

THE BUSINESS REVIEW

VOL. 34 NO. 1

APRIL 13-19, 2007

FOCUS:

ENERGY & ENVIRONMENT



DONNA ABBOTT VLAHOS | THE BUSINESS REVIEW

Timothy Trumbull lectures nuclear engineering students at Rensselaer's L. David Walthousen Laboratory in Schenectady.

Chain reaction

Nuclear engineering students say RPI rep counts big in worker-starved industry

BY ERIC DURR
THE BUSINESS REVIEW

Rensselaer Polytechnic Institute is powering up its nuclear engineering program to help meet a shortfall of skilled workers in a revitalized U.S. nuclear industry.

Nineteen nuclear plants are on drawing boards nationwide and many utilities are extending the lives of the 103 operating re-

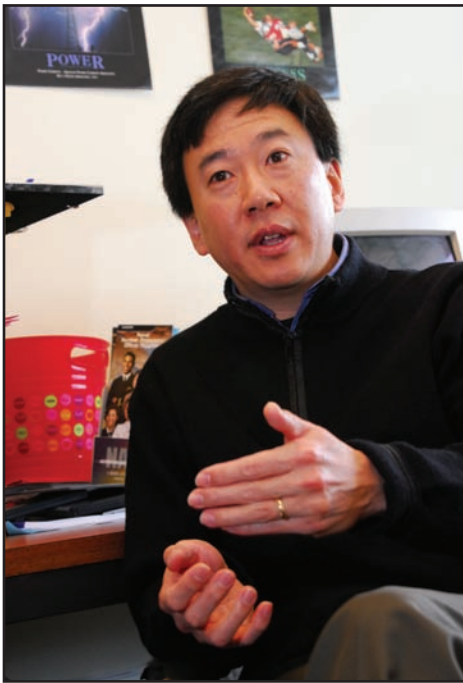
actors in the United States. In addition, the 43 plants planned or under construction in Asia mean work for American component manufacturers GE and Westinghouse.

It's a renaissance for a U.S. industry that had been crippled by increasing costs, complicated licensing procedures and concerns about where spent nuclear fuel would be stored.

At the same time, the American nuclear industry faces a shortfall of 15,600 skilled

workers. Moreover, 32 percent of employees in businesses that supply the nuclear industry are eligible to retire.

"We think it is important to educate engineers and people in nuclear science," said Rensselaer President Shirley Ann Jackson, who was head of the Nuclear Regulatory Commission from 1995 to 1999. "Our students have always done well and there has been increasing demand by students to major in this area. Even when there were



DONNA ABBOTT VLAHOS | THE BUSINESS REVIEW

Timothy Wei, professor and head of the department of mechanical, aerospace and nuclear engineering.



DONNA ABBOTT VLAHOS | THE BUSINESS REVIEW

(From left) Graduate student Jason Thompson, director of the Walthousen Lab, Glenn Winters and senior reactor operator and Rensselaer graduate Jessica Leone in the control room.

darker days relative to the future of nuclear power, we felt it was important to have a strong program.”

A REVIVAL IN THE INDUSTRY

The number of undergraduate and graduate students at Rensselaer has grown to 130 from 76 in 2000. Jackson said those numbers will increase as the university aggressively recruits new students.

With 311 undergraduate and graduates students, Texas A&M University has a larger nuclear engineering program than any of the other 33 American universities that offer that degree.

Last year, 346 students nationwide graduated with a bachelor’s degree in nuclear engineering, according to Larry Blair, of the federal Oak Ridge Institute for Science and Education, which tracks scientific education for the Department of Energy.

Texas A&M and Penn State University led with 31 graduates each. Rensselaer was close behind with 27, although in each of the three previous years, Rensselaer led the pack.

The number of students enrolled in nuclear energy programs has been growing nationally, Blair said.

Texas A&M is recruiting high school and college students throughout Texas, said John Poston Sr., interim director of the school’s nuclear program.

Blair said Rensselaer’s intention to increase enrollment in the program is timely.

“There appear to be jobs for these peo-

ple,” he said. “Recently, in the last two or three years, there has been a revival and discussion about more growth in nuclear energy.”

The nuclear industry was crippled by public concerns about the safety of plants after the partial meltdown of a reactor at Three Mile Island outside Harrisburg, Pa., in 1979. In New York, opposition to new plants resulted in Long Island Lighting Co.’s \$6 billion Shoreham plant being shut down in 1989 without ever operating commercially.

But the industry was also crippled by increasing costs because of non-standard designs, complicated licensing procedures and concerns about where spent nuclear fuel would be stored.

Jackson said changes made by the Nuclear Regulatory Commission during her tenure as chairman, and since, have resulted in standardized nuclear plant designs that are safer and cheaper, and revised licensing and permitting requirements make plants financially viable.

The establishment of a national repository at Yucca Mountain in Nevada was designed to address the spent-fuel dilemma, she said. But the repository has not yet been opened due to Congressional opposition. The “achilles heel” of the nuclear industry remains the lack of an open, dedicated storage facility, Jackson said.

Additionally, increasing demand for electricity heightened awareness of a warming climate make it clear that nuclear power is the only really viable option for carbon-

free electricity production, Jackson said. Recently, and for the first time in 30 years, an early site permit has been given, this one to Exelon, an energy company in Chicago with a site in central Illinois.

“People consider this a major step,” Jackson said.

