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TOWARDS LONG DURATION VIDEO IMAGING FROM SMALL LEO SPACECRAFT

Abstract

Small satellite technology has matured to the point where demanding operational missions can now be implemented. This has driven demand for groups and constellations of such small low-cost spacecraft, in order to provide high temporal resolution capabilities on a global scale. Examples include the Orbcomm communications constellation, and the RapidEye Earth Observation constellation.

As the cost of ownership for space systems has come down, an increasing number of Universities, companies and nations are also getting involved in operating their own small satellites, to get access to the data they need, and get it when they need it.

Spacecraft traditionally have been very labour intensive to develop, especially where capability and reliability are important to the user. This ultimately becomes a major factor in the final cost of ownership of the spacecraft. For single spacecraft this can be justified, but for groups of spacecraft it is possible to adapt techniques used elsewhere in the consumer electronics sector.

In order to address the demand for very low cost spacecraft batches, SSTL has investigated, qualified and implemented a new satellite platform production process, alongside a new set of avionics. The process makes significant use of modern automated manufacture and test techniques, and the avionics are designed taking this production process into consideration. The consequence of this is that significant savings in production costs and schedule are achieved, which are quantified in this paper. Most of the effort has been focused on qualifying the production process, to ensure it meets the strict requirements placed on equipments for long life operational space missions.

Initially these techniques will be used in SSTL's smaller spacecraft platforms including cubesat, nanosatellites and microsatellites, but eventually these will be rolled out across the larger platforms as well where appropriate. The first mission which will be produced using these new avionics and processes has been contracted, and will be using a new SSTL-x50 platform.

One of the reference missions using the production engineered platform is the SSTL-x50 precision mission, which provides a very high resolution imaging capability including high definition video. This paper will give an overview of the SSTL-x50 precision video mission, as well as the new scalable avionics

architecture, and its production approach for the new platforms. The production efficiency in terms of schedule and recurring cost is quantified, and a number of reference missions will be described.