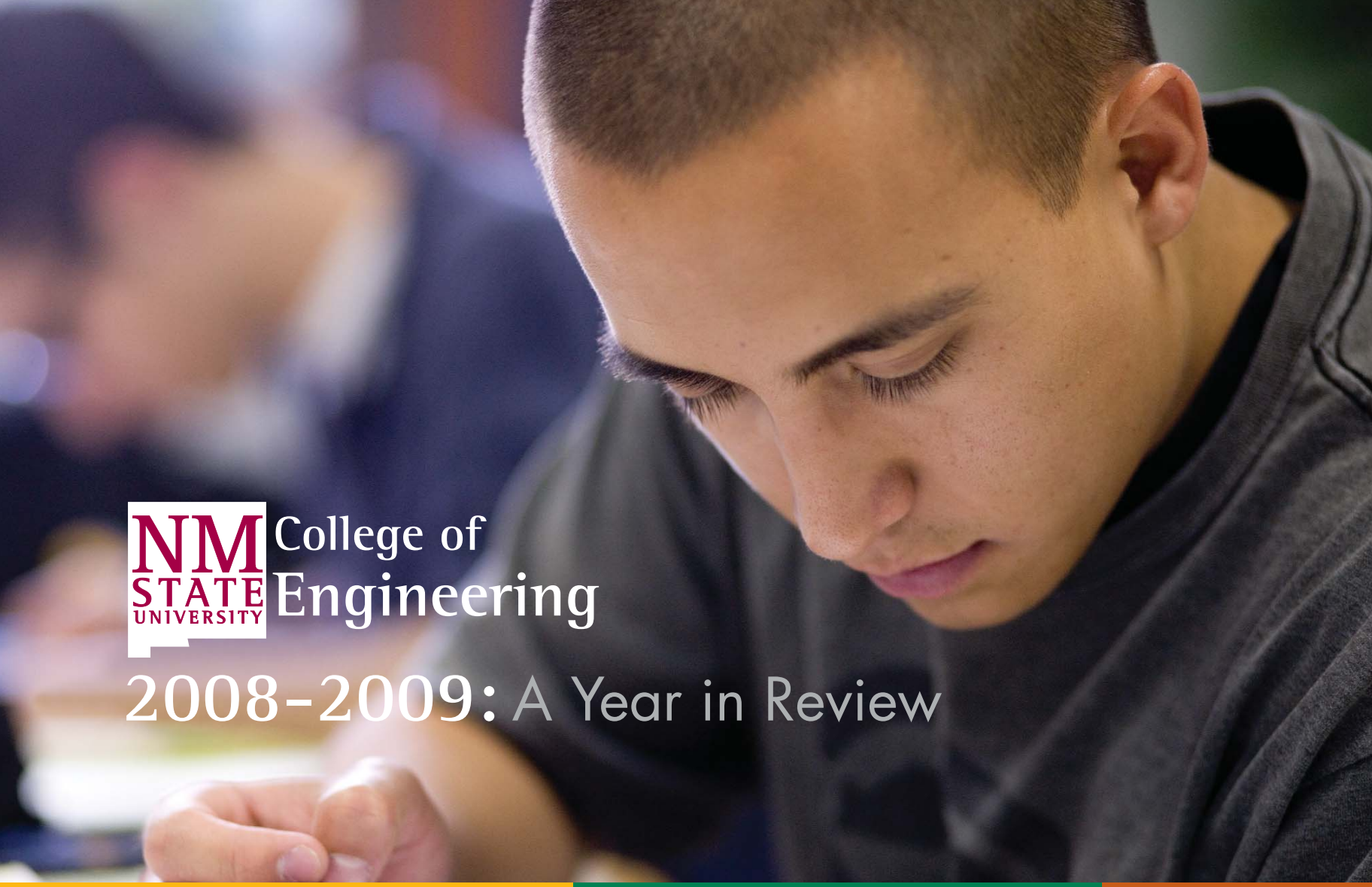


NM STATE UNIVERSITY College of Engineering

2008–2009: A Year in Review

Kenneth R. White
Interim Dean,
College of Engineering
Regents Professor

Mission

The College of Engineering will uphold the land-grant mission of NMSU through nationally recognized programs in education, research and professional and public service.

A MESSAGE FROM THE Interim Dean

Serving as interim dean for the second time in my career (I first served as interim dean in 2002-2003) is a great privilege for me. There are many accomplishments of which we can be proud in the College of Engineering. I'm confident that our successes will continue during this period of transition.

During the past year we have attained many achievements of note. Some of them are highlighted on these pages. I hope you enjoy reading about them.

We continue to work toward our goal of becoming one of the leading engineering schools in the nation. Several measures indicate that we are making progress: the college is ranked 62nd in the nation by U.S. News & World Report's annual evaluation of American graduate school programs—up from last year's ranking of 69th. Further, NMSU is ranked 10th in the nation for total research and development expenditures in engineering-related projects by the National Science Foundation—up from a previous ranking of 14th.

Someone who has played a tremendous role in making great things happen in the College of Engineering was Dr. William C. McCarthy, who passed away in late July. He made his mark in many ways, but perhaps his most significant was serving as an advocate for students with disabilities. His passing is a great loss to all of us.

I'm pleased to be able to lead the College of Engineering during this time. It is exciting and fulfilling to see the many achievements and progress of the college. We have a great team of faculty and staff who are dedicated to our students and this institution. Additionally, we have the support of many friends, alumni and partners which is the foundation for the growth and advancement of the college. We are truly appreciative of all who contribute toward that end.

Sincerely,

Kenneth R. White, Ph.D., PE
Interim Dean and Regents Professor

College Profile

ACCREDITATION

Baccalaureate programs in civil, chemical, electrical and computer, engineering physics, industrial, mechanical, and surveying engineering are accredited by the Engineering Accreditation Commission of ABET, Inc. Baccalaureate programs in civil, electronics and computer, and mechanical engineering technology are accredited by the Technology Accreditation Commission of ABET, Inc.

