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Certification or Not . . . ISO Standards Provide a Viable Marketing Edge

By Steven J. Storts
Dublin, Ohio

ONE of the common discussions among U.S. companies regarding ISO's global quality standards revolves around the question of certification and its value as an exclusive marketing tool. While ISO certification is a laudable path that many industries choose to pursue, it is not the only option for businesses wishing to promote the quality of their products and services under the umbrella of the International Standards Organization.

Having developed and published more than 19,000 voluntary international standards covering most aspects of technology and business, ISO provides companies with ample opportunities to help make their industries more efficient and effective. However, subscribing to ISO's state-of-the-art specifications for products, services, and best management practices does not require certification as the endgame. In fact, ISO is not involved in the certification to any of the standards it develops. That service is performed by external, independent certification bodies or registrars, which are largely private.

Companies pursuing certification of their products, services, or management systems must go through a lengthy review and audit process, one that can take nine to 18 months to complete, or even longer, and cost upwards of $2,000 per day per reviewer or auditor, including travel expenses, plus application fees and later renewal charges. The length and expense of the process depends on such factors as the extent of certification desired and the degree to which a company has already implemented a documented standards-improvement program. When successful, the process results in a company's certification to ISO standards or requirements, but only the specific products, services, or processes reviewed and audited are certified, nothing else. Also, while companies may proclaim ISO certification through their advertising and marketing efforts, ISO does not permit its logo to be used by anyone in connection with certification.

As an alternative to committing additional time and financial resources to the certification process, some companies simply issue a *self-declaration of conformity* to ISO standards and then engage in a marketing campaign promoting that declaration. Although they cannot us the words "ISO certified" or "ISO certification" in defining their processes, products, or services, they can still outline and promote their adoption and implementation of ISO standards, requirements, or guidelines. This strategy is especially popular regarding ISO's family of management system standards: 9000/quality management, 1400/environmental management, and 3100/risk management. It is important to note, though, that these standards specify requirements for a management system, not the technical specifications of any products or services.

Currently, ISO's independent organizational structure encompasses a global mix of members from national standards bodies representing 164 countries The United States is represented by the American National Standards Institute. Two of ANSI's standards that are characteristic to U.S. industry were used as source material, along with other countries' guidelines, in developing the ISO 9000 quality management series, still one of the most accessed set of standards. It is currently reported that more than 20,000 businesses in the United States are ISO 9000 certified.

Whether or not a company chooses to seek certification, the value of ISO's standards alone remains as an exclusive marketing tool for participating enterprises. International standards help harmonize technical specifications of products and services, making industry more efficient and breaking down barriers to international trade. ISO reports that 80 percent of world trade is impacted by international standards, and that an 84 percent reduction in global transportation time has been realized due to standardization of shipping containers. Conformity to ISO standards also assist in reassuring consumers that products are safe, efficient, and good for the environment.

Aside from the overall benefits of cost savings, enhanced customer satisfaction, access to new markets, and increased environmental sustainability, there is an added benefit of ISO certification for U.S. industries under the 9000 series. Certification reduces the concept of multiple-supplier audits because it helps to eliminate organizational paperwork and manpower shortages that can result from having to continually review the quality of supplier products and services.

Moreover, certification can help to limit the liability of losses through

litigation, according to legal sources. When a company's quality system is under control, the elements relating to potential customer injury from products during actual use are going to be minimized. Punitive damages can also be reduced or even eliminated because a company cannot be cited for dereliction of responsibility in monitoring the quality system that produces the products.

Undoubtedly, the number of U.S. companies considering ISO standards as quality and performance guidelines is on the rise, if for no other reason than to be more competitive in both domestic and international business. And it is projected that more contractual obligations between companies, customers, and suppliers in the future will require ISO certification, or at the very least, legitimate declarations of conformity to ISO standards and best practices.

Today, virtually all global continents have embraced ISO standards to some extent within their public agencies and private industries, and U.S. companies are increasing their certification activities for specific products and services, not just their quality management systems. The Federal Drug Administration was a staunch advocate for adherence to ISO standards as far back as the 1990s. ISO consultants suggest that U.S. companies consider certification if they deal 50 percent or more with European and Asian business enterprises, and particularly if a European or Asian operation contributes more than half the value of a product manufactured or service offered in the United States.

Christopher J. Scolese, director of NASA's Goddard Space Flight Center in Greenbelt, Md., summarizes, "People sometimes forget that standards evolve with time. This is a job that ISO and the ISO community do very well. They adapt as we learn things. International standards are the repository of our knowledge . . . . They explain it and maintain it well; they are the caretakers.

"At the same time, we are constantly learning and updating our standards. This is done through a formal process to make sure that everyone understands the same thing. Our duty is to communicate the correct information, not only to the current generation of engineers, but to future generations of engineers and scientists."

September 2012

Transportation Agencies Discuss Value of Certified Support Staff

By Steven J. Storts
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A ZOGBY International poll conducted last year shows that a strong majority of Americans rank highway transportation as "very important." Couple this finding with the impending challenge in this congressional session to reauthorize federal transportation funding for at least the next five years, and one is reminded how state, county, and municipal agencies must continually evaluate the integrity of the nation's transportation network.

The responsibility for assuring a safe transportation system ultimately rests in the hands of licensed engineering professionals and their support team, including engineering technicians and technologists, according to Mike Clark, general manager of the National Institute for Certification in Engineering Technologies.

"The administrative performance of transportation agencies at the state and local levels hinges not only on good management and timely decision-making, but relies heavily on a qualified, credentialed staff," Clark emphasizes. "This is where NICET can provide a vital service to transportation authorities."

To address the credentialing needs of the transportation industry's technical workforce, NICET offers certification programs in both transportation engineering technology and construction materials testing. The latter, through its three subfields of asphalt, concrete, and soils, was designed specifically for field and laboratory technicians engaged in the testing and inspection of construction materials. The recognized technical areas comprising the institute's transportation engineering technology certification program include bridge safety inspection and the highway subfields of construction, design, maintenance, materials, surveys, and traffic operations.

