What if there was a School where curiosity ruled?

HAWTHORNE HIGH SCHOOL OF ENGINEERING

2011 Yearly Report

CENTINELA VALLEY UNION HIGH SCHOOL DISTRICT

2011

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Hawthorne High
School of Engineering

2011 Yearly Report

Message from the School of Engineering:

2010-2011 year proved to be a very exciting year. We are inviting you to take a look at the many innovations we have introduced in our educational program, in response to today's educational and industry needs and how they positively influence our students. Engineering is a rapidly evolving industry as is the way we are educating our future workforce. In today's complex world our students must be able to keep up with this continuous evolution. Innovations in Pre-Engineering Education will help accomplish this objective.

With a focus on providing a rigorous high school education we are injecting an innovative pre-engineering educational program that will not only introduce our students to the world of engineering and technology, but also excite them to continue their life-long journey into these fields

This brief report provides a snap shot of these efforts and some of these outcomes.

School of Engineering Overview

History:

Started as a Small Learning Community in 2003 with 30 students on the campus of Hawthorne High School in Hawthorne, CA.

Our program was named one of 14 model schools for Project Lead the Way® in 2008, out of over 3000 schools nationwide.

Our robotics team is a recognized leader in F.I.R.S.T. robotics.

Current Status

Current enrollment is 345+ students. Four Year Comprehensive Pre-Engineering Program

We are the mentor school for all Project Lead the Way® schools in the South Bay. Mentored/are Mentoring the following schools in robotics and engineering:

- Beverly Hills High
- Palos Verde Peninsula
- California Academy of Math and Science
- Lennox Academy
- Palos Verde High
- Redondo Beach High
- Hawthorne Math and Science Academy
- Da Vinci Design

Future Plans

With the support of the local community we have been approved to move forward on modernization and establishment of the School of Engineering at Hawthorne High School. Measure CV a 98 million dollar bond measure passed by the voters in November of 2008 has proven to be an exciting part of our 2010-2011 year. A 38,000 square foot facility with 16 academic classrooms, 3 Pre-Engineering Labs, 2 Industry Standard Manufacturing Shops and 1 professional development space is currently in the final stages of design and should be breaking ground Mid 2012.

School of Engineering Innovations

Innovations (classes)

Freshman Fab Lab: (freshman)

Small-size classes expose freshman to big picture engineering and build community through hands on projects that inspire student's confidence and personal growth. Project-based programs designed to challenge and engage the natural curiosity and imagination of high school students

Introduction to Engineering Design: (sophomore)

Our student's first official engineering class, students use 3D solid modeling design software to help them design solutions to solve proposed problems. Students will learn how to document their work and communicate solutions to peers and members of the professional community.

Principles of Engineering: (junior)
This survey course of engineering exposes students to some of the major concepts they'll encounter in a postsecondary engineering course of study. Students have an opportunity to investigate engineering and high-tech careers and to develop skills and understanding of course concepts. Students employ engineering and scientific concepts in the solution of engineering design problems.

Computer Integrated Manufacturing: (senior)
The major focus of this course is to answer questions such as: How are things made? What processes go into creating products? How do assembly lines work? How has automation changed the face of manufacturing? As students find the answers to these questions, they learn about the history of manufacturing, a sampling of manufacturing processes, robotics, and automation. The course is built around several key concepts: computer modeling, Computer Numeric Control (CNC) equipment, Computer Aided Manufacturing (CAM) software, robotics and flexible manufacturing systems.

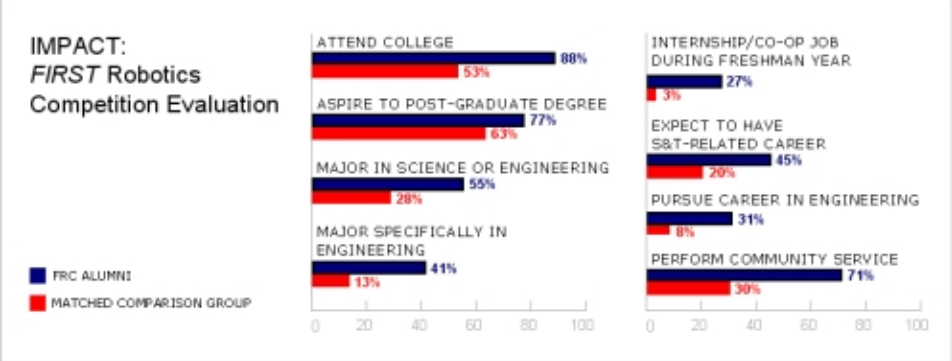
Engineering Design and Development: (capstone course)
This is an engineering research course in which students will work in teams to research, design, test, and construct a solution to an open-ended engineering problem. The product development lifecycle and a design process are used to guide and help the team to reach a solution to the problem. This course utilizes all previous or concurrent courses.

