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IMSE Alumni Survey of ABET Program Educational Objectives

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IMSE Alumni Survey of ABET Program Educational Objectives

University of Nebraska – Lincoln

January 2006

The Program Educational Objectives represent the expected characteristics of industrial engineering graduates within three to five years of receiving a Bachelor of Science degree in Industrial and Management Systems Engineering from the University of Nebraska-Lincoln. Our objectives specify that an IMSE graduate should be able to:

Objective 1: Design, develop, implement and/or improve integrated systems that involve people, materials, machines, information, technology, processes, equipment, and/or financial resources

Objective 2: Serve as effective change agents in the organizations that employ them, based on strong interpersonal and teamwork skills, an understanding of professional and ethical responsibility, and a willingness to take the initiative

Objective 3: Able to use modern computer software tools to solve engineering problems and effectively communicate results, solutions, and/or recommendations

Objective 4: Obtain professional employment and/or admission to a graduate education program.

Between January 6, 2005 and January 25, 2005, alumni of the Department of Industrial and Management Systems Engineering were solicited for their thoughts on the revised program educational objectives. A total of 76 responses were received for the following questions:

Question 1: The revised educational program objectives match those required of a new student graduating with a B.S. degree in Industrial and Management Systems Engineering.

Question 2: I have been able to achieve educational program objective #1 “design, develop, implement, and/or improve...” in my career and/or continued education.

Question 3: I have been able to achieve educational program objective #2 “serving as a change agent...” in my career and/or continued education

Question 4: I have been able to achieve educational program objective #3 “able to use modern computer software tool...” in my career and/or continued education

Question 5: I have been able to achieve educational program objective #4 “obtain professional employment and/or admission to graduate school...”

Question 6: My degree in Industrial and Management Systems Engineering has helped me to be successful in my career and/or continued education.

Question 7: How closely does your current employment position match what one would typically consider an “industrial engineering” type of position?

Question 8: How has your perception about the industrial engineering professional changed/evolved since you finished school?

Question 9: Please specify the two most useful engineering topics (e.g., engineering economics, operations research, calculus, project management) that have had a positive impact on your career or continued education

Question 10: Please specify two engineering topics (e.g., engineering economics, operations research, calculus, project management) that you wish you had been taught better or had learned more about.

The alumni survey responses indicate ***strong agreement and approval*** for the new Program Educational Objectives. The associated comments will be used by the IMSE faculty to future refine the course curriculum to ensure that we are meeting the needs and demands of current and future students.

**ALUMNI
QUESTION 1****The new educational program objectives match those required of a new student graduating with a B.S. degree in Industrial and Management Systems Engineering.**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Strongly Agree	34	44.7%
Agree	38	50.0%
Neutral	0	0.0%
Disagree	2	2.6%
Strongly Disagree	2	2.6%
Total	76	100%

Comments of alumni who *Agree* or *Strongly Agree*:

- Especially agree with Objective #1. Integrated systems should be the livelihood of Industrial Engr. resources in today's environment; without the need for companies to bring in outside consulting resources to achieve the same results.
- Also, engineering for me (and I hoped this would happen when I was in school) was also a stepping stone to becoming a top executive and then owning a large company.
- As long as Objective one or two includes project management skills.
- I suggest maintaining a focus on industry trends in general and providing the basics of Six Sigma and Lean Mfg.
- I would emphasize key skills for Program Management. In my experience with defense system acquisition, the IMSE curriculum provided a significant leg-up in the management of major systems acquisition. I believe it would also have been valuable for all of the program and project managers who work for the contractors supporting our program.
- Objective #2 is, in my opinion, the most important and most differentiating in today's environment. Engineers must learn to write beyond technical manuals and present beyond senior projects.
- objective 3 is a little narrow - focus on the immediate wrench turning application - need to also understand enterprise wide problems/solutions
- I think that except for the understanding of ethics, objective 2 may be difficult to measure.
- Objective 2 is the most critical for IEs in my organization - being able to manage change using persuasion and cooperation.
- Some students may not understand the meaning of the phrase " change agents" in the workplace right away.

