

Background

Re-RASSOR is a scaled down version of NASA's mining rover which operates on planets and moons. This version is used for educational purposes and will be reproduced for STEM education.

Specification

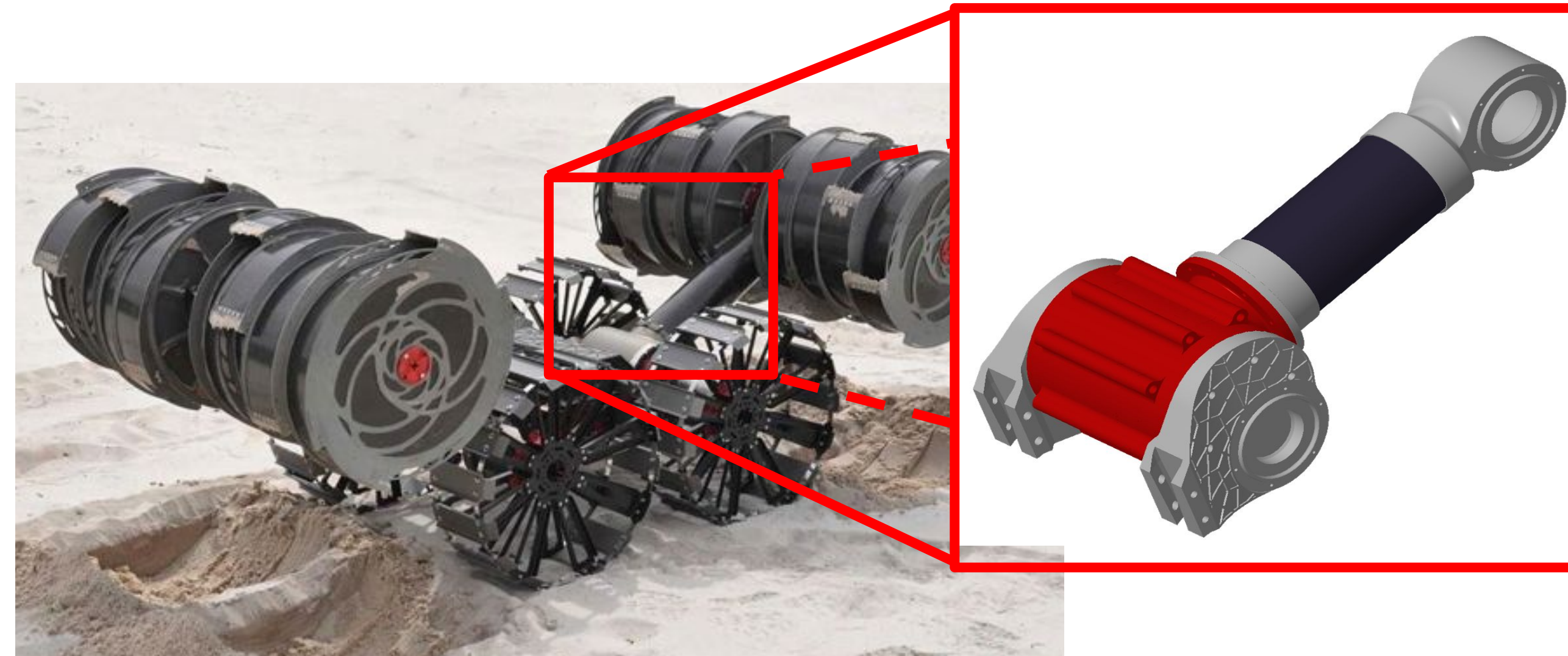
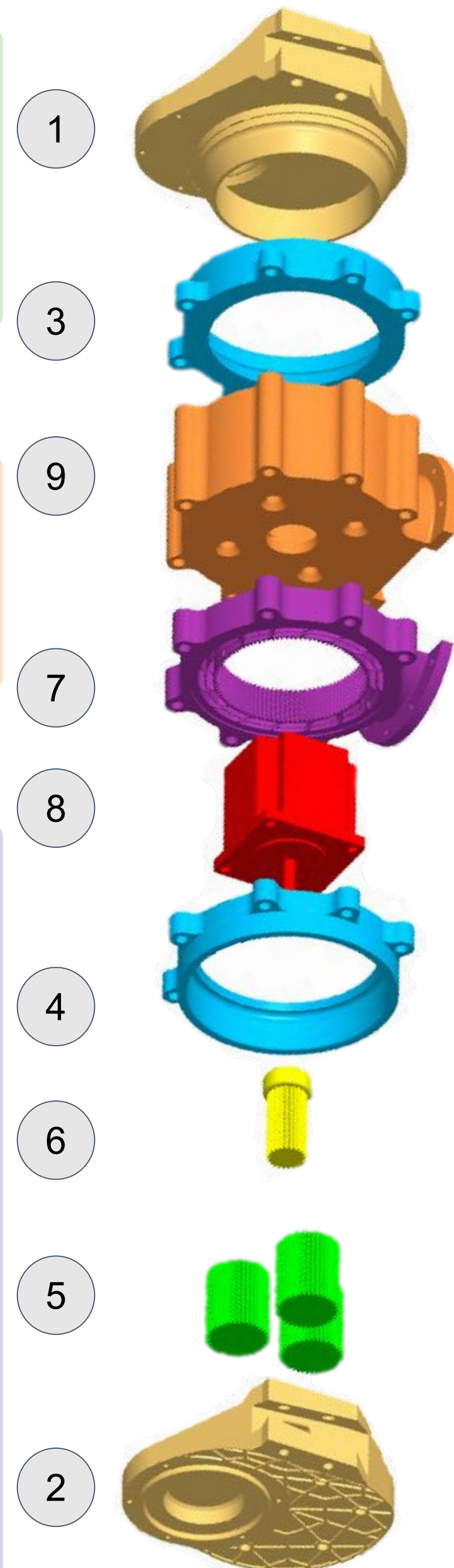
Motion: Rotates 270 Degrees
Power: 12 V & 1.2 A
Support: Lift 4 kg Drum
3D Printed in PLA Filament

