

First ACI Certifications in China and Taiwan

How to successfully launch a new program

by Luke M. Snell and John K. Conn

In 2010, Zongjin Li, a Professor in the Department of Civil & Environmental Engineering, Hong Kong University of Science & Technology, and Director of the ACI China Chapter, contacted ACI about launching the ACI Concrete Field Testing Technician–Grade I certification program in China. Prior to the launch of any ACI Certification program, a local Sponsoring Group (SG) must first be established to provide in-country program oversight and test administration. The ACI China Chapter agreed that the Jiangsu Research Institute of Building Science in Nanjing would be the appropriate organization. A certification committee was formed and an SG application was submitted to ACI for approval. Ultimately, the SG acts as ACI's agent and assures the certification program is conducted consistently and in compliance with all ACI program policies.

At about the same time, although separately, Jenn-Chuan Chern, Minister of Public Construction Commission, Executive Yuan, contacted John Conn and Wen-Chen Jau, Department of Civil Engineering, National Chiao Tung University, contacted then-ACI President Kenneth C. Hover about launching the ACI Concrete Strength Testing Technician certification program in Taiwan, ROC. After many discussions, it was decided that the Taiwan Concrete Institute (TCI), already an ACI International Partner, would be the appropriate SG. Because of the close proximity of both countries, John Conn requested authorization to assist both new SGs at the same time under an ACI Board-approved program to help launch new international ACI Certification programs (refer to the sidebar).

Selecting the Program to Sponsor

The ACI China Chapter and Jiangsu Research Institute of Building Science decided—as most groups do—that the Field Testing Technician–Grade I certification was the ideal program to start with. The Field Testing Technician certification is ACI's highest-volume certification program. In this program, the examinee must pass a written examination on the seven ASTM standards for freshly mixed concrete: temperature, sampling, air content by the pressure method

ACI Certification International Support Program

In an effort to do more to assist new international Certification Sponsoring Groups in initiating certification, in 2008, the ACI Board of Direction approved and funded a program to provide direct ACI support.

Under this program, ACI provides up to two ACI representatives to conduct a review and certification examination as a *train-the-administrator* session. The representatives are also available to meet with governmental/industry leaders to generate interest and support as well as speak at chapter or industry events. As an additional component of this program, ACI waives exam materials and processing fees for this inaugural session for up to 20 participants (these participants should be hand-selected by the SG for their ability to act as future Examiners, Supplemental Examiners, proctors, and trainers).

Funding has been established for one international support program per year and it requires a minimum of 12 to 18 months to plan and organize. To be eligible:

- The SG and certification committee must be established and approved by ACI;
- The technical basis of the program(s) must be locally accepted (ACI, ASTM, or local standard);
- End users of the program must be able to understand existing available languages (translation into other languages will require additional time);
- The new SG has ability to pay established fees for certification and study materials after initial session;
- The new SG operates in a country not subject to U.S. embargo; and
- The local economy is able to support ongoing certification activities.

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In Nanjing, China, instruction on the pressure method for measuring air content

and air content by the volumetric method, density, slump, and making and curing concrete test specimens in the field. The examinee must also pass a hands-on performance examination on each of these ASTM procedures under the observation of a Supplemental Examiner.

Another important certification that an SG might consider as its first program is the Concrete Strength Testing Technician certification. This certification program covers the four ASTM standards on capping concrete cylinders, using unbonded caps on concrete cylinders, and testing compressive and flexural strengths of concrete. The certification is designed for technicians who work in the laboratory and are responsible for the proper care and testing of concrete samples. The SG in Taiwan, TCI, selected the Concrete Strength Testing Technician certification as its initial certification program.

ACI has many other certification programs that may be considered. A complete list can be found at www.concrete.org/certification/cert_prog.asp. However, it does not make a difference to ACI which program the SG selects. This decision is based on the needs of the area and which program will have the greatest positive impact on the local concrete industry.

