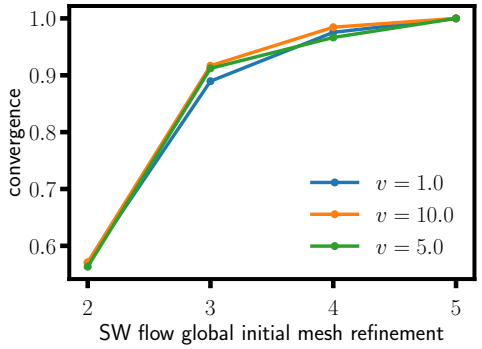
Aerodynamic simulation in SolidWorks Flow dink

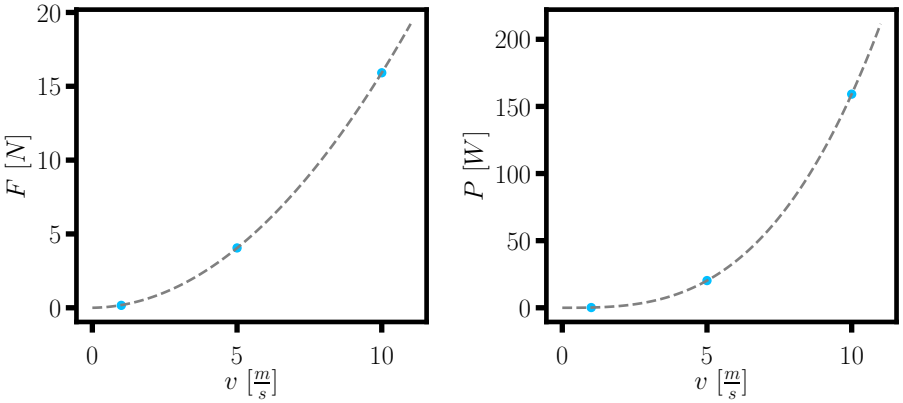
Solidworks flow simulation for a simplified version of the tandem trike (simple wheels, no chairs). Increased "global initial mesh refinement" until results converge.
It is clear that predicted force F, and power P calculated by $P = Fv$ is low by a factor ≈ 3.

	Drag (N)
no roof	15.9
flat roof	17.0
curved roof	19.1
curved roof and sidefenders	18.5
covered front	34.3
covered front and sidefenders	30.6
curved front to ground	72.1
curved front to ground with plate	61.2

