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# Judging Concrete Quality

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The quality of our product, ready mixed concrete, is a very important factor in the continued success of our industry. Realizing this, about two years ago the National Ready Mixed Concrete Association's Research Engineering and Standards (RES) Committee decided to institute a Concrete Producer Excellence in Quality Award to recognize the commitment to quality of its member companies. How would one go about judging the quality of a concrete producer? What would be the criteria? A task group was created to develop the criteria for the award. At the outset the task group decided that as far as possible the criteria should be objective – in other words there should not be any subjectivity in selecting the winners. After four task group meetings and multiple emails the task group came up with an entirely objective set of criteria for the award. Apart from providing recognition to the companies the award also serves as a valuable tool for companies that are interested in improving quality. Companies have also used the award criteria for conducting internal quality audits.

After much deliberation the task group identified seven sections with multiple questions under each section. The questions are based on the NRMCA Guideline for Developing a Quality Manual, which itself is based on ISO concepts and was developed for the NRMCA P2P Initiative. For each question the task group discussed the choice of answers and ranked those answers in order from most desirable to the least. NRMCA staff chose points for each question/answer. Task group members were not privy to details of the scoring system and were therefore eligible to apply for the award. The maximum score that can be attained is 100 percent. Companies that achieve a score of 75 percent or greater receive awards at the annual NRMCA Fall Conference and Expo.

The award sections are as follows:

1. Management Commitment and Decision Process
2. Customer Focus
3. Human Resources

4. Production Facilities and Equipment
5. Materials Management and Testing
6. Specification Review and Mixture Design
7. Measurement Analysis and Improvement

This article includes a brief review of each section and questions, i.e. *essentially the criteria that are important for a company to supply concrete of good quality.*

### Management Commitment and Decision Process

Companies should have a quality plan. Individuals should be assigned for quality system operations, documentation and approval. There should be a process in place for updating the quality plan on a regular basis and distributing the updated version within the company to all the relevant individuals. Companies should have one or more quality benchmarks and track that. The total weighting for this section is 15 percent.

### Customer Focus

A process should be in place to collect customer feedback/complaints and affect process change based on that. Companies should conduct customer surveys and customer education on a regular basis. The total weighting for this section is 13 percent.

### Human Resources

Companies should have a system for providing concrete technology training for new hires in technical and non-technical roles. Companies should have a certain number of Quality Control (QC) technicians for a given annual concrete volume. QC personnel at both the technician and higher levels should hold relevant certifications for their positions that are offered by American Concrete Institute (ACI), NRMCA, Department of Transportation (DOT) and state associations. A proportion of the QC personnel above the technician level should participate in national codes and standards making bodies such as ACI, American Society of Testing Materials (ASTM) and NRMCA. QC personnel should participate in local technical

activities such as training, certifications and technical committee membership of state associations or ACI chapters. Given the very importance of people the total weighting for this section is 25 percent.

### Production Facilities and Equipment

Ready mixed concrete plants and trucks should be either NRMCA certified or regional state DOT inspected. Weight scales, volumetric measuring devices and admixture dispensers should be calibrated frequently. Concrete trucks should be inspected on a regular basis for blade wear, buildup, accuracy of water measurement and functioning revolution counters. Concrete plants should have a process for preventing contamination of cementitious materials. Individuals should be assigned for review of batching accuracy. There must be a process for controlling mix water in batches to not exceed design. The total weighting for this section is 13 percent.

### Materials Management and Testing

Since a large portion of concrete variability comes from the variability of material ingredients, companies must test the cementitious materials on a regular basis. Companies should frequently calibrate aggregate moisture probes (if they are used) or measure aggregate moisture through other means on a daily basis if moisture probes are not used. Aggregate grading should be measured frequently. Companies should have in-house laboratory capabilities to conduct basic tests on aggregate and concrete. Laboratories should conform to ASTM C1077 and participate in CCRL proficiency sampling and inspection. The total weighting for this section is 14 percent.

