

DOD QUALITY ASSURANCE OVERVIEW

1. Introduction. The concept of quality embraces much more than mere inspection and acceptance of supplies and services. The end result of quality management activities involving the life-cycle development of acquisition category programs should be the delivery of operational systems that satisfy the user's requirement under all anticipated deployment and operating conditions. This statement can be paraphrased to apply to all acquisitions. Every requirement should be focused on quality of design (does the detail design provide the requested level of performance?), quality of conformance (does the product meet the detailed design requirements?) and fitness for use (were all of the correct requirements imposed?). The package must specify the results you desire, not specific standards. If you specify standards, you will need a waiver. **Quality assurance**, in contracting, is a planned and systematic pattern of all actions necessary to provide adequate confidence that adequate technical requirements are established; products and services conform to established technical requirements; and satisfactory performance is achieved. Government quality assurance is a contract administration function, so Defense Contract Management Agency (DCMA) plays a large role in assuring contractor conformance with contractual requirements.

2. Objectives. At the conclusion of this block of instruction, the student should be able to:

- a. Discuss how quality applies to acquisition category programs.
- b. Describe the roles and responsibilities of key players in the quality assurance process.
- c. Discuss Defense Contract Management Agency's (DCMA) role in quality assurance.
- d. Describe the four categories of contract quality requirements and determine when each is appropriate for use.

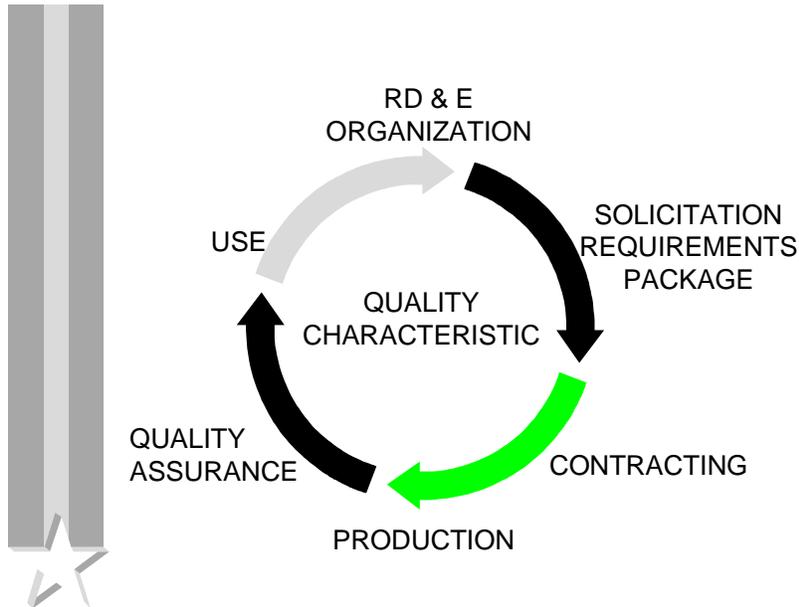
3. Quality and Acquisition Category Programs.

a. According to DoDD 5000.1, the primary objective of the defense acquisition system is to acquire quality products that satisfy the needs of the operational user with measurable improvements to mission accomplishment, in a timely manner, at a fair and reasonable price. The Directive further establishes guiding principles for achieving that objective, one of which is "Acquiring Quality Products".

b. The application of these principles requires that quality be the responsibility of every person involved in the acquisition or management of DoD materiel. Quality must be considered and applied throughout the life-cycle. Quality of design effort predominates in the first two phases of the life cycle, becoming subordinate to quality of conformance effort in the last two phases. Associated with both of these must be emphasis on fitness for use. If the ultimate product or service is not what the user needed, quality of design and of conformance mean nothing.

4. The Life Cycle of a Quality Characteristic.

a. Quality begins with the design of an item or description of a service. Quality of design for complex items comes into being as the result of development of thousands or perhaps millions of quality characteristics which are the smallest nuclei of quality. These characteristics will be reflected in the specifications and drawings for the item. They may be of various types falling under such general and broad classifications as: (1) physical (size, shape, materials, parts); (2) technological (hardness, inductance, acidity); (3) psychological (taste, beauty, status); (4) time-oriented (reliability, maintainability); (5) contractual (guarantee provisions); and (6) ethical (courtesy of sales personnel, honesty of service shops). The quality “order of precedence” begins with simply stating the “function” or, in other words, describing the ultimate job to be performed. The second higher level is “performance” which describes the operational characteristics of the item. Finally, a design specification gives precise measurements and tolerances to be used. Of course, the more complicated the specification, the higher the cost. The circle below shows how a quality characteristic is affected through its life cycle.



