Lunar Contact Sampling Device

Team Menteluminosa

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Project Background

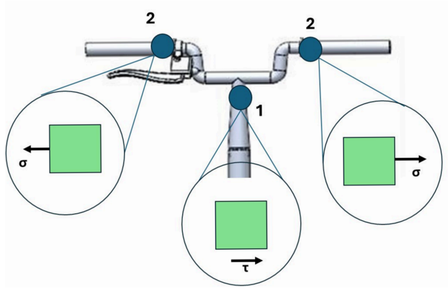
NASA's Artemis III mission will explore the lunar south pole, where astronauts will collect regolith samples to enhance understanding of the Moon's geological history. This investigation focuses on studying grain size, material diversity, distribution, and orientation to gain insights into space weathering. To ensure pristine samples, a specialized Contact Sampling Device is required, capable of preventing contamination from EVA disturbances like dust or debris. Building on lessons from past missions, this device must improve usability and securely contain samples for return to Earth.

Future Work

In the future we will be planning to:

- Manufacturing of parts for full working prototype
- Analysis of individual manufactured parts
- Adjustment of design
- Testing of design using regolith simulant

Analysis



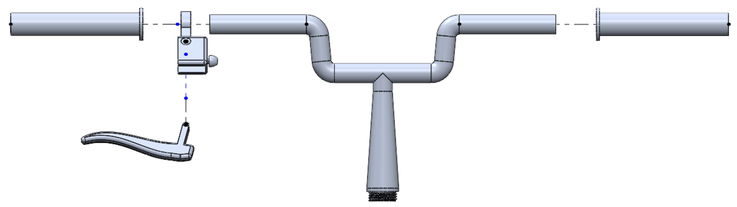
Free body diagram & Stress analysis of the handle

Location	Safety Factor
Stem (1)	19.8
Handle (2)	18.2

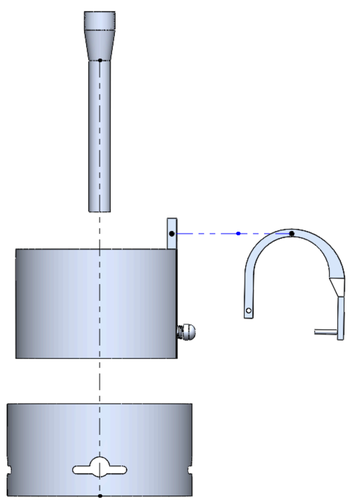
Abstract

One of the main goals of Artemis III is to collect geological lunar samples during an extravehicular activity (EVA) and send it back to earth for further studies. To do this a device needs to be designed to that can safely collect and store a lunar sample while keeping in mind the unique environment of a lunar EVA. For this project, this team is designing a rotating lunar contact sampler that can safely store and collect lunar regolith samples.

Rotating Lunar Contact Sampling Device

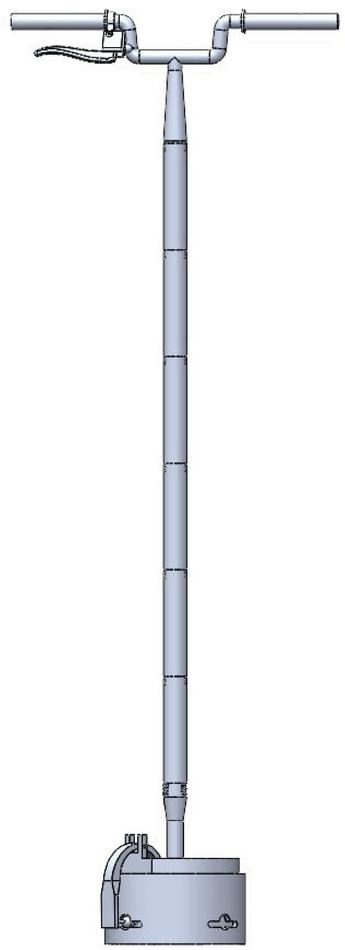


Exploded view of device handle



Exploded view of collection device

Exploded view of shaft



Sampling Device

Objectives

To design a lunar contact sampling device that:

- Is Ergonomically designed for an EVA
- Is Safe to use in lunar environment
- Has a maximum stowed volume of 8"x8"x36"
- Is manually powered
- Can collect an undisturbed lunar sample and retain grain orientation

Conclusions

The team provided a working design that fits within the confines of the Microg next competition requirements. The design includes handles able to be operated by a person wearing EVA gloves, a shaft which is able to be disassembled to fit with the maximum required storage space of 8" x 8" x 36", and a collector which can revolve to allow for multiple samples to be collected and is removeable for study back on Earth.

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