

# A Comparison of Industry Relations Between Two Accrediting Organizations in Construction Education

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**Abstract** – The relationship with industry and academia is an important aspect of the educational process. In fact, both ABET, Inc. and ACCE, the American Council for Construction Education require their accredited programs to maintain an advisory board consisting of industry professionals as part of the accreditation. For the construction industry, ABET, Inc. accredits programs in Construction Engineering and Construction Engineering Technology and ACCE accredits programs in Construction Management, Building Science and other similarly named programs. A close relationship with the construction industry is important to stay attuned to these increased demands through interaction of academia and industry. One way to measure this involvement and interaction is by the number of student chapters from ABET and ACCE programs in construction trade associations. This paper compares the relationship with the construction industry of ABET, Inc. and ACCE by examining memberships of their respective programs in construction education with industry trade associations and related organizations.

*Keywords:* ABET, ACCE, Construction Engineering, Accreditation

## INTRODUCTION

The construction industry is a major part of this country's economy, accounting for 4% to 5% of GDP. Also, the numbers of individuals in this industry show that it is one of the largest market sectors of employment. Even with the down economy, construction employment in August, 2010 was over 5 million and over 6 million in August 2009, which makes up roughly 1 out of every 20 jobs in the U.S.[9] Also, the construction industry is one of the prime indicators of the health of the U.S Economy and is often noted by the number of new homes constructed and the number of commercial projects undertaken to forecast. With such an important industry, it is important for future professionals to be educated and prepared to enter this sector of the economy.

As the industry has grown and changed over the years it has become more and more complex. Delivery methods have changed and new methods have developed, that while made to increase the success of projects has compounded the managerial and technical complexity. Design-Build, Construction Management at Risk and the newer Integrated Project Delivery methods give more focus to the management skills of construction professionals. Owners and clients consistently want projects completed in shorter time periods and still built within budget. These changes and advances have added to the complexity of the construction professionals in addition to the technological advances in materials, equipment and means and methods of construction.

As the industry becomes more complex the relationship between industry and academia is critical for the sharing of knowledge from both the academic and industry sides of the profession. Industry needs well educated and trained employees that can enter this ever changing sector and contribute as soon as possible as productive employees. Academia is there to provide these well educated employees and provide industry with research in the field. Additionally, with budgets in higher education tightening, academia is reliant on industry for not only moral support but also, financial support. This synergy is critical and communication between to the two parties is the only way to achieve the relationship necessary to both enhance the educational process and contribute to the productivity of the industry. This collaboration between academia and industry is usually informal in nature. For the most part, the

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greatest contributions from industry to education are in the areas of time, money and information. Time and information are often the most valuable of the three.[12] Some ways industry provides these are through guest speaking engagements, sponsored field trips, job shadowing, job fairs, and cooperative education. Financially, most industry support academia through scholarships, endowments and sponsorship of educational activities. Academia gives back by providing an educated workforce, promoting the industry and often offering continuing education to industry personnel through sharing of resources that universities often have but small to medium sized businesses do not.

Many programs in construction education have close ties to local constructors, usually by means of alumni of the programs. A common way for educational programs to interact and participate with industry is through professional trade organizations, as student chapters. In construction, the major industry-specific organizations include the Associated General Contractors of America (AGC), the Associated Builders and Constructors, Inc. (ABC), Construction Management Association of America (CMAA), National Association of Home Builders (NAHB), and the Design-Build Institute of America (DBIA). Additionally, from the educational side of construction there are the Associated Schools of Construction (ASC), which supports educational conferences and annual student competitions and Sigma Lambda Chi (SLC), the only honor society in construction education.

Programs in construction education are typically found in programs of Construction Engineering (ConE), Construction Engineering Technology (ConET), and Construction Management (CM). These programs are accredited by the Engineering Accrediting Commission of ABET, Inc. (EAC/ABET), the Technology Accrediting Commission of ABET, Inc. (TAC/ABET), and the American Council for Construction Education (ACCE), respectively. There are other accrediting agencies that have programs in construction such as the Association of Technology, Management, and Applied Engineering (ATMAE) and then there are programs that are unaccredited. Additionally, construction education can be found as tracks or an emphasis in programs in Civil Engineering and Architecture which are accredited by EAC/ABET and the National Architectural Accrediting Board (NAAB), respectively.

