

NRMCA InFocus

2017 Quality Benchmarking Survey

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Introduction

The 2017 NRMCA Quality Benchmarking Survey was conducted in the calendar year 2017. This is the fourth such survey, the previous ones were conducted in 2014, 2012 and 2010. This is the first time that the benchmark information has been obtained from the annual quality award application. Comparisons are made for results of this survey to prior ones when the questions are similar to serve as a trend analysis. Surveys were completed by NRMCA Producer member companies that either represented the whole company or a division of the company. The survey is facilitated by the NRMCA Research Engineering and Standards Committee.

This article provides a snapshot of the findings. The complete report establishes benchmarks for various aspects of a company's quality management system and is available free for all quality award participants. In most cases, the weighted average is reported. Weighted average was determined by multiplying the percent volume of each company listed and the individual company average statistic (similar items are covered in the NRMCA Quality Certification program).

For this survey respondents were asked to use data from the most recent fiscal year. Respondents were asked to avoid guessing and not to respond to questions where information was not available. There were 46 respondents to this survey compared to 15 respondents recorded in 2014.

Annual Concrete Volume (cubic yards)

The respondents to this survey produced a cumulative 55.9 million cubic yards in 2017, representing approximately 16.3% of estimated ready mixed concrete produced in the U.S. for that year. The participation was better than the 7.7% recorded in 2014. In 2017, the smallest company produced 52,000 yd³ while the largest company produced 8 million yd³. Of the 46 respondents, 31 had production exceeding 500,000 yd³ and therefore the data is likely to be weighted toward the larger companies. The breakdown of the company annual concrete volume for this and previous surveys is as follows:

Annual Concrete Volume, yd ³	Number of Respondents			
	2017	2014	2012	2010
≤100,000	1	0	2	1
100,001 to 250,000	3	1	2	5
250,001 to 500,000	11	2	9	6
500,001 to 1 Million	15	4	8	12
1 to 3 Million	14	6	5	2
>3 Million	2	2	2	2
Total Respondents	46	15	28	28
Survey Total, million yd³	55.9	23.8	22.6	21.7

Provide information on two most common concrete mixtures for 2017

Question	Weighted Average			
	2017	2014	2012	2010
Standard deviation (S), psi	465	551	491	505
Specified strength, psi	3970	3427	3865	3773
Strength increment, %	34%	30%	26%	29%
Mixtures that are air entrained, %	52%	75%	50%	-

According to ACI 214R-11, S below 500 psi would qualify as a very good standard of concrete control for general construction testing. It is generally recognized that the strength S of air entrained concrete is higher than that with non-air-entrained concrete.

Strength increment represents the increment of the average strength above the specified strength for the two mixtures reported by the respondent. On a weighted average, the increment of the average strength of the mixtures over the average specified strength (overdesign) is 34% (1350 psi). For mixture submittals, according to ACI 301, the weighted average increment can be calculated as 620 psi over the specified strength for the reported weighted average specified strength and standard deviation. The fact that concrete producers are providing an excess of 730 psi above that total is not unusual and could be because producers are reducing their risk of failing test results.

This year producers were asked not to include mixtures with a maximum w/cm or minimum cementitious content or mixtures that require a fixed strength increment greater than specified strength because these specification requirements result in a higher average strength. Assuming that 1 lb/yd³ of cementitious corresponds to a compressive strength of 10 psi, the excess strength of 730 psi represents excess cementitious material use of on average 73 lb/yd³.

Cost to company to resolve customer problems, in \$ per yd³ produced.

Include cost to repair, replace or mitigate hardened concrete issues because concrete did not meet purchaser's or specification requirements, expectation, etc. For example, if the company produced a total of 20,000 yd³ of concrete and the total cost paid out for the above reasons was \$20,000, the cost should be calculated and reported as \$1/yd³.

The weighted average cost to resolve customer problems was calculated as \$0.11/yd³ as compared to \$0.17/yd³ in 2014. The actual number varied from a low of \$0.00 to \$0.56/yd³. The distribution of responses was as follows:

Cost to Company. \$/yd ³	Percent of Respondents			
	2017	2014	2012	2010
0	4%	0%	4%	7%
0.01 to 0.20	70%	67%	46%	29%
0.21 to 0.50	13%	13%	21%	25%
0.51 to 0.99	2%	13%	4%	7%
≥1.00	0%	0%	14%	14%
Did not respond	11%	7%	11%	18%

Number of claims made related to quality in the last 12 months per 100,000 yd³ of production.

The weighted average number of claims related to quality was calculated as 1.03, which is lower than 2.91 reported in the 2014 survey. Since the answer choices are different, the data can be categorized better this year. The distribution of responses was as follows:

No. of claims per 100,000 yd ³	Percent of Respondents		
	2017	2014	2012
0%	2%	NA	NA
0.01 to 0.50	30%	NA	NA
0.51 to 1.00	17%	NA	NA
≤ 1.00	50%	27%	18%
1.01 to 2.00	15%	7%	18%
2.01 to 3.50	11%	13%	14%
3.51 to 5.00	2%	7%	29%
>5.00	4%	20%	18%
Did not respond	17%	27%	3%

Does your company perform an internal quality audit to ensure conformance to its quality plan, at least annually?

This question was reworded this year and so no comparison is made to prior surveys.