Assumptions

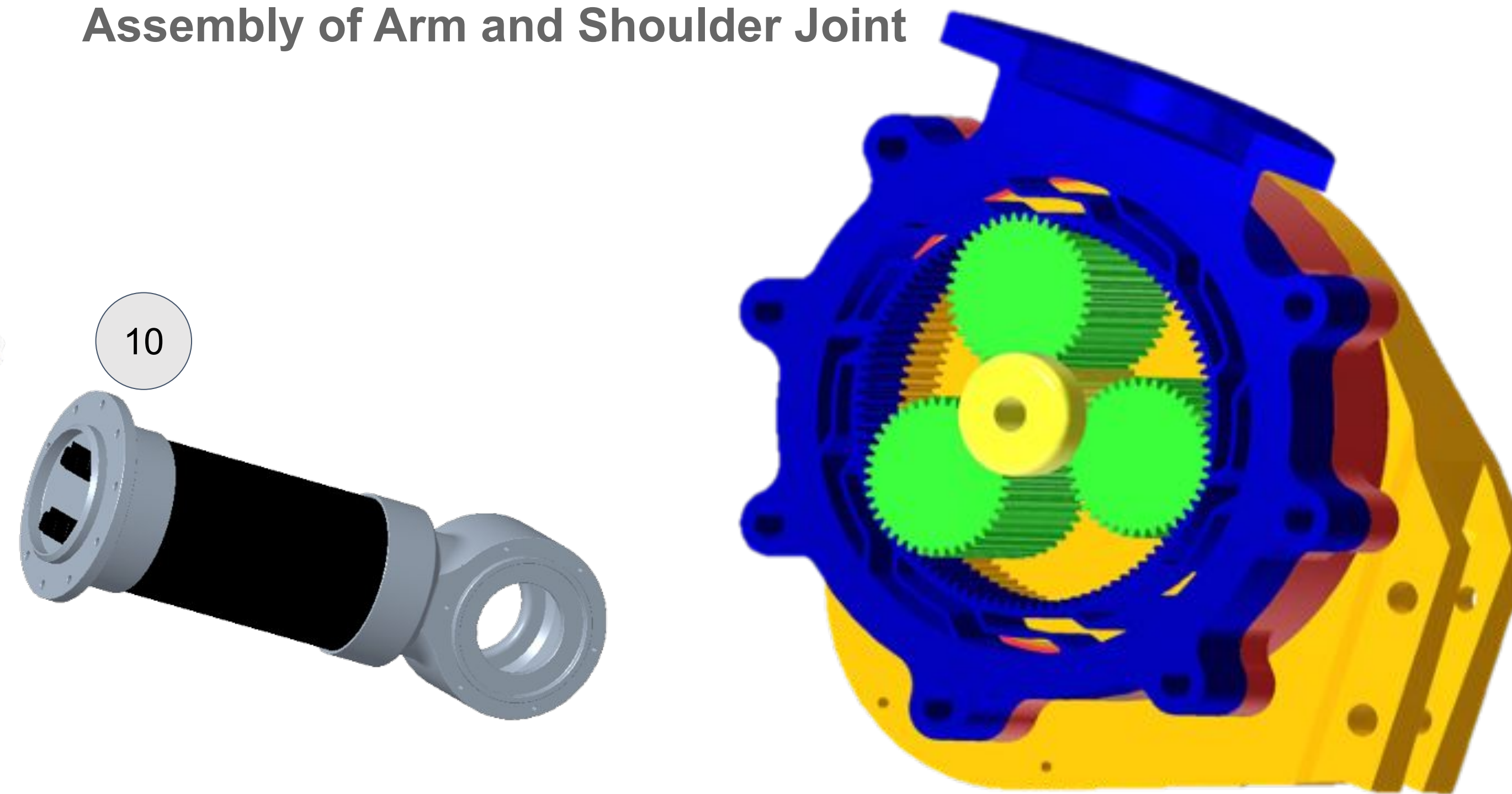
Provided 12 Volts
Used in earth environment
Only needs to pivot

