

Ping Pong Ball Launcher Project

Goal

Design, Construct, and Test a Mousetrap Powered Ping Pong Ball Launcher.

Design Specifications

- The launcher shall be able to be adjusted so that different targets distances can be obtained. This must be done in two ways:
 - The launcher must have the ability to cock the mousetrap to at least two different positions that can be maintained without human intervention once it is set.
 - The launcher shall have an adjustable launch angle that can be maintained without human intervention once it is set. (Note: All launch angles during competition launching must be at or above the horizontal.)
- The launcher a “trigger” mechanism. It is not okay to simply pull back on the mousetrap and release.
- The ping pong ball must be launched through a section of the PVC pipe.
- The “hammer” that strikes the ping pong ball must have a large enough surface area to prevent damaging the ball. No part of the mousetrap may directly contact the ball.
- Markings on the device or measuring instruments may be incorporated into the body of the device for aiming purposes.
- No instruments that are not part of the launcher may be used to adjust the device for competition launching.
- Each team will be allowed to use calibration data from previous testing during the competition launching.

Construction Constraints

- 12 inches of PVC pipe
- One mousetrap
- Any other hardware, provided however, that the only source of energy is the spring on the single mousetrap and the only barrel mechanism consist of PVC pipe.

Additional Project Requirements

- You must determine the spring constant of the mousetrap. Force sensors may be used in conjunction with this inquiry.

Project Deliverables

- Fully functioning Mousetrap-Powered Ping Pong Ball Launcher – Each group will demonstrate their launcher on **Thursday, May 10th** ...no exceptions!
- **Each student** will turn in an **original, well-formatted Excel workbook** by the end of the day on **Wednesday, May 9th** ...no exceptions! As of the publishing date of this document, the workbook should contain:
 - ~~Torque-angular displacement data for determining spring constant~~
 - ~~Graph used to determine spring constant~~
 - Data from launch trials showing launch range as a function of (1) launch angle and (2) spring position
 - Graph(s) showing launch range vs. launch angle – multiple graphs may be needed, given that you have multiple spring positions at each launch angle
 - Graph(s) showing launch range vs. spring position – multiple graphs may be needed given that you have multiple launch angles for each spring position
 - ~~Theoretical calculations from energy considerations~~

~~Check with D-Conn around May 2nd to see if any of the requirements for the Excel workbook have changed! See the modifications above!~~
- Each group will give a **summary presentation (May 15th & 16th)**. You are to adhere to the general guidelines we have discussed for technical presentations. The **PowerPoint file** for the presentation is due on **Monday, May 14th**. Additionally, this presentation should
 - Be 5-7 minutes in length
 - Clearly discuss the use of the Engineering Design Process
- **A test on Simple Machines and Energy will be given on Friday, May 11th**. In preparation for the test, students are expected to
 - Complete the **assignments** specified on the EA2 website
 - Be able to discuss your Ping Pong Ball Launcher from the perspective of work and energy. Questions to consider include:
 - What energy conversions took place?
 - Was energy conserved? Why or why not? How do your test results support your answer?