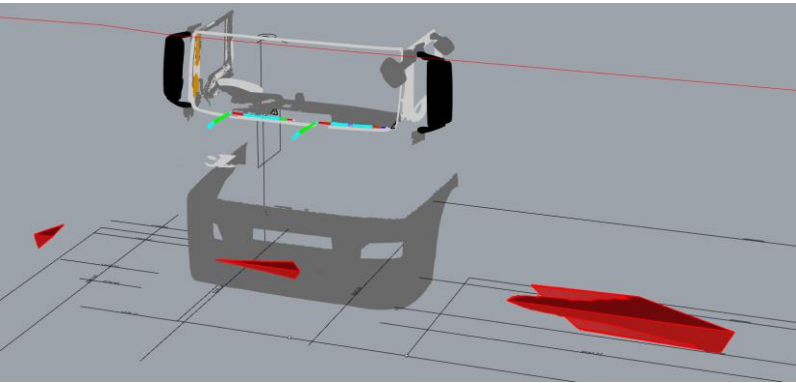
## OPTION 3 OR OPTION 4 – ACEA EXAMPLE



Design improved to include the yellow area by lowering the dashboard

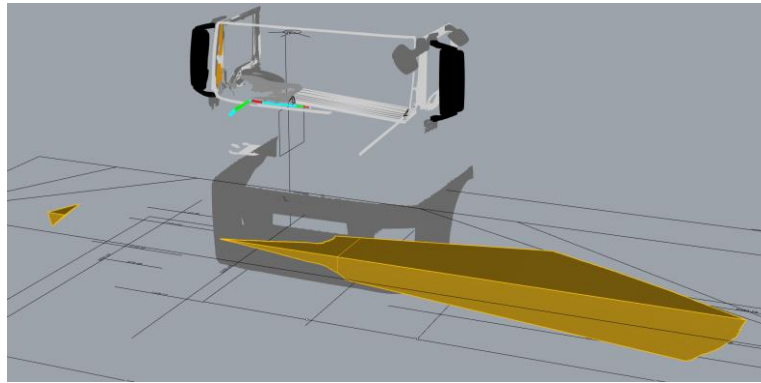
## OPTION 3 OR OPTION 4 – ACEA EXAMPLE

Old design



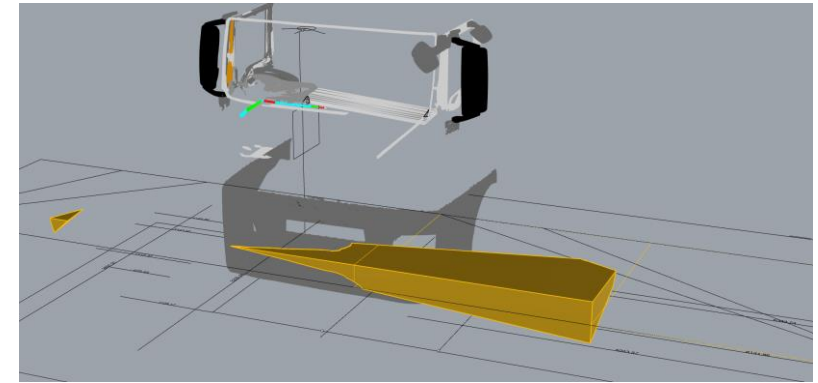
Front visible volume  $0.036\text{m}^3$

Improved design assessed with option 3



Front visible volume  $0.34\text{m}^3$

Improved design assessed with option 4



Front visible volume  $0.21\text{m}^3$

- The above illustrates that an improvement to the design of the dashboard and windscreen line is accounted for in both options 3 and 4.
- The key issue for the team that designed the Direct Vision Standard is the importance of the location of visible volume as demonstrated below

# OPTION 3 OR OPTION 4 – ACEA EXAMPLE

## DV FROM DRIVER POSITION

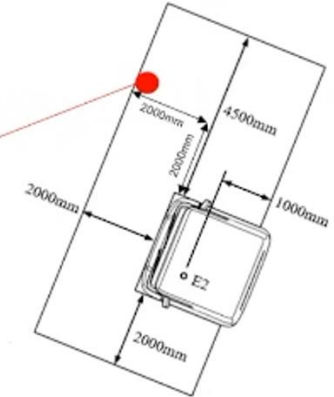
- In a recent task force meeting ACEA used the image on the right of an example of why Option 3 should be used
  - We don't know the height of the user highlighted by the red arrow
  - The eye point of the DVS systems doesn't appear to have replicated well
- It was stated that this vehicle was a mid height distribution version
- The person highlighted by the arrow is outside of the option 4 zone, but inside the option 3 zone
- We placed a 99<sup>th</sup>ile Dutch male in the position stated but cant see the legs of the person (tallest population in the World)
  - Would expect to!
- Therefore the photograph is either of a higher truck than the one in the simulation, OR the photograph was taken from an position closer to the windscreen than the Eye point used in the DVS standard.



