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Transmissions, Pumps, and Electric Vehicle Chargers

For Adams Baker, it was almost written in the stars that he would pursue a career in engineering. It all began at a very early age, exemplified by a famous story that his mom proudly tells about him. When she could not start the lawnmower, Baker, at the young age of two, waddled over and asked her to turn it upside down. He pointed out that the blade had been removed to be resharpened.

A few years later, Baker became fascinated by trucks, and little did he know that his first two assignments after graduation would be working on a revolutionary hydraulic hybrid transmission and an industry-first dual-clutch transmission for medium-duty trucks. As a child, every Tuesday, he would race outside to watch the garbage truck, riveted by how the trash was compacted after the men threw it in. “When asked what I wanted to be when I grew up,” he recalled, “I would tell people a garbage man or a lumberjack because they had the coolest trucks!”

As Baker got older, his fascination with machines and mechanical systems continued to grow. He became curious and wanted to understand



Adams Baker

the intricacies of these systems and how they worked. “I would take everything apart that I could get my hands on, and sometimes even get it assembled back together correctly.” He added, “So I knew back then that engineering was my calling.”

Baker’s grandfather played a major role in piquing his interest in engineering. He was an engineer at Bethlehem Steel Corporation, an American steel and shipbuilding company, which was one of the world’s largest companies until its bankruptcy in 2003. He spent hours with his grandfather building transistor radios, multimeters, and wooden bows and arrows as well as servicing

his grandfather’s lawnmower and other equipment.

Education

Baker attended Dartmouth College in Hanover, New Hampshire, United States, to study mechanical engineering and economics after graduation from high school in 2002. He recalled that, during his studies, he coincidentally had fluid mechanics-based internships. “In one internship, I worked on improving the accuracy of a peristaltic pump for mixing drugs for pharmacy applications,” Baker said. “During another internship, I worked on the testing of a multistage centrifugal reverse osmosis pump for the CVN-78 aircraft carrier, which was later named the U.S.S. *Gerald R. Ford*.” Interestingly enough, he found himself once again working with a big, noisy mechanical pump, using reed valves in the air intake for controlling the flow direction of the air to improve the performance of four-stroke dirt bike engines by reducing exhaust backflow.

Upon successfully completing his undergraduate degree in 2006, Baker decided to stay at Dartmouth College to further his education. He enrolled in a master of engineering management program,

a course-based curriculum designed to help engineering graduates gain a better understanding of general business management functions.

Transition From Academia to Industry

Baker was recruited directly out of graduate school by Eaton Corporation to join the inaugural class of its Engineering and Technology Leadership Program (ETLP)—a two-year rotational program designed to develop a pipeline of product design engineering leadership within the company. His first year of the ETLP was spent as a design engineer working on a revolutionary hydraulic hybrid truck transmission designed to improve the fuel economy of United Parcel Service (UPS) delivery trucks.

“It was such an innovative project that was full of design challenges,” Baker explained. “My role on the design team was integrating sophisticated pump/motors into the truck chassis and then performing fuel economy testing at the National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan, on huge truck dynamometers.”

During the second year of the ETLP, Baker’s new assignment was the development of an industry-first dual-clutch transmission for medium-duty trucks, a transmission system that, back then, existed only in sport cars like the Ferrari California. This transmission system was hydraulically actuated and needed a specially designed pump that could produce the right pressure and flow across the entire engine speed. “And once again, I found myself working on a pump,” he recalled.

Upon completing the ETLP, Baker joined the Energy Solutions group, a part of Eaton’s Electrical Sector. His job was to offer consulting services to industrial and commercial customers to help them reduce their electrical consumption. “Besides lighting, much of the electricity consumed in these environments is via motors turning pumps and fans,” he explained. “So, more often

than not, I was once again working with pumps.”

Two years later, he returned to product development as a lead mechanical design engineer for Eaton’s commercial electric vehicle charging products. “I helped develop what was, at the time, the world’s highest-powered electric vehicle charger—a 500-kW product for charging electric city buses in a matter of minutes,” he said.

After a few years of working with electric vehicle chargers, Baker joined Eaton’s sales team for medium-voltage, variable-frequency-drive products, typically used to control the speed of a pump or fan for applications in fields such as mining and petrochemical. “I must have subconsciously missed pumps!” he commented.

