

Aeronautics

Advanced CubeSat Ejector System (ACES)

A unique, reliable solution for 6U CubeSat ejection

The NASA Goddard Space Flight Center (GSFC) Wallops Flight Facility (WFF) began the SmallSat Advanced Technology (SSAT) project in 2009 to develop nanosatellite capability. In an effort to increase the science capabilities for missions, it was decided to part ways from standard 1, 2 and 3 Unit CubeSats and, instead, develop the a 6-Unit CubeSat. As with 1-3U CubeSats, an ejector system was needed for the 6U CubeSat, but it had yet to be developed. The ejector system interfaces to the launch vehicle and functions to protect the primary payload from the nanosatellite, constrain the nanosatellite during launch, and perform a guided ejection afterwards. The standard 1-3U CubeSat ejector's method (Poly Picosat Orbital Deployer (P-POD)) for the constraint and guided ejection functions was found to be inadequate for NASA mission needs. Therefore, an ejector system was designed to provide the nanosatellite with a more secure constraint interface during launch and an efficient guided ejection, while permitting a less restrictive inner volume. At the conclusion of the SSAT project in late 2011, a prototype of the CubeSat ejector design was successfully tested.

BENEFITS

- ➔ ACES offers up to a 19% greater internal packaging volume than a standard 6U ejector
- ➔ Greater external volume by allowing 3/8" protrusion from the external surface or 1/2" from the internal surface
- ➔ Customizable panels for mission to mission flexibility
- ➔ Two guide rail system frees up two corners for additional packaging or deployable options
- ➔ Design eliminates door impact and bounce back during satellite deployment
- ➔ Offers full verification of the ejector system functionality, and multiple verification points allow for easier troubleshooting
- ➔ Offers the ability to have an electrical interface while stowed, which can charge batteries or run diagnostics on systems prior to launch
- ➔ Offers the ability to include nitrogen purge features for critical components

technology solution

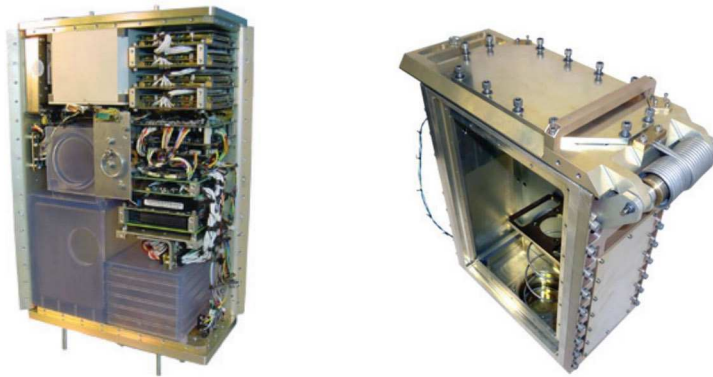


THE TECHNOLOGY

Since the conclusion of the SSAT project, the design for ACES has been significantly improved through mass and volume reductions, overall functionality enhancements, and added features to better meet customer needs.

ACES is a predictable, preloaded system that provides a secure axial and lateral constraint for the payload. It features large satellite access panels. ACES does not rely on friction to hold the satellite, and decouples the guide rails from the constraint system allowing for relaxed tolerances. The two-stage satellite deployment system utilizes a lever at the top of one of its guide rails. A spring pushes the satellite halfway during deployment, and the lever rotates away, allowing guide rails to minimize tip off effects. The door does not contact the satellite during ejection, yielding more predictable exit velocities.

Wallops Flight Facility provides support from concept to launch. The WFF Mission Design Laboratory can take your idea to the next level by providing technical expertise to design subsystems to meet your mission needs, onsite integration and test facilities, launch service support on orbital and suborbital platforms, and world class telecommunication systems to bring your data back to you.



Advanced CubeSat Ejector System (ACES) 6U CubeSat System

APPLICATIONS

The technology has several potential applications:

- Any launch vehicle providers or 6U CubeSat designers may benefit from using ACES in their systems. ACES is capable of fitting within a sounding rocket volume envelope, and offers a high level of customizability for payload packaging.

PUBLICATIONS

Patent No: 9434486

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