

38th STUDENT CONFERENCE (E2)
Student Conference II (2)Author: Mr. Alexey Makhnutin
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Royal Melbourne Institute of Technology (RMIT), AustraliaINVESTIGATION INTO THERMAL MANAGEMENT FOR LUNAR EXTRAVEHICULAR
ACTIVITIES (EVA) AND RELATED EQUIPMENT**Abstract**

With NASA planning a return to the moon, it is necessary to investigate previous experiences during Apollo era, to understand the problems that will be faced in future Moon exploration.

Researchers conducted a review of environmental problems encountered in the Apollo missions program to identify areas where further investigation would improve the outcomes and performance of lunar operations. In particular one area that was found to need greater attention was the thermal management and the effects of lunar dust on the heat rejection systems. Little research during the Apollo era was carried out during Apollo era, and recent work on the subject does not describe the effects of the lunar dust on the subject of thermal management.

An experiment was designed and conducted to prove the established hypothesis that the dust is major factor in the heat management system. Lunar dust in both the experiment and on Apollo missions was found to cause a significant load on the thermal management system. These effects were greatly underestimated in the past, which resulted in early equipment failure as result of overheating and insufficient cooling. An example being the Lunar Rover Vehicle (LRV) had reduced operation time due to the batteries where operating much hotter compare to what where predicted during preliminary study.

The experiment method and results were validated against Apollo mission data for lunar rover and lunar surface equipment. The experiment has shown that the lunar dust substitute gave similar results to that experienced in actual Apollo missions. A thermal profile for lunar dust accumulation was derived to assist in prediction techniques during EVA.