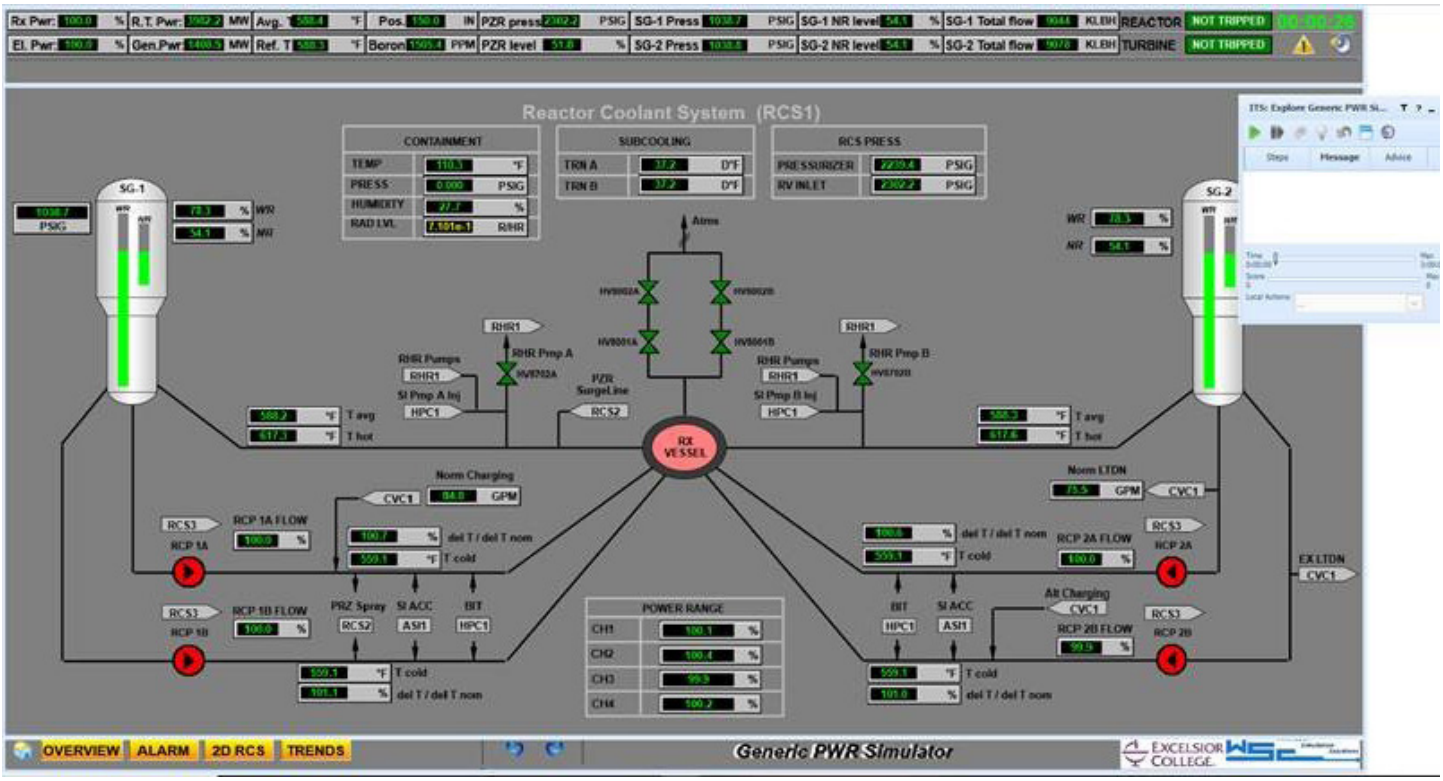


Reactor coolant system for a Westinghouse pressurized water reactor. Students monitor system parameters and observe how the system responds to various transients.

Online College Benefits from NEUP Grant: Funds Allow Excelsior To Offer Degrees to People in Industry and Military

by Paul Menser for DOE's Nuclear Energy University Program

While the COVID-19 pandemic has accelerated the trend, online learning and nuclear engineering have been moving toward each other for more than a decade. One of the leaders has been Excelsior College, an online school based in Albany, New York.

In 2018, Excelsior was able to purchase a generic pressurized-water reactor simulator through a $245,000 grant from the U.S. Department of Energy's Nuclear Energy University Program (NEUP). Used in five required courses in the online bachelor's program, the simulator is an essential tool in helping students understand both basic and advanced concepts.

Michael Johnson, former associate dean of technology in the School of Business & Technology, led the effort for online learning at Excelsior. "When I was in the nuclear navy, Admiral (Hyman) Rickover never believed in simulations," Johnson said. "Students were to run equations." He doubts Rickover would approve even now, but Johnson believes running equations and checking them against simulation results provides valuable information and aids critical thinking.

Johnson has a unique background in that he is a two-time Excelsior graduate himself. His experience dates back to when he was in the Navy, serving as a nuclear limited duty officer in Norfolk and attending night school. Through the base's education office, he discovered that Regents College (Excelsior's original name) would allow him to take exams that would earn him the upper-level credits he needed for a bachelor's degree in sociology.

