

OSD Foreign Comparative Test – Magellan ENSURE

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Product: ENSURE (ENhanced SURvivability Elements)
Panels for Radiation and Kinetic Impact Protection

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Short Description: ENSURE (ENhanced SURvivability Elements) NextGen is a spacecraft panel that will combine radiation and kinetic impact (both artificial and natural) shielding properties while also serving as a structural element.

Technology Readiness Level (fielded, lab tested, operational test): TRL 4 for MMOD (micrometeoroids and orbital debris) – simulation, HVI (high velocity impact) testing; TRL 1 for radiation and artificial projectiles – initial feasibility assessment.

Countries Using This Product: None operationally. R&D was supported by contribution funding from Innovation, Science, and Economic Development Canada.

Application: (the so what?) Space pre-eminence requires satellites to be protected from radiation effects and kinetic impact resulting from the space environment or deliberate attack. ENSURE NextGen panel technology could be applicable either to protecting an entire spacecraft bus or as enveloping “vaults” that protect specific critical or sensitive spacecraft components. The new panels will be designed to serve also as structural elements, with the goal of reducing the mass penalty of traditional approaches that employ separate structural and shielding elements.

Science (how it works): Magellan’s first generation ENSURE panel consisted of aluminum facesheets and an aluminum foam core that was intended to provide MMOD protection only. ENSURE NextGen will have a viscous nanoparticle enhanced radiation protective material impregnated into the aluminum foam core, resulting in a structural panel that would provide both kinetic impact and radiation shielding.

Data (key tested performance metrics):

For MMOD panel, HVI testing demonstrated 2 mm facesheets and 40 mm foam core at 4% relative density protected against 6 mm debris at 7 km/s relative velocity.

U.S. Partners: None

Previous Work with DoD: None