NICET's credentialing mission has been welcomed by the Mississippi Department of Transportation. Nationally recognized for its employment practices, MDOT says its optimal approach toward maintaining essential services to the public is through qualified staff and support personnel. In doing so, the agency uses certified engineering technicians as senior designers, mid-level supervisors, senior inspectors, and field supervisors.

"Our certified and senior certified technicians are the backbone of this agency," notes Kenneth Wallace, P.E., construction engineer for MDOT District 5. "These folks are the seasoned veterans of MDOT on whom we depend to make sure the work is done correctly and that all assignments are carried out without flaw."

Wallace says most of his agency's offices have a very limited number of engineers and must count on their senior technicians to close the gap in oversight and administration of each office's duty. "Here in District 5, the engineering technicians and senior engineering technicians carry great responsibility, from managing projects to supervising the production and placement of hot-mix asphalt and concrete," he explains. "The project engineers have to rely on them for direct supervision and control of the work."

MDOT participates in several of NICET's credentialing programs, including highway design, construction, and maintenance; bridge safety inspection; civil engineering technology; and construction materials testing.

"Certification provides MDOT an employee who is committed to professionalism, personal growth, and the knowledge that a certified technician has passed a national review standard," says Steve Spell, one of the agency's leading engineering technicians, who points out that several MDOT employees have been honored by the American Society of Certified Engineering Technicians.

For another state agency, the Alaska Department of Transportation and Public Facilities, the benefits of certification cannot be measured, at least not in the traditional, evaluative sense. Maureen Lee, a testing technician and examiner for Alaska DOT&PF's Western Alliance for Quality Transportation Construction program, explains, "From the technician's and technologist's point of view, increased knowledge is power, power to channel their interests and experiences to develop a career path, beneficial to the employer and their own interests."

Lee, who is certified with NICET in the construction materials testing subfields of asphalt, concrete, and soils, is a former member of the NICET Board of Governors. She points out, "Certification programs expand the range of knowledge, thus increasing the confidence level of technicians and technologists, as well as boosting the confidence level of the entire engineering team. Increased confidence in the individual members' abilities is correlated to increased communication within the team. It's a win-win situation."

Engineering consultants, particularly those who contract with the

Pennsylvania Department of Transportation, are also well aware of the value of NICET certification programs to their companies. Thomas Maheady, P.E., vice president of Borton-Lawson Engineering Inc. in Wilkes-Barre, Pennsylvania, notes, "For highway inspection, you can't hold the contract if you can't find a sufficient number of certified inspectors who will come on board with you. In our transportation group, when we had open-end highway inspection contracts, we had to retain individuals with NICET certification. This was a requirement."

Maheady praises the institute for its credentialing mission. "Not all certification programs are created equal," he observes. "I think NICET's are well structured and of high quality. There are lots of other certifications that are just one-day training programs by a vendor, but they really don't do anyone much good."

February 2005

Students Should Discover Early the Long-Term Value of Credentialing

By Steven J. Storts
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CONVINCING practicing technicians and technologists to pursue certification in their field of experience can sometimes pose a challenge, but it's one that can often be satisfied by appealing to their "professional nature." However, trying to persuade students majoring in a technical field of the need to demonstrate their competency level beyond the classroom usually requires different approaches, according to the National Institute for Certification in Engineering Technologies.

Transcending his role as an educator to one in career guidance is Don Gillum, P.E., chairman of the instrumentation technology program at Texas State Technical College. "Many companies use certification as a first screening process for employment, while others use the various levels of certification as a means for advancing along a career path," he explains.

"For a student, that can actually start with a NICET program because he or she majoring in a related technical field can test successfully and be certified at Level I while still a student," he notes. "Level I certification doesn't require work experience for individuals in an apprenticeship program or enrolled in a college technical program."

Gillum serves as a liaison for the Instrument Society for Measurement and Control, helping to coordinate ISA's Certified Control System Technician program—established in 1995—with NICET's certification program offerings. According to Gillum, NICET was developed with specific work elements to define technical competence in specific areas, whereas the CCST program uses domains and tasks.

"Both NICET and CCST offer credit for certification for an associate degree," he points out. "And I do stress the importance of certification to students whether it is a NICET or CCST program. However, testing does require additional time and expense." To address this issue, Gillum is working on initiating a program whereby prospective employers would provide funding for students to take certification tests.

"This seems like a win-win for companies to further the cause of strengthening the workforce and to show a public interest in the certification effort," he adds. "I'm certain this would pay dividends."

In Ontario, Canada, the Seneca College of Applied Arts and Technology offers a program in fire protection technology, with about 40% of the curriculum focused on sprinklers and sprinkler design. From the perspective of Stuart Evans, coordinator of Seneca's School of Fire Protection Engineering, certification is not only important for career advancement, it's an important rung on the "job ladder" itself.

"We place about 90% of our graduates as designers in the sprinkler industry," says Evans. "This means that certification through NICET is important to us and our graduates. We inform our students about NICET's programs and the importance of obtaining certification. And we encourage students to pursue these programs after graduation."

Seneca faculty members continually point out the financial rewards available to students through obtaining certification. "We find that our students have a reasonable knowledge of NICET's process, which helps them on their first job as they undertake the certification exams," Evans emphasizes. "In fact, from the college perspective, we're aware of NICET requirements as we design curricula."

Job retention and salary increments are also strong incentives for trainees in the New York City College of Technology's Joint Urban Manpower Program. This 10-week curriculum helps provide a more effective pathway for underrepresented minorities and women to enter civil engineering fields.

