


Background & Objectives

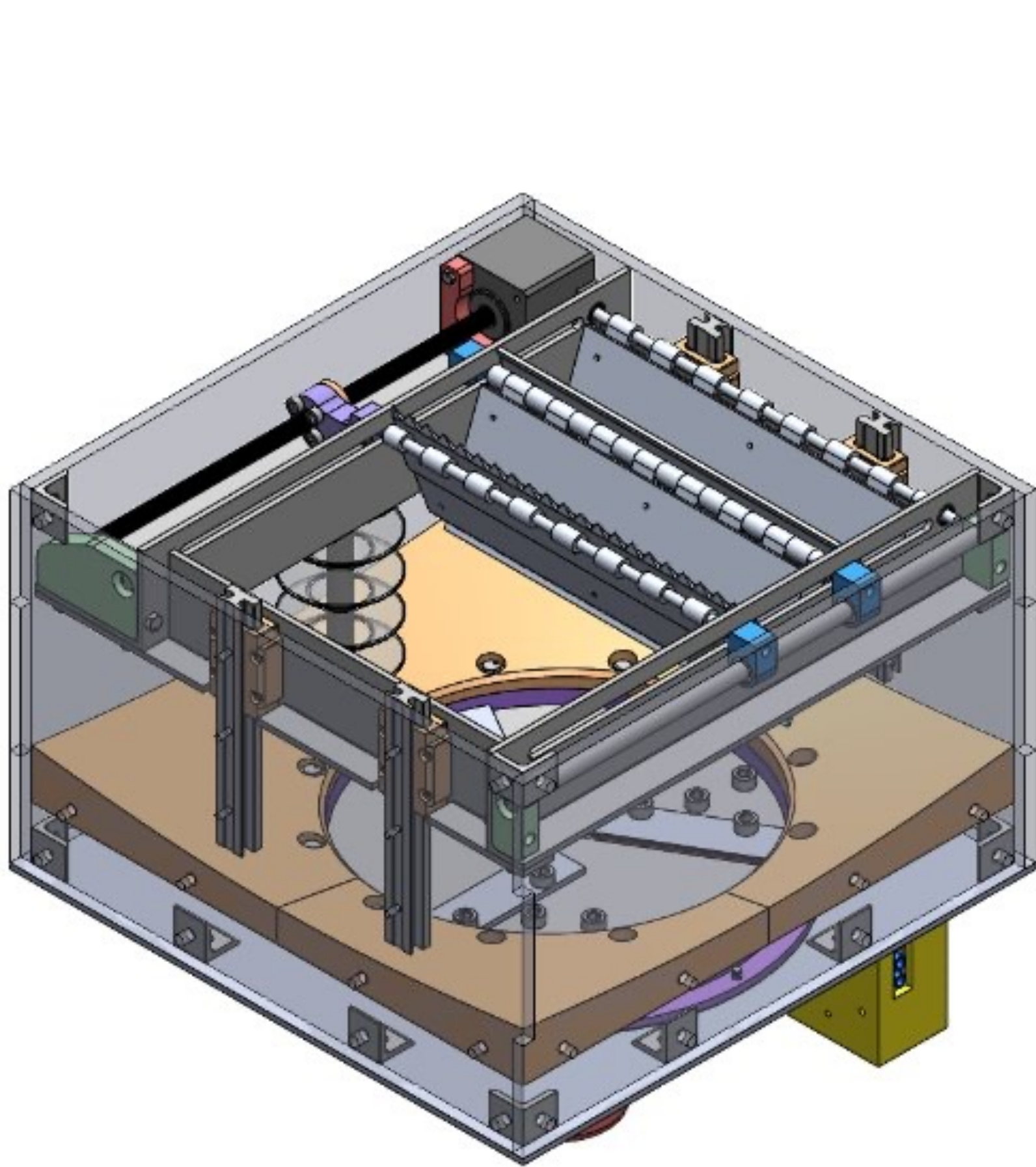


Karman+ is an asteroid mining company focused on supplying the space economy.

