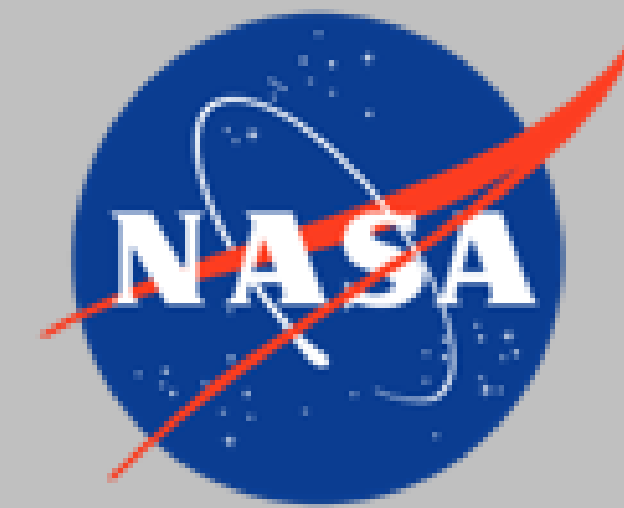




T515: Reusable Shock Absorber for New Lunar Lander



FAMU-FSU
Engineering

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We would like to thank our: **Sponsor:** Rachel McCauley **Instructor:** Dr. Shayne McConomy **Advisor:** Keith Larson

Project Motivation

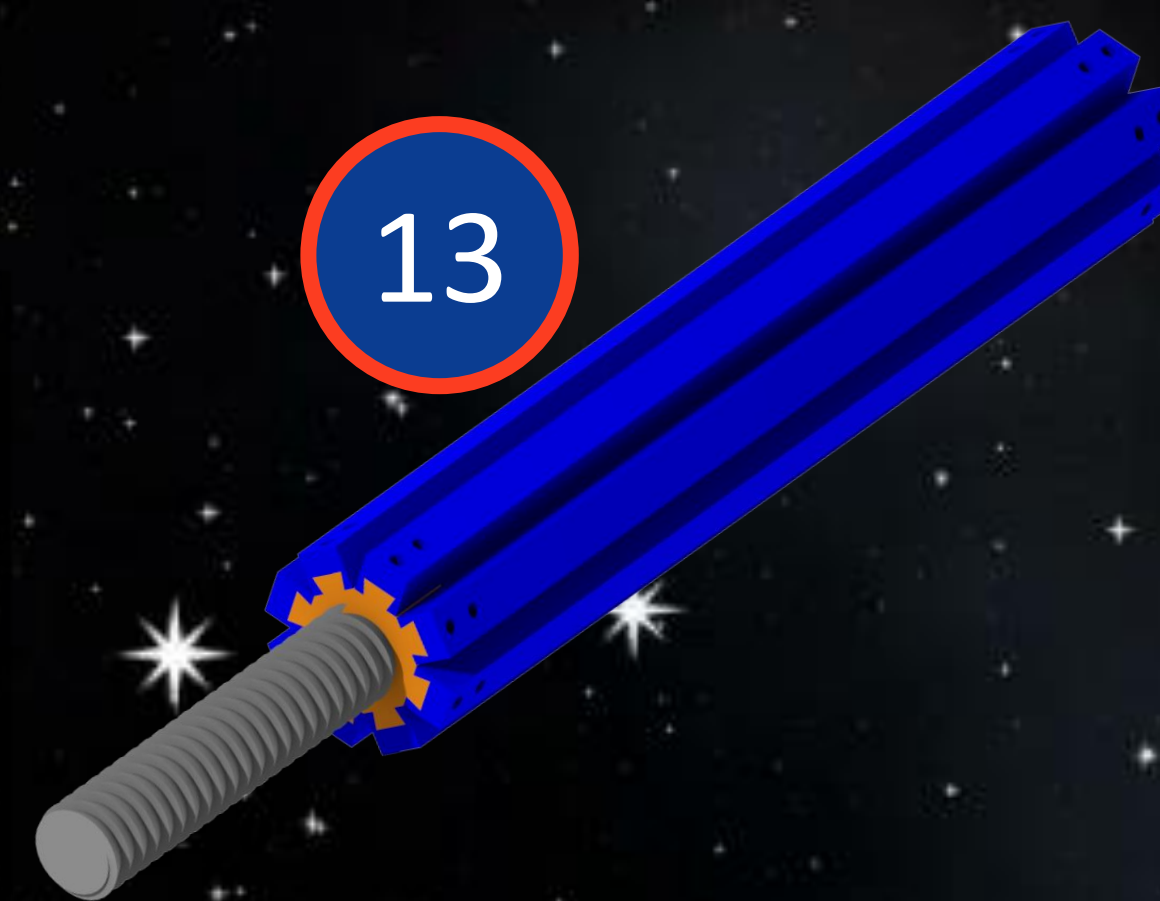
Mission Artemis aims to establish a human presence on the moon, requiring a human lander that can land multiple times, meaning it will need a reusable shock absorber. Space conditions complicate the use of traditional shock absorbers, which use heat dissipation and working fluids.

