

Compact Commode for Space Living



Name of Technology:

Compact Low Logistics Commode for Exploration

Participating NASA Centers:

JSC (Lead); ARC, KSC, MSFC

Technological Area:

H20.01 Solid and Liquid Waste Management for Human Spacecraft

Vision for the Technology:

NASA needs an innovative compact commode (toilet) for on-orbit and Deep Space missions utilizing minimal resources such as water. Solid and liquid waste management are not only needed to capture waste in a sanitary manner (microbial release), but also the system needs to be able to control odors. A compact commode for safe, efficient processing of human waste with minimal consumables is required for future exploration missions.

Challenges:

The US relies on the Russian designed commode on the International Space Station (ISS) for metabolic waste management. The Russian toilet is not suitable for lunar or Mars missions since it has considerable mass and requires ~1 rack of installed equipment.

The Russian toilet on ISS weighs 126 kg and takes up ~1 m³ of space. The consumables are ~150kg/CM-year for 1 year of operation.

NASA Seeks to Meet the Following Specs:

Successful closure of this gap will be measured through:

- 1) Mass of commode <51 kg for surface and <70kg for microgravity,
- 2) Volume of commode < 0.34 m³,
- 3) Consumables <100 kg/CM-yr

There are currently no solutions that meets the required limited commode volume/mass for future missions.

Overview of Student Project:

NASA seeks an innovative compact commode (toilet) for safe, efficient processing of human waste with minimal consumables for future exploration missions. The technology needs to also control odors so as not to affect the living environment.

Innovative Areas Student Projects Can Address:

- Design a compact commode for use in exploration missions that is safe and efficient in processing human waste while controlling odors.
- Design an alternative capture components of human waste along with processing of such waste.

Project Phases

- I. Conceptual and feasibility study with characteristics
- II. Proof of Concept/Prototype in lab environment

Research Funded by NASA on this Topic:

Proposal Number: 15-2 H4.01-8817
[In-Suit Waste Management Technologies](#)

Proposal Number: 09-1 X3.02-9169
[Lunar Organic Waste Reformer](#)

Proposal Number: 18-1- H3.02-8532
[Advanced Organic Waste Gasifier](#)

References:

[H20.01 Solid and Liquid Waste Management for Human Spacecraft](#)

[H3.02 Spacecraft Solid Waste Management](#)

[X3.01 Spacecraft Cabin Atmospheric Management and Habitation Systems](#)

[NASA's Lunar Loo Challenge](#) (NASA)

[NASA's Lunar Loo Challenge](#) (Herox)