

Pressure Shell Approach to Integrated Environmental Protection

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The next generation of exploration mission human systems will require environmental protection such as radiation protection that is effective and efficient. In order to continue human exploration, habitat systems will require special shells to protect astronauts from hostile environments. The Pressure Shell Approach to integrated environmental (radiation) protection is a multi-layer shell that can be used for multifunctional environmental protection. Self-healing, self-repairing nano technologies and sensors are incorporated into the shell. This shell

consists of multiple layers that can be tailored for specific environmental protection needs. Mainly, this innovation focuses on protecting crew from exposure to micrometeorites, thermal, solar flares, and galactic cosmic ray (GCR) radiation.

The Pressure Shell Approach consists of a micrometeoroid and secondary ejecta protection layer; a thin, composite shell placed in between two layers that is non-structural; an open cavity layer that can be filled with water, regolith, or polyethylene foam; a thicker composite shell that is a structural load

bearing that is placed between two layers; and a bladder coating on the interior composite shell. This multi-layer shell creates an effective radiation protection system. Most of its layers can be designed with the materials necessary for specific environments. *In situ* materials such as water or regolith can be added to the shell design for supplemental radiation protection.

This work was done by Kriss J. Kennedy of Johnson Space Center. Further information is contained in a TSP (see page 1). MSC-24637-1