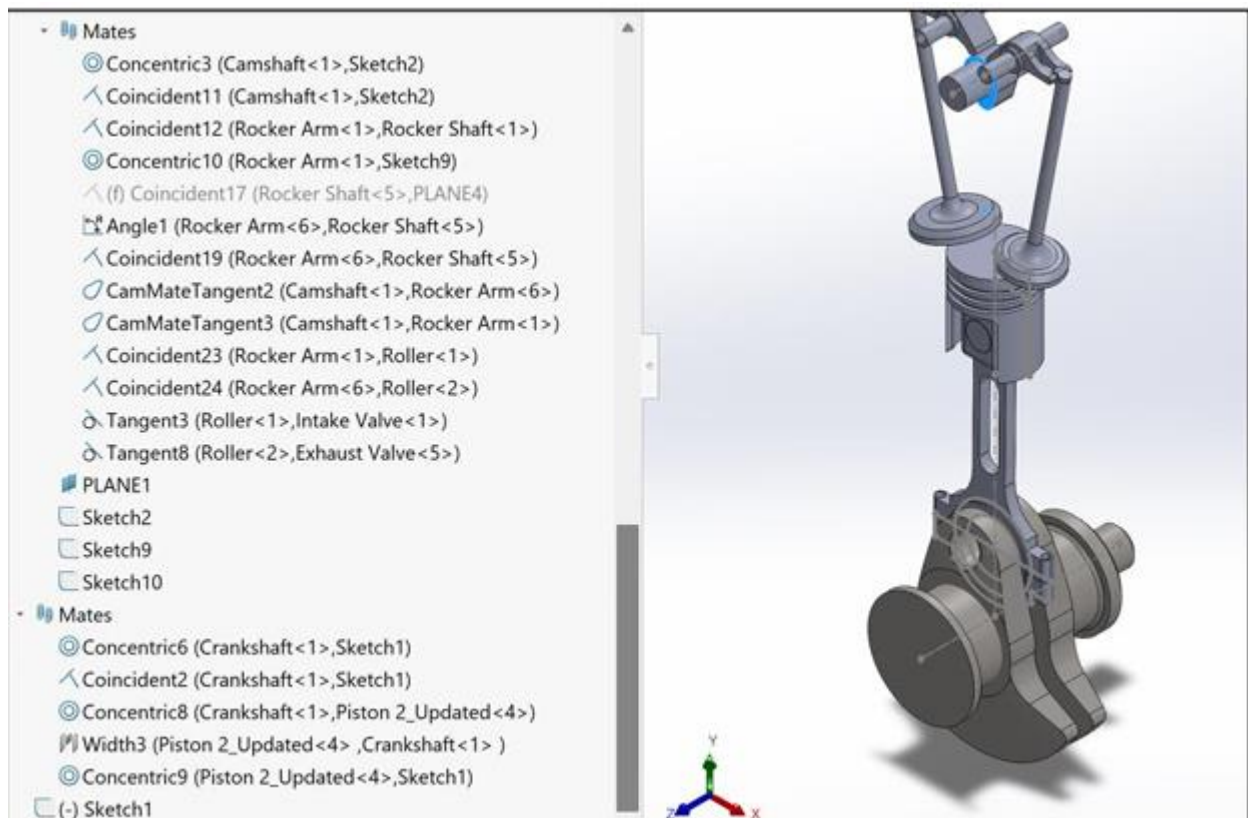
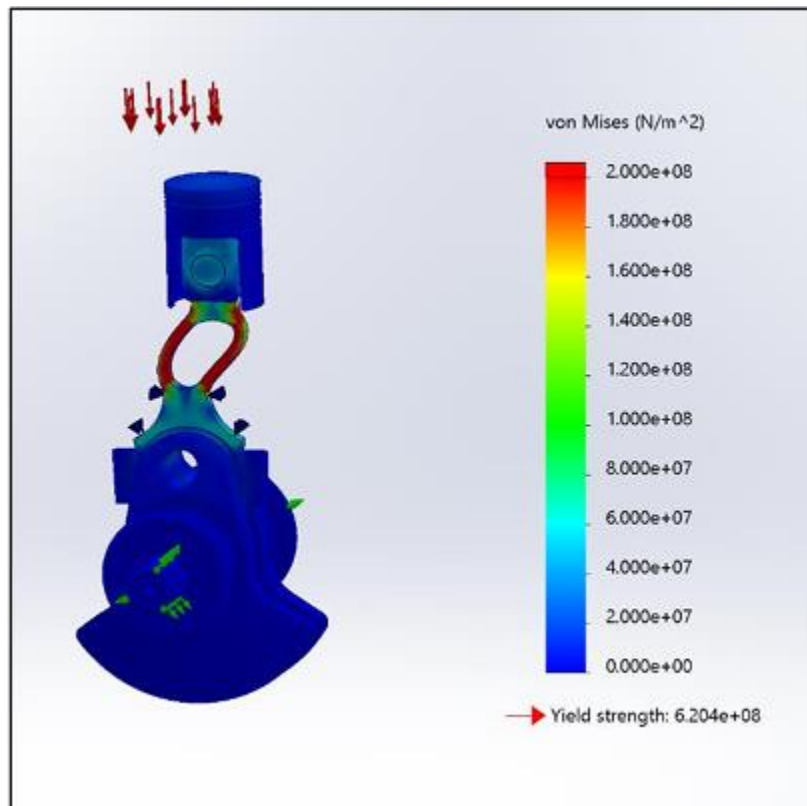