Part of JUMP's mission is to assure the New York State Department of Transportation (NYSDOT), the program's funding agency, and the consulting engineering firms hiring the trainees that they have been taught essential knowledge, skills, and the behaviors necessary for success in their occupational area, and that the trainees have attained a recognized level of proficiency.

Dorothy Solomon, program manager for JUMP, observes, "For skills-training programs operated by the industry or academic institutions, it's extremely helpful to have an outside body such as NICET validating training program curricula and their success to determine the skills and knowledge acquired by the trainees."

And perhaps equally as important, Solomon adds, "When certification is nationally recognized, it provides workers with job portability—the ability to get a similar job throughout the U.S."

JUMP trainees are advised by their consultant firm employers, NYSDOT,

and JUMP staff that they're only hired for a two-year period. Their retention is contingent upon their attainment of NICET Level II certification (required for highway construction inspection posts) and whether their employer has additional contracts. Trainees are also advised that ultimately they'll become "independent contractors," and that their ability to find additional work will be based on job performance and NICET certification.

NYSDOT also has provisions in its contracts with consulting engineering firms that mandate pay increases for trainees who attain NICET Level I certification in highway construction or highway design. When trainees achieve Level II certification stature, they're rewarded with additional salary compensation. However, that process also requires additional supervised time on the job.

"Trainees perceive certification as a rite of passage," Solomon explains. "It becomes a challenge they must all face. They know that attaining NICET Level II certification means they'll be able to work in their chosen field and have a career, earn a good living, and have the opportunity for job mobility."

January 2005

Construction Team Certification Expands Higher Levels of Quality Assurance

By Steven J. Storts
Dublin, Ohio

IN a recent opinion survey, engineering consultants were asked to comment on the benefits of technician and technologist certification programs to their organizations. Although opinions varied and were subject to a firm's scope of services and client base, one common perspective prevailed: certification programs add a higher level of professionalism to the construction team.

This is not to imply that the contracting industry lacks professional skills or credentials. On the contrary, as with licensure, certification helps provide an added level of quality assurance. Design professionals, who play a significant role in the successful outcome of any engineering project, fully recognize the value of a qualified and credentialed construction team, including the technical staff.

The National Institute for Certification in Engineering Technologies offers the construction industry a broad spectrum of four-level certification programs that address water and sewer lines; water and wastewater plants; construction materials testing; civil engineering technology, mechanical engineering technology, and architectural/building construction engineering technology; safety inspection of building and fire codes; and highway/bridge design, construction, and inspection.

Froehling & Robertson Inc. of Richmond, Virginia, takes full advantage of NICET's certification experience, encouraging and supporting credentialing programs for its technicians and inspectors.

"Our primary reason is for career development and, thus, to show this group of employees the importance and significance of their work and their value to the construction industry," says F&R President Sam Kirby Jr., P.E. "For the employees, it develops their self-esteem in this career choice. We provide training materials, reimburse the associated fees, and provide bonuses once they begin to achieve Level II and higher certifications."

"This also allows F&R to further differentiate itself in a very competitive market," Kirby adds, "but there are still too many buyers or specifiers who are driven by cost decisions with the general conclusion that all such companies are qualified regardless of their training and educational efforts." It is this latter issue, he notes, that has F&R, among others, working with NICET to achieve more practical programs with the hope that NICET certification will become a more recognized standard and requirement.

Professional Engineer David Folk, president of Buchart-Horn Inc. in York, Pennsylvania, says his firm is required through contracts with the Pennsylvania Department of Transportation to have the majority of its inspection personnel NICET-certified in construction materials and highway construction.

However, Folk points out that PennDOT also requires several other certifications, which can "become quite a burden on the consultants." Often, the benefits of certification must be weighed against the overall allocation of financial and time resources to essential areas. "A couple of our guys had water and wastewater plant certifications but let them drop because we didn't see the benefit," he adds. Still, he agrees that "taking a NICET examination guarantees a level of knowledge," an added professional edge that may help secure additional contracts.

At the offices of Fuller, Mossbarger, Scot, and May Engineers Inc. in Louisville, Kentucky, NICET certification is regarded as providing "a good indicator of the individual skill levels of technicians to both the employer and client." Robert Blessing, manager of field and laboratory services, notes that for the technician, NICET credentialing encourages "continuous study and development in the individual testing areas."

He further emphasizes that NICET "promotes a greater understanding and mastery of the individual work elements among the laboratory staff and, in turn, results in more efficient and accurate testing in the laboratory and the field."

The Metropolitan Sewer District of Louisville also utilizes specific certification programs to assure the capability of its hired inspectors and to identify and measure training areas that need addressed.

"NICET certification gives technicians a career path and helps us to hire with more assurance than what a resume can provide," says Professional Engineer James Wathen, MSD's construction team leader. "We believe that it raises the bar. People are interested in these national certification programs to measure their professional expertise. Certification proves they have experience and competence beyond a resume. And NICET certification also requires continuing competence."

Wathen points out that NICET's storm water and wastewater system

inspection certification program, as it's designed, helps MSD to focus more on its specific operations, in comparison to a more standard underground utilities certification program.

"In essence, when the entire project team is licensed and certified and those credentials are known, it establishes the professionalism of the team," he contends. "It gives the individual team members more confidence in each other and improves overall self-esteem."

There's still work to be done, though, Kirby emphasizes. "At this point in time, there are few requirements for NICET certification in many construction specifications," he explains, noting that while the American Society for Testing and Materials references NICET in numerous standard methods, those requirements typically are not enforced in private construction nor in most public construction.

"This is both an educational issue for owners and specifiers as well as one of economics," Kirby observes. "It will require the effort of NICET to place their programs, value, and merit front and center. As NICET reworks its programs to gain better acceptability in the highway industry, it is hoped that it will generate more interest in the building industry, too."

A Cause for Inspection

As owners as both public and private projects compete for sources of capital funding, coupled with advances in construction materials, new contracting methods for project delivery, and expanding health and safety regulations, the inspection and testing responsibilities of the construction industry have increased exponentially.

