ME01 Introduction to Engineering "Up, Up and Away" Freshman Design Competition

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Abstract

ME01 "Introduction to Engineering," is an interdisciplinary, freshman design course that included a multi-team project that used energy in a moving airstream to lift a mass a vertical distance of 2 feet. Fifty-four, four-person teams from five pre-engineering programs (College of Sequoias, Fresno City College, Reedley College, West Hills Community College, and Willow International) and one four-year engineering program (Fresno State) competed in the 15th annual Central California Engineering Design Competition (CCEDC) in Fall 2011. The winning device scored the greatest performance index of P=mass (g)/(time in s to lift two feet) of 137.2 g/s.

Introduction

ME01 "Introduction to Engineering" is a course that involves lectures on introduction to engineering design; case studies in engineering; problem solving using the engineering approach; introduction to engineering code of ethics; and overview of the engineering profession and career opportunities.

The primary goal of this course is to enhance student success by concentrating on student development to make freshman engineering students effective early in their academic careers. New students need a "taste of engineering" through hands-on design projects, case studies, and problem-solving early in their academic careers. Students learn about the various aspects of the engineering profession and acquire both technical skills and non-technical skills, such as communication skills, team skills, and how to deal with ethical dilemmas.

Central California Engineering Design Challenge

CCEDC was begun 15 years ago to provide a forum for freshman engineering students to work in teams using engineering design principles to solve a posed problem with constraints for both the design and competition. Past challenges have included mousetrap-powered cars, boats and tractor pulls, machine-based bean bag tosses, machine-based penny drops, catapults, gravity-driven CD-wheeled cars, wind-powered vehicles, etc.

"Up, Up and Away" 15th Annual CCEDC-Objective

Each team designs and builds a device that uses the energy from a moving airstream produced by a fan to lift a mass a vertical distance of two feet. The team members decide the magnitude of the mass to be lifted (within competition rules) with the goal of maximizing their score [score = mass of load (g) / time (s)].

"Up, Up and Away" 15th Annual CCEDC-Constraints

1. The device has initial overall dimensions of no more than 24"x 2" x 24 "cables or cords that are used with th e device are excepted from the size limitation).
2. The mass of the device may be no greater than 20 kg (44.1 lb_m)
3. Energy storage devices are allowed, but any energy initially stored may only be used to deploy sub-assemblies

"Up, Up and Away" 15th Annual CCEDC-Competition

The mass to be lifted is attached to a hanger which initially rests on the ground directly below the lip of a table. The rectangular table top is 2'-6" by 6', and is at a height of approximately 2'-5" above the ground. The hanger has a mass of 50 g. The team decides what mass to add to the hanger (the added mass may be from 0 g to 1,000 g, to be added in 5 g increments). The table, hanger, and added mass are provided by the competition. The mass/hanger's position may be adjusted by the team. The lift duration is timed with the start time being the instant that the fan is turned on and the end time being the instant that the bottom of the base of the hanger reaches the two feet (2') height mark. The lift has a maximum time limit of five minutes, i.e., to post a valid score of mass (g)/time (s).

"Up, Up and Away" 15th Annual CCEDC-Results

CCEDC Number	Finishing 2nd Round P=m/t (g/s)	Qualifying 1st Round P=m/t (g/s)	School	Team Name	Competition
22	137.2	135.2	Reedley College	----	1st-Gold
37	134.6	122.4	Fresno City College	Team 7	2nd-Silver
49	119.3	120.9	CSU, Fresno	Fire Crash	3rd-Bronze
31	108.8	138.3	COS	8 Seconds	
26	105.0	107.9	CSU, Fresno	The Outlaws	
12	102.9	94.0	CSU, Fresno	Coolest Engrs	
47	101.9	85.7	CSU, Fresno	(integrate)innovate	
41	101.2	95.6	College of Sequoias	Team Go	
5	97.3	93.0	Fresno City College	Team 2	
29	96.2	113.8	Reedley College	----	
45	89.0	78.9	CSU, Fresno	Almighty Fliers	
27	82.9	71.4	CSU, Fresno	Fantastic Five	
7	80.9	78.5	Fresno City College	Team 10	
14	75.1	78.6	Fresno City College	Team 5	Eng Design Award