



NASA STTR 2014 Phase I Solicitation

T1.02 Small Launch Vehicle Propulsion Technology

Lead Center: MSFC

Participating Center(s): GRC, KSC

Small satellites are becoming ever more capable of performing valuable missions for both government and commercial customers. However, currently these satellites can only be launched affordably as secondary payloads on large launch vehicles. This makes it difficult for the small satellite mission to launch when needed, to the optimal orbit, and with acceptable risk to the mission. There is no affordable, dedicated launcher available that will meet the small satellite launch needs. This subtopic solicits technology proposals for the boost propulsion system(s) of such a launcher. Specifically, the subtopic requests proposals for propulsion systems for application as first stages or strap-on boosters with the following functional and cost goals and within the following geometric constraints:

- Cost goal - Assuming a production rate of 8 boost systems per year, a recurring stage cost of \$400K
- Total Impulse goal - The stage shall be capable of providing 2.5M lbf-sec total impulse
- Delta-V goal - The stage shall be capable of providing 6800 fps delta-v to a 8,000 lbm mass from ground launch.
- Size goal - The stage shall be designed to fit within the size envelope of height of 25 ft and a diameter of 3.5 ft for individual elements. If a cluster of elements is proposed, the central element should stay within this envelope.
- Strength goal - It shall be capable of structurally supporting (compressively) 8,000 lbf/lbm for use as a core booster stage.

Though not explicit goals, other desired functionality in the first stage include thrust vector control (TVC), basic health and status monitoring, and throttling.

Technologies meeting these goals will support development of a 25 kg to 50 kg payload launcher to low-earth orbit. Phase I activities will be used to develop the data necessary to assert with confidence that the proposed technology solution will meet the goals of the subtopic. Phase II activities will include verification of functionality, as much as possible through testing, and substantiation of recurring cost projections. At the end of Phase II there will be sufficient validation of the technology to warrant purchase of one or more stages for initial flight testing under potential follow-on activities.