

AMERICAN SOCIETY FOR QUALITY CONTROL



ENERGY DIVISION



TO: DISTRIBUTION

FROM: G. W. ROBERTS - CHAIRMAN, COMMITTEE FOR RESEARCH AND DEVELOPMENT

SUBJECT: MINUTES OF THE MEETING OF MAY 3, 1987

DATE: MAY 26, 1987

The meeting was held in Minneapolis in conjunction with the 41st Annual Quality Congress. Attendees were:

G. W. Roberts
R. K. Gill
H. E. Schock, Jr.

Committee members had significant difficulty in finding the meeting room since the name had been changed from the Helsinki Board Room (name provided by ASQC staff) to the Minneapolis Board Room of the Radisson Hotel.

The committee will sponsor a three-speaker session at the National Energy Division Conference in Las Vegas. The speakers and topics will be:

1. Quality Assurance from a Researcher's Perspective
by Dr. Robert Thomas, Chemistry Department,
Brookhaven National Laboratory
2. Creativity in Quality Assurance
by Richard J. Gariboldi
U. S. Department of Energy, Chicago Operations Office
3. Quality Improvement in R&D
by Mohamed Beheiry, Vice President,
Philip Crosby Associates

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May 26, 1987

There was no report on the annual trend forecast, however, the chairman noted that Mrs. Baer needs more support from the committee to help her develop the inputs for this annual event. Harvey Schock reported that he was presenting a paper at the Quality Congress entitled "Quality Management Program Registration Savings." A copy of that paper is attached to these minutes.

A draft entitled "ASQC Standards for Laboratories" has been circulated by National. H. Schock and G. Roberts both reported casting negative votes for this draft. The scope of the draft is limited to activities generally considered as testing and, therefore, the term testing should be included in the title.

Harvey reported that a draft standard was being circulated on guidelines for national labs for developing countries. Committee members are urged to obtain copies of this standard so they may comment on it. The initial draft of the guidelines document for research and development has been issued to all members of the committee. They are urged to provide comments to Mrs. Gill as soon as possible. The chairman made a brief presentation on design review as practiced by B&W Research Division.

The next meeting is scheduled for Tuesday, September 15 from 3 - 5 p.m. in conjunction with the National Energy Division Conference in Las Vegas. Members will be notified of the specific meeting room at a later time. The meeting was adjourned at approximately 4:45.


G. W. Roberts, Chairman

tb

5/26/87

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Draft

QUALITY MANAGEMENT PROGRAM REGISTRATION SAVINGS

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ABSTRACT

Quality management registration programs are expanding throughout the world, resulting in systems useful for front end evaluation and in some instances as replacement for product certification, laboratory accreditation, and other formal qualifications. The programs provide objective requirements and criteria elements to identify management requirements, technical activities and performance.

Auditing of quality management programs may extend into areas of cost expenditures and savings. Coordination between external audits and internal company audits and surveillance aids in reducing redundancy of customer, third party, and regulatory audits.

Top management appreciates the expanded value from objective analysis using quality management program requirements and practices in associated areas, including: risk management, organization development, organizational change, strategic planning, tactical planning, as well as for improving quality assurance, quality control, and productivity.

Quantification of cost control techniques was started with "Quality Costs What and How" and new elements were added to correlate auditing with actual qualification practices. Explanation is provided of quality cost auditing in contracting and regulatory areas.

Quality management elements are explained relating to management, process and technology with management analysis quantified for process and product performance.

The paper shows increased use of cost and profit improvement techniques in contracting and how they are directly related to quality management practices. Techniques are shown relating quality assurance and quality control measures to contracting. Examples include products, construction, and service areas. Applications include auditing of quality programs for external recognition for contributions to company planning and profits.

Examples include international use in standards development and trade promotion.

INTRODUCTION

Obviously actual costs of quality are proprietary to a producer. However, many producers are realizing that through formal quality program recognition systems their quality program capabilities receive greater visibility and acceptance in commerce. This results in cost savings for producers by reducing the number of assessments or audits of their capability. Likewise with uniformity and hopefully simplification of quality program requirements these producers are able to reduce costs associated with quality programs and producer capability recognition.

