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Design and Analysis of Drone

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Abstract - *Weight decrease is one of prime problems for a flying UAV. It was chosen to decrease weight of drone by material AL-7075 T6 . CAD modelling software is used for designing of drone for fulfilment of our conditions. Conditions are required to activate drone system working successfully . The research paper additionally includes the parameter for drone, static analysis, and steady state thermal analysis dependent on different parameter. Structural analysis is done based on mechanical strength of material and Thermal analysis is done based on heat properties of material. This research paper studies an optimized design of the drone which aims at reducing weight and maintaining the strength along with reducing the deformation at higher temperatures as compared to the OEM available in the market.*

Key Words: *Drone, Modal analysis, Weight reduction, increased strength*

1. INTRODUCTION

A UAV is an Unmanned Aerial Vehicle. They can fly distantly, (for example, with a regulator or tablet) or self-sufficiently. Anyway, a robot… correct? Indeed, fundamentally yes. The two terms are frequently utilized reciprocally. Robot appears to have won out right now because of its utilization in the media, films, and TV. So, in the event that you do utilize similar terms in broad daylight, it's feasible nobody will reprimand you. We won't judge!

UAS – All right. Fortunately, this one is a smidgen more clear. A UAS (Unmanned Aircraft Systems) incorporates the UAV (or robot), yet in addition the individual on the ground controlling the flight and the framework set up that associates the two of them. Fundamentally, the UAV is a part of the UAS, since it alludes to just the vehicle/airplane itself.

RPA – Many pilots lean toward the expression "Distantly Piloted Aircraft." This is on the grounds that flying particular kinds of UAVs require significantly more ability (consider years preparing) than anything you could purchase in a store. Assuming responsibility for a RPA requires more than basic handheld controls. You can't eat a sandwich and control one of these simultaneously! The cockpit for an airplane like a Global Hawk is nearer to that of a business carrier. On schedule, this expression could get on to portray more unpredictable flights. Other than that, however, RPA is basically exchangeable with UAV since there is no agreement right now.

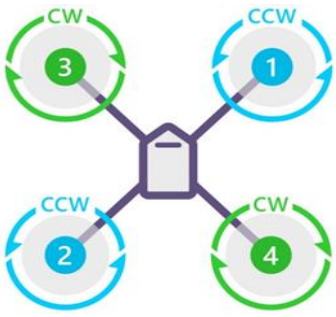

Fig -1: Drone Structure

2. LITERATURE SURVEY

K.Sowjanya and S.Suresh [1] have presented research paper which gives an overview of analysis of drone. Drones are mechanism system which is used to rotating motion of moving body. Drone is made of cast iron or, aluminum composite. These

are selected by running several tests on software likes Pro/E (Creo- Parametric) for solid modelling and static analysis are done by CAD/CAE softwares.

Neeraj Singh at el [2] have worked on research paper which focuses on structure and test examination of UAV mechanism for drone system. Every part of UAV mechanism was designed on CATIA-V5 though investigating and temperature analysis was finished by ANSYS16.

Vivek Singh Negi at el [3] has been examines thoughts for utilizing different parameter in the systems, structure factors and rationale behind the choosing right estimate of the factors. Structure of drone system mechanism comprises of evaluating huge number of a situations and utilizing to accomplish the ideal, yet compelling UAV. Information identified regarding to utilized to remove normal estimations of design parameters, making hypothetical counts as reasonable as could be expected under circumstances.

Kush Soni at el [4] has been done the part determination of drone system mechanism is talked about. Different calculation of power, torque are appearing. Likewise, the safety of utilizing drone is approved by calculation and thermal investigation. Our essential point was to think of a drone system mechanism that is straight forward and has an advanced load along being dependable. According to the rule book of SAE, it was obligatory for the system to comprise of two independent operated hydraulic circuits.

