MENTORSHIP: ACHIEVING CAREER GOALS

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Woman Engineer

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ELECTRICAL ENGINEERS
WIRED FOR SUCCESS

Melissa Morin, Bechtel

AEROSPACE & DEFENSE
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CHEMICAL & ENVIRONMENTAL ENGINEERING
SAFE CAREERS AND SAFE SUBSTANCES

WIRED FOR SUCCESS

ELECTRICAL ENGINEERS ENJOY A RANGE OF CAREER OPPORTUNITIES

WHEN KELLY SEILER VOCKE WAS IN HIGH SCHOOL, SHE WANTED TO BE AN ARCHITECT. BUT THEN SHE NOTICED SOMETHING: "ELECTRICAL ENGINEERING WAS EVERYWHERE … EVERYTHING HAS ELECTRICAL IN IT." TODAY, SEILER VOCKE IS AN AVIONICS ENGINEER WORKING ON UNMANNED AERIAL VEHICLES, AND HER STATEMENT APTLY CHARACTERIZES THE BREADTH AND DEPTH OF THE ELECTRICAL ENGINEERING FIELD. FROM MAINTAINING THE ENGINES AT A NUCLEAR PLANT TO DESIGNING LIGHTING SYSTEMS, ELECTRICAL ENGINEERING OFFERS A LIMITLESS RANGE OF JOB POSSIBILITIES.

CONSULTING ENGINEER SEES PROJECTS FROM START TO FINISH

Melissa Morin's work helps get people from point A to point B. A consulting engineer for Bechtel, Morin is working on the Dulles Metrorail Extension in Washington, DC. One of the largest construction projects in the country, this 23-mile extension will bring rail service to fast-growing areas of Northern Virginia and provide transportation from Dulles International Airport to downtown Washington, D.C.

Morin is responsible for station distribution power, or "anything you need to turn on in the station." From working with the power company to the power receptacles in the wall, individual panels to large equipment, cables to lighting, it all falls under Morin's purview.

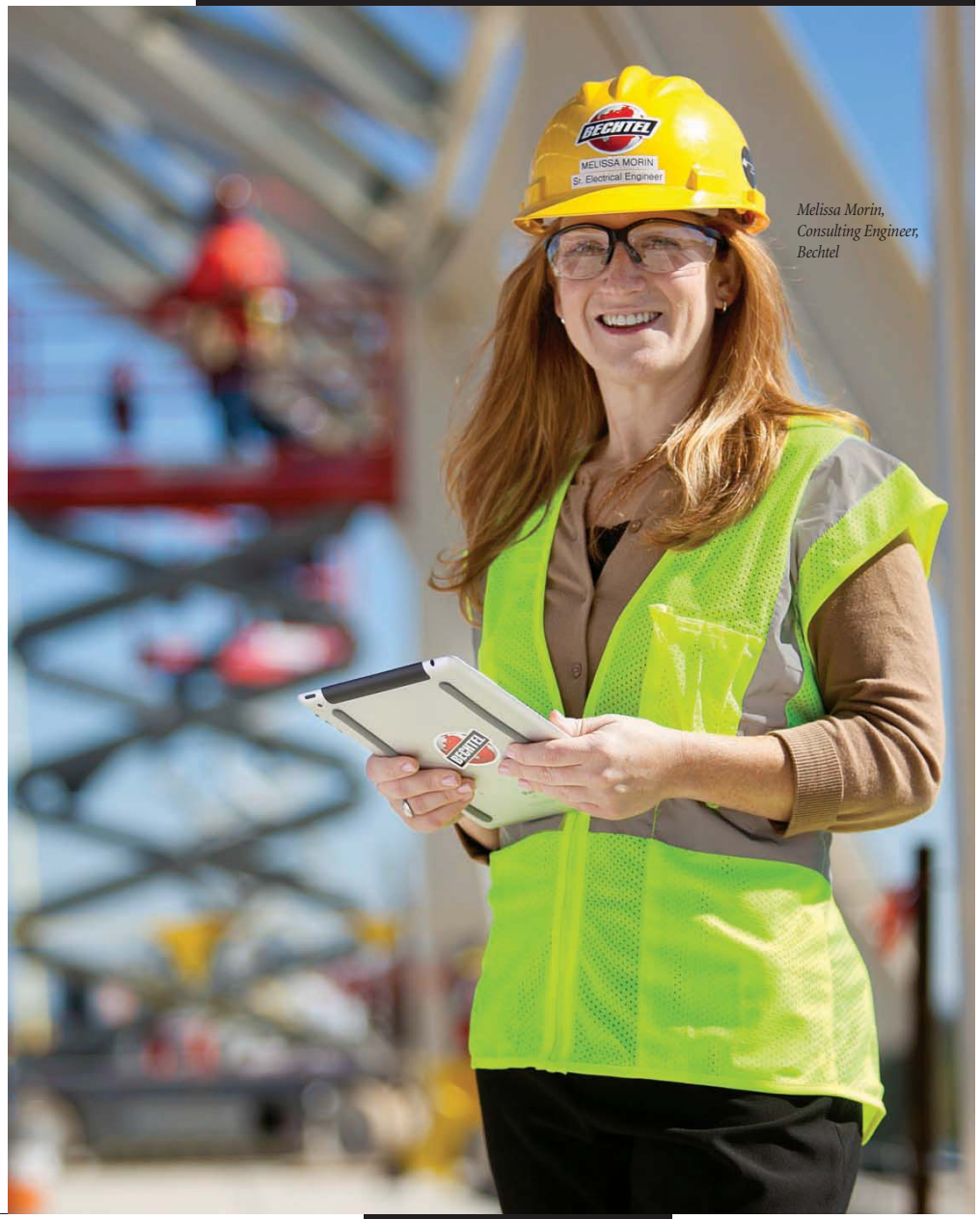
With the company about 18 months, Morin brings a wealth of transportation experience to the project, including work on East Side Access, which connects the Long Island Rail Road to the Grand Central terminal; the World Trade Center temporary PATH; and the Washington Metropolitan Area Transit Authority (WMATA) system, which the Dulles extension will connect to.

