ME NEWS

Cal Poly's Mechanical Engineering Community Newsletter

fall/winter 2008

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February 15-21

Open House
April 16 - 18

Commencement
fall - December 13
spring - June 13

The Mustang '60 Shop

Gifts from Alumni Help Complete a New Student Shop

Pictured above: **John Nielsen** in the new Mustang '60 Shop

By Andrew Davol

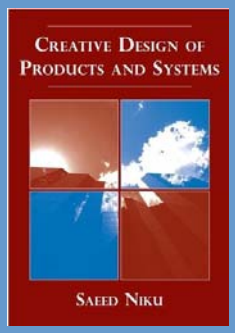
From hack saws and hand drills to Computer Numerical Control machining centers, the Mechanical Engineering Department at Cal Poly has come a long way with the help of our generous alumni. Our long-standing "learn by doing" tradition is nowhere more apparent than in our department's senior projects and student clubs. Many of you may have fond memories of working on your own senior project in your garage, backyard or living room, on projects that have amazed professors for generations. In 2005 the ME department combined its team-based, industry-sponsored design course with senior project to launch a new, team-based, "Design - Build-Test" senior design project. This new team-based model has been a great success. But success has also brought challenges. The days of the hand drill on the living room coffee table are fading, and the projects are now almost exclusively built on campus using machines and labs, straining our resources beyond capacity.

Students involved in clubs and some senior project students became very familiar with the much beloved (and condemned) Aero Hangar machine shop, with its dim lighting, frigid temperatures, and asbestos-lined walls. For the last 15 years, the Mechanical Engineering Department, along with our Industrial Advisory Council, has been working to improve the facilities available for our students to work on their projects.

An answer to our call came in 2001 when Paul Bonderson, a Cal Poly electrical engineering graduate ('75), helped bring this dream closer to reality by funding a new building specifically for engineering students to work on their projects. Plans for the now built Bonderson Project Center included room for a small machine shop and wood shop, along with project assembly space to augment the existing shop at the Aero Hangar. So far, this building has been a great resource, giving students space to store their materials and assemble their projects. But the machine and wood shops remained without machines and equipment for two years as we lacked the funding to outfit the new facilities when the center was first built.

(continued on page 2)

Dr. Niku Authors New Design Textbook



The ME department would like to congratulate Dr. Saeed Niku on the release of his new engineering design textbook, entitled *Creative Design of Products and Systems*. This is the second textbook by Dr. Niku; the first was *Introduction to Robotics: Analysis, Systems, Applications*, published in 2001.

The textbook is intended for use in the sophomore course "ME 234 Philosophy of Design," although the book could be used in fields such as architecture and industrial design as well.

Why a new book on this subject? "There are no books (one single book) that has all this material in it, but it is also a question of integrating everything together," Dr. Niku says. "Bottom line, nothing like this exists in the market that I could use."

Saeed Niku in his Robotics Lab

ME Welcomes New Chair

The Mechanical Engineering Department welcomes Andrew Davol as the new Mechanical Engineering Department chair, taking over for Tom Mackin after three years in the position. Drew spent six years as a Design Engineer and Stress Analyst at Boeing, working on the design of the 747-400 and the 777, before going back to school to earn his Ph.D. from the University of California, San Diego. Many of you remember him as a professor— he has taught in the department for nine years! But some of you may remember him as a classmate - he's a Cal Poly mechanical engineering graduate from the class of 1987. We wish him the best of luck!

Andrew Davol, Department Chair

(Mustang '60 continued)

In 2007 Haas Automation generously agreed to outfit the machine shop in the Bonderson building with three CNC (Computer Numerical Control) machining centers. The last piece of the puzzle fell into place with John and Connie Nielsen's incredibly generous donation, which allowed us to complete outfitting the shop areas of the building. John Nielsen (ME '65) and his wife Connie were inspired by the Mechanical Engineering Department's and Paul Bonderson's dream to improve the technology and facilities available to our students. On November 14, 2008 the shop facility was dedicated as the "Mustang '60 Shop," named by John and Connie in commemoration of the 1960 Cal Poly football team that lost so many of its players in a devastating plane crash.

