

DEPARTMENT OF NUCLEAR TECHNOLOGY
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CIDA COURSE ON QUALITY MANAGEMENT

" QUALITY in PROCUREMENT "

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1. Objective Of Presentation :

This presentation deals with " Quality in procurement" as it applies to general procurement activities for capital projects or manufacturing operations.

Specifically, the following will be discussed :

- planning for quality
 - organizing for supplier relations
 - supplier relations
 - quality planning
- achieving quality
 - joint quality planning
 - supplier selection and certification
 - improvement of supplier quality
- controlling quality
 - evaluation of performance
 - supplier quality rating
- material management considerations
- Quality Program

2. Introduction

2.1 A properly conceived and implemented supplier Quality Program provides the purchaser with assurance that the technical requirements specified by the designer will be met. Such assurance is required if failure of the product would result in hazards to operating personnel, the public or would have significant economic impact.

2.2 Quality of purchased items has become increasingly important for several reasons :

- amount of purchased product . For many original equipment manufacturers, more than half the materials embodied in their products is purchased from other companies.
- high costs associated with poor quality of purchased items, which often result in high warranty and rework costs
- interdependence of buyers and suppliers, who sometimes are highly integrated with each other.

- internal factors at the buyer's organization, such as "just-in-time" delivery concept. If a significant portion of the supplier's product is defective, than a major disruption may occur at the buyer's plant because of lack of sufficient back-up inventory.

2.3 In recent years there has been a move from "mass-manufacturing" methods to "lean manufacturing". One of the principal characteristics of the lean manufacturing process is the **evolution of the relationship** between the supplier and the purchaser of goods manifested by the move from the prevailing adversarial relationship towards the new, cooperative, team relationship.

2.4 This move is necessitated by the need to consistently secure quality components from suppliers. A company whose product includes a significant content of purchased components needs improved quality of these components in order to improve its product. Securing such improvement from suppliers is obviously more readily achieved in a cooperative relationship.

2.5 Additionally, in order to reduce costs through reduction of inventory, the lean manufacturers have introduced "just-in-time" delivery, sometimes directly to the assembly line. This places a large premium on the assurance of quality of the product, as often no receiving inspection takes place and the component is installed in the assembled product literally within hours of being delivered to the factory.

2.6 The key elements of supplier-purchaser relationship have become :

- total costs over the term of contract - usually at least several years
- reliability of delivery
- assurance of product quality
- length of contract

3. Planning for Quality

Quality planning is the cornerstone of defect prevention and continuous improvement. The following considerations must be addressed :

Organizing for supplier relations

3.1 Responsibility for supplier relations is usually divided between product Development, Purchasing and Quality functions. It is very important that the responsibilities be clearly delineated , communicated and adhered to, so as to eliminate confusion in the supplier's mind.

3.2 The activities of developing policies and procedures for supplier relations are often executed jointly and cooperatively between the three departments, however one of them must clearly be designated as the **responsible department**.

3.3 Division of responsibilities must take into consideration the nature of equipment being purchased, the resources and skills available in each department and, in the case of a company with multiple locations, the extent of centralization desired.

Supplier relations.

3.4 The overall objective is to create a relationship with the supplier that assures that the product will meet fitness for use and performance requirements with minimum of incoming inspections or corrective actions.

3.5 The activities necessary for achievement of this objective are :

- define the product and program quality requirements
- evaluate alternative suppliers
- select suppliers - limit the number to a manageable few
- conduct joint quality planning
- cooperate with the supplier during the execution of the contract
- obtain proof of conformance to requirements
- certify quality suppliers
- conduct quality improvement programs as required
- create and utilize supplier quality ratings

3.6 Relationships between buyer and supplier vary from adversarial to cooperative, with several variations in between.

3.7 In **adversarial relationship** the supplier is viewed with suspicion. Low bid prices are emphasized and each party presses for short-term advantages. Mutual suspicion precludes mutual assistance, joint planning or other forms of close cooperation.

3.8 In the **cooperative relationship**, the buyer and the supplier work together as if they were both part of the same company. This is a planned, continuing relationship based on mutual confidence, joint planning, mutual visits and assistance.

3.9 The Japanese Union of Scientists and Engineers developed the principles on which the cooperative relationship should be based. These are :

- mutual respect and cooperation
- prior contractual understanding
- agreed methods of evaluation
- agreed plans for settling disputes
- exchange of essential information
- adequate performance in related functions, e. g. , inventory control
- supplier responsible to deliver good product and supporting data
- customer's interest pre-eminent

3.10 The decisions which will determine the **nature of buyer-supplier relationship** should be made by the buyer's senior management.

