

Engineering Design Project #2

EGN 3000 – Foundations of Engineering (Fall 2003) Sections 005, 010, and 011 (Christensen)

Objectives: Your objectives are two-fold, they are: 1) To build a vehicle that will travel as great a distance as possible powered only by a standard Victor-brand mousetrap, and 2) to properly document your design and implementation in an engineering report.

General rules:

- 1) You are to undertake this project in groups of three to four students. Group assignments will be made in class.
- 2) All parts for the vehicle must be either free (i.e., free for anyone, not just you) or purchased at Home Depot for a budget of less than \$15.00. String, tape, glue, and lubricant (e.g., graphite or WD-40) are exempt. A mouse trap will be given to by your instructor. You must submit all receipts with your final deliverables.

Vehicle-specific rules:

- 1) The vehicle may not leave any parts behind (e.g., launching a golf ball is not allowed).
- 2) The vehicles must be self-starting. No pushing is allowed.
- 3) The vehicle must steer itself. No direction adjustments allowed once the car is moving.

Contest-specific rules

- 1) The contest is run for distance. Each vehicle will be given three runs and the longest distance will be counted.
- 2) The contest will be run on the south aisle of the second floor of ENB. If a vehicle runs into a wall, it cannot be touched. Dealing with the “wall effect” may be part of your vehicle design.
- 3) The contest will be held during the class period of the week of November 17th.

Deliverables: Your final deliverables include your vehicle (to be returned) and an engineering report. The report must contain:

- 1) A coversheet with the names of all team members
- 2) A description of your design including design drawings (“blueprints”).
- 3) A discussion of design trade-offs. Why did you choose the design you did?
- 4) Instructions on how to implement your vehicle. This should be written at a level so someone else (i.e., not in your group) could build a vehicle to your design.
- 5) Photographs of a top, bottom, side, front, and back views of your implemented vehicle.
- 6) A discussion of improvements that could be made to your vehicle and why these improvements would result in a greater distance traveled.
- 7) An itemized list of expenses and copies of all receipts for materials purchased.
- 8) All deliverables are due in class on the week of November 17th.

Grading: Your grade is based on the distance your car travels and the quality of your report. Distance will be graded as follows (based on best of three runs):

- Less than 2 feet – overall grade no higher than C
- Greater than 2 feet and less than 10 feet – overall grade no higher than B

The report will be graded as follows

- Professional appearance (neatness) – 10%
- Organization – 20%
- Completeness – 15%
- Discussion of design trade-offs – 20%
- Discussion of possible improvements – 20%
- Demonstration that basic engineering concepts are understood – 15%

Hints and ideas:

- The keys to a winning mouse trap car are 1) efficient transfer of energy from mouse trap to wheels, 2) reducing friction, and 3) steering. If your wheels spin, you are losing energy. Weight contributes to friction. If your vehicle does not travel in a straight line and/or your vehicle touches the walls you are losing energy.
- On the web you will find lots of ideas for mouse trap cars. You should learn from these resources, but remember your constraint – you are limited to parts that are free and/or available from Home Depot only with a budget limit of \$15.00.
- Use available resources... talk to your instructor to get hints and ideas.

Prize: For each section, the group that has the longest distance vehicle will win a gift certificate to a Chili's Restaurant.