

# ENGINEERS' FORUM

VOLUME 19 • NO 3

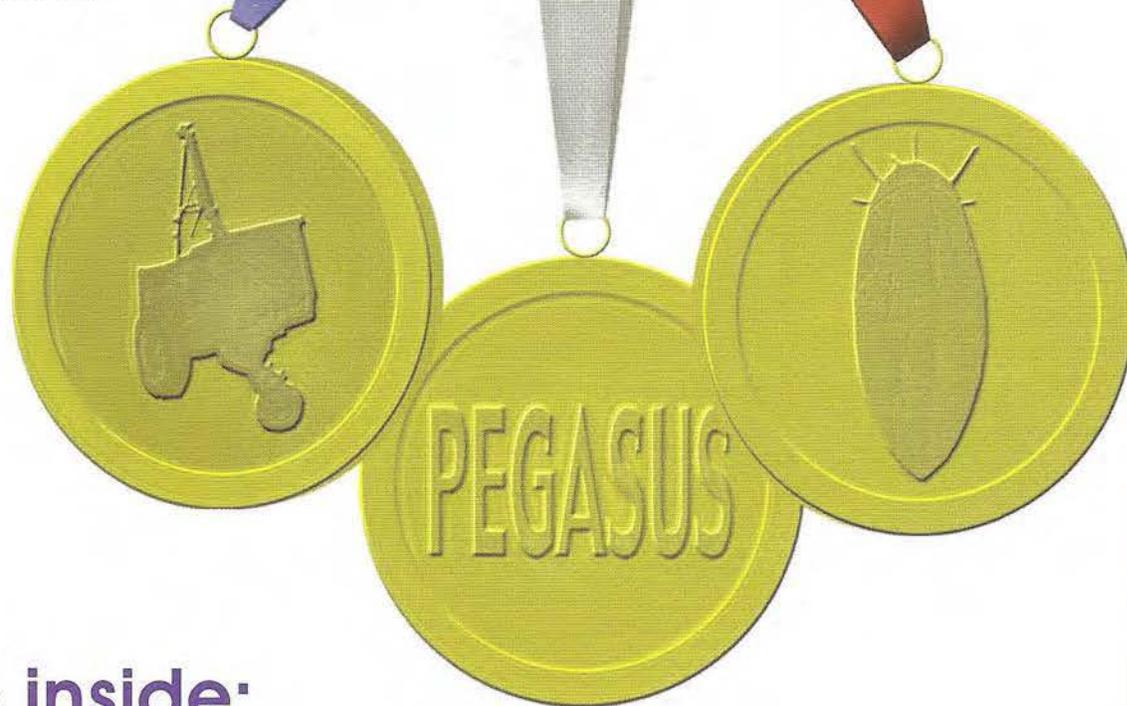
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## Also inside:

- Gettin' Dirty with EF
- Perspectives

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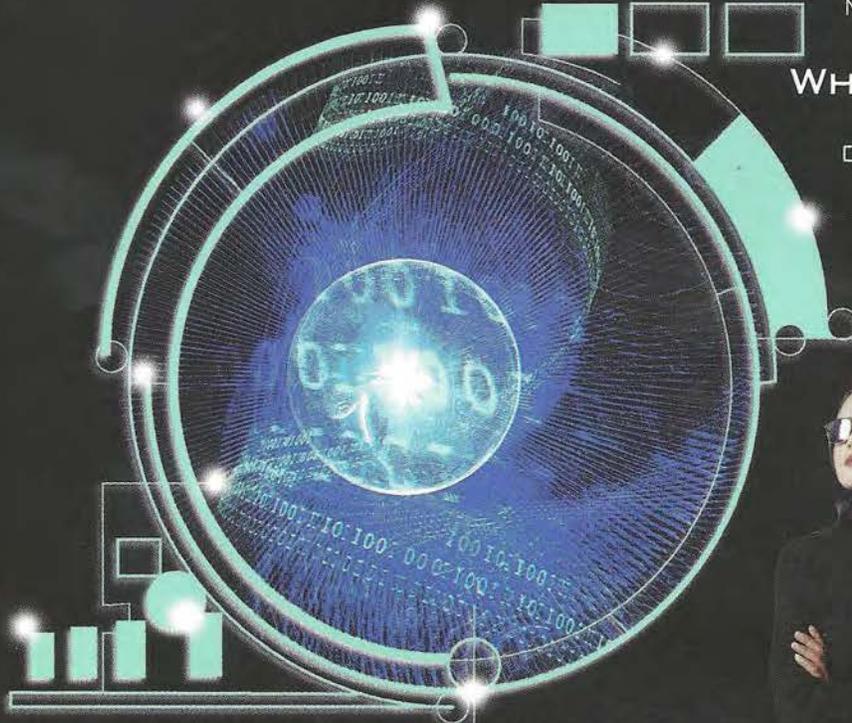
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## Editor's Note

Welcome back everyone, and to all the freshmen and women greetings from the Engineers' Forum. For those that are picking up our magazine for the first time, we are a student run, student produced magazine that covers issues every student deals with here at Virginia Tech. In our last issue, we attempted to make engineering issues relevant, interesting and in many cases controversial. Based on the response of students and faculty alike, we succeeded.

This issue heralds the accomplishments of three engineering design teams here at Tech. The Human Powered Submarine, Autonomous Vehicle and Aircraft Design Teams all won national competitions bringing excellent exposure to Tech's Engineering programs. Following this is an article detailing the successes of our magazine in a national competition at the end of last semester.

This issue also contains pertinent information that every student needs for the Engineering Job Expo 2000. Furthermore, EF Students take a look at the practical, and dirty, side of construction in Gettin' Down and Dirty with EF. We also continued our Perspectives section and have the honor of printing an excellent article that takes a look at the downside of summer internships.

Hopefully we have achieved our goal of creating an entertaining and informative Engineering Magazine. If not, let us know how you feel. All students have a voice through the *Forum*.