In fact there are currently 11, 4-year baccalaureate programs accredited by EAC/ABET in Construction Engineering[5], 24 accredited by TAC/ABET in Construction Engineering Technology[5] and 64 accredited by ACCE in Construction Management, Building Construction, Construction Science or some similar nomenclature.[4] These constitute the majority of the 4-year baccalaureate programs in construction education (Appendix). Additionally, TAC/ABET and ACCE accredit 2-year associate degree programs in their respective fields.

The relationship with industry could be compared to other professions such as law and the American Bar Association, medicine and the American Medical Association, architecture and the American Institute of Architects and with engineering and the American Society of Civil Engineers, Institute of Electrical and Electronics Engineers, American Society of Mechanical Engineers, etc. These disciplines are improved by their close relationship with their respective professional organizations, much as construction education is improved by its relationship with industry individuals, industry organizations and the accrediting bodies. ACCE and ABET, Inc. serve the construction industry through their educational programs and are needed to assure the quality of those programs. Accreditation serves the following purposes; 1. Assuring Quality: Accreditation is the primary means by which institutions and programs assure quality to students and the public. Accredited status is a signal to students and the public that a program meets certain standards for its faculty, curriculum, student services etc. 2. Engendering employer confidence: Accredited status of a program is important to employers when evaluating credentials of job applicants, when deciding whether to provide tuition support for employees seeking additional education, and when deciding to support construction education programs.

ABET, Inc. and ACCE are similar in their goals for the programs in construction. Without examining the differences of Construction Engineering and Construction Engineering Technology versus Construction Management, it is evident from the goals of ABET, Inc. and ACCE that their purposes are very similar. The goals of the TAC/ABET Construction Engineering Technology program are to "... prepare graduates with the technical skills necessary to enter careers in construction, operation and/or maintenance of the built environment and global infrastructure." ABET, Inc. expects that its' graduates in Construction Engineering Technology "...are prepared to specify project methods and materials, perform cost estimates and analyses, and manage construction activities." [2] Likewise, the purpose of the ACCE curriculum is to "provide an education that will lead to a leadership role in construction and to prepare the student to become a responsible member of society. The curriculum should be responsive to social, economic, and technical developments and should reflect the application of evolving knowledge in construction and

*in the behavioral and quantitative sciences.*”[3] One of the ways to ensure these goals is through collaboration of industry and academia. This collaboration with higher education and industry has been explored for various educational programs and industry types. It has been a way for both parties to benefit through the sharing of knowledge, infrastructure and resources that are expanded beyond what each could do on their own. One of the guiding principles of academic and industry collaboration is that the association or partnership should support the mission of each group. This principle is evident in the construction education-construction industry association. The core goal of academia is provide the best educational opportunities to its students and a major industry goal is to grow the profession and have the best trained and educated workforce available.[13]

## METHOD

The accrediting agencies ABET, Inc. and ACCE maintain a list of accredited programs in construction on their respective websites. The Construction Engineering programs of EAC/ABET are 4 year baccalaureate only, while the ACCE and TAC/ABET programs in construction contain both 4 year and 2 year programs. This paper examines only the 4 year baccalaureate programs. From the respective websites, the list of all 4 year accredited programs in Construction Engineering, Construction Engineering Technology and Construction Management were obtained. The examination did not consider programs in Civil Engineering, Civil Engineering Technology, Architecture or other related degree programs that may have an emphasis in construction.

Similarly, the majority of the construction trade organizations and construction education organizations maintain lists of members on their websites. Those that did not have the information posted online were contacted and the information was received directly from the organization or in the case of the ABC, was obtained from a recent magazine article. With the list of organization members and the list of accredited programs, a cross-reference was done to determine the number of members from each accrediting agency in each construction organization. The evaluation consists of comparing the number of student chapters from each accrediting body in each of the major industry organizations. The organizations used for the comparison are the previously named, AGC, ABC, CMAA, DBIA, NAHB, ASC, SLC, and NECA.[1],[6],[8],[11],[14],[15],[16],[17],[18]