Evaluation of quality programs requires a meaningful set of requirements, criteria, and finally checklists for conducting actual assessments. These assessments relate to existing company policy, programs and implementation by management, organizations, humans, design, procurement, production, and cost control. Cooperation between developers of checklists, those conducting actual

assessments, and users of products from assessed operations results in substantial cost savings. Assessments are implemented under control with periodic visits to reduce the number of assessments, to improve assessment review validity of producer capability, and to permit more frequent coordinated reassessments.

Systems for assessment of quality programs are more extensive than previous audits of quality systems, which usually concentrated on details of process control, corrective action, and inspection. Increased attention is now directed to management areas of organization, operation effectiveness, and commitment. Top management appreciates assessor attention to objective analysis using quality assessment checklists designed for management awareness and results. And, customers are more satisfied that the producer has a management system that will support quality.

This paper addresses the structure and use of assessment checklists, other existing practices and opportunities for relating to cost areas.

GOVERNMENT AND INDUSTRY APPLICATIONS.

A study for the U.S. Department of Commerce reviewed many innovative practices of the Federal government to facilitate use of product certification in contracting and regulation. Many new techniques were disclosed to improve the understanding and use of product certification in the Federal government for acceptance of products and services in government areas of legislation, operations, procurement, regulation, compliance, enforcement, and similar. This study identified private sector activities providing economic improvement and a clearer recognition of responsibility roles of the original producer with reduced redundancy and overview. Unfortunately at the time of the study there were no identified applications of the now rapidly growing use of quality program registration, with its potentials for improved quality assessment and cost savings. (Ref 1.)

The Federal government however is continuing to look for opportunities to use private sector assessment of quality program especially in conjunction with possibly product certification programs. A defense and industry meeting on December 5th, 1986, looked into potentials for recognizing existing private sector voluntary certification programs.

This emphasis on continuing change and optimizing or streamlining of procurement practices is also reflected in the recent Packard Blue Ribbon Commission review of Department of Defense acquisition policy, which included recommendations for use of commercial items in some defense procurement. (Ref. 2 and Ref. 3)

QUALITY PROGRAM ASSESSMENT AND CHECKLISTS.

Many modern quality programs are limited to specific and detailed design, procurement and production activities. They often fail to recognize their obligation to management, employees, customers, and company owners. Previous quality review approaches were often directed towards implementing standards, criteria, guidelines, and other requirements which were historically oriented to detailed process control approaches for quality and which failed to recognize opportunities for checklists to aid in management meaningfulness, change and improvement. Modern assessment techniques have built on these historic approaches which emulated traditional Gantt charts and specifics of process capability, control, and inspection.

For example, this new broader understanding is useful to introduce meaningfulness in a Memorandum of Understanding between two parties or countries for acceptance of systems relating to assessing quality, such as associated with qualified lists for producers, processes, or products.

Some of these new opportunities for modern implementation of quality management relate to broader responsibilities of risk management, investor protection, government regulation, consumer protection, consumer regulation, legal regulation, management growth opportunities, as well as cost economics.

1987-ASQC QUALITY CONGRESS TRANSACTIONS-MINNEAPOLIS

In addition new factors and new values have been found useful in evaluating modern companies of small, medium and large size. Also, for various conditions of innovating, expanding, continuing, or withdrawing levels of technology, production, and marketing. And, for variations in design, processes, products, human resources, managers, management, production, ownership, economics, regulation, and other areas. These concerns are included in checklists rather than referencing in normal requirements or criteria.

Many of these new factors have never previously been identified, defined or evaluated in quality management areas, especially relating to costs of quality. Some relate to mandated activities for underdeveloped, disadvantaged, disqualified, minority and similar areas, which were initially thought to be special conditions. Others relate to basic opportunities which are often overlooked in allegedly sophisticated national or international requirements attempting to cover broad areas. (Ref. 4)

In addition to quality program assessments there is opportunity for operational auditing (to identify opportunities for improvements), specific program improvement auditing (for assessment of specific positive changes), specific process improvement auditing (for validation and revalidation of control and change), specific quality assessments (for product control), specific cost accounting audits (for historical accounts attesting) and specific cost accounting audits (for potential problem situations).

In comparing quality program assessment to cost accounting audits, attention must be given to possible opinions associated with the latter areas. Such opinions include those shown below.

A clean opinion, which consists of two paragraphs in which the auditor attests that the public company's financial records have been examined and have been found to fairly present the company's financial condition in accordance with generally accepted accounting principles.

