

Hiring the Newly Minted

A design instructor discusses what to look for in hiring an engineer right out of school, and whom to ask for a word of reference.

By Ronald Rorrer

Hiring anyone, especially a graduating student, for a full-time position is akin to marrying your significant other who just happens to have the world's best divorce attorney. If either of you has made a poor choice there will undoubtedly be pain and suffering for both of you in the future.

While an employer will be frustrated when draft picks do not fulfill their promise, be assured that an employee is also frustrated when success as a student does not translate to success in the working world. Thus it behooves both parties to choose well.

Educators are often amazed when an engineering manager extols the virtues of a graduate whose performance as a student was uninspired at best. It has taken me over 15 years as a university professor to gain a modicum of insight into why success in college so rarely correlates with success in industry.

Since the mid to late 1970s success in undergraduate mechanical engineering courses typically goes to students who

possess good analytical mathematical skills and the ability to work alone on single-solution, convergent problems. At most colleges and universities students work alone until they embark on the senior design sequence.

Many students with high grade point averages have never had another student help them with study or homework. These students are not experienced in incorporating others' viewpoints into their own thinking, and that is a flaw that becomes apparent when they have to work with others. Many of my

poorest-performing senior design teams have been composed of the highest GPA students. One team had three of the top students in the senior class, who would not listen to anyone, especially each other.



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Another candidate for failure in the business world is the honors student who maximizes his return on investment by working on his other courses with the expectation that the rest of the senior design team will do the work. This happens every year. Not working for the team violates the engineering code.

But often the low-GPA student excels on the design team and in the workforce. How? Because the most important sets of skills are quite different.

Few industrial engineering positions require the technical rigor required in the undergraduate curriculum. Many engineers will independently solve neither a calculus nor differential equation while working in industry.

A Success Story

A student (let me call him Frank) who had the lowest GPA in the senior class one year was working on a team with a few students who had the highest grade averages. He came to my office to express his concern. I was concerned, too, and we decided that he should concentrate on helping out everywhere he could.

One night, when I went with another student to the laboratory to help work on a problem, there was Frank, waiting. He smiled and simply said, "I knew you needed help." In fact, he was helping everyone on everything and ultimately secured a large donation for the project.

A few years after he graduated, he visited my office again and told me he was

being sent by his company to revamp a struggling office in another state. He was unsure of his ability to do the job. I told him that, of course, he could do it, just as he demonstrated that he could accomplish objectives on his senior design project.

A few years later, he informed me that his company wanted him to go to another location and do the same thing all over again.

Approximately half the time, the best senior design teams in our department do not contain honor students. I have had faculty ask me which is the best team and then tell me that the best cannot possibly be so, based upon the individual performance of the team members in lecture courses. We have now identified one of the great disconnects between college and industry.

My recommendation is that, when hiring a newly graduated engineer, you should contact senior design instructors for realistic references. In a previous article in *Mechanical Engineering*, I discussed using the senior design report as a tool to evaluate a candidate (August 2003). I believe that the senior design sequence, as much as a college course can, reveals the relevant character of an individual with respect to an ability to work with others and to a future work ethic.

If you call the references provided to you by the candidate, you will speak to instructors who granted the best grade or bonded with the candidate in some other manner. I have had students work for me as an undergraduate and not use me as a reference, because they have inferred, usually correctly, that I will not be a very positive reference.

You can always ask a faculty reference to identify someone for whom the student has worked on a project.

Of course, there are limitations to the senior design instructor's view of students. The instructor can fixate on the manufacture of the product, and ignore the overall process of design, working in a team, and finally the production of the design.

However, the senior design instructor will often have a more accurate insight

into the students as practical engineers than any other professor will. I will spend time out of the classroom with students. Some of that time is spent standing on the sidelines watching them interact and work. They can actually forget I am there.

I can tell you whether or not the individual is capable of showing up for a group meeting or work period on time. When I was in aerospace, it was an offense verging on firing not to show up to a meeting on time, or ahead of time. As engineers we were known for showing that kind of respect to our non-engineering colleagues.

I can also identify the student who, even though not physically hearing impaired, can fail to hear sound waves coming from fellow team members and the instructor. We heard of one

erence once told me that a prospective hire had a problem with women. She was misleading me: the man in question did not have a problem with women. He had a problem with everyone.

She should have said that the individual had a problem with everyone and a particular problem with women. That would have been more accurate. It is clear she was being generous.

Reading the Grade

In addition to the senior design instructor, the grades of both the design and build courses of a senior design project can be helpful indicators of future performance. The build semester is more indicative of future industry performance than the design semester. Here is what a grade in senior design really means.

ment, the student put forth no effort and should have failed. From past experience, however, instructors know that a failed student is likely to go on to sabotage a team the following year. Thus the student is passed, but just barely, in an educational analogue to triage. We would rather the student tell the rest of the world he or she graduated from our department than have to endure the student's effect on another senior design project.

Last summer I visited my alma mater. Two professors of mechanical engineering and I were discussing the declining state of society and academia when one of them told me in complete disgust that the previous spring a few of the seniors received the D- grade. The disgust was not that the students received the grades. As most of you know, university faculty have no issues with doling out low grades with abandon. It derived from the realization that seniors at the end of the program would have so little work ethic and self-respect that they would deserve the grade.

An F grade is never given to a team, but only to an individual. It is virtually impossible for a student to receive this grade. (See the discussion of D-). It takes more effort to foul up and slack off to the degree that will earn an F than it would have taken to actually slide by with a minimum of work and pass the course. This student should never be employed as an engineer. If there were extenuating circumstances that prevented the student's participation, then the student should have withdrawn from the course.

Every mechanical engineering department has students who have evidenced great character under trying circumstances and, more importantly for you, will be great assets to your organization. However, employers often pass these students by as they pursue students who present the façade of being good prospects based upon GPA or other factors.

You just need to dig a little deeper. Call me. Actually call the senior design instructor at a college or university near you. OK, you can actually call me. ■

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of our graduates who would not acknowledge when the manager was talking to him. He lasted a month at that company, which I felt was quite an achievement.

I probably will not tell you that a student goes to happy hour every Friday or about a student's personal life, except in the case of security clearance discussions, but I will discuss performance, such as making or missing meetings, and working or not working.

Potential employers may think that they do not need to call references, or if they do call, they have difficulty interpreting what the references have said. With the exception of the rabidly negative reference, which typically should be discounted because of the obvious bias, most references are actually distorted to the positive side.

Most of us have behavioral patterns that from our teen years do not change—unless there has been a life-changing, near-death experience. A ref-

A grade of A distinguishes the team as having exceeded expectations of a senior project team. While this does not mean that every student performed at the top level, it does mean that the overall team effort was at a high level, and there was no compelling reason to lower an individual's grade from the team grade.

B indicates that the team met expectations for the course. Every individual on a team should be embarrassed to receive a grade below B-, since the grade is usually indicative of an inadequate effort.

A grade of C or below usually is not attributable to technical difficulties that were insurmountable. Those kinds of difficulties are statistically expected by the instructor for a few projects. Students are expected to address them. The low grade is the result of a lack of effort to overcome difficulties.

A grade of D+, D, or especially D- implies that, in the instructor's judg-