Techniques for Improving Quality in a Third-Party Laboratory

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CTLGROUP

What is the Purpose of Third-Party Labortories?

- Produce results which indicate **an independent organization** has determined a **product complies** with specific **standards** for quality or performance.
- Third-party laboratories should have **certificates** by **regulatory agencies** at the local, federal and international level.
- These certificates demonstrate:
  - Compliance with national or international standards,
  - Independent validation and verification, and
  - Increase credibility and acceptance with clients and government officials

Why Do We Perform Standardized Testing?

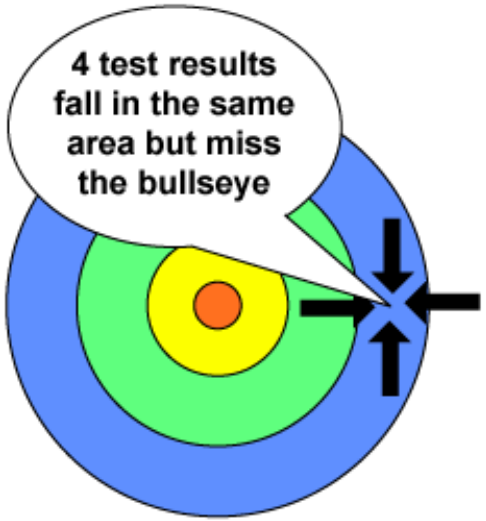
- To ensure uniformity of materials,
- To check for potential material related failures,
- Documentation for government representatives,
- Documentation for future problems, and
- Life Safety.

The ultimate goal is to…..build buildings, bridges, roadways, and all structures that are safe and durable.

How Reliable is Laboratory Testing?

- Accuracy
  - Refers to the closeness of a measured value to a standard or known value.
- Precision
  - Precision refers to the closeness of two or more measurements to each other.

Accuracy



Precision

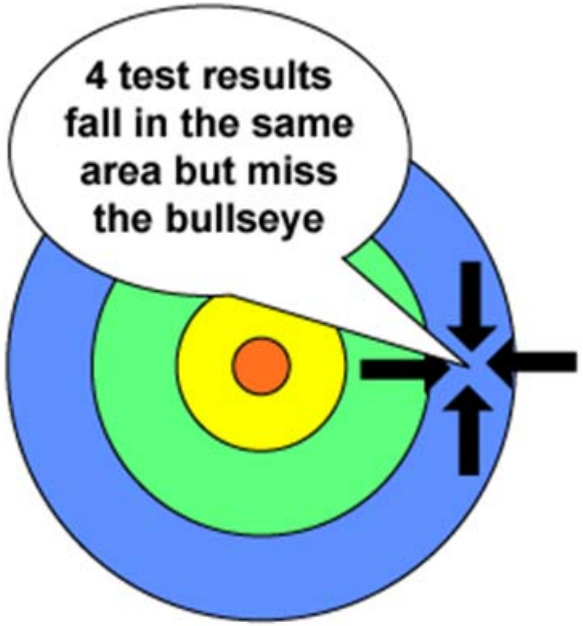
Ideally…

- We want test that are accurate and precise.
  - Accurate meaning they tell us the future of the concrete in the field, but
  - This is beyond the ability of most testing procedures.

Accuracy

So, We Will Focus on Precision.

- We will discuss:
  - Tools to improve precision,
  - Introduce different quality programs available, and
  - nuisances of the testing procedures (Tomorrow).
- So, that you can get precise results that are repeatable in your laboratory and amongst other laboratories.



Precision

How Do We Improve Precision?

NQA-1 Compliant

17025

Quality management systems help meet the most demanding requirements for engineering consulting and testing of materials and structural components.

ASTM Cement and Concrete Reference Laboratory (CCRL)

- Proficiency Sample Program
- Laboratory Inspection Program

What is Proficiency Testing?

- Determines the performance of **individual laboratories** for **specific tests** or measurements and is used to monitor laboratories' **continuing performance**
- Compares the measuring results obtained by **different laboratories**
- Also called **interlaboratory comparison**

Proficiency Testing: Procedure

- One or more **materials** are **sent** between a number of **participating laboratories**. Each laboratory **performs specific tests** and reports its results to the administrator.
- The **results** reported by each laboratory are **compared** to the **reference value**.
- The result is considered **successful**, if the result of the proficiency test is within the **stated uncertainty**. Based on a number of assumptions, this is expected to be the case at least 95% of the time.
- If a laboratory has any **unsuccessful results**, it is expected that the **laboratory investigates** the reason for the disagreement and **implements corrective action**.