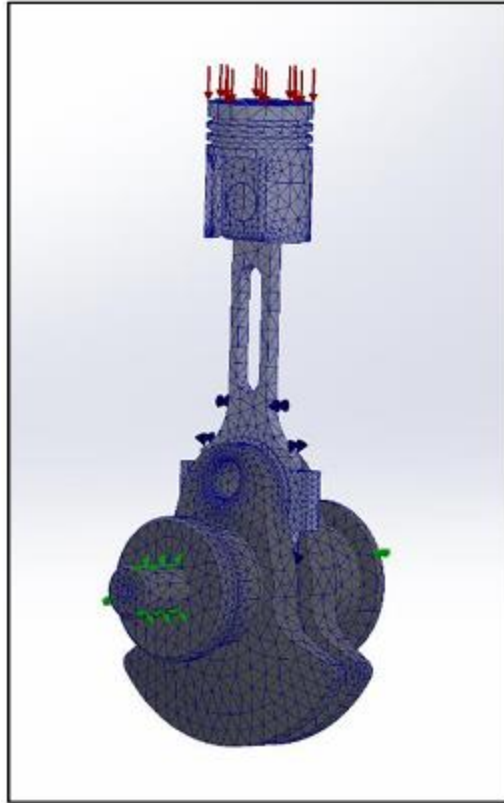