While at Drexel University, it was a co-op program that introduced Morin to the transportation sector; in her time with a consulting firm, she worked on an airport.

"I really enjoyed being a consulting engineer, seeing a project from start to finish," says Morin. "You start on paper, then you walk off with an actual airport behind you."

In her next co-op, she worked on a rail project in New York City.

BY AMANDA N. WEGNER



Melissa Morin, Consulting Engineer, Bechtel

Photo: Rich Silva, Bechtel

As it was a defining experience for her career, Morin highly recommends co-op assignments. "Having that opportunity to try out a profession and see how it felt was key to where I am today."

Once a student knows what they want and where they want to go, she adds, "go for that. Once I knew what I enjoyed doing, having time in the field and going to client meetings, I went after those sorts of projects."

She notes that women shouldn't shy away from the transportation and construction sectors; Bechtel, in particular, offers many opportunities to women in engineering.

"You don't have to be worried or nervous about that," says Morin. "A number of my managers are women. If you decide this is what you want to do, there are jobs out there."

An international company, Bechtel has robust college recruitment programs around the world.

Interns are assigned peer mentors, and college hires are assigned mentors outside their departments to help acclimate to the company. Bechtel also offers an employee group, NextGen, for early career hires. The company also works on STEM (Science, Technology, Engineering and Mathematics) programs in elementary schools to get young students involved and interested in these fields.

Morin encourages young engineers to take their FE (Fundamentals of Engineering) and PE (Professional Engineering) exams as soon as possible. The FE exam can be taken during a college student's senior year. After five years of work experience, graduates can take the PE exam to obtain their license.

"The sooner you take it out of college, the better off you are," says Morin. "Colleges don't bring it up a lot, but it's something important for this field."

MAKING EACH PROJECT UNIQUE AT STANTEC

Diane Bookwalter, PE, studied architectural engineer but is now specializes in electrical engineering, designing power distribution, lighting and fire-alarm systems for science, technology and higher education buildings.

An associate engineer with Stantec, Bookwalter started her career as a design engineer. After an opportunity to provide design support on a large laboratory project, she decided she wanted to work with buildings that were more technical in nature.

"Over the years, I have been mentored in the sci/tech field … I now lead the design side of projects, mentor younger engineers and oversee day-to-day concerns of projects in different stages of construction."

Bookwalter's projects primarily include laboratory facilities, academic centers and student union buildings.

Diane Bookwalter, Engineer Associate, Stantec

Her work begins with electrical design, from its point of entry into the building to the end-user equipment. Additionally, she designs fire alarm systems, coordinating with the other engineering disciplines to ensure occupants' safety.

With a master's degree from Penn State with an emphasis in lighting design, Bookwalter is often asked to work on projects where lighting is a bit more complicated.

"Lighting design provides me the ability to 'think outside of the box' and make each project unique."

While she interned at Stantec in college, Bookwalter has been working with the company for more than six years. Stantec, she says, is a great place to work as "the company remembers that there is life beyond work and has really accommodated me as a full-time working mother."

Bookwalter works on a variety of projects simultaneously. For instance, she's been working with Corning, Inc. for the last four years on a new facility and upgrading existing facilities to promote new research. This is an extremely technical project with many engineers working together. And she recently completed a four-story classroom building at University of Massachusetts.

"While this project did not nearly have the amount of engineers working on it as Corning nor was it nearly as technical in regards to specific equipment, it offered a new challenge in coordinating the engineering with the architecture for a flawless appearance."