Table 1: Drag force for wind speed of 10m/s, for different roof shapes



Sideview velocity contour plots



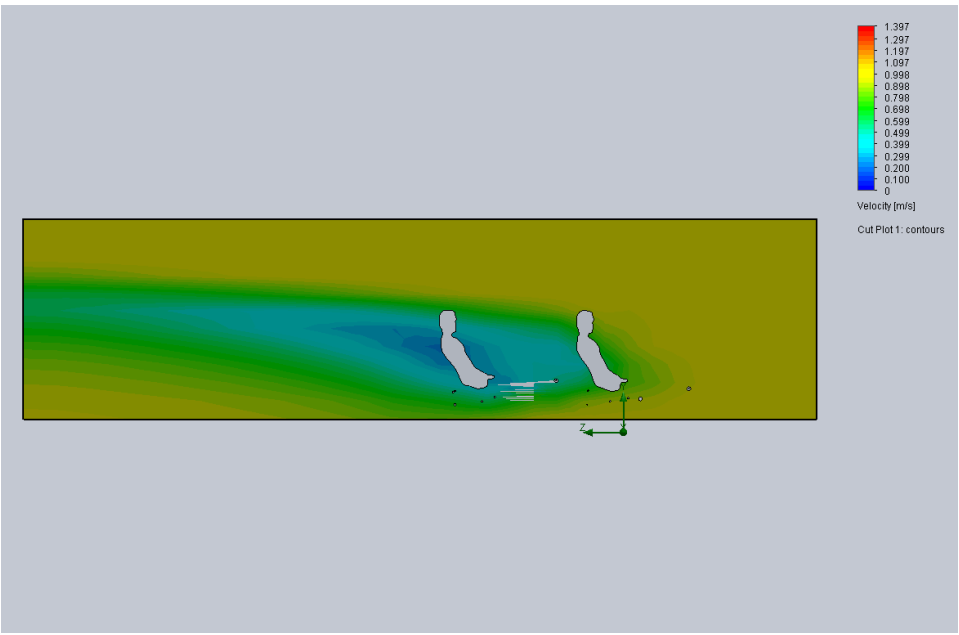


Figure 1: $v = 1m/s$, global initial mesh = 2

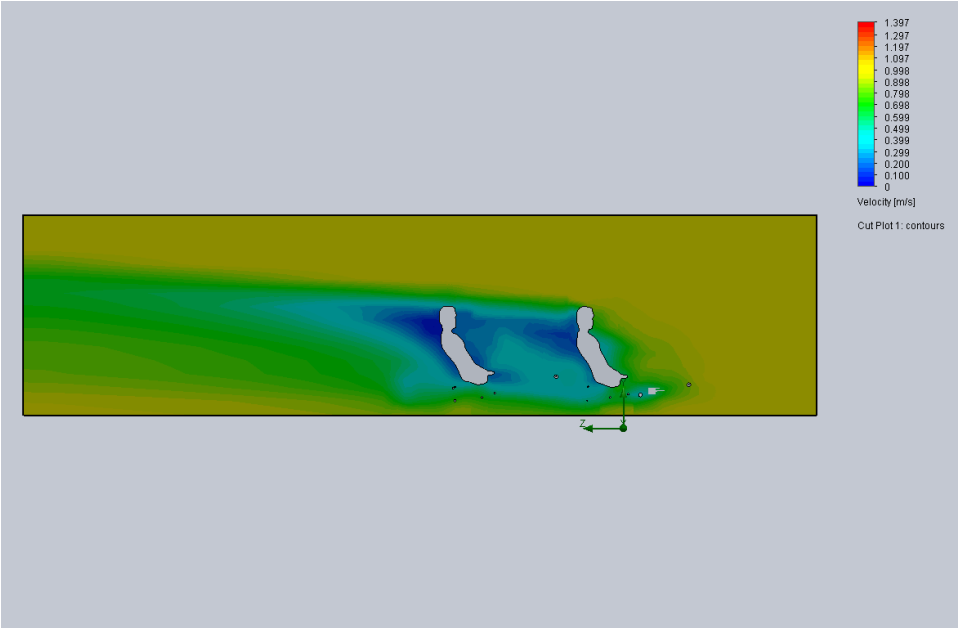


Figure 2: $v = 1m/s$, global initial mesh = 3

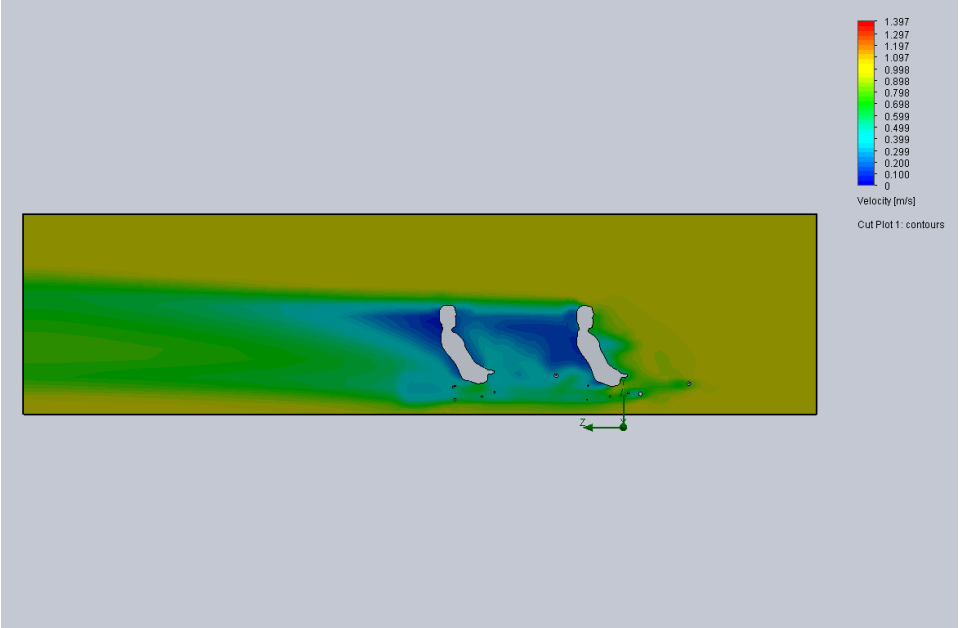


Figure 3: $v = 1m/s$, global initial mesh = 4