1. SOHC single-cylinder motorcycle engine — assembly design & FEA.

A compact, single-overhead-cam engine assembly I modelled in CAD and verified with finite-element analysis to ensure structural integrity and serviceability under operating loads. The work ties part-level detail (shafts, bearings, mounts) to system-level behavior.

- Role: full CAD assembly modelling, constraint/fit checks and FEA setup.
- Analyses performed: static stress distribution, contact checks, and boundary conditions representing mounting and thermal/operational loads.
- Skills demonstrated: CAD assembly modelling, meshing for FEA, interpretation of von-Mises stress and displacement results.

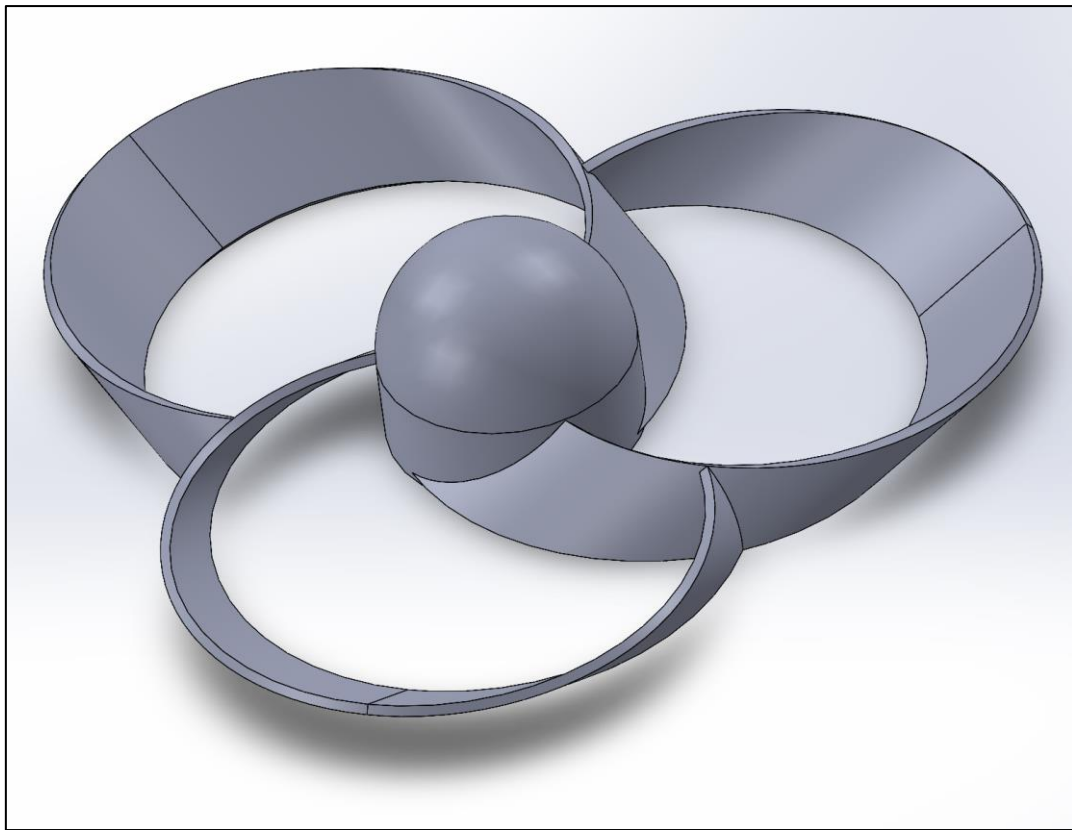




2. Toroidal propeller — CFD research study.

A research CFD investigation of a toroidal (ring) propeller geometry to understand its aerodynamic performance, wake structure and potential efficiency benefits compared to conventional blades.

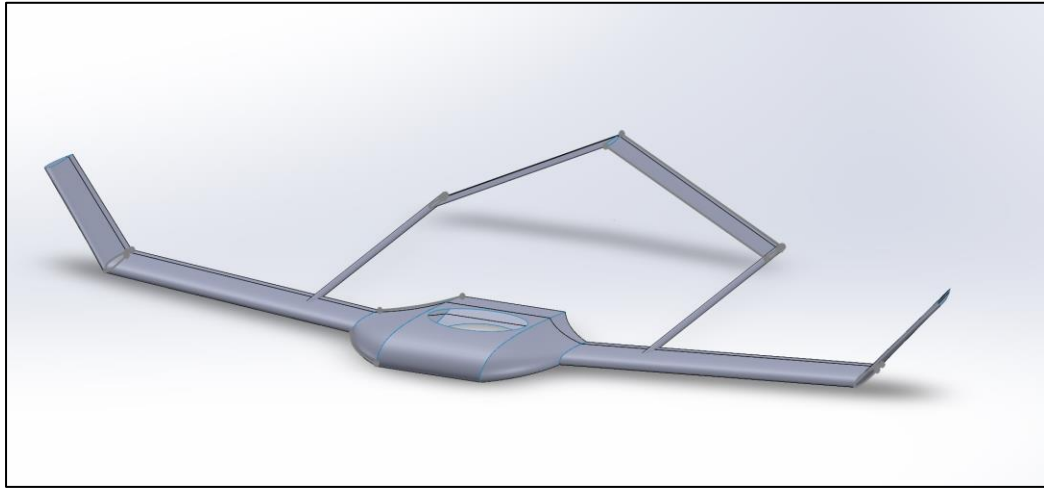
- Role: geometry preparation, domain setup and CFD runs for steady/unsteady analysis.
- Analyses performed: velocity/pressure fields, thrust and torque prediction, wake/vorticity visualization and parametric studies.
- Skills demonstrated: CAD-to-CFD workflow, mesh strategy for rotating/propulsive bodies, postprocessing of flow fields and performance metrics.