Commission of the Accreditation Board for Engineering and Technology

III Market Place, Suite 1050
Baltimore, MD 21202-4012
Telephone 410-347-7700

DEGREES OFFERED

Aerospace Engineering (BS with MS and Ph.D. pending)
Chemical Engineering (BS, MS and Ph.D.)
Civil Engineering (BS, MS and Ph.D.)
Electrical and Computer Engineering (BS, MS and Ph.D.)
Engineering Physics (BS)
Engineering Technology (BS, emphasis on Civil, Electronics and Computer, or Mechanical)
Industrial Engineering (BS, MS and Ph.D.)
Information and Communication Technology (BICT)
Information Engineering Technology (BIET)
Mechanical Engineering (BS, MS and Ph.D.)
Surveying Engineering (BS)

STAFF

Tenured Faculty	58
Tenure-Track Faculty	26
National Science Foundation Career Awardees	5
Endowed Chairs	4
Endowed Professorships	14
Research Faculty and Staff	48

RESEARCH CENTERS

Bridge Inspection Program

For more than 25 years, the Bridge Inspection Program has been an important resource for bridge evaluation, bridge inspection training, technology development and broad-based research and development. NMSU offers the only Bridge Safety Inspection training program in the nation.

Center for Space Telemetering and Telecommunications

NMSU was designated as the first Telemetering Center of Excellence by the International Foundation for Telemetering in1987 for the study of telemetry systems, advanced communications, advanced modulation, coding, data transport and equalization techniques.

Institute for Energy and the Environment

The Institute for Energy and the Environment (IEE) is a multidisciplinary research organization focusingon issues related to energy, water, and the environment. Combining the resources of the Carlsbad Environmental Monitoring and Research Center, the Southwest Technology Development Institute, and the WERC Consortium for Environmental Education and Technology Development, IEE conducts research, analytical services, technology development and deployment, and public outreach.

Manufacturing Technology and Engineering Center

M-TEC supports economic development in New Mexico by providing education, engineering, technical and other extension services to constituents at NMSU and throughout the state.

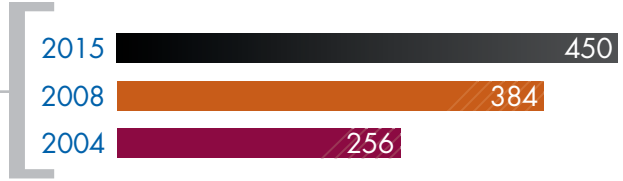
COLLEGE STATISTICS

Numbers for 2004-2005 in the following charts are the baseline for goals outlined in the College of Engineering strategic plan. Numbers for 2015 are targeted goals.

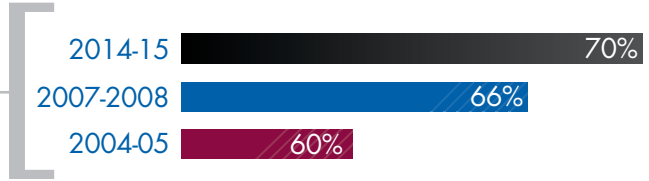
RESEARCH EXPENDITURES

(IN MILLIONS)

FRESHMAN ENROLLMENT



FRESHMAN RETENTION



TOTAL ENROLLMENT

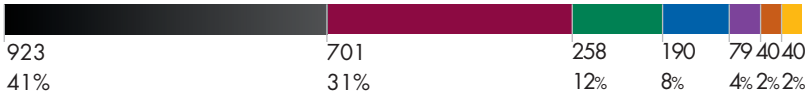
UNDERGRADUATE GRADUATE

SIX YEAR GRADUATION RATE

*GOAL FOR 2015

FALL 2008 STUDENT ETHNICITY

HISPANIC
CAUCASIAN
INTERNATIONAL
UNKNOWN
NATIVE AMERICAN
AFRICAN AMERICAN
ASIAN AMERICAN



FALL 2008 STUDENT GENDER

MALE FEMALE

COLLEGE ENDOWMENT

(IN MILLIONS)

TOTAL GIFTS RECEIVED

(IN MILLIONS)

NUMBER OF SCHOLARSHIPS AWARDED

*THIS INCORPORATES ALL FINANCIAL AID PROCESSED THROUGH THE COLLEGE OF ENGINEERING.

TOTAL VALUE OF SCHOLARSHIPS AWARDED

(IN THOUSANDS)

*THIS INCORPORATES ALL FINANCIAL AID PROCESSED THROUGH THE COLLEGE OF ENGINEERING.

RESEARCH FOCUSES ON ENABLING FLIGHT OF unmanned aerial helicopters

AEROSPACE:

Rocket science in the U.S. had its beginnings in New Mexico. NMSU, already heavily involved in aerospace research, is leading its future with the only degree-granting aerospace program in the state. Some current projects include systems that monitor materials behavior, biomimetrics to understand the mechanisms that allow birds and fish to generate thrust, computer simulation of structural vibrations, nanosatellites, unmanned aerial vehicles, and the development of robotics to control aerospace vehicle maneuvers.

Robots that fly is how Ou Ma, professor of mechanical and aerospace engineering at NMSU, describes the unmanned aerial vehicles (UAVs) that he and his students have been working with for the past two years. These sophisticated vehicles could have wide-ranging applications—from military surveillance to crop monitoring to perhaps, someday, pizza delivery.

"UAVs have tremendous potential for military, industrial and civilian applications," said Ma. "They could be used to gather surveillance information for police. They could be used to survey crop conditions or natural resources. If a national disaster occurred, they could be sent in quickly to assess before humans can safely assess risky areas. Maybe even one day they could deliver pizza in congested urban areas."

Ma runs a UAV laboratory where he and his students are currently conducting three research projects that involve unmanned aerial helicopters. The projects—all geared toward enabling the helicopters to fly without human assistance— are funded through NMSU's Physical Science Laboratory by the U.S. Air Force.

