

## ME 489 Practices of Modern Engineering

### Group Assignment 2:

**Due February 8 (soft and paper copies)**

Based on your feedback forms, class survey, and personal conversations, **many of you foresee a career in management and business.**

Read and discuss with your group the articles published in ASME Magazine:

<http://memagazine.asme.org/Articles/>

#### 5 Myths

*When it comes to selecting managers, there are common assumptions that doom many to failure*  
February 2009 Issue

#### To a Higher Degree

*How do you decide which advanced course of study is the best option for your career?*  
March 2008 Issue

Additional reference

#### Finding the right MBA

<http://www.economist.com/node/21014607>

Write a **500** word essay in reply to

"Is management just another engineering skill?"

"What do I need to learn and to do to become an effective manager?"

We will also discuss the topic and your comments in class

Luis San Andrés (lecturer)

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## 5 Myths

### FOCUS ON ENGINEERING MANAGEMENT

*When it comes to selecting managers, there are common assumptions that doom many to failure.*

By Steven Cerri

Sooner or later, nearly every mechanical engineer confronts the question of whether to move into management, and every manager is faced with selecting a new manager from the ranks of the engineering staff. By most accounts, this selection process is at best hit-and-miss, with as many new engineering managers succeeding as failing.



I believe the current selection process for new managers is based on myths that don't deliver. There's a better way.

The professional world is filled with myths about what it takes for an engineer to make the transition successfully to manager.

Some say that being able to conduct a performance re-view, or prepare a budget, or develop a schedule, or use Microsoft Project is sufficient skill to qualify for the title of manager. Some say that being able to do your technical work well is sufficient for promotion to manager of a team doing similar work. Some say that being able to inspire others is sufficient. Some say you should get an MBA. There is no shortage of ideas regarding the skills necessary to become a successful technical manager.

But there are five myths that seem to rise constantly and consistently to the top of the list. They are used over and over again to justify the selection of new managers, and over and over again they don't deliver. Let's consider them.

### THE GREAT ENGINEER

One myth states that because you are doing such a good job as a mechanical engineer, you can obviously manage other mechanical engineers doing tasks similar to yours. Because you're a good mechanical engineer and you seem to get along well enough with people, you can probably manage other mechanical engineers. You don't show any obvious personal faults or quirks. You seem to follow directions well and therefore you can probably give directions well.

While this rationale sounds reasonable, nine times out of 10 it won't work. It doesn't work because mechanical engineering and technical management are two separate disciplines. One deals with physical laws, objects, principles, and things that don't have feelings or talk back. The other deals with people—those seemingly unpredictable, emotional, sometimes tired and cranky creatures. To think that because you can deal with one well you can also deal with the other is foolhardy.

## JUST LEARN THIS TASK

Another myth states that if you learn a few basic “concrete skills” like Microsoft Project, or how to conduct performance reviews, or how to develop schedules and budgets, or learn the corporate policies and procedures, then you can be a manager. This myth is based upon the idea that management is a “no-brainer” and that management is dependent upon the successful execution of certain tasks or hard skills—that management is not really a difficult task and any bright person can do it. In this case, you’ve been identified as a bright person and you’re missing only a few skills.

What this myth fails to comprehend is that what keeps new managers from being successful is not the lack of hard skills, but the lack of interpersonal, people skills. Technical management is not about acquiring a few new specific skills. Management is a new career. Management is a new way of thinking and moving through the world. It’s a very different way of focusing on the world from that of an engineer or scientist. That’s why success is not about skills like Microsoft Project or performance reviews. It’s about motivating, and communicating and dealing with people.

## MANAGEMENT BY OSMOSIS

There is also a belief that management ability will come to you if you spend time working with other managers in your organization. This myth is based on the idea that management is not really a discipline but more of an art, which can be passed down to you through corporate teachers—that is, the current managers. Just follow them around, watch them, listen to them, do what they do, and you, too, can become a good manager.

The osmosis theory usually doesn’t work. Training by example succeeds only if you have a good manager to work with who also happens to be a great teacher. A great teacher passes on to you the skills and the thinking processes required for success. The advantage to this approach is that you will learn what the company wants you to know. The disadvantage is that you will learn, and therefore propagate, the management mistakes of your teacher. The reason this method seldom works is that there aren’t many good managers who can teach the why and how of what they do.