NICET's credentialing services for inspection, maintenance, and testing extend to fire suppression systems, water-based systems, electrical systems, communications, geotechnical construction, soils and erosion/sediment control, construction materials, storm water and wastewater systems, and highways and bridges.

To help assure the qualifications of its inspection staff, the Clark County Department of Development Services in Las Vegas, accepts various certifications issued by NICET. "As a jurisdiction, it is sometimes difficult to find certification programs for certain aspects of special inspection activities," says Jonathan Bahr, P.E., who serves as associate engineer of the CCDDS Building Division. "NICET provides some certifications that are unique to the organization, such as smoke control, fire protection, and geotechnical engineering technology."

According to provisions of the *Building Administrative Code of Clark County*, to "qualify as an approved special inspector, an individual must demonstrate competence as a special inspector to the satisfaction of the building official, achieve and maintain national certification(s), and meet the requirements of the technical guidelines." Clark County's certification requirements for special inspectors are applicable to both the *Uniform Building Code* and the *International Building Code*.

How beneficial are these certification programs to the engineering team? Bahr points out, "NICET certifications provides the CCDDS Building Division and other project team members—the contractor, quality assurance agencies, owner, and licensed design professional—a level of assurance that a person who is granted a certificate by NICET is competent in the field for which he or she is certified."

Engineering Initiative Reaches Out To Ethnic Minority Students on the Delta

By Steven J. Storts
Dublin, Ohio

SOMETIMES, smaller is better, particularly when it comes to a local outreach effort such as the Louisiana Engineering Advancement Program. Founded in 1979, LEAP is a precollege training initiative aimed at attracting ethnic minority students and assisting them in the preparation for careers in engineering.

More importantly, however, thanks to contributions from the corporate community and a grant from the U.S. Department of Energy, LEAP is now firmly entrenched in more than 25 middle schools, junior highs, and high schools in the New Orleans metropolitan area. And the wide array of programs and activities sponsored or provided by LEAP have helped a significant number of students make decisions regarding the selection of their course of study in college.

Today, more than 5,000 students have been involved in LEAP, with more than 80% entering college. Of those students, more than 50% have selected engineering or other mathematics- and science-based curricula.

Managed and operated by the University of New Orleans College of Engineering, LEAP's director and assistant director are responsible for ensuring that the program's objectives are met and exceeded. Regularly scheduled meetings with corporate representatives and teachers help guarantee that the engineering school's commitment to serving New Orleans and the Mississippi River region is effectively met.

Several corporations and organizations, in fact, help coordinate plant facility tours and field trips and provide representation on the LEAP Board of Directors and identify associates with professional experience to serve as mentors and motivational speakers.

Because LEAP places emphasis on motivating and academically preparing younger students to pursue a four-year engineering degree, any middle school, junior high, or high school is eligible to participate in the program, provided the following minimum requirements are satisfied:

- The school must offer the minimal state requirements for mathematics and science, and high schools must provide mathematics courses in algebra, geometry, and trigonometry, and science courses in physical science, biology, chemistry, and physics.
- The school's participation in the program must have the approval and commitment of the principal, who must identify and assign a LEAP Club sponsor (two recommended).
- The teachers assigned to the LEAP Club must be committed to providing the leadership for the club and submit required documents and reports.

Students wishing to participate in LEAP must also meet specific requirements. For instance, they have to express an interest in pursuing engineering or other mathematics- and science-related fields and be in good academic and social standing with the school. A minimum 2.5 grade-point average (on a 4.0 scale) is required for high school students, and junior high and middle school students must maintain at least a 2.3 grade-point average.

Additionally, students must agree to enroll in approved science courses that provide basic preparation for engineering and engineering-related careers and take calculus-track mathematics courses (high school students) and advanced mathematics (junior high and middle school students).

Participation in 75% of LEAP activities such as club meetings, sponsored activities, and summer enrichment programs is also recommended for students to remain in good standing with the program.

Two of LEAP's most successful activities are the video-essay contest, in which students write an essay about a selected engineering or science-based subject or topic viewed on videotape, and the science fair, where students exhibit selected science projects along with written analyses of their findings. In both programs, students compete at four different levels, according to their grade level. The top entrants in each grade level then advance to their respective competition finals.

Another successful endeavor is the LEAP Summer Scholars Program, which consists of two intensive four-week sessions (ninth and 10th grade) where students attend classes on the campus of the University of New Orleans to improve their science, math, computer, vocabulary and oral presentation, and analytical problem-solving skills. Field trips, tours of engineering labs, and actual engineering projects that incorporate class learning help augment the program.

And for academic excellence, LEAP awards annual scholarships to qualified students who have maintained a minimum 3.25 grade-point average while in high school and have been accepted to an engineering program at an accredited institution. Addition-

ally, scholarship recipients must have ACT or SAT scores reflective of scholastic capability and proficiency in a university academic environment show evidence of previous academic recognition and community or school involvement.

Scholarships are also awarded to former LEAP students currently studying engineering and to students who attend summer enrichment programs that are aligned with LEAP's mission.

September 2004

Credentialing in Electrical Systems Testing Raises the Bar for Training, Reliability

By Steven J. Storts
Dublin, Ohio

MOST industrial plants have extensive electrical systems consisting of equipment that continually needs monitored, tested, and maintained to ensure safety and reliability. But what type of tests should be performed? And what do their values represent? These questions hold true not only for new installations but for in-service equipment as well.

This is where certified employees become so valuable within an industrial organization, says Ralph Patterson, president and owner of Power Products & Solutions Inc., of Charlotte, North Carolina. "A certified engineering technician properly trained and experienced has the unique ability to perform electrical testing as well as understand how to read test results and determine their impact on performance," he explains.