### Specification Review and Mixture Design

Since standard deviations of compressive strength tests are an important measure of concrete quality (a low standard deviation implies good concrete quality), companies should

use, where permitted, strength deviations as the basis for concrete mix design submittals. Individuals should be assigned for establishing concrete mixture proportions and for making significant changes to established mixtures based on material changes and weather. Testing of standard concrete mixtures and delivered concrete mixtures must be conducted on a regular basis. Companies should make attempts to negotiate (post bid) with specification requirements to change mixture toward better performance or avoid anticipated problems. Companies should initiate pre-bid/pre-construction conferences. The total weighting for this section is 10 percent.

### Measurement Analysis and Improvement

Companies must have written criteria for establishing quality goals. Companies should have process in place for collecting and analyzing project quality control control/quality assurance (QC/QA) data for improvement. Companies must have quality criteria in writing that trigger action for change. Individuals should be assigned for affecting change from measurement analysis through a standardized process. Companies should conduct internal quality audits on a regular basis to ensure conformance to quality plan. Incentives for employees must be based on company quality benchmarks. The total weighting for this section is 10 percent.

### Other Award Requirements

Only NRMCA member companies are eligible to apply. Companies can apply as a company as a whole or a division. Awards are provided in three categories based on annual production of the applying entity. Additional documentation must be furnished as requested to demonstrate pertinent activities; the company applicant is encouraged to provide comments on the cover page to ensure that the award criteria could be improved on a continual basis. For most questions, applicants are required to choose only one answer that most closely matches what their company does. For some questions they are required to choose all that apply.

The whole application process including the scoring is fully electronic and conducted on a MS Excel system.

### 2007 Producer Excellence in Quality Award Winners

The NRMCA Producer Excellence in Quality Award was first announced in August 2006 with the completed applications due by December 31, 2006. For this first offering 14 companies submitted applications. The following seven companies are recognized for the 2007 NRMCA Producer Excellence in Quality Award. The awards will be presented during the 2007 Fall Conference in Phoenix.

#### Category A (annual production exceeding 1 million cubic yards)

- Transit Mix Concrete & Materials – Dallas
- Ready Mixed Concrete Company – Raleigh, NC
- Chandler Concrete Company, Inc. – Burlington, NC
- Lafarge North America Western US Division – Denver
- Thomas Concrete Industries Inc. – Atlanta
- Tarmac - A Titan America Company – Pt. Orange, FL

#### Category C (annual production less than 250,000 cubic yards)

- Ozinga Concrete Products, a division of Ozinga Bros, Inc. – Elgin, IL

Given that 75 percent was required for a company to receive an award, this is a good overall performance. Most of the applicants felt that participating in the award process was not onerous. The RES Committee felt that given that half the companies received an award the overall award criteria was just about right and should not tampered with even though the task group may make look at individual questions and make improvements if necessary. One drawback for this award though is the lack of validation of responses from applying companies. Future awards may require more validation and even random audits.

It was noted that on an average companies scored more than 80 percent in the categories of Management Commitment and Decision Process, Production Facilities and Equipment, Specification Review and Mixture Design. Companies scored 70-75 percent in the categories of Materials Management and Testing, Measurement Analysis and Improvement. Companies scored about 60 percent in the categories of Customer Focus and Human Resources. If a company scored less than 60 percent in any section they were informed so that they would see that as an opportunity to improve their quality initiatives in those categories.

### Summary

1. The new NRMCA Producer Excellence in Quality Award provides recognition to the companies that maintain high quality standards.
2. The award criteria discussed briefly here can serve as an excellent quality improvement tool for companies.
3. Companies have also used the award criteria for conducting their own internal quality audits.
4. In the future it is conceivable that the award criteria could form the basis of a concrete producer certification program.
5. The NRMCA Producer Excellence in Quality Award serves as an excellent tool to raise the bar and move the industry forward. ■

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