## CREAM RISES

A dangerous myth holds that the best manager will appear from a no-holds-barred competition. The rationale for it sounds like this: “We all know that cream rises to the top. Let the management candidates compete against each other and the best leader will appear.” While it is popular in the more aggressive and competitive work environments, I have always considered this myth to be especially dangerous, because it appeals to a chaotic, aggressive mentality that doesn’t train or teach. It is often the downfall of many potentially good or even great managers because they learn that aggressiveness is the key to success in their organization.

This myth postulates that management and leadership are innate, like the fat in milk, and that good managers and leaders are born, not made. Perhaps it is a belief that an instinct to manage is in the genetic code. It puts forth the idea that all an organization has to do is put the combatants in the ring and get out of their way.

I can guarantee you it just doesn’t work. In fact, I have never seen this approach work. It produces a great deal of collateral damage. A lot of management careers are slowed or even terminated by this approach to management selection. (By the way, managers and leaders are made, not born.)

## JUST FOR A LITTLE WHILE

Sometimes organizations assume that anybody can manage a small task. The manager thinks, “We need a short-term manager on this small project. This isn’t a big project. It will be over soon, so you can do this for a while until we find someone more experienced to take it over.”

This assumption is based on the idea that if you are given a small project or a task of short duration, you can’t possibly do any real damage. Your goal is to watch over the task for a while and it will all be okay. Once again,

this is a myth that believes management is not a discipline and that management can be successfully performed with little to no experience. The idea is that it's almost possible to "creep up" on being a manager.

It doesn't work because there is no training, no transfer of knowledge and skill, and no preparation.

## JOB REQUIREMENTS

These five myths don't work because they ignore the fundamental structure required for technical management. The myths ignore the fact that an engineer has chosen a profession that engages in a very individualized process of finding answers to problems.

Management is not about individualized work. It's about teamwork. It's about working with and influencing others. For most mechanical engineers, management is a new career. It's about doing all those things you were not trained for and, in fact, it's about doing all those things you really didn't want to do.

In order to ensure that mechanical engineers are successful in their transition to management, they need training in new disciplines, disciplines that college didn't teach them. In fact, there are four new subjects that must be taught.

Management candidates must understand how they function. This is about self-awareness. When they're dealing with and managing people, managers must understand themselves before they can understand others well enough to manage and lead.

Management candidates must understand how others work. It stands to reason that, if you are going to lead others, you must understand how to motivate and inspire and manage others. You must understand others as well as you understand your technology.

Management candidates must understand that communication is their best management tool. In the final analysis, the only real tool a manager has to motivate, manage, and lead people is communication.

Management candidates must understand that personal flexibility is critical. Many unsuccessful management candidates fail because they are convinced there is but one "right" way to manage. Today's highly successful manager is willing to modify his or her behavior in order to be most successful and effective.

The following is a true story, about an engineer stung by the combination of common myths. John (not his real name) worked for a large, high-technology aerospace firm as a mechanical engineer. He was given management responsibility twice in his 15 years at the company. Both times, it was because he was a good engineer and his manager thought he could handle a small project managing two or three other mechanical engineers. In both cases, John received no training or preparation. He seemed to be a good engineer who got along with other people well enough. It seemed obvious to his manager that he'd be able to manage other engineers doing what he was doing. And this was a small project.

In both management assignments, John felt ill-prepared and, in both cases, he felt he did a poor job as a manager. In both cases, his managers agreed and thought John could have done better, but they didn't understand why he performed so poorly.

The sad point is that John didn't even know what the issue was that caused him to be less than effective as a manager. After these two difficult and disappointing attempts, John was afraid to accept another management assignment. What made him a good mechanical engineer didn't seem to work when it came to management.

It wasn't until John took one of my classes that he began to understand the importance of knowing himself and being good at people skills. What John and his managers didn't understand was that he brought to his management assignment the mentality of an engineer. What John needed instead was the mentality of a manager and leader, something no one had prepared him for.

Once managers and potential management candidates understand the importance of people skills, self-awareness, and communication skills, the selection of the next management candidate is a process based upon

training and the willingness of the candidate to venture into a new area of career development.

College prepared you to be a mechanical engineer. It didn't prepare you to be a technical manager. That's your next career path, if you choose it.

