# Cargo Glider 2022-2023

Jeanette Espino

Imperial Valley MESA

# Todays Training

1. Competition Objective
2. Rule changes 21/22 vs 22/23
3. Competition Video
4. Curriculum
5. Building a SImple Gilder
6. Glider Concepts
7. Questions
8. Survey

# Competition Objective

Middle School: 6th, 7th-8th

Students will design and construct a glider with a payload of 2 ping pong balls that, when launched , flies through the air, goes over an obstacle and lands the farthest (longest distance).

High School: 9th-10th, 11th-12th

Students will design and construct a glider with a payload of 4 ping pong balls that, when launched, flies through the air, goes over an obstacle and lands on a target (accuracy).

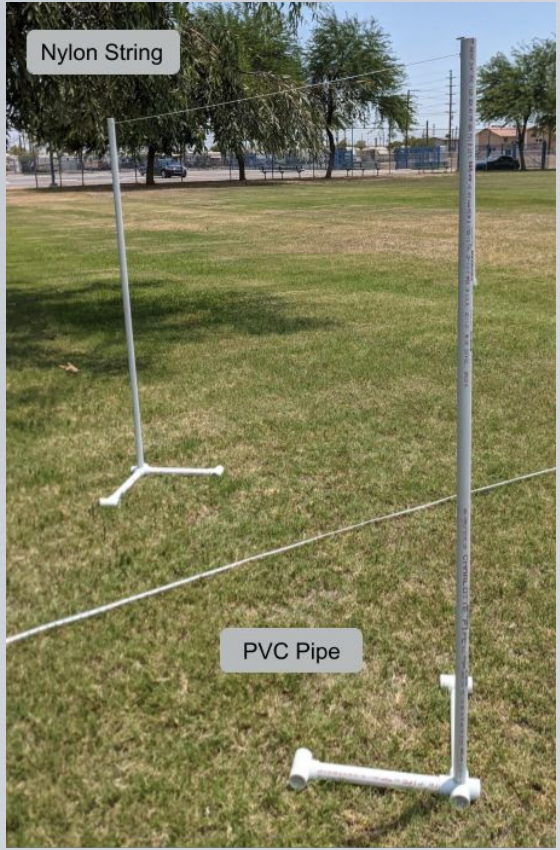
Engineering Lab Book due with this project.

# Materials

Any materials are allowed.
Exceptions:

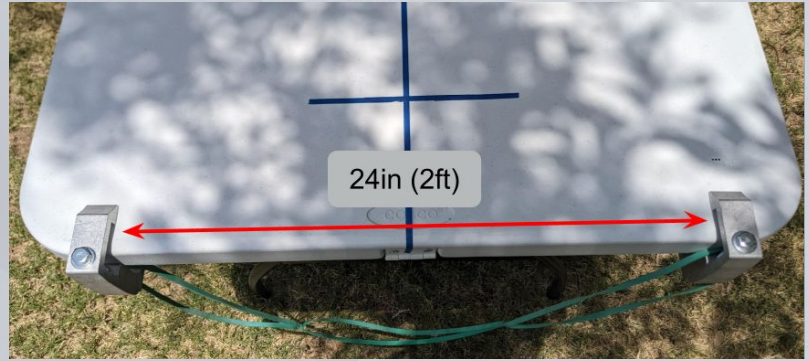
- Hazardous materials
- Remote control devices of any kind
- Additional power sources (i.e. thrust, lift or stored energy that assists dynamic flight)

# Obstacle




The glider MUST fly over the 5-foot obstacle and MUST stay within the 10-foot width of the obstacle. For gliders that go outside this boundary, the launch is considered a MISTRIAL

