

Stress Analysis of Helicopter Skid Landing Gear

Dilraj Singh

Punjab technical University
GurukulVidyapeeth, Banur
dilraj279@yahoo.com

PaviterPuneet Singh

Punjab technical University
GurukulVidyapeeth, Banur
paviterpuneet@yahoo.co
m

Harpreet Singh

Punjab technical University
GurukulVidyapeeth, Banur
terrarsao700@gmail.co
m

ABSTRACT

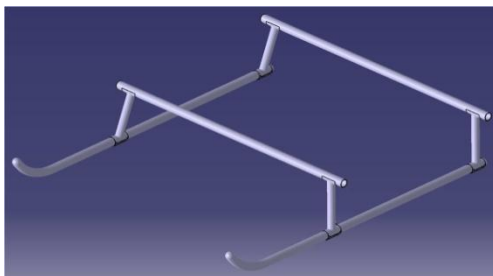
The undercarriage or landing gear in aviation is the structure that supports an aircraft on the ground and allows it to taxi, takeoff and land. A helicopter is an aircraft that can take off and land vertically also called a rotary aircraft, it can hover and rotate in the air and can move sideways and backwards while aloft. Tubular landing skids are often used by helicopters to save weight and volume or to allow the version to flotation devices. However, the danger of Ground resonance may require dampers so touchdown shocks or jolts are not transmitted to the main rotor system. In this paper we are going to represent stress strain analysis of skid landing gear of Helicopter under particular force.

1. INTRODUCTION

Skids are used mainly because they weigh less than wheels. On larger, more powerful helicopters, wheels are used because the utility and convenience can be more important than the savings in weight. In order to move a skid-equipped helicopter on the ground, one has to attach a set of ground-handling wheels, jack up the helicopter, and roll it (into the hangar for maintenance, for example). It really depends on the primary use of the helicopter; if you are logging, skids make sense because you can lift larger loads and are more concerned with hovering performance. If the primary mission is medevac or air transport, retractable wheels allow greater speed and increased fuel economy over long distances.

2. OBJECTIVE

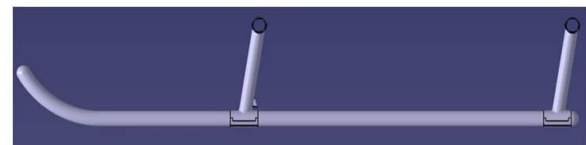
The objective is to offer a “high skid gear” option for more Ground clearance .The solution desired is to develop a new skid gear assembly using the same skid tubes (left & right running fore-aft) & the same cross tubes (front & back running right-left) but incorporate 8” taller Leg Assy. The gear assy needs to have a similar stiffness to the current gear assy to ensure we do not encounter ground resonance. We would like to adapt a 6” long extension to the back of the skid tubes to provide additional ground clearance of the tail rotor when taking off & landing.



Overview of Skid Landing Gear



Front view



Side view

3. MATERIAL SPECIFICATION

Aluminum Alloy 7075

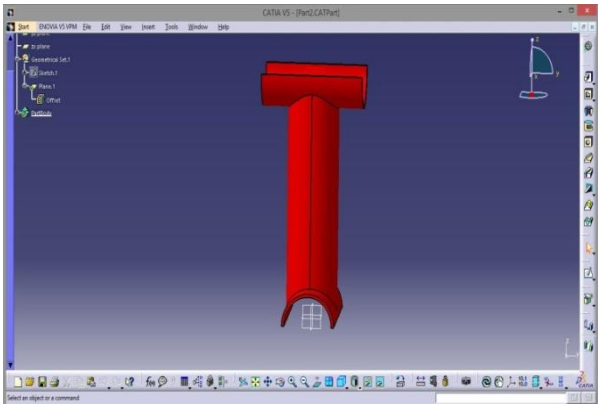
Aluminum alloys have strong corrosion resistance. At sub zero temperatures, their strength increases, thus making them a useful low-temperature alloy and their strength decreases if they are subjected to very high temperatures. The aluminum 7075 alloy has high strength.

Applications: Aluminum 7075 alloy is mainly used in manufacturing aircraft and other aerospace applications.

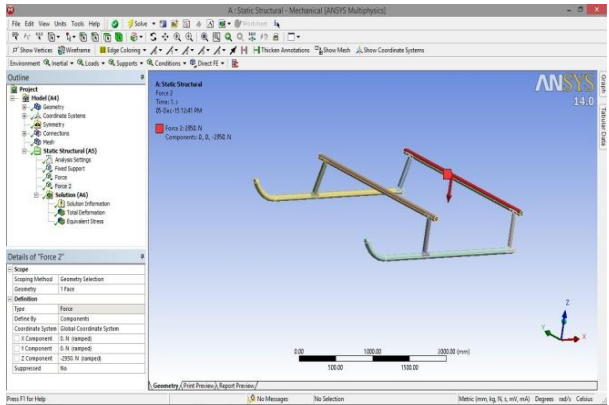
- Very high specific strength. This means very high strength and low weight.
- Great freedom of shape. Double curved and complex parts can be simple produced.
- Excellent fatigue endurance concerning number of load cycles (many times higher than with metals) and residual fatigue strength (aramide and carbon epoxy laminates retain more than 60% of their residual static strength, which is far more higher than is possible with metals).
- Excellent chemical resistance against acids, chemicals.

