Paying It Forward

Steve Maylish • *Chief Commercial Officer, Fusion Biotec*
Mike White • *Chief Technology Officer, Fusion Biotec*

As we progress in our careers, it's interesting to reflect on the times that made a real difference. For us, it was three mentors: one when my career was just beginning, and two when our careers were shifting gears. These highly intelligent people taught us about technology and the medical industry, but more importantly, about mentoring.

Most people will experience ample on-the-job training in their careers; this is not the subject of this article. Mentoring involves an experienced, trusted advisor who values people and their contributions, taking an interest in career development. Mentoring is about "paying it forward."

Design engineers must quickly gain command of the tools and skills needed to independently develop a product as they start their careers. This can be a long, uphill slog at companies where training is little more than "sink-or-swim." For this reason, many recommend to start a career at a large company with established training and on-boarding programs. However, this is typically more suited for the corporate-minded employee, but not necessarily the best course of action for the creative and aspiring young engineer.

A mentor can be invaluable for the fledgling engineer looking to learn as much as possible at the beginning of his or her career. It's difficult enough to land a job, let alone decide whether that job is a good fit. Finding a company working on multiple engineering projects (e.g., contract engineering firms or medical device incubators) that is willing to train new engineers is ideal. This environment usually requires a mentor to step up, because team members must become contributors as soon as possible. If you're sold on engineering design and enjoy being part of a team, finding the right company and mentor is crucial for your career and for professional development. Most people starting out don't realize the importance of their first career job.

Some design knowledge comes from engineering school and some can be learned, but after school, product design is best understood through mentoring. Medical device design is more difficult than most industries because of its complex regulatory environment and patient implications. Quality and compliance are a greater focus in this industry because one bad design can seriously harm patients or devastate a company. (In the 1980s, a heart valve company was ruined by a failure rate of less than 1 percent on one of its valves!).

Mentors also understand the importance of intangibles such as time-saving design tricks, rules of thumb, sources for critical components and materials, industry-specific terminology, and most importantly, how to tie up loose ends in order to finish a project. Companies hesitate to hire "outsiders" because of the tacit knowledge required to navigate U.S. Food and Drug Administration (FDA) regulations like the design control process. Partnering a new engineer with the right mentor can drastically accelerate the learning curve.

Effective mentoring results from a good understanding of roles and boundaries by the experienced employee and the new engineer being mentored. There are important polarities to balance. It's difficult to determine the appropriate level of independence to give the trainee. Technical mentors tend to micromanage. The mentor knows their discipline and it can be painful watching a new engineer stumble through the learning process. However, an overactive mentor not only suppresses creativity and independent thought, but also wastes time being over-involved. Mentors can fall into this trap if they find themselves thinking, "sometimes it's just faster to do it myself."

At the opposite end of the spectrum, misguided managers or co-workers may believe in the "sink or swim" approach. This is not mentoring at all—it could instead be an overworked senior engineer's poor attempt to juggle too many priorities. An effective mentoring approach gives the new engineer considerable freedom and provides frequent check-ins. This allows the trainee to learn by doing as well as apply their own creativity, while the mentor provides targeted knowledge and course correction as necessary. If mentors pay attention, they will learn as much as they teach. Smart engineers have good ideas regardless of experience.

From an experienced engineer's perspective, mentoring can be both challenging and rewarding in the best circumstances. It's likely to be a negative experience if considered an unwanted distraction. If regarded as a way to pay it forward or a learning process, it should be positive. Mentors should strike a balance between hands-off and micromanagement. If done well, mentors will earn a lifetime of goodwill and gratitude for their efforts.

There are 10 good ways and 10 bad ways to solve a problem. If the new engineer comes up with a good method not in line with the mentor's thinking, the mentor should be open to alternatives. Don't just shoot down the idea. At the same time, don't just let a trainee crash and burn. There's a significant difference between mentoring and hands-off training. It's like teaching someone to ride a bike; success is not about how well you hold them upright, it's about how quickly they ride away on their own.

Mentoring should be a volunteer activity for those interested in teach-

ing and giving back. It should be part of the planning process and allowed for in one's schedule. If not, it can easily devolve. Mentoring requires patience and occasionally slows down productivity. The trainee should be open to new ideas, be interested in learning, and willing to accept constructive feedback. It's a time to accelerate one's learning curve, build business relationships, and reach the next level. Think of this time as a continuation of your schooling. College laid the foundation—getting experience provides the know-how.

