



33RD UNECE VRU PROXI GROUP MEETING: TECHNOLOGY NEUTRAL SFVV

DR STEVE SUMMERSKILL

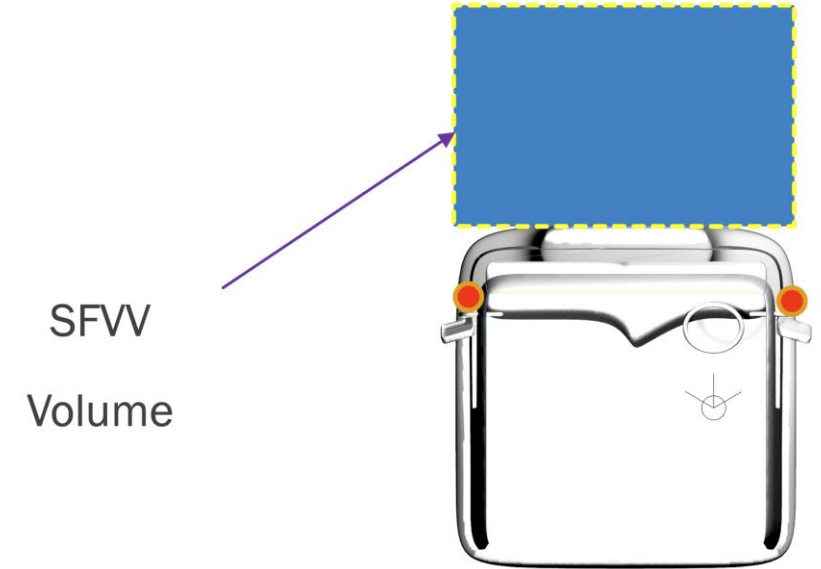


CONTENT

- Proposal
- Testing the proposal

THE NEED FOR A TECH NEUTRAL SFVV

- It has been highlighted that the approach taken to ensure that frontal volume is technology neutral for reduced A-pillar width, needs to be replicated for the SFVV volume
- i.e. the SFVV volume is defined by vehicle width but there is less volume to see for narrower vehicles
- A narrower 2.3m cab currently has the same volume requirement as the 2.5m cab in the current version
- This needs to be corrected
- This presentation presents an option for solving this issue.