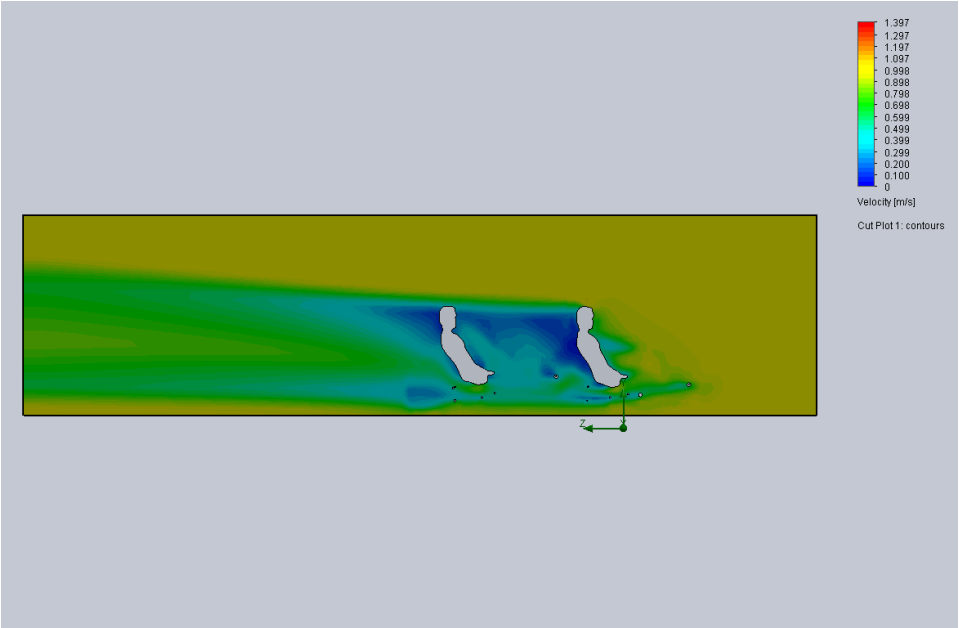


Figure 4: $v = 1m/s$, global initial mesh = 5

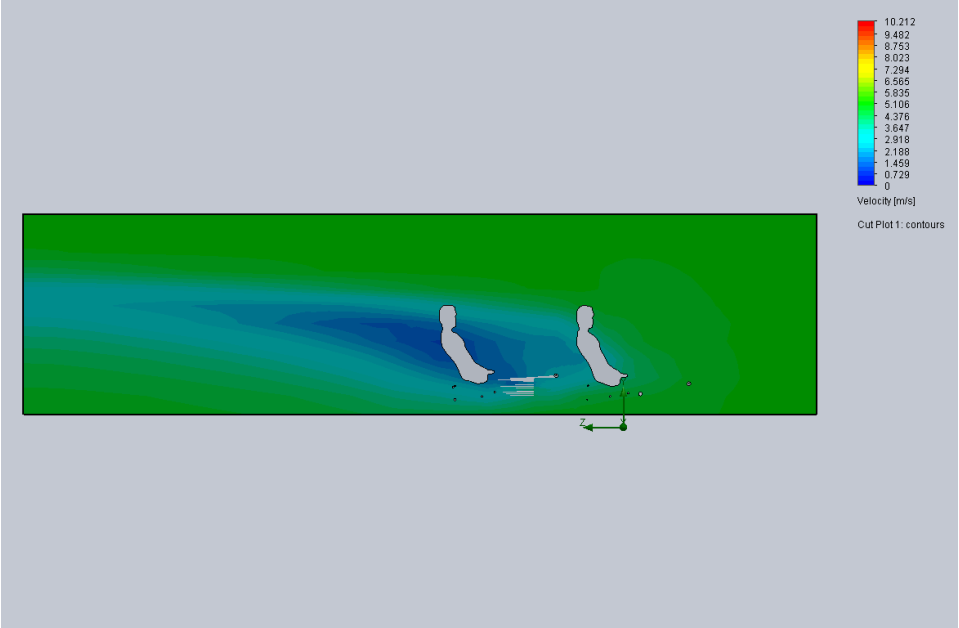


Figure 5: $v = 5m/s$, global initial mesh = 2

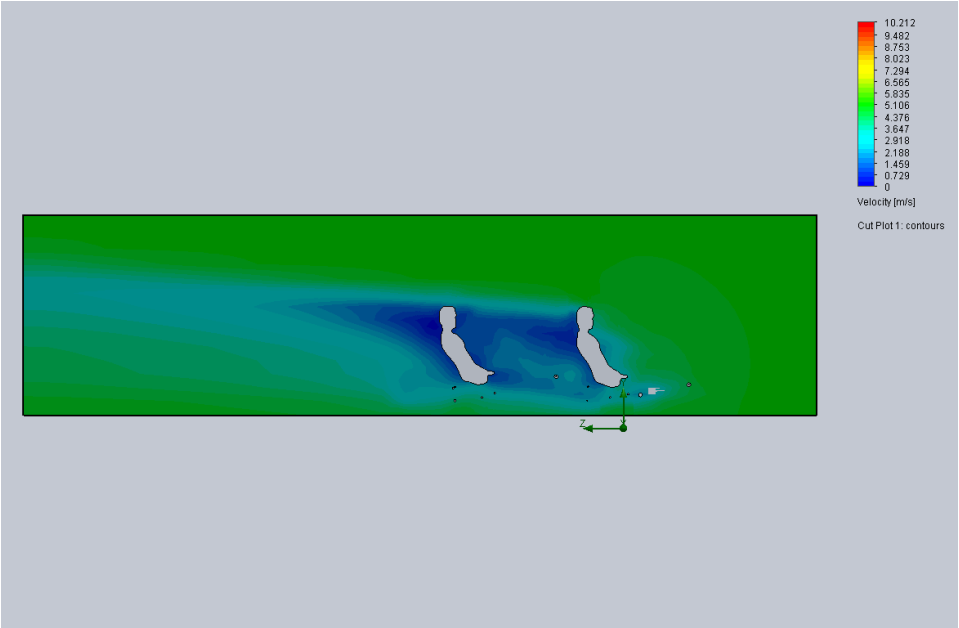


Figure 6: $v = 5m/s$, global initial mesh = 3

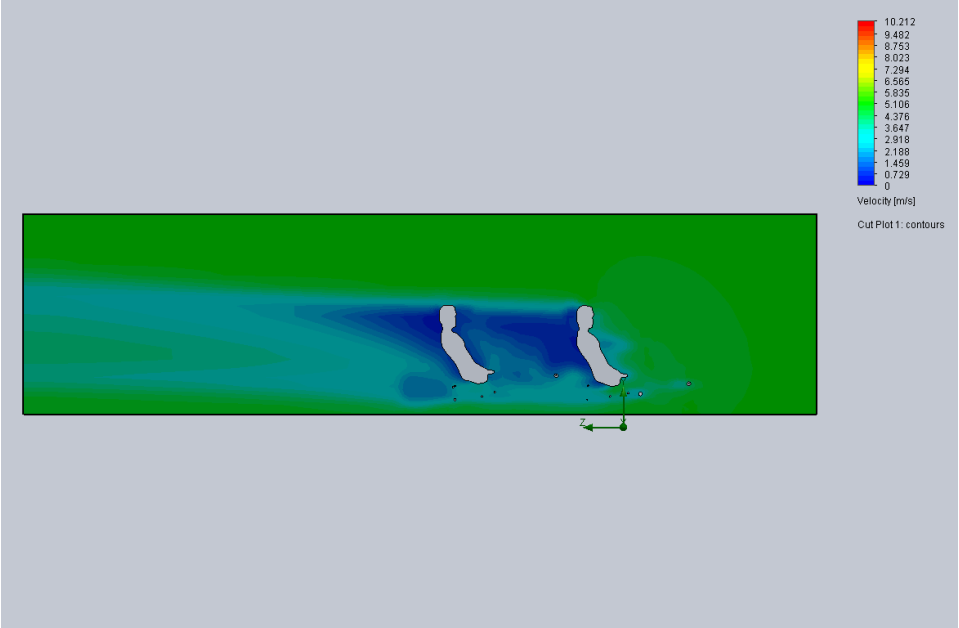


Figure 7: $v = 5m/s$, global initial mesh = 4

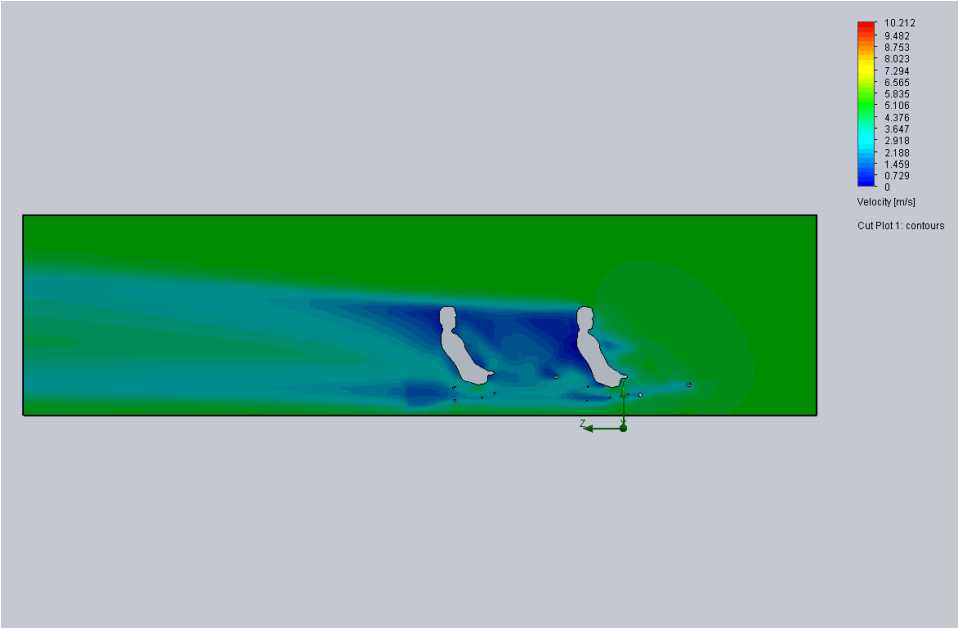