*Tom Catherwood*

Tom Catherwood  
Executive Editor

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# Engineering Expo 2000

by Tom Catherwood

**C**hecklist for Monday September 25th. Shirt, jacket and slacks dry cleaned? Check! Power tie ready? Check! Resume polished and looking impressive? Check! Well then, it appears you're all set for the 26th and 27th of September. 26th and 27th? Expo 2000 of course. Every year the Student Engineers' Council (SEC) sponsors the largest job fair on this side of Virginia. If you're an engineering student with plans to graduate in the near future, this is a key opportunity to get out and make the initial connections necessary for landing that first permanent job. Don't worry about not finding your niche either. SEC volunteers work hard all year to get well

over 200 companies represented at the job fair. In fact, Expo has become so successful that the SEC is having to turn some companies away. That means there are more companies out there that want to hire Tech students than there are students to hire.

So the outlook is optimistic. The clothes are set, the resume is crisp and clean and there are a veritable plethora of

companies that want YOU. In today's successful economy, it is an employees market. Take this occasion to move forward and plan for your future. Even if graduation is a few years down the road, Expo will give underclassmen a good sense of what companies are looking for in their young employees. It's never too early to start. Furthermore, there are numerous internships and semester co-ops available to those that go looking for them.

Some day, we'll all have to get up for work before 11 AM, and stay later than 3:30 PM (or even 6:15 if there's a late class). Virginia Tech Engineering and the SEC provide a priceless opportunity. Don't let this one pass you up. 



*With hundreds of companies and representatives there is something for everyone at EXPO 2000!*

## Engineering EXPO 2000 Schedule

Tuesday, September 26th	10:30 AM - 5 PM	Booths Open
Wednesday, September 27th	9 AM - 2PM 9 AM - 5 PM	Booths Open Company Interviews

The Job Fair is being held in Squires Student Center (Commonwealth and Old Dominion Ballrooms) and Owens Banquet Hall. For more information e-mail the SEC at [sec@vt.edu](mailto:sec@vt.edu)

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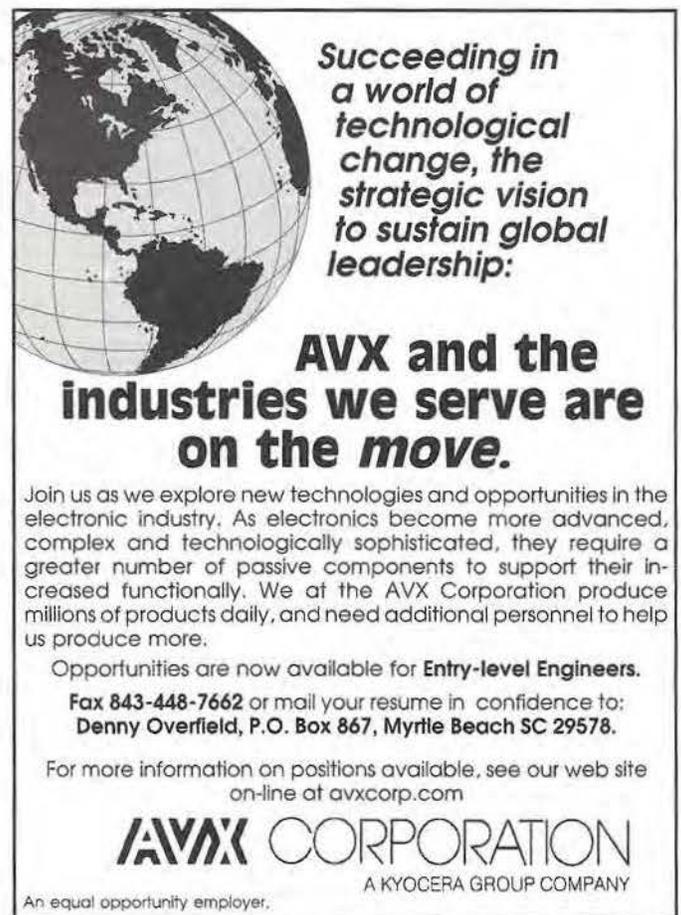
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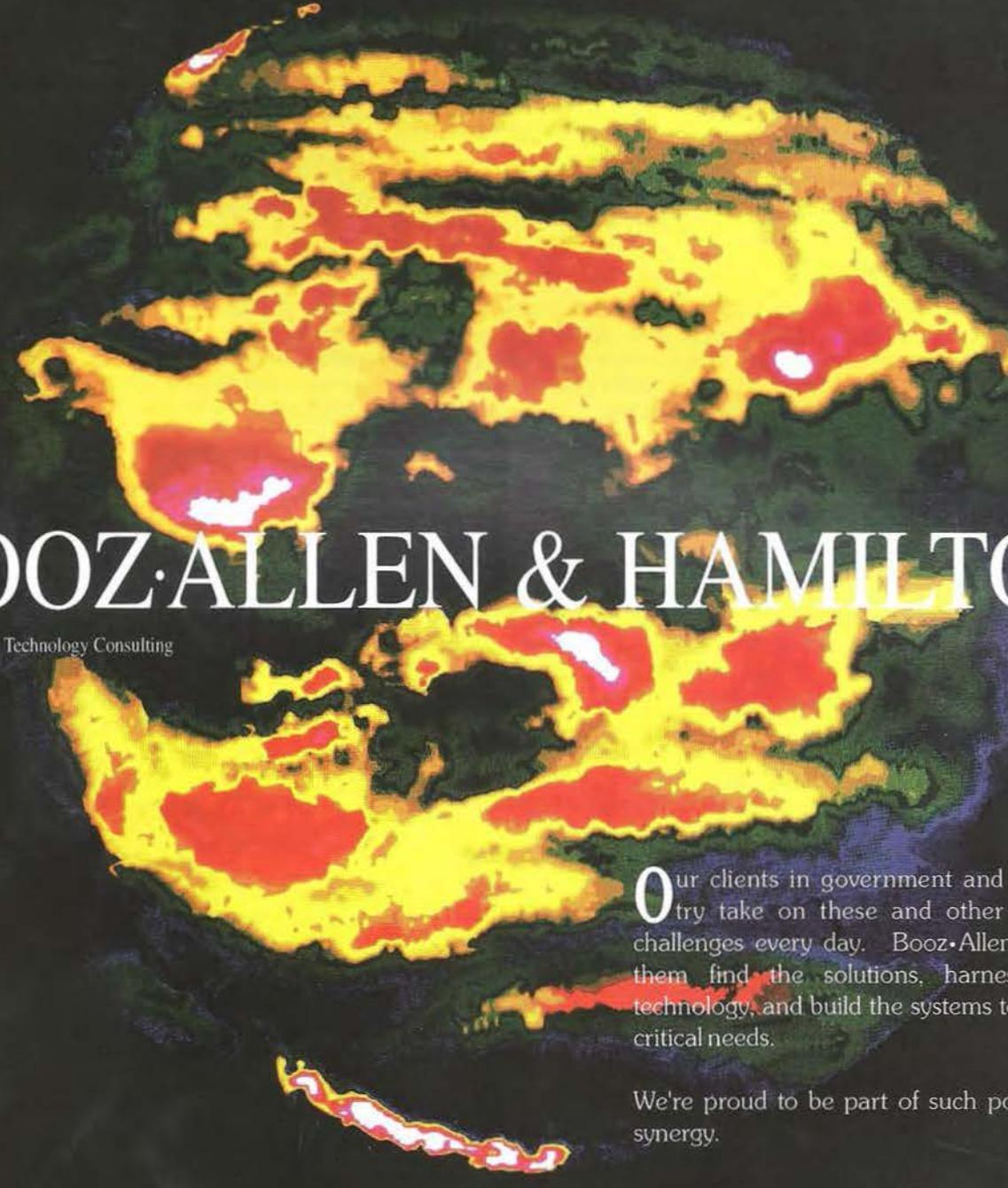
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# Gettin' Down and Dirty with EF