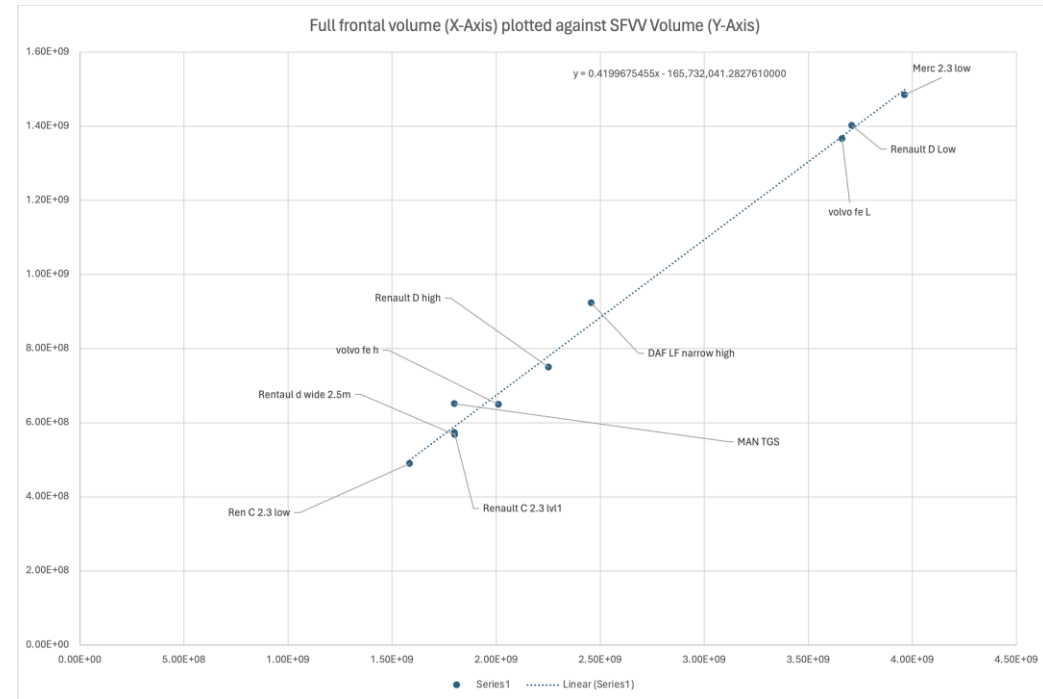


PROPOSAL

- Our proposal is as follows
 - For a Level 1 vehicle with a cab width of 2.5m we expect to see 0.47m³ of SFVV volume and 1.8m³ for the frontal volume as a minimum requirement as defined in the proposed amendment. This is taken from the table in the Tech Neutral Amendment of UNECE 167
 - The SFVV value is therefore 26.1% of the frontal volume for level 1 vehicles (urban)
 - For a vehicle with a cab width lower than 2.5m the IAPD can be measured and the frontal volume calculated.
 - To find the SFVV volume requirements you take 26.1% of the volume found by the IAPD equation
 - For level 2 and 3 vehicles the requirements is 1m³ for the full frontal volume, and 0.163m³ for the SFVV
 - Therefore the SFVV volume is 16.3% of the total frontal volume.
- This method uses the work already established to be able to determine the volume requirements to the front for vehicles with reduced Inter A-Pillar Distance (IAPD)
- This proposal is assuming linearity of the proportion of SFVV to frontal volume, and so we did some testing to see if this was the case.

CHECKING LINEARITY OF SFVV TO FULL FRONTAL VOLUME

- The graph shows the Subsection Frontal Visible Volume (SFVV) plotted against the frontal volume for 10 different 2.3m wide cabs
- The correlation is 0.996
- Therefore we are assuming Linearity
- We then checked some real world cases to see that percentage of the full volume the SFVV provides.

