

## **An Analysis of the Career Value of a Graduate Engineering Management Degree**

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### Abstract

The Lockheed Martin Engineering Management Program in the College of Engineering and Applied Science at the University of Colorado at Boulder has been granting graduate degrees for 14 years, and in that time over 200 engineers have graduated. The focus of the graduate program is to prepare individuals who have been working as professional engineers for two to approximately six years for technical management career paths. We have been interested in the value of this degree to our graduates in initially moving into a management position and to the longer-term value to their career advancement. A questionnaire was prepared and disseminated to all graduates from 1988 through 1997, and a second questionnaire is now being processed for graduates from 1998 through 2001. The reason for conducting two different surveys is that the curriculum was significantly changed starting in 1997. In both surveys, information has been sought on the value of our graduate program to our graduates' careers. This paper will report the results of the first survey.

### Background

The program evolved from discussion between the College of Engineering and Applied Science and local industry about the need to provide engineers with a practical set of management skills prior to undertaking early management assignments. High technology companies, such as the then Martin Marietta, were concerned that many engineers were entering management positions responsible for project or development teams or promoted to managers of small departments or work groups with little preparation. Ironically, these opportunities sometimes came as a reward for a job well done for engineering contributions but placed the individual in an awkward position. As Matson<sup>1</sup> and Lancaster<sup>2</sup> have reported, and this author observed while working in industry, engineers usually find themselves very poorly equipped to take on their management assignments. To exacerbate this situation, many individuals cannot leave the workplace for an extended period to obtain the essential management education. In some cases this even extends to attending during evenings and on weekends. Business travel, work crises, and family obligations make attendance at regularly scheduled classes very difficult. Given the above considerations, a flexible and portable graduate program that students can take while they continue working is a highly desirable option.

Based on the issues highlighted above, the program's guiding principles can be summarized as:

- A primary focus on engineers preparing for early management assignments
- A rich mix of relevant management theory and practices
- Flexibility and portability to meet the work and personal demands on students
- A format that effectively engages remote students
- An opportunity to include a technical area of emphasis associated with the manager's functional area
- A provision for an original research project on a management topic

## Curriculum

The original program curriculum is illustrated in Table 1. The core curriculum offered a set of six technical management courses that were highly integrated and provided a solid foundation of knowledge and skills for the new technical manager. Starting in 1997 and continuing through today, the core curriculum has been expanded into three more-focused tracks. These tracks are in quality and process management (the original core curriculum), R&D management and operations management. This significant change prompted us to develop two different surveys to study the career value of our degree. The three technical electives and a final capstone research project are still required.

Table 1. Original Program Curriculum, 1987-1996

<p><b>Core Technical Management Curriculum</b> (18 hours)</p> <p>Management principles and concepts Engineering economics and finance Project management Quality, strategy, and value creation Process management methods Leadership and management</p>
<p><b>Technical Electives</b> (9 hours)</p> <p>Technical courses selected from the College of Engineering</p>
<p><b>Capstone Project</b> (3 hours)</p> <p>Original research project</p>

An alumni survey<sup>3</sup> was conducted for our program by a former student. The purpose of the survey was to determine what had happened to our graduates after leaving the program, and it was focused on graduates who had experienced the original curriculum. A large amount of information was gathered from the 56 surveys returned out of 183 sent out. The distribution of the 56 respondents by year of graduation is shown in Table 2. The skewing of the response distribution toward more recent graduates both reflects our ability to track down more recent graduates and the relatively low number of graduates in the early years of the program. Responses to specific questions relating to career value were extracted for this study.

Table 2. Distribution of Survey Respondents by Graduation Year

Graduation Year	88-89	90-91	92-93	94-95	96-97
% of Respondents	1%	13%	20%	25%	41%

### Analysis

The survey was constructed to obtain specific information on promotions or new jobs obtained after graduating from our program and also information on the value of the program to career objectives. The first question analyzed for this study asked the respondents to rate the importance of several attributes in acquiring a new job or receiving a promotion. This question was part of a larger inquiry into the types of career moves that graduates had made following the attainment of the degree, and as such, the responses were based on the actual realization of a new job or promotion. The response scale was from 1 to 5, with 1 being not important and 5 being very important. Table 3 shows the percent distribution of responses. Not all respondents had taken a new job or received a promotion, and a few had combination of both new jobs and promotions.

Table 3. Importance Ratings of Certain Attributes in Acquiring a New Job or Receiving a Promotion

Rating	1	2	3	4	5
Prestige of a Masters Degree	16%	15%	31%	22%	16%
Engineering Management Degree from an Accredited University	23%	13%	38%	12%	14%
Additional Management Skills through the Program	10%	6%	12%	49%	23%

The second question asked the respondents to rate the value of the program in achieving several types of career objectives. The response scale was from 1 to 5, with 1 being not helpful to 5 being very helpful. Table 4 shows the percent distribution of responses. This question was not related to a specific job or promotion, and as such, there was one response to this question for each survey participant

Table 4. Program Helpfulness Rating in Achieving Certain Career Objectives

Response	1	2	3	4	5
Transition into a Management Position	14%	10%	29%	25%	22%
Salary Increase	10%	20%	26%	22%	22%
More Job Opportunities	9%	4%	21%	43%	23%
Personal Satisfaction on the Job	8%	7%	20%	45%	35%

## Conclusion

The clear message from responses to the first survey question is that additional management skills were quite important to a large number of the respondents for new jobs or promotions. Less clear is whether or not those skills need to be obtained through a traditional advanced degree or one specifically in engineering management. The rather even distribution of the responses on the first two attributes suggests that companies may not be ascribing significant value to the source or nature of the management education. Short courses, seminars, and certificates may hold as much value as an actual advanced degree in management. One could further infer that engineering management may not be held in any more esteem than an MBA or other type of management degree with similar content.

The second question shows that the engineering management degree was a significant contributor in achieving the career objectives of personal job satisfaction and in creating more job opportunities. The author's own management experience in industry supports the notion that the additional technical management education creates a more versatile and flexible employee eventually leading to more diverse opportunities for that individual. However, the <50% positive responses rating the first objective, transition into a management position, may be more telling about the tendency of some companies to promote engineers into management positions based on their engineering performance rather than management aptitude. This is a well-known problem as described above and is precisely why this professional graduate degree was originally created. The fact that 47% did respond favorably to the helpfulness of this degree in making the transition into management indicates that this type of advanced education is valuable in some organizational cultures.

The written comments of the respondents in the comment sections of the survey reveal a high level of satisfaction with the program's emphasis in creating a holistic and integrated perspective on becoming a technical manager. This may well explain the high positive response to the helpfulness of the program in achieving job satisfaction as a manager. However, the written comments also clearly point out this more general nature of the program might be a somewhat of a liability in attaining very specific management positions in areas such as development or operations. These comments support the less than enthusiastic response to the importance of the pre-1997 engineering management degree in attaining a new job or promotion. Starting in 1997 the new curriculum tracks created a higher level of specialization, so it will be interesting to note how the results in the new survey of post-curriculum survey graduates respond.

The two survey questions provide an interesting counter-balance, one that a professional program such as this one struggles to maintain in equilibrium. On one hand, it is important to create perspective and provide insight on the role and function of technical managers in a complex organizational environment, while on the other hand these new managers need skills in specific areas. This first survey provides a glimpse that our program historically has responded much better to the first of these two. It will be important for us to look for indications in the new survey whether or not we have achieved the right balance in adding more specific skills preparation.

## Bibliography

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