

May 2013

NASA awards Quest Thermal Group a Phase I contract for R&D on novel Advanced Cooled Shield MLI concept

NASA has selected Quest Thermal Group for a contract to develop a new advanced insulation that could help preserve cryogenic propellants for long duration missions. Cryogenic propellants are important to NASA's missions. Improvements in cryogenic propellant storage and transfer are critical to future long duration NASA spacecraft and missions. *Advanced Cooled Shield - IMLI (ACS-IMLI)* is an innovative ultra high performance system in which an Advanced Cooled Shield is fully integrated into the IMLI layer structure, reducing mass, forming a single robust system, with integrated cooled gas distribution in a cooled shield layer, eliminating heat flux through thermal shield tank standoffs or supports, and operable in both passive (vapor cooled shield) and active (broad area cooled shield) modes.

NASA's TA-02 Roadmap calls "Zero Boil Off storage of cryogenic propellants for long duration missions" the #2 ranked technical challenge for NASA mission objectives and needs. Quest Thermal Group has developed *IMLI*, an advanced thermal insulation that uses proprietary discrete spacer technology to reduce heat flux. IMLI's unique structure is able to self support various loads, including a thin, lightweight vacuum shell for in-air operation, high strength ballistic layers for MMOD shielding, an external Broad Area Cooling Shield with cooling tubing, or an integrated thermal shield within the layers. IMLI's layer structure gives it unique capabilities, such as an embedded conductive, sealed thermal barrier.

In this Phase I program, an ACS-IMLI system would be modeled, analyzed, designed, fabricated, installed on a cryotank, and tested for structural strength and thermal performance. Advanced Cooled Shield – IMLI (ACS-IMLI) could provide a lower mass, single insulation system, operable in both passive (vapor cooled) and active (cryocooled) modes, with 3 – 4X lower heat flux than IMLI alone. ACS-IMLI could help meet NASA's cryogenic fluid management requirements such as Zero Boil Off for cryogenic propellant storage and transfer.

Scott Dye, Quest Thermal CTO, states "The team has been working on an Advanced Cooled Shield concept for several years, and this NASA contract allows us to continue development of innovative high performance thermal systems for infusion into NASA."