2004 ASEE MODEL DESIGN COMPETITION

Sponsored by the Two Year College Division of ASEE

Date: August 25, 2003
Dear Colleague,

On behalf of the American Society for Engineering Education (ASEE) - Two Year College Division (TYCD), we invite you to encourage the submission of student design projects for the 6th Annual ASEE Lower Division MODEL DESIGN COMPETITION. This event will be held in conjunction with the 2003 ASEE Annual Convention, June 20-23, 2004 in Salt Lake City, UT. This competition is open to 2nd and 1st year students at four and two year colleges and universities.

This year a competition of battery - powered model vehicles will take place. The models must adhere to the guidelines of the model design competition and an oral presentation is included as part of the competition.

The main reason for this competition is for students to gain a better understanding of the design process from start to finish. Designing and building something from an idea is probably why they chose engineering in the first place. Use this design competition as a platform to reinforce their ideas and have some *engineering fun!* We hope to see you and your students' entries in Salt Lake City.
Please find enclosed the guidelines and registration forms for this event. The interest and registration forms are on the back of this letter.

Sincerely,

Paul E. Gordy
Phone: 757-822-7175
Fax: 757-427-0327
Email: PGordy@tcc.edu

William C. Beston
Email: wbeston@stx.rr.com

Results from the 2003 ASEE National Two Year College Division Model Design Competition in Nashville, TN:
There was a record turnout for the competition in Nashville! Congratulations to all of the students and faculty advisors involved. At one point there were 23 vehicles registered from 14 colleges and universities. Due to the challenging nature of the competition and, in some cases, the difficulty in arranging to get students to the competition, a number of teams dropped out just before the big event. However, the crowd at the convention center was still very impressed by the 9 teams from 6 colleges that competed.

1st Place: Cedarville University (Team: Hare II) - Cedarville, OH
Team members: Nathaniel Smith, Jeremy Wheeler, Tim Linden
Advisor: Dr. Clint Kohl

2nd Place: Binghamton University – Binghamton, NY
Team members: Alex Zelenka, Eyal Cohen, Greg Alton, Matt Hilt, Ryan Ahern
Advisor: Richard Culver

3rd Place: Cedarville University (Team: Tortoise II) - Cedarville, OH
Team members: Nathaniel Smith, Jeremy Wheeler, Tim Linden
Advisor: Dr. Clint Kohl

Web Site: Visit the following site for rules, photos, videos, and more.
http://www.tcc.vccs.edu/studorgs/vbeng/aseecar/index.htm

2004 ASEE MODEL DESIGN COMPETITION
Salt Lake City, UT
MODEL COMPETITION GUIDELINES

The American Society for Engineering Education (ASEE) Two-Year College Division (TYCD), Model Design Competition will be held Monday, June 21, 2004 in conjunction with the ASEE Annual Convention in Salt Lake City, UT.

MODEL PROJECT:

Objective:
To design and build an autonomous battery-powered vehicle that completes two laps as quickly as possible around the specified track following a "figure 8" pattern formed by going around two barriers on the track.

Vehicle Specifications:

Allowable battery types:
The vehicle may use up to one 9 Volt battery and up to eight 1.2-1.5 Volt batteries in any combination of D, C or AA.
The batteries used should be commonly available in department stores (such as Walmart) and should be either alkaline or rechargeable NiMH (Nickel Metal Hydride).

Maximum vehicle size:
Height: 5 inches
Width: 7 inches
Length: 15 inches

Components, Fabrication and Cost:
Team members must build their vehicles using tools and component parts that are commonly available to the general public and the team members must perform all fabrication work on the vehicles. The use of a commercially available battery-powered vehicle or robot or kit will not be allowed. The use of vehicles from previous competitions is prohibited. The total cost of all components must not exceed $350.

Vehicle Navigation:
The vehicle must be capable of navigating the course without any input from the team. Team members may not operate radio, infrared, ultrasonic, electrical, or other remote controls once the vehicle begins moving.