The key decisions are :

- the desired basic relationship - adversarial or cooperative
- relative emphasis of quality in purchasing decisions
- multiple suppliers versus single source
- internal versus external suppliers
- long term relationship or not

Quality planning is achieved through the regular use of the following Quality Management tools.

3.11 These are :

- development of process flow charts for procurement processes
Flow charts of existing or proposed process show the relationships between operations and control points. The charts also provide essential information for other quality planning techniques such as the process FMEA and control plan and help to identify significant process parameters.
- development of process control plans. Control plans contain all statistical and other methods that are to be used for process monitoring.
- application of failure mode and effects analysis (FMEA) to assist in prevention of deviations. FMEA's should be used for process planning for all new or changed processes.
- process monitoring and control instructions based on the following inputs :
 - FMEA's and the control plan
 - supplier/manufacture input
 - personnel's expertise and knowledge of the process
 - customer needs and expectations
- planning for on-going quality, which includes the following actions
 - training of personnel
 - assessment of effectiveness of management actions
 - assessment of customer needs and expectations

Use of these quality planning tools is typically described and specified in "Supplier relations manual".

4. Achieving supplier quality

Joint planning for quality

4.1 Completion and execution of the contract between supplier and buyer requires detailed quality planning, covering three elements :

- managerial
- technological
- economic

4.2 Elements of joint **managerial planning** include :

- definition of respective responsibilities, as spelled out in contracts, supplier relation manuals or communications between the two parties
- definition of responsibility within buyer's organization
- agreement on documentation and reporting to ensure compatibility and understanding of reports in both organizations
- setting up of multiple communication channels, so that communications flow freely and clearly, e. g. designers to designers . This is a radical departure from the traditional, where all communications were to be channeled through one individual or department
- agreeing on media for written quality plan, for example "Supplier relations manual".

4.3 Publication of the manual is commonly an occasion for holding seminars for suppliers in order to explain the manual and to promote the use of quality planning tools.

4.4 Elements of joint **technological planning** include :

- agreement on the exact meaning of performance requirements
- quantification of reliability and maintainability requirements
- preparation of process control plan for manufacturing
- classification of defects with respect to seriousness
- standardization of test methods and test conditions
- establishment of quality levels, including traceability
- establishment of system of corrective action

4.5 Elements of joint **economic planning** include :

- buying "value" rather than "conformance to specification", as examined through "value engineering " techniques.

Typical considerations are:

- over-specification for the use of the product

- emphasis on original price rather than on life time costs
- emphasis on conformance to specification rather than fitness for use
- **optimizing quality costs**

Supplier selection and certification

Selection of supplier starts with the decision whether to make or buy. This decision requires analysis of factors such as:

- 4.6 Capability :
- skills and facilities available
 - plant capacity
 - ability to meet delivery schedules
 - expected costs of the alternatives

Cost of purchase :

4.7 The total cost of a product is the purchase price plus costs due to scrap, rework, delays, field failures and other consequences of poor suppliers quality. These added costs often exceed savings due to buying from the lowest bidder.

4.8 Purchasing decisions should be based on total costs rather than solely the initial price. However, the information required to evaluate the total cost is often difficult to obtain since the accounting systems are often incapable of identifying quality related costs originating with the supplier.

4.9 Supplier certification is the process of evaluating the performance of a supplier, with respect to product quality, with the view of authorizing the supplier to self-certify shipments.

4.10 The process typically follows the following steps :

- the buyer invites proposals for self-certification from prospective suppliers. The response must include "failure prevention analysis" along with the quality plan.
- information submitted is evaluated and conclusions are drawn about suppliers capability, usually requiring a visit to the suppliers plant
- a sample shipment is delivered along with data to document process capability
- the shipment is inspected and compared to quality data to determine if the supplier can be relied upon to make good **product conformance decisions**
- if the sample shipment is acceptable, then production shipments are authorized
- after a number of production shipments have been approved, the supplier becomes certified for that item. This means that the

supplier is to self-certify all future shipments and keep process data on hand for possible review by the buyer.

- quality of delivered items is periodically audited

4.11 In some industries suppliers become certified to a specific set of standards which permits them to manufacture and guarantee product conformance. Examples of such certification are the "N" stamp, certifying that all requirements of a nuclear standard of quality have been met. Another example is the ISO registration which guarantees conformance to the ISO quality system.

Improvement of supplier quality.

4.12 The supplier must be motivated to thrive for continuous improvement of the product. This is best accomplished by using factual information and prospects of financial gain if product quality is improved while the cost is reduced at the same time. . One approach is to demonstrate the effect of inadequate quality on supplier costs and sales income. An alternative approach is to threaten punitive action if quality is not improved.