The relationship should be a two-way street where the mentor also learns from the trainee. For example, a new engineer at a diagnostic company used Arduino microprocessor boards (used in her school) to run a lifecycle testing fixture, rather than a typical programmable logic controller. She taught the manager how to utilize them in a day, and the Arduino saved time and thousands of dollars when the manager designed and built the next larger-scale fixtures.

Mentoring can also be part of company culture, so everyone in the company supports the effort. It should fit into a long-range vision to develop engineering talent or specialties that will differentiate the company. For instance, if a company is concerned about maintaining an edge in diffusion bonding of plastics, mentoring is critical to keep a competitive advantage.

Student internships are another way to pay it forward, because they benefit both interns and companies when a program is well thought out. However, internships differ in that they require discipline in recruiting, project scope, and follow-up. Interns gain experience and skills through mentorship from experienced co-workers and companies benefit from their energy and creativity, versed in the latest techniques and unfettered by a bureaucratic mindset. Internships can also be practical to help screen future positions.

Conversely, internships may fall prey to the common pitfalls of unproductive or one-sided results. Expecting or planning too much is a formula for disappointment. By focusing on a few key elements, companies can avoid these pitfalls and provide value to both interns and themselves.

The first element is hiring the right person for the job. One large medical device company recruited summer interns for a product design group. One had perfect grades from a top school, but not much hands-on experience and was not successful at completing assignments. The other, who had less-than-perfect grades, designed products as a hobby outside of school. Her internship was far more effective and she was hired after graduation. Internships should be viewed not only as a source of labor, but as a talent funnel. A three-month internship is a highly effective job interview.

The next, most important aspect is project choice. A good project is straightforward, with well-defined success criteria and visible milestones. It should not involve special tools or software to be learned prior to the project. Especially in FDA-regulated industries, projects should be selected without a requirement to complete extensive training or regulatory certification.

On one occasion, an intern attempted to redesign a heater system with custom-designed, plastic molded parts, which required custom parts, supplier selection, and a lead time to build molds. Unfortunately, despite the intern's hard work, the project was never completed. Another, more successful intern designed and built a pneumatic test fixture from off-the-shelf components—a challenging, but still achievable project. (Be advised: hiring an engineering intern to clean up a database doesn't benefit anyone.)

The final important part of an effective internship is planning and infrastructure. This can be simple, but should be well organized. There should be a hiring calendar that is coordinated with typical college recruiting fairs and timelines. The tools, computers, IT access, and workspace should be ready and waiting on day one. If possible, make available a quick-start guide for standard practices and tips on how to get things done. To close the loop, interns should have regular check-in times with their manager at least weekly to review and adjust project milestones.

Internships can be valuable, but they aren't for every company. Consistent success demands a well-organized, multi-year program that focuses on fit, project selection, infrastructure, planning, and feedback. The expectation should be completing simple project work, the intern learning through mentorship, and creating a long-term recruiting funnel. If a company has the correct resources, an internship program may be worthwhile in order to hire exceptionally smart, driven college students.

As opposed to on-the-job training by a supervisor or manager, a mentor supports and teaches someone to be successful in their chosen profession. An altruistic mentor finds fulfillment in making a difference in someone's life—a great way for experienced engineers to pay it forward and new engineers to start creative and exciting careers. Research shows early "wins" can produce a lifetime of success. Engineers always remember their mentors, and the goodwill lasts a lifetime. ❖

Steve Maylish has been part of the medical device community for more than 30 years. He is currently chief commercial officer for Fusion Biotec, an Irvine, Calif.-based contract engineering firm that brings together art, science, and engineering to create medical devices. Early in his career, Maylish held positions at Fortune 100 corporations such as Johnson & Johnson, Shiley, Sorin Group, Baxter Healthcare, and Edwards Lifesciences.

Mike White has been consulting in the medical device industry for the last 16 years. Most recently for Beckman Coulter, he built a value engineering group from one to 53 employees in three years, and received his Value Engineering/Value Analysis Master Blackbelt. Before Beckman Coulter, White patented and developed a novel surgical navigation system for hip replacement surgery. Prior to that, he worked for General Motors for 13 years.