The Nielsen donation has also allowed us to hire a technician to get the shop up and running, as well as to work as a design and manufacturing consultant for the senior design project teams. The Mechanical Engineering Department is lucky to have found Eric Pulse to fill this critical position—a Cal Poly mechanical engineering graduate ('05) who worked for three years as a student shop technician in the Aero Hangar. The combination of CNC machines and Eric's knowledge in running them will add a vital component of advanced manufacturing. The Mustang '60 Shop is a great supplement to the facilities in the Aero Hangar.

We feel incredibly fortunate to have alumni like Paul Bonderson, John Nielsen, and countless others whose contributions have strengthened our program for the benefit of our students.

Pictured from the Mustang '60 Shop Dedication ceremony, (above) from left to right: **George Leone, John and Connie Nielsen** (left): **George Leone, Joe Donahoo, John and Connie Nielsen, Eric Pulse and Paul Bonderson**

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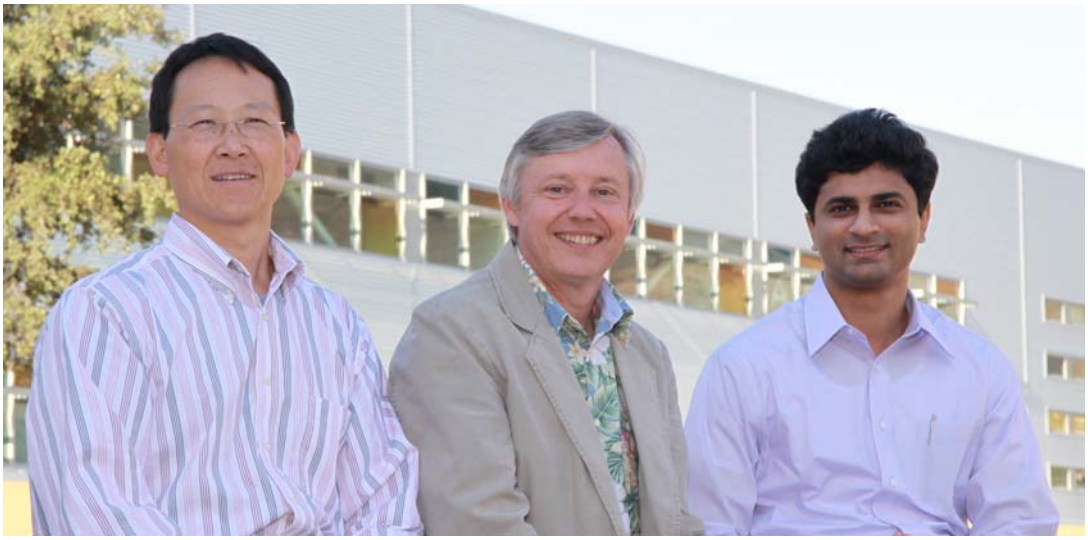
Meet the New Faculty



Pictured from left to right:
John Chen,
Russ Westphal,
Hemanth Porumamilla

John Chen

John Chen has joined the mechanical engineering faculty, and is excited to have returned to California after ten years of teaching in New Jersey. John received his M.S. and Ph.D. in Mechanical Engineering from Stanford, and B.S. at the University of Virginia. Technical interests include applied heat transfer, combustion, and engineering education. "I really love teaching for the impact that I have on students, especially those who seem to be struggling and just hanging on in their academic careers. Sometimes, it takes just a little bit of success in a single course to boost a student's self-confidence, and to propel him or her past the 'threshold' to becoming a successful student and, eventually, onto a successful career," John says. His time outside Cal Poly is spent with his wife and two young children.

Russ Westphal

The son of a rocket test engineer, Russ Westphal has grown up with engineering in his blood. Russ also earned his M.S. and Ph.D. degrees from Stanford University, and earned his B.S. at Washington State before teaching at Washington State and San Jose State, and working at the NASA Ames Research Center. Russ says: "In my first weeks on the job, I've been delighted to find Cal Poly's high reputation to be well-earned and am very impressed by the dedicated staff, faculty, and superb students, who are obviously the basis for the great reputation that Cal Poly enjoys." His technical interests involve measurement and control of fluid flows for applications aimed at enhanced performance of systems like aircrafts, wind turbines, and air-cooled electronics. He is married and has two sons: Thomas, 21, and Mark, 15.