A "subject to" opinion, in which the auditor certifies that the financial statements fairly present the company's results and are subject to certain adjustments.

An "except for" opinion, which indicates an auditor was unable to audit a certain area of a company.

A statement disclaiming any opinion about the company's financial condition.

In addition, there may be other accounting audit statements relating to comparability, completeness, consistency, feedback value, materiality, predictive value, relevance, timeliness, understandability, and certificability. Although used in cost accounting, such opinions are not generally found in quality auditing or assessment.

ASSISTING TRANSITION TO PRODUCTION.

The U.S. Department of Defense has developed an extensive program to improve transition from development to production through use of templates and informational techniques to record past experience and serve as guidance for developing new programs. (Ref. 5 and Ref. 6)

The templates help identify steps in development resources, design resources, procedural resources, process resources, human resources, facilities resources, production resources, resulting product, distribution resources, application resources, support resources, etc.

These interesting and helpful publications provide a valuable resource for industry. In relating to costs they provide important guidance that management grid expenditures should be coordinated for initiation and completion with specific milestones. This timing is important and often overlooked in implementation for cost of quality programs, which consider only total costs and possible time period or production area cost trends. Going beyond these total expenditures and trends must command importance with attention to the timing of expenditures for optimum impact.

Obviously all quality cost related expenditures must be carefully integrated with other costs. Likewise the degree of certainty of risk must be associated with engineering and manufacturing elements in the acquisition process. These must be defined to accelerate the transition from development into production and reduce chances for error. This concept is valuable for proper use of costs of quality in providing another measure of progress for expenditures to achieve defined objectives.

These transition areas are especially important as government procurement specialists pay increased attention to warranty costs and look for contractor responsibility for costs of material not meeting specifications and exceeding expected levels of nonconformance. Nonconformance liability potential extends from initial quality into areas of reliability and maintainability. US Army procurement process evaluation, for example, is based on realistic test and performance requirements through test programs and data base with validation and revalidation to data systems for future developments. The possible related cost of quality programs are living and ongoing. The emphasis is on reducing total cost. (Ref. 7)

COST OF QUALITY APPLICATIONS.

Growing employee knowledge of costs presents a real opportunity associated with quality in employee awareness programs. Such costs include the value of machines, materials, inspection, and controllables. Specific employee awareness areas include costs for training, instruction, qualification, certification, process control, inspection, test, rework, repair, customer satisfaction costs, regulatory requirements, liability potentials, proficiency demonstration, requalification, and many other items often identified in quality improvement programs with employee participation. Many associated costs are also identifiable relating to nonconformance analysis, problem investigation, replacement tooling, expedited delivery, reliability, reliability growth, maintainability, warranty, field support, and many other areas directly associated with employee performance.

The list grows even longer when associated with normal accounting areas of learning curves, loss variances, underliquidation, penalties, fines, and other negative potentials.

COMPUTERIZED SYSTEMS.

It is important to apply new computer technology in production planning and operation. A source of information for developing and controlling costs of computerized systems is available in a compendium of standards for computerized systems. (Ref. 8)

This compact book provides a formal approach to considering development, procurement, acceptance, implementation, and training for use of computerized systems. It is important to have a good starting point to identify associated costs for quality in these areas for prevention, detection, and correction. In addition this source is of help in planning for assessments or audits.

To this can be added concern for computer software quality and reliability, where costs of quality are often significant in prevention, detection and correction areas.

TEST AND INSPECTION CAPABILITY ASSESSMENT COSTS.

Increased national and international use of formal recognition of test and inspection laboratories or activities permits techniques to identify areas of quality. As a starting point for developing specific assessment criteria and checklists, it is recommended that a systems approach be used starting with a well known U.S. national standard, which includes some quality systems guidelines. (Ref. 9)

This standard will help in developing specific program requirements as it is not intended for actual examination or assessment of quality programs or test and inspection operations. Specific criteria or checklists must be

prepared and used for specific test methods or identified appropriate defined fields of activity.

To implement accreditation requires a system meeting the criteria outlined in another document on accreditation systems. (Ref. 10)

This guide also has quality system criteria and provides a good starting point to establish assessment, provide recognition, evaluate continuing test or inspection proficiency, provide for appeals, and consider similar maintenance requirements. Obviously this is only a starting point document and specific programs will have variations in actual requirements and practice, especially for assessor training and qualification.