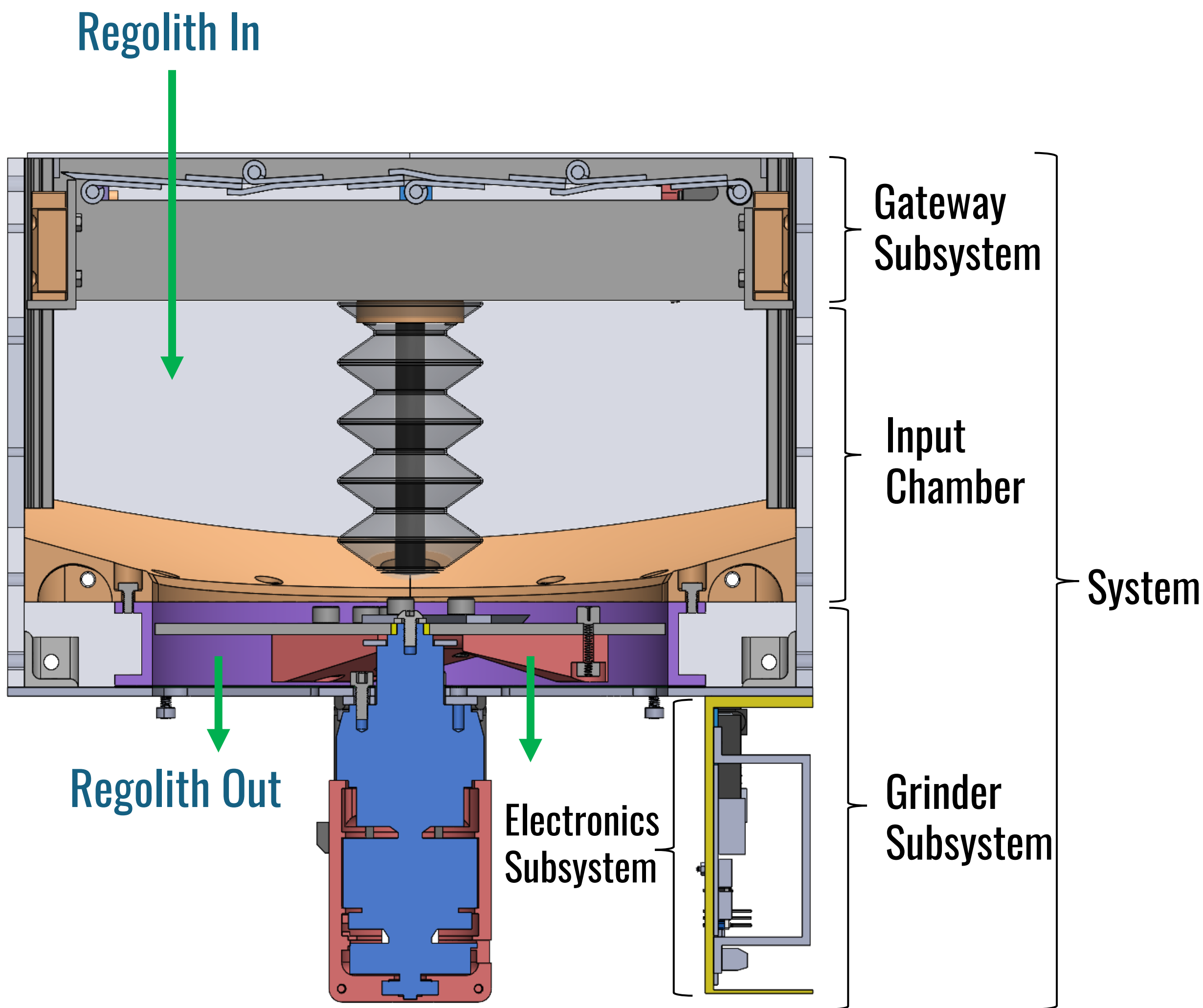
The goal of the project was to develop a system to grind asteroid regolith to under 0.5 mm in grain size. This will serve as the first step in processing mined regolith.

Karman+ will implement this process on their 2028 mission to a near-Earth asteroid to demonstrate the feasibility of regolith processing for large-scale applications.

