Clarifying Quality Control

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Defining Quality Control

“Inspection, analysis, and action applied to a portion of the product in a manufacturing operation to estimate overall quality of the product and determine what, if any, changes must be made to achieve or maintain the required level of quality.”

McGraw-Hill Dictionary of Science and Engineering
Defining **Process Control**

“Activities involved in **ensuring** a process is predictable, stable, and consistently operating at the target level of performance with only **normal** variation.”

*BusinessDictionary.com*
How Do You Define QC?

• It’s not just sample testing by QC personnel!
• *Everyone* plays a role
  • Quality Control
  • Production
  • Placement

• **Inspection**
  • Individual materials
  • Mixture
  • Processes
  • Equipment

• **Analysis**
  • What’s wrong?
  • What needs fixed?

• **Action**
  • Proactive vs. Reactive
QC – Misperception

• It’s not just *mixture* testing!
  • Mix results *may* predict pay, but...
  • For *unacceptable* results, what’s the next step?

• Constantly testing *mix* samples, challenges us in performing actual “*Quality Control*”

• Today, we are asking more of our QC personnel than ever before

• Trained, staffed and equipped?
QC Personnel

• Must be:
  • Trained
  • Equipped

• Over time they gain:
  • Knowledge
  • Experience

• If managed correctly, they’ll become invaluable!
QC Personnel

• Must be trained in numerous subjects:
  • Materials properties
  • Materials testing:
    • Operation, calibration and maintenance of equipment
  • Specification requirements
  • Etc.

• Must work closely with:
  • Production & Placement personnel
  • Requires knowledge of those operations
QC Personnel

- Sample (Stockpiles & Mix):
  - Obtain, handle and test
    - Do it accurately and consistently
    - Do it at the “right” frequency
- Manage materials
- Understand the mix:
  - Mix adjustments
  - Impact on production and placement?
- Snapshot of QC effectiveness
- Recognizing segregated samples
Segregated Mix

Graph showing 4.75mm and AC Content per Sample with a peak at sample 3 and a decline thereafter.
Segregated Mix

2.36mm and AC Content per Sample
Non-Segregated Mix

2.36mm and AC Content per Sample

Sample

2.36mm Sieve

AC Content

33 34 35 36 37 38 39 40 41 42 43 44 45 46

4.4 4.5 4.6 4.7 4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7

Adjust Ending Sample  Adjust Y-Axes
Production QC

• Plant Scheduling:
  • Number of mixes & switchovers
  • Mix verification prior to project start
• Clearly Identify:
  • Stockpiles (virgin and recycle)
  • AC storage tanks
• Stockpile Management:
  • Build them right
  • Prevent intermingling
  • Load out of them right
  • Use as many cold feeds as possible
  • Identify Cold Feeds
Production QC – Plant Calibration

• Do it accurately and often
• Cold feeds
• AC/Binder
• Additives
• Multiple Rates:
  • Low, Medium and High
• Scales used to measure any of the above
Production QC – Plant Operation

- Production rate
- Temperature consistency
- Use and level of silos or surge bins
- Mix segregation:
  - Are there locations where it is occurring?
  - How can they be fixed?
  - Impacts truck and plate samples!
- Maintenance:
  - Regularly scheduled items
  - If it’s broke, fix it!
Production QC

• It’s not just mix testing!
• Inspection, Analysis and Action:
  • Action occurs before sampling or before testing
  • We react too often – we must be proactive
  • Don’t assume the owner’s minimal requirements will suffice
• QC personnel seldom have time to test and oversee the process
• QC Managers play a vital role
Placement QC – Misperception

• It’s not just *density and smoothness* testing!
  • Test results *may* predict pay, but…
  • For **unacceptable** results, what’s the next step?
• Many Field QC techs are overwhelmed!
  • Lots of locations to test
  • Often utilized for **NON-QC** tasks
  • Sometimes undertrained
• **Someone** has to look at the **BIG** picture......
Placement QC

- Truck Dump Personnel – Backing Up and Unloading Trucks:
  - Safely, Timely and Efficiently
  - Communicate with truck driver, MTD and/or paver operator
  - Impacts paver operation, mat consistency & flow of paving train

- Screed Personnel:
  - Address mat imperfections
  - Strive for consistent texture and uniform density

- Lute and Shoveling Personnel:
  - Do they improve imperfections?
  - Involvement in plate sampling?
Placement QC – Paver Operation

- Good working order?
- Slope and grade?
- Speed:
  - Consistent?
  - Match production rate?
  - Delivery rate?
  - Keep rollers in sight!
- Screed:
  - Uniform mat?
  - Extensions set properly?
  - Turning 90% of time?
  - Mix at mid-depth?
  - Tunnel and auger extensions?
Placement QC – Compaction

- Rollers = Placement rate?
- Is each one operating properly?
- Operator familiar with equipment?
  - Amplitude & frequency settings
  - Water in drums
  - Water spray system
  - Tire pressure

- Rolling Pattern:
  - Number of passes?
  - Pattern layout?
  - Speed?
  - Pattern length?
  - Compaction temperature range for roller position?
  - Directly impacts density and smoothness
Placement QC

• There are many other items to pay attention to, such as:
  • **Base** conditions – temp, smoothness, stiffness, texture
  • **Ambient** conditions – air temp, sunlight, wind
  • **Prime / Tack** – type, amount, uniformity of application, adequate cure time
  • **Mat thickness** – available compaction time
• Is anyone *making* time to watch these QC items?
Placement QC – Sampling/Testing

• Mix samples:
  • Take them correctly and consistently
  • Identify them clearly and get them sent in

• Density – Gauge:
  • Is it working, and being used properly and frequently?
  • Has it been calibrated to this mix, on this job?

• Density – Cores:
  • Use the right equipment, remove them carefully!
  • Identify clearly and get them sent in

• Smoothness:
  • Mat thickness, mat temperature, etc.
Obtain density readings every 1’ across **uncompacted** mat and test behind rollers to identify density variability across mat before **and** after compaction.
Obtain density readings every 25' through roller pattern overlap to identify density variability.

Approximate center of rolling pattern overlap.
In The Past...

Quality Control

QC Manager

Plant

Road
Functioning as a TEAM!

Clarify QC and Everyone’s Role

Train them, Enable them, and Support them
Thank You!

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