This was the first time in his career that he worked on the customer side of a product as opposed to designing it. Baker recalled that this was such an enlightening experience, as it was a great opportunity for him to understand products and problems from the viewpoint of the customer and end user. “This sales role was a great segue into my current position as a product manager of Eaton’s low-voltage switchgear product line,” he said.

Getting Involved in the IAS

Baker got involved in the IEEE Industry Applications Society (IAS) at the encouragement of one of his Eaton mentors, David Durocher, the current *IEEE Industry Applications Magazine* editor-in-chief and a past IAS president. He started attending IAS industry conferences to connect with a number of professionals from various industries and learn the latest trends.

The first IAS conference that he went to was the IAS Pulp and Paper Industry Committee (PPIC) Technical Conference in 2017, an annual event that he still attends to this day. He also routinely attends the IAS Electrical Safety Workshop; IAS Petroleum and Chemical Industry Committee

(PCIC) Technical Conference; IAS and Portland Cement Association (PCA)-cosponsored Cement Industry Conference; and IAS Electrical Safety, Technical, Maintenance, and Projects (ESTMP) Workshop.

Additionally, he is a member of three IAS Process Industry Department committees: PCIC, Electrical Safety Committee (ESafeC), and Cement Industry Committee (CIC). Furthermore, he is a technical paper reviewer for the IAS Power Systems Protection Committee of the PCIC and ESafeC.

Baker has coauthored and presented technical papers at all of these conferences and received a few awards for his work. In 2018, he won the first-place best presentation award at the ESTMP Workshop and the third-place best paper award at the PCIC conference; in addition, the paper he presented at the PPIC conference was published in *IEEE Transactions on Industry Applications*. In 2019, his PCIC paper won the honorable mention paper award. “Attending and presenting at IEEE conferences provides a great opportunity to share the work that our teams are doing to advance the state of the electrical industry,” he explained.

Baker mentioned that getting involved in the IAS is particularly important to him because “IAS is where the rubber meets the road, so to speak.” He stated that, at IAS, the principles of electrical engineering are applied to solve real-world applications by bridging the gaps among academia, research, and industry. Moreover, the IAS provides him with networking opportunities to share knowledge with and learn from industry leaders.

Typical Workday

In his product manager role, Baker’s primary focus is to learn market trends, determine customer needs, and apply this understanding to develop new or enhance existing products to meet the requirements of his customers. To achieve this, he

works closely with all of his customers as well as various Eaton design teams to develop creative solutions to customer problems.

Baker's day-to-day activities span across different functions. He explained, "Some days I may be writing a marketing and customer requirements document; other days I am participating in a product design review," adding that other times, "I am writing technical articles, white papers, or webpage content."

In addition to all of these activities, Baker travels around Canada and the United States to meet with customers to educate them about new products and/or solutions that will help them perform their work more safely, efficiently, and reliably. "Traveling to meet my customers is my favorite pre-COVID-19 part of the role because every meeting is a learning experience and an opportunity to collaborate with my customers to solve their most pressing electrical concerns." He added, "I am looking forward to being able to visit my customers again after this pandemic is under control."

Work Satisfaction

Baker enjoys his job as a product manager because it combines the best of both worlds—new product development engineering and customer interaction. "I can get as technical as I want with our engineers and then translate the technical jargon into clear, understandable benefits to my customers."

Moreover, he likes working in the electrical industry because it is exciting, dynamic, and always advancing. Unlike the common belief that the electrical industry is a legacy and stagnant industry, he believes that it has many opportunities because of the push for electrification and for adding intelligence and communications to all equipment. Baker stated that the entire world is going through a massive energy transition by abandoning fossil fuels and adopting renewable sources of power for homes, vehicles, and industries. He

said, "The electrical industry is a relevant, cutting-edge, and exciting place to be."

Leisure Activities

Baker is an avid outdoorsman, and when not working, he tries to spend as much time as possible outside. "My wife and I do not own a TV, and we do not have any streaming subscription services, either," he said. He often runs or rides his road bike after work on the Blue Ridge Parkway, a National Parkway and All-American Road in the United States near Asheville, North Carolina, where he lives.

