

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
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CHASSIS OPTIMIZATION OF A 1U CUBESAT MADE IN A DEVELOPING COUNTRY

**Abstract**

This paper presents the chassis structural optimization of the Morazán Sat (MRZ-SAT) the first 1U nano satellite designed and built in Honduras by professionals, teachers, and students in collaboration with peers from Guatemala and Costa Rica. MRZ-Sat is the winner of the 5th Kibo Cube round sponsored by JAXA and UNOOSA, which main purpose is the development of an early warning system for floods and landslides. To date the project has a preliminary design that complies with JAXA structural requirements, however, the structures team want to study some possibilities for reducing structure's mass to have more room for payload. This work takes the geometry and dimensions of the current preliminary design and explores four new variations: an Isogrid, a Honeycomb, a Concentric circle and a generative design latticed patterns inside the corner plates that define the mainframe. Then, the structural performance of the four variations is compared by total mass, resultant von Mises stresses, natural frequencies, global stiffness as well as safety factors. The objective is to obtain the lighter yet stiffer chassis as it is the main goal in any aerospace and/or spacecraft object. The FEA analysis are performed using Autodesk Fusion 360 and Ansys Student. Finally, a real scale model of each one was built in aluminum 6063 to test the constructability within the national industry capacities of CNC milling in a developing country like Honduras.