b. The responsible Government and contractor **research, development, and engineering** (RD&E) organizations impact heavily upon the quality characteristics. During development, RD&E personnel will create, change, modify, and trade-off quality features or characteristics to provide the engineering description necessary to produce an item or system which will both meet the needs of the user, and be within the cost and schedule limits. Careful consideration of individual quality characteristics must occur to ensure that fitness for use is designed and built into the end item or system.

c. After the engineers have made all of the necessary changes and trade-offs and the design is determined to be adequate, a **Solicitation Requirements Package** (SRP) for the production contract may be prepared. The drawings and specifications in the SRP must accurately reflect the

characteristics decided upon for the final design. Documentation of all changes and trade-offs made throughout development has to be provided by the developmental engineers. There must be coordination and cooperation between the engineers and the personnel who prepare the TDP. The results of the RD&E effort can be, and have been, inadvertently changed by the specification writer or draftsman. There must be controls to prevent errors, omissions, conflicts, or ambiguities. Errors and omissions in specifications and drawings are common causes of contract modifications and problems.

d. The final form of the specifications and drawings is sent to the **contracting officer** and becomes a part of the solicitation package. Although the production contract for the system itself is often sole-source, competitive contracts for components, assemblies, subassemblies, and parts are not uncommon. The contracting team must ensure that those quality characteristics which are of paramount importance and significance are included in the evaluation factors for these contracts. This will help assure that unplanned trade-offs do not occur during the contract negotiations as the Government and contractor reach mutual agreement through compromise.

e. The **production** phase of the acquisition process affects the quality characteristics greatly. Quality of conformance becomes a reality or a failure as the result of production efforts. Such areas as manufacture, processing, assembling, and finishing are where failure or success in the area of quality of conformance actually takes place. The original quality characteristic may be altered in production. Any operation which causes the characteristic to be outside the specified limits will render the configuration of the product different from that which was originally intended. This sometimes results in the granting of waivers, deviations, or changes which alter the quality configuration.

f. There may be as many as four independent **quality assurance** organizations involved on any production contract. Quality assurance elements of the contractor, DCMA, the contracting activity, and often the project or program manager's office can all be involved in quality assurance functions for a given contract.

g. The last element which affects quality characteristics is feedback from the **user**. All of the previous efforts receive their real test when the item or system is actually placed in use. If these efforts have not been adequately performed, the resulting product may fail to meet the user's needs. At the worst, the item or system may turn out to be useless. The goal is always to strive for the opposite extreme where the item performs with no failures and accomplishes its intended mission to the satisfaction of the user. Problems found by the user can normally be traced to a problem in design or a problem of conformance, or both. These problems may be so severe as to require another complete quality cycle; so again: quality is the responsibility of everyone involved in the acquisition process. When anyone makes a quality change, it is imperative that it be coordinated with all of the activities involved, otherwise the cure may turn out to be worse than the problem.

4. Key Players in Contract Quality Assurance.

a. The **requiring activity** represented by the technical personnel responsible for documenting the requirement for acquisition documents and describes the necessary quality requirements, such as inspection, testing, and acceptance. Standardization documents, such as non-Government standards, commercial item descriptions, and defense specifications, contain quality assurance provisions addressing testing, evaluation, inspection, and acceptance. These criteria must be tailored so that they are commensurate with the item or service required. For service contracts the requiring activity provides a quality assurance surveillance plan. Review of the specifications, technical data package, statement of work and any other solicitation documents is commonly a team effort accomplished by a requirements review board or an Integrated Process Team.

b. The **procuring contracting officer (PCO)** includes in the solicitation and the contract the appropriate requirements for the contractor's control of quality for the supplies or services being acquired. These range from inspection at destination to Government-imposed quality performance standards. Once the contract is awarded, the PCO issues any necessary instructions to the administrative contracting officer and, in turn, acts on any recommendations received from that contracting officer. If there is no administrative contracting officer, the PCO retains responsibility for ensuring that the contractor meets the requirements. The PCO is also responsible for ensuring that nonconformances are identified and for establishing the significance of a nonconformance should one occur.

c. The **contract administration office**, usually located at DCMA, is responsible for developing and performing Government contract quality assurance actions under the contract in accordance with the written direction of the PCO. The contract administration team performs all actions necessary to verify whether the supplies or services conform to contract quality requirements, and maintains suitable records pertaining to Government quality assurance actions and decisions made. These actions include implementing any specific written instructions from the PCO. In addition, the team reports to the PCO any defects observed in design or technical requirements, and recommends any changes necessary to provide more effective operations or eliminate unnecessary costs.