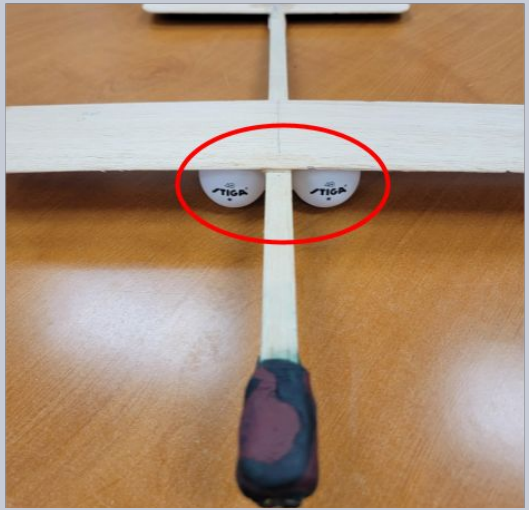
# Launcher




# Cargo Glider Payload- One Star Rated

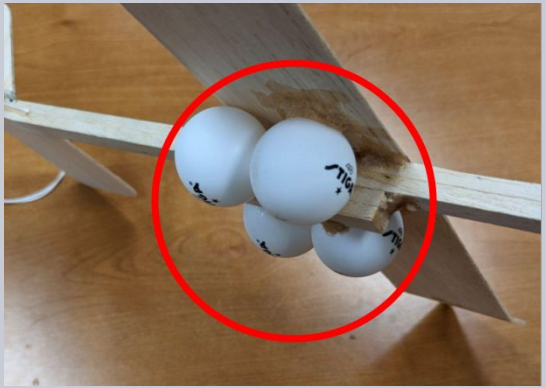
6th, 7th-8th

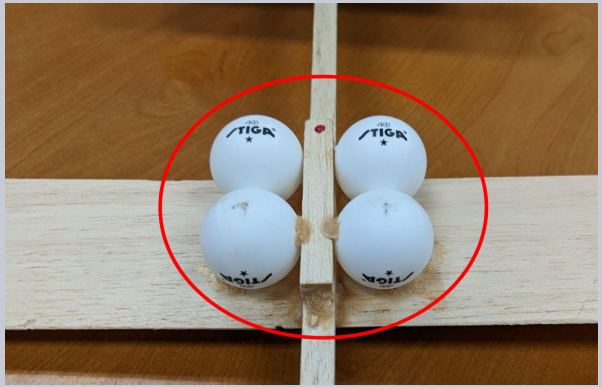
2 Ping Pong Balls



9th-10, 11th-12th

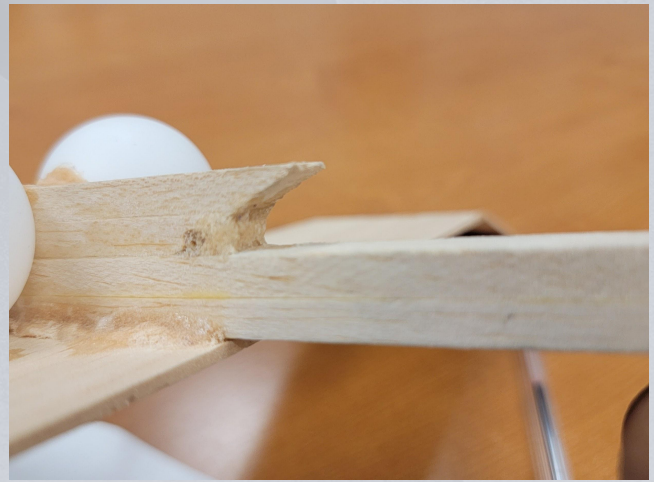
4 Ping Pong Balls






Teams cannot change the shape of the ping pong ball in anyway, that includes crushing, cutting, drilling, etc.  Balls may be glued.

# Launching Hook

The glider MUST contain an easily identifiable, prominent feature on the fuselage that adapts and connects with the launcher adapter. The adaptation MUST be identified by a red dot.

# Changes to the rules

1. The distance from the table to the obstacle has increased from 11.5ft to 17ft
2. High School: Target has changed from 23ft to 34ft from the table to compensate the distance from the obstacle.
3. The number of ping pong balls has decreased.
   a. High School: 4

   b. Middle School: 2

4. Support for the folding table has been made to prevent it from moving while launching.
5. Rubber Band usage has changed to better reflect the rubber band's limit
   a. 16 to 70 with 15 stretches before testing.