Hemanth Porumamilla

Fondly nicknamed "HP" by students and faculty, Hemanth Porumamilla earned his B.S. in Mechanical Engineering from B. M. Sreenivasaiah in Bangalore, India and his graduate degree in Aerospace Engineering at Iowa State University. His doctoral research was on a pneumatic suspension system and incorporated designing a non-linear robust control algorithm for actively controlling the system, earning a research excellence award from Iowa State. What excites HP about teaching is that it's a "service-oriented field, in which I believe I can make a positive impact on people's professional lives." HP loves Cal Poly specifically because of "Cal Poly's 'Learn by Doing' philosophy because it's in tune with my fundamental beliefs and experience during my own undergraduate curriculum." When not teaching, HP loves to play and watch cricket, to travel, and to work on home improvement projects.

O to 62 mph in 45 Days

Pictured to the left: Team picture- **George and Carole Leone**, **Ron Layman** (rider), and **John Pocock** (chief mechanic), **Justin Jang** (not pictured)

Picture sequence from top to bottom: **Professors Hemanth Porumamilla** and **John Ridgely** helping with the final sanding of "Primal." **George Leone** placing a hot coat of the surface of the HPV. Waiting on the start line for launch clearance.

George Leone, a senior technician for the Mechanical Engineering Department, has been designing a Human Powered Vehicle on paper for years, but it wasn't until this summer that it finally took shape – literally. With the help of some Cal Poly faculty, staff, students and alumni, his dream of creating one of the fastest Human Powered Vehicles became a reality.

Human Powered Vehicles (commonly referred to as HPVs) are streamlined bicycles with two or more wheels. They can be upright but are most often recumbent. Any design is allowed, as long as it's powered only by a human being and has a safe means of stopping. Competitive speed bikes (those that can reach speeds over 60 mph) all have rider protection from a fiberglass or composite cover, called a fairing.

The premier event for these speed bikes is the annual World Human Powered Speed Challenge that happens near Battle Mountain, Nevada in the fall. This event, now in its ninth year, draws entries from Europe and all over North America. Using a five-mile, dead flat road, everyone's goal is the same: break a world record, or at least 60 mph. The prize: a hat inscribed *60 mph club*, *70 mph club* or, the ultimate, *80 mph club*.

While mentoring the Cal Poly Human Powered Vehicle Team for the past twenty years, George always held the dream of designing and building his own vehicle for this event, but wasn't able to build it for various reasons. This year, it all came together.

The Frame

After years of designing on paper and then building a muffler-tube prototype (with the help of former students Rusty Browning and Matt Scott), George finally settled on the frame design he wanted. The geometry is based on the work of retired Professor Bill Patterson, who pioneered the study of single track vehicle dynamics based on aircraft dynamics. The actual frame construction was the work of recent ME graduate, welder and mountain bike racer Daniel Baggs.

The Fairing

Again, after years of designing on paper, on July 31, 2008 George began the fairing with a huge block of foam and a pile of com-

posite supplies. After transferring his design onto the foam, he hand-shaped it to create an 8.5 foot long, 44 inch high foam version of the fairing. Then began the labor-intensive process of using the shaped foam to create two molds and then using those molds to create the actual fairing itself out of Kevlar, carbon and fiberglass.

Time was getting short, but George's friends and co-workers stepped in to help him achieve his dream. Professor Hemanth Porumamilla took on the project wholeheartedly and was part of the team every step of construction. Professors Joe Mello, John Ridgely, Andrew Davol, Hans Mayer and staff member Chuck Keezer all arrived at George's barn at various times to help.

Several of the student technicians of the ME department rallied around the project, too, including Steffen Hausler, Justin Jang, Chris Dirkes, Amy Kronsteiner and Andrew Ouellet. It became a true Cal Poly "family" event when former students Ron Layman and John Pocock became the rider and chief mechanic, respectively, at the race itself.

The bike, named "Primal," was finally ready to race and in a record time of 45 days!

Competition
September 15 – 20, 2008

One of the big concerns was that since rider Ron Layman lives in Tucson, Arizona it wasn't possible to fit the rider to the bike until the day before the competition started. The good news was that the rider fit in the bike and could see out the windshield. The bad news was that he could not fit his leg between the fairing and the gear cluster (a matter of the bike builder having longer legs). A last-minute trip to the local welder resulted in a new position for the gears, which solved that problem (and created a couple more). As the week progressed and the team worked daily on the bike either fixing problems or improving the aerodynamics, the speeds steadily increased from 43 to 56 to 61 to 62 mph! Attaining this speed is tremendous for a bike that had just been built.