by Radhika Kapur, Karey Edens, Matt Hepler

A couple of weeks ago, I read an article that outlined the difference between college freshmen and high school seniors. One of the statements that caught my attention went something like this, "In high school, when the teacher said, "Good morning," you mumbled back. In college, when the professor says "Good morning," you write it down." So when my EF professor asked if we wanted to learn how to operate a "backhoe," my answer was obvious!

Several students took the opportunity to learn the finer art associated with

Our adventure began on Professor Devens' property, where he demonstrated how to operate a backhoe. For those of you who don't know what a backhoe is, a backhoe is an excavator with a large front bucket and smaller rear bucket. The rear bucket is attached to a hinged boom. Professor Devens showed us the backhoe's controls, how to change gears, how to operate the large front bucket, and how to operate the rear boom & bucket. He also demonstrated how a backhoe's two stabilizers and front bucket are used to create a firm working platform. The entire machine can be lifted off the ground using these three devices!! Next we took the backhoe on to the golf course where a "water hazard" was being expanded.

We went to where they were piling the dirt and got down and dirty. Each of us drove the backhoe around and got familiar with all its controls. For some of us, it was our first experience in operating a stick shift piece of equipment. The clutch had to be pushed in to change the backhoe's gears or direction. Matt was the first to jump on the backhoe and "get it goin!" Karey found out that if her career as an engineer didn't work out, she could always go into construction work, as she was such a "natural". Radhika found that she probably needed driver's training before she could properly reverse. Prof. D, who accompanied each of us on the backhoe during our training, was holding on for dear life by the time we were done with the lesson.

Next we started "backhoeing" previously moved sludge to another location. For most of us, this was the best part of the entire experience. There were four levers that we could use to



*Engineering Students step beyond the classroom, and into a dump truck.*

construction equipment. Here is the description of the day when we, student engineers, went on site to the Blacksburg Country Club, got our hands dirty, and hard hats scratched. It was our first taste of life as engineers.

operate the backhoe. The first one would move the boom left or right, the second lever was used to raise or lower the boom, the third extended the boom forward or backwards, and the final lever would open and close the bucket at the end of the boom. We each had an opportunity to pile dirt like there was no tomorrow. By the time we were finished this part of our adventure, there was a gigantic pile of mud where there had been none...and we were all well trained backhoe operators. Our hands make the boom flow with the hum and smoothness of a well-tuned engine. Prof. D now had to move the entire pile of dirt back to where it had originally been. This had to be done with the large bucket that was located on the front of the machine.

Prof. D then asked one of the dump truck operators to show us how to use a dump truck. Almost immediately, the operator opened up the front of the dump truck, described the engine, and then explained the dump truck's controls. He

demonstrated which levers were used to elevate the back of the truck. He also explained the gauges that monitor temperatures at various points on the truck. If a gauge displayed too high a temperature, the respective truck part would be experiencing too much pressure or overheating. The operator could then usually correct the problem by stopping his operation and dumping some of the

load that the truck is carrying. We decided, for the most part, that this job would not be too difficult. Little did we know the conditions under which the driver's worked. We agreed that the dump truck operators were pretty tough to work under the day's hot conditions. It was getting pretty toasty while we worked



Finally! Something FUN to play with.

with the big machines. Most of us had seen a dump truck, but the experience of actually being in something so heavy duty was completely new. All the truck's controls were programmable. What surprised us the most though, was the fact that the driver did not use the air-conditioning even though it was provided.

