



Team #6: Solar Powered Composter

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Objective

Design and manufacture a prototypical self-turning, solar powered composter which requires nominal human input and can withstand environmental exposure.

Basics of Composting

- Composting accelerates when bacteria are provided ideal conditions & nutrition:
- >5% Oxygen
- C:N Ratio (30:1)
- Conditions depend on materials and agitation.
- 40-60% Moisture
- 50-150 °F



Figure 1: Composting [1]

Engineering Specifications

- 30 Gallon Capacity
- 3W control circuitry
- 3 to 7 day intervals
- Two 12V, 35Ah batteries
- 100W Solar Panel

Safety

- Pinch points and electrical equipment covered
- All rotation is disabled if any door is not closed
- Warning labels indicate hazards
- Small openings covered to deter insects and rodents
- Corners & edges are rounded preventing user harm

Final Design

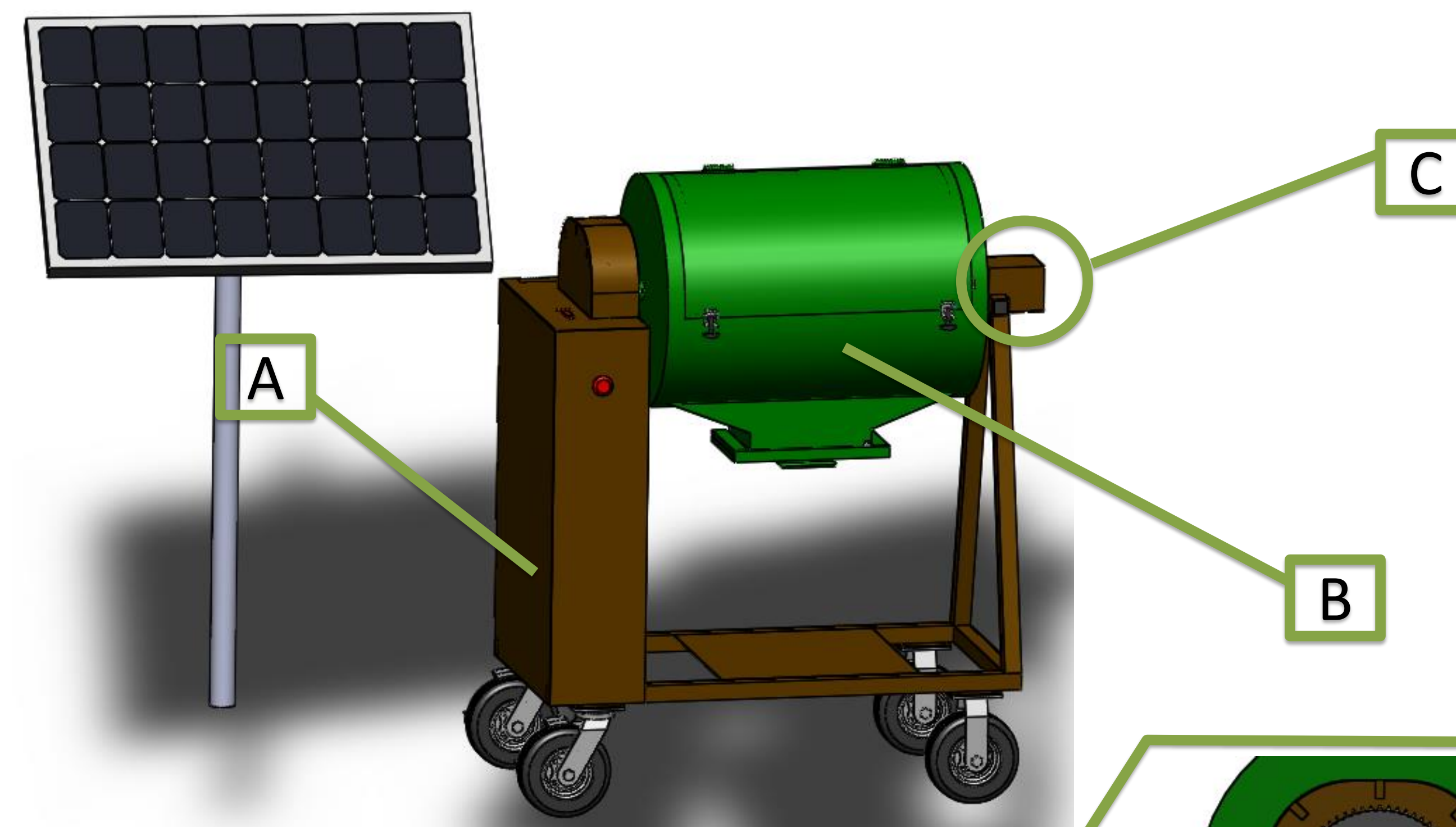