When considering accreditation areas in the international context it will be useful to refer to various documents developed by the ISO/IEC standards organizations. These guides are available in a special compendium and although costs of quality are not identified it will be easy for the quality professional to develop appropriate criteria. (Ref. 11)

PRODUCT CERTIFICATION COSTS.

Likewise costs of quality must be identified relating to formal certification programs of products and services.

The national standards used for this certification in the United States are presently being updated and in 1987 will contain new provisions relating to quality systems requirements. (Ref. 12)

These standards will be useful for quality professionals to identify cost elements relating to certification.

QUALITY AUDITING OR ASSESSMENT COSTS.

The term "auditing" has long been used by the business community in financial areas and has also been adopted in the United States in its standard of generic guidelines for auditing of quality systems. (Ref. 12)

However, in national and international evaluation and accreditation areas for testing and inspection activities the accepted term for evaluation is "assessors" and "assessing". Quality professionals should therefore be attentive to possible dual application of the terms in relation to quality programs.

In addition we must be able to relate to ongoing "surveillance" or other terms used to describe the activities of those performing tasks in relating to continued awareness and self examination for input in company practices or assessment programs.

RISK ASSESSMENT TECHNIQUES.

Costs of quality are ideally suited for use in potential risk assessment. There are many commercial books on this area, however a useful document is available in the Defense community and provides specific references for product and service areas associated with quality. (Ref. 13)

This reference is especially important as it was designed for Program Management Personnel and will help quality personnel relate performance of products or systems to overall program management quantified risk assessment.

QUALITY COST TRAINING.

Modern approaches to business management education are well suited for training in costs of quality. A typical business management course considers:

- 1-Business Policy & Strategy
- 2-Organization Structure & Operation

- 3-Human Resource Management
- 4-Management Communications
- 5-Marketing
- 6-Finance
- 7-Operations Management
- 8-Production
- 9-Controls
- 10-Managerial Economics
- 11-Customer and Government Economics
- 12-International Economics

A cost of quality program should relate to each of the above areas. The approach should be from a viewpoint of top management for understanding benefits of a coordinated quality program with meaningful assessment and appraisal of possible management concerns. It should relate to overall corporate policy and individual policies, including: procurement policy and practices for evaluation of suppliers and production. It should also provide a generic base program for the company compatible with a uniform national policy and practice throughout the private sector.

Above all, a cost of quality program must provide evaluation criteria for opportunity, potential, parameters, organization, risk, tremors, trends, unsuitability, control, receptability, implementation, timing, and other management concerns.

Its development should wherever possible use an existing accounting base. It should recognize there will be natural differences within a company and between plants departments, processes, and products. It should recognize trends. It should relate to quality improvement programs and tasks. It should relate to accounting cost and measures. It should relate to changes and innovations in design, suppliers, materials, parts, processes, products, learning skills of personnel, competitive changes, local area changes, and other variability.

A cost of quality program must remember possible limitations in the role of quality professionals in some company situations and be able to relate to accounting for accountants, management for managers, humans relations for personnel, and other specialities for their experts.

As we experience decontrol we must be able to identify and respond to changing requirements and conditions.

CONCLUSION

Increased use of quality program evaluation to established checklists and use of formal recognition systems provides an international quality capability identification technique. This approach permits corporate management to attain recognition for its quality program capability while simultaneously providing for internal proprietary use of associated data on costs of quality. The bibliography permits interested parties to initiate their structured approaches for improved use of costs of quality in their internal management systems.

BIBLIOGRAPHY

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LCS: 353:10:000

DESIGN

REVIEW

DESIGN REVIEW MANDATE

- **CUSTOMER/GOVERNMENT REQUIREMENT**
 - **CONTRACT**
 - **SPECIFICATION**
 - **AMCP 702-3**
 - **NHB 5300.4 (1A)**
 - **10 CFR 50 APPENDIX B**
- **PRODUCT LIABILITY**
 - **CONCEALED DANGER HAS BEEN CREATED BY THE MANUFACTURER'S DESIGN**
 - **MANUFACTURER HAS FAILED TO SUPPLY NEEDED SAFETY DEVICES**
 - **DESIGN CALLED FOR MATERIALS OF INADEQUATE STRENGTH TO COMPLY WITH ACCEPTED STANDARDS**
- **CORPORATE DECREE**
 - **0405-A1**