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As our lesson progressed we learned that the particular dump truck we were working with was an ADT, that is, an Articulated Dump Truck. These trucks have an articulation joint and an oscillation ring between the cab and body. The oscillating ring allows the front of the truck to move independently from the body. This capability makes working on uneven

back up the hill, Prof. D demonstrated the danger associated with jumping off a piece of heavy equipment. We now know through personal experience that you should always maintain three points of contact. Not complying with this rule can possibly lead to a sprained ankle. Isn't that right Prof. D?

ground possible and ensures all the dump truck's wheels remain on the ground, maintaining the truck's stability and maneuverability. The articulation joint also allows the dump truck to bend at a 45-degree angle which improves its steering function.

As we were walking

After our time at the work site, Prof. D took us back to his home. We met his family and had a greatly appreciated glass of ice water. Next, we were introduced to electric arc welding. It involves putting a positively charged electrode or welding rod (anode) and a negatively charged steel plate (cathode), commonly called a ground, together to complete a circuit. When the welding rod is held close to the grounded object, the current jumps the gap creating an enormous amount of heat. This electric arcing melts the welding rod and objects to be welded.

Each of us welded a nail onto an old lawn mower blade. Out of all the nails on the blade, one was perfectly welded. The others were pretty much distorted. Prof. D's was definitely the best, and Karey's was by far the worst. (She welded right through the metal and left a gaping hole!) The welding was not as tough as we had previously thought. We'll certainly do better the next time we have a chance. The

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hardest part for most of us was not being able to look directly at the objects we were welding without eye protection. Doing so would burn our retinas if we observed the white hot light. As a result, we had to look through a mask which had a special glass made to protect our eyes. This makes it difficult to begin a weld since looking through the glass only allows you to see molten metal and its immediate surroundings.

Now that we had all been introduced to welding, "backhoeing", driving a stick shift, and operating a dump truck, we were finished with our field trip. We concluded our day of practical exposure to the work site. We all packed up and headed back to campus. We had been enlightened as to what our future jobs as engineers would entail. We would be working with people who hold the



*Digging yourself into a hole with a professor was never so literal*

types of jobs to which we were exposed. We saw how much work would go into planning a project like the one we saw in action. The parts of the equipment, which were explained to us, also helped us to visualize what was actually taking place inside the machines. This experience will definitely help us later in our academic

careers when we take classes that involve forces, pressures, and mechanical devices.

In retrospect, we now realize how important it is to include such real world learning experiences into fundamental engineering classes. Each of us took back cherished memories and a valued outlook from that day. We have a real appreciation for what it takes to work with heavy equipment, and we have a better grasp on what can be expected of the operators of

the machines. We thank Professor Devens for giving us this opportunity and would encourage all potential engineering students to make use of a chance like this. The experience made us look forward to all the potential learning experiences our respective engineering disciplines will have to offer at Virginia Tech. 

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# Intern! Co-Op! Relax!

by John Cruz

Where did that dang summer go? For some odd reason, as the years add up, the summers go by that much faster. Almost like life is reminding us that it's time to grow up, and forget all that the silliness that comes with youth. I think that I have been living in denial for the past few years of my life. I still have trouble fathoming the fact that I am in the third year of a college career (apparently my mother is diagnosed with the same condition, as I am still referred to as "the baby").

So one day, this baby got to thinking, "How many summers do I have left?" If all goes to plan, there are two summers still in the works. Two summers!?! Two summers to sit under a tree and relax without a care in the world. Two summers to go to the beach for a day, just because you can. Two summers to visit my parents in Texas and enjoy all that great Tex-Mex. Two summers to...intern?

Internships. The word is tossed around in engineering like rice at a wed-

I have been led to believe that shoe-shining and busboy are the only options I have if I fail to find a suitable internship before leaving this fine institution. I have the utmost respect for everyone out there that has entered the real working world and made it back here. More power to you. I like what I'm studying, but at this point in my life I have learned to appreciate the times when life crawls by. To quote one of the greatest minds of this generation, "Life moves pretty fast, if you don't stop to look around once in awhile, you could miss it." For nine months out of the year, we are running around like chickens without heads, scrambling to meet deadline A without compromising report B and homework C. I can remember times when I have set everything aside, because I needed that bit of space, that breathe of fresh air. "You could miss it..."

For the past two summers, after final exams ran the gauntlet on me, I knew that three more months of engineering wouldn't cut it. At the conclu-



Photo by John Cruz

*Can you say no to this face?*

summer. Me? I retreated to a very special place, a place where I have done most of my growing up. I came back to Camp.

Camp Good Counsel is a day camp that runs for five weeks of the summer. Approximately forty to fifty underprivi-

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Internships. The word is tossed around in engineering like rice at a wedding.

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ding. Every conversation that I have had in the school of engineering has either been about the static equilibrium of a cantilever beam with a load applied; or if I have found an internship yet. It has gotten to the ridiculous point where

sion of last year, I was drained and exhausted. I remember the sigh of all sighs that I let out after that last final exam, and the ultimate desire I had to get home. Most of my classmates had internships and co-ops lined up for the

leged children from the area come to make use of the empty rooms and halls in Good Counsel High School in Wheaton, Maryland. The children usually come from single family homes, with many siblings. It is common to talk

dreams made real.



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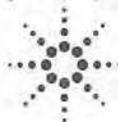
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to a 7-year old and find out that she is taking care of her younger siblings. It is also common to have a conversation deviate from favorite lunch foods to Pokemon to less than favorable comments about your personal appearance. Hey, they are kids after all!

What makes this camp so unusual and special is that every camper is given a counselor. The counselors volunteer their services for the five-week period, and they end up developing a one-of-a-kind relationship with their camper. Often the campers have problems at home, and they find solace and peace in this big person willing to sit down and listen to them. The one-on-one relationship that each camper/counselor pair shares creates a very fun, easygoing atmosphere, where the number one priority is giving these kids a good summer.

Camp Good Counsel has been a part of my life for the last six years; I served as a counselor for four years while in high school, and then was asked back by the directors to return as a staff member. I wouldn't take back these last six years for anything, and I have learned things from these kids that I have had the privilege to meet in my years with Camp. I have learned to take nothing for granted in this world, I have learned the virtues of patience, and I have learned the value of sitting back and watching the world. You can get some amazing insight from a 6-year old missing two front teeth.