Patterson, whose engineering experience spans the field of high-voltage electrical equipment testing, has served as a design engineer for both Standard Transformer and Duke Power Company, head of transformer design with Ohio Transformer, and as field engineer for Update Inc. Prior to establishing Power Products & Solutions, he was a principal and executive vice president of SETA-AC Testing.

"Experience is said to be invaluable," he points out, "but learning the hard way that removing a relay may shut down an entire facility is not practical. As technicians strive to improve their reliability and that of their employers, training and certification becomes the credentials that technicians aim for."

The National Institute for Certification in Engineering Technologies offers credentialing programs for industry in the areas of instrumentation, electrical/electronics, electrical power (distribution, production, substation, and transmission), electrical testing, and industrial engineering technology. This year, NICET added a new program—video security systems—as part of its certification package in low-voltage electronic communications systems.

NICET offers four levels of certification in the career path of an electrical testing technician. A cooperating partner with the institute in this program is the InterNational Electrical Testing Association, an accredited standards developer for the American National Standards Institute that defines the parameters by which electrical equipment is deemed safe and reliable. Part of NETA's mission in serving the industry is to establish standards, publish specifications, accredit independent testing companies, and certify test technicians.

"With an increasing number of required certified technicians by NETA member companies and the industry itself, certification has certainly become of age," says Patterson, an active member of NETA who's leading the effort to redesign NICET's electrical testing certification program.

Currently, he and other members of the NETA Standard Review Council are working with NICET in developing a comparable program that includes a technician profile and knowledge-skill-ability requirements for each certification level.

"Some of the difficulty in becoming a certified technician is the background and or experience required to fully understand the electrical distribution systems," Patterson notes. "The NICET program is unique in that it allows the emerging technician to develop skills at an increased pace when presented with the opportunity to evaluate and perform electrical testing."

Patterson emphasizes that NETA has developed, and continues to revise, industry-recognized acceptance and maintenance specifications for electrical power distribution equipment and systems.

"The certified technician needs a complete understanding of these procedures as well as a background for interpretation of the results," he contends. "The NICET program is one of several offerings that provide this coveted insight. It's my mindset that although technician certification should be a requirement, it is just as much essential for the well-being of the public and the industry as a whole."

NICET General Manager Mike Clark admits, "Even though we've made substantial progress with our engineering technology programs in industrial instrumentation, electrical/electronics, electrical power, and electrical testing, we still need to make greater inroads into the industrial community, particularly the power sector."

Many of the larger energy companies, such as American Electric Power (AEP) and the Duke Energy Corporation, do not require additional credentialing or certification of its engineering technician and technologist staff beyond the basic entry-level requirement of a two-year associate degree approved by the Accreditation Board for Engineering and Technology.

"Just as the National Society of Professional Engineers (NSPE) has faced challenges over the years with the industry exemption in encouraging qualified engineers to become licensed, so, too, have we faced difficulties at times in convincing engineering technicians in industry to become certified," Clark adds. But he notes that alternative approaches do exist.

For instance, Duke Energy officials point out that although the company doesn't require technician certification, "if an employee wants to pursue certification, we will support the effort and provide dollars through our tuition refund programs to assist financially."

And AEP policy "recognizes the competitive advantage inherent in the knowledge and skills of its workforce. To meet the demands of a highly competitive, technology-driven global economy, the company provides financial assistance to eligible employees furthering their education and pursuing personal development."

"We need to take advantage of these opportunities," Clark concludes. "Companies that provide resources promoting career development are, in essence, opening the door for our programs. However, they're not going to come to us. We must go to them and do a better sales job. This is where NSPE can help, by having its members address the career paths of technical staff within their own companies to see if NICET can enhance their potential for advancement."

Industrial Instrumentation

Instrument control systems are an integral part of any manufacturing industry. The benchmarks for all processes ranging from product quality to emission compliance depend on accurate measurements from precise instruments that are installed correctly and tested according to national standards.

NICET's instrumentation certification program was designed for engineering technicians who are engaged in a combination of the following activities: design assistance, installation and maintenance of industrial measurement and control systems; and the installation and maintenance of electrical, electronic, and pneumatic instruments used within systems.

The program recognizes situations where the principal activities of the technician may be focused on in-plant environments, laboratories, or engineering offices. It also recognizes a working environment where the technician routinely has job tasks in all areas of instrumentation and control—conditions that often require more of a generalist rather than a specialist.

Areas covered include knowledge of the principles and operation of instrumentation systems, standard maintenance procedures, specialized repair facility and field maintenance procedures, applications, installation practices, record-keeping, and reports.

As with most of the institute's programs, instrumentation certification comprises four levels beginning with the trainee and entry-level categories, then progressing to the intermediate levels, and finally reaching the independent, senior-level designations. NICET certification provides a comprehensive approach to most industrial process control projects in the domestic market and some international markets, too, ensuring the highest quality of craftsmanship for plant or project owners.

July 2004

Certification Programs Help Assurance Of Fire Protection System Quality

By Steven J. Storts
Dublin, Ohio

ASSURING the public's health, safety, and welfare is the responsibility of licensed engineering professionals and their support team, including engineering technicians and technologists. Nowhere has this become more evident than in the public sector, particularly in the fire protection agencies of many states and municipalities.

Over the last decade, the National Institute for Certification in Engineering Technologies has significantly expanded its credentialing role in the fire protection field, which actually comprises four subfields: fire alarm systems, automatic sprinkler system layout, special hazards suppression systems, and inspection and testing of water-based systems. In fact, NICET has experienced 20% annual growth since 1999 in its fire protection certification programs.

The horrifying aftermath of fires last year in Rhode Island, Tennessee, and Chicago have heightened public concerns about fire safety, particularly in commercial establishments. As a result, many states and local jurisdictions are carefully scrutinizing their fire and building codes and regulations regarding the installation and servicing of fire protection systems.