## RESULTS

A chart of the number of members from ACCE, TAC/ABET and EAC/ABET programs graphically reveal the reported level of interaction with each of the construction organizations examined. Below, Figure 1(Fig. 1) represents the total number of members from each accrediting body in each of the examined construction organizations. As an example, the ABC has 21 student chapter members from ACCE accredited programs, 2 members from TAC/ABET accredited construction programs, 2 members from EAC/ABET accredited construction programs and 12 student chapter members from other accrediting bodies or without accreditation for total number of student chapters of 37.[1] Additionally, Figure 2 (Fig. 2) represents the percentage of each accrediting body in each construction organization. As an example of this graph, 60.9% of all accredited ACCE programs are a student chapter of NAHB, with 4.3% of all TAC/ABET construction programs and 18.2% of all EAC/ABET construction programs as student chapters of NAHB.[17]

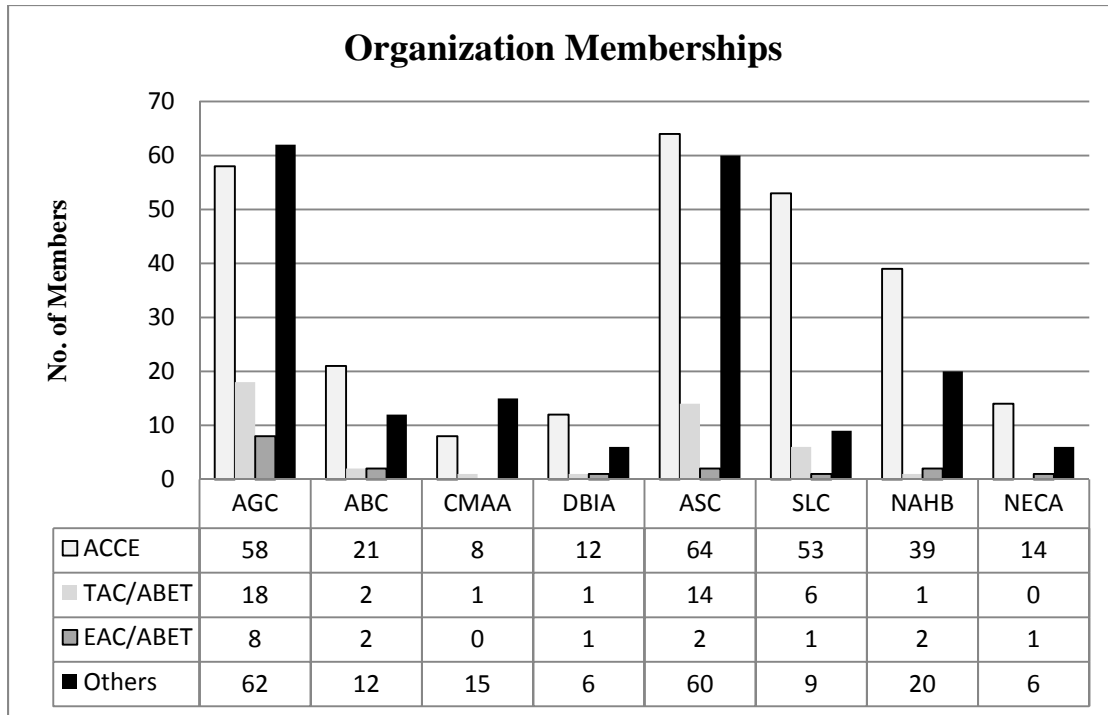


