

Thermal Orientation Test Bed

Advisors: John LaRue and Khalid Rafique

Background:

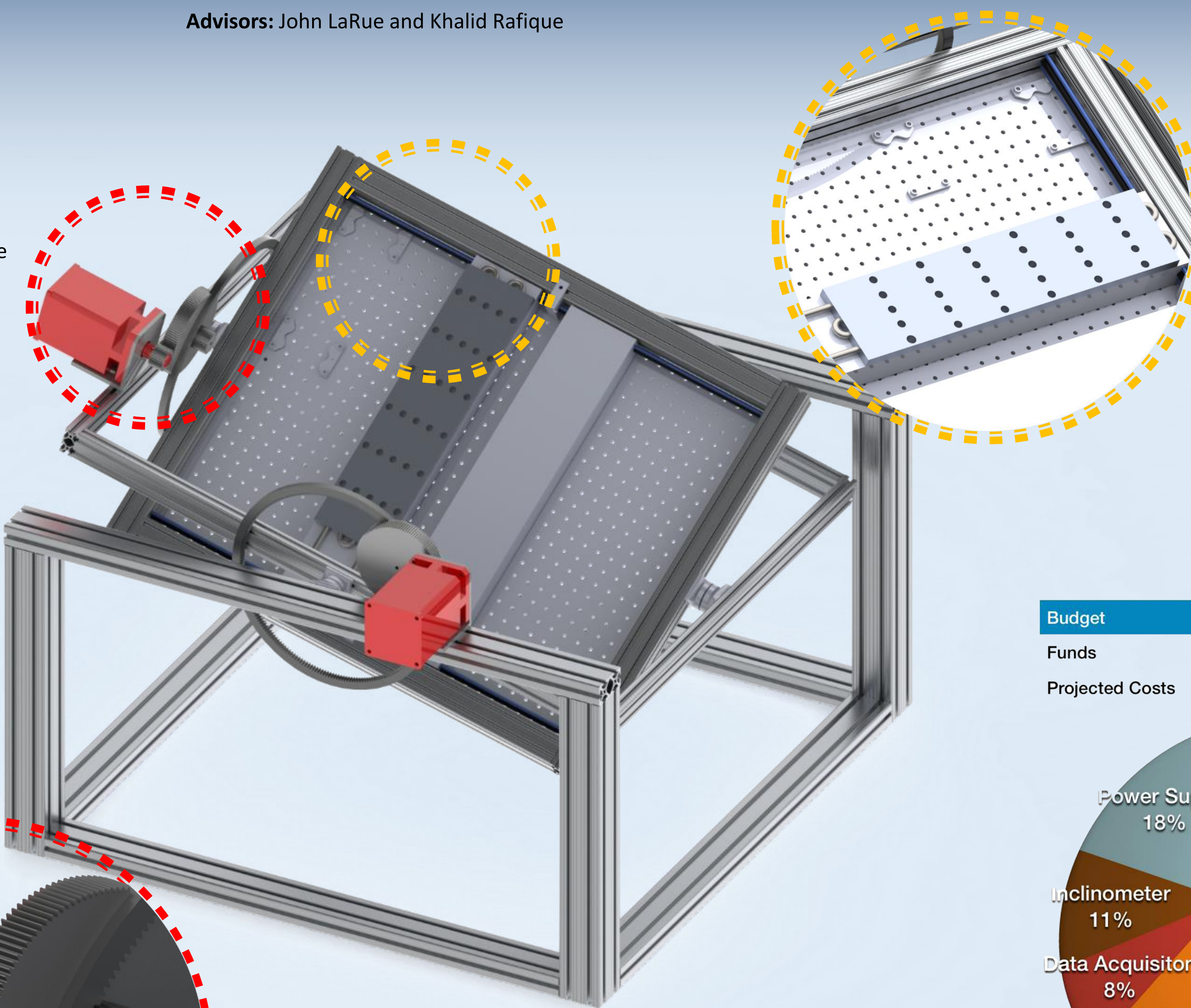
Thermal Orientation Test Bed is a joint-research project with Air Force Research Laboratory to design and manufacture an apparatus capable of mimicking conditions in space. The apparatus will test the thermal qualities of heat pipes and satellite components at specific orientations.