d. The **contractor** is responsible for carrying out its obligations under the contract. Specifically, the FAR gives the following responsibilities to the contractor:

- (1) Control the quality of products or services.
- (2) Offer to the Government for acceptance only those supplies or services which conform to contract requirements.
- (3) Ensure that vendors or suppliers of raw materials, parts, components, subassemblies, etc., have an acceptable quality control system.
- (4) Maintain and furnish, when required, substantiating evidence that the supplies or services conform to contract quality requirements.

Control of quality may relate to such areas as: manufacturing processes; drawings and specifications; testing and examination; reliability and maintainability assessment; fabrication and delivery of products; technical documentation; preservation, packaging, packing, and marking; and procedures and processes for services. The contractor performs all inspections and tests required by the contract except those specifically reserved for performance by the Government.

5. The Role of DCMA in Contract Quality Assurance.

a. In the past, the quality assurance role played by **DCMA** focused on defect detection and monitoring contractor conformance. **DCMA** changed its quality assurance philosophy over the past several years and now focuses on understanding, measuring, and analyzing processes. These concepts formed the basis of the In-Plant Quality Evaluation (IQUE) program. The primary objective of the IQUE program was to ensure acceptance of conforming products, but by approaching that end through working with contractors in a spirit of teamwork to measure and continuously improve processes and resulting product quality.

b. The IQUE program has since formed the basis of Process Oriented Contract Administration (PROCAS) which applies to all functional areas of **DCMA** contract administration. When focused on product delivery, PROCAS is designed to examine the adequacy of contractor processes to produce consistently conforming products and to identify opportunities for process improvements through analysis or process measurement data. It incorporates the need for comprehensive knowledge of product and the processes associated with its design, development and production. Through use of auditing principles and statistical techniques, PROCAS assesses the adequacy of contractor processes to conform consistently to contractual requirements and promotes reduction in process variation leading to continuous improvement.

6. Categories of Contract Quality Requirements. Contract quality requirements fall into four general categories depending upon the extent of quality assurance needed by the Government for the acquisition involved. The type and extent of contract quality requirements needed depends on the particular acquisition and may range from inspection at time of acceptance to a requirement for the contractor's implementation of a comprehensive program for controlling quality.

a. The first category applies to contracts for **commercial items**. The Government relies on contractors' existing quality assurance systems as a substitute for Government inspection and testing before tender for acceptance. The exception to this is when customary market practices for the commercial item include in-process inspection. In that case, the Government could also perform in-process inspection as long as it was conducted in a manner consistent with commercial practice. Reliance on the contractor occurs regardless of the dollar value of the contract.

b. The second category is Government reliance on **inspection by the contractor**. This category applies to **simplified acquisitions** of other than commercial items. The general rule is that the Government relies on the contractor's internal controls to accomplish all inspection and testing needed to ensure that supplies or services acquired conform to contract quality

requirements before they are tendered to the Government. The clause used is entitled **Contractor Inspection Requirements**. The contracting officer is allowed to make a determination not to use this clause and to impose either of the next two categories if necessary.

c. The third category is **standard inspection** requirements. These requirements allow the Government to perform inspections and tests, instead of relying completely upon the contractor. Standard inspection requirements are contained in the inspection clauses prescribed for use with the following type contracts: (1) fixed-price supply contracts; (2) cost-reimbursement supply contracts; (3) fixed-price service contracts; (4) cost-reimbursement service contracts; (5) time-and-materials and labor-hour contracts; (6) cost-reimbursement research and development contracts; and (7) facilities contracts. Standard inspection requirements are also contained in the product or service specifications included in solicitations and contracts. Each of the standard inspection clauses: (1) requires the contractor to provide and maintain an inspection system that is acceptable to the Government; (2) gives the Government the right to make inspections and tests while work is in process; and (3) requires the contractor to keep complete, and make available to the Government, records of its inspection work.

d. The fourth category is **higher-level contract quality requirements**. When higher-level contract quality requirements are prescribed, the contractor must comply with Government-specified requirements for an inspection system, quality control system or quality program. Higher-level contracting quality requirements are appropriate for solicitations and contracts for a complex or critical item, or when the technical requirements of the contract are such as to require: (1) control of such things as work operations, in-process controls, and inspection; or (2) attention to such factors as organization, planning, work instructions, documentation control and advanced metrology. The contracting officer consults technical personnel before including one of these requirements in a contract, since these higher-level requirements are normally very expensive.

