Ready Mixed Concrete Plant Certification: A Mark of Quality

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NRMCA's Plant Certification program was instituted, following approval by its board of directors, in 1966. At the time the development of the certification program was partly in response to a series of concrete failures that were damaging the reputation of concrete as a building material. A national joint committee representing American Concrete Institute, American Institute of Architects and the American Society of Civil Engineers was established to outline in detail the specific responsibilities of all the principals in concrete construction. The creation of the NRMCA certification program represented an industry-developed program providing a fair and equitable audit process that set forth the quality standard for concrete production facilities.

As the industry evolves to performance-based specifications, it is anticipated that certification of plants and personnel will be an important part of establishing a company's credentials in its ability to produce performance-based concrete.

What Does Plant Certification Accomplish?

NRMCA certification of concrete production facilities provides a system for establishing that production facilities of ready mixed concrete, which includes plants and delivery vehicles, comply with minimum industry standards. It reflects and in many cases exceeds the requirements of standard specifications for ready mixed concrete, such as ASTM C 94 and AASHTO M 157 and the Concrete Plant Standards of the Concrete Plant Manufacturers Bureau, CPMB 100. A certified plant is permitted to display an NRMCA Certificate of Conformance that assures the purchaser that the facility is physically capable of furnishing good quality concrete. Reference to compliance to ASTM C 94, *Specification for Ready Mixed Concrete,* appears in most project specifications and producer delivery tickets. The NRMCA program provides a means of verifying to the purchaser and the producer that concrete is being produced in accordance with ASTM C 94.

No claim is made that certification of plant facilities will assure delivery of high quality concrete. Properly operated equipment is only one of several factors involved in concrete control, although a very essential one. The presence of a Certificate of Conformance should, therefore, be accepted precisely for what it is — evidence that certain capabilities exist. The existence of those capabilities will reduce the likelihood of deficiencies in quality when normal inspection is exercised within requirements of usual sales agreements or project contracts. NRMCA Plant Certification is required by several state agencies for state projects, the U.S. Army Corps of Engineers, several local specifying authorities and by several design firms representing owners of commercial structures and facilities. It is referenced in industry standards such as the ACI 318 Building Code for Structural Concrete, ACI 301 Specifications for Structural Concrete and the AIA MasterSpec.

Table 1 provides a breakdown of the number of currently certified plants by state and the number of delivery vehicles certified. NRMCA estimates that there are approximately 6000-7000 plants and 80,000 mixer trucks operating the U.S. The number of certified plants represents a relatively small percentage of the total, primarily because many state highway agencies conduct their own plant inspections to qualify them for state work.

Table 1. Number of NRMCA certified plants by state

State	Number Certified	State	Number Certified
AK	**3**	MT	**2**
AL	**152**	NC	**1**
AR	**16**	ND	**2**
AZ	**11**	NE	**22**
CA	**164**	NH	**0**
CO	**10**	NJ	**9**
CT	**0**	NM	**10**
DC	**7**	NV	**48**
DE	**2**	NY	**3**
FL	**32**	OH	**40**
GA	**10**	OK	**4**
HI	**5**	OR	**4**
IA	**2**	PA	**10**
ID	**8**	PR	**0**
IL	**40**	RI	**0**
IN	**38**	SC	**8**
KS	**18**	SD	**0**
KY	**9**	TN	**20**
LA	**10**	TX	**206**
MA	**20**	UT	**44**
MD	**23**	VA	**45**
ME	**8**	VT	**1**
MI	**246**	WA	**82**
MN	**2**	WI	**37**
MO	**5**	WV	**1**
MS	**12**	WY	**1**
Foreign Locations	**19**		
Total Plants	**1472**		
Total Trucks	**15,000**		

Another important part of a quality process is a company established quality plan for process control to assure quality and uniform concrete. This is not implicitly addressed by the NRMCA plant certification program. It is often a part of a materials inspection program by state highway agencies in several states.

Companies choose to certify their production facilities because: 1) It is part of a quality plan endorsed by management; 2) They want to market their company against their competitors; and 3) Specifications require it. The more common reason is number 3.

The Benefits of Certification

Quality Assurance. The purchaser of ready mixed concrete is assured concrete is being obtained from a quality focused company. For larger project specifications, the NRMCA certification provides a means of verifying that production of ready mixed concrete conforms to industry standards such as ASTM C 94.

Clear Expectations. The NRMCA plant certification program provides a clear outline and expectations to the owner of the plant, the specifying authority and the inspecting engineer of the minimum standards for concrete production facilities. Since the program is developed by industry members, the requirements are considered fair and achievable. Plant owners can plan to ensure that all necessary plant and truck components and production processes are in place prior to an inspection.

Quality Focus. Certification provides a means for identifying best practices for materials management, batching process and for monitoring production processes for optimum quality. The certification offers a discipline for management and production employees to ensure scale and batching accuracy on defined periods for all measuring devices with a goal to produce and deliver uniform concrete. This allows for non-conforming product to be identified and corrected before it is delivered to the customer.

Benchmarks for Efficiency. It provides for a means for companies to measure and improve their production efficiency while maintaining quality. Benchmarks might include quantifying material inventory, batching accuracy, product performance consistency and productivity targets.