Figure 8: $v = 5m/s$, global initial mesh = 5

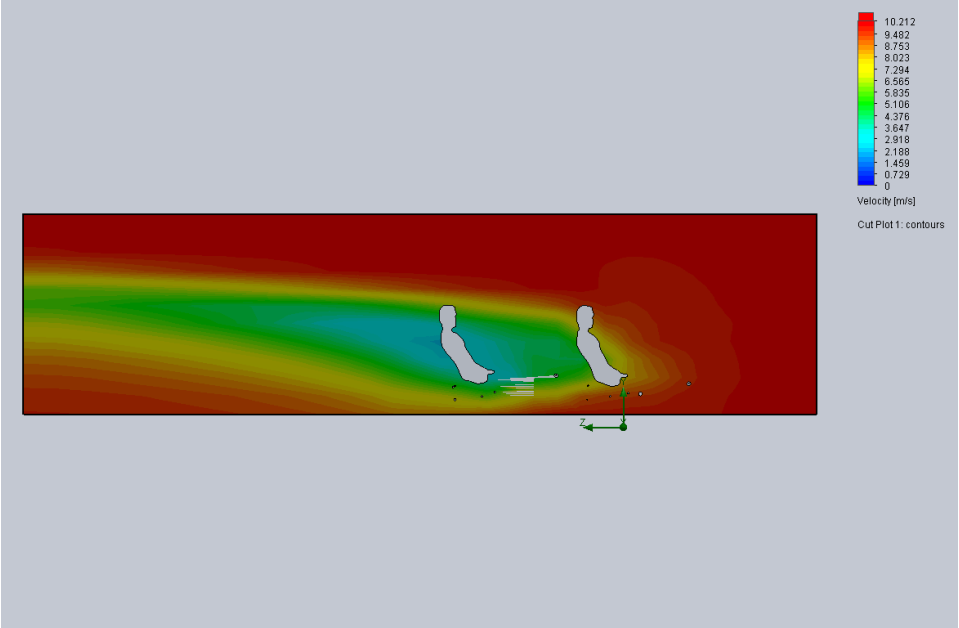


Figure 9: $v = 10m/s$, global initial mesh = 2

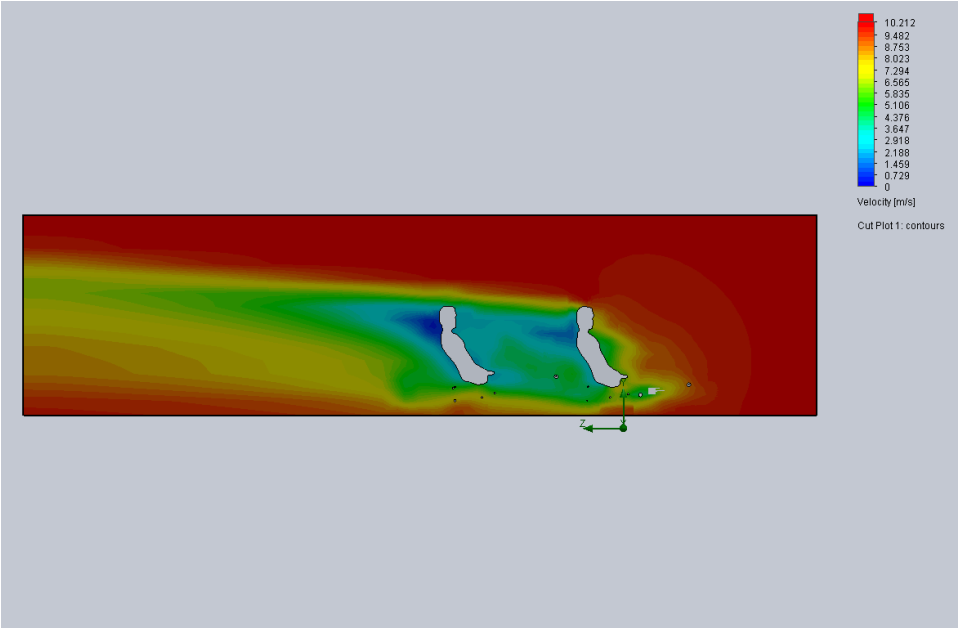


Figure 10: $v = 10m/s$, global initial mesh = 3

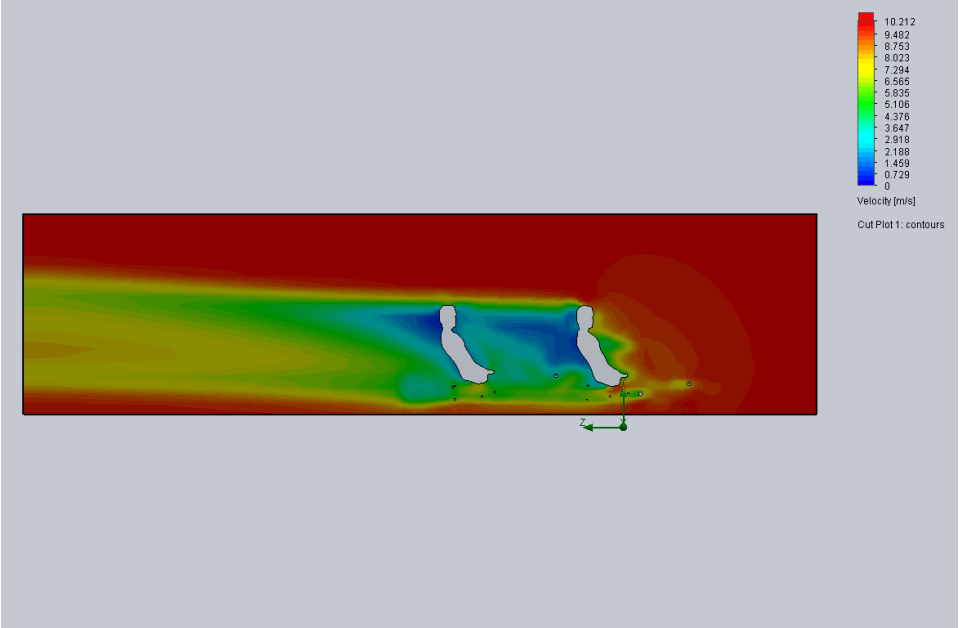


Figure 11: $v = 10m/s$, global initial mesh = 4

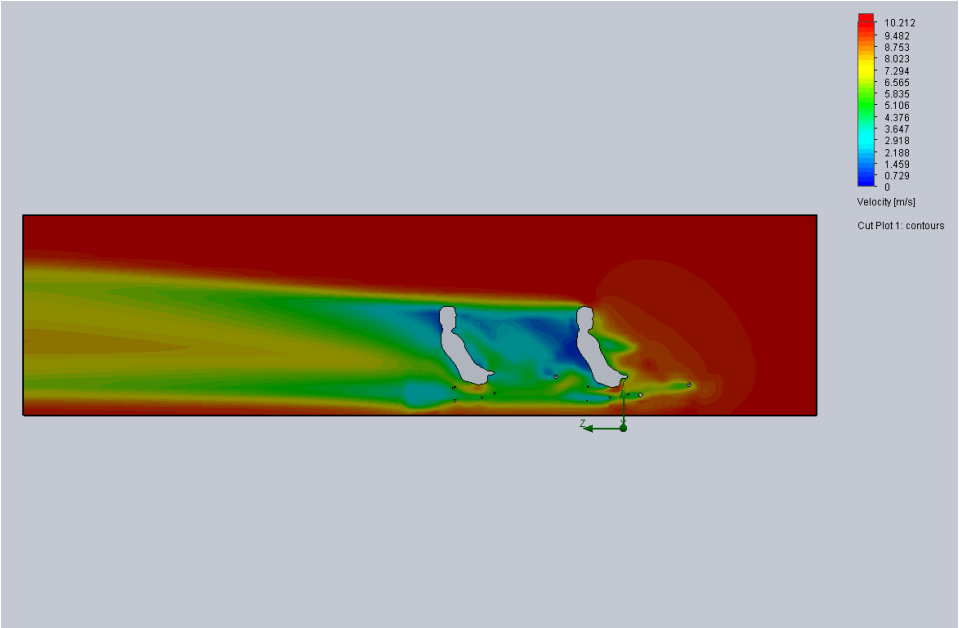


