

Helicopters

Division B/C

Georgia Tech Event Workshop Series
2024-25



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The Rules Sheet

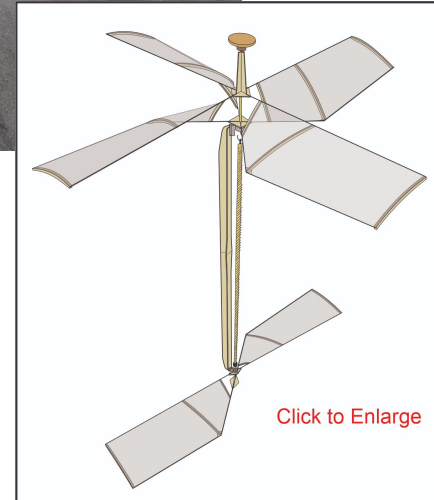
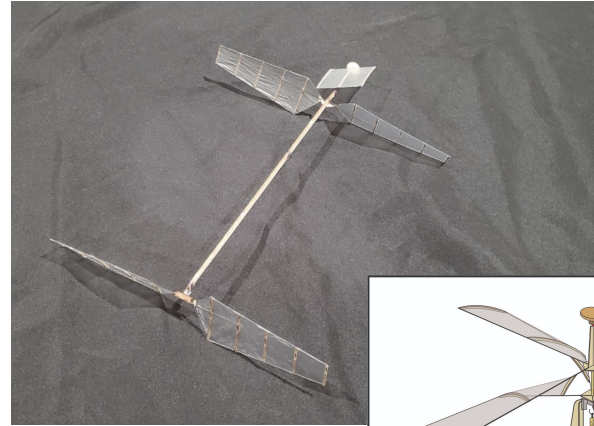
- Build parameters
 - Fit in a 32 cm x 24 cm x 47 cm box
 - Up to 3 fixed pitch rotors
 - Mass must be 4 g or more (excluding rubber motor)
 - Rubber motors can be of any mass or length
- Flight Log: 6 parameters
 - Required: Motor size, number of turns or torque of motor before launch, flight time
 - Examples of more parameters: number of winds remaining on motor, propeller pitch, estimated peak flight altitude, etc.
- Competition
 - 10 minute flight period
 - 2 official flights
 - As many unofficial flights as you want



DIFFICULT TOPICS

Topic 1: Getting Started

- What design should I choose?
- What materials are good for a helicopter?
 - The lightest (least dense) balsa wood
 - The thinnest plastic bags (or even mylar)
 - You want to save weight!!!
- Where do I get the rubber for the motor?
 - Many suppliers (linked later in the presentation)

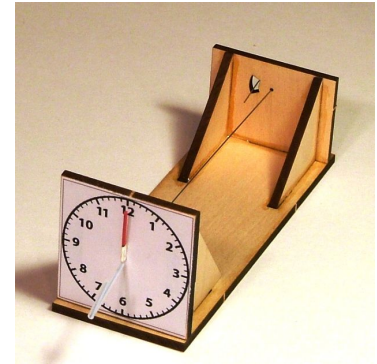
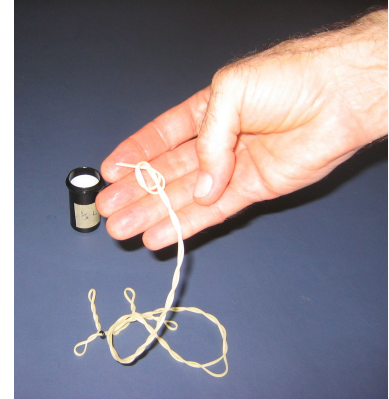


Topic 2: Testing

- Where should I test?
 - Any open room that has minimal obstructions on the ceiling (ideally a flat ceiling if possible)
 - Height of the room does not matter as much for this event
- What should I expect out of my first tests?
 - Unstable flights
 - You are just trying to see if your helicopter can even get airborne
- What data should I collect?
 - Weight of the motor [required]
 - Length of the motor (rubber band)
 - How many winds you put into the motor/torque [required]
 - Flight time [required]
 - Any interesting characteristics of the flight (did the helicopter drift in one direction, did the helicopter vibrate, etc.)

Topic 3: Optimization

- How do I use the data I collect to improve my flight times?
 - Check if changing a characteristic of the
- Changing the rubber band I use?
 - New rubber band thickness
 - Thicker bands will release their energy must faster, so they may not be good for long flight times
 - Changing the length of the motor?
 - Longer bands can hold more energy overall, so we could get longer flight times, but there is a breaking point where the longer rubber band adds more weight to the helicopter than its worth



Tips from a Veteran

- TEST, TEST, TEST!!!!
- Don't be afraid to test at home
- Things break, just fix them
 - Look for any changes in flight characteristics before and after the repair
- Play with the rubber motor sizes
 - Including thickness and length of the rubber band
- Make sure to use some sort of lubricant on the rubber band
 - Armorall (car seat cleaner)
 - Helps with the rubber band releasing as much energy as possible before it is out of winds



Additional Resources

<https://freedomflightmodels.com/kits.php>

<https://jhaerospace.com/product/tornado2025/>

<https://www.faimodelsupply.com/>

<https://www.lasercutplanes.com/product/dirt-cheap-torque-meter/>

Additional Resources

<https://www.endlesslift.com/making-a-rubber-motor/>

THANKS!

