

Small Launch Vehicle



Vehicle highlights

- Supports DoD, NASA, university, and commercial nanosatellite activities
- Simple, reliable, low-cost design
- Safe, green bi-propellant liquid engine
- Proven integrated tank/booster/engine
- Clean-pad approach for affordability and launch availability
- Rapid response
- Compatible with multiple ranges
- Provides delivery to LEO and a range of orbital capabilities
- Applications:
 - Up to 25 kg orbital nanosatellites
 - Missile defense target vehicle
 - Sounding rocket for experiments

The need for on-demand intelligence and communications in remote geographical locations is increasing requirements for rapidly deployable and tailorable space assets.

Data indicates a booming market for satellites weighing less than 50kg — projected to grow to over 500 annually in the next 4 years.

Dynetics has enjoyed a 41-year history of success in flight system hardware development. We have the capability to rapidly develop affordable and operationally responsive systems to deliver payloads for suborbital and low Earth orbit (LEO) missions.

In developing our small launch vehicle, Dynetics has already ground tested key technologies for low-cost launch vehicles, including:

- Storable and green propellants
- Ultra low-cost tank design
- Integrated thrust vector control system
- Integrated tank and engine booster design
- Integrated propellant valve
- Rapid propellant conditioning and fill system

..... Validated through subscale hot-fire engine testing and full-scale hot-fire booster stage testing



Dynetics wind tunnel testing of an SLV

The Need for Small Launch Vehicle Technology Development and Demonstration

While market projections are promising, an integrated orbital flight technology demonstration is needed for affordable, reliable and rapid small launch.

- Utilize the NASA STMD Game Changing Technologies Program annual BAA with an amendment for a two-year SLV development and demonstration flight

Phase I (1st year) — Complete the design and critical testing for an SLV:

- Flight dynamics and wind tunnel testing
- Avionics qualification
- Complete long-lead procurements
- Booster and engine hot fire
- Environmental testing
- Ground Support Equipment (GSE)
- Booster buildup

Phase II (2nd year) — Complete an orbital flight demonstration:

- Complete ground testing
- Complete GSE development/manufacture
- Complete launch vehicle/stage manufacture and assembly

- Obtain range safety/operations approval
- Complete integration, test, and operations
- Complete orbital flight demonstration

Given the dynamic nature of this market and the need for U.S. government investment in the technology area:

- SLV technology demonstrations should be **designed, manufactured, and tested in the U.S.**
- The **government should own the intellectual property and make it available to U.S. companies to leverage for later commercial launch services**
 - Will drive to the lowest commercial operations cost
- Firms should be required to submit:
 - **Viable commercialization plans** showing a path to a **\$5M or less per launch**
 - Credible plans for **FAA license approval and range operations**
 - **Ground-launched concepts** since DARPA is already developing air-launched technology
- Infrastructure-independent designs—requiring the vehicle to bring its own launch and propellant assets



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