

Surrey Satellite Technology Ltd; Spin in of COTS Visco-Elastic Materials and Elements into Space Applications

Executive Summary

Under a NSTP2 Grant for Exploratory ideas (contract No. RP10G0348E27), SSTL has undertaken a study in collaboration with Stop-choc to establish a new industrial research collaboration and to spin in Stop-choc's technology in SSTL's space applications.

Viscoelastic materials, typically different types of rubbers, are a well-established technology to attenuate vibrations. SSTL regularly uses viscoelastic materials and elements on their spacecraft for the purpose of vibration, microvibration and shock isolation systems. Currently, supply is relying on a single foreign supplier and new developments are costly and time consuming. The cost to supply existing isolation elements is prohibitive to use on the lowest cost small missions SSTL offers. Reducing the cost would allow SSTL to offer smaller low cost platforms providing better imagery. SSTL have identified Stop-choc as an excellent candidate to be a UK supplier which meets these requirements.

Stop-choc design and manufacture anti vibration mounts, vibration isolation products & vibration isolators, shock mounts and shock isolation systems. Stop-choc provide anti vibration mount solutions using the latest technology in highly damped materials reducing amplification at resonance and providing excellent durability in severe environments which are used in various industries, such as the aerospace industry. However, Stop-choc has not previously applied their knowledge to a space application.

The main purpose of this study was to assess the suitability of existing Stop-choc technology for space applications. It was anticipated that integrating Stop-choc components would constitute a considerable cost saving for future SSTL missions.

The chosen project to trial Stop-choc technology was a vibration and microvibration isolation mount for a reaction wheel. In the frame of this study, viscoelastic materials have been identified and supplied by Stop-choc to SSTL. Outgassing tests have been performed as well as extended material testing. The best identified viscoelastic material could be used in the space environment ensuring that sensitive devices such as optics are protected or are far away from these viscoelastic materials. The mechanical tests performed on the best viscoelastic material suggest that this material could be used to manufacture a suitable damper. However more testing at damper level should be performed to assess its stiffness and damping properties.

Based on the mechanical properties tested the material shows promise for use as an isolation mount.