Personnel Training. The certification provides one part of a quality system that allows plant managers an important tool to train production and quality control employees by documenting the reasons and benefits of the various requirements in the Plant Certification Check List. The company benefits from a third-party audit that can impart new ideas for improvement.

Cost Effective. Companies have considerable potential for savings on ingredient materials waste by monitoring scale accuracy and batching records, reduced product rejection and product liability claims, increased new and return business with purchasers who demand quality and reduced time dealing with alternative undefined local inspections.

The commitment by a company to obtain certification requires an investment of personnel time and money to ensure that the systems are in place and are maintained, and the cost for the inspection and certification. It allows the company to budget for necessary quality processes and improvements. The costs, however, are more than offset by the benefits provided.

The Process

Certification may be obtained by any producer of ready mixed concrete with the procedures and limitations addressed in the check list document. The check list represents the items that need to be inspected for conformance and represents requirements of current industry standards. Certification is issued only when the facility complies with all the pertinent requirements in the check list. Revisions to requirements of check list and certification policies are balloted for approval by the NRMCA Research Engineering and Standards (RES) Committee and are subsequently approved by the NRMCA Board of Directors.

The certification program requires concrete production facilities and delivery vehicles to be audited in accordance with the check list by a professional engineer licensed in the state where the facility is located. The licensed engineer may be an employee of the company, with the consideration that he would be very knowledgeable of concrete operations and production and is responsible to his code of licensure. While the inspecting engineer can only corroborate conformance at the time of inspection, another important part of the process is for a responsible company official to sign an agreement to maintain the facility in conformance for the duration of the certification.

Certification is valid for a period of two years for production facilities. Delivery vehicles must be recertified on an annual basis. The certification process provides an option for delivery vehicles to be inspected by company personnel with a subsequent audit of their process by the inspecting engineer. A certificate of conformance is issued to the production facility after the completed checklist is reviewed by NRMCA. Proof of certification, with an expiration date, is provided for producers to display on their delivery vehicles.

A certificate of conformance indicates the following for the production facility:

- Plant name, location and company operating it
- Type of plant – truck mixing, shrink mixing or central mixing
- Batching capabilities – manual, partially automatic, semi-automatic or automatic
- Recording capabilities, if any, for one or more of cementitious materials, aggregates, water and chemical admixtures
- Restricted capabilities for producing concrete in cold weather
- Signature and seal of the inspecting engineer
- Signature of the responsible company official
- Inspection and expiration dates

A sample certificate of conformance is indicated in Figure 1, on page 11.

The Requirements

The Plant Certification Check List includes five sections briefly described below:

- **Section 1** addresses material storage and handling processes for cementitious materials, aggregates, water and admixtures. The checklist items include requirements for good practice and some requirements addressed in ASTM C 94.
- **Section 2** addresses batching equipment including scales, weigh batchers, volumetric batching devices for water, and dispensers for liquid admixtures. It includes requirements for verifying accuracy of plant batching, defines batching systems and provides requirements for batch recording devices.
- **Section 3** is applicable to plants with a plant mixer. The section defines requirements for a plant to conform to a central mixing or shrink mixing operation. To qualify as a central mixing operation, the plant mixer needs to be visually inspected or evaluated by performing mixing uniformity tests.
- **Section 4** addresses the requirements of a ticketing system. This is required for a ready mixed plant to conform to the certification. The reporting requirements on delivery tickets are the same as the mandatory reporting requirements of ASTM C 94.

- **Section 5** deals with the inspection of the delivery fleet, which may be truck mixers, agitators or non-agitating units. Inspection and certification of the delivery fleet is a requirement of the certification program since it is part of the production and delivery process. At least 90 percent of the fleet operating from the plant must be acceptable to qualify for certification of the production facility. Delivery fleet can be inspected by the company with an audit by the inspecting engineer or the complete fleet can be inspected by the inspecting engineer.

The Future of Plant Certification

As evidenced by the increasing quality focus and demands by users of concrete, certification programs are only going to see increased use. The push toward performance specifications will support this and other certification programs. While state highway agencies traditionally have inspected concrete production facilities, constrained resources are making them consider adopting national certification programs such as the NRMCA program.

The NRMCA RES Committee continually monitors the requirements of the NRMCA plant and truck certification program to ensure it conforms to revisions of the referenced standards. Since it represents a minimum industry standard, the program serves to raise the bar for the industry so all companies are operating at an equal level. Revisions are being considered to address the use of new material technologies and production processes. Items that are being considered for revision include achievable batching tolerances, evolving control systems and data recordation, cold weather operations, consistent procedures for calibration of scales and volumetric measuring devices.

Another important initiative currently underway is the development of a guide for plant inspections that will provide additional details and information to both plant inspecting engineers and company production and quality control personnel. It is anticipated that the RES Committee will make this required reading for potential "NRMCA-approved" inspectors.

As a condition for adopting the NRMCA program, the state highway agency of South Carolina required the Carolinas Ready Mixed Association to conduct a training program for plant inspectors. NRMCA facilitated a one-day training program with a plant visit and an examination to qualify inspectors in the state. The requirement for a licensed engineer still exists in order to establish the credibility of the program. ■

Figure 1. Example of a NRMCA Certificate of Conformance

Information on details of the NRMCA certification program for concrete production facilities and a copy of the Plant Certification Check List are posted on the NRMCA website at www.nrmca.org.

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