DEFINITIONS-DESIGN REVIEWS -CORPORATE POLICY (0405-A1)

DESIGN REVIEW IS:

- **FORMAL**
- **DOCUMENTED**
- **SYSTEMATIC APPRAISAL**

PERTAINING TO:

- **PRODUCT**
 - **ITEM**
 - **SERVICE (TESTING, SOFTWARE, TRAINING, ETC.)**
- **PROCESS**
 - **MANUFACTURING**

NEW CONCEPTS OF DESIGN REVIEW PROGRAM

- **TEAM APPROACH**
- **FORMAL**
- **AGENDA (TYPICAL)**
 - **SPECIFICATIONS – PRODUCT, PROCESS OR SERVICE**
 - **STRESS AND STRUCTURAL REQUIREMENTS**
 - **CODES AND STANDARDS**
 - **ENVIRONMENTAL REQUIREMENTS**
 - **MAINTENANCE**
 - **MATERIALS OF CONSTRUCTION**
 - **CONSTRUCTION FEATURES**
 - **MEETS THE NEED**
- **TIMING**

R&DD ADMINISTRATIVE PROCEDURE 0405-01

DESIGN REVIEWS

TYPES

- **MAJOR REDESIGNS OR NEW EXPERIMENTAL FACILITIES**
- **NEW PRODUCTS OR PROCESSES DEVELOPED BY
THE R&D DIVISION**

ROLES AND RESPONSIBILITIES

LABORATORY MANAGER OR ADVANCED PRODUCTS MANAGER

- **DETERMINES THE NEED FOR A DESIGN REVIEW**
- **ARRANGES "FIRST" AND "SECOND" DESIGN REVIEW MEETINGS**
- **SELECTS CHAIRMAN**
- **SELECTS PARTICIPANTS OF DESIGN REVIEW BOARD**

**DESIGN REVIEW INFORMATION PACKAGE
SHOULD CONTAIN BUT NOT NECESSARILY LIMITED TO:**

- AGENDA
- DESIGN OBJECTIVES
- ALTERNATIVES
- TEST RESULTS
- DRAWINGS
- SPECIFICATION REVIEW RECOMMENDATIONS
- COMPARISON TO SPECIFICATIONS
- COSTS
- MINUTES FROM PREVIOUS REVIEW MEETINGS WHERE APPLICABLE

ROLES AND RESPONSIBILITIES

LABORATORY MANAGER OR ADVANCED PRODUCTS MANAGER

- **DÉTERMINES THE NEED FOR A DESIGN REVIEW**
- **ARRANGES "FIRST" AND "SECOND" DESIGN REVIEW MEETINGS**
- **SÉLECTS CHAIRMAN**
- **SÉLECTS PARTICIPANTS OF DESIGN REVIEW BOARD**

DESIGN REVIEW REPORT

(SUGGESTED CONTENTS)

- **OBJECTIVES**
- **SPECIFICATIONS**
- **DRAWINGS**
- **BACKUP INFORMATION**
- **RECOMMENDATIONS OF REVIEW BOARD
(INCLUDING MINORITY OPINIONS)**
- **SIGNATURES OF BOARD MEMBERS**

ROLES AND RESPONSIBILITIES

LIBRARY

- **MAINTAINS UNIQUE REPORT NUMBERING SYSTEM FOR DESIGN REPORTS**
- **RETAINS THE REPORT**

DESIGN REVIEW OPTION

PURPOSE: EARLY DETECTION AND REMEDY OF DESIGN DEFICIENCIES WHICH COULD JEOPARDIZE

- **SUCCESSFUL PERFORMANCE OF A PRODUCT, PROCESS OR SERVICE DURING USE**
- **COST IN BUILDING OR FABRICATING**
- **EASE OF MAINTENANCE**

HISTORICALLY, DESIGN REVIEWS HAVE BEEN PERFORMED BY:

- **THE HEAD OF AN ENTERPRISE**
- **THE HEAD OF A TECHNICAL DEPARTMENT**
- **NEW PRODUCT COMMITTEE**
- **MANUFACTURING PLANNING**