4. ANALYSIS AND CALCULATIONS

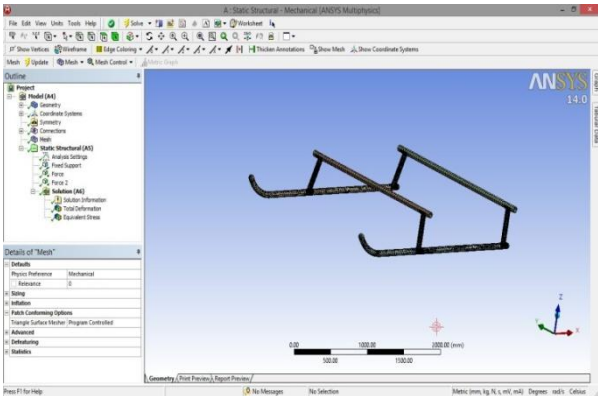
Helicopter skid landing gear stress analysis is done by using ANSYS WORKBENCH under static structure analysis. The load is applied in -Z direction to check on how much load the body part failed. The maximum and minimum stress is also represented.



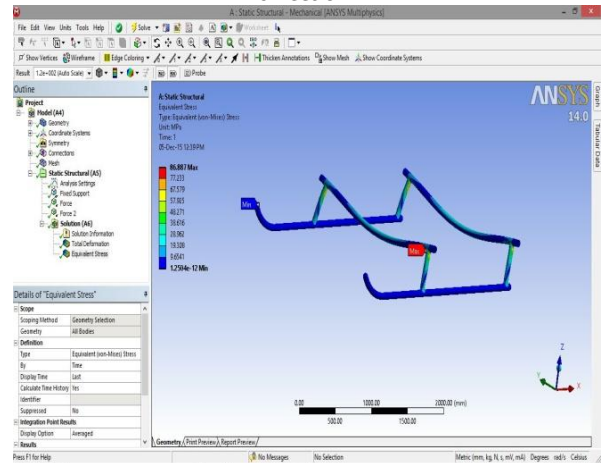
Vertical Body Part-Leg assy



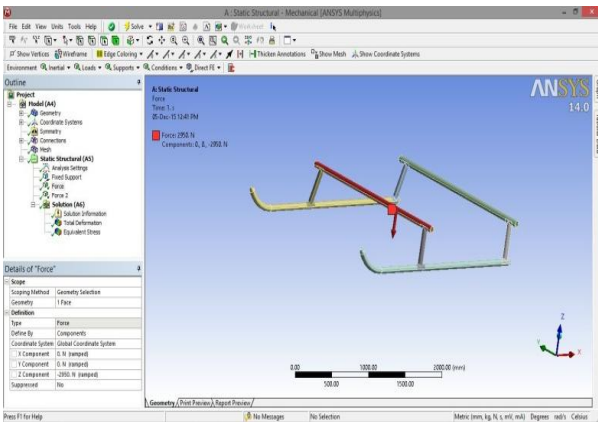
Force 2950Mpa is applied on Upper Right assy in –Z direction



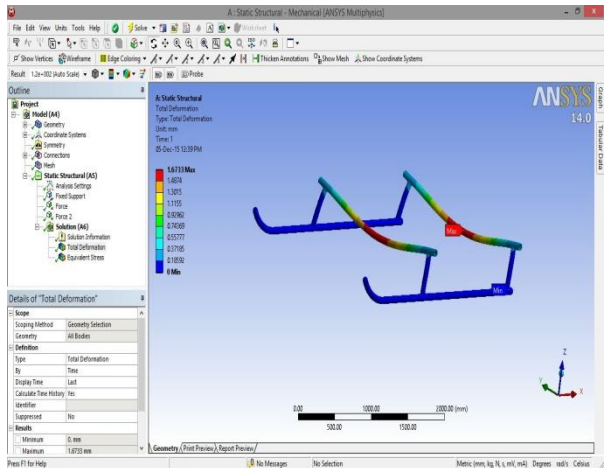
Fine Meshing of whole Body



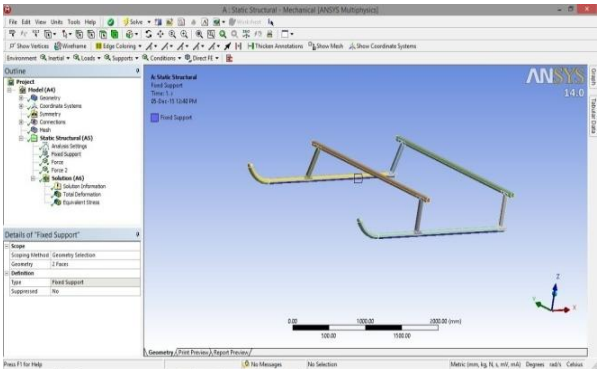
Equivalent Stress, max (red icon) and min stress (blue icon)



Force 2950Mpa is applied on Upper Left assy in –Z direction



Total Deformation of body with max and min deformation represented



Skid assys are fixed represented in yellow and light green color

5. CONCLUSION

The Aluminum Alloy 7075 is a strong Alloy with strength comparable to many other materials, and has good fatigue strength and average machinability. The Experiment is conducted for Design and Structural Analysis of Skid Landing Gear and results



6. ACKNOWLEDGMENTS

We wish to express our most sincere gratitude to everyone who helped us in our research efforts and acknowledge the initial encouragement received from Friends and Parents.

7. REFERENCES

[1] Stuctural Design by Michael Chun Yung Niu

[2] Analysis and Design of Flight Vehicles Structures by BRUHN

[3] Structural Analysis by R.C. HIBBELER