Design Innovations: (facilities)

- Fab Lab: a general purpose laboratory designed to expose new students to modern up to date technology used in industry.
- Design Lab: 3D modeling computer lab equipped with industry standard computers, software and 3D printers designed to give the students realistic touch of engineering design and development.
- Engineering Lab: mixed use lab designed to broaden the student's abilities and knowledge of engineering theory and practical applications.
- Manufacturing Lab: an industry level machining facility that allows the students design, prototype, and manufacture a professional grade product for use in student engineering competitions and real life applications.
- **Robotics Lab:** this laboratory is part of a senior culmination course where all levels of our students can go to work on various projects and student competitions. We are planning on using this lab as the primary research and development lab of the engineering school as a whole.

Student Innovations: (competitions)

- **FIRST Robotics Competition (FRC) -** is a national high school robotics program designed to build awareness and interest in science and engineering among school-aged youth and to provide young people with challenging and engaging skill-building opportunities. FRC challenges teams and their mentors to solve a common problem in a six-week timeframe using a standard kit of parts and a common set of rules. Teams build robots and participate in a variety of other associated team activities, including design of team websites, computer animation (CAD/CAM) presentations of their robots, and involvement in community service activities.
- The impact of FIRST Robotics on students is represented in the chart below:



- NEW **F1 in Schools California:** F1 in Schools is a multi-disciplinary challenge in which teams of students aged 9 to 19 deploy CAD/CAM software to collaborate, design, analyze, manufacture, test, and then race miniature gas powered balsa wood F1 cars. Working in teams of between 3 and 6, each student is assigned roles. The team prepares a business plan, develops a **budget** and raises sponsorship. Teams are encouraged to collaborate with Industry and forge business links.
  - Using **3D CAD** (Computer Aided Design) software, the team designs a Formula One car of the future.
  - **Aerodynamic features** are analyzed for drag co efficiency in a virtual reality wind tunnel using Computational Fluid Dynamics Software (CFD).
  - Using **3D CAM** (Computer Aided Manufacture) software, the team evaluates the most efficient machining strategy to make the car.
  - **Aerodynamic**s features are tested in **wind and smoke tunnels**.
  - The **Race** is on, at more than 60kph. Cars race side-by-side along 20-metre straights
  - **Hawthorne High School of Engineering will be the first Host School in California providing/granting all racing support to new schools.**

- **Northrop Grumman Design Challenge:** this is a yearly engineering design challenge open to local high schools. Northrop provides the design constraints and mentors for all teams involved. This year's competition involved designing a remote control aircraft from scratch. (Sponsored by **Northrop Grumman Corp**.)

- **PLTW Design Challenge:** The PLTW Student Design Competition provides a platform for the ***Introduction to Engineering Design and Principles of Engineering*** Students to put their skills to the test by solving a design problem using specific materials in a short period of time. Each team (three students) has the opportunity to showcase their extraordinary talents, in a variety of engineering fields, to a panel of engineering judges. (Sponsored by **Chevron Corp**.)

Funding Innovations:

We are consistently searching new methods of funding. Our current list of funding sources includes: California Department of Education(**California Partnership Academy Funding**), Federal Aid (**Carl Perkins**) and industry support including, but not limited to: **Boeing, Northrop Grumman, Disney Imagineering, Google, ACE Clearwater, Small Manufacturers Institute, Society of Manufacturing Engineers, American Institute of Astronautics and Aeronautics (AIAA)**

Being that our community has allotted our school with funds to construct a new modern facility we are in **need of outside funding** to furnish the new construction. The School of Engineering's vision for the community is to equip all of classrooms with up to date industry standard teaching tools and equipment.

Community Innovations:

The School of Engineering has taken on the task of creating a professional student chapter of SME **Society of Manufacturing Engineers** to provide a viable link in a **SME-based model manufacturing K-16 workforce development pipeline in the Los Angeles region** that is launching **Fall of 2011**. This will be a first for a high school level Pre-Engineering Program to establish a student chapter with a population of **future engineers under the age of 18**.