Ph.D. student Khaled Hatamleh is developing a system identification method for identifying the mathematical model of a "desktop" helicopter that is mounted on a test rig directly connected to and controlled by a computer. Data about position, acceleration, velocity, and other parameters, detected from sensors onboard the model helicopter, are communicated to the computer in real-time, as the model moves, to identify or update its mathematical model.

"We need a good math model for proper control of an autonomous UAV—each time we record data the math model becomes more accurate and will result in better control of the autonomous vehicle," said Hatamleh.

Another goal of this research is to supplement the traditional navigation sensors, such as GPS, gyros, sonar sensors and compasses, with small cameras to enhance situation awareness and to enable visual servo control. This is because visual data has much more information about the surrounding environment than any other sensors.

Using another type of controller, Ph.D. student Jesse McAvoy is working with a small radio-controlled helicopter. The Thunder Raptor 90 is equipped with an auto-pilot system that uses electronics that can be programmed to control flight. The goal is to let the helicopter take off, fly to a prescribed location and land on its own.

McAvoy is ready to start testing basic autonomous flight on the helicopter, making it hover in one place.

"We need to develop a good base platform for testing UAV controllers," said McAvoy. "Eventually, we will put Kahled's visual sensor and control system on it."

The group hopes to one day apply their work to a new Yamaha RMAX helicopter that was donated to NMSU by Northrop Grumman this past spring. McAvoy has already made a manually controlled test flight of the $200,000 helicopter. (See related story on page 20.)

In a third project, master's student Carlos Ortega is working with tiny, bird-sized micro air vehicles (MAVs). Because of their small size and power limitations, MAVs usually have little or no payload capability. To avoid crash, a UAV is usually constrained to a mechanical arm for testing its flight control

system, especially in the early test stage. But when an MAV is attached to a test arm, it is not capable of flying. Ortega found an innovative solution to the problem, designing a gravity-balanced arm that can compensate for its weight, so that the MAV can easily fly while attached to it. With such a device, an MAV can fly freely while different types of controllers are tested.

"MAVs are just small flying robots—like artificial birds. These robots are still not very practical because many enabling technologies are still immature," said Ma.

"This research effort is necessary for test driving autonomous flight controllers without a risk of damaging expensive equipment and losing time-consuming work," said Ma. "Some of our models, priced from $50 to $200,000, are too expensive to afford a crash or damage."

Jesse McAvoy demonstrates a gravity-balanced arm created by Carlos Ortega that can compensate for its weight. The arm enables tiny micro-air vehicles to easily fly while attached to it allowing different types of autonomous flight controllers to be tested.

PREPARING STUDENTS FOR the business of power

ENERGY:

We are building on our expertise in fuel-cell technology, renewable resources and electric power systems engineering to address the growing nationwide demand for power. We are examining ways to develop alternative sources of energy and utilize traditional fossil resources to provide cost-effective, distributed electricity to our communities. Our Institute for Energy and the Environment is providing innovative research in alternative energy and water. Our Electric Utility Management Program has been preparing students with the engineering skills and business acumen to serve as leaders in this complex industry for nearly 40 years.

Electric utilities are big business and it takes more than technical expertise to keep them operating. NMSU's Electric Utility Management Program (EUMP) has been educating students with just the right mix of engineering skills and business acumen for this complex industry for nearly 40 years.

"Like it or not, the power industry is unique in that it is regulated at the federal and state levels," said Satish Ranade, director of EUMP and professor of electrical engineering. "People in this industry have to understand the economics and management for the commissions that set the rates and direct these public utilities."

EUMP is a unique graduate program through which students acquire both engineering skills as well as an understanding of the economics, management and societal aspects of the electric power systems. Courses from the College of Engineering and the College of Business Center for Public Utilities comprise the program. Most students in the program, Ranade said, graduate with a minor in economics. The program has graduated 257 students with master's of science in electrical engineering, seven of whom have become CEOs of public utilities. It's the only such program in the country and NMSU is one of only a handful of universities that offers a degree in electric power engineering.

"When Prof. Bill Kersting started the program in 1968, the electric utility industry was growing by leaps and bounds," said Ranade. "The industry had some lean times, but it's growing again and there is a real demand for people with this expertise. In the 25 years I've been associated with the program, I can't recall a student who did not have two to three job offers upon graduation."

Funding for EUMP comes entirely from the public sector, which provides fellowships for students. Many students are hired as interns by sponsors of the program to conduct research.

Currently, they are creating the wave of the future for power production and distribution, investigating the feasibility of microgrids and smart grids, generation of power for a small customer base having their own generation facilities and doing so within federal and state regulatory environments.

"We are changing the paradigm here. It is not very difficult now for people to have wind generators, solar power, batteries for storing energy, diesel generators, and fuel cells at their house." said Ranade. "The electric grid systems of tomorrow will be designed to accommodate this kind of power generation in a reliable and secure manner."

The technology exists to support the next generation of power-grid "smart" breakers, the two-way metering capability, the power electronics, communication and control systems, and safety measures needed to allow small, local generating systems to serve local needs during a utility outage, or to feed power to the larger grid.

"These are challenging times and this model is changing the way we think about power generation," said Ranade.

Left to right: Former College of Engineering Dean Steven P. Castillo, Professor Satish Ranade and U.S. Rep. Harry Teague (D-NM) discuss cutting-edge microgrid research in the College of Engineering Power Lab.

Solar-powered SENSOR NETS MAY BE THE FUTURE OF BORDER SECURITY

INFORMATION SCIENCES:

NMSU is at the forefront of this important area, with funded research in wireless networking, remote sensing, sensor networks, target recognition, speech processing, space communications, and antenna design. Our strengths in information sciences draw from expertise in computer networking, communications, digital signal processing, integrated circuit design, microwave engineering, and optics.