Objective:

- Research methods of making ground equipment vacuum compatible
- Accurately simulate torque applied on motor
- Machine gearboxes
- Create a comprehensive Graphic User Interface (GUI) that allows full control over the test table while displaying thermal data readouts
- Design new methods of mounting cold plates, heat pipes and heat sources with minimal heat loss

Requirements:

- **Environment:** Vacuum
- **Minimum Rotation About Primary Axis:** 180°
- **Minimum Rotation About Secondary Axis:** 90°
- **Orientation Accuracy:** 0.1°
- **Max Test Bed Size:** 39.5"x71"x40
- **Minimum Test Article Size:** 2"x6"x0.08"
- **Maximum Test Article Size:** 24"x24"x30"
- **Maximum Payload Weight:** 200lb



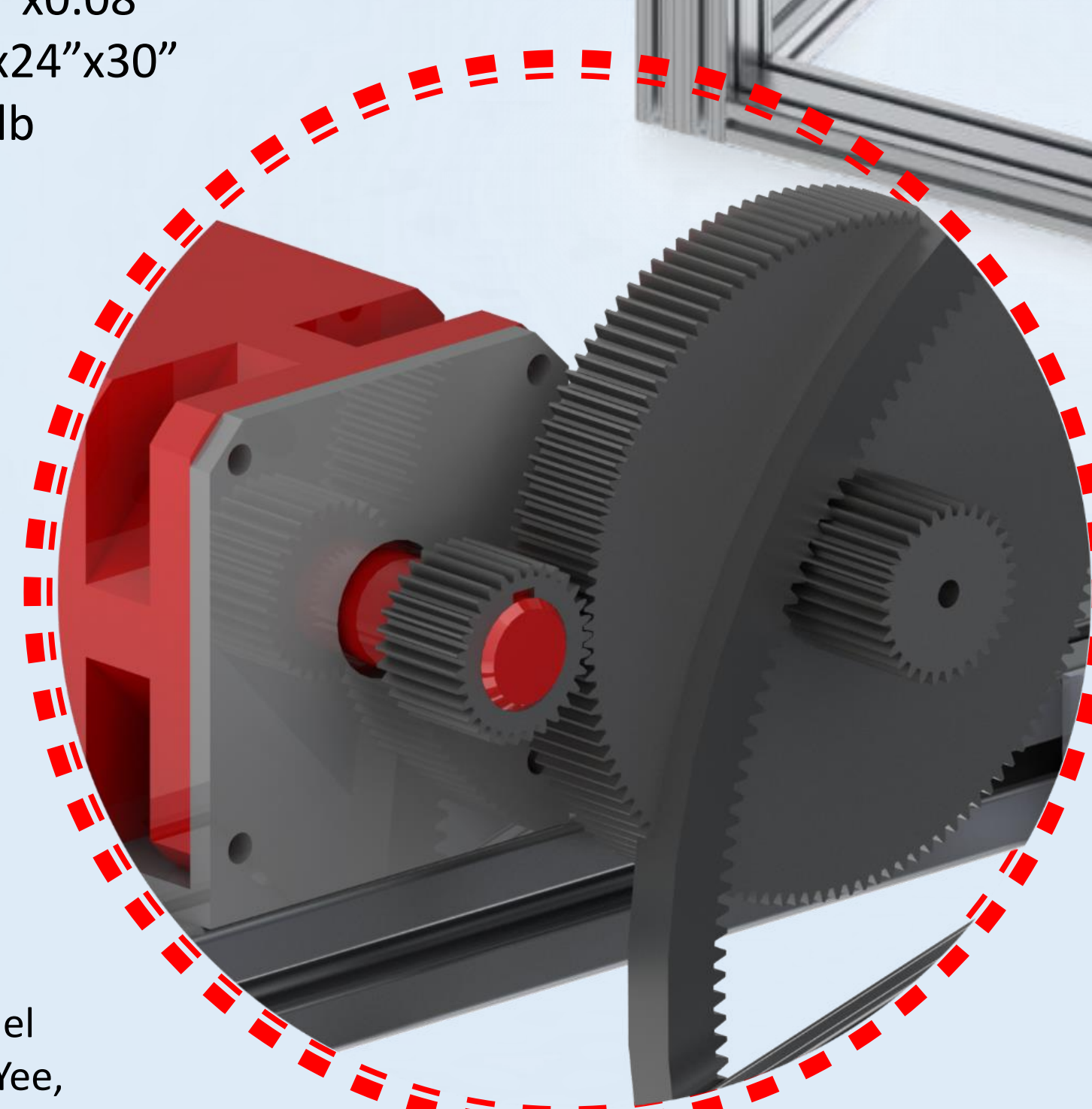