Figure 12: $v = 10m/s$, global initial mesh = 5

1 roof tests

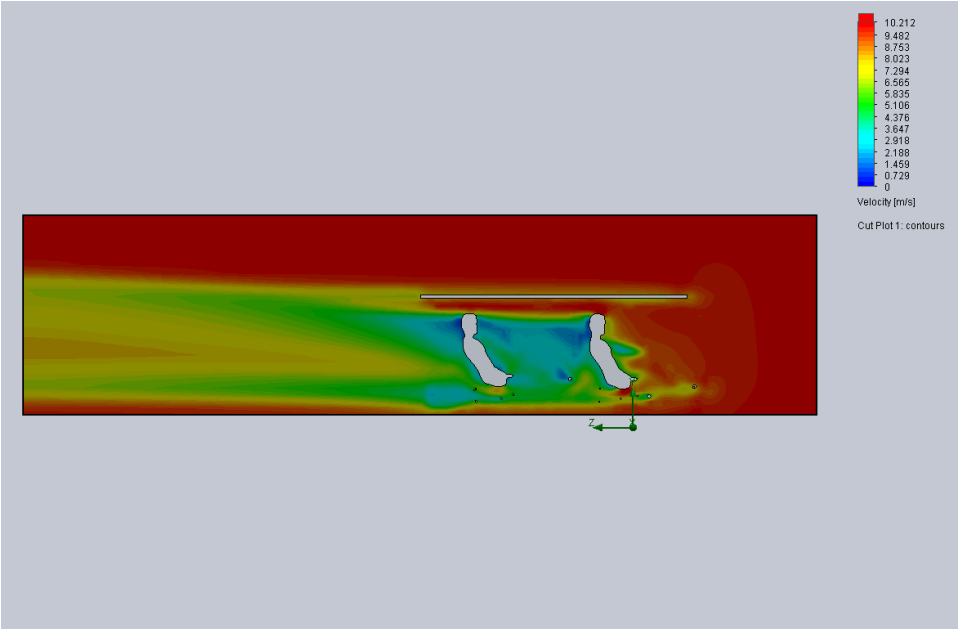


Figure 13: $v = 10m/s$, global initial mesh = 5. Note that with the roof the drag increases from 15N to 17N.

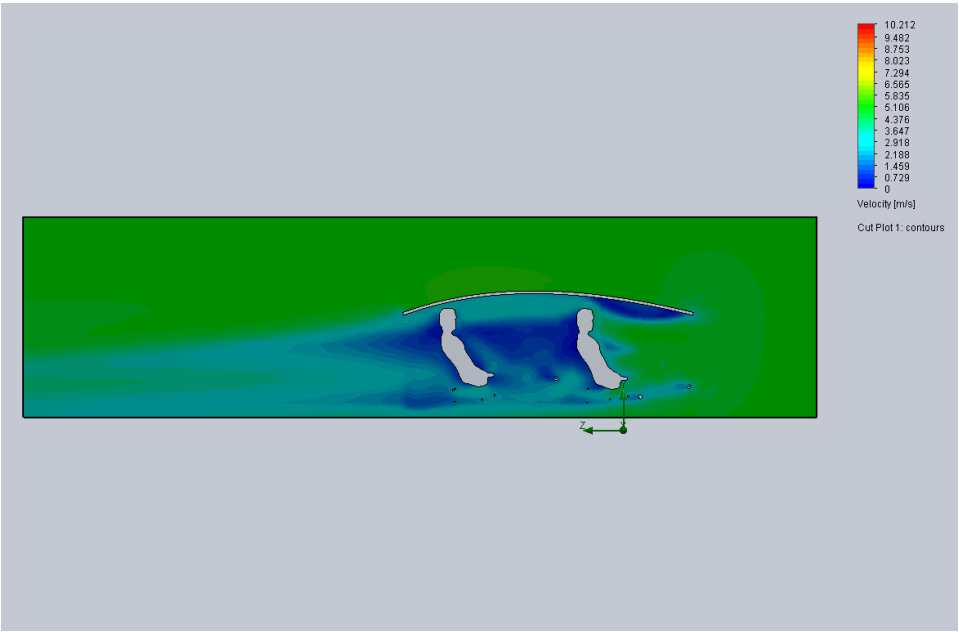


Figure 14: $v = 5m/s$, global initial mesh = 5. Note that with the roof the drag increases from 4N to 5N but turbulent tail is significantly suppressed.