3. DESIGN OF QUADCOPTER

Parameter –

Arm Length = 415mm

Drill length = 1505mm

Centre Base = 72mm

Fig -2: 3D view

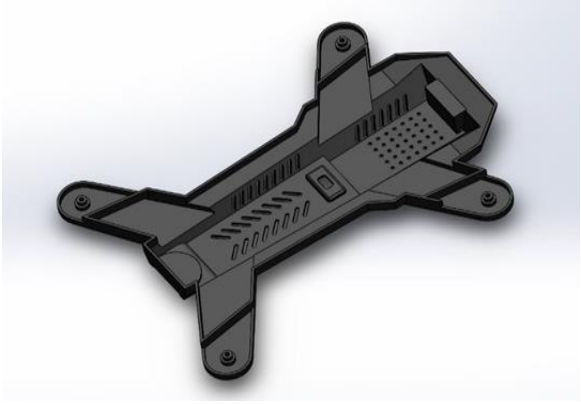

Fig -3: Drone Base

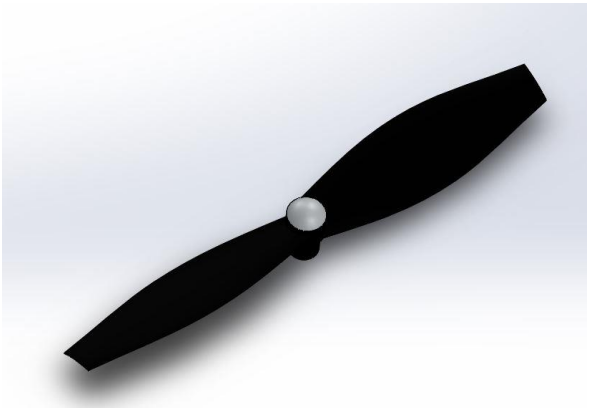

Fig -4: Propeller

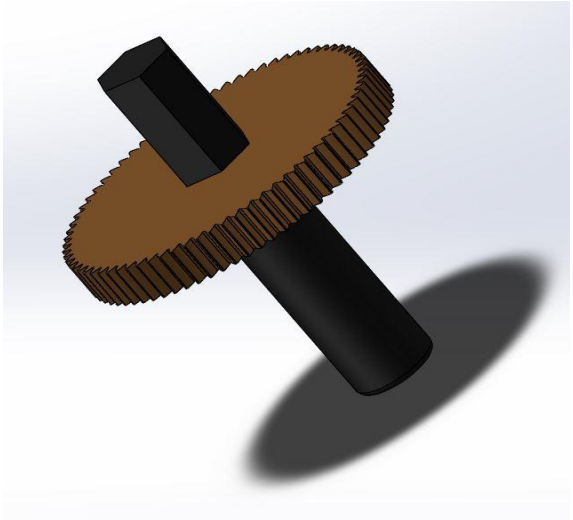

Fig -5: Gear

4. Material Selection

A detailed study was done to pick the most compatible material for fabrication of the braking system. Various factors were considered while selecting the material such as availability of material with mechanical strength, elongation at break, Hardness,

weldability, cost etc. The material which we selected was Al-7075 T6 because of its better yield strength and ultimate tensile strength as compared to other material.

Table -1: Material Property

Properties	Values
Density	2.81g/cc
Ultimate Tensile Strength	572MPA
Tensile Strength	503MPA

5. ANALYSIS

In our analysis for Drone, we had done simulations for propeller and base. In this paper we are analyzed two analysis of disc brake i.e., structural analysis and thermal analysis. In material selection of disc brake is AL-7075 T6. Both analyses have done using ANSYS 19 software.

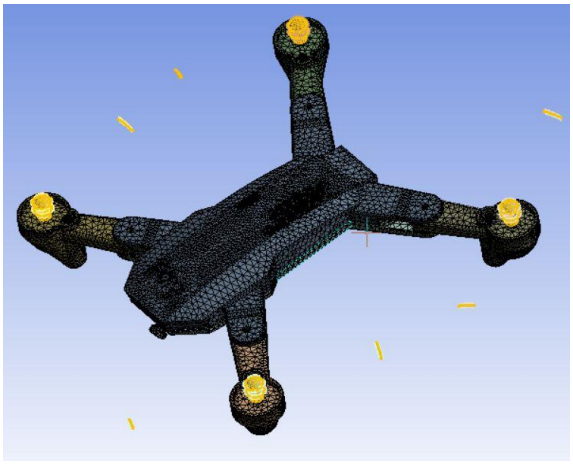

Fig -6: Meshed Model

The design was simulated for the below conditions using following mesh parameters.

Table -2: Meshing Parameters

Parameters	Values
Element Size	1mm
Element Type	2D
Element Quality	0.94
Total Nodes	186423
Total Elements	99537

6. COMPONENTS OF DRONE

1. Propeller
2. Camera
3. Flight Controller
4. Electronic Speed Controller
5. Antenna
6. Receiver

7. RENDERED PICTURES

Fig -7: Picture 1

Fig -8: Picture 2

8. CONCLUSION

In this paper we have discussed the parameter of some drone system which effect the performance of our UAV and we used AL 7075 T6 material for drone. We go with results obtain in our simulation on ANSYS Workbench. From the set of variables, the best results are found at deformation is 0.014503 mm, factor of safety is 1.89 and temperature at 152.21 C on AL 7075 T6.

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BIOGRAPHIES

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