6. Adapter to the rubber band has been made to ease launching of the glider.

# Obstacle Distance Change

1. Obstacle Distance has changed from 11.5 ft to 17ft
   Most planes did not go over the obstacle at the distance of 11.5ft due to the glider having a small angle of incidence. Pushing the obstacle back will make it easier for the gliders to go over

# Support for Launcher

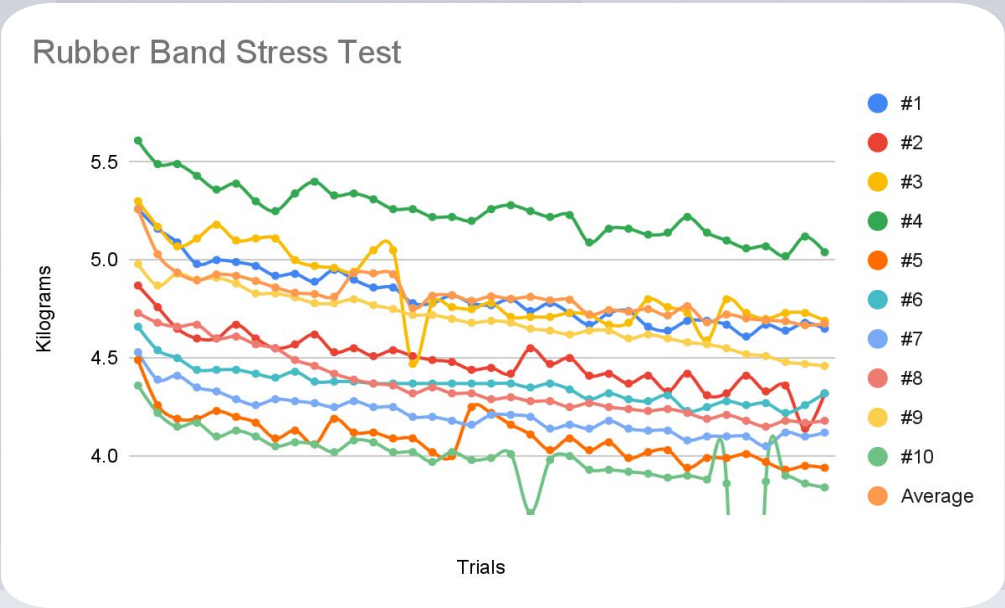
# Support for Launcher

1. Hard Surface Alternative

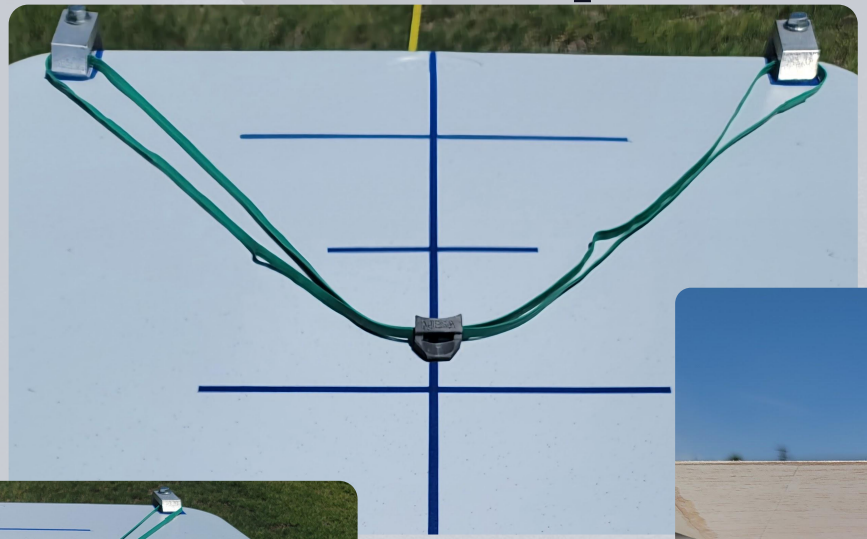
# Rubber Band Usage

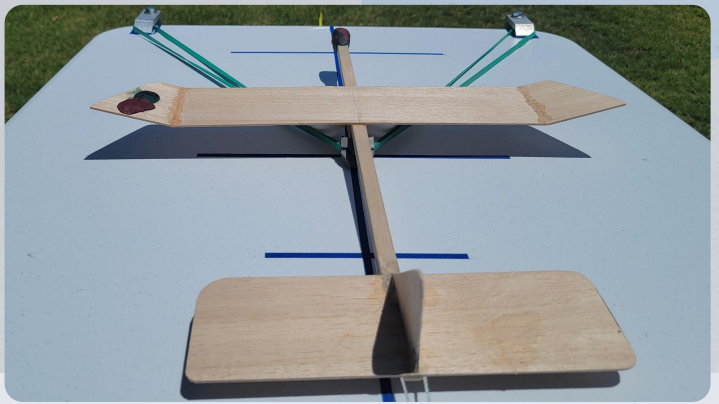
After testing the rubber band, we concluded that we can increase the original 16 pulls(21-22 rules to replace rubber band) up to 70 pulls with an initial 15 pulls before use.

