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PRELIMINARY STUDY ABOUT THE IMPLEMENTATION OF A STRUCTURAL BATTERY ON A  
1U CUBESAT

**Abstract**

Even though the technological advancement of the last few years has lowered the launcher's payload cost dramatically, the limits in terms of mass and volume of the spacecraft are still a big concern. Due to this fact, the aerospace industry is constantly looking for ways to push the technological boundaries to develop lighter satellites with higher available volume.

In order to fulfill these goals, the 6S Cubesat team has selected as payload the structural battery Volta Structural Battery, a new technology that will be integrated in the satellite's structure for an In-flight testing campaign. Volta Structural Battery is a sandwich panel composed by different layers of aluminum foils, carbon-carbon composite and a core of aluminum honeycomb that is capable of storing electric energy thanks to an aluminum-ion technology.

For a correct design process of the Cubesat and for the implementation of the finite element model of the component, it is necessary to go in detail regarding the correct mechanical characterization of this structural element. A mechanical testing campaign on the structural component will then be performed in order to validate the FE model created as well as the testing campaign on the whole Cubesat's assembly required by the deployer.

From a preliminary study, it is clear how this technology has a significant impact on the volume and mass budget of the spacecraft, moreover, the substitution of the regular batteries with the structural one reduces the presence of lumped mass components in the assembly with a beneficial effect in terms of frequencies. Since Volta Structural Battery lends itself to assume different shapes in order to match the designer needs, it is clear how its implementation helps in increasing the flexibility of the design process of the structure.

The obtained results were considered positive, both in terms of mass and volume saving and in terms of improvement of the design process, fulfilling in this way the set goals