

Case Studies: Composite Hydrogen Pressure Vessel

Frewer Engineering completed R&D of composite wound hydrogen fuel tanks. Specifically, the feasibility of integrating these into existing EV modules. Exploring novel shapes, optimising mass fraction, and reviewing structural challenges.



Novel Composite Design

EV battery modules are inherently flat, a shape that is not well-suited for use as a high-pressure vessel. By applying our expertise in composite design, particularly in compact and highly intricate structures, we developed solutions that balance high mass fraction, packaging constraints, and structural integrity. Our approach considers design, analysis, and manufacturing feasibility from the outset, enabling rapid and effective evaluation of concepts.



Lightweighting Optimisation

Percentage mass fraction is a key design criteria relating hydrogen mass to the containment structures mass. Minimising tank weight whilst maximising hydrogen capacity is vital for tank efficiency and feasibility. Our iterative method of maximising fuel capacity without jeopardising the tanks structural integrity ensures peak performance of the fuel system.

Filament Winding Model

Complexity in wound structural analysis stems from the multidirectional layering of composite fibres. Our team created bespoke code that transfers filament winding data for manufacture into an FEA model suitable for analysis. Analysis using this method has shown good agreement with physical testing, providing an efficient and accurate service.

