

# Kwadropus Duster--Propulsion Rubric – PDR

Evaluator Name: \_\_\_\_\_

Judges:

Thank you for helping us today. Your input is critical to our appraisal of each project. Please use this evaluation form for each of the teams you meet today. Please indicate your assessment using the following numerical format.

4 – **Exceeds expectations.** Prototype\*, data, and testing indicate that the project is ready for implementation with little additional development. Design can be replicated by others and is ready for production.

3 – **Meets expectations.** Prototype\*, data, and testing demonstrate functionality. Additional development is still needed, but team has demonstrated that their prototype\* fulfills design objectives.

2 – **Approaches expectations.** Prototype\*, data, and testing are demonstrated but does not perform to design requirements. Completion of recommended design, or testing changes can bring prototype\* to desired performance requirements. Please provide a brief statement on your recommendations.

1 – **Does not meet expectations.** Team does not have prototype\*. Data on design and replication are missing. Team does not have testing data.

\*For purposes of these evaluations, prototype is a representation that may be constructed of materials (cardboard, wood, 3-D print, etc.) which demonstrate functionality, and convey the design concept that students have developed.

## Project Components

1. Name of Prototype, team members, teacher, and school  
Photos of Propulsion and drawings of what they planned  
All information is present on brochure, poster, PowerPoint. Yes/ No

Score

2. **Research** – It is evident that the team has researched microgravity from discussion  
They have done research on requirements for fulfilling the project objective. \_\_\_\_\_  
Check each that applies:
- Verbally able to describe the micro-gravity environment of a space station
  - Compared Commercial Off the Shelf related products or research
  - Contacted professional company or university working on similar work
  - Missing some details
  - does not understand background

3. **Prototype** – Team has a preliminary prototype of the Mobility Arm that shows how it will move. \_\_\_\_\_

Comments:

Fully functional      Mostly functional      Partially      minimal or no functionality

4. This initial prototype may be made of simple materials (cardboard, etc.) and represents any components that are required in final version.  
Circle all that apply for the prototype

Wood, metal, mixed materials, off the shelf parts, 3D printed parts

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5. Team describes planned updates for the next version of the prototype (circle one)  
Great ideas      sounds good      needs some work      going wrong direction

Comments:

6. **Design** – Team has **portfolio** drawings which clearly show how final version of Prototype will be constructed. \_\_\_\_\_

Comments:

Engineering binder (or power point)

- Solid works/Inventor/Fusion 360
- Tinker CAD
- Pencil drawing with generalize measurements
- No drawings

Please feel free to add any additional information that may be useful to the team. Thank you.

### Propulsion

The main objective of the propulsion is to push the kwadropus back onto the rack face when it has been pushed away from the wall or rack face either from being kicked or failing to attach itself and floating back.

If the response time to not being on a rack face is quick, the kwadropus will need little propulsion and little control to get back onto the rack face.

How quick can the kwadropus grab onto the rack face?

If the propulsion is too forceful of a push, the kwadropus may bounce off the rack face before it can grab on. It would be good if the propulsion is relatively gentle. It may require several

What if the kwadropus tumbles from a kick? This suggests there needs to be more than one 'thruster' or that the propulsion unit can change directions to be able to

What is the method of expelling air?

Is it easy to automate?

What is the method of refilling the supply of air

Is it easy to automate?

Does it refill quickly?

Does it refill from the same location it exhausts from or a different inlet?