3. V-tail UAV — initial conceptual design for Teknofest.

An initial airframe concept using a V-tail configuration tailored for competition requirements: lightweight structure, control authority, and manufacturability.

- Role: concept CAD, layout of lifting surfaces, tail geometry, and control surface sizing.
- Analyses performed: basic stability/trim considerations and control surface effectiveness checks (conceptual level).
- Skills demonstrated: aircraft conceptual design, trade-off thinking, rapid CAD iteration for competition timelines.

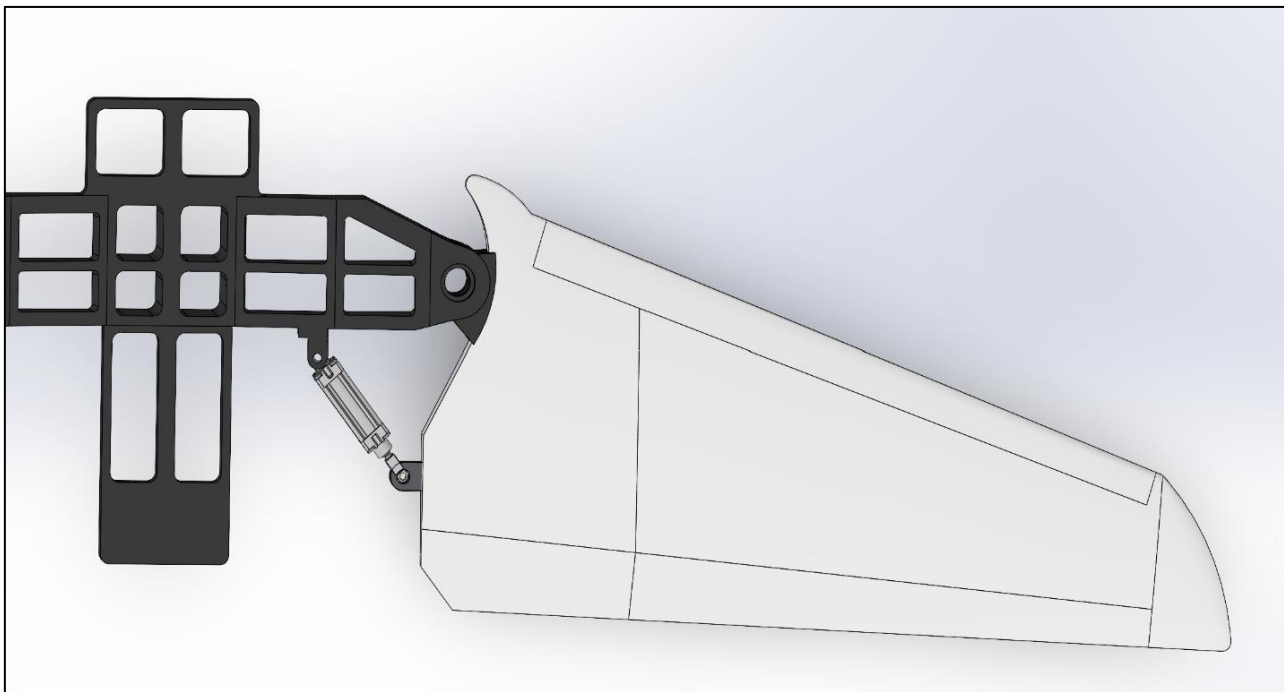
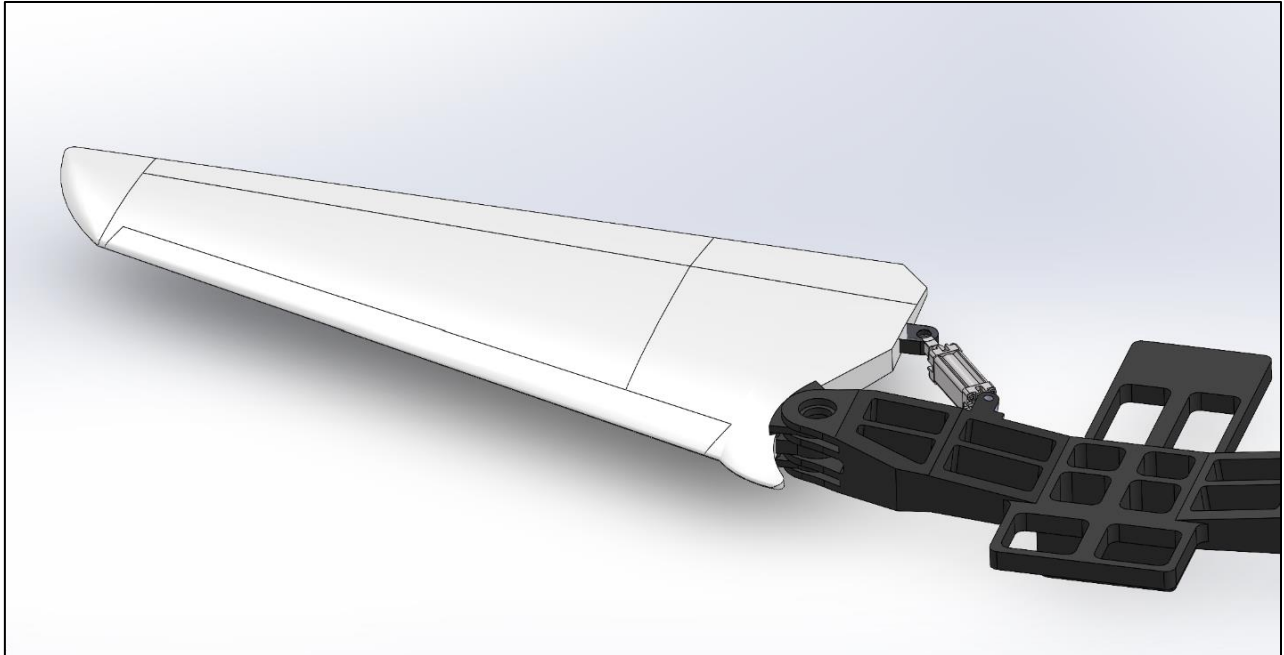


