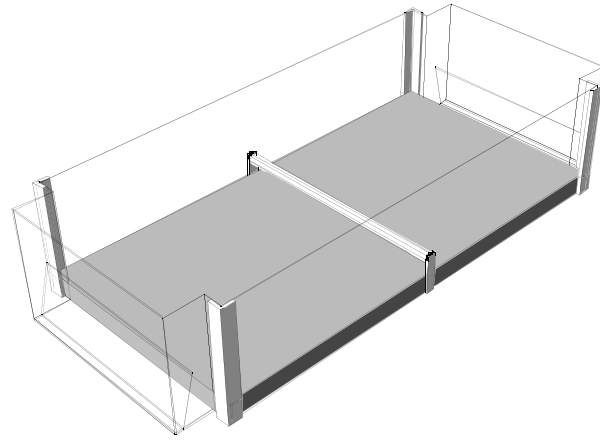


Rules in Brief:

At the start, each team's devices (together a maximum of 20 x 20 x 40 cm in size (about 8 x 8 x 16 inches) and 4.0 kg in mass (about 8.8 pounds)) are positioned within their 20 x 40 cm start zone on a 1.22 x 2.44 m (4 x 8 foot) table. The start zones are on opposite sides of a central horizontal bar. The bar is a 5 cm (2 inch) diameter tube mounted 5.7 cm (2.25 inches) above the table top. At the start, 15 ping pong balls sit equally spaced atop the bar. A goal box is mounted at each end of the table.



The goal box comprises two zones: balls moved into the region closest to the table are scored 1 point each; balls put into the upper region (behind the sloping wall) are scored 3 points each. During the 30 seconds of electrical power (2 channels controlled by a joystick, plus 2 switch-controlled channels, for each device) each team attempts to deliver ping pong balls to its opponent team's goal. The team with the most number of points in its opponent's goal at the end of 35 seconds wins. An overall winner will be determined in a triple-elimination tournament.

Sponsors:

The California Institute of Technology gratefully acknowledges the support provided for the 1998 ME72 Engineering Design Contest by these corporate sponsors:

Schlumberger, Northrop Grumman, Ford Motor Company, General Motors, Allied Signal, Alcoa, Applied Materials, Cordis Webster, Hughes, Idealab, Lockheed Martin, Energy and Environmental Research Corporation, Hewlett-Packard, ITT Automotive, Valeo

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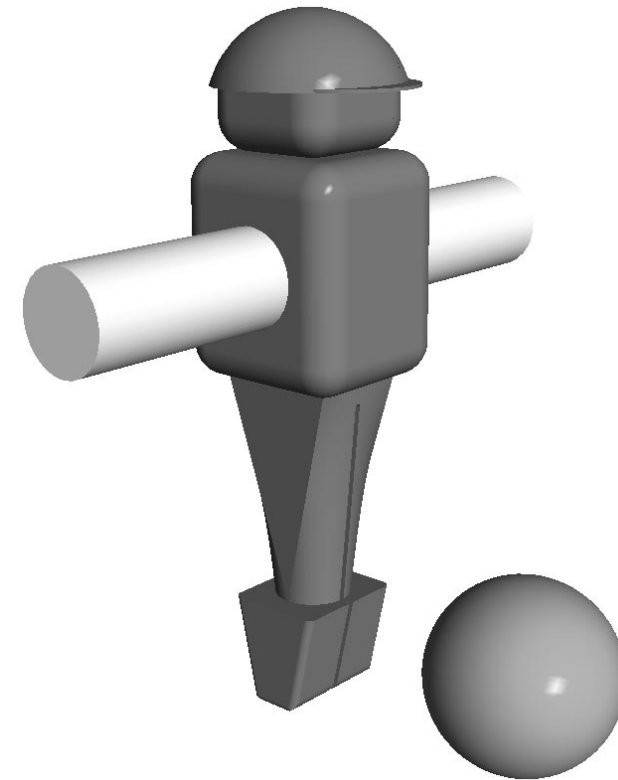
Guy Colville, Randy Rose, Jodie Lee

14th Annual CALTECH ME72 Engineering Design Contest

December 3rd, 1998

Beckman Auditorium

Professor Erik Antonsson
Dr. Curtis Collins



Team Foosketball

Introduction

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. A typical year’s “junk” includes: masonite, plexiglass, aluminum, a few ball bearings, a length of shafting, some brass bearings, 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”.

Six years ago, the students designed and built devices to collect more small plastic pellets than their opponent’s device. Four years ago the students’ devices collected golf-balls from a trough. Three years ago the devices delivered a pre-loaded collection of ping-ping balls to a drain. Two years ago the devices had to gather and sink golf balls into a central drain. Last year the devices moved hockey-pucks, golf-balls, and hose-washers out of their side of the table, across an 8-inch high ridge. This year’s contest is entirely different, and requires students, working in teams of two, to design and build individual devices that compete together in a soccer-like game where the object is to shoot ping-pong balls into the opposing team’s goal.

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: 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; an experience with open-ended problem solving; and working in design teams.

Additional information is available at:

<http://www.design.caltech.edu/Courses/ME72/>

1998 Participants:

<i>Name</i>		<i>Device Number</i>	<i>Year</i>	<i>Student House</i>
Adrienne	Bourque	59	Sr	Lloyd
Kara	Swedlow	59	Sr	Fleming
Samuel	Chang	04	Sr	
Matthew	Hage	04	Sr	Blacker
Amy	Chang-Chien	01	Sr	Blacker
Tanya	Tickel	01	Sr	Ruddock
Francisco	Dias Lourenco	09	Sr	Fleming
Rebecca	Jones	09	Sr	Dabney
Richard	Gilmore	20	Sr	Ruddock
Matt	Johnson	20	Sr	Page
Anthony	Greenman	07	Sr	Fleming
Devi	Thota	07	Sr	Ruddock
Garun	Gupta	12	Sr	Page/Avery
Evan	Tsang	12	Sr	Fleming
David	Hackenson	77	Sr	Page
Charles	Kim	77	Sr	
Eric	Hale	30	Jr	Blacker
Nathan	Schara	30	Jr	Blacker
John	Henderson	99	Jr	Fleming
William	Hiestand	99	Jr	Fleming
Rajat	Kongovi	26	Sr	Fleming
Kudah	Mushambi	26	Jr	Dabney

Previous Winners:

Chris Schofield (1985), Will Slate (1986), Keith Owens (1987), Steve Errea (1988), Charles Cook (1989), Mark Lyttle (1990), Stephen Chang (1991), Richard Zitola (1992), Justin Warner (1994), Scott DeWinter (1995), Eric Jan (1996), Ben Turk (1997).