Figure 2: Solar Composter

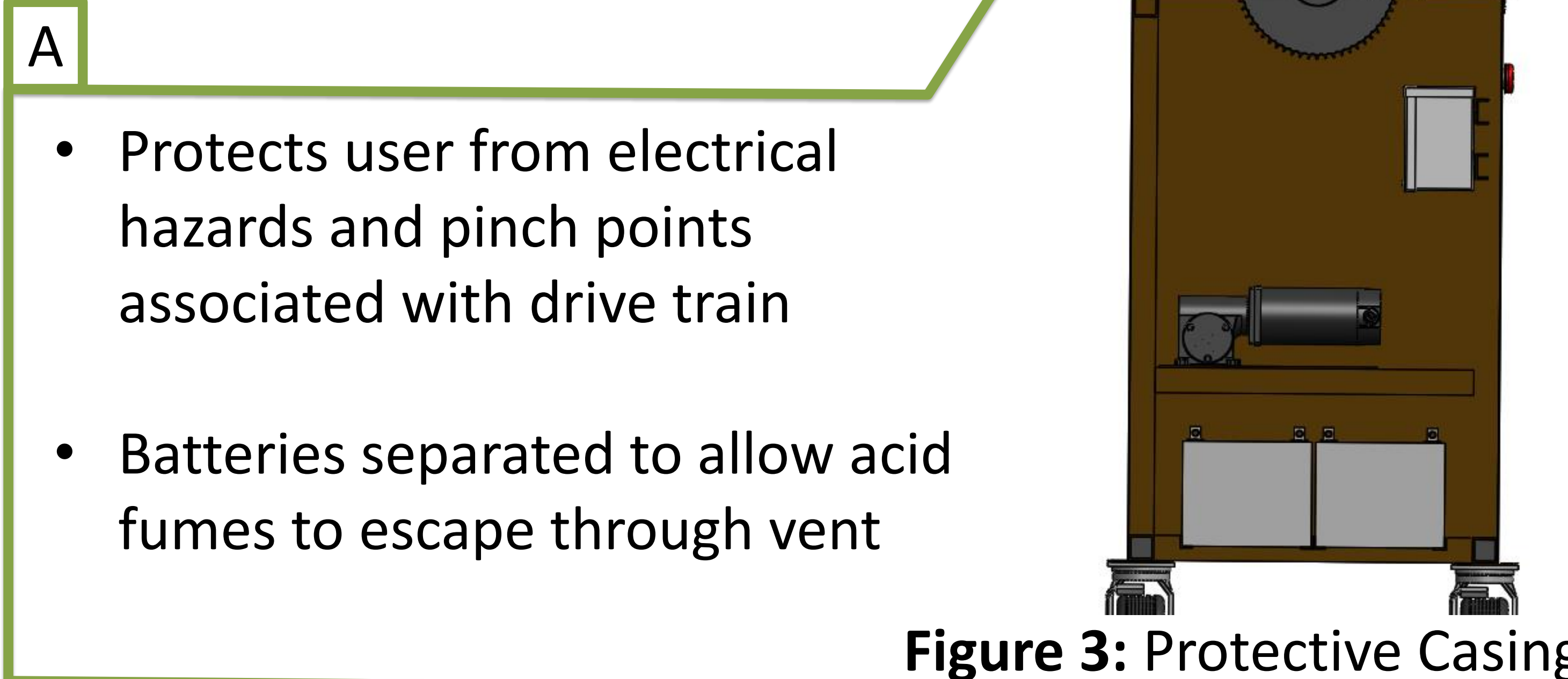


Figure 3: Protective Casing

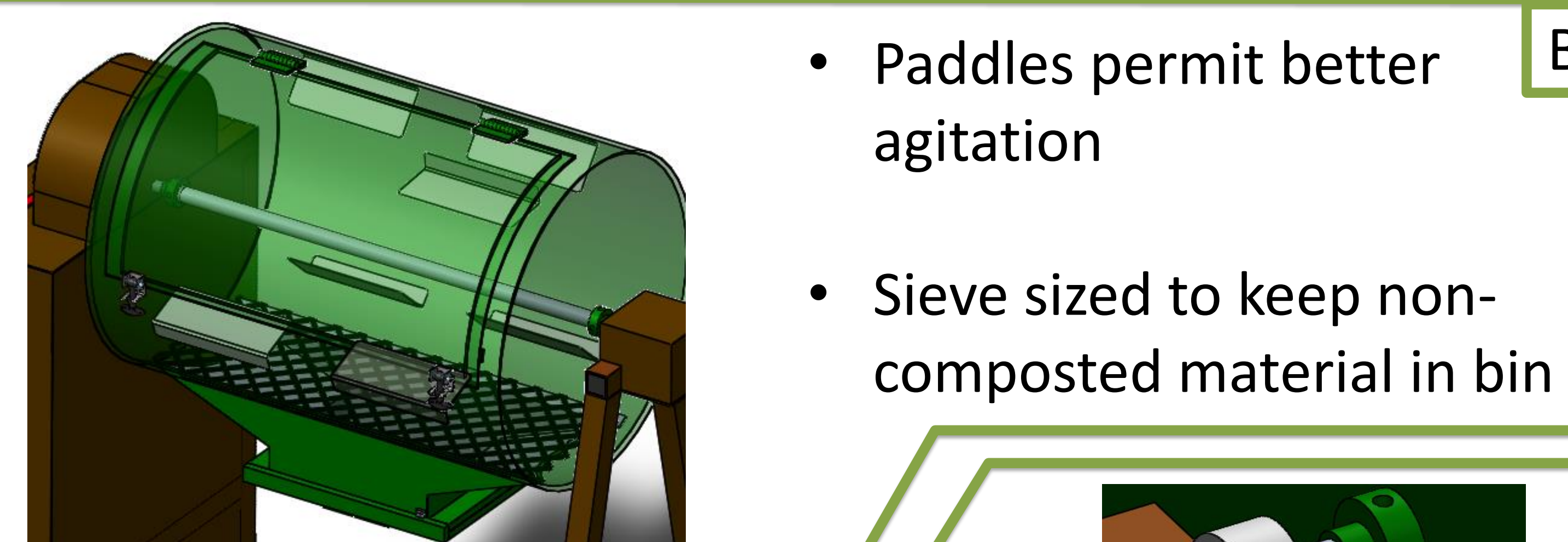


Figure 4: Bin Assembly



Figure 5: Slip Ring

- Protects user from electrical hazards and pinch points associated with drive train
- Batteries separated to allow acid fumes to escape through vent
- Paddles permit better agitation
- Sieve sized to keep non-composted material in bin
- Slip ring allows wires to be connected to door sensors