Comments of alumni who were *Neutral*:

No alumni posted a comment for this choice

Comments of Alumni who *Disagree* or *Strongly Disagree*:

- I believe that most IE graduates are nearly completely unprepared for what must be accomplished to return American manufacturing to a leadership position in the world economy. A important example is lean manufacturing or the Toyota Production System. I believe that all engineers (not just IE) should be fluent in these techniques, because they will need to be the drivers of continuous improvement in team based cultures. I continue to be disappointed with US engineering education and there efforts to prepare students in this area.
- the industrial environment has changed drastically from the days of times of a focus on plant layout & time studies
- This is critical in today's business environment.

**ALUMNI
QUESTION 2****I have been able to achieve educational program objective #1
“design, develop, implement, and/or improve...” in my career
and/or continued education.**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Strongly Agree	46	60.5%
Agree	24	31.6%
Neutral	3	3.9%
Disagree	1	1.3%
Strongly Disagree	2	2.6%
Total	76	100%

Comments of alumni who Agree or Strongly Agree:

- During my career, I have been involved with the design, development, implementation and improvements to a wide variety of engineering problems, including manufacturing assembly lines, facility renovations, office remodeling projects, security systems, energy management systems, fire protection systems, machining processes, transferring of manufacturing capabilities between facilities, etc. The Industrial Engineering program at UNL provided the tools to work in a wide variety of areas.
- Bolstered my background with MSEE degree as well. I'm now cost account manager / project lead with oversight of ~ \$ 84 M for a major military SATCOM program.
- Continuing education that really benefited this objective and my career were: Six Sigma, Lean Manufacturing and Value Stream Mapping (VSM).
- This is the core of my job at Hormel Foods.
- Objective 1 is so "wordy", I'm not 100% sure what it means.
- As a fire protection engineering consultant, I work with clients to improve property protection schemes. Design, develop, implement, and improve are four words that describe my day to day job functions.
- I have been using all these tools and techniques in my career and I am teaching these tools and techniques to my students.
- I have done this primarily serving within the IT Function. I have a strong belief that an IE in IT provides a more business oriented view than just a technology point of view.
- I work with all of the items listed in objective #1 on a regular basis.
- I'm currently the Government lead for acquisition of a space system payload, a position requiring competence in all of the skills and knowledge mentioned.]
- Meeting this object has helped me move forward in my career
- Some of my most rewarding professional experiences have been based on the design and development of new systems and products. In the early 1980's I was able to use statistical models and simulation tools to test and verify the performance characteristics of a complex inventory and warehouse system. That system later won several material handling awards for its creativity, design and operational excellence. Later in my career I was delighted to be able to spend several years working with Hewlett-Packard Labs in Palo Alto CA doing research and development on new inventory systems and computer software products.
- Yes - I have continued my education at Northwestern University and earn a Masters of Manufacturing Management degree from their Kellogg business school and McCormick engineering school. My career started as a manufacturing engineer at Caterpillar, then to a factory manager and mutli-plant manager at Cooper Industries, then to a general manager at Carrier/United Technologies and now I am President & COO of a \$200M packaging machinery company. I have learned and used all of the skills above to gain these promotions.

Comments of alumni who were Neutral:

No alumni posted a comment

Comments of Alumni who Disagree or Strongly Disagree:

No alumni posted a comment

**ALUMNI
QUESTION 3****I have been able to achieve educational program objective #2
“serving as a change agent...” in my career and/or continued
education**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Strongly Agree	49	64.5%
Agree	21	27.6%
Neutral	2	2.6%
Disagree	2	2.6%
Strongly Disagree	2	2.6%
Total	76	100%

Comments of alumni who Agree or Strongly Agree:

