# Evaluation of Main Landing Gear Strut with Metal Matrix Composite

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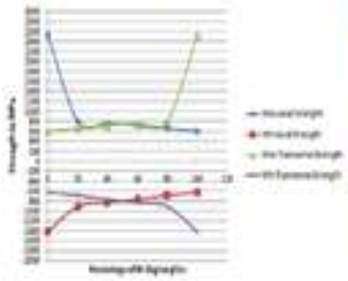
**Abstract:**

Aircraft structures with high strength to weight ratio give advantages like less fuel consumption, increased payload, flight range and endurance, and reduced runway length. Developments in new advanced composite materials have made it possible to realise high strength to weight airframe structures. Main strut is the primary structure in the landing gear. This project was carried out to evaluate the feasibility of replacing steel strut with MMC for weight reduction through numerical simulation.

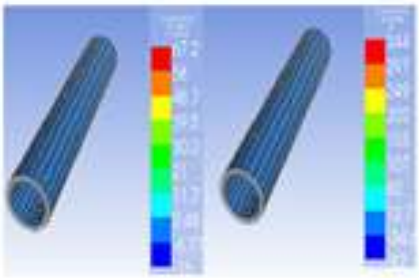
Major design parameters for landing gear of Boeing B737-800 were calculated using conceptual design method and were compared with original picture's dimensions. Detailed sketch tracing of original pictures were done to get the dimensions of main landing gear and was modeled using CATIA. Numerical study was carried out on the existing landing gear to examine the main landing gear stress during one gear hard landing condition using ANSYS. Numerical study was carried out on the same landing gear by replacing the main strut material with titanium alloy. Different laminate sequences such as [0/90/0/90/0]s and [0/90/45/90/0]s were studied analytically as well as numerically using Autodesk Simulation Composite Design 2014, MS Excel and ANSYS software respectively. These results were compared and best laminate stacking sequence was obtained.

The results from the study show that replacing the current landing gear strut material to Ti/SiC has same strength. Thickness of the strut was reduced from 25 mm to 20 mm. Over 62% of weight reduction was observed by replacing steel with Ti/SiC. Hence, it is concluded that a lighter Ti/SiC can be used to replace the existing strut of the aircraft safely without compromising on the strength requirements.

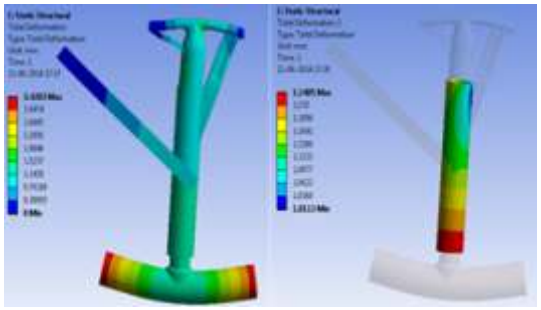
**FE model**



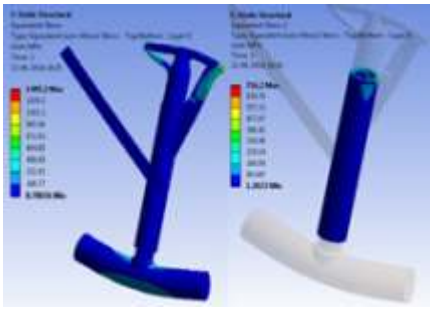
Analytical study of composite



Numerical study of MLG Strut



**Deformation plot with [0/90/45/90]s Ti/SiC strut**



**Stress plot with [0/90/45/90]s Ti/SiC strut**