Design Contest
ME72 Engineering Design Laboratory
Fall Term, 2001

Overview

The 17th annual Caltech Engineering Design Competition will be held on Thursday December 6th, 2001 starting at 2:00 pm in Beckman Auditorium. Spectators are welcome. Admission is free.

Engineering is primarily the process of creating new things to solve problems. This course, and contest, is one attempt to provide students with a real-world opportunity to learn about the design of new things, and the solution of open-ended, ill-defined problems.

At the beginning of the term the students are given a design task, a “bag of junk”, and 10 weeks to design and fabricate a device. The task is a competitive one, and is different each year. Each participant (working as part of a team of two) must design, prototype, fabricate, assemble, test, debug, and tune a device to compete against pairs of classmates’ devices. Only the materials provided in the “bag of junk” are permitted. “Junk” in a typical year includes: plexiglass, aluminum, a few ball bearings, shafting, brass tubing, a few pulleys and rollers, and other miscellaneous surplus “junk” that can be found in sufficient quantity. Before the annual Schlumberger contribution (beginning in 1987), the power source supplied to the students was rubber bands. Since that time we have been able to provide two (or more) electric motors each. Donations from our industrial sponsors have enabled us to provide each student with high quality “junk”. The display case in the middle of the first floor of the Thomas building includes several of the students’ devices from the previous contest, the trophy, and a display of the contents of the “bag of junk”.

In previous years the students designed and built devices that collected golf-balls from a trough, delivered a pre-loaded collection of ping-pong balls to a drain, gathered golf-balls into a central drain, moved hockey-pucks, golf-balls, and hose-washers across a ridge, gathered ping-pong balls from a central bar into soccer-like goals, and attempted to attach plastic shapes to a vertical Velcro-covered wall. Last year the devices, in teams of two, attempted to magnetically attach variously shaped objects to a vertical wall. The contest this year is entirely different, and requires students, again working in teams of two, to design and build individual devices that compete together.

There is an attempt each year to provide a real-world engineering atmosphere. There is a limited amount of time. The hardware resources are limited. Team members must negotiate over size, weight, and task constraints. There are many competing requirements, and overall strategy is a crucial initial decision. Every effort is made to make the contest scrupulously fair; all students have exactly the same raw materials and time, and access to tools and machine tools. The only variability is the student’s learning, talent and expertise. Many lessons come out of the class, including: working in design teams; management and planning of time in the design cycle; decision-making in an uncertain environment; the benefits of prototyping and testing; the benefits of modular easy-to-repair designs; the interaction between design and manufacture; and an experience with open-ended problem solving.

The tournament begins at 2:00 pm and lasts about an hour and a half.