Frequency of Audit	Percent of Respondents
None	7%
Annually	74%
> Annually	20%
Did not respond	0%

Percent of quality control/technical employees above technician level with at least NRMCA Concrete Technologist Level 2 certification or equivalent

Since the answer choices are different in 2017, direct comparison with previous year responses could not be made. Previous year data are provided below:

Percent of QC/Tech with certification	Percent of Respondents			
	2017	2014	2012	2010
< 20%	NA	47%	25%	32%
< 30%	41%	NA	NA	NA
20% to 50%	NA	13%	39%	32%
30% to 60%	39%	NA		
>50%	NA	40%	36%	36%
>60%	20%	NA		
Did not respond	0%	0%	0%	0%

Quality costs, in terms of \$/cubic yard produced

Include lab costs, all overheads and all quality control staff salaries, including corporate level technical managers. Do not include back charges or penalties. The weighted average of quality costs was calculated as \$0.86/yd³ as compared to \$0.80/yd³ in 2014. The breakdown was as follows:

Quality Cost to Company. \$/yd ³	Percent of Respondents			
	2017	2014	2012	2010
0	2%	-	-	-
≤ 0.75	37%	33%	36%	7%
0.76 to 1.25	33%	40%	39%	50%
1.26 to 1.75	13%	7%	11%	21%
>1.75	7%	7%	3%	7%
Did not respond	9%	13%	11%	14%

Percent of production facilities that are inspected or certified – NRMCA, state highway department or other

Since the answer choices are different, direct comparison with previous year responses could not be made. Previous year data are provided below:

Percent of certified Production Facilities	Percent of Respondents			
	2017	2014	2012	2010
< 20%	NA	0%	11%	4%
20% to 50%	NA	0%	11%	7%
> 50%	NA	100%	78%	89%
> 60%	100%	NA	NA	NA
Did not respond	0%	0%	0%	0%

Number of company laboratory facilities possessing at least one strength testing machine

The weighted average was calculated as 0.23 lab facilities with a strength testing machine for every 100,000 yd³ of annual production, as compared to 0.33 in 2014. An alternative estimate is there is one laboratory with at least one strength testing machine for 439,000 yd³. The weighted average for respondents with production less than 500,000 yd³ was one lab for 185,500 cubic yards, compared to one lab for 128,500 cubic yards in 2014. The breakdown was as follows:

No. of labs per 100,000 yd ³	Concrete volume per one lab, yd ³	Percent of Respondents			
		2017	2014	2012	2010
0	NA	2%	0%	0%	11%
0.001 to 0.2	≥ 500,000	39%	27%	25%	14%
0.201 to 0.4	499,000 to 250,000	28%	33%	36%	46%
0.401 to 0.6	249,000 to 167,000	13%	20%	21%	14%
>0.6	< 167,000	15%	20%	18%	14%
Did not respond	NA	2%	-	-	-

Frequency of calibration of moisture probes per plant (plants or aggregate types using moisture probes)

Since the answer choices are different, direct comparison with previous year responses could not be made. Previous year data are still provided below:

Frequency of calibrating moisture probes	Percent of Respondents		
	2017	2014	2012
At least Weekly	48%	40%	25%
At least Monthly	33%	20%	22%
At least Quarterly	NA	20%	21%
Greater than quarterly	NA	13%	14%
Quarterly or greater	15%	NA	NA
Did not respond	4%	7%	18%

Cementitious materials quality control (choose all that apply):

This question was reworded this year and so no comparison is made to prior surveys.

Cementitious Quality Control	Percent of Respondents
None	2%
Maintain mill certifications on file	98%
Review C917 data for trends	65%
Test cement in mortar/concrete	78%
Did not respond	0%

Frequency per month at which production concrete mixtures are tested by obtaining plant samples – average per plant. Do not include testing for mix development and lab mix tests.

Since the answer choices are different, direct comparison with previous year responses could not be made. Previous year data provided below:

Frequency of Plant Testing per month	Percent of Respondents		
	2017	2014	2012
≤ 3	24%	NA	NA
≤ 4	NA	27%	18%
4 to 10	33%	NA	NA
5 to 10	NA	33%	43%
> 10	43%	20%	18%
Did not respond	0%	20%	21%

Incorrect ingredient material accepted. Report as percent of annual ingredient material deliveries

This question is new this year and so no comparison is made to prior surveys.

Incorrect ingredient material orders accepted	Percent of Respondents
0%	30%
0.01 to 0.10%	24%
0.11 to 0.50%	0%
0.51 to 1.00%	11%
>1.00%	7%
Did not respond	28%

Incorrect mixture orders taken or mixtures bid. Report as percent of annual mixture orders

This question is new this year and so no comparison is made to prior surveys.

Incorrect mixture orders taken/bid	Percent of Respondents
0%	11%
0.01 to 0.10%	37%
0.11 to 0.50%	7%
0.51 to 1.00%	17%
>1.00%	4%
Did not respond	24%

Do you measure yield of at least the top selling mixture at each plant at least once per week?

This question is new this year and so no comparison is made to prior surveys.

Measure Yield?	Percent of Respondents
Yes	61%
No	39%
Did not respond	0%

Conclusion

This was the fourth survey on quality benchmarks conducted by NRMCA under the direction of the Research Engineering and Standards Committee. The goal of the survey is to evaluate typical resources and to establish industry benchmarks that support quality initiatives in ready mixed concrete companies. The benchmarks allow for continual improvement in the industry.