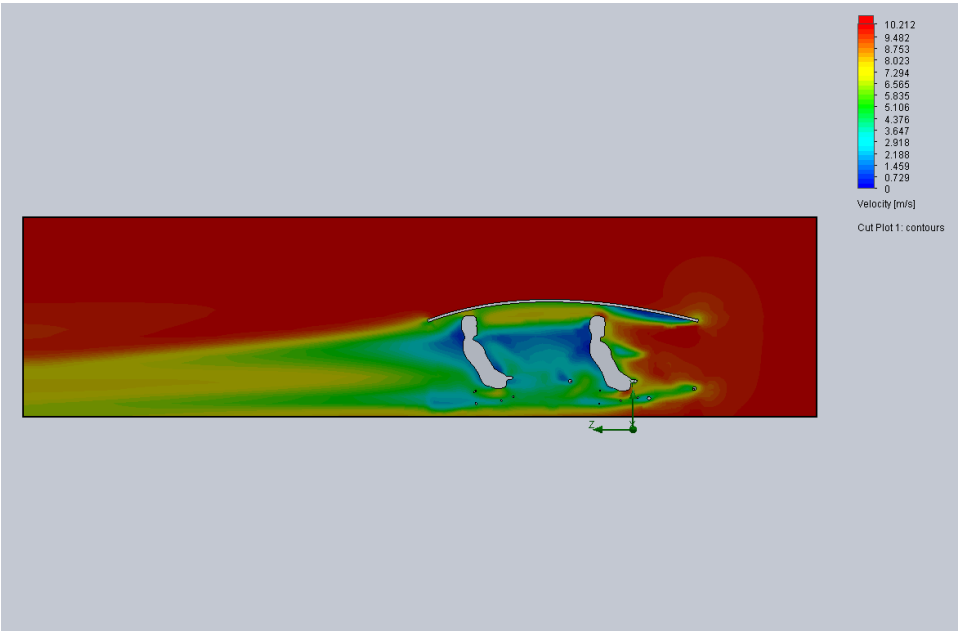


Figure 15: $v = 10m/s$, global initial mesh = 5. Note that with the roof the drag increases from 15N to 19N but turbulent tail is significantly suppressed.

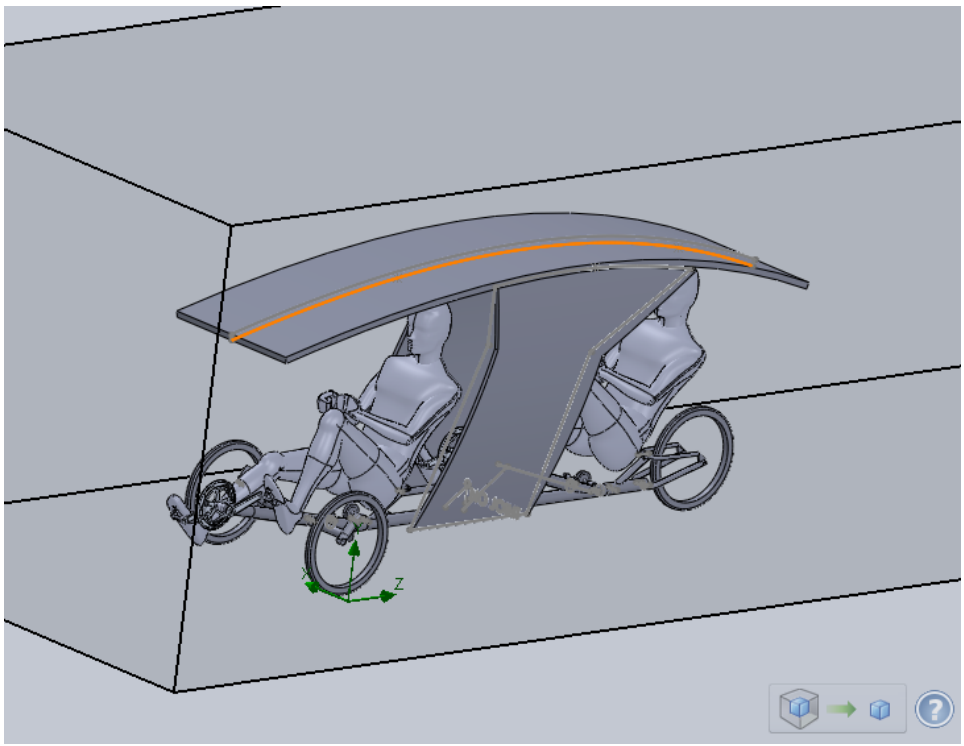


Figure 16: roof and sidefender

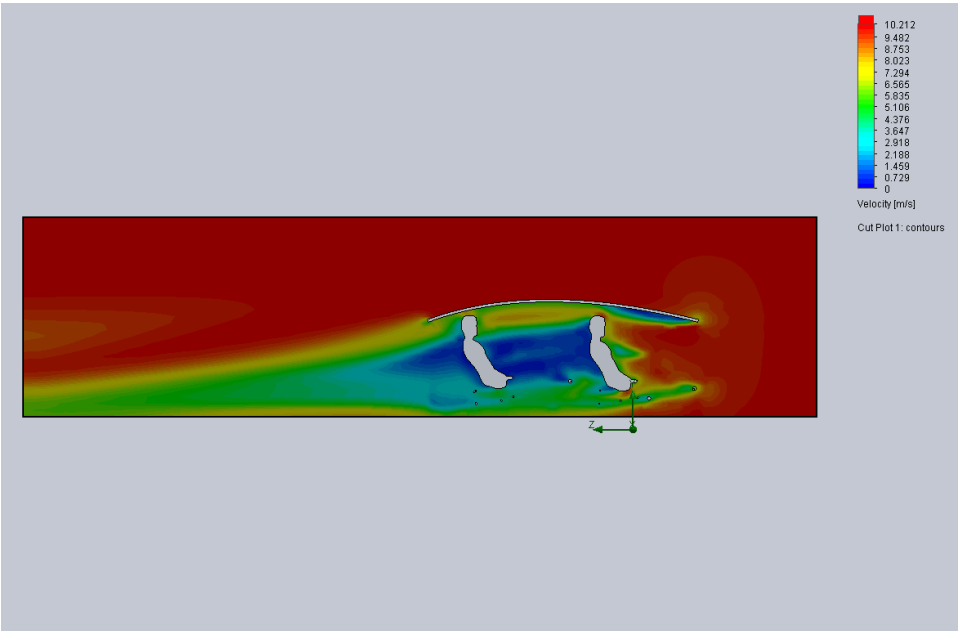


Figure 17: $v = 10m/s$, global initial mesh = 5. Adding sidefenders reduces drag force from 19N to 18.5N

