Analogue Space Suit Research – Recent Development and Testing of 'MarsSkin'

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Gas-pressurised suits have created history by enabling humans to walk in space and across the surface of the moon. Despite being effective as a life support system, the suits are a severe hindrance to astronaut function and capability. They are rigid, heavy, bulky, costly, leaky, and require high maintenance due to the complexity of constant volume joints and associated restraint layers. The gloves of the suits are particularly restrictive and continue to significantly impact the productivity and effectiveness of extravehicular activity (EVA). Immediate advances in glove design are sought by NASA and other agencies.

An alternative suit technology which could be used to develop better gloves relies on tight, form-fitting garments to physically compress the body rather than pressurise it with a gas. Such compression balances the oxygen pressure being supplied for breathing, and is therefore called Mechanical Counter Pressure (MCP). MCP garments are fabricated from elastics, and are light, durable, puncture resistant, with virtually no leakage and excellent flexibility. Recent MCP research has focussed on the development and testing of a glove due to the demand for improvements in glove and EVA performance.

The Mars Society of Australia (MSA) has been developing an 'analogue' MCP suit called MarsSkin to conduct research into the theoretical advantages of the MCP approach. Developments of this suit have been progressively reported at previous AMECs. This talk explores recent tests at two Mars Society simulations: Expedition Two in outback South Australia; and in the USA at the Mars Desert Research Station (MDRS) as part of the Mona Lisa-Leonardo Project. The results of the field studies conducted during these expeditions will be discussed. The findings of the analogue space suit glove performance study undertaken at Expedition Two will be presented. Finally, planned improvements to the MarsSkin suit will be outlined, along with future outreach opportunities.

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