7. DoD Higher-Level Contract Quality Requirements.

a. For thirty years DoD used two military specifications, MIL-I-45208 (Inspection System Requirements) and MIL-Q-9858 (Quality Program Requirements), to define higher-level contract quality requirements. In 1994 DoD added commercial quality system standards to these long-standing military specifications, and in 1996 cancelled both MIL-I-45208 and MIL-Q-9858. Program offices are now authorized to use ANSI/ASQC Q9000 and the ISO 9000 series standards in contracts for new programs. However, this may require a waiver if the contractor has not already implemented the quality program. MIL-HDBK-9000, "Guidance on the Application of ISO 9000/ASQC Q9000 Series Quality System Standards", provides both assistance in determining which standard is most appropriate and recommended statement of work language to invoke quality system requirements.

b. The American National Standards Institute - American Society for Quality Control (ANSI/ASQC) Q9000 series originated from the international standards, commonly referred to as the ISO 9000 series, developed by the International Organization for Standardization. ISO 9000-9004 and Q9000-9004 are technically equivalent. The Q9000 series has been modified to reflect

customary American language usage and spelling, and Q9004 contains some supplementary guidance on sampling and other statistical methods, product liability, and user safety.

c. **Q9001**, Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation and Servicing, is the most comprehensive standard in the series. It covers all elements listed in Q9002 and Q9003. In addition, it addresses design, development, and servicing capabilities. **Q9002**, Quality Systems - Model for Quality Assurance in Production and Installation, addresses the prevention, detection, and correction of problems during production and installation. It is more extensive and more sophisticated than Q9003 which is the least comprehensive standard and addresses requirements for the detection and control of problems during final inspection and testing. Since Government contractual quality system requirements are based on the standard inspection requirements, Q9003 is probably not necessary for Government contracts. Q9000 and Q9004, both of which are guidelines, may be used as guidance, but have no contractual enforceability. **MIL-HDBK-9000** provides the following guidance for selecting the applicable ANSI/ASQC or ISO standard.

CRITERIA TO DETERMINE QUALITY SYSTEM REQUIRED	APPLICABLE DOCUMENT
System in design/development, production, or installation	Q9001/ISO9001
System in production or installation	Q9002/ISO9002

d. **MIL-I-45208** may still be found in existing contracts. It required that the contractor establish and maintain an **Inspection System**. The specification prescribed in performance terms the objectives and essential elements of an acceptable inspection system. This requirement was in addition to a standard inspection requirement. MIL-I-45208 was used in contracts when technical requirements required control of quality by both in-process and final end-item inspection, including such elements of the manufacturing process as measuring and testing equipment, drawings and changes, inspection, and documentation and records. Contractors may propose MIL-I-45208 or a company equivalent in response to a solicitation requirement for higher level quality requirements.

e. **MIL-Q-9858** may still be found in existing contracts. It required that the contractor establish and maintain a **Quality Program**. This requirement was in addition to a standard inspection requirement, and meant that the contractor had to establish and maintain a quality program in accordance with this Government specification. The requirements of MIL-Q-9858 were in excess of those in MIL-I-45208. Contractors may propose MIL-Q-9858 or a company equivalent in response to a solicitation requirement for higher level quality requirements.

f. **Single Process Initiative**. Current DoD-wide directives allow the contractor to consolidate all management operations and production procedures, including QA, so it is a consistent program for all customers. This ISO 9000 and “block changes” have allowed the contractor to set up one system for all customers.

7. Summary. The essential objective of the acquisition process is that the system, item, or service satisfies the requirement for which it was intended. Timely delivery or reasonable price mean absolutely nothing if there is no conformance to technical requirements. That these requirements have, in fact, been satisfactorily met is the function of quality assurance. It must be emphasized that quality assurance is the responsibility of all persons involved in the acquisition process throughout the duration of the life cycle until final disposal has been accomplished. quality assurance is as much the responsibility of the designer, the specification writer, the contract specialist, and the production worker as it is those personnel specifically assigned to quality assurance.

8. References:

- a. FAR Part 46, Quality Assurance.
- b. Corresponding coverage in DFARS and AFARS.
- c. DoDD 5000.1 -- D.2, Acquiring Quality Products.
- d. DoD 5000.2-R -- 4.3.2, Quality.
- e. MIL-HDBK-9000, Guidance on the Application of ISO 9000/ASQC Q9000 Series Quality System Standards.