Once he earned his bachelor's, he stayed in the Navy, refueling reactors aboard the U.S.S. Enterprise while studying for a master's in management at the Florida Institute of Technology's satellite campus in Norfolk. He followed up by earning—online—a doctorate in organizational leadership, but he realized that to get ahead in a technical field he needed a technical degree.

That was when he enrolled in Excelsior's nuclear engineering technology program, earning his bachelor's. The experience was so positive that he stayed connected with Excelsior. While working at a commercial nuclear power plant, he became the school's subject matter expert for thermodynamics and also taught the capstone course in the technology program.

Johnson became Excelsior's faculty program director for energy management in 2014. For three years, he applied his nuclear industry experience to the school's curriculum. Recognizing the industry's demands for structure and attention to detail, he revised the program's capstone course. And, at a conference in 2017, he was able to observe how North Dakota's Bismarck State College was using a simulator. He approached Excelsior's leadership about buying one and was told to go ahead—if he could find the money.

He found NEUP online. Established in 2009, NEUP funds nuclear energy research and equipment upgrades at colleges and universities across the United States. The infrastructure grant to Excelsior in 2018 was one of nine grants totaling $1.96 million. At the time of the award, Johnson called it "an incredible success" for the college, pointing out that other awardees included Massachusetts Institute of Technology, Pennsylvania State, and the University of Florida.

"(This) is indicative of the unrivaled reputation that Excelsior has achieved," he said. "With faculty that have extensive industry experience and now the opportunity to build a world-class online simulator, this puts Excelsior College in the front rank of global centers of excellence in nuclear technology."

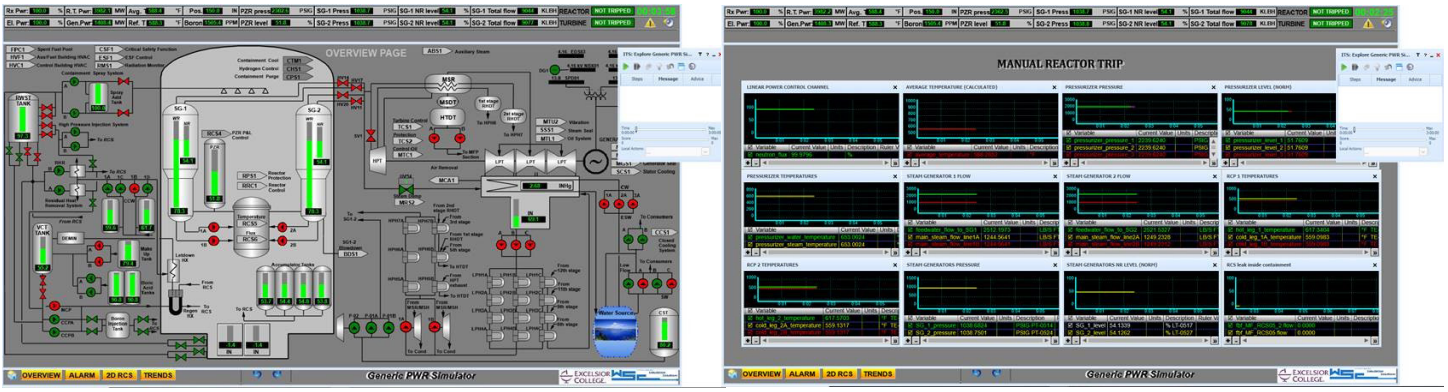
Johnson estimates that between 300 and 400 students enroll in the Energy Management Program each year. The college has partnered with the non-profit Energy Providers Coalition of Education (EPCE), as well as energy industry giants such as Exelon Corporation. Since Exelon joined the EPCE and began offering employees the opportunity to earn a degree from Excelsior, more than 2,200 students have earned a bachelor's in nuclear engineering technology.

Michael Johnson, currently adjunct faculty at Excelsior College.

ABET accreditation (Accreditation Board for Engineering and Technology) means a national non-governmental organization has reviewed the program and found that it meets certain standards for successfully preparing graduates for jobs in engineering and technology fields. For Excelsior, the hardest part of gaining accreditation was convincing the ABET panel that the online learning platform is valid, Johnson said. "We demonstrated to them that online students get more attention and feedback from instructors than they do at brick-and-mortar schools."

Johnson has a special affinity for military service members balancing work with education, especially online learners. "I was in their shoes. I walked in their path to get to where I am," he said. Even as he heads into semi-retirement, he plans to keep a hand in teaching. With so many people retiring from the nuclear industry, there is a definite need for young engineers to fill the ranks.

"I expect it to grow," he said. "I'm keeping an eye on the small modular reactor programs. To me, that's the path."



Students monitor Westinghouse pressurized water reactor system parameters to understand system interrelations (left). Graphical representation of reactor plant response during a reactor scram where students observe the system response and explain why certain parameters change (right).

NEUP Nuclear Energy University Program
U.S. Department of Energy

FY 2021