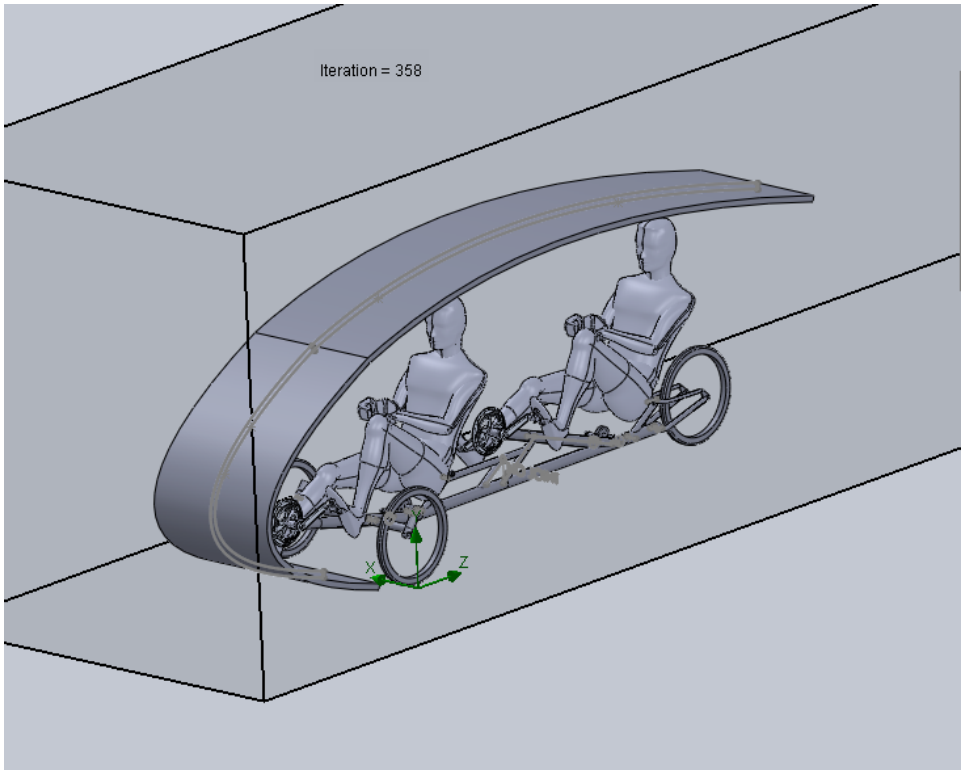


Figure 18: roof and sidefender

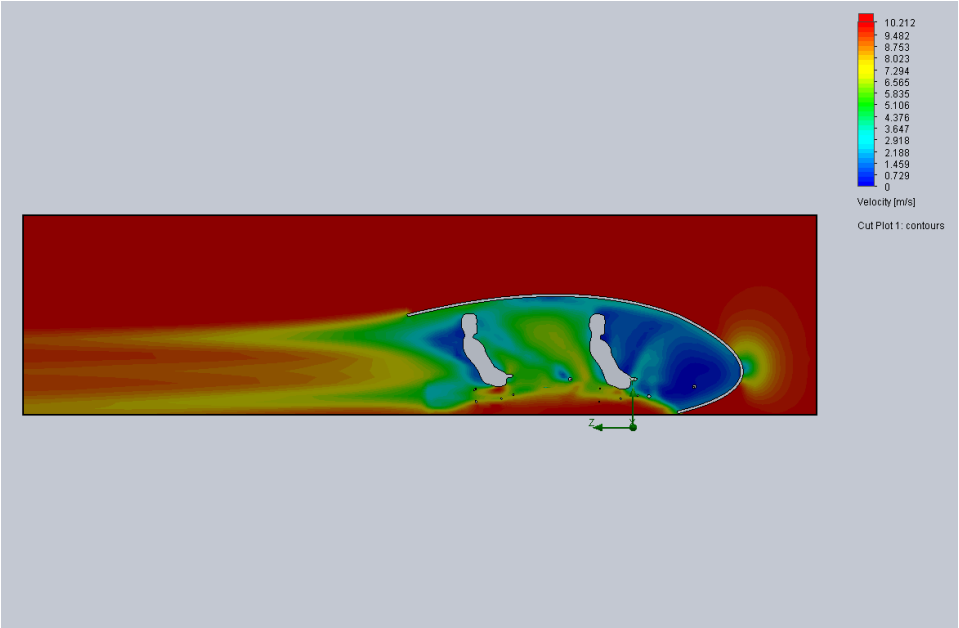


Figure 19: $v = 10m/s$, global initial mesh = 5. Drag force is 34N

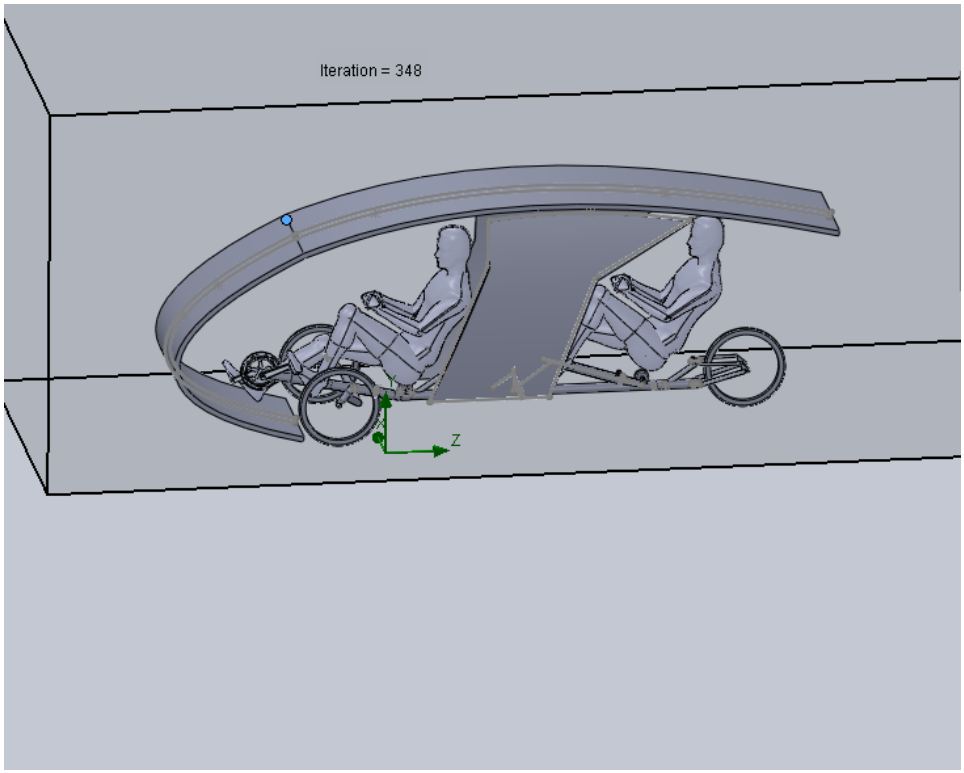


Figure 20: roof and sidefender

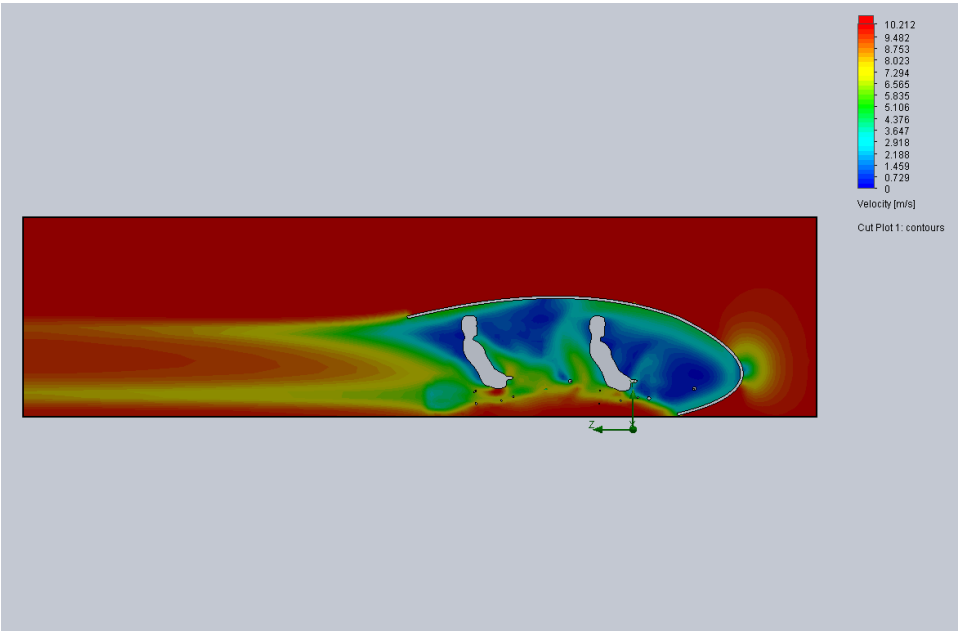