4. Wing with sweep-back mechanism — design & rendering for Mechanics of Materials project.

A kinematic and structural design of a variable sweep mechanism for a fighter-class wing — modelled and rendered to demonstrate actuation, load paths, and feasibility.

- Role: mechanism kinematics, linkage/spar placement and visual renderings to convey motion.
- Analyses performed: kinematic range checks, basic load path / reaction force estimates, and conceptual structural considerations for sweep loads.

- Skills demonstrated: mechanism design, integration of structural thinking with aerodynamics, and presentation/rendering for technical reports.



5. Benches Design:

A design project focused on developing durable, ergonomically optimized benches suitable for public or institutional use. The work emphasized material efficiency, manufacturability, and aesthetic integration with the environment.

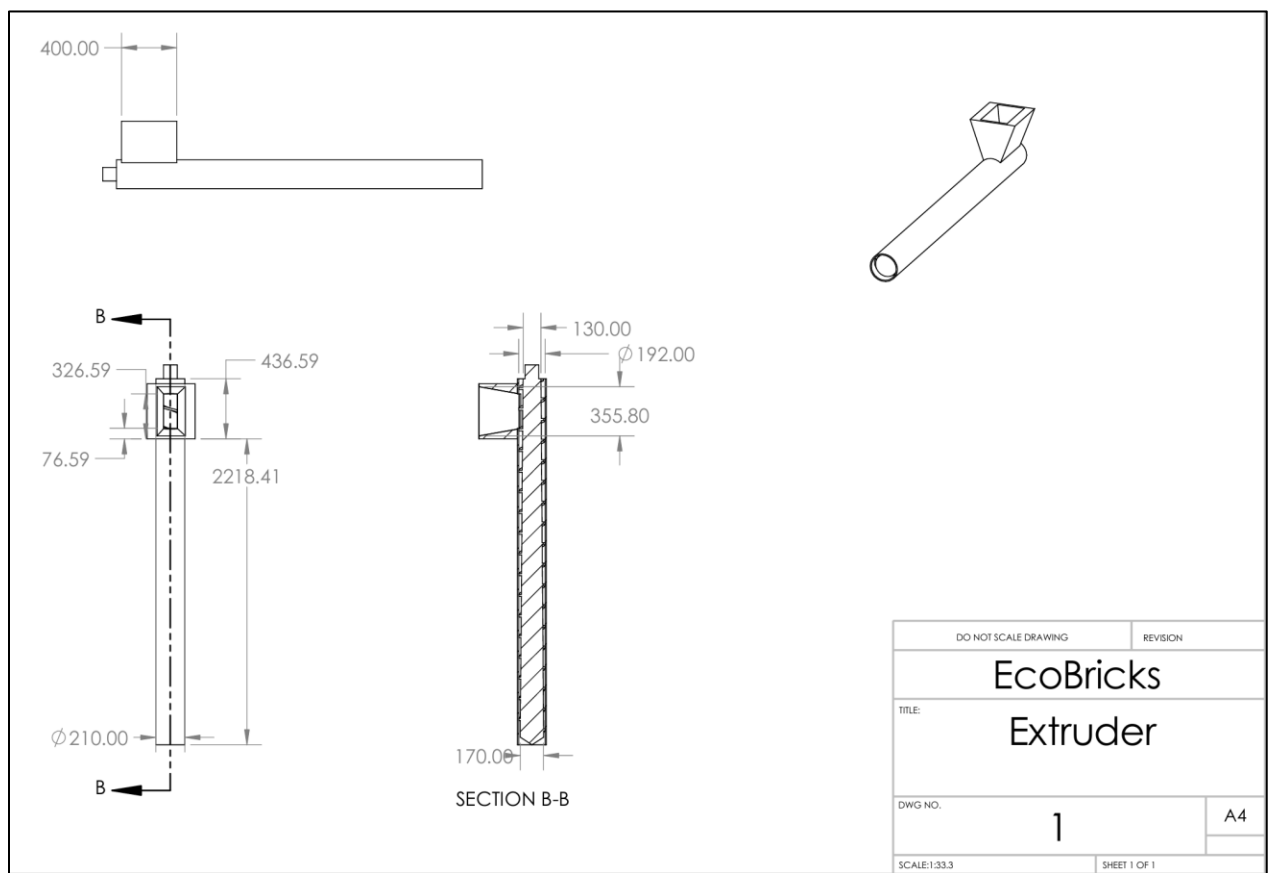
- Role: concept development, CAD modelling, and selection of structural members and materials.
- Analyses performed: static load analysis to ensure safety under user weight, deflection checks, and assessment of joint strength and stability.
- Skills demonstrated: structural design, CAD modelling for furniture applications, load testing via simulation, and design for manufacturability.



6. Extruder Design:

A design and calculation study for a single-screw plastic extruder used in recycling or plank manufacturing applications. The project covered mechanical layout, screw profile optimization, and drive system design.

- Role: mechanical design of key extruder components (barrel, screw, die connection, gearbox), and preparation of calculation sheets for torque and power requirements.
- Analyses performed: torque/power estimation based on polymer properties and throughput, thermal and pressure analysis along the screw length, and basic FEA for component stress verification.
- Skills demonstrated: mechanical system design, thermal and pressure analysis, calculation-based design verification, and understanding of polymer processing machinery.



7. Die Design for a Planck:

Design of a two-part compression-moulding die for manufacturing a recycled-plastic plank (1220×50×25 mm). The focus was on achieving uniform pressure distribution, proper ejection, and effective cooling during moulding.

- Role: detailed 3D modelling of cavity and core plates, design of alignment and ejection systems, and cooling channel layout.
- Analyses performed: pressure and temperature distribution analysis, heat transfer assessment for channel placement, and evaluation of part release mechanisms.
- Skills demonstrated: die and Mold design, heat transfer analysis, mechanical design for manufacturability, and CAD detailing of tooling assemblies.

