Informal document **GRSG-126-35**
(126th GRSG, 10– 13 October 2023
Agenda item 4(e)

126TH UNECE VRU PROXI GROUP: A- PILLAR DISTANCE MEASUREMENT AND REDUCTION IN VOLUME BY A-PILLAR DISTANCE

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CONTENT

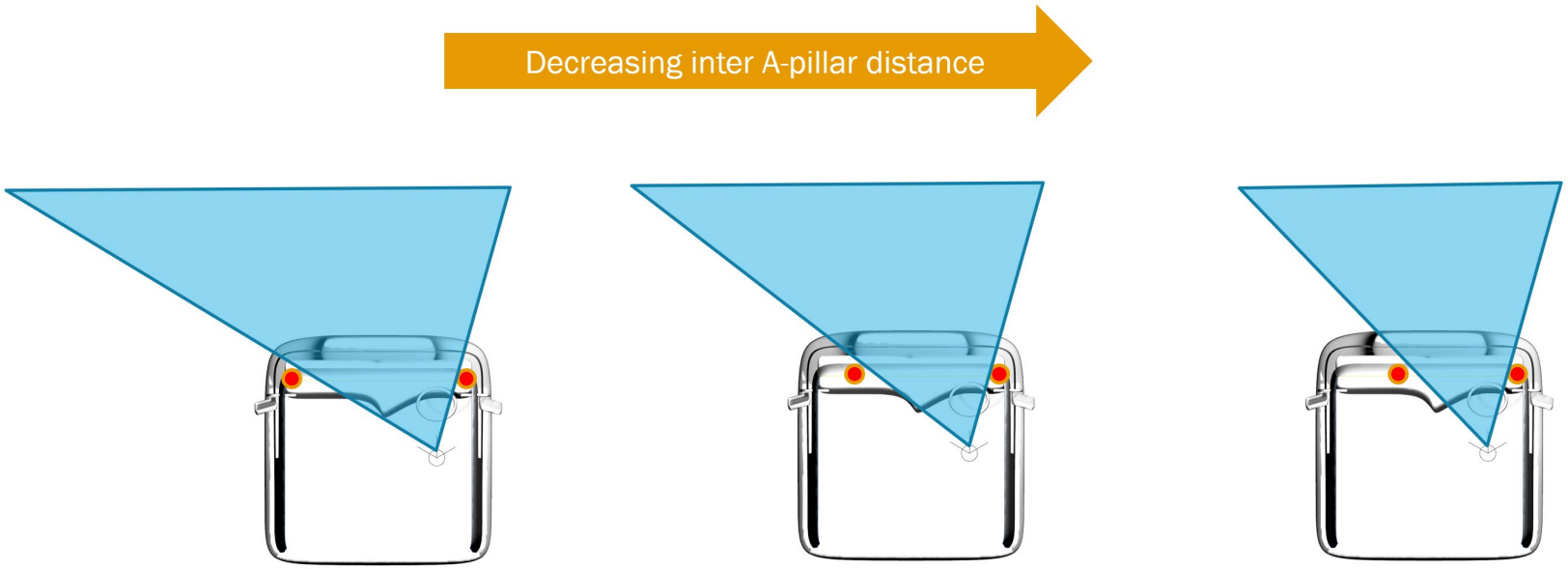
- Reminder of discussion in last VRU proxi Meeting
- Task force meeting requirements
- Options for measuring A-pillar distance
- Results from testing volume required for reduced inter A-pillar distance.

REMINDER OF DISCUSSION IN LAST VRU PROXI MEETING

- In the last meeting it was agreed that we would explore how the volume requirements to the front of Level 1, 2 and 3 vehicles can be reduced with reduced A-pillar distance
- In future there may be vehicles which by design employ a smaller distance between the A-pillars than the cabs that were used to derive the standard then the volume
- In this situation the proposal is that these vehicles should be required to achieve a frontal volume that reduces proportionally with A-pillar distance

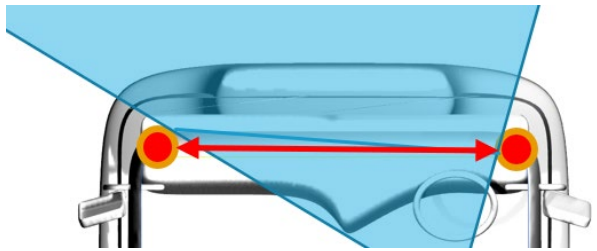
REQUIREMENTS DEFINED BY A SUBSEQUENT TASK FORCE MEETING

- A task force meeting was held to discuss the issues
- It was decided that we (LDS) would utilise the sample of data that have to explore the following issues
  - Which of two possible methods for measuring inter A-pillar distance is best?
  - The options for producing requirements for the volume that must be seen at different inter A-pillar distances