On weekends, Baker and his wife hike, backpack, and camp in Pisgah National Forest. They also canoe and stand-up paddleboard down the French Broad River or load their tandem bike up on the car and head to Virginia or West Virginia to ride the Virginia Creeper Trail, New River Trail, or Greenbrier River Trail. On vacations, they try to get farther away, going on adventures like canoe expeditions in British Columbia, Canada, or Maine; trekking in Chile; or climbing volcanoes in Ecuador. "Two years ago, I became a father," he added. "Our daughter Marlowe was born in May 2019, so now I am trying to foster a love for the outdoors in her as well."

Aha Learning Lesson

Baker recalls that, a few years ago, he was in charge of the development of a complex system composed of various relays and other electronic devices. Each device reported its own health status, so he figured this fulfilled the requirement that the system communicate its health to the user.

He was on the cusp of launching this product when, in the course of a discussion, a customer pointed out that it would be helpful to have a system-level indication of health in addition to the device-level status since an unhealthy device would result in the system not functioning. "In retrospect, this is blatantly obvi-

ous," Baker explained, "but it really highlighted for me the need to get to know the customers and their needs so that I could provide a product they wanted to use."

This encounter made Baker realize that, regardless of his role, he must be customer focused to be successful. He stated that this means putting oneself in the shoes of the customers to understand their wants and needs as well as pain points and problems. "This mentality applies even if your customer is internal to your organization, and the product is a service or other output," he emphasized.

Baker went on to explain that sometimes the customer is obvious, like when in a sales role, but sometimes this concept of the customer is more abstract. To explain this, he used an example of an electrical engineer at a petrochemical facility. In this case, the engineer's customer is not necessarily the individual who purchases the petrochemical products; the customer could be the facility itself. It is paramount for the engineer to understand the needs of the facility by working with its stakeholders without making any assumptions.

The same concept applies to design engineers as well, who are often one or two layers removed from the end user. Design engineers could get caught up in creating products and features, thinking they are useful, but they may not actually matter to the end user at all. During the development process, the design engineer may overlook including features that are important to the customer due to a lack of understanding the use case of the product. "As engineers, we often think we know best, but until we really understand the user of our product, we could be overlooking important deliverables," Baker explained.

Advice for Young Professionals

When asked about the advice he has for young professionals (YPs), Baker said, "Own your career!" He added, "Create a development plan and revise

it yearly.” He encouraged YPs to learn what opportunities are available and map out potential career paths. After gaining enough experience, follow the path(s) that best fits you.

Baker also emphasized the importance of actively pursuing relationships with leaders in the industry as well as your organization. “Invite them out to lunch and come prepared with questions and a notebook in hand,” he suggested.

Another important skill that Baker highlighted is communication. He advised YPs to ask for what they want as long as it is a reasonable request. It will take time and experience to advance in your organization, so it is crucial to be patient and stay humble. “Talk to people currently in the roles you may want to pursue, let them know you are interested, and ask them what experiences you need to have to succeed in that role in the future.” He added,

“Take risks and step outside of your comfort zone. Although this may sound cliché, that is how learning and development happen.”

Baker’s final piece of advice is to make time for strategic thinking and planning. “We are all very busy, so it is easy to spend all our time absorbed in tactical activities, such as answering emails, attending meetings, and getting stuff done,” he explained. “Nonetheless, it is important to make time to clear your mind and schedule for creative and strategic thinking.”

He added that big ideas, clever solutions, and holistic thinking can occur only when shutting off distractions and noise and undertaking a concerted effort to make decisions with the utmost deliberateness. “I understand that this is easier said than done, especially in the era of cell phones and constant connectivity; this only means that it is more important than ever to do it,” he said.

Conclusion

Baker stated that he is involved in the IAS because it is crucial for him to stay informed about the latest research and trends in the electrical industry. He pointed out that the IAS provides him with a network of peers and subject matter experts to collaborate with and learn from their vast experiences. Additionally, the conferences that he attends provide him with an abundance of networking opportunities.

The IAS sponsors various industry-focused technical conferences, which provide excellent opportunities for professional development, knowledge sharing, and networking with industry leaders. All IAS members are welcome to attend and participate in all of these events. If you are interested, why not consider coming to one of the IAS-sponsored conferences?



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