The whole point here is not to badger about the "evils" of interning. Interning is a necessary step to get to the next level, it will provide that extra something to get you noticed when the time comes. However, the last time I checked, the real world was still out there...it's not going anywhere. So this is a call to all engineers, interns and everyone else out there, to take a break from time to time. Find a tree or something, have a seat, enjoy life. Because after all, you could miss it.

Why should we live with such hurry and waste of life? We are determined to be starved before we are hungry. Men say that a stitch in time saves nine, and so they take a thousand stitches today to save nine tomorrow.

Henry David Thoreau



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College Graduates

One if by land, Two if by sea, Three if by... Air? That's right, on the cusp of the 2000 Olympic games, Virginia Tech engineering has spent the summer staging a coast to coast invasion of national competitions. Three Virginia Tech Engineering teams brought home first place awards and national recognition this summer. Think those new body suits for Olympic swimmers are impressive? How about the full fiberglass bodysuit the Human Powered Sub Team sported on its way to gold! Think the triathlon is impressive? The Tech Autonomous Vehicle Team made it look easy in their sweep of national challenges! Still worried about those

spring could not only fly, but also meet or exceed all requirements for general aviation aircraft. Furthermore, imagine that this aircraft remained true to its lineage and met all the automobile requirements for the United States and the European Union. That's one heck of a machine, but don't take my word for it, listen to NASA and the FAA.

16 Virginia Tech Engineering students teamed with 12 students from Loughborough University in England to design the Pegasus, a roadable aircraft or "Flying car" for the 21st century. The team brought home the first place award from the 2000 General Aviation Design

craft in the general aviation category witnessed their heyday in the 1950's and 60's. Numerous factors, including excessive litigation, led to the decline of the general aviation industry some 20 years ago. Today revamped laws and the booming global economy have created an increased demand for small, reliable, inexpensive aircraft.

Though the demand for general aviation aircraft is increasing, the technology is still many decades behind that of larger commercial airliners. According to Dr. Marchman "The airplanes are being made by companies like Piper and Cessna with 40-50 year old technology." The reason for this is that any new technology employed in aircraft opens new avenues for legal action. Therefore, NASA and the FAA sponsor this competition in an effort to see what can be done to update general aviation technology. Such a challenge brings new ideas into the industry and gives students real-world experience.

The Team from Virginia Tech's idea was challenging. Develop an aircraft that met FAA regulations for general aviation and could drive the passengers home from the airport. To accomplish these lofty goals the final design contains many cutting edge technologies including retractable wings, an adjustable height suspension system, and a control system with state-of-the-art road and flight information.

Another unique innovation in the Pegasus is the transmission and drive shaft. Automotive engines and airplane engines are built for completely different run capabilities. An automotive engine is designed for both high speed, long distance highway travel and for stop and go traffic with a lot of gear shifting. The engine is designed to run relatively efficiently through a wide range of rpm's. An aircraft engine is designed to work in a fairly narrow range of rpm's and run forever. The challenge facing the Tech students was to design a transmission and drive assembly



*The intimidating design of the Human Powered sub scared off divers and competitors alike.*

plane and rental car reservations for the Olympics? Tech's Pegasus, a roadable aircraft, is just what you need.

#### Pegasus

Imagine genetically crossing a Chevy Astro Van with a small airplane. Then imagine tweaking the genes so the off-

Competition in Oshkosh, Wisconsin. This national contest is sponsored by NASA and the FAA to garner student interest in the general aviation industry.

General aviation refers to single pilot, fixed wing, single or twin engine, propeller driver aircraft for 2-6 passengers. According to Dr. James Marchman, Faculty advisor for the Pegasus, small air-

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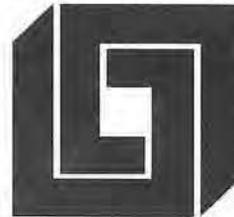
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Photo by Tom Callaway



### Autonomous Vehicle

Engineering triathlon: Event 1 - "The Obstacle Course", Event 2 - "The debris course", Event 3 - "Follow the Leader". Virginia Tech's Autonomous Vehicle Team swept this "triathlon" bringing home first place awards in all three categories. Impressive! Not only did they win first place, but by the time competition rolled around it was up to the machines. Years worth of hard work, hard wiring, and some hard programming lead up to the competition where it was up to the machines alone. Most Impressive!

Virginia Tech's Autonomous Vehicles Navigator and Artemis now sport more gold than Mr. T.

to operate long hours at fairly constant speeds with the efficiency of an aircraft engine and still be able to shift gears, accelerate and decelerate for street travel.

this year's project. Though still in the early planning stages, the design will constitute a small plane (6 passenger), with transatlantic capabilities.

Autonomous vehicles are self propelled robots that are intended to navigate and control themselves by processing their surroundings and calculating a next move. Almost like a game of chess, except

Don't be surprised if one day the autonomous vehicle you see on CNN sweeping a desert for mines bears a large VT logo on the side.

The team successfully found a unique transmission system that allows the engine to stay at the same speed while shifting gears in traffic.