Boyd Petty, manager of licensing in the Louisiana Fire Marshal's Office, says the sprinkler and fire protection licensing laws in Louisiana now require sprinkler contractors, engineered fire suppression contractors, and fire alarm contractors to have at least one individual certified at NICET Level III in the appropriate discipline to qualify a firm for a license.

"Since the licensing of these contractors, the quality of systems installed and serviced per code has increased," he notes. "This is due, in part, because of the requirement to have at least one individual certified at NICET Level III. Additionally, many regulated firms are sending all of their technicians through NICET certification programs, with the result of gaining more knowledge and competency in the field."

In Denver, Colorado, the Fire Prevention Bureau in the West Metro Fire Protection District requires NICET Level III certification for the design of any fire protection system, under a qualified engineer in responsible charge who reviews the work performed and signs the plans. Those holding NICET Level II certification are also required to supervise the installation of all sprinkler, fire alarm, or special hazard systems.

"We hold ourselves to the same standard and have been increasing our demonstrable level of expertise by attaining commensurate certification," says Keith Dix, assistant fire marshal of the West Metro Fire Department. "In the last three years, our department has achieved 15 NICET certifications at varying levels in the fire disciplines. I, myself, have attained various certification levels in three fire disciplines."

Dix points out that the difference between a NICET designer/installer and a noncertified designer/installer is frequently evident in all the stages of a systems design or installation. "Prior to the implementation of NICET certifications, we frequently encountered installers who had no knowledge of NFPA 72, 13, 25, or the other related standards. Often they were unaware that such standards existed. With our requirements, and NICET's help, the quality of systems designed and installed in our district has improved measurably."

In 1998, the Maryland General Assembly passed legislation requiring the Maryland State Fire Prevention Commission to adopt regulations to license fire sprinkler contractors. The regulations, which went into effect on January 1, 2000, were revised in May 2003 to incorporate the latest NICET classifications applicable to fire sprinkler layout certification.

Under the new regulations, the Maryland Fire Marshal's Office has established seven classifications of licenses, depending on the type or scope of work pursued. One of the requirements for each classification is a specified NICET certification or a passing score on a NICET examination in a specified area.

"The regulations have been established with the input and consensus of the sprinkler industry," says John Bender, P.E., chief fire protection engineer for the fire marshal's office. "From my perspective, this has been a positive influence on the sprinkler industry in Maryland."

A grandfather clause contained in the new regulations establishes a "temporary license" to allow existing fire sprinkler contractors time to obtain their NICET certification. After the expiration date, July 1, 2005, all temporary licenses will be suspended and fire sprinkler contractors must then operate under a NICET-certified license—or cease doing business.

"However, we are doing everything we can to encourage sprinkler contractors to get their NICET certification

so that we do not need to take that final action," Bender adds. "So, far it seems that fire sprinkler contractors are heeding that advice."

June 2004

Credentialing Demonstrates Commitment Toward Excellence, Career Development

By Steven J. Storts
Dublin, Ohio

WHAT is the "right technician" for an engineering project? The National Institute for Certification in Engineering Technologies would tell you to look for someone who's qualified to practice, whose knowledge and experience in a technical field meets or exceeds a national standard. NICET should know! It's in the business of identifying, validating, and documenting the skills and performance of technicians and technologists across the U.S.

Established in 1961 as a not-for-profit organization, NICET has witnessed more than 112,000 certifications since its inception and currently maintains a national database of about 26,000 active certificants. With its sole purpose as evaluating the knowledge and experience of individuals engaged in engineering technology fields, the institute administers about 12,000 written exams annually through a national network of more than 140 test centers.

"The widespread use of certifications is a phenomenon of the new economy," says NICET General Manager Mike Clark. "In many instances, certification is becoming a requirement for employment in specific engineering technology areas, although it is a voluntary credential, unlike engineering licensure, which is legally conferred by government authorities. Industry leaders, state and federal agencies, engineering organizations, and other customers confirm that employers increasingly value performance-based certifications and credentials that indicate more specialized knowledge and skills."

Although the overall financial investment in credentialing through certification is modest, the return can be many fold for a company or agency and its employees, Clark adds, noting that certification serves as a benchmark of technician competency upon which most quality assurance and quality control programs depend.

NICET cites other values of certification, including:

- Commitment to the maintenance and improvement of the professional capabilities and ethical standards of employers and their employees;
- Respect and recognition of individuals and organizations that demonstrate high levels of knowledge and experience; and
- Efficient use of an employer's workforce.

Raising the quality or stature of company workforces is receiving more attention these days, particularly in the midst of tight, competitive markets, NICET points out. Certification takes some of the guesswork out of employee applicant screening by identifying technicians and technologists who have acquired a minimum amount of relevant work experience and demonstrated their knowledge by meeting rigorous exam requirements.

Project marketing is another area where credentialing can play a significant role. "A certified workforce indicates to customers and potential clients that your personnel are qualified and that your organization is committed to excellence, including career advancement and support of continuing professional development," says Clark.

As a self-supporting, autonomous division within the National Society of Professional Engineers (NSPE), the institute closely aligns its programs and technical field certifications with the engineering profession. In fact, NICET has experienced 20% annual growth since 1999 in its most popular certification programs, fire protection, construction materials testing, and highway construction.

"Today's technician workforce must be knowledgeable in applied math, physical science, and engineering science, and have proven abilities in applying that knowledge to both the operating characteristics and limitations of engineering systems, products, and processes," Clark explains.

"After all, technicians not only have to be familiar with the design, fabrication, construction, installation, operation, and maintenance of these systems, but they must also carry out vital support functions such as data collection, estimating, preparing proposals and plans, quality control and assurance, and technical sales and writing," he points out.