Vehicle Inspection:
Prior to the race the judges will inspect each vehicle for the following:
1) Each vehicle must meet the required specifications for dimensions, allowable batteries, etc.
2) Each vehicle must pass a safety inspection. Any vehicle that presents a safety hazard, or has the potential to damage any property or the track will not be allowed in the competition.

Track Specifications:
- See Figure 1 for the track dimensions. Note that the top view is shown with the supports removed so that the plywood is lying flat on the ground. This was done to simplify the dimensions.
- The vehicles will be tested on a BC grade plywood surface. The plywood should not be painted or stained.
- The track shall be formed by placing four 2'x8' pieces of plywood as shown in Figure 1. The width of each piece may be a minimum of 23.75" so that two pieces can be cut from a single 4' x 8' piece of plywood. Two 2x6 (actual size 1.5" x 5.5") supports are added under the sheets of plywood as shown in Figure 1 to form hills on the track.
- 2" x 2" (typical actual size is 1.5" x 1.5") boards will be fastened to the top surface of the track as shown in Figure 1 to form barriers.
- 3/4" electrical tape will be placed on the track as shown on the diagram. All curves have a 12" radius.

Speed Test:

In order to complete the course successfully, the vehicle must:

1) The vehicle must begin completely behind the Start/Finish line.
2) The vehicle must complete two laps around the track and completely cross the finish line after the second lap. One lap consists of going around barriers A and B on the track in a "figure 8" pattern.
3) Vehicles may touch the sides of the barriers, but will be disqualified for climbing on top of a barrier or going over the top of a barrier. The vehicle will also be disqualified if any part of the vehicle extends beyond the outer perimeter of the track at any time during the time trial.
4) The vehicle must satisfy the dimensions for the maximum vehicle size at all times during a given time trial. For example, the use of a telescoping arm that extended the vehicle such that it exceeded the maximum length, width, or height would disqualify the vehicle for that given time trial.
5) The time for a given trial will begin when the judges indicate (such as with "On your mark, get set, go") and will end when the vehicle completely crosses the Stop/Finish after completing two laps around the track as described above.
6) No restarting of vehicles is allowed.

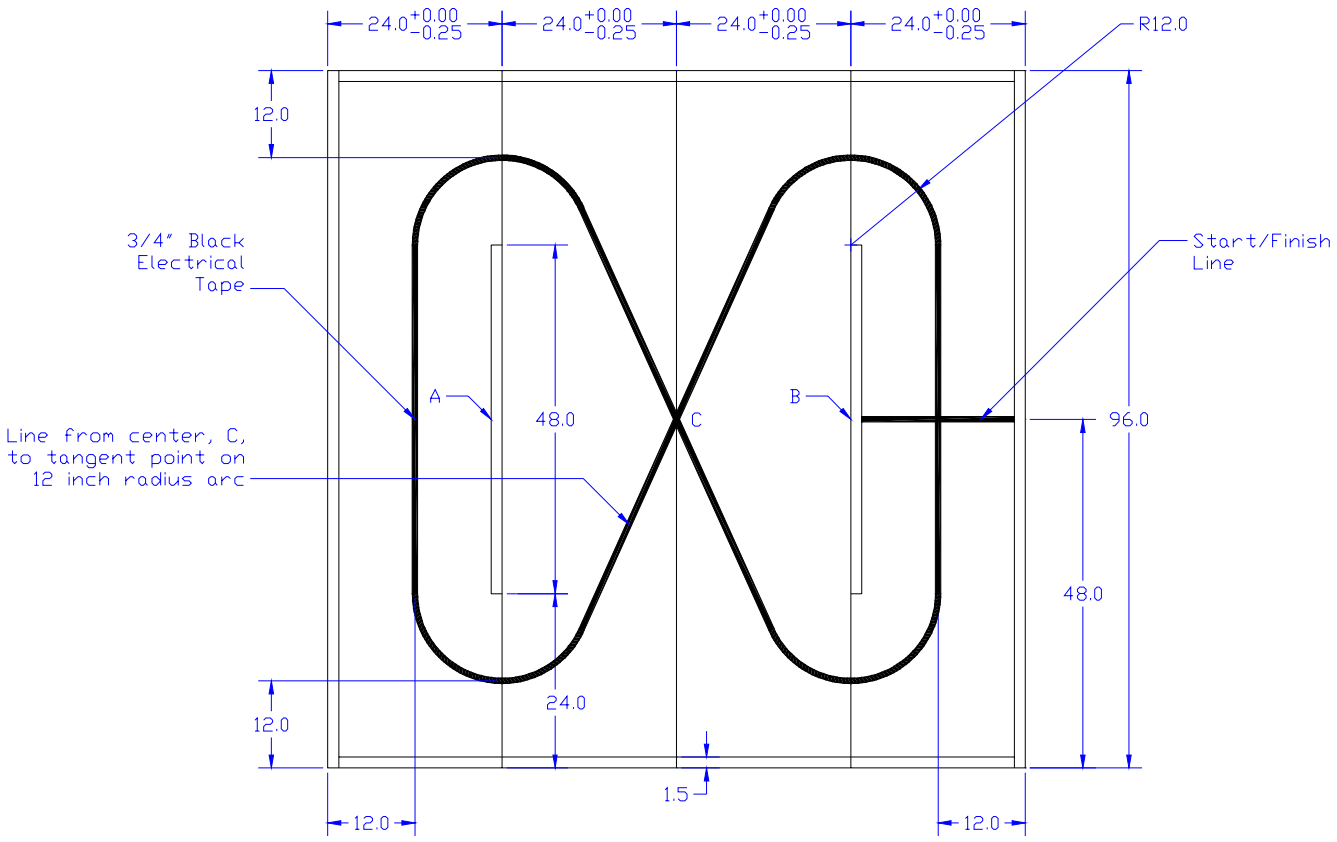
Scoring and Test Procedures:

1) During the competition, each team may perform a maximum of three trials (the judges may opt to reduce the number of trials if they find it necessary due to time constraints).
2) Teams may make repairs or adjustments to their vehicles between trials. No components may be added or permanently removed with the exception of programmable circuit elements and batteries. Replacement of malfunctioning parts between trials is allowed.
3) The batteries on board the vehicle are the only allowable source of energy.
4) The team may not touch or communicate with their vehicle while it is performing a test.
5) The object of this event is to perform the required task in the least amount of time. A team's lowest time of the trials performed will be used in the judging. If a team fails to complete the test in three trials then the team will receive zero points for the event based upon time trials. For the cars that complete the test satisfactorily, the following points will be awarded:
   - 1st place: 55 points for the fastest car's time in seconds.
   - All other teams receive a score less than 55. The number of points will be determined by taking the fraction formed by taking the fastest car's time in seconds and dividing it by their time in seconds. This fraction will then be multiplied by 55 and rounded off to the nearest whole number. This is the score for that team.
   - Judges are allowed to add up to 10 points to any team's score based upon judgment of performance criteria not specified by the competition rules.

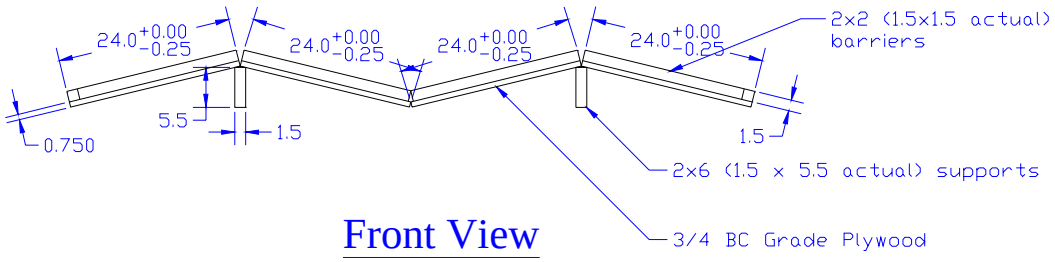
Judges Discretion:

If questions arise regarding the rules of the competition:

- Before the date of the competition: Contact Paul Gordy or Bill Beston
- On the date of the competition: Judges may be asked to clarify the rules. All decisions by the judges are final.