The 103 commercial nuclear reactors in the United States account for 19.2 percent of the country’s electricity production. Six reactors provide 29 percent of New York’s electricity. Nineteen more plants are on utility wish lists.

Japan operates 55 nuclear reactors, which generate 30 percent of the country’s electricity; 11 reactors are planned and one is under construction. South Korea’s 20 operational reactors generate 37 percent of the nation’s power needs; one plant is under construction and seven are planned.

China operates 10 reactors which generate just 2 percent of its electricity. Five plants are under construction and there are plans to build 40 additional gigawatts of nuclear generation.

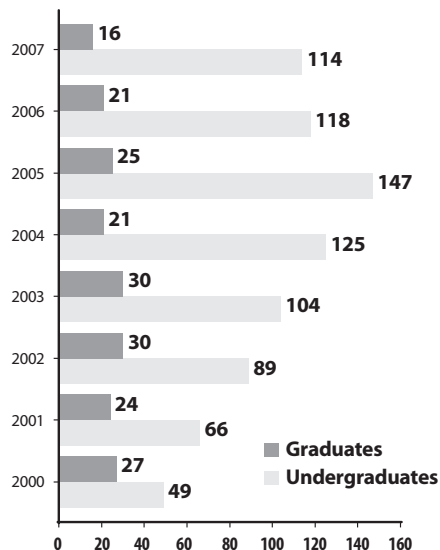
A single nuclear plant normally produces about 1 gigawatt, enough to power 1 million homes.

‘AWESOME’ JOB OPPORTUNITIES

There will be plenty of work for the 114 undergraduates and 16 graduate students enrolled in Rensselaer’s nuclear engineering and engineering physics program, said Timothy Wei, the head of the 1,300-student department of mechanical, aerospace and nuclear engineering.

POWER SUPPLY

RPI Nuclear Engineering Enrollment



Nuclear Industry Data:

Number of states with nuclear power plants:

31

Number of companies operating nuclear power plants: 32

Largest U.S. nuclear plant: Palo Verde, Ariz.; three reactors producing 3,875MW

Newest nuclear plant: 1996, Watts Bar 1 owned by the Tennessee Valley Authority

Oldest operating nuclear plant: Oyster Creek Generating Station, owned by AmeriGen LLC, operating since 1969.

Reactor manufacturers: Westinghouse Electric LLC, General Electric, AREVA NP.

RPI also offers engineering degrees through the Navy's nuclear program, which offers a course geared for naval personnel stationed at the Navy's prototype reactors at the **Knolls Atomic Power Laboratory** in West Milton. About 60 to 70 students enrolled in that program this year, pumping up the number of Rensselaer's nuclear engineering total.

Wei plans to hire three tenured staff members immediately and hire two more over the next two years. The nuclear program is now staffed by six tenured professors and three part-time professors emeriti.

"The bottom line is, we are going to grow the nuclear program," Wei said. "The industry is talking about needing thousands of nuclear undergraduates every year. We need to be producing them."

Jason Ingraham, a 22-year-old senior from Norwich, Chenango County, is looking forward to being one.



DONNA ABBOTT VLAHOS | THE BUSINESS REVIEW

(From right) Nuclear engineering students Jason Ingraham, Vicki Sullivan and Timothy Watson.

He spent the summer between his junior and senior years working for Westinghouse Electric LLC, a major producer of nuclear plants. After graduating, he will join General Electric's Edison Engineering Development Program, where he'll work on a master's degree while rotating among different job assignments, including nuclear plant design.

The job opportunities in the industry are "awesome," and Rensselaer has a good reputation in the industry, which helps lands jobs, Ingraham said.

"When I went down to interview with GE, there were students from every major nuclear engineering university in the United States. It was overwhelming. They were all top-named schools," Ingraham recalled. "I remember feeling out of place because a lot of the other students didn't recognize Rensselaer Polytechnic Institute. It was nice when the head of the engineering department came in and, as soon as he heard RPI, the first words that came out of his mouth were, 'Great school.' It was nice to know the industry was recognizing the school."

Vicki Sullivan, a 22-year-old senior from Colorado who plans to work in reactor-core design at Knolls after graduation, has also found that a Rensselaer pedigree commands respect in the industry.

"I went on three interviews and got three job offers. The program is good and the industry knows that," Sullivan said.

Along with a first-rate faculty, one of the attractions of the RPI nuclear program has been the feeling of community the tight-

knit group has had, said 20-year-old junior Erica Sherman, a New York City resident. She will work this summer in Washington, D.C., as part of a congressional internship program sponsored by the American Nuclear Society.

One of Wei's challenges will be to grow the nuclear engineering program without losing the sense of community that is one of its strengths.

"They are unique and that's something I don't want to lose for them, but I always want to gain it for the rest of the department," Wei said.

While there's a big emphasis on increasing the number of undergraduates in the nuclear engineering program, RPI will continue to encourage new graduate enrollments.

Cathy Romano, a 43-year-old Clifton Park resident, is doing research into fission byproducts for her doctorate. Knowing what results from a fission reaction allows designers to make better and safer reactor cores, she said.

It's that kind of research that will help the nuclear industry revitalize itself, Wei said.

One member of Rensselaer's nuclear engineering faculty, for example, is exploring the use of nanotechnology in reactor design. He's working on materials that are strengthened by exposure to radiation. That could prevent the breakdown of reactor containment vessels over decades of operation, Wei said.

"We will be producing world-class research that the industry can use."

edur@bizjournals.com | 518-640-6818