Benefits of Proficiency Testing

- Participation helps **satisfy laboratory accreditation requirements**
- Produces data for **monitoring lab strengths and weaknesses**
- Residual sample material useful as **internal QA sample**
- **Demonstrate** your testing capability to **customers**
- Test results and associated **statistics** help ASTM validate test method performance under real world conditions

Proficiency Testing

ASTM Proficiency Testing Programs

- Launched in 1929, the program has grown to include different material types

- Petroleum products
- Plastics
- Metals
- Aromatic hydrocarbons
- Concrete
- Insulating fluids
- Engine coolants
- Cement
- Rebar
- Textiles

- Uniform, homogenous samples are analyzed by participating labs using specified methods and results are submitted for statistical analysis
- Post testing, a final statistical report summarizing the testing performed by labs around the world is distributed

53

proficiency testing programs involve 4,700 Laboratories and 6,500 units of participation
52% of participation from outside USA

ASTM Proficiency Testing Program Types

Cement and Concrete Testing

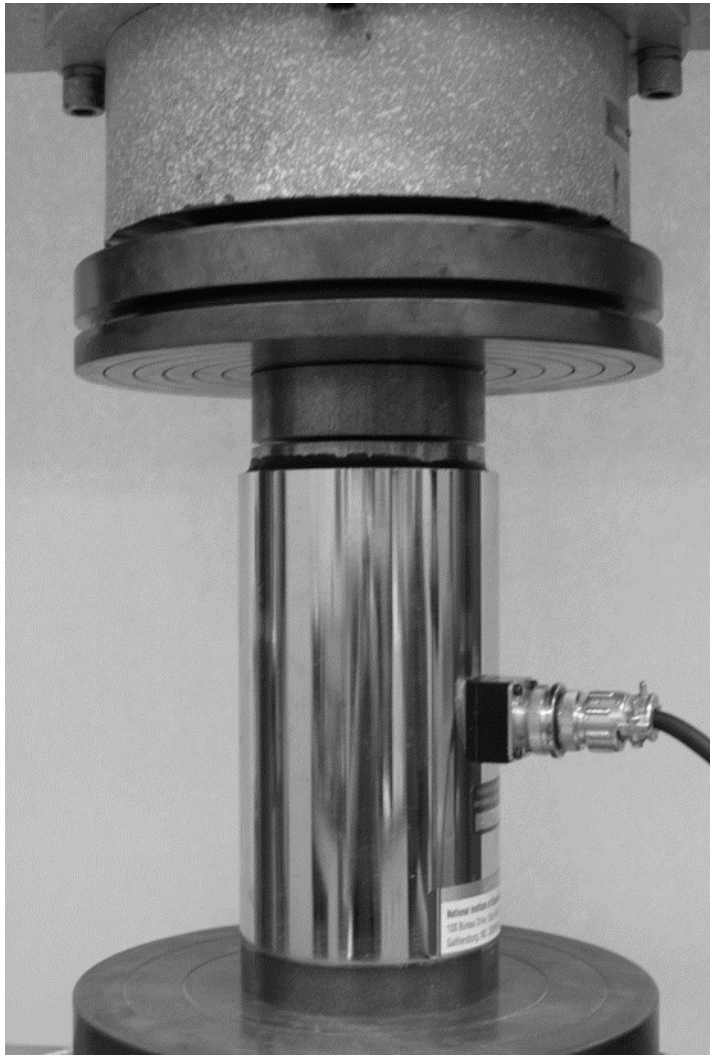
- Concrete
- Concrete Masonry Units
- Portland Cement
- Masonry Cement
- Blended Cement
- Pozzolan
- Masonry Mortar
- Rebar (reinforcing steel)

Laboratory Inspection Program Overview

- **Measurement and evaluation of equipment** used in testing (calibration)
- **Assess** laboratory **personnel** performing tests
- Detailed **review** of **quality system**
- Identify Corrective Actions (Report)
- Laboratory visits every **26-28 months**
- Inspect over 900 laboratories each year

Inspection Material Types

- Cement
- Concrete
- Concrete Aggregates
- Steel Reinforcing Bars
- Pozzolans
- Concrete Masonry Units
- Masonry Bricks
- Masonry Mortar