The event was won by Sam Whittingham of British Columbia who broke his own world record with a speed of 82.33 mph. But "Team Leone" went home happy to have broken the 60 mph barrier. They also left with a four-page list of improvements for next year!

Cal Poly's Powerhouse event

If there were an award for most competitors from a single school, Cal Poly would have definitely won: Cal Poly graduates Larry Lem and Tom Amick rode their tandem to a top speed of 67.06 mph, which is only 1 mph off the world record for tandem bikes; Cal Poly graduate Matt Scott battled mechanical problems, but rode his speed bike to a top speed 54.97 mph; Aaron Williams of the current Cal Poly HPV team had chain derailment problems, but managed to ride their entry "Athena" to 54.16 mph. Also there with the Cal Poly team was Team Advisor, Kim Shollenberger and students Steffen Hausler, Joe Levysohn-Silva and recently graduate Darryl Fletcher.

Pictured below: **George Leone** (pictured in the forefront) and **John Pocock** running alongside "Primal " with **Ron Layman** riding the HPV. Bikes are launched at two mile intervals. Riders can't put their feet down so they have to be assisted at launch and caught at the finish.

ME HISTORY

The ME History Project

By Tom Mase

When I was hired at Cal Poly two years ago, I was excited to teach at a premier Engineering program that truly valued teaching and hands-on learning. Now that I'm here and teaching with the "learn-by-doing" motto, I'm curious as to how it all started!

One of my alma maters (Cal Berkeley) has a "History of the Mechanical Engineering Department" book that is fascinating because it details through words and photos the growth of the department from inception through present day. So, I have suggested that we build a similar book to learn about Cal Poly Mechanical Engineering and to be able to pass this knowledge onto others. Emeritus Faculty, like Ray Gordon, have even volunteered to serve as a resource for this assignment which we're calling the "ME History Project."

But we need your help!

We are looking for your stories, your pictures, and department historical facts that you may have. Share your memories with us at me-history@calpoly.edu or by mail to Cal Poly Mechanical Engineering, 1 Grand Ave, San Luis Obispo, CA 93407. (If you mail us any photos, we will make sure to get originals back to you at your request.) We'll take our favorite stories and photos, and highlight them in future newsletters!

Dr. Tom Mase is a second-year faculty member in the ME department. Along with teaching mechanics courses such as Statics and Dynamics, he researches and designs golf clubs for the gold industry. He also authors a column, "Ask Dr. Tom," which is featured in Golf Magazine.

...from the Archives

Air-Conditioning Club, 1966

Poly Royal has always had its colorful moments, and for several years the Air Conditioning Club built an ice rink for the event, right outside the Air Conditioning building. The club would get a local female skater to perform, but this is obviously not she! Is this person one of the faculty, or is he a student? We're not sure. But we bet someone out there knows.

ME Faculty & Staff

Fall Conference 2008

Pictured above from left to right (top row): **Eric Pulse, Brian Self, Mary Cooper, Hemanth Porumamilla, John Ridgely, Hans Mayer, Tom Mase, Andrew Kean, Jesse Maddren, Melinda Keller, Russ Westphal, Mason Medizade, Peter Schuster, Lee McFarland** (second row): **Jim Gerhardt, Patrick Lemieux, Steve Klisch, Chris Pascual, Tom Mackin, Charles Birdsong, Sarah Harding, Jim Widmann, Bill Murray, Glen Thorncroft, Jim LoCascio, Christine Haas, Roger Ludin, Vera Vasquez** (third row): **Xi Wu, Eileen Rossman, John Fabijanic, Joe Mello, Andrew Davol, Saeed Niku, James Bahringer, John Chen, Chuck Keezer**

Week of Welcome 2008

Pictured right: **Andrew Davol**, ME's Dept. Chair welcomes the incoming freshman class (far right): root beer float social

Pictured above: **Dr. Joe Mello** meeting some of the new ME students. (to the right): the **freshman class** given introductions to the Mechanical Engineering faculty and staff

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