The final design for the Pegasus was a yearlong process that utilized the combined knowledge of students from Tech and Loughborough University. The teams worked together to create a final design while meeting twice to iron out the hundreds of intricate details. These face-to-face interactions were supplemented with daily e-mails and numerous teleconferences. Dr. Marchman heralded the excellent international experience the students here at tech now have after working with their peers from England, "The aerospace industry, like most industries now, is international... it's really beneficial for students from both schools to learn to work with people that come to the project with different backgrounds and expectations." The only problem of working with an international team, according to Dr. Marchman, was compensating for the 5-hour time difference and students' conflicting schedules. Dr. Marchman's group continues to eye the gold as they embark upon

CONTACT INFORMATION:  
AUTONOMOUS VEHICLE TEAM

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Innovating the HP Way



Photo by Tom Catherwood

*The streamlined sub's pointed snout draws design cues from the Great White Shark*

Vehicle Competition, is held by the Association for Unmanned Vehicle Systems International. The competition has four categories. The first two are the standard obstacle course and debris course that test a machine's ability to observe, react and maneuver through varying terrain and situations. A new competition added this year was "Follow the leader". In this event the vehicle follows the tracks of a lead vehicle. The idea is to develop autonomous machines to drive Army convoys, reducing the risk of human endangerment. The final event was the design competition. Tech's Autonomous Vehicle Team added a fourth gold to its stash pulling a first place award with one of its new vehicles.

The team actually competes with two vehicles. According to Dr. Charles Reinhardt, the team's faculty advisor, every year the team tries to improve a model designed in past years and build a new vehicle. This past year students successfully improved the design of a vehicle named Artemis. The team tweaked with mechanics and programming, refining the machine to the point where it brought home the first place award in the obstacle course, debris course, and the follow the leader competitions. The new design, aptly named Navigator, won first place in the design competition- as well as second, third and fifth in the follow the leader, debris course and obstacles courses respectively.

This year's outlook is nothing but positive. Team leader Philip Kedrowski expressed with enthusiasm and optimism the team's plans for the coming year. Besides working on the Navigator, the team is toying with the idea of building a

new, smaller vehicle with less weight, more quickness and even more potential. Don't be surprised if one day the autonomous vehicle you see on CNN sweeping a desert for mines bears a large VT logo on the side.

**CONTACT INFORMATION:  
AIRCRAFT TEAM**

**Dr. Jim Marchman  
marchman@vt.edu**

Human Powered Submarine  
Phantom III

Newly designed bodysuits for Olympic swimmers are intended to give the athletes an edge by reducing their body's drag through the water. The suit is designed like a shark's skin, successfully shaving milliseconds off a swimmer's time; milliseconds that decide between gold medals and the "also ran" category. Virginia Tech's Human-Powered Submarine Team didn't stop with just the skin. The team designed a streamlined rocket of a submarine with the ominous pointed snout of a shark. The sculpted hull, painted an iridescent sea green, cut through the waters in the Escondido Offshore Model Basin near San Diego earlier this summer.

The competition, dubbed The National Human

Powered Submarine Contest, was sponsored by the San Diego section of the American Society of Mechanical Engineers. Open to both universities and non-profit organizations, like Lockheed, the competition aims to improve the practical application of learning in the mechanical and nautical engineering fields. The idea is that the more practical research and experience at national universities, the better prepared students are when they graduate.

During the competition, submarines are fully submerged and the captain dons scuba gear for the aquatic drag race. The submarines are built around the diver's body so there is little to no extra room. Tech's submarine housed its bicycle gears and propeller shaft in the back with the captain, who serves as both the engine and navigator, lying face down staring ahead through a slat in the nose. The hydrodynamic fiberglass shell designed by the Tech Human-Powered Submarine Team was intended to complement the low aspect propeller, all of which were designed for maximum speed. The team was hoping to break top speed mark of 6.98 knots set by Ecole de Technologie Suprieur in Montreal in 1997. However, the short competition facility prevented the team from running the sub to its max. This was hardly a let down as the team left the competition victorious, rounding out Virginia Tech Trifecta of Gold Medals in 2000. **EF**

**CONTACT INFORMATION:  
HUMAN-POWERED SUB TEAM**

**Dr. Wayne Neu  
neu@vt.edu**



Photo by Tom Catherwood

*This view is similar to that experienced by competing teams.*

# Engineers' Forum Brings Home the Silver... Eye's Gold in Coming Year

by Tom Catherwood

This past April students from the Engineers' Forum Magazine brought Virginia Tech to California for the annual Engineering College Magazines Associated (ECMA) Conference. Held on the gorgeous Cal Berkley campus, the conference was an opportunity to attend seminars on magazine production, ad sales, and writing. Besides Seminars, the hosts offered lectures by renowned professors and leading individuals in the industry, including Joe Oldham, Editor of Popular Mechanics.

Ten ECMA schools, out of ---, made the trip to California. The schools included University of Colorado, Howard University, University of Kansas, Kansas State, University of Minnesota, Notre Dame, University of Pennsylvania, University of Wisconsin and the host UC Berkley.

The three-day conference wrapped up with a formal dinner and award ceremony. Schools were competing for awards including best articles, best layout and best all around magazine.

Virginia Tech's Engineers' Forum came away with 8 different awards, including one national first place award for best non-technical article and a Second Place award for Best All Around Magazine. Placing second in a national competition was an honor for all involved with the magazine, especially since the magazine has a fraction of the staff of competing schools. The Forum was proud to represent Virginia Tech in California and plans to shoot for the stars in next year's competition. **EF**



### ECMA 2000, National Awards

Second Place	Engineers' Forum	Best All-around Magazine
Second Place	Engineers' Forum	Best Covers, All Issues
Third Place	Engineers' Forum	Best Continuous Feature
First Place	Tom Catherwood	Best Non-Technical Article
Second Place	Rebecca Gassler	Best Editorial
Second Place	Shuvom Ghose, Rebecca Gassler	Best Editorials, All issues
Third place	Shuvom Ghose	Most entertaining Feature
Honorable Mention	Jason Gibbs	Best Single Cover

