

Energy storage mechanism

Concept – See next page for helpful graphics

Materials - Materials you'll get:

08 Qty	93897A263	Shoulder Screws; 1/2" Shoulder Length (#10)
08 Qty	93897A279	Shoulder Screws 3/4" Shoulder Length (#10)
08 Qty	94812A500	Nylon Hex Nut (#10)
12 Qty	90295A420	Nylon Washer (#10)
02 Qty	8586K171	ABS Sheet 12" x 12" x 1/4", Black

Fabrication – You may (don't have to) use the waterjet to fabricate parts and other mount/launcher hardware. You will need a course account to charge for this, you may obtain this from the TA (Dan) once he has checked over your design and he has made sure there is little possibility of running into a problem during water jetting.

Deliverables - What you must provide on the due date:

- (a) Hand in the device **functioning without problems**.
- (b) 1 page (front/back, 12pt font, 1" margins) that covers:
 - (i) functional requirements
 - (ii) how you modeled performance
 - (iii) how you experimentally verified performance
 - (iv) how good your data is
 - (v) how well your model worked
 - (vi) what you learned/anything interesting

If you are missing info you think is important, ask Prof. Culpepper and/or research reasonable info.

Charge - You are charged with engineering and fabricating a bistable mechanism-based launcher that:

- (i) can repeatedly be used to launch a pencil
- (ii) is integrated into a 'cross bow' launcher you design
- (iii) launches non-sharpened pencils with eraser first
- (iv) maximizes the horizontal range
- (v) minimizes spread in 5 successive strikes

You will compete with other groups on items (iv) and (v).

The trajectory of the pencil must clear a bar that is 1.5m tall. Once you launch a projectile, you will not be allowed to adjust trajectory (must have repeatability). You have 3 minutes to make 5 launches. Repeatability on landing strike with these launches must be better than +/- 200mm for a passing grade.

Your pencils may be fitted with fins (see next page) that enable them to travel as an 'arrow' with a trajectory you set through angling and positioning your launcher. The launcher will fire from the floor and you can trigger it, but you can not hold it when it fires.

Do not copy the design on the next page, though you may take inspiration from it. The mechanism must be actuated & triggered manually.

Friction and energy loss will be a key issue to address. Make sure you model this so that you have a good idea of how your design will work... and leave time to experimentally verify function.

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