Figure 21: $v = 10m/s$, global initial mesh = 5. Adding sidefenders reduces drag from 34N to 30N.

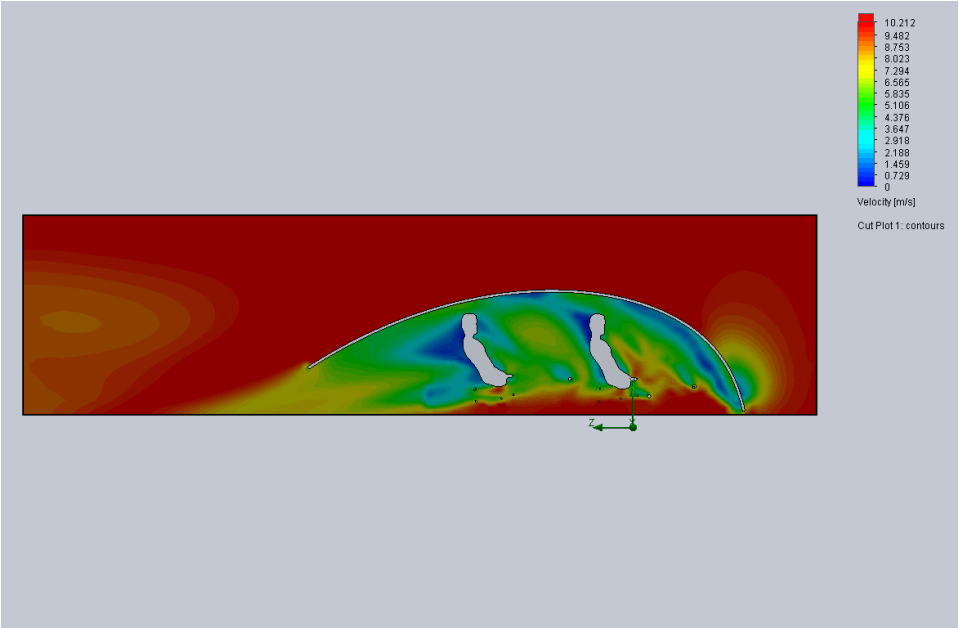


Figure 22: $v = 10m/s$, global initial mesh = 5. Drag is 72.1N.

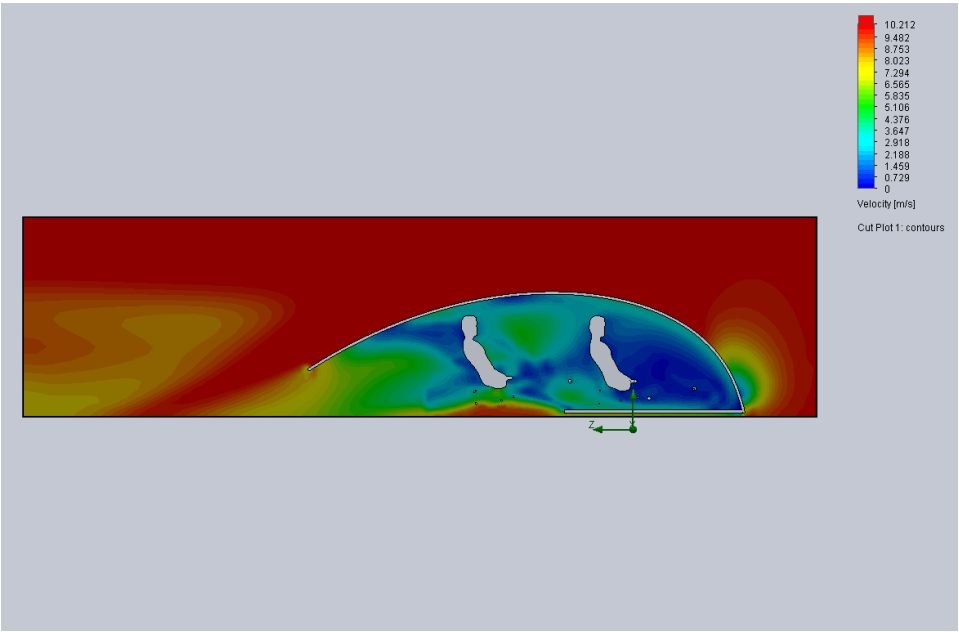


Figure 23: $v = 10m/s$, global initial mesh = 5. Drag reduces from 72.1N to 61.2N when adding bottom plate.