ABSTRACT

The use of drones for medical assistance has emerged as an alternative solution to access remote and hard to reach areas. However, the lack of suitable landing zones and challenging terrain conditions highlight the urgent need for a container capable of protecting its contents when dropped from a height. This study aims to design and analyze the structural performance of a protective casing using a honeycomb based structure for a lightweight first aid kit compartment.

The design and Finite Element Analysis (FEA) were conducted using Autodesk Inventor software. Key parameters observed included displacement and strain. To determine the optimal configuration based on design variations and thicknesses, Grey relational analysis (GRA) was applied as a multi-response optimization method.

Simulation results indicate that the HC2 design with a thickness of 3 mm achieved the highest Grey Relational Grade (GRG) of 0.85, suggesting that it offers the most favourable shock absorbing performance among the tested models. Furthermore, the analysis revealed that any structural damage sustained by the container is acceptable as long as it does not compromise or damage the contents inside. An effective design is not solely determined by the number of honeycomb cells, but rather by the overall stress distribution and the structure's ability to absorb shock evenly.

Keyword : *Cargo Container, Capsule Design, Biomimicry, Honeycomb, Drop test, Explicit Dynamic, Autodesk inventor, Autodesk Nastran*