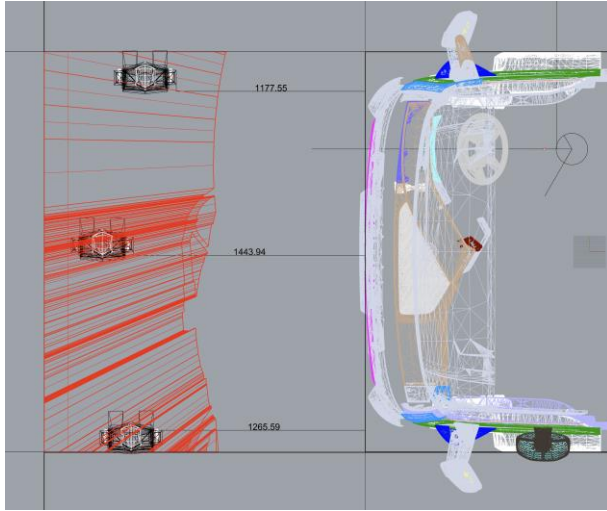


TESTING REAL VEHICLES TO SEE SFVV % OF FRONTAL VOLUME

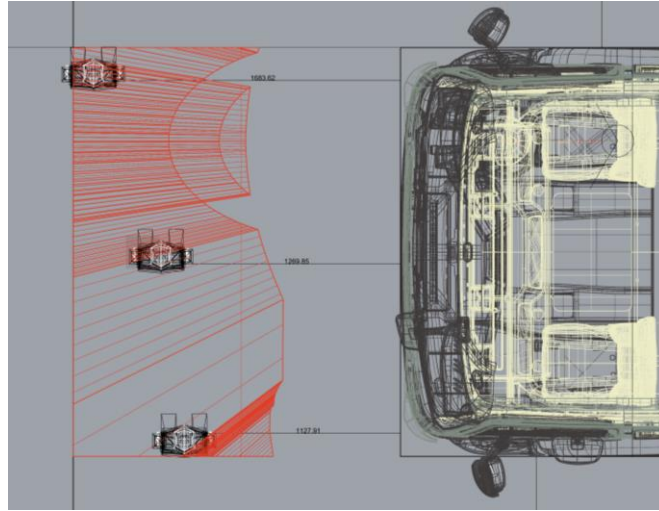
- We have selected a number of vehicles and found the exact mounting height of the cab at which the minimum requirement for level 1 volume is met (1.8m³)
- We then found the volume of the SFVV to compare to the proposed 26.1% of the total volume discussed above
- In each case the SFVV volume was 32% of the frontal volume
- But 26.1% is set as a minimum requirement which relates to the average VRU distance of 1653mm for level 1 vehicles.
- Each of the three vehicles tested over performed in the VRU distance test.

VEHICLE	2.3m cabs SFVV % of front vol		
	FRONT VOL	SFVV	% of SFVV
Ren C 2.3 low	1.58E+09	4.90E+08	31%
Renault C 2.3 LVL1	1.80E+09	573287529	32%
Renault D wide LVL1	1.80E+09	567452057	32%
MERC 2.3 AT LVL1	1.80E+09	574169357	32%
VOLVO FE H	2.01E+09	649661555	32%
Renault D high	2.25E+09	749510693	33%
DAF LF narrow high	2.46E+09	923771833	38%
VOLVO FE L	3.66E+09	1.37E+09	37%
Renault D Low	3.71E+09	1.40E+09	38%
Merc 2.3 low	3.96E+09	1.48E+09	37%

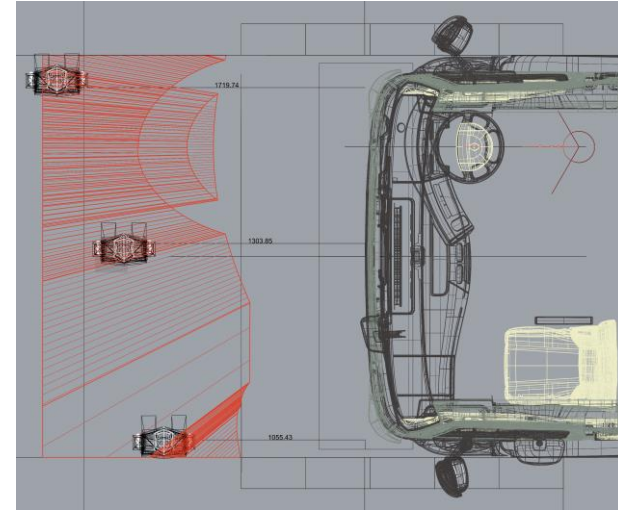
TESTING REAL VEHICLES TO SEE SFVV % OF FRONTAL VOLUME



Merc 2.3 cab



Renault D wide cab



Renault C 2.3 cab

- Mercedes 2.3m cab had an average frontal VRU distance of 1295mm which is 78% of 1653mm
- Renault D wide can had an average frontal VRU distance of 1360mm which is 82% of 1653mm
- Renault C 2.3m cab had an average frontal VRU distance of 1359mm which is 82% of 1653mm
- Therefore, each is overperforming by a similar amount
- If we reduce the 32% of SFVV from frontal volume by the overperformance amount we get 26% for the Renault D and C and 25% for the Mercedes
- Therefore, we are happy with the 26.1% estimate of SFVV volume from full frontal volume.

Project information

Thank you for your attention, are there any questions?

Dr Steve Summerskill (s.j.summerskill2@lboro.ac.uk)

Dr Russell Marshall

Dr Abby Paterson

Anthony Eland

Design Ergonomics Group

Loughborough Design School

Loughborough University

United Kingdom