

Quality Assurance and Control In Design

Presented to NWCCC
Lynnwood, WA

"Quality is everything we do. We're only as good as the last project we delivered. We are not going to grow if we don't produce high quality projects every single day." -- Mike Burke, Chairman and CEO

February 20, 2018

Execution with CertaintySM

AECOM Construction Services Business Units utilizes a managing system called Execution With Certainty.



Quality Management System

AECOM Quality Management System is defined by:

- Project Execution Management Program (PEMP)
- Project Execution Procedures (PEPs)



Quality Assurance vs. Quality Control

- Quality Assurance includes those planned and systematic actions necessary to provide adequate confidence that a product or service will fulfil the specified requirements.
- Quality control is the measurement, testing and review techniques used to ascertain that a particular product or deliverable conforms to specific requirements.

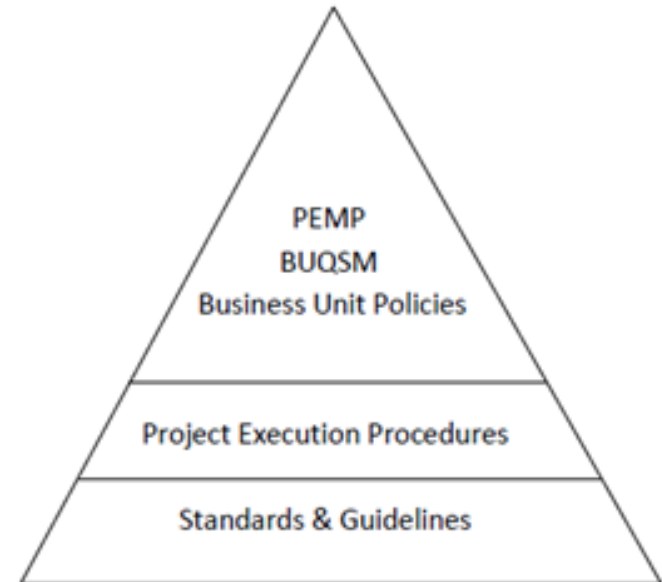
Quality Management System Basics

- Quality Assurance is an integrated system of management, administrative, engineering and technical controls.
- Quality achievement is a primary responsibility of line management and technical organizations.
- Quality verification is a primary responsibility of the Quality Assurance organization.

Quality Assurance Planning

- A Quality Approach is prepared as part of the the RFP review.
- Project Quality Manager works with the Project Engineering Manager to develop a quality control plan for review of selected engineering documents.
- Surveillance and audit plan is created, reviewed and approved.

Program Hierarchy



Quality Control Engineering

Quality related activities performed under Engineering Assurance standards include:

- Independent checking
- Inter-disciplinary/Inter-Function review (IDR/IFR)
- Independent Engineering Design Reviews (IEDRs)
- Engineering Execution Reviews (EERs)

Checking Process

- Check Document(s)
 - Supervising Discipline Engineer or Design Lead assigns independent Checker
 - Checker checks in accordance with the design criteria and requirements

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CHECKED BY <u>[Signature]</u>	DATE <u>7/19/10</u>
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Inter-Discipline / Inter-Function Reviews

–Inter-discipline Review

- Examine reviewed discipline's deliverables to assure utilizing same design criteria
 - Example: Access to components
- Verify reviewed discipline is correctly applying any provided inputs
 - Example: Nozzle sizes and locations
- Verify that all interfaces with the reviewed discipline are sufficiently detailed and accurate
 - Example: Equipment anchor bolts and foundations

– Inter-functional Review

- Interfaces and requirements of reviewing functions adequately addressed
 - Example: Constructability

Independent Engineering Design Review

- Selected technical review of Engineering design documents
 - Assure consistent quality
 - Consistency with Company/Client policies/procedures
 - Consistency with Design Basis
- Focuses on complex and/or high risk elements of the design scope
- Formal process documented on IEDRR

Engineering Execution Reviews

- Random review of deliverables for
 - Overall quality
 - Completeness
 - Adherence to Company governance
- Support/evaluate effectiveness of the Engineering Assurance process
- Focus is on technical quality
 - Design basis
 - Input verification to source documents
 - Work scope
 - Checking process
 - Comment resolution process

