22nd IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND
DEVELOPMENT (D3)
Interactive Presentations - 22nd IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE
EXPLORATION AND DEVELOPMENT (IP)

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LIGHTWEIGHT COMPOUND FOR SPACE STRUCTURE PROTECTION

Abstract

1.Introduction Sabelt is using several materials for developing and manufacturing systems for payload accomodation on board of cargo vehicles missions to ISS. The systems are built with Zylon (used for lightweight straps and nets) and flame retardant EPP (used for floor, roof and any regular support for bags). Both materials, certified for flight, are also popular for ballistic application and can be potentially used for protection of deep space habitation against micro-meteorites impacts and radiation.

2.Solution The combination of two materials (high tenacity Zylon and shock-absorber EPP) is quite common for ballistic application, mainly bulletproof vest. A composite compound with layers of these materials could be a potential structural shield against mechanical impact and radiation. The same solution, made in different configuration and thickness could be used on orbital modules and surface habitations.

3.Advantages The compound with Zylon and EPP, combined, will be extremely light, low weight for space delivery and for in-space handling. It is possible (molding the EPP and cutting the fabric), to create different geometries or elements to be joined together to reach the required shape. Polypropylene (expanded in our case) is candidate to be a material resistant at radiation, suitable to protect space human life.

4.Potential A typical application is the Moon Village where habitation shelters have to be equipped with life protection systems for long permanence on lunar surface. The compound panels can be used internally or externally, closed to the main structure. In a very similar way it is possible to use the same compound and panels for space stations where a long human stay is planned.