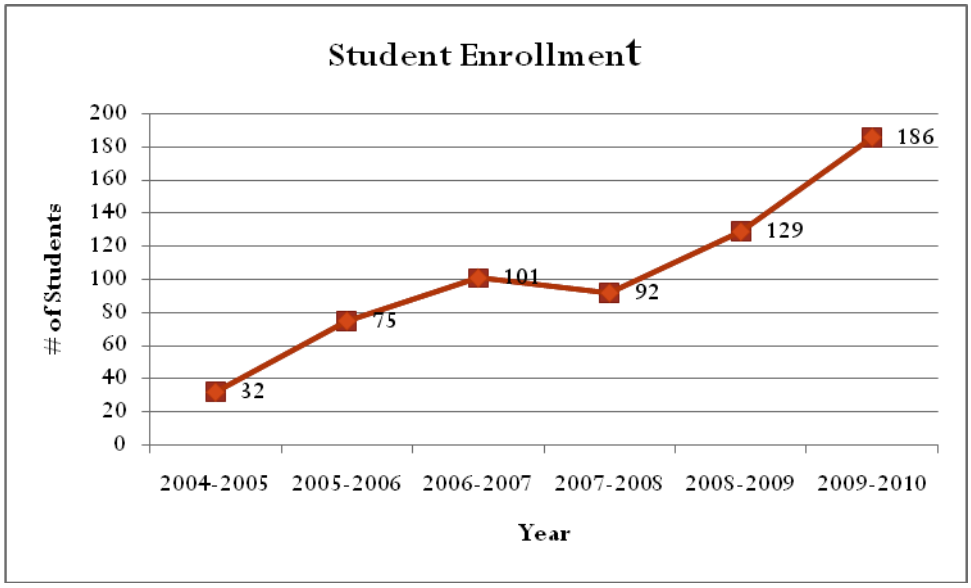
Current K-16 Workforce Development Partners:

- **Society of Manufacturing Engineers**
- **Northrop Grumman Aerospace**
- **El Camino College**
- **Small Manufactures Institute**
- **California State University Long Beach**

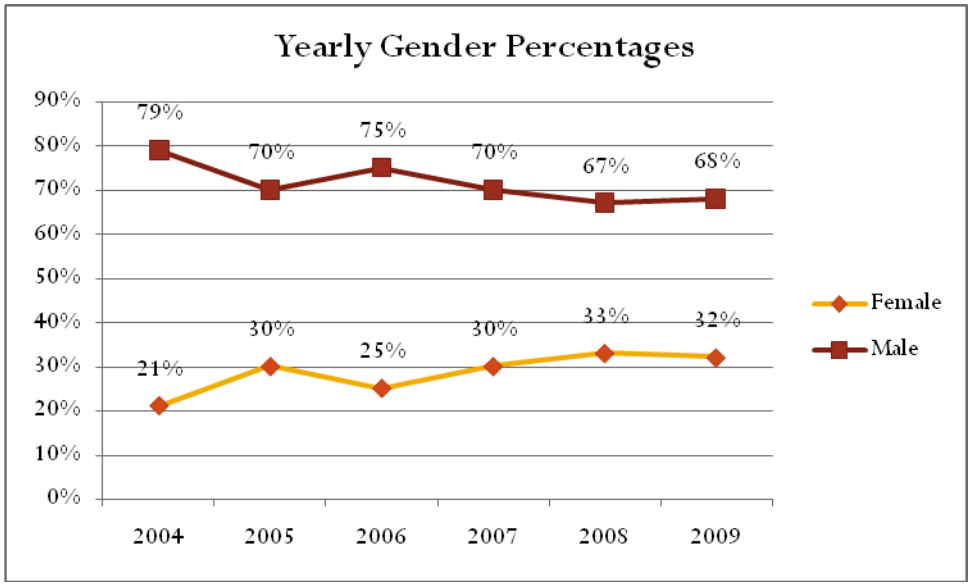
Impact: School Growth *(all charts are waiting on current data)

Total Students in Program 2004-Present: 538

Engineering Enrollment



Data Sets on all charts are thru 2010 year, we are currently waiting for 2011 data