High-tech solar-powered sensor networks being developed by researchers at NMSU may someday be part of the U.S. Department of Homeland Security (DHS) defense arsenal, helping to monitor remote regions of the more than 7,000 miles of border shared between the United States and Mexico and Canada.

Hong Huang and Eric Johnson, from the Klipsch School of Electrical and Computer Engineering, are involved in a six-year study funded by DHS that may lead to increased longevity of sensor networks and minimize the environmental impact they pose. At the same time, they may significantly reduce the cost of the devices.

Wireless sensor networks are spatially distributed autonomous devices equipped with sensors that monitor various physical conditions, such as sound, vibration, motion, temperature, etc. They incorporate wireless communications to relay data to a base station and are typically battery powered.

DHS uses wireless sensor networks to provide unattended, continuous monitoring of remote, inaccessible areas along our borders that are difficult for humans to patrol. By monitoring vibration, for instance, they can detect and differentiate movement that might come from an animal, a human, or a vehicle. They can be dropped by planes and left to do their work where people can't.

"There are some serious limitations," said Huang. "Typically, the batteries last only several months up to a year, and the dead batteries pose an environmental hazard along with the hardware left in the environment."

Huang and Johnson are investigating the use of small, palm-sized solar panels that are commercially available to power the sensors and the wireless communications between devices.

"Our calculations show that these small solar panels can provide one-half-watt of power for seven hours under direct sunshine—enough to power several sensors and extend their lifetime for tens of years," said Huang. "It's a perfect match, especially here in our border region where we have sunshine 360 days a year.

"The challenge is that a randomly deployed device may not land in direct sunshine and it is not feasible to equip them with auto tracking devices to follow the sun according to time of day and year. There are many dynamics that have to be overcome to effectively and efficiently utilize solar power."

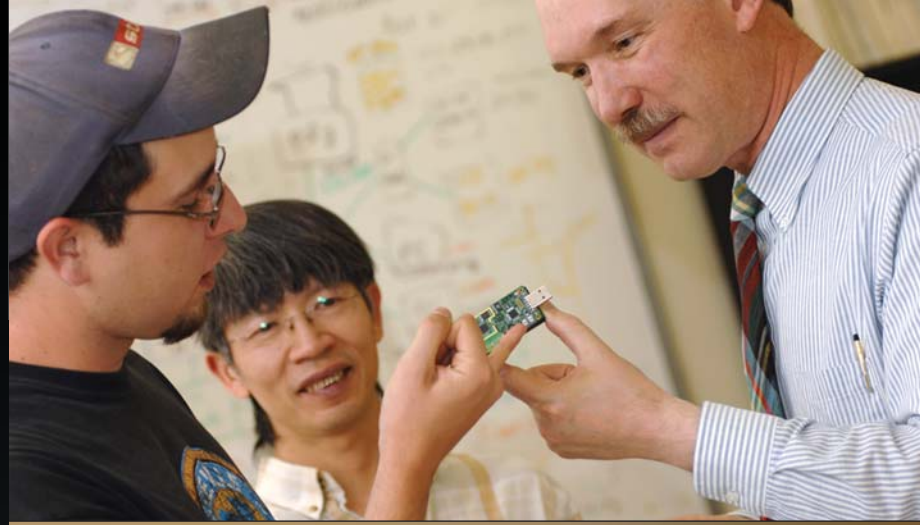
Huang and Johnson are designing a smart, adaptive sensor network that will adjust to the solar power received at various points. They plan to enable the sensor nodes to behave differently, based upon the amount of solar power they have. The solar-rich nodes can take over the burden of relaying data to the base station. Preliminary simulation shows the new method results in energy savings, better performance,

and prolonged life of the network.

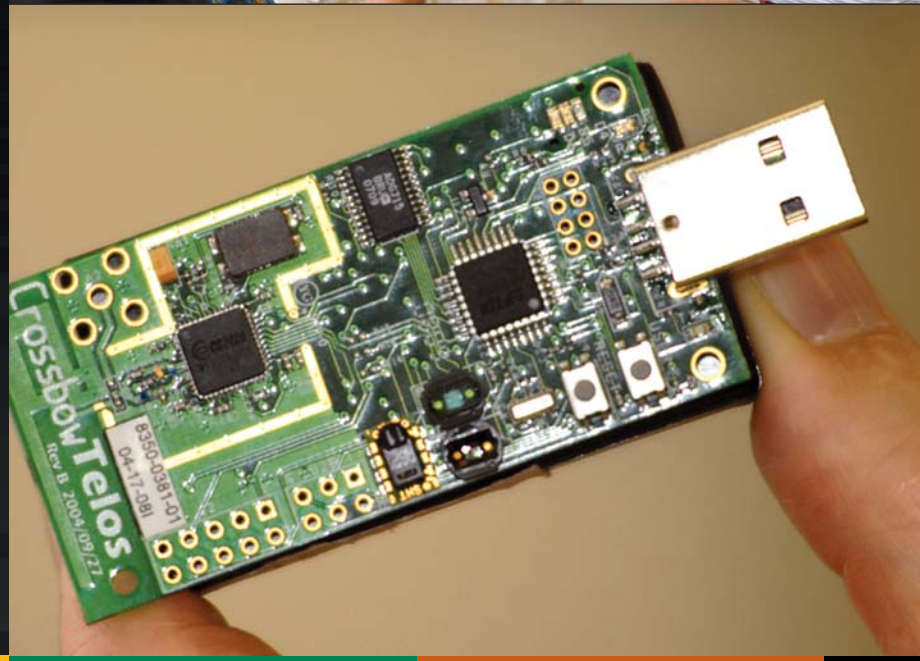
They are also planning to incorporate passive radio frequency identification (RFID), a technology used by retailers, shippers and the military to track inventory and assets. Passive RFID does not require power to transmit data. A network could be composed of many RFID sensors distributed over a wide area that reflect data to a few solar-powered RFID readers/base stations.

