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Designing for Cost Effectiveness Results in Responsiveness: Demonstrating The SSTL X-Series

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ABSTRACT

Demand for small low-cost spacecraft – either as individual missions or in groups such as clusters, swarms or constellations – has been increasing significantly over recent years. In parallel, the microsatellite market has seen an increase in the rate of innovation, as more players create new micro (and nano) satellite offerings. In order to address this increased demand, SSTL has investigated, qualified and implemented a new satellite platform production process and associated new set of avionics as part of a larger “FIREWorks” innovation framework. The first fruits of this development approach are the new X-series of spacecraft. The process makes significant use of modern automated manufacture and test techniques, and the avionics are designed taking this into consideration. The consequence of this is that significant savings in production costs and schedule are achieved, which are quantified in this paper. A secondary and serendipitous effect of this development is the X-series family of spacecraft (and an expandable space technology framework) which is tremendously well matched to operationally responsive space applications. The first mission to use an X-series platform has been contracted for delivery. This paper outlines how the X-series was designed primarily for cost effectiveness, and how these cost savings manifest themselves as time savings. Additionally, the use of an X-series spacecraft as the launch vehicle avionics is discussed, highlighting the cost, schedule and mass benefits to the launch segment of the mission. This paper then summarises how all the design features combine and compound on each other resulting in a game changing approach to cost effective responsive space, ultimately leading to a demonstrable ability to design, build and test a cost effective microsatellite platform in less than 6 months.