- Ditto. In DoD, only former Military service would have further enhanced my ability to act as a change agent.
- Team work and communication are very important. One area that is very beneficial in today's work environment is organization. This is not something that is taught but is very relevant in everything we do. It is easy to get overwhelmed with emails, voicemails, mail, etc. Today's work environment is so fast paced that to remain effective, you need a good system to stay organized by deal with all forms of communication. It has taken me several years to realize this. A good source that is helping me through this is "Getting Things Done." by David Allen. I am in no way affiliated to him or his book other then I believer in the system
- The strongest resistance to achieving Objective #2 is learning to break down the cultural barriers that mature companies have formed. The UNL education program should provide extra focus along these lines, in my opinion.
- "...willingness to take the initiative" is the key to this objective. My experience has been that an individual's success in an organization is based more on a "make it happen" attitude (and personal accountability) than technical knowledge and/or ability.
- Akin to my comment for #1, I developed my capabilities here through professional mentoring and trial-and-error. It would have been very helpful to receive formal coaching as part of an undergraduate program.
- has becomes number 1 asset/skill required these days
- every day
- I am constantly causing change in my client's facilities and operations. As the expert consultant, they look to me for guidance and advice and make decisions with large financial resources based partly on my recommendation.
- I have Serve as an effective change agents in my organization and teach my students how to employ them effectively.
- Meeting this objective has helped me move forward in my career
- My IMSE education has helped me be a much more effective champion of business process improvement through integration of technical tools and systems.
- Teamwork has become more important throughout my career, particularly in the most recent years as changes are implemented with shorter lead times and involve a variety of disciplines within the organization.
- This factor is frequently overlooked as an important element by undergrads, yet seems to be one of the more important things in the real world
- This is more true today than it was when I graduated several years ago. Companies that can't deal with change and use it to improve aren't going to be around very long.
- This is my best ability. I attribute this in part to who I am, but also in part to the engineering management courses I took when at UNL.
- This is often the most challenging part of implementing a new design. Any hands-on experience the students could get in this area will be very valuable.
- Working as an Industrial Engineer is almost by definition "serving as a change agent". During my career I have had the opportunity to work on highly diverse teams spanning multiple countries and cultures to implement global best practices for the companies that employed me.

Comments of alumni who were Neutral:

No alumni posted a comment

Comments of Alumni who Disagree or Strongly Disagree:

- I've got very good ideas, but taking time out put "on the table" in front of others has not been very achievable.
- I am responsible and accountable to effect change within my organization.

**ALUMNI
QUESTION 4****I have been able to achieve educational program objective #3 “able to use modern computer software tool...” in my career and/or continued education**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Strongly Agree	30	39.5%
Agree	31	40.8%
Neutral	11	14.5%
Disagree	2	2.6%
Strongly Disagree	2	2.6%
Total	76	100%

Comments of alumni who Agree or Strongly Agree:

- Absolutely, the IMSE curriculum was a significant contributor... focusing on effective use of these tools, not just mastery of the tools and languages alone.
- Agree, but I didn't learn much of this while obtaining my degree.
- I received my undergrad degree in 1985, so things may have changed, but you might consider more emphasis on Statistical Process Control for the Service Industry, which is where I have spent the last 20 years. Also, a basic flowcharting class would be very helpful in this area.
- I see much better skills coming from recent grads that what I left with in '84.
- My computer training was limited to computer programming and simulation software while I attended UNL, as the more modern tools of today were not available yet. I did use those tools my first few years after graduation
- This is hard to stay ahead of. The university must stay in close contact with employers to understand what software employers require the students to know
- This is more my limitation issue than what the UN staff provided me when I was in college.
- Training on business software and especially AutoCad was important for my career.
- I have been using a variety of different software tools in my career and I have been teaching my students these software tools.
- I was selected for my first job after graduation based very heavily on my computer skills. Over the course of my career there were times when my role in the organization required that I rely on "computer experts" in specialized areas to accomplish organizational goals. In today's world being able to quickly learn and use software tools is a basic requirement for communication and organization. Specialized engineering software is best used by a well trained engineer.
- Strong emphasis on Microsoft Suite of Productivity tools including Visio and PowerPoint. Wide use of a statistical math analysis package (i.e. Statistical or Minitab).
- The software skills acquired via my IE education allowed me to branch off into a career as a software engineer.
- The tools have changed considerably , but the process and approach that was taught has made the continuing acquisition of these skills easier

Comments of alumni who were Neutral:

- Computers and software have changed a lot in the last 33 years
- Expertise in Microsoft Excel, including macros & pivot tables is now essential in business.
- I have achieved this, but when I was in school (graduated in Dec. 1985), computer use was significantly more limited than today. 95% of what I know about computers, I have learned after college.
- I personally could have become much stronger in this area with added focus in my younger years.
- I understand all aspects of ERP computer software tools for manufacturing industry and I have lead an implementation of SAP at one of my companies. I do not believe that this is a critical area of success for new graduates. I do believe that they need to understand the theory and concepts behind MRP, material flow systems and engineering development systems so they can help to improve company performance on day one.
- If you mean MS Office, Project, Visio, and possibly DOE s/w, then I agree. AutoCad, Solid Works, ProE, etc type s/w is much more specialized towards design work, which in my work experience, IEs and Mfg Engrs typically don't do enough of to support learning those s/w packages.