Fig. 1

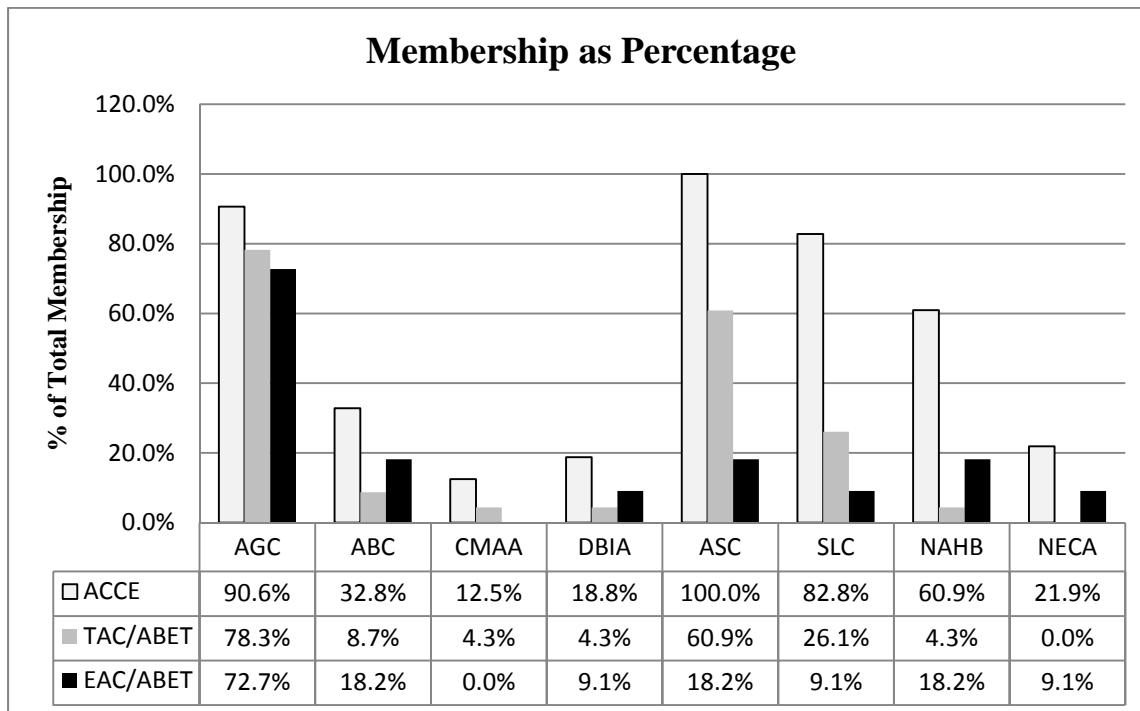


Fig. 2

Additionally, there are multiple, regional and national student competitions each year for programs in construction higher education. The annual Associated Schools of Construction (ASC) and Associated General Contractors of America (AGC)[8] National Student Competition and the Associated Builders and Constructors, Inc. (ABC) [1]Construction Management Competition are two of the most notable. The competitions challenge teams from participating colleges to develop, plan and present their solutions to proposed problems in various aspects of construction, such as estimating, planning, scheduling, safety, in fields such as Design-Build, Heavy-Civil, Commercial and Residential Construction. Figure 3 (Fig. 3) shows the number of participants from each of the three

accrediting bodies that participated in the ABC competition from 2005 to 2010. Figure 4 (Fig. 4) represents the place winners (first, second or third) from the AGC/ASC National Student Competition from 1999-2008.