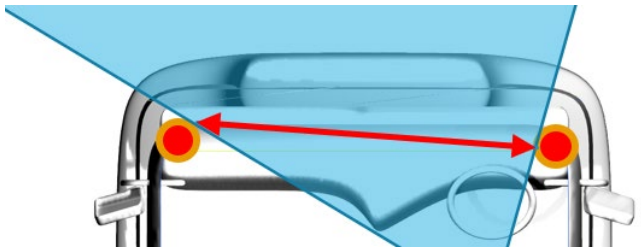


TWO POSSIBLE METHODS FOR MEASURING INTER A-PILLAR DISTANCE

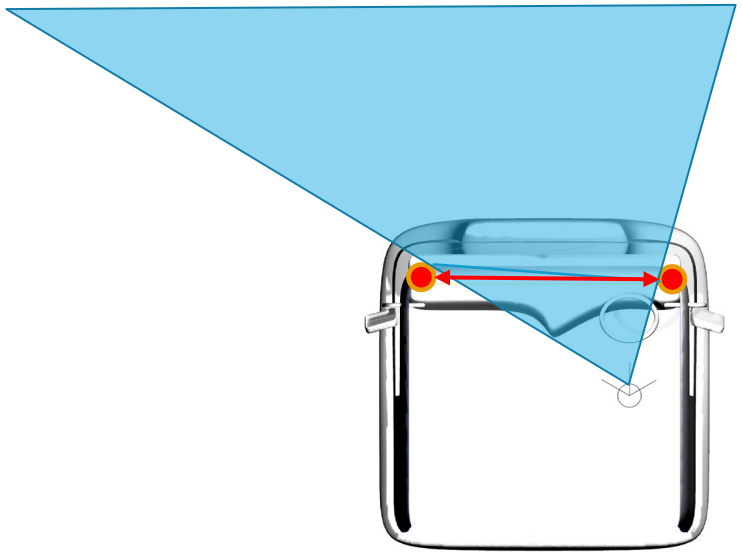
- Method 1 = shortest distance between A-pillars in the Y-Axis at the DVS eye point height
- Method 2 = distance between A – pillars as seen from the driver's eye point