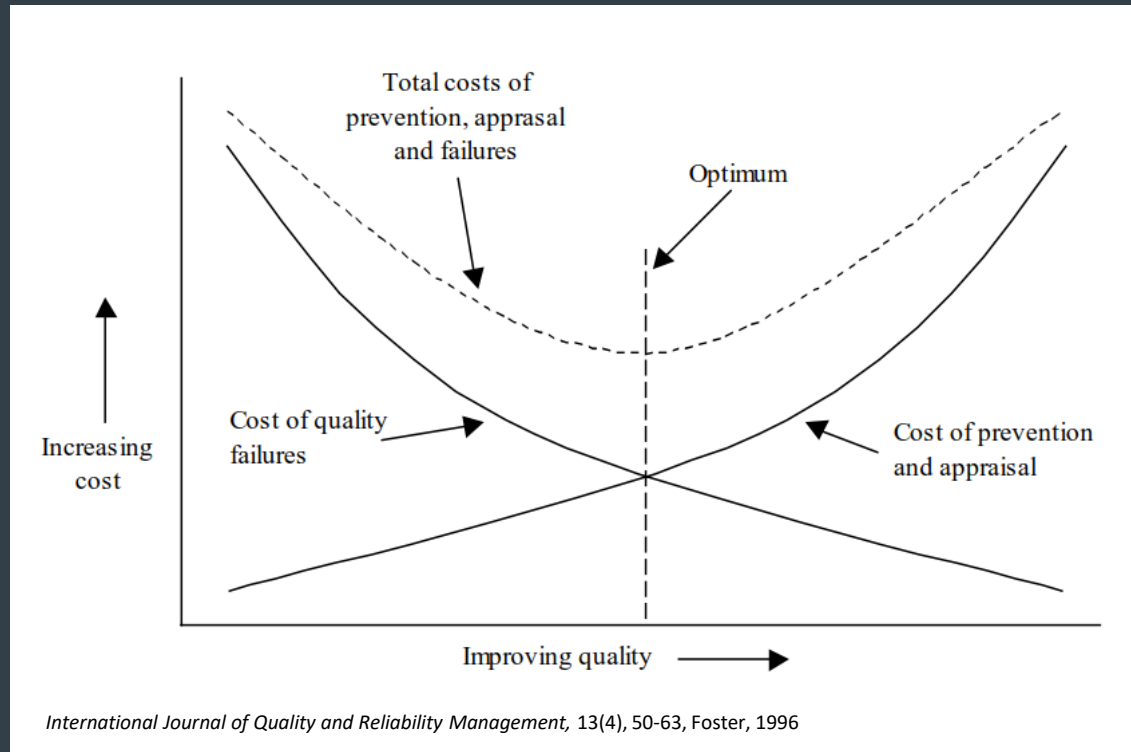
Engineering Execution Reviews

- Formal process executed per Engineering Standard.
- Documented:
 - What was reviewed
 - Results
 - Findings
 - Recommended Corrective Actions
 - Follow-up Actions
- Metrics –Collected and reported monthly:
 - No. of EERs conducted
 - No. and Categories of Findings
 - Procedural Compliance issues

Surveillance and Audit Program

- Surveillances are performed by qualified personnel.
- Surveillances are scheduled on the basis of status and importance of the activity, as well as the results and corrective action commitments of previous surveillances.
- Surveillances of selected activities may be performed on an as-needed basis in addition to scheduled surveillances.

The Cost of Quality – Finding a Balance



1. **Prevention** – activities undertaken to ensure that failures do not occur, e.g. training.
2. **Appraisal** – activities undertaken to ensure that the product (finished design) meets the desired level of quality, e.g. Engineering Assurance, surveillances, audits.
3. **Failures** – a measure of failures and subsequent activities to correct them, e.g. nonconformance resulting in re-work.

Conclusions

- Quality during design is achieved by a broad team using established systems and procedures.
- The more mature the Quality Management System, the more value-added as activities that ensure that failures do not occur are well established.
- Engineering execution and quality control data create metrics that are reported monthly to maintain visibility on conditions adverse to quality and completion of corrective actions.