Why Should We Care About Quality?

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There are many definitions for Quality.

**Quality is.....**

- Based on judgments by an individual or organization
- Fitness for purpose
- Based on acceptable performance
- Meeting *goals*
- Meeting requirements
- The American National Standards Institute (ANSI) and the American Society for Quality (ASQ) define quality as:

  “The totality of features and characteristics of a product or service that bears on its ability to satisfy given needs”
What is Quality?

- Quality is the ability of your product to be able to satisfy your users
  - Quality Assurance
  - Quality Control
Quality Assurance

• An overall management plan to guarantee the integrity of data (the “process or system”)
• The process that demonstrates your product is able to satisfy your users

Quality Control

• A series of measurements used to assess the quality of the data (the “tools”)
• Implementation of the regular testing procedures that requires structured tests and good documentation
The Quality Cycle

Create the product → Test the product → Refine the product → Test results → Create the product

Quality Control

- Quality Assurance
- Input
- Output

Test the product → Refine the product → Create the product → Test results → Test the product
Quality - Desire for Uniformity

- Products (or services) should be uniform
- Individual components of products should also be uniform
- One way to achieve this is through “specifications”
- Specifications attempt to define what is “acceptable” which may or may not be “ideal”
- Variability is the problem (i.e. no two products are going to be exactly alike)
Establish specifications for products, parts (or services)
These specifications should primarily be a result of customer needs
Specifications result from the interaction between the supplier and the customer
Uniformity could be achieved by comparing the product to the specification (i.e. you want to be “within specification”)
This approach relies on extensive sampling and testing
Product is acceptable (within specification) or unacceptable (outside specification)
Problems with Proposed Approach

- Presented approach relies heavily on inspection and testing – both are expensive
- Typically Supplier wants looser specifications and the Customer wants tighter specifications – creation of an adversarial relationship
- It does not address the problem of bad product being made in the first place
- It encourages an attitude of “just good enough”
- Often leads to establishing “acceptable number of products non-conforming to specification” – not a good idea
Begin by accepting the fact that no two products are exactly alike and that there is a natural variability present in any production (or service).

Focus on minimizing the variation within the process.

This will improve the process and remove exclusive reliance on sampling and testing to insure quality.

Using this approach does not eliminate specifications and sampling – we use these for the control of the process.
American statistician, considered by many to be the father of modern quality control by various means, including application of the statistical methods. W. Edwards Deming

Example of application of Deming’s concepts:

- Ford motor company simultaneously manufactured a car model with transmissions made in Japan and the United States (*both transmissions were made to the same specifications*).
- Customers preferred model with Japanese transmission and they were willing to wait for it.
- The American-made car parts were all within specified tolerance levels.
- The Japanese car parts were virtually identical to each other, and much closer to the nominal values for the parts – e.g., if a part was supposed to be one foot long, plus or minus 1/8 of an inch – then the Japanese parts were all within 1/16 of an inch.

This made the Japanese cars run more smoothly and customers experienced fewer problems.

*Source* - Wikipedia
### Standard Company¹ vs. Deming Company¹

<table>
<thead>
<tr>
<th>Standard Company</th>
<th>Deming Company¹</th>
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<tbody>
<tr>
<td>Quality is expensive</td>
<td>Quality leads to lower costs</td>
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<tr>
<td>Inspection is a key to quality</td>
<td>Inspection is too late. Inspection can be reduced (or eliminated) if workers can produce defect-free goods</td>
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<tr>
<td>Defects are caused by workers</td>
<td>Most defects are caused by the system</td>
</tr>
<tr>
<td>Rewarding the best performers and punishing the worst will lead to greater productivity and creativity</td>
<td>Most variability is caused by the systems that judge, punish…. destroy teamwork and the company</td>
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<tr>
<td>Profits are made by keeping revenue high and cost down</td>
<td>Profits are generated by loyal customers</td>
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The Cost of Poor Quality

- “In today's competitive environment, ignoring the quality issue is tantamount to corporate suicide”
  John A. Young, Hewlett-Packard CEO, 1987

- “The cost of poor quality is the single biggest waste we have. It costs us in warranty. It costs us in public image, which in turn affects our residual values”
  Jim Padilla, Ford Group VP, 2002
The Cost of Poor Quality

- **Internal failure costs** – incurred prior to delivery of the product.
- Represent deficiencies which occur when the product fails to meet certain specifications or requirements, resulting in a scrap or rework.
**The Cost of Poor Quality**

- **External failure costs** – costs incurred when the product fails while in the possession of the customer.
  - Examples include warranty charges, failed product charges and customer complaints.
- **Appraisal costs** – represent the costs incurred to determine whether the product meets its specified requirements.
  - Examples include inspection and testing.
Prevention costs – costs incurred to minimize the failure and appraisal costs. Companies may utilize quality audits, process planning, and employee training to prevent the production of deficient or nonconforming products. These prevention costs help save the company money in the long run.
Can the company earn significant returns on investments by restructuring its processes? **YES**

But, this requires recognition that it is far more efficient (and economical) to ensure that no unsatisfactory concrete is produced than to try to detect individual unsatisfactory truckloads.
To achieve high quality of concrete one has to establish a goal of achieving low variability. Achievement of this goal will depend on continuous (and timely) adjustments of mixture proportions as the properties of materials vary.
Experience shows that best quality can be achieved when producers are encouraged to control and can profit from that control.

When producers encounter inhibiting circumstances (i.e. min. cement content specifications, inability to adjust mixtures freely), they are in effect denied the possibility of profiting from their expertise.

That may lead to the situation where worst producers become most competitive and slows-down implementation of new technologies.