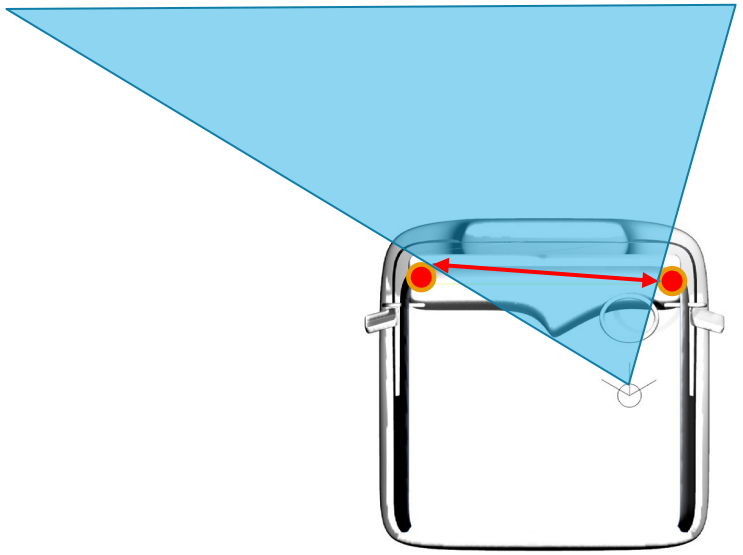


Y-Axis



Distance as seen from eye point



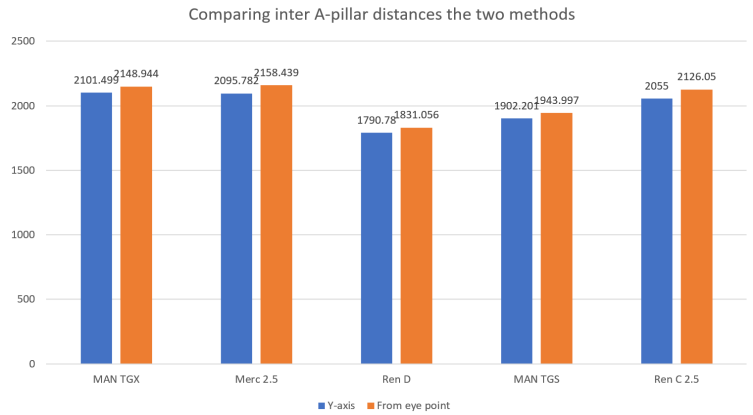


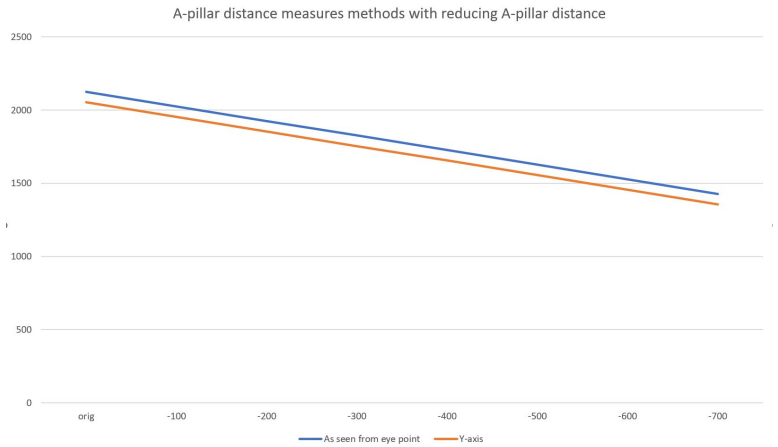
TWO POSSIBLE METHODS FOR MEASURING INTER A-PILLAR DISTANCE

- Results for two possible methods for measuring inter A-pillar distance

TWO POSSIBLE METHODS FOR MEASURING INTER A-PILLAR DISTANCE

- The two methods produce similar results with the inter a-pillar distance for the vehicles tested
- The bottom graph shows an example for one vehicle where the two methods produce linear results
- Hence, the A-pillar profile didn't vary the "as seen from eye point view" as much as anticipated.
- This is good. The simpler method is preferred.
- However future designs may be better assessed with the distance from the eye point