"RFID sensors are very inexpensive and this enables them to be used in widespread applications, such as precision agriculture," said Huang. "Incorporating RFID technology can bring the cost down to several cents or several dollars per sensor."

Graduate student Jesus Jaquez, Professor Hong Huang and Professor Eric Johnson, left to right, examine a solar-powered, wireless sensor that can ultimately be used in a wireless sensor network for a variety of tasks, including building automation and surveillance systems.



Researchers are paving the way for miniaturized sensors to become more environmentally friendly and cost effective.



STUDENT ENGINEERS ASSIST NMDOT WITH highway condition assessments

TRANSPORTATION:
NMSU has a 35-year history of research and collaboration with industry through our Bridge Research Center, working to improve the safety and performance of our nation's bridges. This program fostered our world-renowned research in "smart bridge" technology that incorporates fiber optics to monitor bridge performance. Our research also extends to new technologies for improving highway safety, evaluation methods and performance.

"The New Mexico State Highway System affects the life of every New Mexican, everyday," points out Robert S. Young, New Mexico Department of Transportation (NMDOT) pavement preservation engineer.

While the responsibility of assuring the safety of the traveling public on highways in the state lies with NMDOT, civil engineering faculty and students at NMSU make a big contribution toward that end. They inspect more than 7,500 miles of highway every year.

Trained by experienced NMDOT staff and faculty, 12 students spend the summer conducting visual examinations of a portion of every mile of pavement of state roads and highways in southern New Mexico. Their peers from the University of New Mexico inspect the highways in the north.

NMDOT first used NMSU students to evaluate highways in the 1980s, but went back to performing inspections with their own staff. In 2006, they resurrected the program on a one-year trial basis and have subsequently renewed for four years.

"The state of New Mexico is very happy with its partnership with the universities. They're our eyes. This successful partnership frees up NMDOT engineers to concentrate on highway construction and maintenance projects. The NMDOT could use an outside vendor to assess the state highways, but that would likely cost three or four times as much. And we think the data collected by the university pavement inspectors is actually better," said Young.

Equipped with fluorescent vests and hats and using a rut bar, the student inspectors look for eight types of distresses in the pavement surface such as cracks, patches, ruts, and other signs of deterioration. Stopping at every mile marker to examine a tenth of a mile of pavement, the students evaluate and record the severity and extent of the conditions on a scale of zero to three. After the field evaluation, the students input their data in laptop computers and pass it on to the graduate students at the end of each week. The graduate students evaluate the quality and completeness of the data before it is reported to NMDOT.

The data is compiled into the state's annual report on the conditions of its highways and used to determine if routine maintenance or rehabilitation is needed. It can also be used to develop deterioration and performance models that can predict future pavement conditions.

"The accuracy of the information gathered by our students is very important to the safety of the traveling public as well to taxpayers—very important decisions are based on the information that is derived from this data," said Paola Bandini, associate professor of civil engineering who administers the project.

"The pavement condition data collected as a result of the department's Pavement Inspection Program are the factual basis for

making investment decisions affecting many millions of dollars of taxpayer money. The 26,570 lane miles of paved highways in the New Mexico State Highway System are by far New Mexico's largest material investment, worth more than 15 billion dollars," said Young.

A total of 48 undergraduate students have participated in the highway inspection program, along with a number of graduate students.

"It's a hard job—students are traveling all the time and they walk from four to six miles each day in the hot sun. The students gain not only the academic knowledge, but also learn leadership, planning, engineering judgment and reliability—things they don't get exposed to in the classroom," said Bandini.

Paola Bandini, associate professor, supervises civil engineering students who inspect southern New Mexico highways each summer.

Miniaturized sensors COULD BE THE ANSWER TO LARGE-SCALE BIO-SECURITY

WATER:

Our expertise in ensuring water quality and quantity crosses a number of disciplines that address local issues for our arid region but have worldwide application. Such research includes novel methods of desalination, cost-effective methods to remove arsenic from drinking water and the use of satellite data to measure agricultural crop evapotranspiration. Our goal is to combine innovation and technology to provide clean, affordable water today and in the future.

If terrorists contaminated our drinking water supply with a deadly pathogen such as *Bacillis anthracis*, or anthrax, would we be able to detect the toxin before people consumed it and became ill? A team of researchers from NMSU and Los Alamos National Laboratory (LANL) have been working on a technology to improve our detection capabilities.

Using carbon-based nanotubes, they are working toward the development of a sensor that would enable the quick detection of minute amounts of potentially harmful waterborne pathogens, which typically are colorless, odorless and tasteless, before they pose a threat to our communities.

The research project began with LANL and NMSU in 2005 and has grown into a collaborative campus effort amongst the chemical and mechanical engineering departments and the biology department.

The researchers are manipulating the fundamental components of matter, atoms and molecules, to develop the sensor. At the nanoscale, substances behave differently than they do at larger scales. For example, carbon nanotubes—long, cylindrical carbon structures that are 1/100,000 the diameter of a human hair—are remarkably strong and have excellent adsorption and electrical properties.

"Current methods to detect pathogens in water are not sensitive enough to detect small amounts of pathogens in large amounts of water," said Shuguang Deng, associate professor of chemical engineering. "They involve using a membrane process to concentrate hundreds of gallons of water to less than one liter to detect small amounts of pathogens."

Deng, Geoffrey Smith, professor of biology, and Pedro Cortes, assistant professor of mechanical engineering, hope ultimately to develop a pencil-sized device that could be taken into the field and dipped into a water source to give an instantaneous reading.

"Carbon nanotubes have outstanding electrical conductive properties to chemical and biological substances," said Cortes. "You can detect substances attached to the surface through an electrical response picked up by a sensor."

The group removes impurities from commercially produced nanotubes and modifies their surface to enhance the electrical properties so that the active surface is increased and can be adhered to more quickly. The reaction has to be calibrated with a sensor to quantify exact amounts of pathogens detected, eliminating the need for a microscope in a laboratory.