To pursue this mission, NICET has delineated its credentialing programs into two major categories, job-task competency and general knowledge, which are currently administered through individual certification programs in 36 technical areas that are recognized by government contracting agencies and private enterprises in every state. Specifically, NICET's "certification ladder" features:

- Four levels of technician certification—technician trainee, associate engineering technician, engineering technician, and senior engineering

technician—based on work experience, written examination performance, and third-party evaluations and verification of competency; and

- Two levels of technologist certification based on a four-year engineering technology program, work experience, and endorsements and professional recommendations.

As with engineering licensure, continuing professional development is also a key element of NICET's certification ladder. Recertification is required every three years, based on a registry total of 90 continuing professional development points comprising relevant work experience, continuing education, professional activities, certification activities, and a recertification exam.

Although NICET is autonomous within NSPE, it doesn't and shouldn't stand alone, Clark emphasizes. "We need your partnership to increase awareness of the institute's certification programs within the engineering community and to update existing programs and develop new ones to satisfy current industry standards and needs," he notes.

May 2004

Certification Takes 'High Road' with American Institute of Constructors

By Steven J. Storts
Dublin, Ohio

IT IS often said that nothing stays the same. For the American Institute of Constructors, that reality surfaced in the early 1990s when it was at an "organizational crossroads," recognizing that the responsibilities of the constructor in the built environment were becoming increasingly complex and extending into areas beyond conceptual design and pure construction.

Upon determining that constructors were going to require more knowledge in fields such as construction law, business management, human resources development, and management of construction technology, AIC took a bold step toward change in 1994. The decision was made to establish voluntary certification through a credentialing program modeled similarly after the licensing process for engineers.

For AIC, it was imperative that its national certification program would carry the same credibility as engineering licensure. However, the institute also wanted to maintain peer control over the credentialing standards instead of governmental oversight. Those criteria set in motion the development of the Certified Professional Constructor (CPC) program under the management of AIC.

An independent body was established within the institute to develop credentialing standards, policies, and procedures for administering the program. However, pursuit and achievement of certification is independent of membership in AIC. Today, the constituency of the AIC Constructor Certification Commission comprises numerous professional and trade associations in the construction industry. Also, last year, AIC became an alliance partner with the National Society of Professional Engineers' Construction Practice Division.

"The management of construction has changed and expanded dramatically over the last century," says AIC Executive Director Cheryl Harris. "Professional constructors have accepted these challenges and are developing additional skills and acquiring more technical and managerial knowledge necessary to execute their responsibilities in a professional manner."

Emphasizing that certification raises the standards of practice of the constructor, which, in turn, benefits all members of the engineering team, Harris says AIC's certification process was developed without intent to discriminate or exclude any individual who may be qualified to achieve certification.

"Because constructor certification is aimed at those in the management and administration of the construction process, many avenues of education and experience are open," she notes. "Certification is available equally for both experienced practitioners and new candidates entering the profession."

AIC's two-step certification program, sponsored by the commission, includes verification of education or experience equivalency, verification of practice at an advanced level, and two sets of examinations—basic and advanced. The examination process requires a broad spectrum of professional knowledge expected of the constructor practicing in any sector of the construction industry and under any type of contractual relationship or employment relationship.

To qualify as an Associate Constructor, the first step toward CPC certification, a candidate must have completed four years of acceptable education from an accredited institution or have the equivalent of acceptable experience at the time of application. A candidate must also pass a qualification exam on construction fundamentals.

To qualify for CPC status, a candidate must have passed or been exempted from the first-level qualification exam and attained seven years of additional acceptable professional experience at the time of application beyond that required to sit for the first-level exam. A candidate must also pass a second-level exam on advanced construction applications.

As part of its mission toward providing the industry with standards of certification for ethical and professional practice, AIC has partnered with the academic community in advancing the credentials of schools of construction in higher education. Through the establishment of the American Council for Construction Education in 1974, performance standards for degree programs in construction education at two-year and four-year institutions have been accredited on a national basis.

For one who seeks a systematic plan for career advancement, Harris emphasizes that constructor certification "provides an independent assessment of individual strengths and weaknesses in various subject areas, based on a high national standard, and offers a professional and marketable credential to an employer, prospective employer, or client."

Equally important, she says AIC's credentialing mission helps assure an

employer that its certified employees will seek to upgrade their professional competencies through a required continuing professional development program.

April 2004

University of Washington Heads Project on Better Teaching Practices

By Steven J. Storts
Dublin, Ohio

THE University of Washington is now at the helm of a program exploring how engineering students think and learn—knowledge that educators consider essential to teach today's undergraduates the skills they'll need in tomorrow's marketplace.

Funded by a $10 million grant from the National Science Foundation, the study will track 40 engineering students at five schools through the four-year educational system to determine what classroom practices can be improved and how to apply those improvements. At UW and Howard University, an additional group of students will be monitored from their junior years through graduation and then through their transition into the workforce.

The NSF grant, disbursed over five years, is being used to create a Center for the Advancement of Engineering Education for the five schools. Cindy Atman, Ph.D., a University of Washington industrial engineering professor, is principal investigator on the grant and will lead a small consortium of universities and other collaborating institutions in the CAEE research. The partner schools include the Colorado School of Mines, Howard University, Stanford University, and the University of Minnesota.

"A study of this size with four additional institutions is groundbreaking work," Atman notes. "We tried to get a diversity of schools in this, with Stanford being your private school, Howard being your traditionally black school, and the Colorado School of Mines being a tech school."

CAEE is touted as the first national center funded by NSF to look at not just the engineering learning experience, but to go the next step in applying the data to classroom practices. "When it comes to hard data on the student experience, on how engineering is learned, there really isn't much," Atman points out. "To structure the learning experience in a meaningful way, we need to be working from empirical data. Otherwise, how do you know what to change?"

Educators in higher institutions of learning admit there are critical national needs to advance scholarship in engineering teaching and learning, increase the use of effective pedagogies in classrooms, and strengthen research and leadership skills of faculty and the graduate student community. To address this mission, Atman founded the Center for Engineering Learning and Teaching at UW in 1998. In those studies, Atman and other CELT researchers explored the engineering learning process as it relates to teaching in the classroom.