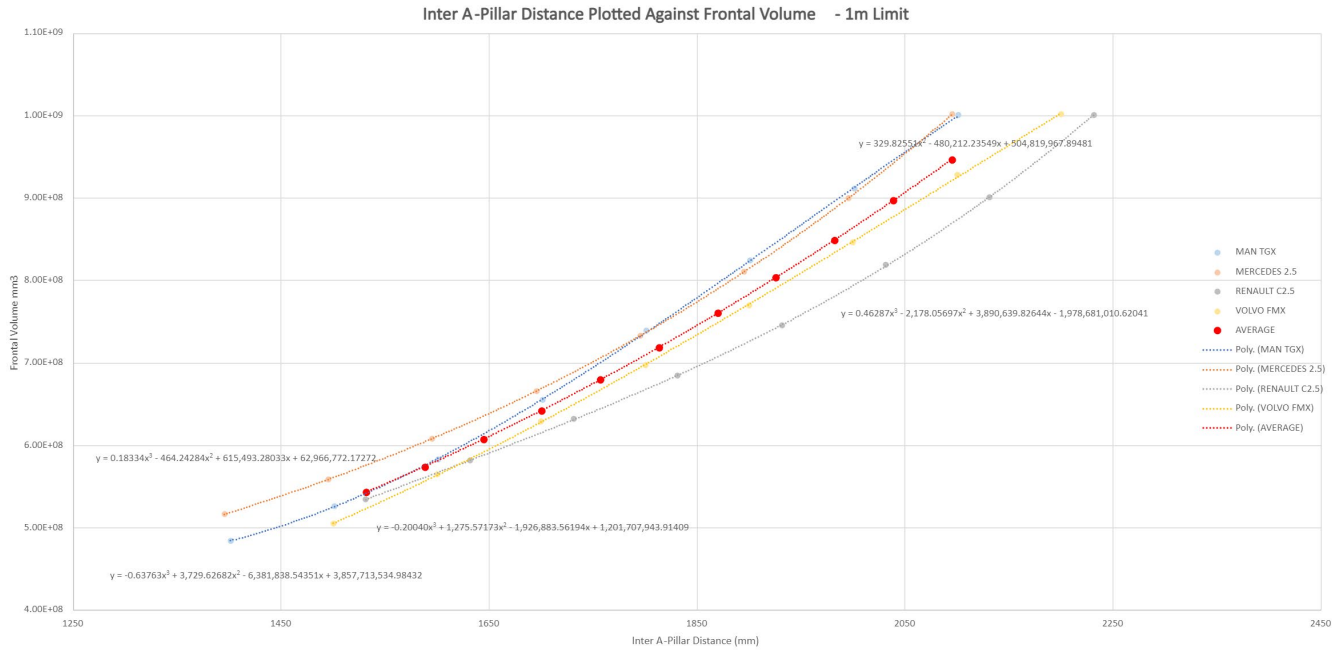


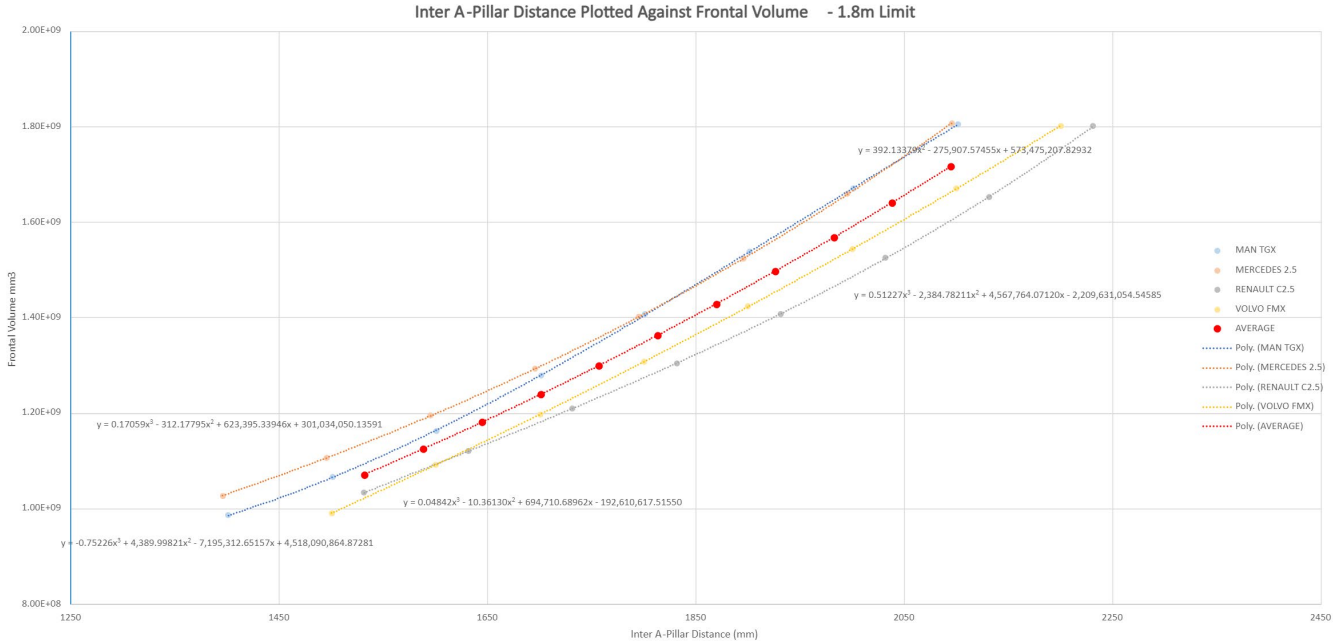
TESTING VOLUME REQUIRED FOR REDUCED INTER A-PILLAR DISTANCE.

- Testing volume required for reduced inter A-pillar distance.

TESTING VOLUME REQUIRED FOR REDUCED INTER A-PILLAR DISTANCE.

