

Design and Analysis of Composite Landing Gear for UAV

Our customer is engaged with development of Unmanned Aerial Vehicle (UAV) for military reconnaissance and surveillance. As an upgrade of an existing UAV, the customer was aiming for design and integration of Landing gear system. The design process required adherence with FAR 23 guidelines so that landing gear design and analyzed for different load conditions.

Zeus Numerix designed a GFRP / EPOXY based landing gear that is non-retracting type, tricycle with steerable nose wheel and two main wheels. Longitudinal location of main and nose landing gear was determined based on CG location, static loads & tip back angle. The lateral location was governed by turnover angle, turning radii & ground clearances. The design was analyzed by FEM simulation using non-linear layered shell element for handling orthotropic properties. Simulations corresponding to 2.7g drop test & one wheel landing conditions fine-tuned the thickness and geometrical parameters of landing gear. Finally, tires were recommended based on maximum speed and load.

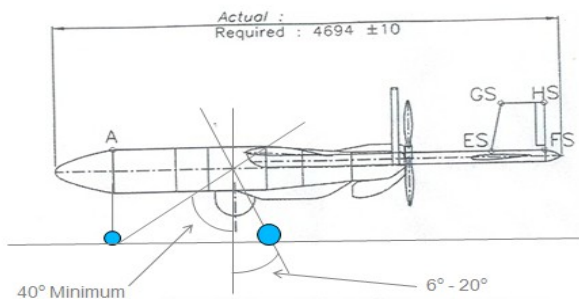


Illustration 1: Schematic for positioning of landing gear

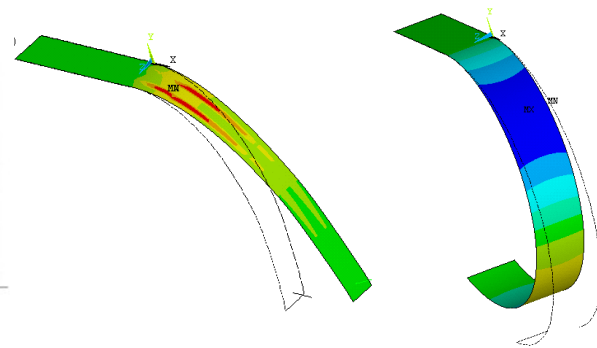


Illustration 2: Shear stress on main & nose landing gear

The customer was delivered with a comprehensive design & analysis report along with detailed manufacturing drawings. The delivery from this project was used by the customer to obtain an approval from certification agency for activities related to integration and flight testing.