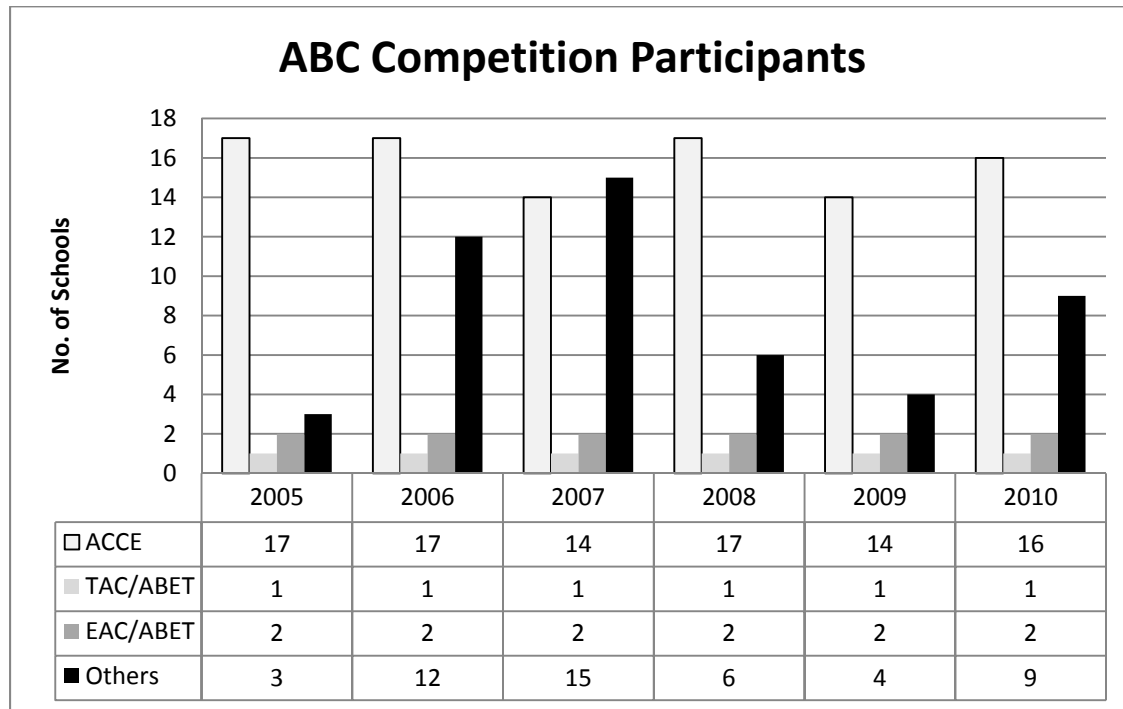


Fig. 3

## DISCUSSION

The professional associations that are members of ABET, Inc. and ACCE further reveal the relationships and links to the construction industry. The association members of ACCE include, American Institute of Constructors (AIC), American Subcontractors Association (ASA), Construction Management Association of America (CMAA), Associated General Contractors of America (AGC), National Association of Home Builders (NAHB), National Center for Construction Education & Research (NCCER), Associated Schools of Construction (ASC), and Construction Financial Management Association (CFMA).[3] The member societies of ABET, Inc. briefly include, the American Academy of Environmental Engineers (AAEE), American Institute of Aeronautics and Astronautics(AIAA), American Institute of Chemical Engineers (AIChE), American Society of Civil Engineers (ASCE), American Society for Engineering Education (ASEE), American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Institute of Industrial Engineers (IIE), National Society of Professional Engineers (NSPE), Society of Petroleum Engineers (SPE), Institute of Electrical and Electronics Engineers (IEEE), and the American Congress on Surveying and Mapping (ACSM).[2] These are clearly professional engineering organizations with only an indirect association with construction. Among these, the associations with the closest link to construction are the ASCE, ASHRAE, IEEE and the ACSM. The close relationship of ACCE and its industry members reveals that the accrediting agency is keeping up to date with construction practitioners and maintaining the synergy with academia and the profession. If Construction Engineering and Construction Engineering Technology are to remain a part of the engineering profession, it appears that the individual schools and programs must form the partnerships to the construction industry that ABET is lacking.

As a former sub-discipline of Civil Engineering and Civil Engineering Technology, ConE and ConET programs have the opportunity to associate with the American Society of Civil Engineers and subsequently the Construction Institute of ASCE. While this institute is open to all individuals associated with construction, it does not have student chapters, only individual and corporate members and thus was not part of the investigation.[14] Additionally, the NSPE has an Interest Group named the Professional Engineers in Construction but is open only to licensed individuals in the profession, not students. The ASCE, also maintains student competitions, most notably sponsoring the annual steel bridge competition with the American Institute of Steel Construction (AISC) and the

annual Concrete Canoe Competition. These competitions are greatly successful, but do not address the construction industry or involve industry professionals from the construction industry.

The previous figures show that the member programs of ACCE have a much higher level of involvement with the major trade organizations of the construction industry and in the annually sponsored construction competitions. Possible reasons for this greater involvement include the higher number of accredited programs, 64 programs compared to a combined 36 programs in Construction Engineering and Construction Engineering Technology. Additionally, the differences may be attributed to the perceived differences in the professions of Construction Engineering versus Construction Management. To further the study of this paper, the author intends to explore the differences and similarities of the two academic areas in a future paper. Alternatively, this paper did not examine any local or regional associations between academic programs and the construction industry. While as important as the national associations, there are aspects that cannot be taken advantage of on purely the local level. Some of the attributes of association with the national organizations are broader networking, peer comparisons, greater knowledge sharing, and the ability to participate in competitions and conferences.