Comments of Alumni who Disagree or Strongly Disagree:

- Have been trained/worked on a lot of the old school systems and languages. Most of Visual has not been learned.
- not mature when I went to school - now I hire the talent
- The use of computers is critical. A very large percentage of the work requires the knowledge and ability to apply various computer software applications.

**ALUMNI
QUESTION 5****I have been able to achieve educational program objective #4
“obtain professional employment and/or admission to graduate
school...”**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Strongly Agree	60	78.9%
Agree	12	15.8%
Neutral	1	1.3%
Disagree	1	1.3%
Strongly Disagree	2	2.6%
Total	76	100%

Comments of alumni who Agree or Strongly Agree:

- Went on to obtain my MBA after working as an IE for four years
- 11 great years and 3 promotions with Hormel Foods Corporation.
- I am currently taking graduate school course work.
- I got my PhD in IMSE and I am proud of it and I am still using all of these concepts at college of IS&T :Design, develop, implement and/or improve integrated systems that involve people, materials, machines, information, technology, processes, equipment, and/or financial resources.
- I had both an Industrial Engineering job offer and admission to Ind Engr graduate school at time of graduation. I accepted the job offer and immediately started graduate school by taking night classes.
- I had originally been interested in Aerospace Engineering, but switched to IE when I learned about the scarcity and cyclical nature of AE jobs. I am now involved in spacecraft development as a Government engineer on the acquisition team. The breadth of skills involved in the IMSE curriculum and my demonstration of similar breadth were key factors in securing this employment.
- I have been employed since my graduation from UNL and have obtained two graduate degrees - MSIE and MBA.
- I have contributed a lot in the aerospace business with Lockheed Martin for well over 20 years, thanks in part to my education from UNL; and I'm quite proud of my accomplishments.
- I have had several professional positions since my graduation. I fully believe these would not have been achieved without my degree. I am now focusing on studying for my MBA. This is seem as very complimentary to what I learned in my undergrad and extremely beneficial in my career. It appears that a four year degree is more of a norm and an MBA will help leverage additional opportunities.
- I have not had any issues finding employment and I have completed an MBA from UNL
- I was hired by 3M Co. right out of school and have been with them for 20 years.
- Never have had a problem getting/keeping a job. I'm satisfied with my level of compensation.
- Worked for 33 years as IE or Department Production Manager

Comments of alumni who were Neutral:

No alumni posted a comment for this choice

Comments of Alumni who Disagree or Strongly Disagree:

No alumni posted a comment for this choice

**ALUMNI
QUESTION 6****My degree in Industrial and Management Systems Engineering has helped me to be successful in my career and/or continued education**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Strongly Agree	49	64.5%
Agree	21	27.6%
Neutral	4	5.3%
Disagree	0	0.0%
Strongly Disagree	2	2.6%
Total	76	100%

Comments of alumni who *Agree* or *Strongly Agree*:

- It helped me land the job and helped me to tackle difficult analytical problems. I have used very little of the actual tools and training that I received at UNL. Should be a higher content. American industry has a ravenous hunger for people that understand lean tools and other programs that can help them compete on a global stage.
- The coursework and instructors at UNL gave me the tools I needed to succeed from a technical and personal standpoint.
- the degree touched on so many areas, it really helps in the real world.
- At times it is surprising how much my degree has helped me even though I work as a civil engineer and have my P.E. in civil engineering.
- Being able to look at an issue or problem, understand the root cause, identify and implement the corrective actions required are key.
- I am an assistant professor at college of IS&T at UNO. My degree in IMSE has helped me to be successful in my career and it is because of my IMSE backgrounds.
- In addition to gaining professional employment in 1986, I went on to receive an MBA from UNL. I felt my undergraduate degree prepared me very well for grad school.
- It has given me the frame work to build off of.
- More than I ever imagined.
- The value to me resides in being able to think logically, being comfortable with "the math", and having a "toolkit" of problem-solving techniques and paradigms.
- The variety skills I obtained with my degree have enabled me to obtain good results working with people, processes, and analysis of information.
- was a great foundation for success
- Yes, with all of the comments above.