CELT researchers noted that engineering graduates must understand fundamental math, science, and engineering sciences. They must also be able to understand the context of engineering problems, synthesize information, design appropriate solutions, and communicate effectively, all in a team environment.

In one CELT study, seniors and freshmen were given the same problem to solve: design a playground for a fictitious neighborhood. They were allowed to ask for information they deemed necessary from a project administrator. The good news was that seniors asked for more information, covered a broader range of design steps, and moved more fluidly through the design process than the freshmen. Seniors had a more global perspective. The not-so-good news was that many didn't go far enough.

"Only slightly more than half of the graduating seniors . . . [examined] the budget that they had to stay within," says Atman. "They also weren't thinking about liability issues, and they weren't thinking about maintenance issues, [either]." She further observes, "The question of how engineering students are educated impacts all of us. Taking into account the people who are building this society is crucial."

The new center will continue what CELT initiated, expanding the effort to a national audience. Its primary goals will be to:

- Understand and enhance the engineering student learning experience;
- Integrate the needs of diverse faculty and diverse students into engineering education;
- Strengthen the engineering education research base
- Expand the community of leaders in engineering education; and
- Promote effective teaching for current and future faculty.

Atman observes, "When you work with engineers, you have to show them data. They want to know why something works. We need to base our discussions on solid data, but we also need to be changing the process. They have to happen together to have an effect."

CAEE will also work with faculty in UW's Technical Communication Department to establish research-based resources and tools to help edu-

cators improve the effectiveness of their teaching. Many of those will be available through a Web-based engineering education portal. As the program further unveils, the center will host annual engineering education institutes to develop a core group of leaders who can foster change in how engineering is taught.

In addition to the partner schools, CAEE's collaborating institutions include the City College of New York, Edmonds Community College, Highline Community College, the National Action Council for Minorities in Engineering, North Carolina Agricultural and Technical State University, San Jose State University, the Women in Engineering Program & Advocates Network, and Xavier University.

January 2004

MIT Sets High-Tech Pace for Distance Learning on a Global Scale

By Steven J. Storts
Dublin, Ohio

IF distance learning at greater distances poses more challenges, do tougher challenges bring greater rewards? The Massachusetts Institute of Technology apparently thinks so. It has taken international distance learning to a higher level, one that now serves as a model in global engineering education.

The Singapore-MIT Alliance, founded in 1998, is an innovative engineering education and research collaboration among MIT, the National University of Singapore, and Nanyang Technological University. The SMA brings together the resources of the three prominent academic institutions, while providing students with unlimited access to faculty expertise and state-of-the-art research facilities.

The alliance combines a focus on creativity and entrepreneurship with an intense, hands-on approach to research. According to the program's administrators, graduates will comprise some of the industry's best-educated professionals, both in the growing economy of Singapore and in industrial centers worldwide.

With a commitment to promoting engineering innovation and excellence, one of the primary goals of the SMA is the creation of a world-class center for graduate education and research in engineering, one that features the most technologically advanced distance learning facilities. Eventually, the center will provide opportunities for private-sector organizations to share in SMA's research, collaborate with its students, and recruit potential employees.

MIT President Charles Vest has stated, "The new media enable us to reach out to the world and extend our learning community by teaching at a distance. They also enable us to bring the world in to our students on campus. Often, we arrive at an amalgam of the two."

Indeed, distance learning is nothing new at MIT. Its Sloan School of Management conducts ongoing seminars with management faculty in leading Chinese universities, and MIT's system design and management program uses advanced videoconferencing and the Internet to instruct masters-level students at their places of employment around the U.S.

A couple of years ago, the Sloan School taught a popular course on investments to 28 Merrill Lynch directors, vice presidents, analysts, and associates in offices in Japan, Hong Kong, and Australia. The course lectures were also made available on CD-ROM that could be used at more convenient times. The faculty brokered discussions and answered questions; students networked with each other and the teaching staff at all hours through e-mail, the Web, and by telephone. Despite their demanding schedules, the students committed themselves to 14 weeks of very hard work; what they got in return was an immersion course in global markets.

Still, the largest MIT experiment in distance education is the SMA. Vest points out that when "you walk into one of MIT's state-of-the art classrooms . . . you will find students engaged in classes together with their Singapore counterparts." During the 2000–2001 academic year, the university beamed more than 500 hours of instruction in 12 subjects to a total of 155 students. The subject areas ranged from advanced materials for micro- and nano-systems to manufacturing systems and technology to molecular engineering of biological and chemical systems.

"We believe that the SMA, which is supported by a 155-megabytes-per-second Internet-2 line, is the world's most technologically advanced point-to-point synchronous educational program," Vest claims. "It uses a dual-screen delivery technology that enables students to view simultaneously camera images from the classrooms and a computer screen for displaying PowerPoint presentations. This technology also makes it possible for MIT faculty to hold help sessions for the students and conduct oral examinations of doctoral students in Singapore."

However, Vest emphasizes that learning—not technology—is the goal of the alliance. Has it been successful? Singapore and MIT students enrolled in the same classes are performing at comparable levels, but professors do report that there is a steep learning curve for preparing and presenting lectures across these boundaries. Fortunately, however, they also report that in a modest amount of time, they reach a point at which the technology ceases to dominate their planning and they're able to concentrate on educational quality.

But what about bringing global education inward to the university's primary students—those in residence on MIT's campus? Vest notes that some interesting examples have recently developed in MIT's School of Architecture and Planning, where students

are using technology to interact with people and projects around the world. For instance, student design projects are routinely evaluated by juries of distinguished architects on several continents, whose schedules would not allow them to convene on the Cambridge campus. Additionally, students have monitored the progress of large international construction projects such as the new Hong Kong Airport.

May 2002