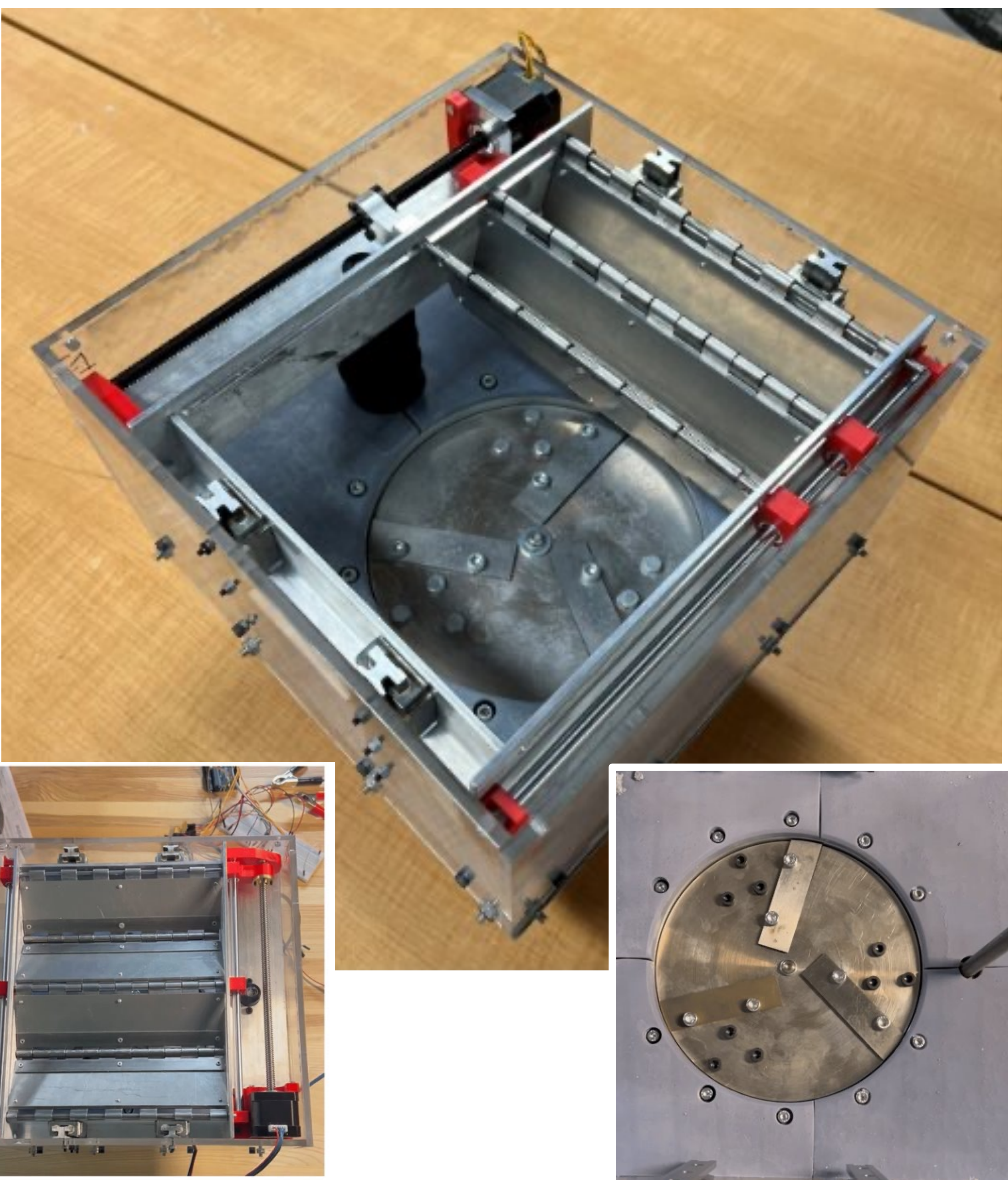
System Overview



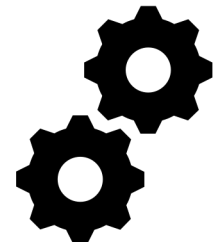
Subsystem Breakdown



Assembled System




Design Requirements

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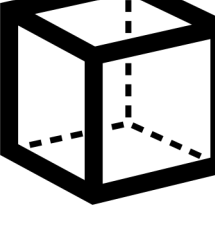
Grind C-type regolith

