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Some Engineering Disciplines Have Available Jobs, *Even in this Economy* by MEG BARONE

The reluctance of banks to lend credit more freely and the wariness of employers to make more hires during this stressful and lingering economic downturn have resulted in job losses across virtually all professions. Some professions are beginning to rebound, however slightly.

Take, for example, the engineering field, which encompasses a broad spectrum of disciplines ranging from Aerospace Engineers to Wind Energy Engineers. Some areas are lagging behind in job development, but others are showing signs of life, and some have exhibited explosive job growth and promise for even more work in years to come.

According to industry experts, there are at least a half dozen engineering areas that are making employment strides include environmental engineering, biomedical engineering and chemical engineering.

"Things are looking up. Jobs across the board for chemical engineering graduates are much more abundant than they were a year ago. People are finding better jobs," said Maria Burka, president-elect of the American Institute of Chemical Engineers, or AIChE. Burka also serves as program director and process reaction engineer for the National Science Foundation in Arlington, Virginia.

Within chemical engineering the biggest growth area is safety, Burka said. Also hot is the area of sustainability. The other area, which is critical, is water. "We're running out of good water. There's a scarcity. There are all kinds of predictions that we're going to have serious problems so water is a hot area," Burka said.

Burka suggested chemical engineering is a wise career choice because of the job flexibility, high salary and other perks. "There are opportunities to travel and work all around the world," she said. The willingness of the younger generation of engineers to consider work beyond the U.S. borders opens up an entire world of employment opportunities to them, she said.

The summer 2010 salary survey from the National Association of Colleges and Employers found that "engineering

degrees account for four of the five most highly paid majors among the college class of 2010," with "petroleum engineers receiving the highest starting salary offer - \$74,799. Chemical engineers were next at \$65,628," followed by computer science students, computer engineers, and electrical/electronics engineers.

"While the salaries are high among the class of 2010, the average salaries actually lost ground for all but chemical engineering graduates," the association said in a recent press release. A NACE official said, "Those high starting salary offers reflect the uneven supply and demand that exists for these graduates, even in the current economy."

Chemical engineering is also a great career option because such engineers are not limited to the chemical industry, Burka said. They have infinite possibilities. They can go into micro-electronics, environment-related opportunities and many other fields and positions, she said.

Chemical engineering is interdisciplinary in the sense that people who graduate from such a degree program can work in many different industries, according to Tarek Sobh, Ph.D., dean of the School of Engineering at the University of Bridgeport. They can work in the energy and oil industries, in healthcare/biomedical because they have a thorough knowledge of chemistry and biochemistry as well as biochemical processes and visualization and information technology applications.

"Many of them also can work within the materials sciences, materials engineering," Sobh said. The whole area of biomedical/biological/chemical is very interdisciplinary in nature, he said. People working in this area could be biomedical engineers, they could be chemical engineers, they could be physicists, biochemists, molecular biologists, or biophysicists. "The area is interdisciplinary enough that it allows for a multiple set of credentials to be able to work and produce," Sobh said. The most sought after credential for this field would be a biomedical engineering degree, "but in many cases chemical engineers would do a wonderful job and they have nearly equivalent training," he said.

Evangelos Hadjimichael, Ph.D., former dean of Fairfield University's School of Engineering, and an engineering professor, said engineering, in general, is a good profession or discipline to pursue. "It always has been. It always will be. Technology results from the creative competencies of engineers. Engineers produce new technologies. They always look to the future, not to the past," Hadjimichael said, adding that those technologies generate more than 45 percent of the country's Gross National Product.

"Engineering is probably the highest value-added major that you can have in college," said Roman Kuc, a professor of electrical engineering and associate dean of educational affairs for the Yale University School of Engineering. "A lot of our engineering graduates go on to jobs that are not traditional engineering jobs. Engineers are taught to solve problems. They encounter a problem and they use their mathematical abilities to model this system and that leads to ideas on how to problem solve. Companies, different types of companies, want these skills," Kuc said.

He said a lot of engineering graduates go off into the financial sector because companies in that sector of the economy use software tools and quantitative reasoning.