Getting Started

After the SG has been approved by ACI and has selected a program to sponsor, there are several action steps:

Testing Equipment: ACI can provide a list of the equipment necessary to conduct each certification examination. For the Field Testing Technician–Grade I examination, the SG will need to borrow or purchase slump cones, tamping rods, scoops, cylinder molds,



Participants in the ACI Certification session in Taiwan

thermometers, and scales. Even in areas where air entrainment is not required, the SG will still have to source air meters.

Study Guides: ACI has prepared workbooks for each certification program. These study guides contain the appropriate resources for the test, study questions, and a checklist that will be used in the performance examination. To allow students to become familiar with the material, the workbooks should be distributed in advance of the examination. More time should be given in areas where English may not be the primary language. In addition to workbooks, ACI also provides online eLearning courses in support of both the Field Testing Technician–Grade I and Concrete Strength Testing Technician certification programs. In both China and Taiwan, examinees had use of ACI's eLearning courses the month prior to the examinations.

Review Session: A review and hands-on practice session is not required by ACI; however, conducting such a session will increase the success rate for the examinees. A typical review session will take about 8 hours. There are also training DVDs available through third-party vendors that visually review each test step-by-step.

The review session can be held in a typical classroom. We recommend that the actual testing equipment be in the classroom so that after the video for each test is shown, the equipment can be discussed and demonstrated. These classroom demonstrations tend to reinforce the details of the test and impress on the student the precision of the ASTM procedures.

The hands-on part of the test must be done where concrete is available: in a laboratory or at a ready mixed concrete plant. These tests are messy and should be done where waste concrete can be easily disposed of and floors are easily cleaned. Each participant should be provided with the opportunity to do all of the tests—most will want to do them more than once. Proper clothing should be required and personal protective equipment (PPE) provided even if not locally required.



Participants in the ACI Certification session in Nanjing

Examiner and Supplemental Examiners: The Examiner-of-Record is an individual, approved in advance by ACI, who is responsible for the examination session and charged with carrying out ACI's program policies. The Examiner-of-Record works through the approved local SG. Supplemental Examiners are selected by the Examiner-of-Record and assist by conducting the performance examinations. For most ACI Certification programs, the Examiner-of-Record must be a registered/licensed Professional Engineer (PE) or, in countries that do not have PE licenses, a person who is authorized to sign engineering documents (plans and specifications). Supplemental Examiners must meet the qualifications of the Examiner and hold a current Field Testing Technician–Grade I certification. Luke Snell, PE, was the Examiner-of-Record; John Conn and Billie Snell, both with current Field Testing Technician–Grade I certifications, acted as Supplemental Examiners. In addition, engineers who were approved by ACI to be Examiners for future exam sessions also acted as Supplemental Examiners. This was part of their training to be future Examiners-of-Record.

Class Size: With launching a new certification program, there is excitement. While many will want to be involved, the class size for the first certification session must be limited to no more than 20 participants. This allows everyone ample time to ask questions, use the equipment, and be comfortable with the certification experience. Participants should also be limited to volunteers who will act as trainers, proctors, Examiners, and Supplemental Examiners for the new SG going forward. As the SG gains experience, they may increase their class sizes.

Certification Sessions Conducted

When we arrived in Nanjing, China, on October 28, 2011, the participants had already spent 1 month reviewing the ACI Field Testing Technician–Grade I workbook (ACI publication CP-1) and ACI's online Field Testing Technician–Grade I eLearning course. This approach allowed participants

to self-study and come to the review session already somewhat knowledgeable about the each test method. This was very important, as none of the examinees had ever seen the volumetric meter. Although they had studied the ASTM standard (ASTM C173/C173M, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method") and had watched the online eLearning videos, they were still quite concerned about this test.

In addition, although practicing engineers, most examinees had never performed any of the concrete field tests. The classroom video review and equipment demonstration seemed to alleviate many of their concerns.

After reviewing each of the ASTM tests, we went to the laboratory and made concrete with Class F fly ash but no cement. We could work with this concrete and conduct tests for an extended period of time without worrying about the concrete losing slump.