Testing

- Sieve size



Figure 6: Sieve Test Plates

- Solar charging/battery discharging
- Plastic weld strength – tensile

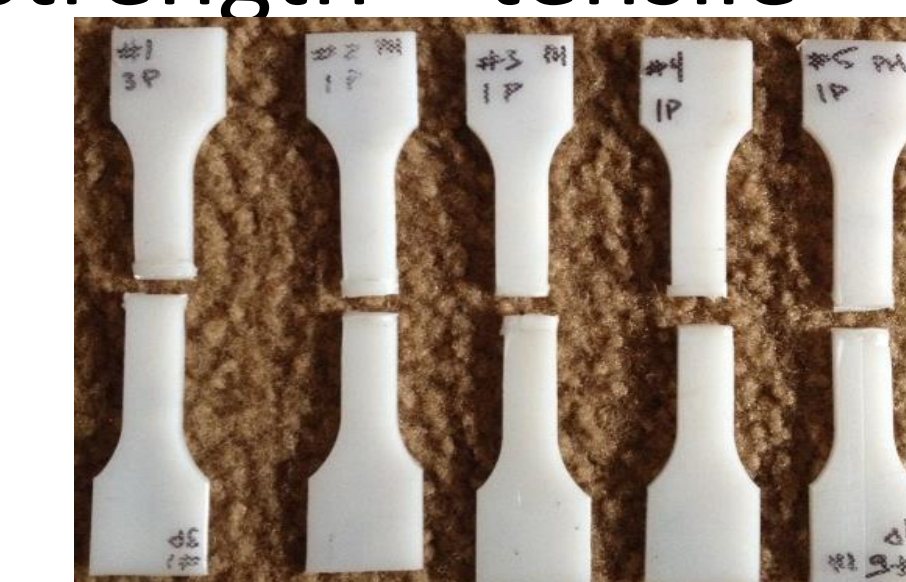
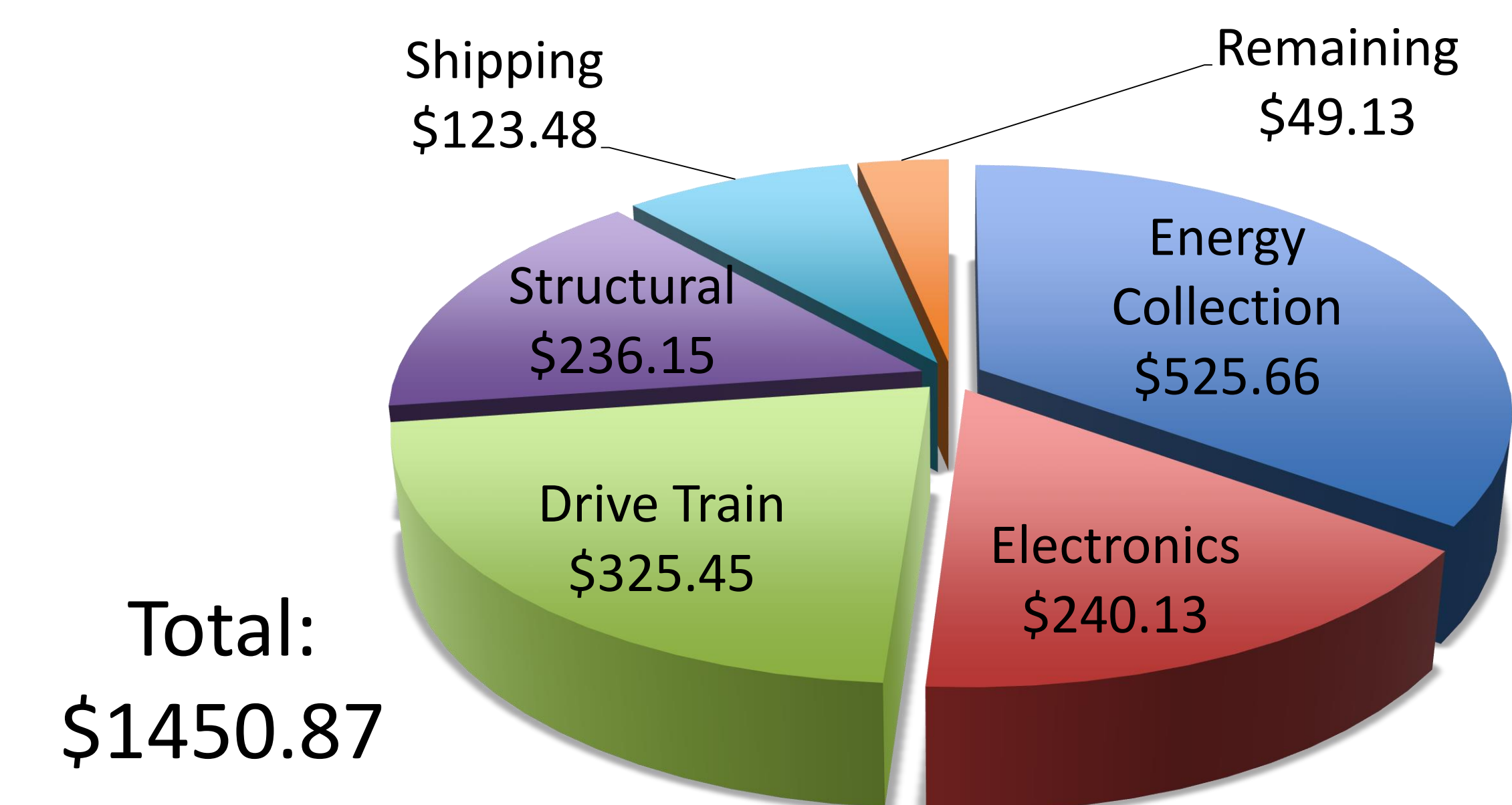


Figure 7: Plastic Weld Tensile Test Results

- Fatigue - simulate 3 years of operation
- Torque requirement

Budget



Donation Acknowledgements



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