Comments of alumni who were *Neutral*:

- I have used the mathematics/ Statistical part of the Program/ degree to a good extent.. Have used the engr part of the BS degree for 1 1/2--2 yrs in the field/experience.
- It has given me knowledge, but personal drive combined with the education is what has made my career successful.
-

Comments of Alumni who *Disagree* or *Strongly Disagree*:

No alumni posted a comment for this choice

**ALUMNI
QUESTION 7****How closely does your current employment position match what one would typically consider an "industrial engineering" type of position?**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Perfect Relationship	15	19.7%
Good Relationship	31	40.8%
Neutral	6	7.9%
Some Relationship	17	22.4%
No Relationship	5	6.6%
N/A – Unemployed	0	0.0%
N/A – Retired	2	2.6%
Total	76	100%

Comments of alumni who's job is a *Perfect or Good Relationship*:

- A good portion of my career has been spent in "Process Improvement". While that is a good relationship to a Typical IE position, I feel there could have been a bit more emphasis on Continuous Improvement. Again, maybe times have changed and you are offering that.
- As an Applications Engineer I constantly interact with the end users. A general understanding of processes and the man/machine interface is required to achieve a mutually satisfactory experience.
- As COO I am leader to ten manufacturing organizations and eleven distribution and service operations. Lots of efficiency improvement opportunity.
- Currently the Director of Quality, Reporting and Training, and am a certified Six Sigma Black Belt.
- Currently working as Systems Engineer in Aerospace/ Electronic Technology
- I actually work in an Production Control organization now, but my ability to problem solve, present information, etc., traits that I learned in Industrial Engineering, are keys to my success.
- I started in a more classical Industrial Engr. position and have "migrated" into an environment which combines the management of Industrial Engr. with Program Finance. It's a somewhat unconventional approach but I have been able to leverage both skills and maintain a strong IE influence.
- I work for the U.S. DOT in the Federal Highway Administration as the Division Chief in charge of one of the national data programs.
- IE's on the IT team have the advantage of looking across business borders and/or functions. This broad view allows process improvements to made across the business. This also allows an enhanced ability to prioritize change.
- lots of project and mfg line management.
- many of the simulation and operations research tools have been a cornerstone of business management philosophy
- Only until recently, though (~ 1.5 years), have I turned from the classic design engineering path to be more in-line with your current definition of IMSE. Up to that point my career path was more in-line with a EE RADAR / Comm Systems Engineering background.
- Reference: I am a supply chain consultant.
- After 15 years in Industrial Engineering and 10 years in Quality Control I was moved to current position of Product Cost Analysis by Plant Manager to further utilize my Industrial Engr. training and experience.
- I am a process engineer who is going to be trained as a six sigma black belt.
- I am a Project Manager responsible for everything from customer relations to product quality.
- MIS and IMSE have a lot in common. Still I am using my old notes and texts in quality control, Process Reengineering, Operation Research, TQM, Project Management,.....
- We do a large degree of classical industrial engineering work but also get involved in anything that impacts the bottom line. It's exactly what UNL prepared me to expect and execute.

Comments of alumni whose job is a *Neutral*:

- The answer to this question may depend on who the "one" was. Tom Landry the football head coach of the Dallas Cowboys had an IE degree as did Lee Iacocca, the former chairman of Chrysler Corporation. In the latter stages of their careers one might argue that they were still successfully meeting the Industrial Engineering objectives listed, (with the possible exception of objective #3) but I doubt that most people would consider them to be "industrial engineers". In much the same way my current career has evolved to be much broader in its scope but is well grounded in my Industrial Engineering education.
- Although my current career in transportation is not an engineering position, the education I received has been and continues to be valuable.
- I am currently working as a Sales Engineer

Comments of alumni whose job is has *Some or No Relationship*:

- I had worked in the KC area for almost 8yrs IT/telecom & Healthcare Administration.. Since moving back to Omaha in mid-2004..Have only been able to find & work service-related positions.
- I'm now working in customer loyalty for American Airlines
- The common perception of IE is that of a production process engineer... constantly measuring and refining a mass production process. While I am involved in a production activity, production runs can be measured on both hands with fingers to spare. It is regrettable that our prime contractor does not have IEs on the production floor since spacecraft production is more of a custom build for each unit and we repeatedly experience production problems related to minimal production metrics and lack of repeatability of assembly operations.
- All of my company's manufacturing has been moved overseas. My work for the past 7 years has been mainly focused on business process design in the area of manufacturing and distribution planning. I certainly don't use all of my degree but I use the core of it.
- I am the CFO of a small (but fast-growing) business unit within H&R Block. I transitioned from I.E. to Finance after I received my MBA in 1990. However, I have used my I.E. education as a foundation for critical thinking skills and efficiency improvements in all of my professional positions.
- I am working as a 'fire protection engineer.' Basic core engineering principles are used regularly and the 'management' type courses in the IMSE department have helped me to succeed in my career.
- I have many more duties that would most often considered more mechanical engineering related. I think IEs need to be more adequately prepared on the mechanical side.
- I own a multimedia company and a real estate development co.
- I'm a manufacturing engineering manager and have been called an ME for the last 18 years. IEs seem to be out of favor in Southern California. The ME position is typically responsible for IE type duties, but in my experience, most MEs come from a Mechanical Engineering background.
- My position does not call on the traditional industrial engineering principles; however, the soft skill focus of industrial engineering has been of the greatest value in my profession.

Comments of alumni who selected *Not Applicable*

No alumni posted a comment for this choice

**ALUMNI
QUESTION 8****How has your perception about the industrial engineering professional changed/evolved since you finished school?**

Range of Answers	Alumni Response (Number)	Alumni Response (Percentage)
Very Positive	19	25.0%
Somewhat Positive	30	39.5%
No Change	23	30.3%
Somewhat Negative	4	5.3%
Very Negative	0	0.0%
Total	76	100%

Comments of alumni who's perception has changed *Very or Somewhat Positive*:

- I am absolutely certain I selected the right engineering discipline for me. I enjoy the variety of tasks we get involved with, and the exposure I get to the business and marketing side of our company. We have the ability to work across a broad range of projects due to our versatility in education and training. I love that about my job!
- I have observed my employer seeking out Industrial Engineers to fill Mfg Engr positions due to their perceived ability to contribute better when compared to other degrees.
- It seems that the industry perception is that IE's do time studies; especially with the further development of Mfg Eng and Quality Eng into their own programs. But as an IE, I have called upon my Mfg, Quality, and Mechanical classes just as much as any traditional IE classes. The ability to compete with my peers in these other disciplines has awarded me the ability and versatility to survive many downsizings and be one of the more highly-valued engineers in the company.
- The broad educational experience well prepared me for my career, and gave me options and opportunities.
- Focus on IE activity (6 Sigma Black Belts) has significantly increased in past 5 years
- I believe that more and more companies are utilizing Industrial Engineers outside of the manufacturing environments. They can bring the analytical skills to the company to assist in process improvements and reducing costs.
- I don't see us as the time study people any more.
- I feel IE's have a well rounded education and diverse background that makes them good candidates for several different areas of discipline, not necessarily limited to typical IE professions.
- I firmly believe that a good Industrial Engineering organization is key to a successful business.
- I have become significantly more aware of the broad scope of projects/jobs where industrial engineers can have a positive impact
- I was disappointed that I could not find an IE position right out of school, but yet I have always managed to find work in the transportation sector where I can use the skills that I learned in school.
- It was always good... despite being commonly derided by students in other engineering disciplines, I recall IE leadership in winning E-week events and attributed this to a unique ability to combine skills and think outside the box. Now, having seen how the curriculum left me well prepared for program management, I believe that IEs should be considered more often... unfortunately, popular perceptions still rule.
- My perception was always positive and has continued.
- My positions within companies have largely been places that do not have Industrial Engineers. However, the one (Bryan Memorial Hospital) that did use IEs had a mixed view of IEs. Most were please with the value that was added, but a great many did not understand what IEs are? Other places I worked were not familiar with IEs, but I have to say they appreciated the perspective that I brought to the organization.
- Now that I'm more of a CAM/PL, I would say a lot. The objectives you've outlined are nearly 100% aligned with my current responsibilities.
- Probably not a popular comment here, but I have found that people who tend to cling to the "died in the wool" classical IE principles are actually less valuable than those who are willing to combine their IE skills with other functions, such as Program Mgmt., Finance, and Production Engr. Maintaining diversity is key in today's environment.
- Some companies have IE's in name only. They did not actually get an IE degree, they just get placed in a job function titled "Industrial Engineer"

Comments of alumni who's perception has *No Change*:

- I still think it's a great degree but feel sorry for those of us in the US where manufacturing floors to work on are hard to find. There just aren't as many opportunities as there once was.
- I think there is a perception in industry that they don't need University educated IE's. I think there is a shortage of IE's.
- Tough question - I have great love for the IE and Manufacturing Engineering profession as I believe there is great opportunity and a great need in the US for people with real skills. Unfortunately, I do not believe that current graduates are prepared and I have to train them from scratch. This takes a lot of time and money.