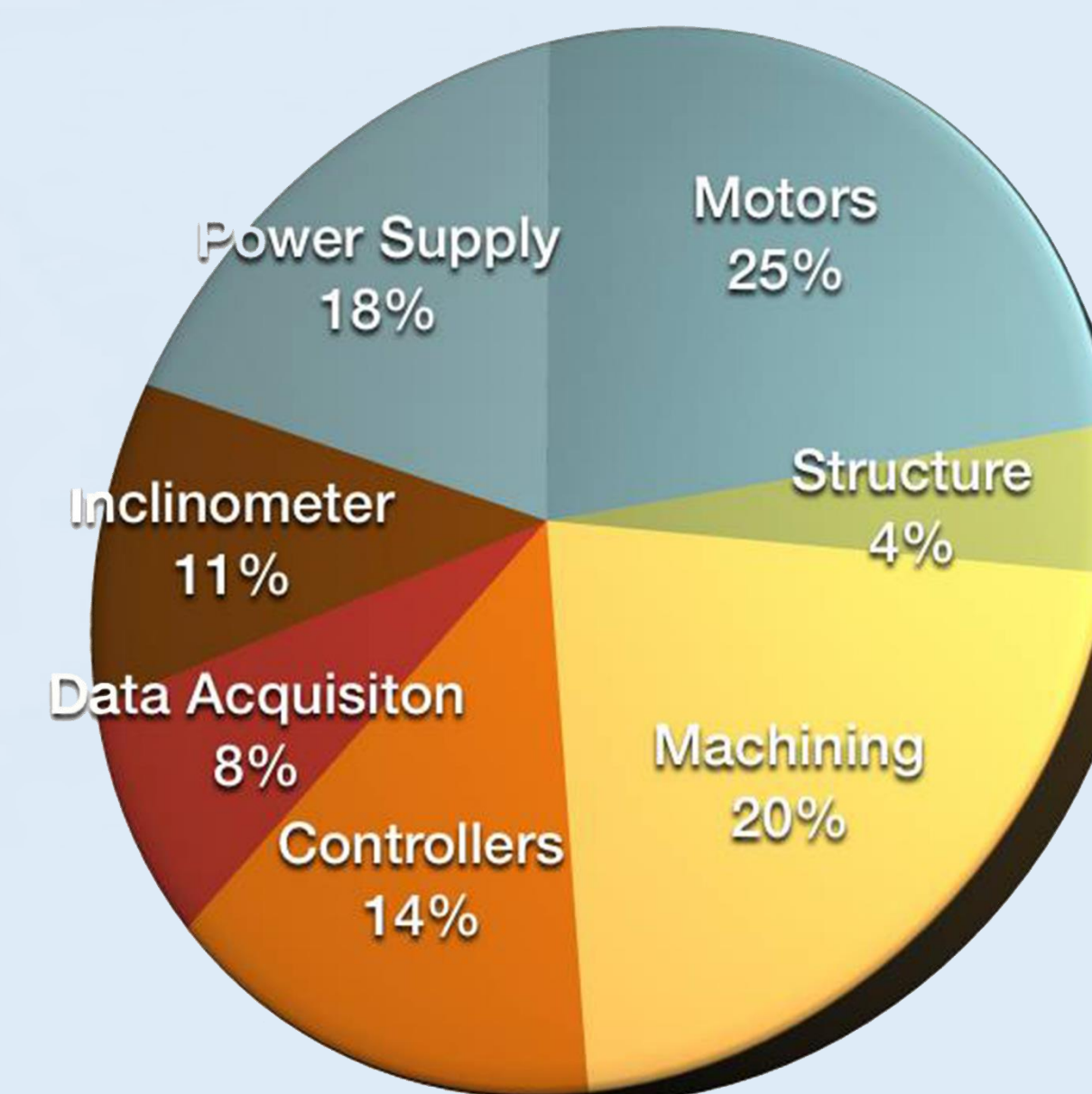
The mounting system is used to hold a heat pipe or other test article between a heat source and cold plate

Next Steps:

- Compile hardware items and orders
- Continue subsystem detail calculation
- Refine overall design
- Begin fabrication
- Ground testing and calibration

Budget

Funds	\$11,200
Projected Costs	\$14,875



The motors being used are Nema 34 vacuum compatible stepper motors. Vacuum compatible motors are significantly weaker than their standard motor counterparts requiring a custom gearbox to be manufactured.

Timeline:



Team Member List: Daniel King, Michael Rodriguez, Willis Zhang, Sonny Li, Eric Yee, Phillip Friedman, Tony Magana, Alanna Ho, Amirhessam Samada, Kamelia Asgari, Maral Abbasinik, Eric Huang