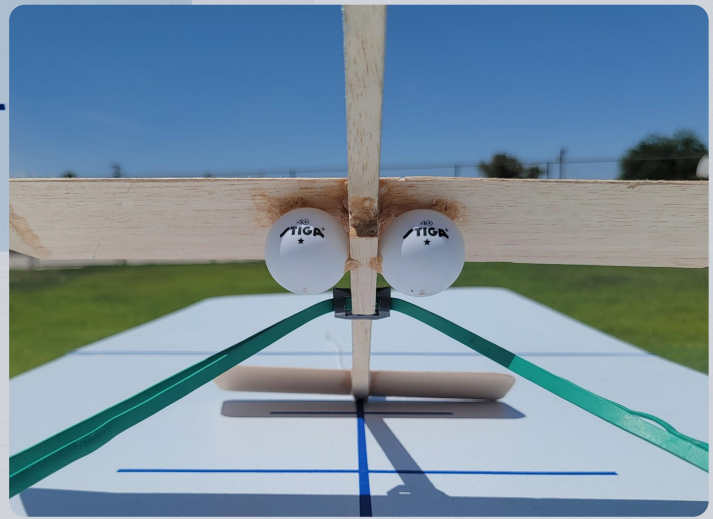
We tested 10 rubber bands in the launching set up with a pull scale. Every test was conducted on a brand new rubber band and as depicted on the graph almost every rubber band plateaus after 15 pulls giving us up to 70 launches before the rubber band needs to be changed.