With all the coordination, "keeping everything organized is definitely a must," says Bookwalter. "You

may have hundreds of correspondence – email, meetings, phone – with multiple entities on a project. To keep all this information straight, I've learned that documenting everything and organizing it where I can find it later is a must. It's simply impossible to remember everything at every stage of the project." Another must in this field is sustainability.

"Owners are becoming more aware of the environment and are more willing to invest in a sustainable design," says Bookwalter. "While we've always tried to create energy-efficient buildings as a practice of good design, we are now seeing owners who want to go a step further and are willing to invest in a green design."

ENSURING SAFE FLIGHTS AT NORTHROP GRUMMAN

While Kelly Seiler Vocke is only responsible for five piece of hardware, they are five very important pieces. They are crucial for navigating the skies.

Seiler Vocke is an avionics engineer with Northrop Grumman, working on unmanned (or uninhabited) aerial vehicles or UAVs. For three years she's been working on the Triton, a surveillance UAV under development for the U.S. Navy and is responsible for everything from making sure her hardware is on order to testing it ensure safe flight. "I make sure they'll work with the main flight computer and they'll talk to each other. I also do troubleshooting and help design the tests," says Seiler Vocke, who has a degree in electrical engineering from Cal Poly San Luis Obispo. "We do a lot of testing before the build, all hardware, wiring and software and run that all before they go to the plane."

Many of today's UAVs use waypoints, or a series of coordinates, each with a set time, speed, latitude, longitude and altitude, to make their way through the airspace. UAVs, she notes, are not allowed in same airspace as passenger planes.

With the company for five years, she began on the Global Hawk UAV, working on its safety and airworthiness, before moving to avionics with Triton.

A robotics enthusiast who helped found Cal Poly's robotics club, Seiler Vocke was particularly attracted to the company and these projects as "UAVs are like flying robots." Initially, however, she wanted to be an architect.

"You have to keep trying or you'll never figure it out," she says. "And you always have to be looking for something new. The simplest designs are the best, but the hardest to make. Complex is easy, but how can it still work if the user can only input three things to make it better?"

She adds: "There is more troubleshooting than design in this job."

As electrical engineers have an array of fields available to them, Seiler Vocke recommends trying "out as much as you can, with internships, clubs at school, design competitions and more. Figure out some way to try it out and see if you like it."

Her love of robotics, plenty of hands-on experience and a number of internships helped Seiler Vocke land a job a Northrop Grumman right out of college. "Real-world experience counts for a lot."

While UAVs are now used for research and the military, Seiler Vocke sees their use expanding in the near future, especially for shipping companies. The FAA and its European counterpart, EASA, have long been developing rules to expand their use.

"In the future, they'll be more integrated, more everyday. I don't know if they'll ever move people around, but it's a great application for shipping. I think that's still a long way off, but that's the thing that everyone in the UAV world is looking forward to."

IDENTIFYING EMERGING ISSUES AT NUCLEAR PLANT

If you're looking for job stability, look no further than nuclear energy.

"The stability of the field is a huge plus," says Shannon Jones, a senior engineer with Duke Energy's 900-megawatt Harris Nuclear Plant in New Hill, NC. "With all the qualifications needed to do the job, it's not easy to replace people when mergers occur. Plus, it's a very long-term energy source."

With degrees in computer engineering and electrical engineering from North Carolina State University, Jones wears multiple hats at the plant. She is Harris' on-site motor engineer, responsible for predictive and preventative maintenance on all motors; the plant's cable aging engineer, maintaining the facility's power cables; and she handles most of the plant's thermography, or heat pictures that help identify

emerging issues. She is also beginning to take on additional duties as a breaker engineer.

Jones joined the company in September 2003. Initially, she was one of just two female engineers; now there are 10. "This industry is really a man's world, but more women are coming into it," says Jones.

A strong engineering background and practical experience are equally important. For instance, Jones has taken several motor courses in the industry and has worked directly with mechanics, as "knowing the theory and how the motors actually work are not necessarily the same thing."

In addition, working in the nuclear field comes with special requirements, such as safely moving in and out of radiation areas, dressing properly and more. Employees, says Jones, must also be prepared to deal with the public.

"It's not uncommon to have a staff with many individuals in their upper 40s, 50s and 60s,"says Jones. "But there are many new and young engineers coming in and bridging the generations and communicating and working together is necessary."

Jones recommends that young engineers seek out a range of experiences and build a breadth of knowledge; in her own experience, she largely focused on small wire, like telecom and logic circuits, in college, which made the switch to big wire (power plants) a "big jump."

A male-dominated field, she encourages young female engineers to make their voices heard. "Don't get uptight if you're only woman in the group. Make yourself known and you'll find success."

With advances in nuclear technology, Jones is hopeful for its future.

"We just need to find a way to deal with the waste," says Jones. "In my lifetime, more reactors will be built, and I look forward to learning the nuances of the reactors."