

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

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THE DEVELOPMENT AND OPERATION OF AN AFFORDABLE AIR LAUNCHED
NANOSATELLITE LAUNCH SYSTEM FOR THE US AND EUROPEAN MARKETS

Abstract

In recent years the capabilities and applications for satellites of less than 10 kg launch mass (called nanosatellites) have grown considerably, evolving from simple student CubeSat class projects. The CubeSat has now become the basis for a modular architecture ranging from a single unit to a 12 unit (12 kg) satellite with on-board propulsion and three axis stabilization and pointing capability. Many commercial applications of 3U CubeSats are now in development, including constellations of 16 or more spacecraft providing continuous global coverage.

The major choke point in continued market development for nanosatellite systems is the ability to find launch opportunities. So far, all satellites in this mass range have been launched as secondary payloads. This method of access to space carries several disadvantages. First, the launch vehicles primary customer has no real interest in other payloads which add any risk at all to the expensive launch event. Therefore a rigorous and expensive testing and qualification program is needed before clearance is granted for the secondary payload flight. Rocketplane Global is developing a new category of hybrid launch system specifically to service the small satellite developer community as the primary payloads. This launch system initially uses the existing F104 fighter operating commercially at KSC in Florida. Later, performance is upgraded using the reusable XP suborbital spaceplane as the first stage carrier aircraft along with the two stage low cost expendable upper stage and payload fairing stack to reach orbit. The system is designed to launch up to 25 kg to 500 km polar orbit. Multiple 1U to 3U CubeSats can be deployed via a dispenser system, or a single small satellite can be launched. Test flights from KSC are expected within two years.

For launch operations that will service the EU market a polar azimuth launch corridor over the North Sea from The Netherlands territorial waters has been identified, as well as an additional corridor over the Baltic flying from Poland. The launch flight plan takes advantage of dual-use opportunities for Military Restricted Airspace that is a common feature in US commercial spaceflight licensed launch activity.

This paper will describe the technical and performance aspects of the Rocketplane XP nanosatellite launch system along with launch cost projections and regulatory aspects of such launch operations in the US and Europe.