✓



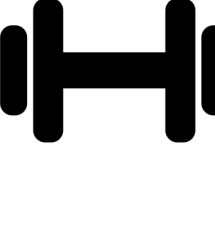
Microgravity operation

52%



Fit in 300 mm cube

✓



Mass < 5 kg

8.3 kg




Power < 500 W

✓



95% output < 0.5 mm

✓



Input diameter > 200 mm

✓



Operate > 20 cycles

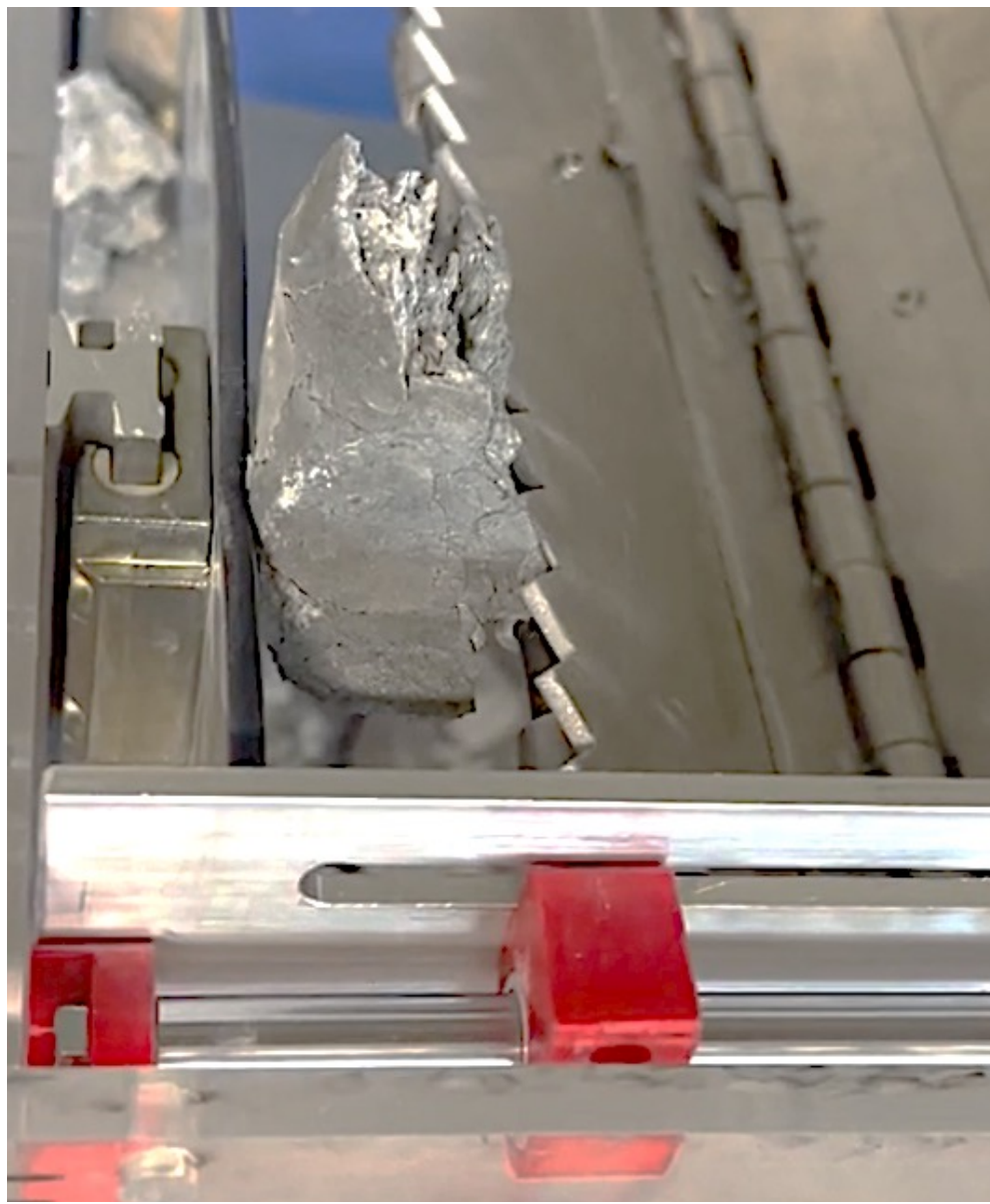
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Testing & Validation

Gateway Crushing Test: To prevent jamming, the gateway panels must slice through any regolith along its path. The subsystem can cut through regolith simulant up to Strength 4.

Input Chamber Compression Test: Upon descent, the gateway can crush up to Strength 4 regolith and does not experience any binding.

Full System Test: The full system can process C-type regolith and draws at most 200 Watts.