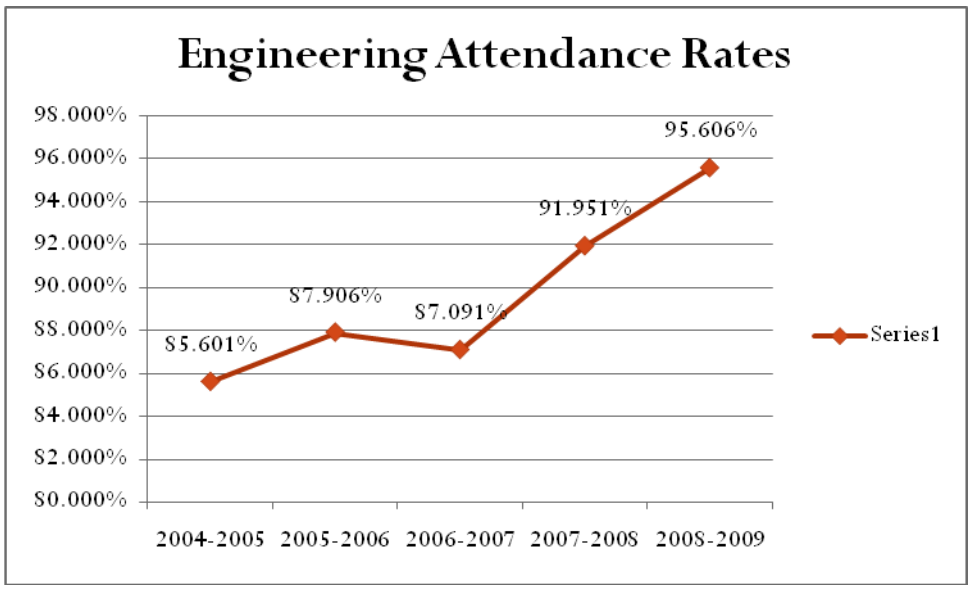


Retention: School Data

Our students are typically "at risk" students. Approximately 85% of our students begin our program as "at risk" students. "At risk" designation is based upon:

- Deficient in earning credits necessary for graduation
- Low family income
- History of absenteeism
- History of low motivation
- Scoring in bottom two strands on California Standards Tests in English Language Arts and/or Math

Despite the fact that the majority of our students start our program with this status, our attendance rates are strong and our overall graduation rates exceed those of our home school, Hawthorne High School.



2006-2008 Average Graduation Rate	
Hawthorne High School	67%
Hawthorne High School of Engineering	77%

Educational Partners:

- California State University Long Beach
- San Diego State
- El Camino College

Industry Partners:

- Northrop Grumman Aerospace Division
- Northrop Grumman Air Combat Systems
- Boeing Satellite Division
- Walt Disney Imagineering
- ACE Clearwater
- American Institute of Aeronautics and Astronautics
- Small Manufacturer's Institute
- Society of Manufacturing Engineering
- South Bay Workforce Investment Board

School of Engineering at a Glance

Founded: Hawthorne High School of Engineering began in September 2004 as the Hawthorne Engineering Academy, a California Partnership Academy, a Project Lead the Way® Model School 2008

Curriculum: Project Lead the Way® - A nationally recognized pre-engineering curriculum developed by the Rochester Institute of Technology and the University of Indiana to expose high school students to a rigorous, relevant curriculum that inspires them to pursue technology based engineering careers.

Current Student Population: 345 Students; 106 freshmen, 105 sophomores, 53 juniors, 81 seniors

Faculty: 3 Engineering Instructors; 3 English Instructors, 3 Social Studies Instructors, 3 Science Instructors, 3 Mathematics Instructors

Alumni: 229 students have graduated from our program since its inception. Recent graduates are in the engineering programs at Cal Poly – San Luis Obispo, Cal State Northridge, Cal State Long Beach, and El Camino College. A number of our current group of seniors have been accepted to these programs as well as UC Riverside, Cal State Fullerton, Cal Poly Pomona and San Diego State University.

Measure CV: 98 Million Dollar Bond Measure Passed in November 2008 has allowed for the School of Engineering to design and build a 38,000 Square foot Pre-Engineering Facility slated to break ground summer of 2012.

16 New Academic Classrooms
3 Pre-Engineering Labs
2 Industry Standard Manufacturing Shops

All designed to provide a true school with in a school modeled after top university atmospheres

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