MarsSkin and VSSEC: Suiting up the Students

An Overview of MarsSkin, the VSSEC Suits and MarsSkin 4 Development

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MarsSkin

- Project MarsSkin formed in 2001 to produce analogue MCP suits for scientific studies.
- MarsSkins worn at Ex 1 & 2 and Leonardo & Mona Lisa

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MarsSkin

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- MarsSkin also found to be excellent PR/Outreach tool.

- VSSEC contacted MSA/MarsSkin at RMIT Space Expo 2004 to help supply a suit for the Mars surface based on MarsSkin 3.

- The VSSEC suit would use grey Yakka coveralls as a pseudo gas-pressurisation garment for simplicity. MarsSkin would develop a new helmet, backpack and ventilation system.

- MarsSkin felt this was an excellent outreach opportunity, as well as a chance to test and evaluate new ideas for MarsSkin 4.

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Requirements

Suits would be used multiple times per day by secondary school students, so the suits had to be:

- Safe
- Rugged
- Comfortable
- Attractive
- Easy to maintain

In addition, VSSEC requested that costs be kept to a minimum, and that the helmets incorporate a solid base, be separate to the backpack and be easily removed. Ventilation would also have to be improved.

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Helmets

• Helmets would use a 2” diameter smaller clear dome for a better fit to students, made by Ballis Plastics.

• Base would be same dome as top, but in grey and with a head entry port. Neck ring was to be a grey plastic pot riveted to the base, but rejected due to appearance and safety concerns.

• Final iteration has a neck ring produced by Ballis and bonded to the base.

• Attached to backpack by squeeze connectors.

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Backpacks

- Boblbee hard-shell backpacks of MarsSkin 3 found to offer best size, comfort, appearance and value-for-money. Hard shell is also beneficial for drilling and component mounting.

- Selected in metallic grey

- Simulation oxygen canister installed with protective cover.

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Ventilation System

- Air flow and location of 1 PC fan in MarsSkin 3 insufficient, however MDRS suit ventilation sufficient on 2 fans.

- Fans to be mounted on each end of oxygen canister to mimic gas supply, and connected to helmet via washing-machine hose.

- 7Ah 12V lead-acid battery chosen for single charge duration of ~5 hours.

- On/off switch and fans include lighting for attractiveness.

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Ventilation System

• Separate helmet and backpack units required ventilation hose connectors. Many possible connectors investigated, but simple plumbing supplies found to work best.

• Helmet inlet air required to be forced forwards against faceplate to reduce fogging and prevent cold spots. Special inlet ‘ears’ made from helmet base offcuts improves appearance, directs air and covers sharp edges of plumbing.

• All components assembled with heat-shrink tubing, nylocs and loctite 222 to improve ruggedness.

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Outreach opportunity

- Wearing the VSSEC suits gives a taste of the ‘astronaut experience’
  - some of the restrictions (vision, mobility) that a spacesuit imposes on the astronaut
  - the confined feeling of an enclosed space suit helmet
  - the sounds and sensations of a spacewalk and exploring another planet

- MarsSkin hopes the suits will give many students the chance to be inspired about space exploration, both at VSSEC and other locations with further outreach suits.

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MarsSkin 4

- Incorporate new ventilation system and helmet.
- Experience in ‘mass production’.
- New Yakka coveralls.
- Proceeds to help fund purchases.

- Further development: new skins, HUT.

- HUT to be incorporated in next Outreach MarsSkin.