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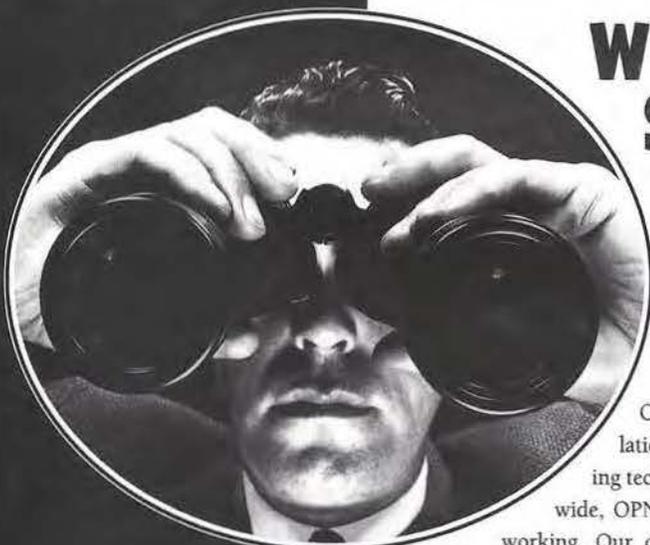
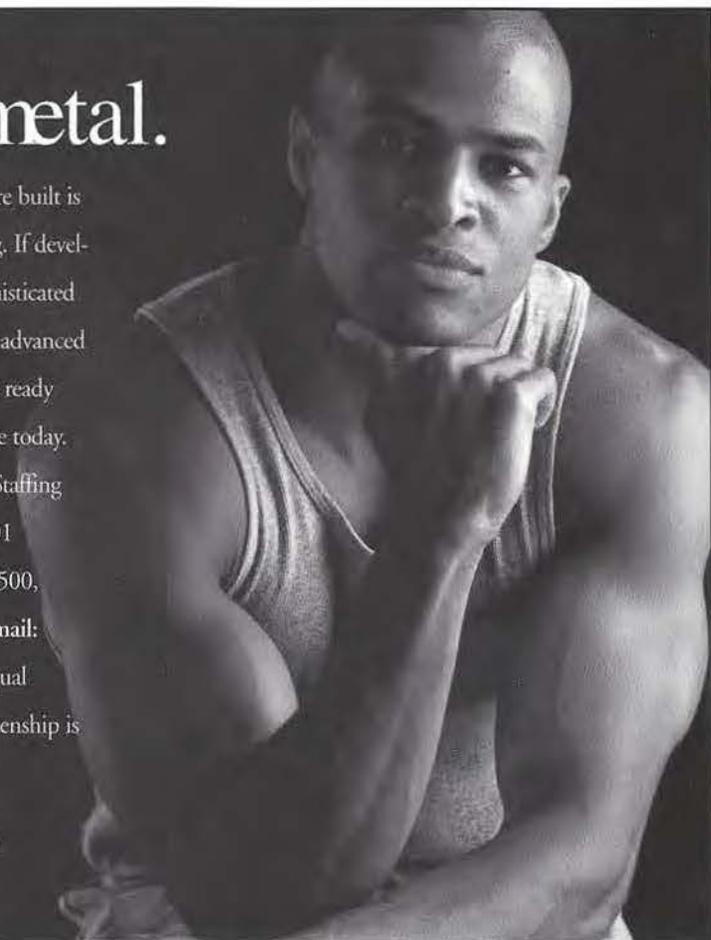
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Mutant Marsupials Take Up Arms Against Australian Air Force

The reuse of some object-oriented code has caused tactical headaches for Australia's armed forces. As virtual reality simulators assume larger roles in helicopter combat training, programmers have gone to great lengths to increase the realism of their scenarios, including detailed landscapes and - in the case of the Northern Territory's Operation Phoenix- herds of kangaroos (since disturbed animals might well give away a helicopter's position).

The head of the Defense Science & Technology Organization's Land Operations/Simulation division reportedly instructed developers to model the local marsupials' movements and reactions to helicopters. Being efficient programmers, they just re-appropriated some code originally used to model infantry detachment reactions under the same stimuli, changed the mapped icon from a soldier to a kangaroo, and increased the figures' speed of movement.

Eager to demonstrate their flying skills for some visiting American pilots, the hotshot Aussies "buzzed" the virtual kangaroos in low flight during a simulation. The kangaroos scattered, as predicted, and the visiting Americans nodded appreciatively... then did a double-take as the kangaroos reappeared from behind a hill and launched a barrage of Stinger missiles at the hapless helicopter. (Apparently the programmers had forgotten to remove that part of the infantry coding.)

The lesson? Objects are defined with certain attributes, and any new object defined in terms of an old one inherits all the attributes. The embarrassed programmers had learned to be careful when reusing object-oriented code, and the Yanks left with a newfound respect for Australian wildlife.

Simulator supervisors report that pilots from that point onward have strictly avoided kangaroos, just as they were meant to.

-- From June 15, 1999 Defense Science and Technology Organization  
Lecture Series, Melbourne, Australia, and staff reports

Bill Goes to Hell

Bill Gates dies in a car accident. He finds himself in purgatory, being sized up by St. Peter.

"Well, Bill, I'm really confused on this call; I'm not sure whether to send you to Heaven or Hell. After all, you enormously helped society by putting a computer in almost every home in America, yet you also created that ghastly Windows '95. I'm going to do something I've never done before in your case; I'm going to let you decide where you want to go."

Bill replied, "well, what's the difference between the two?"

St. Peter said, "I'm willing to let you visit both places briefly, if it will help your decision."

"Fine, but where should I go first?"

"I'll leave that up to you."

"Okay then," said Bill, "Let's try Hell first."

So Bill went to Hell. It was a beautiful, clean, sandy beach with clear waters and lots of bikini-clad women running around, playing in the water, laughing and frolicking about. The sun was shining; the temperature perfect. He was very pleased.

"This is great!" he told St. Peter. "If this is hell, I REALLY want to see heaven!"

"Fine," said St. Peter, and off they went.

Heaven was a place high in the clouds, with angels drifting about, playing harps and singing. It was nice, but not as enticing as Hell. Bill thought for a quick minute, and rendered his decision. "Hmmm. I think I'd prefer Hell," he told St. Peter.

"Fine," retorted St. Peter, "as you desire."

So Bill Gates went to Hell.