Comments of alumni who's perception has changes *Somewhat or Very Negative*:

- I can use my critical thinking in applying toward how processes work, but IE has evolved into using more computers/different systems since 1989. For example, within the last yr--yr and a half, "lean engineering" has come as a new engineering method, but don't really know the concept. A lot of change since Classic Industrial Engineering
- I found in my career as an Industrial Engineer that it was difficult to convince other engineers that IEs were more than time study specialists.
- With most high volume manufacturing moved offshore, IEs will have to expand their horizons. There is still a lot of low volume/high mix mfg going on in the states, but most companies call these positions Mfg Engineering. I don't have any experience in the service industries so I can't comment on the job outlook there.

**ALUMNI
QUESTION 9**

Please specify the two most useful engineering topics (e.g., engineering economics, operations research, calculus, project management) that have had a positive impact on your career or continued education:

Engineering Topics	Alumni Response (Number)	Alumni Response (Percentage)
Project Management	34	23.3%
Engineering Economics	30	20.5%
Statistics	21	14.4%
Operation Research	13	8.9%
Ergonomics	9	6.2%
Engineering Management	5	3.4%
Quality Control	5	3.4%
Facility Design	4	2.7%
Simulation	3	2.1%
Work Measurement	3	2.1%
Business Communications	2	1.4%
Fluid Dynamics	2	1.4%
Systems Design And Analysis	2	1.4%
Calculus	1	0.7%
Computing Classes	1	0.7%
Data Analysis/Mining	1	0.7%
Drafting/CAD Systems.	1	0.7%
Electrical Engineering	1	0.7%
Ethics	1	0.7%
Group Technology	1	0.7%
Organizational Behavior	1	0.7%
Process Improvement.	1	0.7%
Safety	1	0.7%
Statics	1	0.7%
Strength Of Materials	1	0.7%
Teamwork	1	0.7%
Total	146	100%

**ALUMNI
QUESTION 10**

Please specify two engineering topics (e.g., engineering economics, operations research, calculus, project management) that you wish you had been taught better or had learned more about:

Engineering Topics	Alumni Response (Number)	Alumni Response (Percentage)
Project Engineering	19	17.3%
Operations Research	14	12.7%
Engineering Management	8	7.3%
Engineering Economics	7	6.4%
Statistical Analysis	6	5.5%
Quality Control	5	4.5%
Electrical Engineering	4	3.6%
Computer Programming	3	2.7%
Ergonomics	3	2.7%
CAD/CAM	2	1.8%
Continuous Process Control/Continuous Quality Improvement	2	1.8%
Databases	2	1.8%
Facility Layout	2	1.8%
Information Systems	2	1.8%
Interpersonal & Teamwork Skills	2	1.8%
Simulation	2	1.8%
Calculus	1	0.9%
CNC Programming.	1	0.9%
Contract Development	1	0.9%
Factory Accounting	1	0.9%
Financial Markets	1	0.9%
Fluid Mechanics	1	0.9%
Forecasting	1	0.9%
Graphical Information Systems	1	0.9%
Industrial Safety	1	0.9%
Labor Resources Management	1	0.9%
Lean Manufacturing	1	0.9%
Logistics Management	1	0.9%
Manual Assembly Processes	1	0.9%
Manufacturing Planning	1	0.9%
Manufacturing Processes	1	0.9%
Material Flow	1	0.9%
Operations Analysis	1	0.9%
Organizational Behavior	1	0.9%
Problem Solving	1	0.9%
Regression Analysis	1	0.9%
Simulation	1	0.9%
Six Sigma	1	0.9%
Statics	1	0.9%
System Design	1	0.9%
System Verification	1	0.9%
Time Study	1	0.9%
3D Modeling	1	0.9%
Total	110	100%