4.13 Supplier improvement programs can fail because the **vital few problems** are not identified and corrected. Instead, there are attempts to tighten up on all procedures.

4.14 Pareto analysis is one technique which can be used to identify the "vital few". It is therefore helpful for the buyer to assist the supplier with expertise to direct him towards use of correct tools for identification and resolution of quality problems.

4.15 It is also helpful for the buyer to offer technical assistance to the supplier. Many supplier quality problems can be best solved by joint analysis and action rather than separately.

4.16 Each of the parties has experience and expertise in management and technology and they can share it to solve the problems at hand, through :

- access to experts in the technological area which underlies the problem
- equipment and instrumentation of special character
- experience in solving similar problems with other buyers and suppliers
- expertise in problem solving generally

4.17 In many cases, the supplier wishes to improve but is not certain what steps to take. The supplier can be assisted in acquiring the appropriate knowledge and skills as follows :

- inviting the supplier to participate in quality training sessions sponsored by the buyer. Sessions should start with **supplier's senior management**.
- recommendations to supplier concerning other training opportunities
- **joint quality improvement teams**. Not only will problems be solved, but the supplier can benefit generally by applying the improvement process to other products.

5. Controlling quality.

Control of supplier quality has to do with assurance that the product will satisfy buyer's requirements over the duration of the contract.

Evaluation of performance.

5.1 Evaluation of supplier performance can assume several forms :

- 100% inspection of incoming material for some or all attributes. Cost of inspection is compared to the possible damage resulting from no inspection. Inspection is generally regarded as the least desirable way of assuring quality.
- sampling inspection in accordance with an accepted sampling plan
- identity check, in which a lot received is examined to determine if the correct product has been received. No inspection of the product itself is made.
- no inspection
- use of supplier data. The supplier provides a copy of the results of outgoing inspection and tests at the suppliers plant and this is used in place of incoming inspection. This is the desirable way, inherent in the cooperative buyer-supplier relationship.

Supplier quality rating.

5.2 Supplier quality rating is an overall **assessment of supplier quality performance** . It is used in making important decisions, e.g. whether to continue doing business with this supplier.

5.3 Supplier quality rating (usually a number) has several purposes:

- to provide objective, quantified measure of supplier performance
- to aid in arriving at a balanced judgment of supplier performance
- to provide both buyer and supplier with common factual information

- to identify troublesome areas so that corrective action can be directed at them

5.4 Supplier rating measures and formulas cover the spectrum from the simple to the highly complex. They are based on one or more of the following performance measures :

- product percent non conforming. This is the ratio of the amount of defective items to the total of items received
- disposition of lots. This plan summarizes supplier performance by using a weighted analysis of action taken on lots which were non conforming
- economic analysis. This type of plan compares suppliers on the total cost for specific purchases.
- composite plan. This plan does not limit supplier rating to quality only. It includes performance with respect to delivery, price and other performance categories, such as for example service.

5.5 Supplier rating is an important defect prevention measure if it is used in an atmosphere of interdependence between buyer and supplier.

6. Material management considerations.

6.1 In addition to dealings with suppliers, the management of an enterprise must have effective means of managing materials in its possession.

6.2 Following issues must be addressed:

- receiving :
 - inspection
 - documentation
- storage (warehousing)
 - identification and traceability
 - protection from elements
 - special storage requirements
 - control of shelf life
- issue of material :
 - control for correctness
 - traceability
- quarantine of non-conforming material
- repair and refurbishment

7. Quality program

The Quality Program must address the usual QA considerations, with special emphasis on the following issues :

Grading of requirements:

7.1 Quality requirements for various items should be graded to reflect their complexity and importance to the overall quality of the product.

7.2 With respect to planning for quality, the **spectrum of purchases** can be divided into three categories :

- standard materials and hardware. For these kinds of purchases, industry specifications have usually been prepared.
- minor components and materials. The specifications may be unique to each supplier or may be industry-wide
- major components. These complex items require special considerations.

7.3 There exist a number of **national manufacturing standards** which define quality requirements related to product complexity, uniqueness and importance. The Quality program should reference these and offer a guideline as to their applicability and use.

Corrective action .

7.4 There shall be process by which supplier's corrective action to address deficiencies shall be determined, implemented and verified for effectiveness.

7.5 The process, including responsibilities of the supplier and the buyer shall form a part of each purchase contract.

Audits and assessments.

7.6 Audits and assessments shall be carried out of all procurement activities, both at the buyer and the supplier. Typical audit topics include :

- organization of procurement activities
- procurement document change control
- evaluation of bids and award of contracts
- effectiveness of interface with suppliers
- control of deficiencies and corrective actions
- control and quality of documentation

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