There is an obvious disconnect between the ABET, Inc. programs in construction and the construction industry. To strengthen the relationships of academia and industry for ConE and ConET programs, there should be a better representation of these programs in the construction specific organizations. Construction Engineering and Construction Engineering Technology should not consider themselves as above or apart from the construction industry but as an integral piece and take part in the construction organization activities. Additionally, ABET, Inc. should explore adding such organizations as, AGC, ABC, DBIA, CMAA and ASC to their member associations to gain input from the construction industry in addition to the input they receive from the engineering societies. ABET, Inc. is well represented by engineering related associations but lacks sufficient representation from construction associations. With the ever changing means of design and construction delivery, such as Design-Build, Integrated Project Delivery and Building Information Modeling, it is important for both engineers and construction professionals to understand their shared roles. These newer delivery methods amplify the overlap of these roles and continue to blur the distinction between engineering and construction and increase the level of team work and joint participation. A greater relationship between academia and industry can contribute to this increased understanding of these roles and assist in better team work and cooperation. While this study may seem obvious to some, it was a way to define anecdotal evidence and put it in terms that could be clearly seen. Hopefully, this will lead to further study into the industry relations and bring new ideas and ways for those relationships to be cultivated. It should be evident that the Construction Engineering and Construction Engineering Technology programs can only be strengthened through better relationships with the construction industry.

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## APPENDIX

### List of Accredited 4 year baccalaureate programs

<u>TAC/ABET</u> Construction Engineering Technology	<u>ACCE</u> Construction Management *	
1. U. of Akron	1. Auburn U.	38. Missouri State U.
2. Alfred State College***	2. Arizona State U.	39. U. of Nebraska
3. California State Polytechnic U.-Pomona	3. Northern Arizona U.	40. U. of Nevada, Las Vegas
4. East Tennessee State U.	4. John Brown U.	41. U. of New Mexico***
5. Farleigh Dickinson U.	5. U. of Arkansas, Little Rock	42. Alfred State College***
6. Florida A&M U.	6. California Polytechnic State U. – San Luis Obispo	43. East Carolina U.
7. Indiana U.-Purdue U.-Fort Wayne	7. California State U. –Chico	44. North Carolina A&T State U.
8. Indiana U.-Purdue U.- Indianapolis	8. California State U. – Fresno	45. Western Carolina U.
9. Louisiana Tech U.	9. California State U. – Northridge	46. North Dakota State U.***
10. U. of Maine	10. California State U. – Sacramento	47. Bowling Green State U.
11. Missouri Western State U.	11. Colorado State U.	48. U. of Cincinnati
12. Montana State U.	12. Central Connecticut State U.	49. U. of Oklahoma
13. Murray State U.	13. Florida International U.	50. Oregon State U.
14. New Jersey Inst. of Tech.	14. U. of Florida	51. Pennsylvania College of Tech.
15. Oklahoma State U.	15. U. of North Florida	52. Roger Williams U.
16. Pennsylvania State U.- Harrisburg	16. Georgia Institute of Tech.	53. Clemson U.
17. Pittsburgh State U.	17. Georgia Southern U.	54. South Dakota State U.
18. Purdue U.-Calumet	18. Southern Polytechnic State U.	55. Texas A&M U.
19. U. of Southern Mississippi**	19. Boise State U.	56. U. of Houston
20. State U. of New York- Farmingdale	20. Bradley U.	57. Brigham Young U.
21. Temple U.	21. Illinois State U.	58. Weber State U.
22. Texas Tech U.	22. Southern Illinois U.- Edwardsville	59. Virginia Polytechnic and State U.***
23. U. of Toledo	23. Indiana State U.	60. Central Washington U.
	24. Purdue U.***	61. U. of Washington
	25. Kansas State U.	62. Washington State U.
	26. Eastern Kentucky U.	63. Milwaukee School of Engineering
	27. Northern Kentucky U.	64. U. of Wisconsin-Stout
	28. Louisiana State U.	
	29. U. of Louisiana – Monroe	
	30. U. of Maryland –Eastern Shore	
	31. Wentworth Institute of Technology	
	32. Eastern Michigan U.	
	33. Ferris State Univ.	
	34. Michigan State U.	
	35. Minnesota State U.- Moorhead	
	36. U. of Southern Mississippi**	
	37. U. of Central Missouri	

Notes:

\*Construction Management,  
Building Construction,  
Construction Science or other  
variation.

\*\*Program dually accredited by  
TAC/ABET and ACCE.

\*\*\*Separate programs at the  
same institution separately  
accredited by ACCE,  
TAC/ABET or EAC/ABET