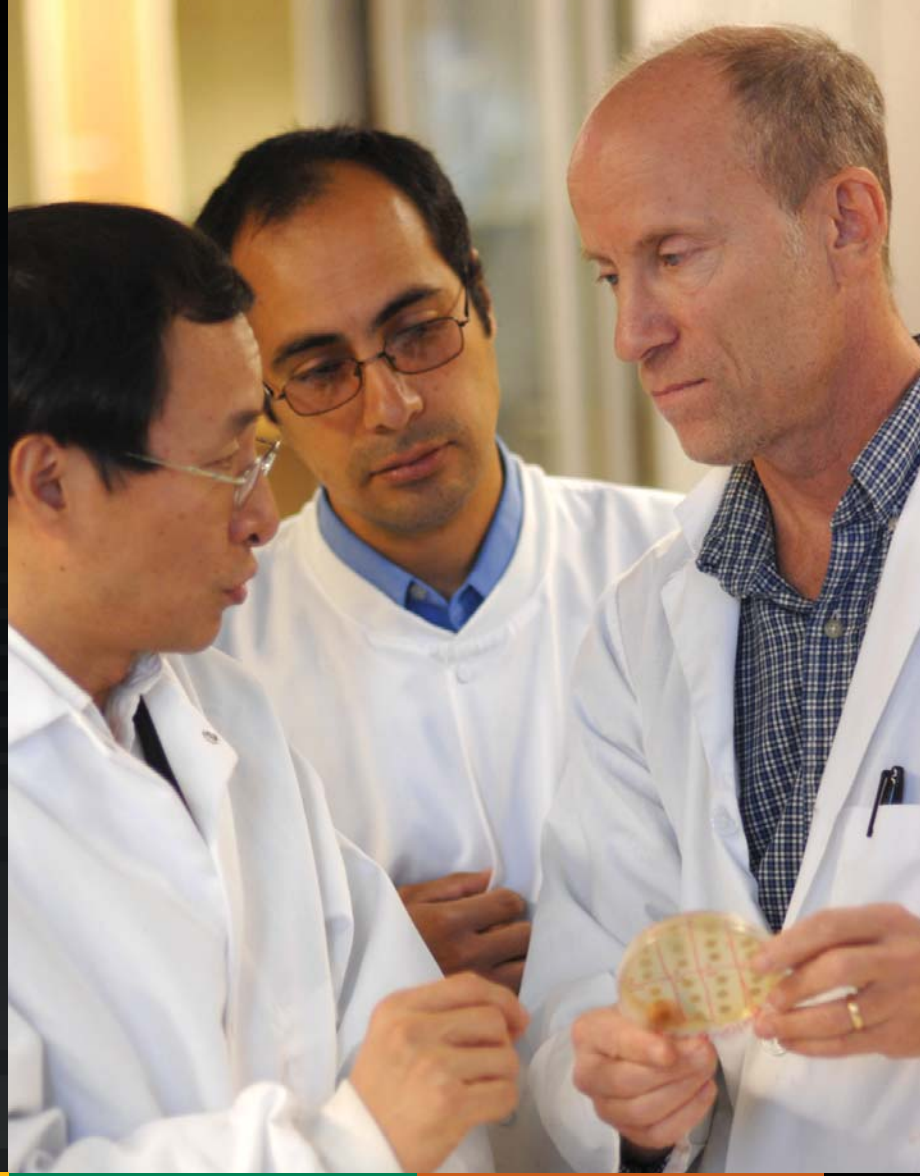
They found that the nanotubes were, in fact, very effective at quickly attracting bacteria and concentrating them: within 30 minutes the nanotubes adsorbed greater than 99 percent of the bacteria.

Differentiating between biological substances in the same water sample poses another problem.

"We hope to develop a sensor that has specific areas that will adsorb targeted pathogens," said Deng. "In the future, we hope to establish a database of pathogens that the sensor could detect. It's a few years away, but there is very real promise that this can be done."

The same technology could also be used to develop a purification process for water or to detect explosives in the air.

"There is huge commercial interest in the use of nanotubes," said Smith who describes this research as some of the most rewarding work he's done in his career. "Aside from the defense applications that we are investigating, there are environmental and medical applications that could be used in our everyday lives."



Left to right: Engineering professors Shuguang Deng, Pedro Cortes, and biology Professor Geoffrey Smith examine grown spores in the presence of carbon nanotubes.

NMSU's Professor Cook WINS PRESTIGIOUS SCIENTISTS, ENGINEERS NATIONAL AWARD

Jeanine Cook, associate professor at the Klipsch School of Electrical and Computer Engineering, was the recipient of the nationally recognized, prestigious Presidential Early Career Award for Scientists and Engineers (PECASE). The award was presented to Cook by President George W. Bush on at the White House.

The PECASE award is one of the highest honors bestowed by the United States government on outstanding scientists and engineers beginning their independent careers, according to the Office of Science, U.S. Department of Energy web site. Individuals can receive only one PECASE award in their careers. And only about 50 individuals throughout the U.S. are selected each year.

"The 50 national winners are a collection of world-class scientists and engineers," said Stephen Horan, professor and department head of NMSU's Klipsch School of Electrical and Computer Engineering. "This is ratification that one of our faculty members is one of the top people in the nation."

Cook's field of expertise is in micro-architecture simulation techniques, performance modeling and analysis, workload characterization, and micro-architectural power optimizations. She directs the Advanced Computer Architecture Performance and Simulation Laboratory at NMSU. She has a bachelor's in electrical engineering from the University of Colorado at Colorado Springs, a master's in computer science and a Ph.D. in electrical engineering from NMSU.

It was her work in performance analysis with a Sandia National Laboratories program that got the attention of Sandia scientists. Cook solved performance problems on some Sandia applications. To determine where the problem was located, Cook had to build a simulator to pinpoint the exact area of the problem. The Sandia scientists recommended Cook for the PECASE award.