Top View (with supports removed)



Front View

Figure 1 – Track Dimensions

Oral Presentation:
Prior to the testing of the vehicles, each team shall make a maximum 10-minute oral presentation. The judges may reduce the actual length of the presentations if the number of entries does not allow the presentation component of the competition to be completed in a reasonable period of time. The oral presentation will be followed by up to 3 minutes of questions by the judges. If time allows the judges may allow additional questions. Only one spokesperson for each team will be allowed to ask questions if recognized by the judges. Other competing team members or spectators may not ask questions or make comments during the oral presentation or questioning period.

The oral presentations should include the following components (each component is worth 5 points):

1. Problem Identification: A description and history of why the vehicle was designed and built.
2. Preliminary Ideas: Problem Formulation
3. Abstraction and Synthesis: Refinement of goals and ideas
4. Analysis: Comparison and evaluation of alternate designs (Scaled drawings of the vehicle need to be included)
5. Final Solution: A discussion of what improvements could be made on future designs is required

In addition, the assessment of the presentation will include two components worth 5 points each.
6. Presentation Quality and Adherence to the Guidelines of the Project
7. Written report: A written summary (max of 3 pages) of the presentation shall be given to each judge (5 copies). An appendix should be included containing a parts list, detailed cost estimate, CAD drawings, and copies of the receipts or vendor price list for all parts having a retail of more than $10 is required.

Scoring:
The judges will evaluate the content and form of the oral presentation. Teams may receive any integer number of points between 0 and 35. The judges may give an equal score to two or more teams.

PROJECT TEAM / ENTRY LIMITATIONS:
Each construction team must have at least one faculty advisor and at least 2 student members but no more than 10 student members. Each team member must primarily be enrolled in freshmen or sophomore level classes.

PROJECT INTEREST AND REGISTRATION FORMS:
Please find the entry forms on a separate page. The Interest Form must be received no later than March 1, 2003. A Registration Form for each model design team must be received no later than June 1, 2003.

ASEE ANNUAL CONVENTION PASSES:
It is not required that student team members or faculty advisors be registered for the ASEE Annual Convention. Passes will be provided for all team members and advisors so that they can enter the conference area and exhibition area on the day of the competition. Details for obtaining passes will be made available a couple of weeks prior to the competition.

JUDGING:
Oral Presentations will take place Monday prior to the Vehicle competition at 10:30 AM unless otherwise specified. Specific location will be published within the ASEE Final Program and Proceedings booklet.
Vehicle judging will take place Monday afternoon, June 23, 2003 in the Exhibitor's Hall Area at about 2:00 PM.
All decisions made by the judges are final.

PRACTICE SESSION:
The official track will be available in the Exhibition Hall for teams to practice following the oral presentations. Teams should be considerate and only use the track for brief periods if other teams are waiting to use the track. No cars should be on the track after 1:45 as the judges will be preparing to begin the time trials at 2:00pm.

AWARDS:
First, second, and third-place teams will receive plaques. Please direct questions to:

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Web page: http://www.tc.cc.va.us/studorgs/vbeng/
William C. Beston
Email: Email: wbeston@stx.rr.com

2004 ASEE MODEL DESIGN COMPETITION
INTEREST FORM

Number of Model Entries Expected ☐

College/University:

Faculty Advisor Name:

Mailing Address:

City, State, Zip

Phone: Fax: e-mail:

Please submit to:

Paul E. Gordy, Tidewater Community College
1700 College Crescent, Virginia Beach, VA 23453
Phone: 757-822-7175
Fax: 757-427-0327
Email: PGordy@tcc.edu
http://www.tc.cc.va.us/studorgs/vbeng/

This form is due by March 1, 2004 (by mail, fax, or email)

2004 ASEE MODEL DESIGN COMPETITION

REGISTRATION FORM

College/University:

Faculty Advisor Name:

Student Names: 1) 6)
2) 7)
3) 8)
4) 9)
5) 10)

Please submit to:

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