‘LUNAFILT’ MECHANISM FOR FILTRATION OF LUNAR DUST

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INTRODUCTION

- Dust builds up upon the objects in the lunar environment. The composition of lunar dust on the lunar surface is about 50% SiO2, 15% Al2O3, 10% CaO, 10% MgO, 5% TiO2 and 5-15% Iron[1].
- The surface systems on the lunar surface must be freed from dust before humans are chronically exposed to it.
- Problem solving methods may include advancements in suit designing along with development structurally potent and feasible dust capturing devices.

EFFECTS OF LUNAR DUST

- Lunar dust may accelerate machinery decay due to abrasion
- It may cause faults into the delicate and sensitive surface systems.
- Composition of lunar dust is harmful to human beings, Thus particulates could act as carcinogens as well as irritants also.
- The prolong exposure to the lunar dust can produce chronic disorders in human beings.
- Thus the problems which humans may face within near future must be addressed and resolved at the earliest.

DUST PROTECTION (On Lunar Faclilites)

A small amount of dust inhaled in the lunar facilities such as ISRU units is potentially much more damaging to the health of human beings. Thus adequate importance must be shown to the protection of humans from the lunar dust

INSTANCE-1

The suits of Apollo astronauts were reported to be quickly wore out due to lunar dust. Thus, Reducing the number of joints to one or two the air loss rates could be reduced. Along with that it can be ensured that suits are not locked by lunar dust.

INSTANCE-2

The dust mask also carries immense importance while human operation in the metal refining ISRU units. Exposure to a small amount of dust could lead to undesired situation on the metal refining lunar ISRU units

FEATURES

REUSABLE MATERIALS	TIME IS THE FACTOR
The system uses materials for the filter which could be mined on moon in near future. Also these materials do not get worn they could be reused back for the same purpose of filtration.	This system follows the guidelines for the time required for the good decon processes which is estimated 20 sec. The system is non invasive and hardly dangerous.

REDESIGNING SPACESUITS	CORE TECHNOLOGY
This projects suggests to redesign amount of joints in a particular spacesuit which would carry huge amount of dust in conventional joints. Along with that in future dust masks should be designed with proper care.	The system utilizes electric charge and filter used is constructed of ceramics. Thus having presence of these type of filtration based machines would definitely help humans to explore moon efficiently.

CONCLUSIONS

1. The Electrostatic systems seem a better alternative for dust removal on the lunar facilities compared to mechanical direct air processes, vibrations of high frequency, and brushes.

2. The catering technique for dust problem can be primarily accomplished through electrostatic systems. This causes dust to be repelled from the object it is resting. The system comprises of a conductive plate. On this plate a charge can be placed. Dust being repelled is a result of charging of objects which are in contact with plate. A current of gas can be fed through the chamber at the point and dust will carried away resulting into reduced dust levels.

3. Then this dusty gas is passed through a thin filmed ceramic multilayer filter to remove the dust. This particular filter can be cleansed by blowing gas simply rearwards through it. One filter is expected to run 1 Million cycles of filtration. The expected life span for the better adsorption and high efficiency is recommended 5 years but it could be used for next 5 years in adverse conditions.

4. This method can be also used in microgravity and then put to test on lunar surface. This will work better in microgravity as there will be no conductive plate but objects will hold conductive bars. In microgravity there is lack of acceleration. Thus particles tend to show more desired nature for the system as compared to other environment.

FUTURE SCOPE

In near future the importance of lunar surface structures would be emphasized like never before due to moons position and resource availability. This project will help to understand a method to filter lunar dust on moon’s surface

[1] D. Loftus, E. Tranfield, J. Rask, C. McCrosssin, NASA ARC, The Chemical Reactivity of Lunar Dust Relevant to Human Exploration of the Moon