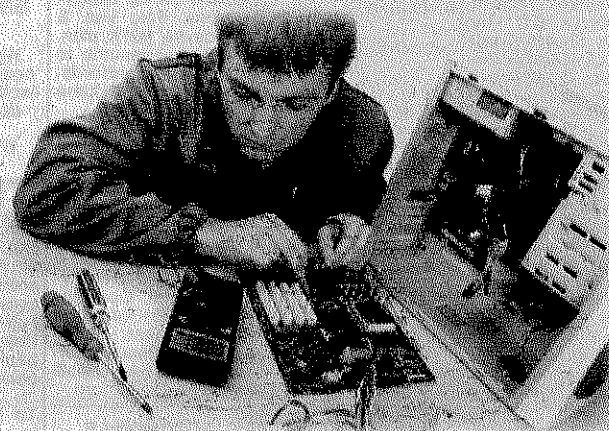
"When engineers work in a particular industry for a long time they begin to specialize and then you get the problem of over-specialization. Engineers that seek jobs in their specialty are necessarily confronted with a narrower job market," Kuc said. If engineers promote themselves as problem solvers, that they have the ability to design, that they have quantitative reasoning skills, then maybe recruiters would not try to fit them into one particular position but instead would see that their engineering skills have other applications that would benefit the company.

It's not enough in this complicated world to specialize in one field. There has to be some integration between disciplines. "Engineering works in collaboration with other fields," Hadjimichael said.

Sobh suggested mechanical, electrical, computing or biomedical engineering students should take complementary courses in areas that are relevant. They could use their elective courses within their bachelor's degree programs to study biotechnology, sustainable development, network security, web and mobile computing and so on. That additional knowledge will better position them for good employment, opportunities he said.

Kuc said people in the engineering field must have the ability to use modern software tools to solve engineering problems, the ability to use math and science to run experiments, and communicate effectively, as set by a consortium of professional organizations and recruiters from large companies.

In the past, Kuc said, engineering students would learn



engineering fundamentals using math and science skills, they would go into a job and the company would train them according to that company's field of expertise. That training could take a year or more. Today, companies can no longer afford to do that. They need employees who can hit the ground running, he said.

"Engineering companies are saying they want engineering graduates to be productive upon graduation. 'When we hire then we want to get value from them,' and so the training period is reduced to a great extent," Kuc said. As a result, engineering education uses software tools that are used in industry so that engineering graduates are more prepared to do engineering design upon graduation.

Sobh sees a trend in job growth of permanent, full-time placement for some engineering disciplines, including sustainable, environmental engineering and greening-related jobs; information technology security; bio-medical engineering; and healthcare information technology. "For this economy that's wonderful," he said.

The latter is not really engineering per se, Sobh said. But people working in healthcare IT come from varying backgrounds, among them computer engineers, IT specialists and computer scientists. "Within the area of healthcare IT management we are seeing permanent job growth," he said. In the area of IT security, particularly the sub-field of security for wireless/IT mobile communications and computing, he is also seeing permanent job growth.

Sobh said mobile media, in general, is really exploding because cell phones and wireless devices are multi-functional. The many competing companies in this field need workers who can develop and maintain various applications.

"We are also seeing job growth in temporary placement, consulting type jobs, limited term contracts," he said. As an example he mentioned a software engineering job or an information technology job for a project of limited duration. The company does not want to outsource the job because of logistics and because of the need for someone in the office. "But the employer is wary of hiring someone on a permanent basis in this economy so they would go with the consulting option," Sobh said.

Sobh said ten years ago the big trend was to outsource jobs overseas, which continues to be the case, but that trend may give way to another in the near future, Sobh said. "As time progresses, the kind of savings that companies used to have ten years ago by hiring a group of programmers or software engineers or software project managers overseas versus hiring them in the U.S. was huge. Now, with the global economy being the way it is and the hourly rates for consulting and even the job placement permanent hiring are flattening out," he said.

In fact, as the standard of living improves in other parts of the world, some companies are thinking twice about hiring overseas employees and making choices closer to home.

Consulting jobs are not necessarily short term. They could be for one year or even longer, and they could result in an offer of permanent employment, Sobh said. "Many of these jobs are projected to turn into full-time. Most companies are hedging their bets. They don't want to hire people on a permanent basis and do that kind of commitment," he said.

Jani Pallis, Ph.D., chairman of mechanical engineering at the University of Bridgeport, said that in the past six months the School of Engineering is getting many more inquiries from companies in Connecticut that are looking to hire.

"We're seeing many more opportunities in all aspects of mechanical engineering, from manufacturing to solar and environmental work to total quality management," Pallis said.