

Licensing and Technology Transfer Opportunity: Manipal University

Title of Technology Available: Improved Serial staging technique for multi-stage launch vehicles

Brief Description of Invention: The invention introduces a new technique of staging in multi-stage launch vehicles which leads to reduction of total number of engines required in overall vehicle. This method results in significantly less structural mass without compromising with performance parameters.

Brief Background of Invention: In performance of any launch vehicle structural weight plays most critical role and designers always tends to keep it to the minimum. To accomplish this target staging of vehicle is used and one of most widely used is serial staging. In serial staging multiple smaller launch vehicles (generally 3-4) are stacked over each other with payload on top. Firing sequence starts from the bottom one and this sequence follows till each stage is burnt and each stage has its own set of engines. As any stage burns off it got abandoned and rest of the vehicle continues on the trajectory. But when lower stage burns it carries dead mass of engines of upper stages which are not useful at that particular time.

Proposed technique addresses this issue by introducing new design of engine clusters which can be used along with every stage. To implement this approach major modifications are required in the vehicle such as structural changes, choice of fuel and choice of engines. But overall this approach helps in reduction of complexity as the whole system and reduces total of engines.

Describe the final product: The final outcome of this approach leads to design of a launch vehicles which are capable of carrying higher payload mass or capable of providing higher change in velocity (as per user's requirement) as compared to conventional launch vehicles with similar performance parameters but using common serial staging approach.

Technological Domain (Keywords):

Multi-stage, Launch vehicle, Engine cluster, Serial staging, locking mechanisms, linear actuations

Proof of Concept:

A static technology demonstrate was developed and studied before proceeding for patent filling. It demonstrates successful working of crucial subsystems such as engine cluster design, moving mechanism along with locking mechanisms.

Stage of Development:

Advanced Prototype

Provide Information on Competitors who manufacture and/or sell similar products: NA**What are the unique advantages your innovation has compared to the competition:**

This innovation helps to increase payload mass or change in velocity in multi-stage launch vehicle design with serial staging. This will attract more launch customers because of less cost per kilogram launched to particular orbit as compared to other competitors.

A few potential companies who might be interested in this technology:

Indian Space Research Organization, Defense Research and Development Organization and other emerging companies in the field of space exploration.

Intellectual Property Status: Indian Patent application with number: 201841002276 and Date of Filing: January 19, 2018

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