Components

1. Left Shoulder Blade Bearing and Gear
2. Right Shoulder Blade Bearing
3. Left T-joint Bearing
4. Right T-joint Bearing
5. Planetary Gears
6. Sun Gear
7. Harmonic Gear
8. Nema 23 Motor
9. Motor Mount
10. Arm



Assembly of Arm and Shoulder Joint



Gearbox Design

Summary

The shoulder joint is responsible for moving the arm to the desired position during mining, transporting heavy loads, and adjusting the drums which also enable it to travel through rough terrain. The final product is a light, inexpensive, and durable design that is cohesive to the current rover. The housing, gear box, motor, bearings, and arm have been designed to meet and exceed all these goals.

Design

An integrated hybrid harmonic gearbox with a cylindrical arm.

Harmonic Gear:

- Compliant Design
- Designed to Skip
- 100 teeth

Planetary Gears:

- Planet: 40 teeth
- High Infil

Sun Gear:

- Driven by Stepper
- 24 Teeth

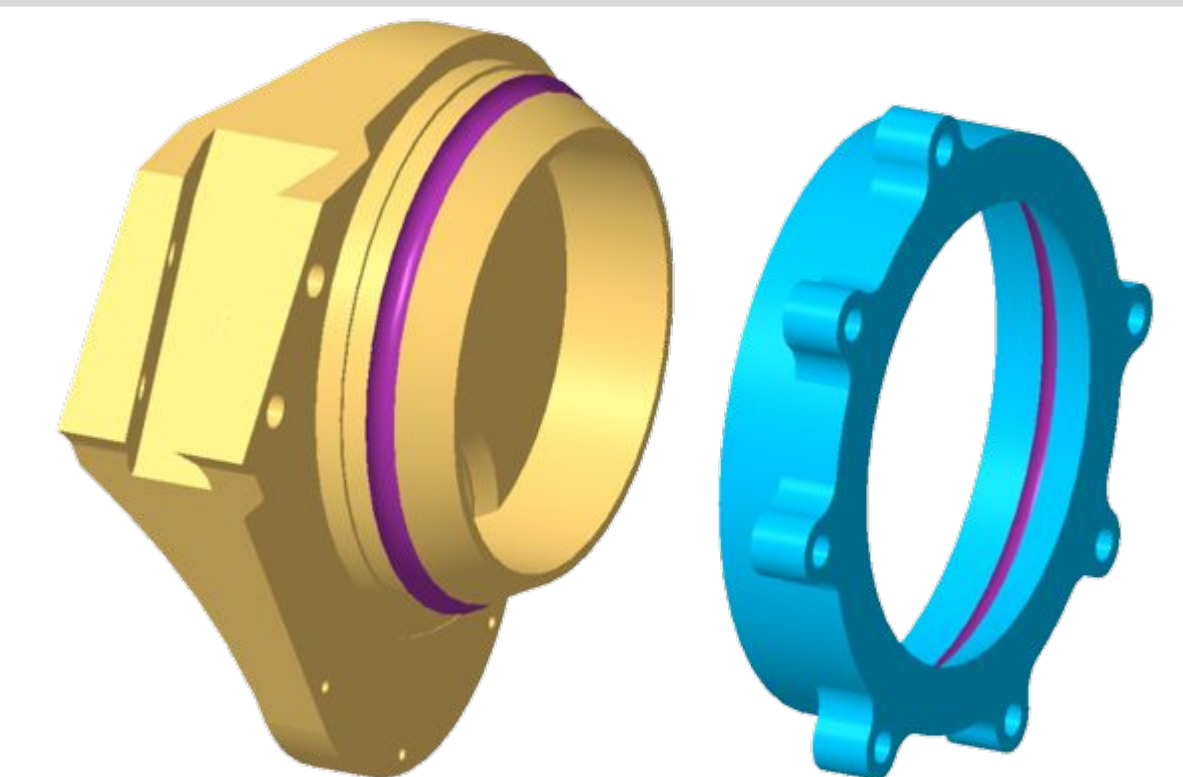
Bearings

- BB balls along a track
- Sandwich Fit
- Rolling Contact

Arm

- Cylindrical Shape
- Tapered

Final Gear Ratio 160:1



Bearing Tracks