

Spacecraft In-flight Waste Jettison



Name of Technology:

In-flight Waste Mass Jettison

Participating NASA Centers:

JSC (Lead); ARC, GRC, KSC, MSFC

Technological Area:

X3.02 Water Processing and Waste Management

Vision for the Technology:

Deep space exploration missions will require for non-recyclable waste to be jettisoned to save fuel and maintain limited living volume. NASA needs a mass waste containment system that can be jettisoned with minimal fuel to be directed to the Sun. Waste jettison systems must be efficient and reliable as to not put the spacecraft, crew, or other planets at risk.

Challenges:

Waste items that remain on in-flight spacecraft contribute to fuel usage. To reduce propellant usage and improve spacecraft performance, trash and other waste products will need to be jettisoned.

Currently, there is no existing solution in space flight applications, except jettison by departing logistics module, which is performed on the International Space Station (ISS), but not feasible for deep space missions.

NASA Seeks to Meet the Following Specs:

Successful closure of this gap will be determined through:

- Safely and effectively jettisons trash and other waste products while a spacecraft is in transit.
- Alternative option: Trash-to-gas feasibility assessments to inform jettison technology decisions.

Overview of Student Project:

NASA seeks innovative waste jettison systems that must be efficient and reliable as to not put the spacecraft, crew, or other planets at risk. Additional propellant will be required for the missions due to higher spacecraft mass during maneuvers without a waste jettison system. Therefore, an in-flight, mass waste containment system is needed to be jettison towards the Sun.

Innovative Areas Student Projects Can Address:

- ❖ Design a waste containment system to be jettison from spacecraft
- ❖ Trash-to-gas propulsion system for waste jettison technology

Project Phases

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

Research Funded by NASA on this Topic:

[NASA Waste Jettison Mechanism Challenge](#)

[NASA Tournament Lab](#) – (NASA Waste Jettison Challenge)

References:

[X3.02Water Processing and Waste Management](#)

[X12.07Advanced Life Support: Water and Waste Processing](#)