

**Supplementary material**

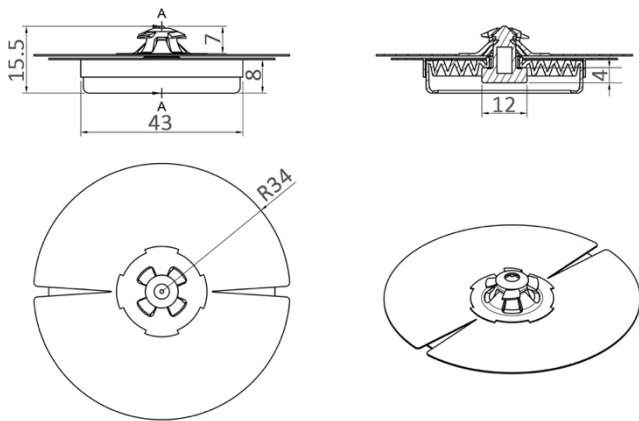


Figure 1: External shape, section and dimensions of the pads in mm.

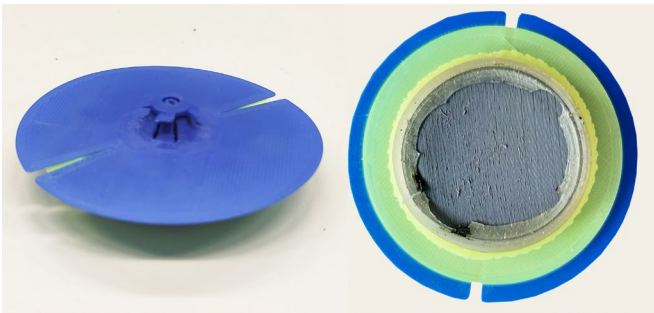


Figure 2: 3D printed pad.

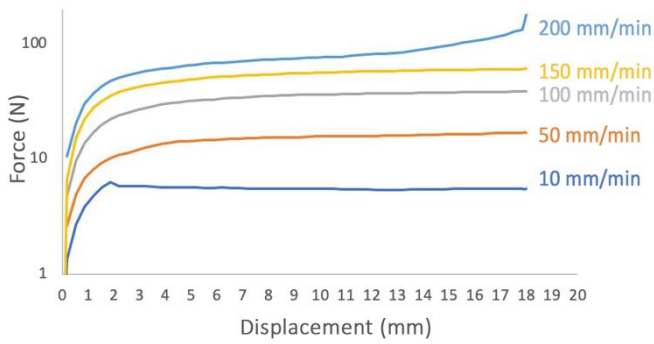


Figure 3: Force vs displacement curve for shear thickening fluid at different shear strain rates.

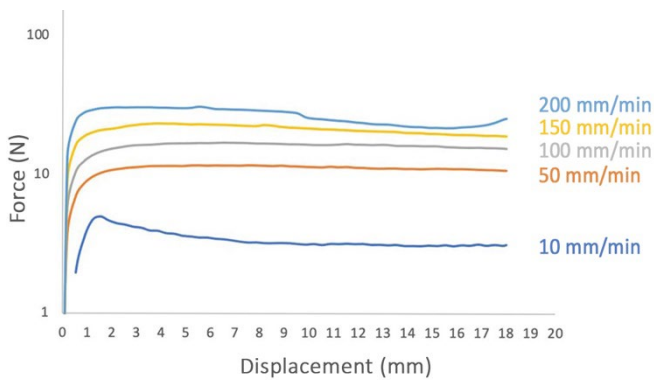


Figure 4: Force vs displacement curve for shear thinning fluid at different shear strain rates.

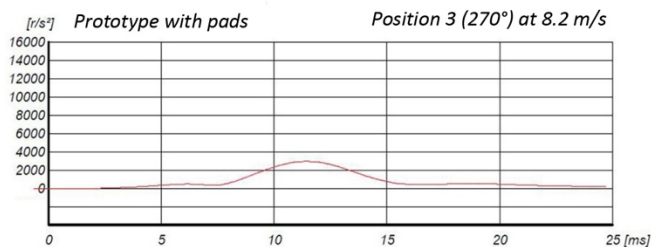
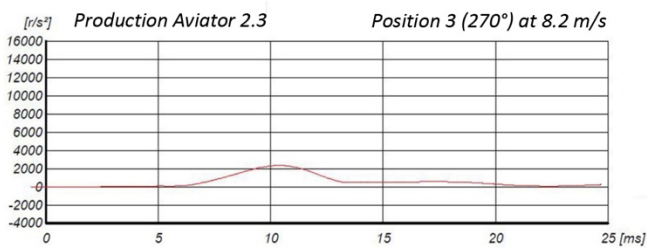
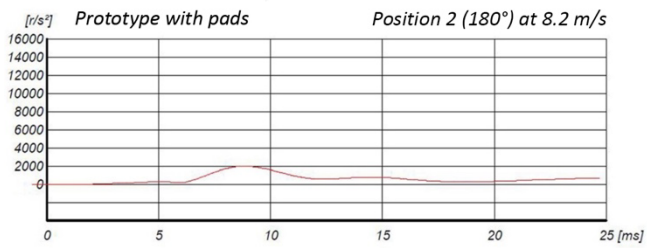
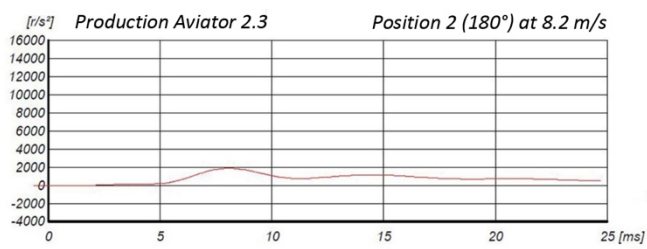
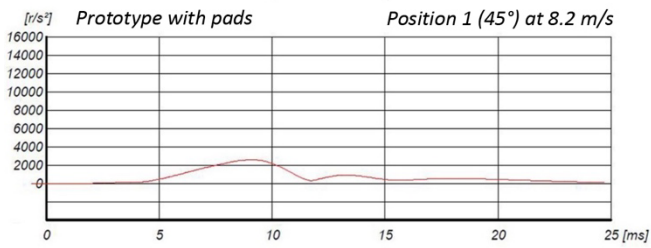
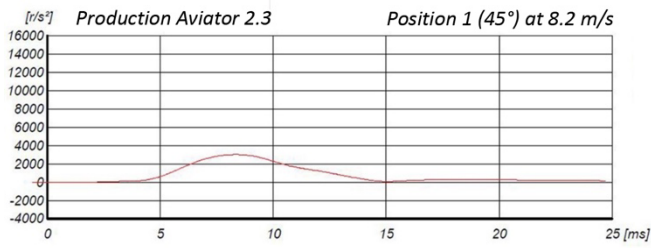


Figure 5: Impacts accelerations ( $r/s^2=rad/s^2$ ) vs time for the two helmets (in positions 1,2,3) with and without pads