Inspection Coverage

Core ASTM Test Methods based on:

- Concrete/Concrete Aggregates - C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
- Cement - C150 Standard Specification for Portland Cement
- Pozzolan - C311 Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
- Masonry Mortar – C270 Standard Specification for Mortar for Unit Masonry
- Masonry Brick – C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
- Concrete Masonry Units – C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

Process - “Hands On” Inspections

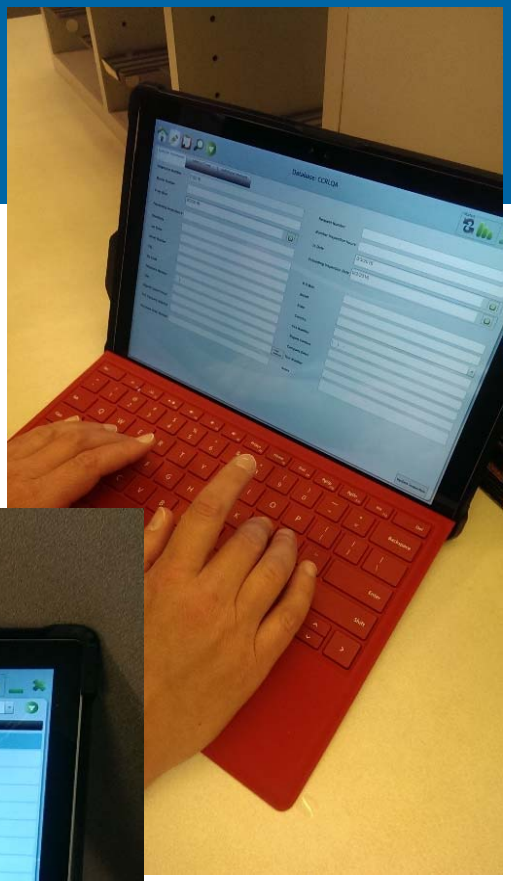
Inspectors look at 139 ASTM Test Methods

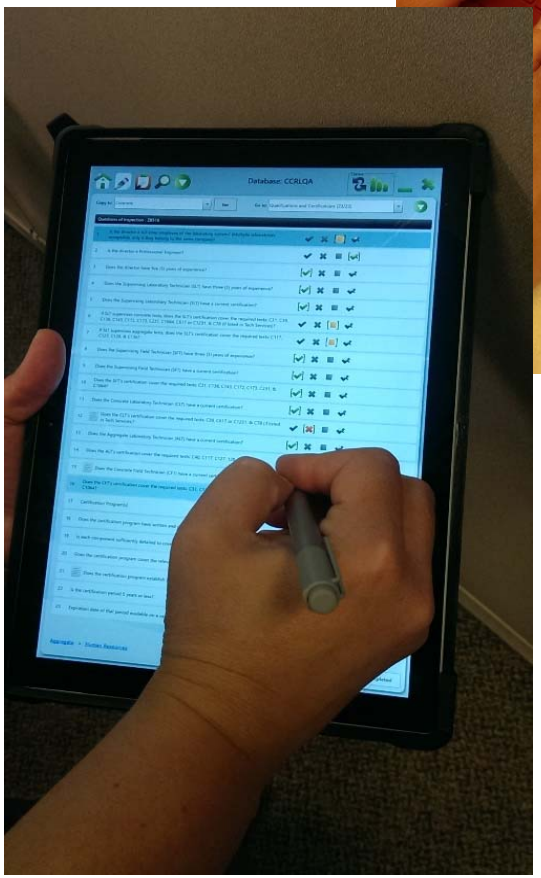
Each Test Method

- Examine Equipment
  - Thermometers & Thermocouples
  - Rulers, Micrometers, Calipers, & Spherometers
  - Balances & Balance Weights
  - Load Cells & Indicator
- View Procedures
- Document Observations

New Mobile Inspection System

- Electronic worksheets
- Real-time report generation
- Share data with accreditation body
- Compilation of yearly inspection results





How Do We Improve Quality in a Third Party Laboratory?

- Implementation of Quality Management System (QMS)
  - Internal and External Audits
  - Yearly Performance Evaluations
- Proficiency Testing
  - Validate procedures
  - Compare results
- Laboratory Inspection
  - Assess laboratory personnel
  - Calibrate equipment

Questions & Answers