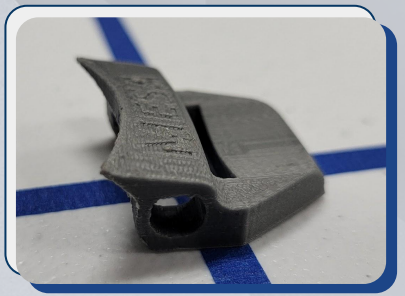
# 3-D Printed Launcher Adapter



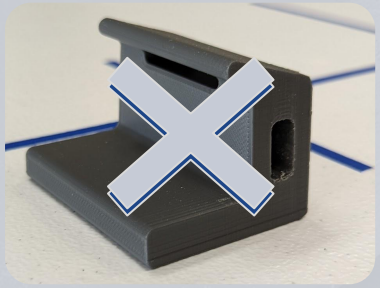


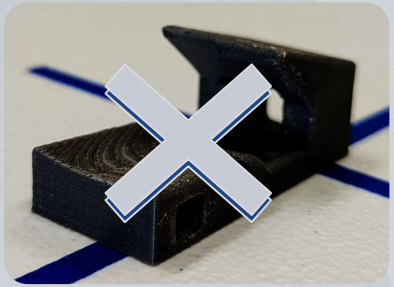


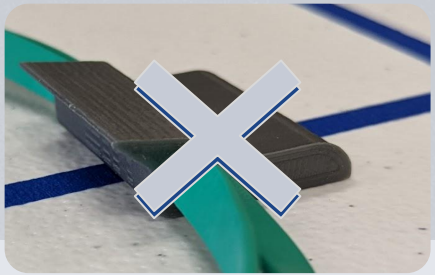
# Launcher Adapter

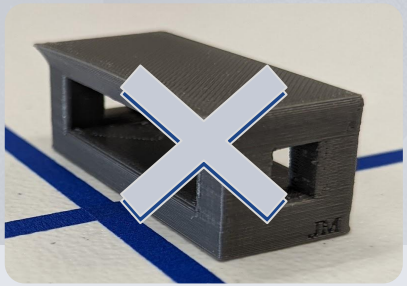


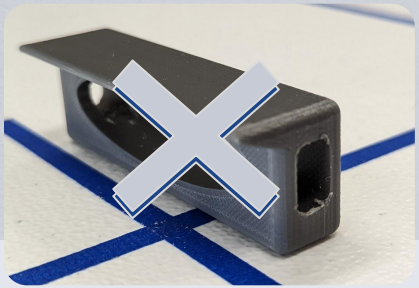
Final Product

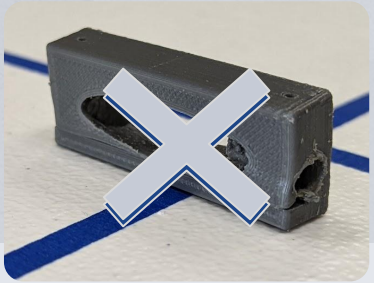




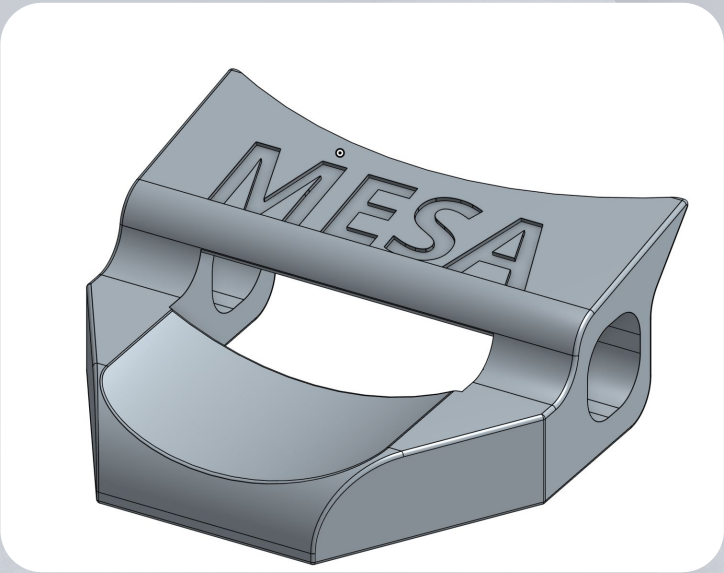


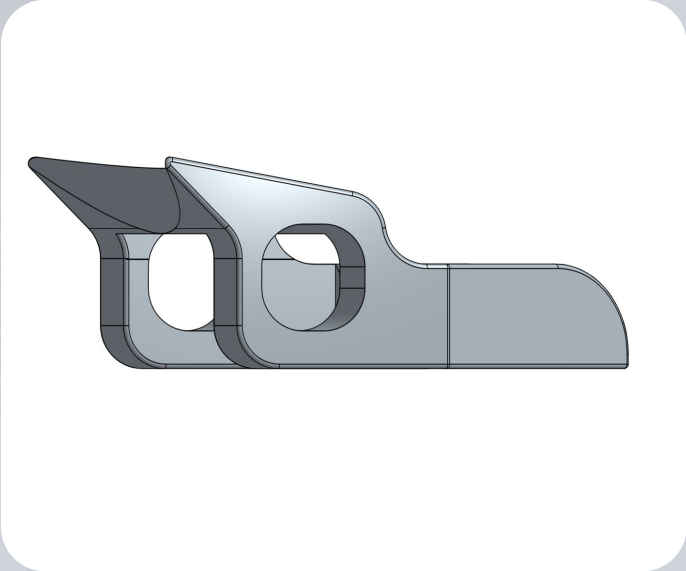






# .STL File Available to 3D Print



# Competition Video

https://youtu.be/OIkVFe5kBSQ

# Curriculum

https://cole2.uconline.edu/courses/1410210

# How to build a Simple Glider

- https://youtu.be/UQlyWn_BM6k

# Glider Concepts

https://youtu.be/WOiKJzRIK7s

# Resources

- Aerodynamic Forces
- Glide Angle
- Inclination Effects on Lift
- Shape Effects on Lift
- Aerodynamics Index
- Re- Living the Wright Way

# Questions

Jeanette Espino

jespino@sdsu.edu

# Thank you!

Please take the Survey.....

https://forms.gle/aLxGAejNtF9jikqc9

# Closing Ceremony is next: Must be present to win raffle prizes!!