Cook's trek through academia has not been easy. Shortly after starting college in 1982, Cook suffered a tragic accident that left her paralyzed from the waist down.

Interim President Waded Cruzado believes Cook has broken through many seemingly impossible barriers as a paraplegic, as a woman, and as an ethnic minority to get to where she is, today (Cook's father is Italian and her mother is Hispanic).

"Jeanine is a prime example of the outstanding faculty talent NMSU strives to recruit and retain to help this land-grant university's mission and commitment to providing the highest quality of education for its students. The NMSU family is very proud of Jeanine's accomplishments and the honor and recognition that she has brought to herself and this university," Cruzado said. "The distinction of receiving the PECASE award demonstrates how women, minorities and persons with physical challenges can overcome the many obstacles placed before them to succeed and exceed in their careers."

Faculty and staff honors:

Jeanine Cook, associate professor at the Klipsch School of Electrical and Computer Engineering

- **Assistant Dean Patricia Sullivan** was appointed by Governor Bill Richardson to serve for a second term on the Western Interstate Commission on Higher Education.
- **Phillip De Leon, electrical and computer engineering professor,** was chosen as a Fulbright Scholar. He taught and conducted research at the Vienna University of Technology in Vienna, Austria, from August to December 2008.
- **Martha C. Mitchell, department head of chemical engineering,** received the Robert Davis Chemical Engineering Professorship.
- **David V. Jáuregui, associate professor of civil engineering,** received the Wells/Hatch Family Civil Engineering Professorship. Additionally, Jáuregui was selected as Higher Education Educator of the Year by the Society of Hispanic Professional Engineers.
- **Charles D. Creusere, associate professor of electrical and computer engineering,** received the NMSU International Foundation for Telemetering Professorship in Telecommunications.
- **Thomas D. Burton, department head of mechanical and aerospace engineering,** received the Robert G. Myers Department Head Professorship in Mechanical Engineering.
- **Edgar G. Conley, associate professor of mechanical engineering,** was selected as a 2008 fellow for the NASA Administrator's Fellowship Program.
- **Igor Sevostianov, associate professor of mechanical engineering,** and co-author M. Kachanov were honored by the International Journal of Solids and Structures as the most cited authors for 2005 – 2008 for their paper entitled, "On quantitative characterization of microstructures and effective properties," published in 2005.
- **David A. Rockstraw, professor of chemical engineering,** received the Engineering Education Excellence Award from the National Society of Professional Engineers Professional Engineers in Higher Education interest group.

NMSU STUDENTS build bridge and goodwill in Mexico

Undaunted by U.S. State Department warnings about travel in Mexico, a group of 12 NMSU students, advisers and community volunteers made the journey to a remote Mexican village during spring break. They came back with blistered hands, sore muscles and fatigue, along with the gratitude of a small Mexican community.

They were on a mission a year in the making: to build a bridge for the 150 or so inhabitants of the village of Las Boquillas, enabling the residents to traverse a stream that floods for several weeks each year, isolating them from food and other necessities. The village is some 30 miles from the larger community of Satevo—about 80 miles southwest of Chihuahua City.

For five days, the NMSU team worked alongside four skilled workmen from Satevo to build a 180-foot-long, 12-foot-wide, four-foot-tall ford bridge. They mixed and transported about the equivalent of four trucks' worth of concrete by hand.

"They thought we were there to party on spring break. It took a day before they believed we were really there to work. By the end of the week, they left us with big hugs," said engineering technology professor Kenny Stevens, adviser to the group.

The students' contribution was not all labor, however. They began the endeavor during last year's spring break, taking the first of three trips to the area. They identified 20 possible projects and chose the bridge project as the one that was most needed, could help the most people and was achievable.

They made detailed measurements and, with the head of public works for the town, sat at a table in a local restaurant and drew out informal plans and materials specifications on a napkin. Subsequently, they spent many hours making formal plans for the project.

"I spent six hours a week, outside of group meetings, working on plans and others in our group put in long hours, as well," said Dorothy Lanphere, a senior in engineering technology. "It was a great opportunity and we learned things we couldn't learn in a classroom."

Additionally, through fund-raising efforts and donations, they raised $4,000 to purchase the cement and rebar used to construct the bridge.

"It was an amazing opportunity for the students," said Sonya Cooper, Engineering Technology and Surveying Engineering Department head. "They had the opportunity to design a bridge, estimate and procure the materials, plan the sequencing of work and logistics. And best of all, they got to work and live closely with the townspeople and see it all come together."

The community provided the skilled workers, who transported materials to the bridge site and began digging the foundation a week in advance. Their progress was slowed when they hit groundwater while digging the foundation, requiring design modifications and additional time to pump the water out. The bridge deck was not yet completed at the end of the week, but the workers will complete the deck.

The seven students who made the trip are members of Engineers without Borders, an organization that focuses on projects that are sustainable and can be maintained by the communities where they are located. Although this was not an official EWB project, the group plans to return for future projects, possibly two a year.

"This was a great start. The best part was having the opportunity to see how it brought out the best in the students and faculty," said Lanphere, president and founder of NMSU EWB. "We hope to be doing these projects for many years to come."

"The town really needs a sewer system," said Stevens

who is planning to spend the spring 2010 semester in Satevo on sabbatical. "Even a low-tech, simple system would cost $50,000-$60,000, which is a bit ambitious for us. We'd like to do something involving renewable technology, perhaps utilizing solar pumps."

A civil engineering environmental class has already begun the design for the sewer system as their capstone project. And the students are already planning fundraising opportunities.

"It was awesome to do something to help people who are in need," said César Villasana, an electrical engineering student who grew up in Juárez. "I could have done other things over spring break, but the satisfaction of knowing that I did something for others—that will stay with me for years."

