TOPOLOGY OPTIMIZATION OF A UNIBODY QUADCOPTER STRUCTURE

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Quadcopters a type of unmanned aerial vehicles also shortly abbreviated as UAV are the most commonly used of them. Based on their four layout rotor arrangement can they provide a substantially crucial eventuality over various platforms like defense, agricultural, cinematic fields in the modern day world. What so ever, optimizing the flight longevity and cargo carrying capability is the actual hardship for increasing the performance and effectiveness. Thus in this study we shall tackle these setbacks by concentrating on the main structure or chassis which is the actual donor to the complete weight. Therefore the offered approach encompasses a unified design methodology to this problem. With the help of topology optimization, light weight and good strength at the same time can be accomplished. This along with part consolidation can be achieved with the help of Autodesk's Fusion 360. This robust software helps to maintain structural strength while minimizing the weight of the same. Traditional drone structures, usually comprise of multiple parts namely the fastening elements like nuts screws and bolts forming an assemblage of components. This largely affects the time needed to assemble and put the drone structure together while also affecting the structure to have a sturdy framework. To tackle these disadvantages, this study brings in the idea of a single body framework providing a simple less time consuming and light weight frame for the same. This design thus makes use of or puts into effect the view of topology optimization to figure out efficient material dispensing among various regions in the structure. This will be thus succeeded by revalidation through various analyses. Thereby ensuring its functionality requirements being met. Further prolonged validation of the single body structural framework will be conducted through various kinds of simulations. The stress simulations analyzed the strength and deformation of the structure. The fatigue analysis validated the life and durability of the same. The modal analyses, validating the mode shapes and vibrational characteristics. Computational fluid dynamics could successfully evaluate the velocity and pressure results. Or simply aerodynamics as known to all.

 ISBN 978-8-19688-984-5