Each test method was set up as an individual examination station and the participants were allowed time for hands-on practice of each test method. Supplemental examiners served as instructors at each station to help reinforce the proper test procedures.

On the day of the test, the examiner administered the written exam. A few students requested translation help for the Chinese equivalent of unfamiliar English terms. The translator was instructed to not give hints or go beyond a simple translation of the word(s). The performance testing took over 6 hours to complete. As expected, most participants had trouble with the air tests. Many students required the use of both of the two allowed trials to pass.

With the idea that Concrete Strength Testing Technician certification will continue in Taiwan, TCI handpicked engineers to go through the first certification session. One-third of the engineers were those who were just starting their careers, one-third had about 10 years of experience, and one-third had over 20 years of experience. TCI wanted to set an example of the importance of this certification and that all engineers working in the concrete industry should take the class and become certified. Many of the engineers who took the certification examination were college professors.

When we arrived in Taiwan on November 3, 2011, the participants, as in China, had already spent 1 month reviewing the ACI Concrete Strength Technician workbook (ACI publication CP-19) and ACI's online Concrete Strength Technician eLearning course. Most of the participants were engineers who were already familiar with the ASTM test procedures; however, most were not experienced with physically doing the tests.

In Taiwan, cylinders are capped using gypsum cement. Sulfur caps and unbonded caps are not used, so the students had no experience with the unbonded capping procedure (ASTM C1231/C1231M, "Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders"). After viewing videos of



Performance exam in Taiwan

the tests, we demonstrated each method. Part of the testing procedures had to be simulated because there wasn't a testing machine in the classroom. The gypsum-capping procedures used in Taiwan are in the specifications for capping cylinders (ASTM C617/C617M, "Standard Practice for Capping Cylindrical Concrete Specimens"), so we used that performance checklist for the bonded capping method. The class then went to the laboratory and performed each test.

On the test day, the students took the 1-hour multiple-choice, closed-book examination followed by the hands-on performance examination in the lab. It took about 7 hours to complete the entire examination process. Several students had minor problems with the testing procedures and had to repeat the cylinder capping—they forgot to make sure the capped cylinder was level and sound. All students ultimately passed the performance test.

The success rate for both China and Taiwan was nearly 100%. It was probably due to the careful selection of the students and the realization that they will be responsible for continuing the ACI Certification program in their countries.

Plans to Continue Certification

The Taiwan Concrete Institute SG plans to schedule several more strength testing certification sessions once program materials are translated into Mandarin Chinese. After the first session, they felt confident that they could conduct this program by themselves.

The launch of ACI Certification programs in China and Taiwan was a carefully thought-out process that any SG can follow as they consider ACI Certification. It takes a lot of planning, an assessment of the needs in the area, and a champion in each area. In China, Zongjin Li, Professor, Department of Civil & Environmental Engineering, Hong Kong University of Science & Technology, and Director of the ACI China Chapter; Herbert Wei Zheng, General Manager, Concrete Technology Department, Gammon Construction (Hong Kong), and President of the ACI China Chapter; Jiaping Liu, Vice President, Jiangsu Research Institute of Building Science and General Manager,

Jiangsu Bote New Materials, Co. Ltd.; and Tian Qian, Professor Senior Engineer, Jiangsu Research Institute of Building Science, became the champions and made sure everything was in place.

In Taiwan, Wen-Chen Jau, Department of Civil Engineering, National Chiao Tung University; Shih-Tang Lin, Tatung University College of Engineering and President of the ACI Taiwan Chapter; and Ta-Peng Chang, National Taiwan University of Science and Technology and President, Taiwan Concrete Institute, were responsible for the success of the program.

It also takes recognition that the first certification program is just a start. To improve the quality of concrete construction, these programs need to continue. We look forward to the success of the Jiangsu Research Institute of Building Science in Nanjing, China, and the TCI in Taipei, Taiwan, ROC certification programs and hope that their example can be a model for other SGs that want to get certification programs started.

Selected for reader interest by the editors.

Note: Additional information on the ASTM standards discussed in this article can be found at www.astm.org.



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