Students learned to tie rebar and mixed and transported by hand four trucks' worth of concrete to build a 180-foot-long, 12-foot-wide, 4-foot-tall, ford-bridge in Las Boquillas.

Local residents made a daily trip to watch as NMSU students worked with skilled laborers from the village of Las Boquillas, Chihuahua, Mexico, to build a bridge for the community.

ENGINEERING RECEIVES $200,000 RMAX helicopter FROM NORTHROP GRUMMAN

It was kind of like Christmas in February and Northrop Grumman was Santa Claus bringing a $200,000 Yamaha RMAX Remote Control Helicopter to NMSU's College of Engineering.

The state-of-the-art UAV (Unmanned Aircraft Vehicle) is part of Northrop Grumman's overall initiative to advance interest in Science, Technology, Engineering and Mathematics (STEM) careers. NMSU is one of only three universities to which the company donated the helicopters. Cal Poly San Luis Obispo and Cal Poly Pomona also received similar UAVs.

"We are very pleased with the donation of the RMAX unmanned helicopter to NMSU," said Steven P. Castillo, dean of the College of Engineering. "It will give our students an unprecedented opportunity to work on a state-of-the-art UAV platform – both for research and educational purposes."

The RMAX Type II remote-controlled helicopters measure an estimated 12 feet in length by 6.5 feet wide and 4 feet in height. The vehicles are typically used for observation purposes in agriculture and forestry. Manufactured by Yamaha, the remote R-50, with a payload of 20 kilograms or 44 pounds, in 1987 reportedly became the first practical-use, unmanned helicopter in the world to be used for crop dusting.

The vehicle is operated by means of commands sent from a specially programmed personal computer at the ground base to control the helicopter's position, flight direction and speed. It has a flight range of about two kilometers and a continuous autonomous-flight time capability of 1.5 hours at speeds of more than 15-20 kilometers per hour, or 9-12 miles per hour.

"This is known as one of the most advanced remote-controlled helicopters around," said Ou Ma, professor of mechanical and aerospace engineering. "I have been working in aerospace and I know how sophisticated this aircraft is. There are many things we can do with this platform, but we will mainly use it to teach students flight dynamics and control in both component and system levels. On the research side, we would like to use the platform to test new sensing and flight control technologies." Ma's main expertise is in robotics and he believes this will help the students learn the many different components used to create such a system.
(See related story on page 6.)

Jesse McAvoy and fellow students on the UAV team led by Dr. Ou Ma are conducting several research projects aimed toward enabling autonomous flight. One day, they hope to use their autonomous control systems on this Yamaha RMAX donated by Northrop Grumman.

STUDENT ACHIEVEMENTS:

- Kevin Thompson, a sophomore in electrical and computer engineering, was accepted into the Army High Performance Computing Research Center's 2009 Summer Institute for Undergraduates in Computational Science and Engineering at Stanford University.
- Benjamin Walker, a senior in electrical and computer engineering, was selected by the Johns Hopkins University Applied Physics Laboratory in Laurel, Md. to participate in the laboratory's summer internship program.
- NMSU's concrete canoe team took sixth place in the national competition held in Ala. in June. The competition is sponsored by the American Society of Civil Engineers.
- Electrical and computer engineering students Ivan Mecimore and William Fahrenkrog, along with Associate Professor Charles Creusere, received an outstanding paper award from the International Test and Evaluation Association at the Live Virtual Constructive Conference held in El Paso, Texas.
- For the third year in a row, New Mexico State University's Gamma Chi Chapter of Eta Kappa Nu has received the Outstanding Chapter Award.
- Mechanical engineering doctoral student Jesse McAvoy received a national merit-based fellowship awarded by NASA's Graduate Student Researchers Program.
- Luis Onsurez, a mechanical engineering technology major, presented his research project at the national conference for the Society for Advancement of Chicanos and Native Americans in Science in Salt Lake City, Utah.
- The NMSU Flying Aggies once again were selected to participate in NASA's Reduced Gravity Student Flight Opportunities Program at the Johnson Space Center in Houston, Texas. NMSU's Flying Aggie teams have participated in the program every year since 2001.
- The NMSU Chapter of American Institute of Chemical Engineers was named one of 14 outstanding chapters in 2008 and won the 2009 Best Student Chapter Website.

SIGNIFICANT GIFTS TO THE COLLEGE:

- A $240,000 estate bequest was made to the college when Martin V. Trujillo passed away in spring 2008. The gift augmented a scholarship that was established in 1975 honoring Martin's late uncle, Felix C. Trujillo. Both Martin and Felix are civil engineering alumni.
- The Boeing FIRST scholarship of $5,000 per year for up to a total of $20,000 over four years was established to be awarded to a freshman students. The scholarships are the largest ever awarded by the College of Engineering. The FIRST Scholarships are in addition to $22,000 provided by Boeing for engineering scholarships at NMSU.
- Intel provided $50,000 in support of the Pre-freshman Engineering Program at NMSU. The gift augments an additional $20,000 provided by Intel for engineering student scholarships, $10,000 for BEST Robotics and $16,000 in new computer equipment for one of the student computer laboratories.
- The New Mexico Chapter of the American Concrete Institute established an endowed scholarship with a gift of $20,000 to benefit civil engineering students.
- Vectors, Inc., of Denver, Colo., made a gift-in-kind donation of GPS units, receivers, antennas, a data controller and processing software to surveying engineering valued at $29,297.
- Donations totaling $18,820 have been received to fund the Russell P. Jedlicka Endowed Scholarship in memory of the NMSU electrical and computing engineering professor who passed away in early 2008.
- Dr. Edgar and Kathleen Roman established an endowed scholarship in appreciation for the education received by their four children, all of whom earned electrical and computer engineering degrees at NMSU.
- Western Refining donated equipment that measures total sulfur in gas or liquid hydrocarbon process streams to the chemical engineering department. The device is valued at $25,000.

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