Project Introduction (i)

This project will serve as a challenging and interesting experience in preparation for your future engineering coursework. You will need to apply and document your fundamental engineering skills learned throughout the semester to produce a quality solution to the problem statement. In this project you will witness each of the stages in engineering design from the initial concept formation to the final product and its presentation. This project will help illustrate the question “what is engineering?” and hopefully will be very enjoyable in the process.

This project will consist of two main sections: a competition, and a written report. The competition and the written report will each count as fifty percent of the project grade.

Project Specifics (ii)

For this project you will work with other students in designated teams. Your objective will be to design a system for transporting a standard ping-pong ball to a target under specific conditions.

A standard ping-pong ball will be placed inside of a 1-foot diameter helium filled latex balloon. The balloon will then be tied to a 3-foot string that is taped to the floor. This allows for the balloon to float at a 3-foot height above the ground. The goal of the project is to design a system that will transport the ball into a cylindrical drum that is 2-feet high with a diameter of 3-feet. The necessary transport system must consist of two separate but cooperative elements, A and B.

Element A
The cylindrical drum will be placed at a direct distance of 15 feet from a starting line, which will be marked on the floor. The fifteen foot distance will be measured from the center of the drum, to the starting line. Only the ball is allowed past the starting line. No other objects may pass over the starting line, or the project is disqualified. In order to transport the ball from the starting line to the drum, a device with the following specifications must be used:

- The device must be entirely concealed within a cube of side length one foot.
- The cube must be exactly 1 cubic foot, no larger or smaller dimensions are acceptable.
- The top of the cube must have a circular hole of diameter three inches
- An additional side of the cube must have a circular hole of diameter three inches
- Any material may be used in the construction of the cube, and its contents

In addition to these constraints, the device must be placed on the floor within a 2 foot by 2 foot marked region, and may not leave this region for any reason. No objects other than the ball may ever contact the device, and no object other that the ball may enter or leave the device. This includes radio waves, or any other foreign matter. The ball must enter the top hole in the device (the input) and exit the device from the hole on of the sides (the output). The ball must also stay inside of the device for at least 5 seconds, and no more than 30 seconds. The device and its contents must exist in a neutral state before the ball enters.

Element B
The ping pong ball will be initially located inside of the balloon as mentioned. The goal of element B will be to transport the ball to the box (Element A). Element B may consist of any material or of any working design. However, no tangible material may extend outside of the project region which will
be 10 feet by 10 feet square. The enclosed area will be surrounded by 2x4 panels of wood. Team members may not enter the project area at any time.

**Competition (20%)**

Teams will be randomly selected for the order of participation in the competition. The team members will align their devices with the starting position as indicated by the instructor. When the team has positioned its system, the instructor will give the signal to begin. Each team will have three attempts to put the ball inside of the target drum. An attempt is counted when the ball enters the box, or a time limit of 5 minutes, whichever comes first. A score of 100% is awarded for this section if the ball enters the drum. If the ball does not enter the drum, a fraction of the score will be awarded based on performance. This score is left to the direct and sole discretion of the instructor. If the ball exits the project area, it will be replaced at the location closest to its exit with no penalty. An attempt is disqualified if the ball exits the project area twice within a single attempt.

**Written Report (40%)**

For this project each team will need to submit a written report accounting for all of the stages in the creation of the device. Guidelines for the report will be distributed in class.

**Oral Report (40%)**

Each team will make an 8 minute PowerPoint presentation. Students are strongly encouraged to use the slide format that will be distributed in class rather than the Microsoft default formats. Detailed requirements for the oral presentation will be distributed in class.

**Project Due Dates**

- The Competition will be held Monday, April 25, 2005 7:00PM
- The Written Report is due anytime before April 29, 2005 5:00PM
- Oral Reports will be presented on April 22 from 2-4pm