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## To a Higher Degree

### engineering management

*How do you decide which advanced course of study is the best option for your career?*

By Kevin D. Kuznia

The phone rings once again. On the other end is an engineer confused about continuing his formal education. He has been in engineering for a few years. He sees his colleagues pursuing either an M.B.A. or an M.S. in engineering.

While both are noble pursuits, each is a distinct path to follow, with different expectations and outcomes. Theoretically the option exists to pursue both paths. However, such an endeavor is rarely practical, partly because of the expense involved and even more so because of the daunting prospect of spending six years or more juggling graduate study and full-time engineering employment. So how does anyone decide which road to take?



In my endeavors as a career consultant, I work with a steady progression of engineering professionals. These individuals, who thrive on data and analysis, seem to become paralyzed when deciding whether or not to pursue advanced education. To add to the confusion, I often hear, "Well, my boss said..." or, "This guy just got his degree and he got promoted."

But is an advanced education the answer? Frankly, not for everyone. But if it is something you choose to undertake, which degree should you pursue?

Yesterday's engineering careers were a little simpler than today's. Then, you went to college for four years, graduated, and took a job as a junior engineer until you earned the title of advanced or senior engineer. Through organizational tenure, you moved up in the engineering world until perhaps one day you became engineering manager. There was less need to consider advancing your formal education, because nearly everything you needed to know was gained through on-the-job experience, and a few hard knocks. And those M.B.A.'s? They were locked in the business office trying to figure out how to take the company to "the next level."

Today's engineering careers have changed. Not only must you keep up with emerging technologies, but you also have to understand the financial and strategic ramifications of your decisions. When designing parts or systems, you may be peppered with questions from marketing, accounting, and other engineering groups. It would appear that gaining an advanced education may put you on equal footing with these individuals. Having that degree can, and does, level the playing field-as long as you choose the right degree and apply your newly gained knowledge in the correct fashion.

So, let's look at each of these degrees to determine the prerequisites, effort for completion, and potential impact on your career.

## What Is an M.B.A.?

The M.B.A., or Master of Business Administration degree, has been around since the beginning of the 20th century. It is a very popular degree program, attracting people from a wide range of academic disciplines outside of business.

Prerequisites for M.B.A. programs vary. Some programs have very liberal admission requirements. Some require no previous business courses. However, nearly all applicants to M.B.A. programs are required to take the Graduate Management Admission Test. The GMAT is designed to assess quantitative reasoning and verbal skills. Depending upon the university, work experience, academic transcripts, essays, references or letters of recommendation, and personal interviews may be considered for admission to a program. In addition, competitive schools also may be interested in extracurricular activities, community service, and how the applicant can improve the program's diversity and contribute to the student body as a whole.

Full-time M.B.A. programs are the most common, normally lasting two years. Students may or may not enter the program with real-world work experience. The classes are typically conducted during weekdays, like undergraduate university classes. Most students are in their early 20s with few over 30.

Part-time M.B.A. programs are geared toward older working adults. Universities typically hold classes on weekday evenings, after normal working hours. The students in these programs typically consist of working professionals, who take a lighter course load for a longer period of time. These programs generally last three years or more.



Executive M.B.A. (or E.M.B.A.) programs were developed to meet the educational needs of managers and executives, allowing students to earn a degree in two years or less while working full-time. E.M.B.A. students generally have a higher level of work experience, often 10 years or more, than other M.B.A. students. Classes are typically a mix of weekend courses combined with electronic correspondence.

Upon starting an M.B.A. program, a student can expect to take classes in a variety of areas. Core subjects typically include economics, organizational behavior, marketing, accounting, finance, strategy, operations management, and information technology management. Some students may then seek to specialize in an area such as international business, supply chain management, or project management.

An engineer who pursued a management degree is someone I'll call Steve. He was a very successful mechanical engineer for a Fortune 500 manufacturing company and had always had ambitions to become an engineering manager like his college intern mentor. He asked his former mentor what skills would be necessary to move into a management position. He learned that, although technical skills were necessary, business skills also play a big part in management, and so he decided to pursue a master's degree in business administration.

Through his M.B.A. program, Steve learned how to effectively manage people, how various aspects of corporate finance worked, and how the contributions of his department supported the overall strategy of the company. According to Steve, these were all important aspects to a successful engineering management career. Steve is now the vice president of engineering for his company, and suggests that the keys to his success were a solid technical background in engineering combined with business acumen gained from earning his M.B.A.

