

Group Design Project: ASEE Model Design Competition
Spring 2009

Reference: 2009 ASEE Model Design Competition Official Rules – available at:
<http://www.tcc.edu/faculty/webpages/PGordy/ASEE/ASEE2009/index.html>

The group design project will involve researching, designing, building, and testing a design that could be entered into the 2009 ASEE Model Design Competition. Detailed modeling of the design will be performed using Inventor and some basic analysis may be performed using MatLab.

Teams

The class will initially be divided into teams (3-5 students per team) to work on separate designs. Depending on the results produced by each team, work may continue on separate designs, or the class may decide to work on a single design where different teams would be in charge of different subsystems. For example, teams could be arranged as follows:

1. Chassis Team
2. Steering Team
3. Power Train Team
4. Ball Pickup and Delivery Team
5. Electronic Control Team (programming the BASIC Stamp to control the robot)

Parts

The instructor can provide parts for the design within certain limitations as noted below:

- Some parts are available for team from a collection of parts developed over the last ten years as TCC has participated in the ASEE Model Design Competition. Parts include:
 - Servos (standard and continuous)
 - Wheels
 - Motors
 - Gearhead motors
 - Motor/gearbox assemblies
 - Hubs
 - BASIC Stamp Board of Education (BOE)
 - 3mm and 6mm thick PVC and glue (works well for frames, mounting brackets, etc)
 - Hardware (nuts, bolts, washers, collars, brackets, rods, etc)
- Some parts can be ordered (if sufficient justification is presented)
- Mr. Ezzell has volunteered to machine some parts (out of aluminum, for example)
- We have access to a 3D printer that can be used to make some plastic parts directly from Inventor models
- Students can provide their own parts

Tools

Some tools are available at the Virginia Beach Campus for construction. Some meetings outside of class time could be scheduled there in order to fabricate some of the parts. The following items are available:

- Bandsaw
- Drill press
- Vice
- Soldering irons
- Dremel
- Assorted hand tools

ASEE Model Design Competition

If the class is successful in building a complete design during the semester, it can be entered into the 2009 ASEE Model Design Competition to be held in Austin, TX on June 15, 2009. If it appears that this class will have a design capable of competing, we will discuss how to proceed near the end of the semester.

Tentative Schedule

The group project will involve several milestones in order to make sure that progress is being made on the project throughout the semester. Dates and assignment descriptions will be more clearly specified as the semester progresses.

Date	Assignment
T, 1-27	<u>Step 1: Introduce ASEE Model Design Competition & Form Teams</u> The rules of the competition will be discussed in class in detail. Possible approaches for navigation, power train, ball pickup, sensing, etc., will be discussed. Teams will be formed and will have one week to come up with a preliminary design.
T, 2-2	<u>Step 2: Discuss Designs and Determine How to Proceed</u> The designs produced by each team will be discussed. Depending on the quality and feasibility of the designs, the class will decide whether to continue with individual designs or to join forces and produce a single design. If a single design is to be pursued, subteams will be formed. If subteams are assigned, they will be given one week to form preliminary design sketches and a parts list.
T, 2-9	<u>Step 3: Subteam Designs</u> – Subteam designs will be discussed. Parts lists will be discussed and refined. Team members will begin modeling parts using Inventor.
	<u>Step 4:</u>
	<u>Step 5:</u>
	<u>Step 6:</u>
	<u>Step 7:</u>