

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Small Launchers: Concepts and Operations (7)

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## SUPER STRYPI – RESPONSIVE SMALL LAUNCH

**Abstract**

The US Air Force's Operationally Responsive Space (ORS) Office with support from the Sandia National Laboratories (SNL), the University of Hawaii, and Aerojet is developing a low-cost small launch vehicle known as Super Strypi. The goal is to deliver payloads in the range of 300kg to Low Earth Orbit (LEO). SNL is providing launch vehicle system design, engineering, and integration. Aerojet is developing three new solid rocket motors for Super Strypi's primary propulsion: LEO-46, LEO-7, and LEO-1 for Stages 1, 2, and 3, respectively. The University of Hawaii's HiakaSat will fly as the primary payload on the Integrated Payload Stack with an additional 13 CubeSats flying as secondary payloads. In addition, the University of Hawaii's Hawaii Space Flight Laboratory (HSFL) is overseeing the construction of the launch pad and rail for Super Strypi's first flight in late 2013 from the Pacific Missile Range Facility (PMRF) on Kauai, Hawaii.

The ORS Office has named the first mission of Super Strypi as ORS-4. The ORS-4 mission will: • Demonstrate alternative launch vehicle concept that reduces total mission cost through simple and repeatable process. • Move launch vehicle processing from heavy reliance on engineering hours to technician hours. • Reduce launch vehicle integration and processing timelines, contributing to responsive and lower cost launches.

Super Strypi is unique in that it is spin stabilized throughout the entire flight. This sounding rocket approach, borrowed from decades of low-cost suborbital missions, keeps the system as simple as possible and eliminates the significant amount of engineering hours required on guided rockets to develop control algorithms and testing. Sounding rockets are "rail-guided" to provide stability before speed and spinning take over. An attitude control system (ACS) is added to Super Strypi's upper stage to achieve orbital insertion accuracy requirements.

Super Strypi offers tremendous potential beyond the ORS-4 demonstration mission for a variety of customers. For examples, Super Strypi may provide the US Army SMDC and other National Security Space customers rapid deployment of small-sat assets to satisfy critical and immediate needs, and support NASA and university science missions with low-cost access to space.