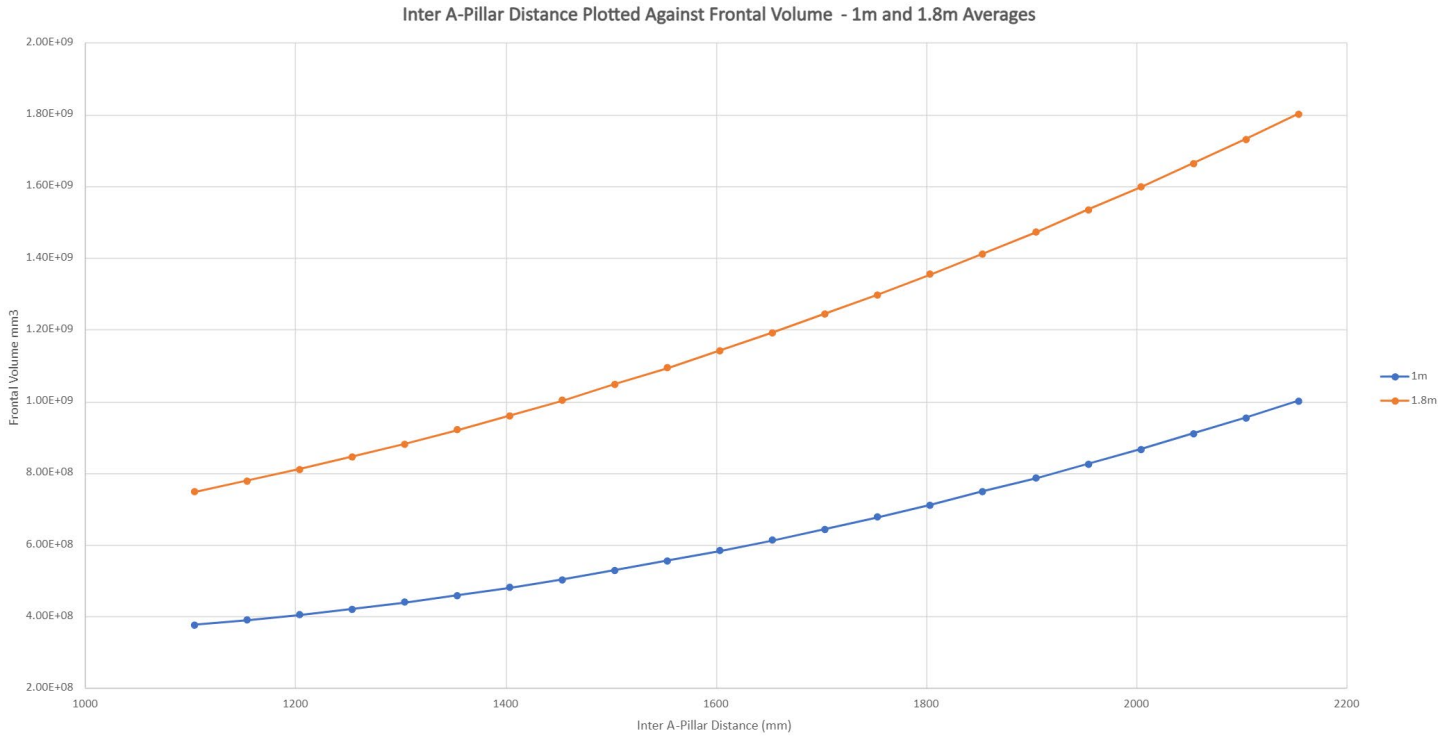
- In the last task force meeting we agreed to perform an analysis with the data that we have, to explore the volume that must be seen for reducing A-pillar width
- We have performed the following steps
- Selected a sample of vehicles that have differing dash board designs
  - MAN TGX, Daimler 2.5m cab, Volvo FMX, Renault C 2.5
- Found the height of the cabs where they meet the 1.8m^3 volume requirement for Level 1 vehicles and the same for 1m^3 Level 2/3 vehicles.
- Reduced the inter A-pillar distance in seven 100mm increments for all vehicles
- Plotted these data to generate the graph on the right





TESTING VOLUME REQUIRED FOR REDUCED INTER A-PILLAR DISTANCE.

- It was proposed at the last meeting that we could average the values for all vehicles at certain A-pillar distances to produce the requirement for volume
- To enable this we have captured the equations of the curves so that we can use these to find equivalent values at certain inter- A-pillar distance
- These data are then used to produce the Average curves shown in the graph where orange is for Level 1 Vehicles and Blue is for level 2 and 3 vehicles
- The equation of the red line for $1m^3$ and $1.8m^3$ could be used in the standard to derive volume requirements values for any inter A-pillar distance
- We then used the new equation of line to extrapolate the curves to cover a wide range of values as the graph on the right



$1.8m^3$ Y=392.13379x2 - 275,907.57455x + 573,475,207.82932

$1.0m^3$ Y=329.82551x2 - 480,212.23549x + 504,819,967.89481

SUMMARY

- We are happy with the simpler method of measuring inter A-pillar distance
- The process followed for the definition of the volume required for reducing inter A-pillar width has gone well and without issues
- This led to the proposal that the following equations can be included in the standard to allow a manufacturer to find the exact volume requirement for the exact inter A-pillar distance

1.8m^3 $Y=392.13379x2 - 275,907.57455x + 573,475,207.82932$

1.0m^3 $Y=329.82551x2 - 480,212.23549x + 504,819,967.89481$

- This process did highlight a further issue as defined in the following presentation