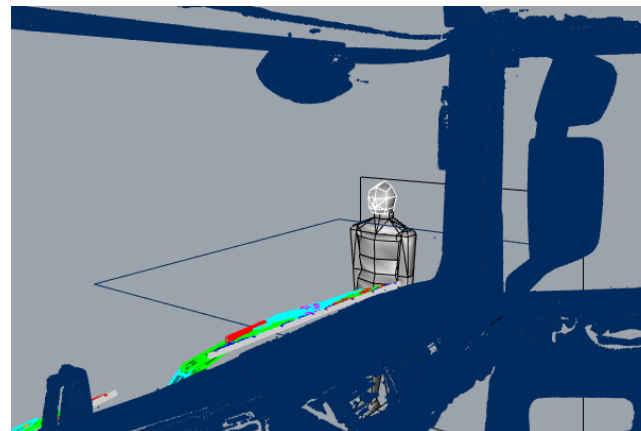
VRU crossing the street through an ordinary pedestrian crossing

[www.acea.auto](http://www.acea.auto)

Position of the person in the picture



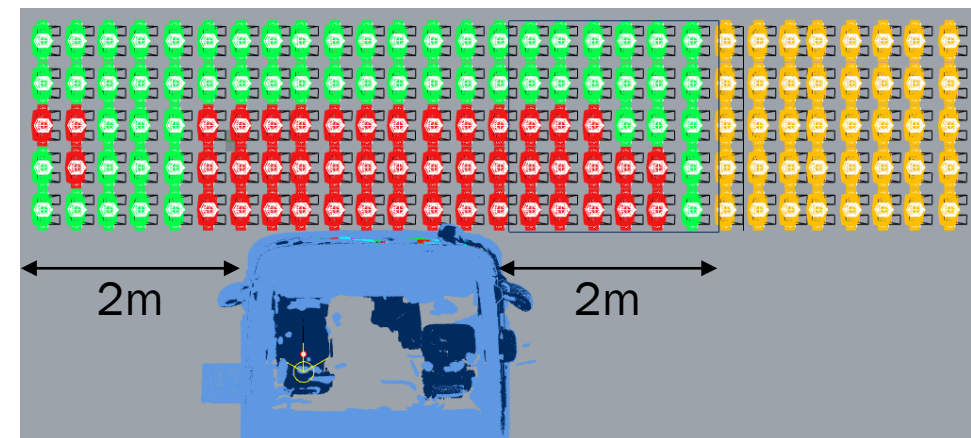
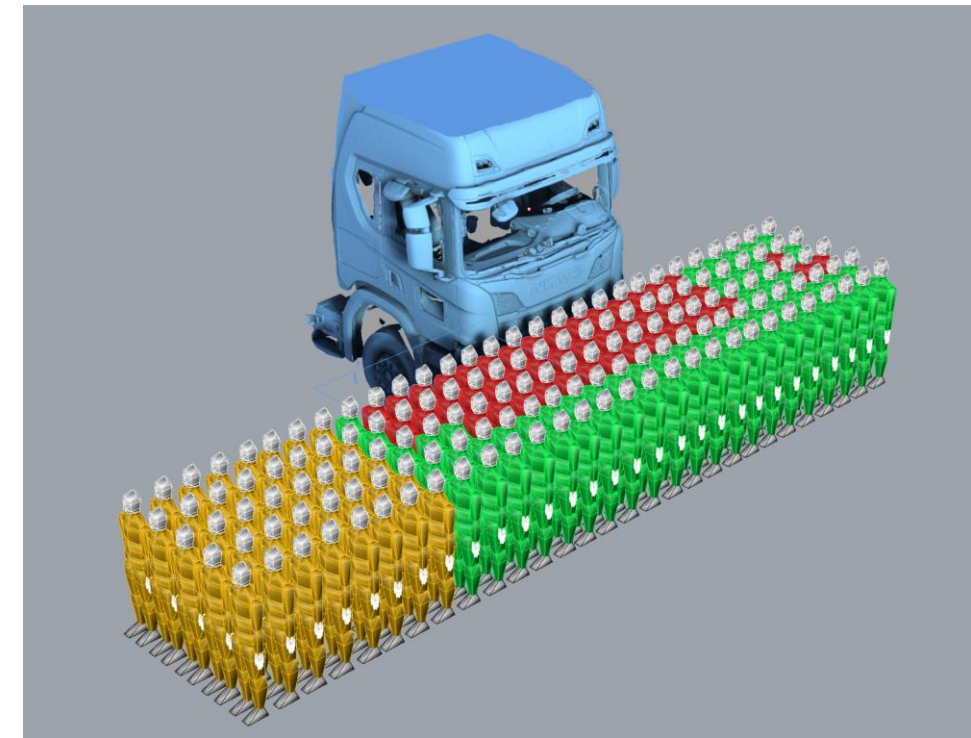
We recommend to include important area for VRU safety in the front visibility requirement (option 3)





## OPTION 3 OR OPTION 4 – ACEA EXAMPLE

- Based upon the information provided by ACEA we have created this simulation.
- 2019 SCANIA P 3D scanned as part of TfL work (eye point 2624mm above ground)
- RED VRUs cant be seen from the standard eye point to the front
- Green VRUs can
- **Orange VRUS are outside of the Option 4 area, but inside option 3 area**
  - There is a certain volume that has to be seen for both option 3 and option 4
- If we accept option 3 then we are allowing a **proportion of the minimum FRONT volume requirement** to be seen in the area shown by the orange VRUs
- Based upon accident data we are more concerned about the visibility of people approaching the vehicle from the side within 2m, and allowing more of the RED VRUs that can't be seen to be visible
- Option 3 gives **as much importance** to seeing the ORANGE VRUs as the RED VRUs and therefore reduces the need to see the RED VRUs by taking up volume in that area
- Put another way, this has the potential to lead to a situation where the limit to the front can be met through prioritisation of seeing the orange VRUs over the red VRUs
- Option 4 ensures that the frontal volume must be seen in an area where VRUs are approaching the vehicle about to cross in front, or are already in front of the vehicle





## OPTION 3 OR OPTION 4

- Our support for Option 4 is based upon the above evidence, combined with the previous evidence which shows that option 4 correlates better with VRU distance and has less variance with regard to changing A-pillar position, and is therefore more tech neutral