



## Innovative Composite Solutions for Rear Under Run Protection in Vehicles

### Overview:

The automotive industry is rapidly evolving and the need for cutting-edge solutions that prioritize safety and efficiency is at an all-time high. This Design of rear underrun protection device aims at improving road safety by mitigating underride crashes where a smaller vehicle travels under another larger one like a truck or bus.

Engineering this product is for replacing traditional sheet metal with composite materials optimized for high impact resistance, weight reduction and facilitating the development of innovation for lightweight, high-impact-resistant products compared to conventional sheet metal parts.

### Challenge:

Evaluating its performance virtually through impact analysis at five distinct locations in compliance with ARAI standards to ensure the product's safety standards after the transformation.

### Engineering Solution:

#### Design:

Redesigning the sheet metal parts to composite for load bearing capacities, stress distributions, and structural integrity with methodology to reduce the weight in significant manner.

#### Impact Performance:

The designed CAD model is modelled for CAE analysis with assigning its anisotropic properties and evaluating the stiffness performance of the same after the impactor impacting the composite beam.

#### Post Processing:

Evaluating the results of impact analysis and optimizing the existing composite beam and repeating the process until its stiffness to weight ratio is considerably very high for all given impact load cases.

#### Manufacturing Process:

Pultrusion is used where it is the best cost cutting process compared to any other manufacturing process of composite. Each layer is carefully inspected during the process for the best outcome of the composite beam for longer durability.

#### Quality and Standards:

At each step of this loop, the standard specified by ARAI is strictly followed for ensuring the product's safety with no compromise in its performance.