Upon completing an M.B.A. program, you should be well versed in the language of business. You should have a clearer appreciation of how your actions affect the business bottom line. You should also have acquired a skill set that is applicable to many different types of organizations. In addition, you'll have developed a broad-based network of professionals employed in a variety of industries.

On the negative side, many individuals are pursuing an M.B.A. Differentiation among M.B.A.'s in organizations is becoming increasingly difficult. It will be up to you to apply your newly gained knowledge to stand out among the ever-increasing M.B.A. crowd.

### The Other Path

By contrast, then, what is an M.S. in Engineering? A Master of Science in Engineering takes your undergraduate engineering education to a more advanced level. In the undergraduate program, you became well versed in the foundation of knowledge necessary to be an engineer. You gained the vocabulary, the analytical reasoning, concepts, and principles that engineers must have to be successful in the field.

Students completing the master's degree in engineering typically acquire a greater depth and breadth of engineering analysis skills, enabling them to better understand and predict the performance of engineered systems and components. They should be able to more effectively understand and utilize research on engineered systems and on phenomena integral to their performance. As a result, graduates should be in a position to better contribute to the body of knowledge available to business and industry, and to more effectively solve complex engineering problems affecting their respective organization.

To apply to a master's program in engineering, applicants typically must have a bachelor's degree from an accredited university with a suitable engineering background for the selected area of study, and a minimum 3.0 grade point average in their undergraduate program. Some universities may grant latitude in the requirements if the applicant can demonstrate extenuating circumstances.

In terms of course structure, master's degree in engineering programs usually follow a pattern similar to bachelor's degrees with lectures, laboratory work, course work, and exams. Many universities require the completion of a substantial project in the final year.

Upon completing a master's degree in engineering, you should possess a much deeper knowledge of a specific engineering discipline. You should also have gained new perspectives on emerging trends in engineering, and have developed network contacts who share your passion for engineering.

Consider, for example, someone I'll call Chad. He truly enjoyed his job as an engineer for a large automotive manufacturer. As engineers often are, he was inquisitive, and would often be found reading about the latest advancements in his field of expertise. With encouragement from one of his peers, Chad enrolled in a Master of Science in Engineering program offered by a local university.

Although it took Chad three years to complete the program, he said that it was time well spent. He met several individuals who shared his passion for engineering, and co-authored a technical paper with one of his professors. Chad said that through the pursuit of the master's degree, he is now even more confident in his abilities as an engineer, and finds himself more marketable to other companies.

Unlike the latitude offered M.B.A. students, you will not find the same variety of programs in engineering.



There are very few accelerated master level engineering programs, but you typically will have the advantage of not having to take prerequisites in order to start the program. However, unlike an M.B.A., which may require engineers to take prerequisite business classes before they start the actual degree program, in a master's program in engineering you'll typically be allowed to take master's level classes immediately.

### Which Way to Go?

Neither degree is inherently better than the other. That would be like comparing business to engineering. Each discipline supports the organization in its own way. Each has distinct advantages and disadvantages, and it is up to you to decide which one supports your career objectives more appropriately.

The M.S.E. is marketable, but in a different way from an M.B.A. However, many individuals outside the engineering discipline will have scant knowledge of just how your degree contributes to the organization. The M.B.A., on the other hand, is a widely recognized degree, and many people within and outside of engineering understand how an M.B.A. contributes to an organization's success. Both degrees can contribute to career advancement. It is important to let others know how your advanced education contributes to the goals of the organization.

Deciding to obtain an advanced degree, whether it is in engineering or business, requires a commitment of time, effort, and expense. But more important, the right degree can make a huge difference in career opportunities. I often counsel individuals by saying that investments in yourself pay the highest dividends. It's up to you to decide where the biggest payoff is.

### What about distance learning?

Whether you are considering an M.B.A. or M.S. in Engineering, distance learning has recently received increased attention in education as more universities are holding classes off-campus.

Distance learning programs are available in a number of formats: offline or online computer courses, correspondence courses that utilize e-mail, prerecorded video, and live teleconferences.

Many traditional schools offer these programs, but so do diploma mills. If you're considering this option, be sure to check the school's accreditation before undertaking distance learning coursework.

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