Design Summary

Our design involves a locking spring that will store energy, rather than dissipate it. Once the spring is compressed, the pawl arms will slide down and hook on to the ratchet screw at maximum compression. The ratchet screw will use a buttress thread design.

This allows the pawls to slide down but not slide back up.

Once the spring is ready to be unloaded, the motor will slowly unscrew the ratchet screw, slowly releasing the stored energy. Once the spring has been fully extended, it will indicate that it is ready for its next use.

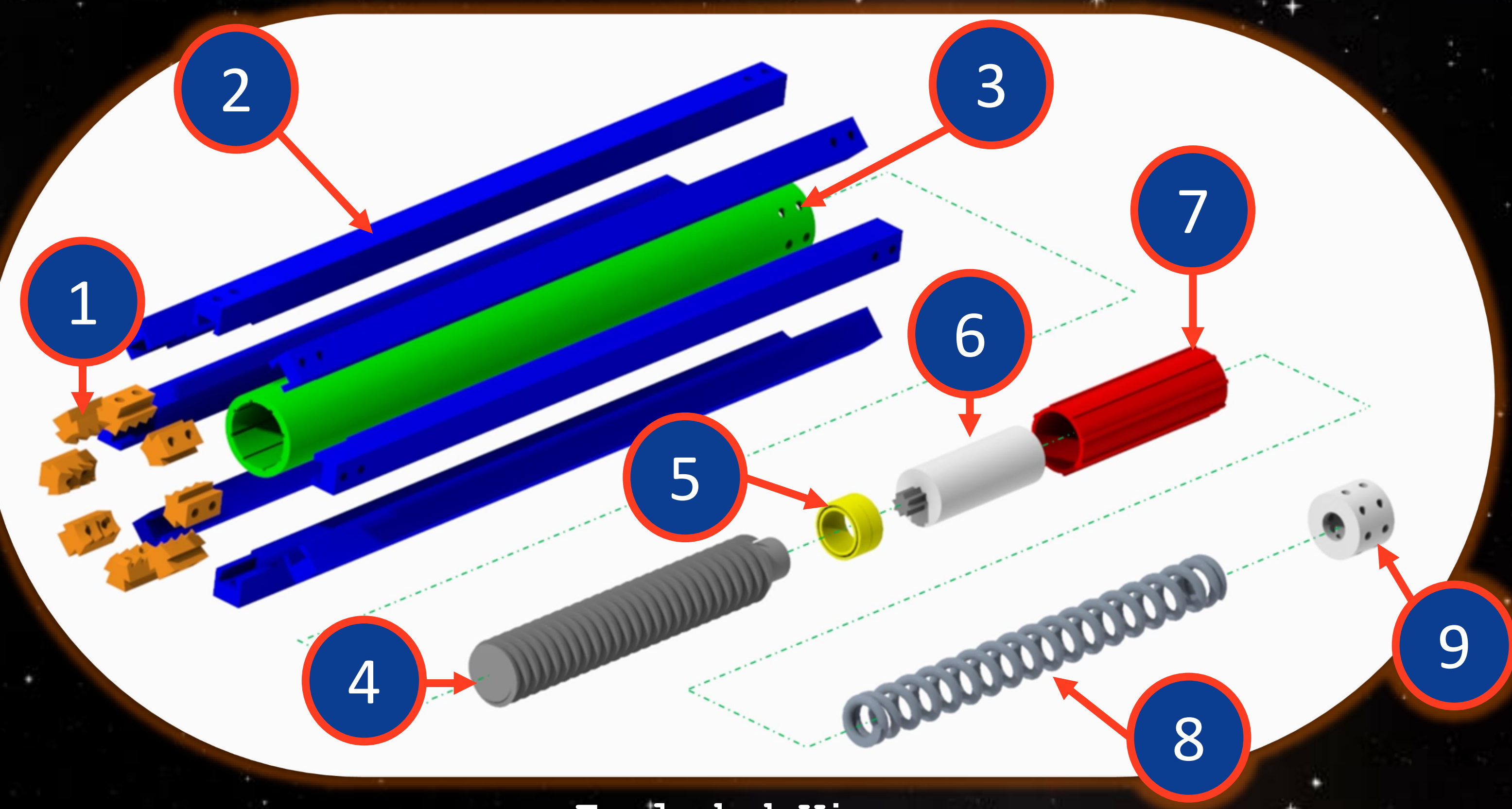
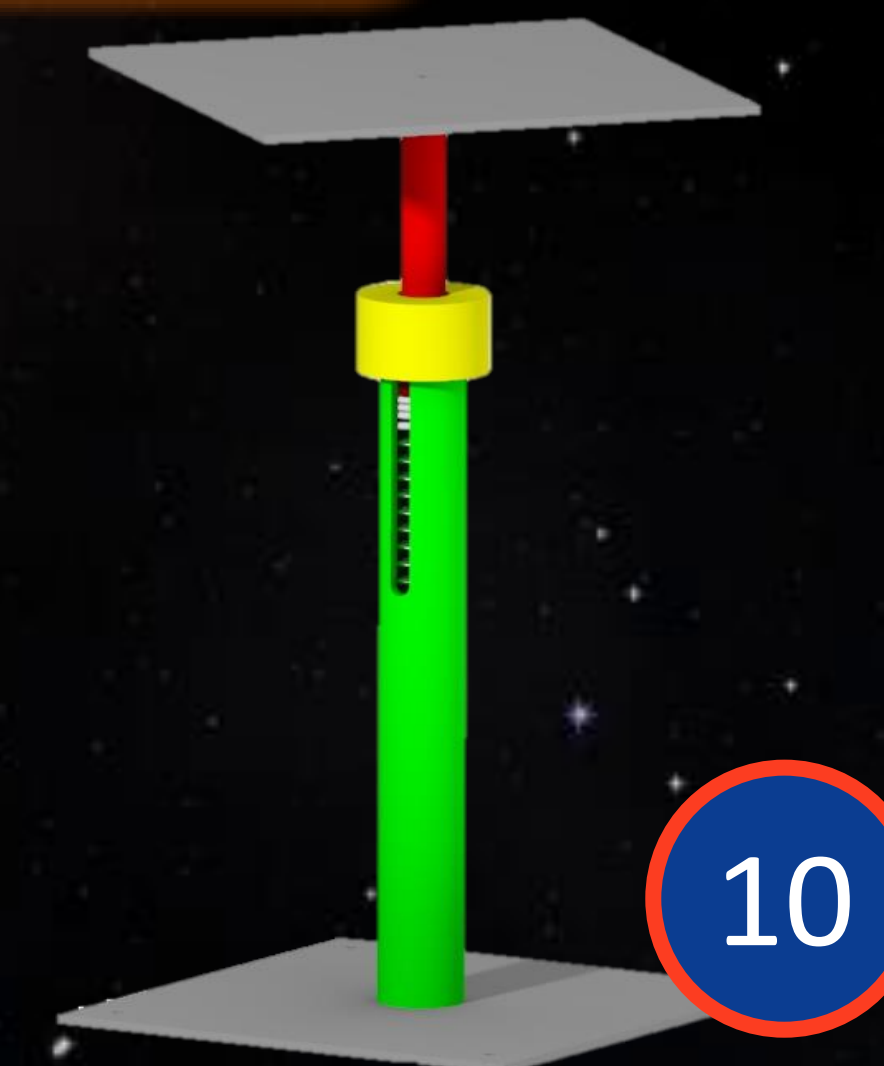


Project Description

To design a reusable device for the human lander system that will dissipate the impact energy in such a way that it does not damage the vessel or occupants.

Validation: Spring Test

The first step to validation was to complete a spring test. This was to ensure that the spring we scaled and used for our prototype would function as theorized. Through this test we observed that it did work as needed, in addition to valuable qualitative data.



Exploded View

Key:

- 1) Eighth Nuts
- 2) Pawl Arms
- 3) Main Cylinder
- 4) Ratchet Screw
- 5) Thrust Bearing
- 6) Motor
- 7) Motor Housing
- 8) Main Spring
- 9) End Cap
- 10) Spring test CAD
- 11) Spring test setup
- 12) Spring test team demonstration
- 13) Final Design

