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LESSONS-LEARNED OF DESIGN AND OPTIMIZATION OF FIRST SCIENTIFIC PAYLOAD FOR
FERMENTED THAI FOOD IN SPACE**Abstract**

This study presents the design and project management of payload for the experiment of “Fermented Thai Food in Space” under the National Space Exploration by Geo-Informatics and Space Technology Development Agency(GISTDA), Thailand. The objective of this paper is to show the design and lessons-learned of the space payload that has to withstand various conditions in rocket launch and in-space environments. In addition, the National Space Exploration project is the first space science project of Thailand. Therefore, we do not have any experiences in the design of space payload. However, we have already done the design and manufacturing of the payload which we present in this paper. Technically, the weight of the payload is designed to not more than 2000 grams. Firstly, Carbon fiber reinforced was considered to be the main structure but its weight was quite similar to the Aluminium structure and, more difficult in the manufacturing process. For the reason that the Aluminium had been used and optimized by the topology optimization which was concerned the natural frequency and its acceleration. However, the final design was not the final iteration of the optimization loop because the final design cannot easily be manufactured. Afterward, the payload was done experimental conditions in vibration and thermal vacuum test. On the other hand, there were many challenges in manufacturing during the project. For example, the manufacturing process was not suitable for the design. In the future, more considering in the manufacturing process has to be considered as well as a new design for decreasing manufacturing time and economical cost.