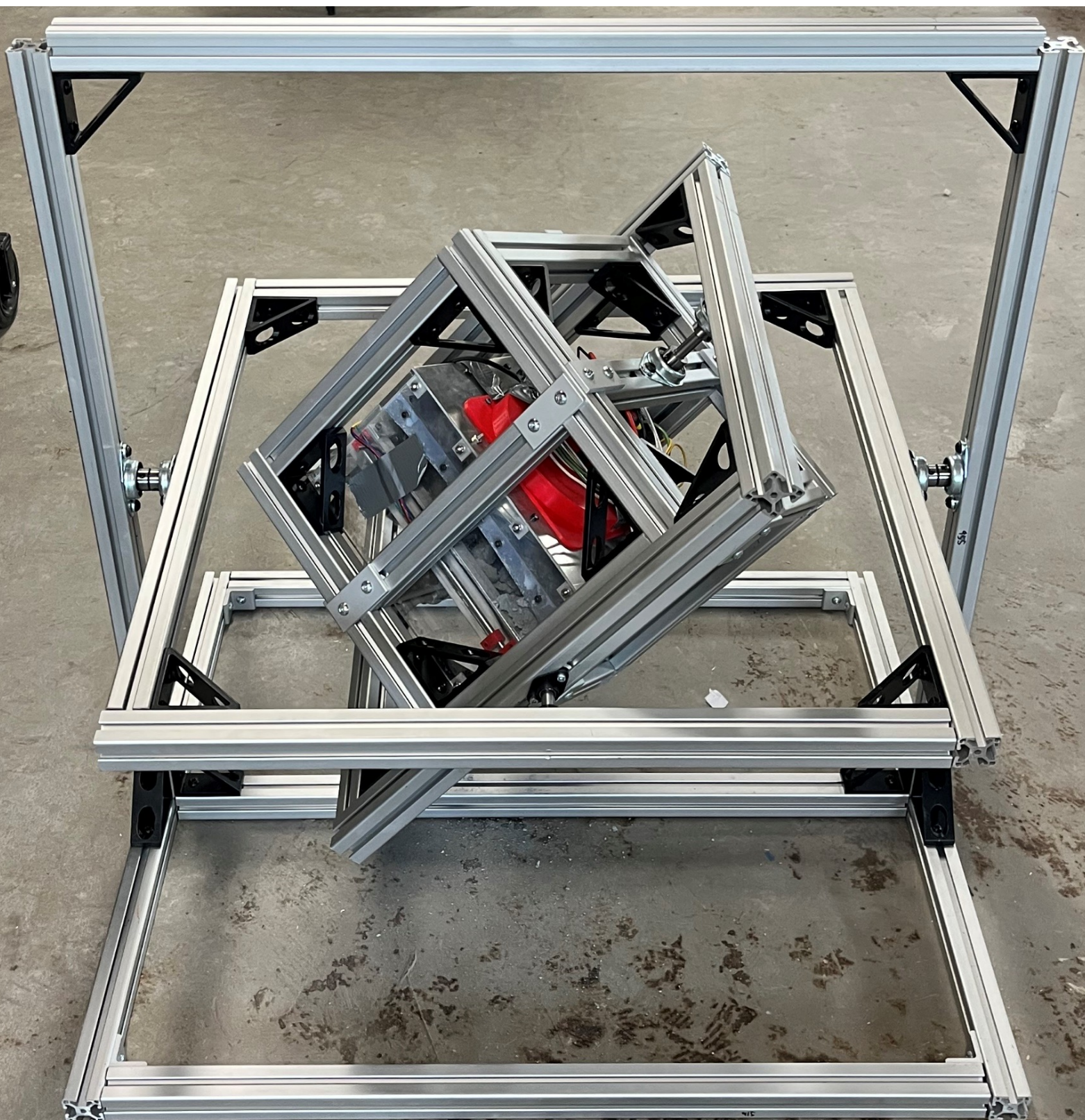


Grinder Subsystem Test: The Grinder subsystem successfully grinds all regolith simulant strengths to below 0.5 mm.

Strength	Output Mass (g)	Percent < 0.5 mm	Percent > 0.5 mm
1	169	100	0
2	149	100	0
4	189	99.95	0.05
5	210	99.90	0.1



3-Axis Gimbal Testing: aimed at simulating a non-gravity reliant environment. The system was able to operate at 52% effectiveness compared to its gravity-assisted upright orientation.



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