Two weeks later, St. Peter decided to check on the late billionaire to see how he was doing in Hell. When he got there, he found Bill, shackled to a wall, screaming amongst hot flames in dark caves, being burned and tortured by demons.

"How's everything going?" he asked Bill.

Bill responded, with his voice filled with anguish and disappointment, "This is awful! This is nothing like the Hell I visited two weeks ago! I can't believe this is happening! What happened to that other place, with the beautiful beaches, the scantily-clad women playing in the water?!???"

"That was a demo," replied St. Peter.

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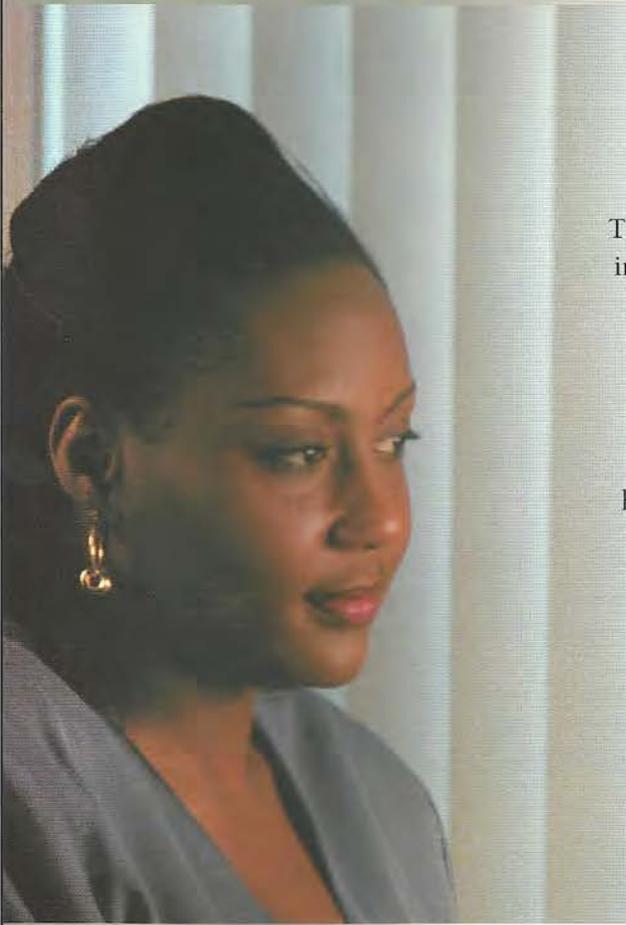
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# letter from the editor

## Engineer 101

by Tom Catherwood

**E**psilon Naught, Avagadro's number, Plank's constant... AutoCad, Excel, Matlab... Circuits, turbines, concrete... Statistics, statics and static electricity. If only there were one equation to sum up engineering, an EQUATION OF EVERYTHING, if you will (No,  $F = m \times a$  is not satisfactory). If you could wrap up four years of learning into one comprehensive equation-- doesn't matter how long it is, there's always the Cliff's notes—you could rule the world. At least until your first summer job. Summer internships serve three general purposes; (1) experience, (2) money, (3) to reaffirm the fact that no matter how well you did in deforms or dynamics, you still know nothing.

How do you account for friction in projectile motion... bring it on! How do you deal with a shady subcontractor, or a helpless internet service provider, or an investor, or the boss of the company? I've yet to find the equation for patience, or the computer program for business savvy, or better yet the class that teaches you the right words at exactly the right time. So I have a proposal for a number of classes that could supplement Virginia Tech's current course selections. These classes require excellent faculty and perfect attendance, but the complete curriculum could propel Tech graduates to the next levels of Engineering. The proposed classes and their descriptions are conveniently listed below for future reference.

**Listening:** Hardly a day will come to pass in engineering when a customer or coworker feels the need to express frustration. One of the keys to "people skills" is patience and the ability to listen. I recommend a full semester course on imagination and day dreaming. That way, while your cubicle neighbor expresses how distraught he or she still is over Richard winning "Survivor", you can listen intently while envisioning Virginia Tech Football, a Macado's sandwich and warm days spent tubing on the New River.

**Proper Cursing Etiquette:** Cursing gets a bad wrap in many walks of life. However, in countless engineering situations nothing else can express so many emotions, thoughts, and visions in so few words. Yet, colorful language is not to be abused. Its powerful emphasis can quickly diminish if used improperly or excessively. Therefore, I propose an intensive two semester course detailing not only "Proper Cursing Etiquette" but also proper pronunciations and body language. The syllabus will rely heavily on work by Richard Pryor, Eddie Murphy and all Quentin Tarantino movies.

**Playing well with others:** You are a young graduate. Your first assignment is to resurrect a project by teaming up with a gentleman or lady that is completely unlike you. This "Teammate" lives in a veritable bubble that compromises the very success of the project. Knowing how to connect on

any level with dissimilar individuals is an outstanding ability that can only be learned through extensive practice and experience. One solution to this problem is to sponsor a class in which engineering students are mixed with business students. Projects like building sandcastles, finger painting and Play-Do sculptures will help these students learn the art of "Playing well with others".

**How to dress for all engineering situations:** "The clothes make the man." First impressions are extremely important. No matter where you go in engineering you need to fit in. Nothing can kill a career faster than being labeled "one of the suits." Hence, a two year online course is required for Tech students to pick up on all the simple nuances of style that exist in engineering culture. This class will cover everything from the basic red power tie and high-water khakis to the "Matrix" inspired style of computer engineers (without the guns and style though).

Whether it is the patience to listen to your underlings extoll the virtues of UVA... the ability to drop the bomb when necessary... the experience to get along with the occasional WVU graduate... And the sense to look good in whatever field you're in, the classes listed above will help ease the change from school to the real world. With the proposed classes Tech students can face the world with no fear of the future. Oh yeah, there will be no Cliff's notes.

*Tom Catherwood*  
Tom Catherwood

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