BOOK REVIEWS

ANSI/ASQC Q90/ISO 9000 Guidelines for Use by the Chemical and Process Industries

Reviewed by Dr. Robert Belfit, Omni Tech International, Ltd., Midland, MI 48640.

REFERENCE: *ANSI/ASQC Q90/ISO 9000 Guidelines for Use by the Chemical and Process Industries*. ASQC Chemical and Process Industries Division, Chemical Interest Committee. ASQC Quality Press, Milwaukee, WI. 1992. ISBN: 0-87389-196-1. $19.95

This book can be of immense value to people not only in the chemical and process industries, but in many other industries as well. Anyone who wants to understand, interpret, and apply the ISO Standards to their field should consider reading it. The concepts and guidelines as developed in this book can be readily transposed to almost any industry.

Generally, the ISO 9000 Standards are not regarded as equivalent to Total Quality Management (TQM). However, these standards embody some of the principles that are missing or not emphasized in TQM, principally the internal audit and management review phases. The book also provides guidance for the registration process. The guidelines emphasize that cross-functional cooperation is required to meet many aspects of the requirements of the Standard.

This book is exceptionally well done; it is very consistent in its approach. This is particularly surprising considering that it is the result of the consensus effort of 17 people who represent different segments of the chemical and process industries. The illustrations are also very useful.

The format used throughout the book consists of the following:

(1) An introduction to the major elements of the Q91 Standard, which is used as the basic standard upon which the total discussion is evolved.

(2) A verbatim statement of an element, presented in a box format.

(3) A discussion of chemical process industry issues.

(4) Interpretation and guidelines, presented for the reader to evaluate and assess relative to their own particular needs.

(5) A presentation of the linkages between the elements of the other Standards, specifically Q92 and Q93.

There are many unwritten rules and hints that are useful in these sections.

The Preface states: "The intent is to provide guidance in using the American National Standard ANSI/ASQC Q91-1987 (ISO 9001) and to promote the use of Q90-Q94 Standards in the chemical and process industries." This goal is very well accomplished.

Some specific observations and recommendations follow:

On Page XVI of the Preface there is an excellent figure describing the relationship between the sub-contractor, the supplier, and the purchaser. On the previous page, "supplier," "sub-contractor," and "purchaser" are defined; however, two definitions are missing: "purchaser supplied product" and "purchased product."

On Page XVII of the Preface the paragraphs regarding the registration process are out of place in the introduction and should be placed elsewhere in the book.

On Page 3 of the book in the second to last paragraph, a statement is made: "The internal quality audit (see clause 4.17) is "*the* major tool" for the verification of the implementation and adequacy of procedures." I think the statement should read "*a*" major tool. The implication in this paragraph is that the internal audit procedure is covering the defaulting of the immediate line responsibility.

On Page 4, where the interpretation of 4.1.2.3 MANAGEMENT REPRESENTATIVE is presented, there is an omission in terms of "it is generally expected that the management representative will schedule, develop the schedule, and the assignments for the internal audit."

On Page 5, under GUIDANCE the statement is made, "However, the supplier's senior manager, not the quality assurance manager, should select a review panel including representatives from support functions. . . ." I believe this generalization is inappropriate for obvious reasons.

On Pages 7 and 8, the book discusses 4.2 QUALITY SYSTEM and mentions the value of the quality manual. I feel that the authors could have gone one step further to describe the contents of the quality manual and its role in documentation of the system.

Throughout the text, the role of the Standard notes are very adequately explained as items that are not necessarily requirements, but are important to follow in order to facilitate a successful ISO 9000 campaign.

4.7 PURCHASER SUPPLIED PRODUCT is an area that has caused confusion in the chemical and process industries, and in the general interpretations of the standards when they first appeared. However, the explanation supplemented by Figure 4.7-1 titled "Purchaser Supplied Product," in the flow of the activities between the sub-contractor, the suppliers, and the purchaser, clearly defines this relationship in a very effective way.

The section titled 4.8 PRODUCT IDENTIFICATION AND TRACEABILITY has also caused some confusion in the application of these standards because it states: "Where appropriate. . . ." In the chemical industry, because traces of materials may ultimately necessitate a recall of a product, the general practice of traceability is important. This rationale is covered very well in the book. In summary, the final statement in the section of this book says, "Traceability should be possible both from the raw materials to the finished product, and from the finished product back to the raw materials."

Section 4.9.2 is titled SPECIAL PROCESSES. The GUIDANCE statement says that "CPI processes are generally considered special processes." I object to this particular interpretation because plants that run day in and day out, and are generally in control, are not considered special processes. Therefore, in my opinion, Section 4.9.1 applies to the chemical industry in general. Section 4.9.2 covers, in my opinion, the situation in which it is impossible to test the product being manufactured, or the end of the production. Shipment is made upon receipt of purchaser approval only after the purchaser has used the product in his or her application.

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This reviewer believes that this book will become the most useful publication that ASQC has published because of its guidance, interpretation, and implementation suggestions.

Electrochemical and Optical Techniques for the Study and Monitoring of Metallic Corrosion

Reviewed by Dr. Gary Burnell, MOD (PE), Reading, England, RG7 4PR.

REFERENCE: *Electrochemical and Optical Techniques for the Study and Monitoring of Metallic Corrosion*, M. G. S. Ferreira and C. A. Melendres, Eds., Kluwer Academic Publishers, Dordrecht, The Netherlands, 1991, ISBN: 0-7923-1368-2, $175.00.

This well-presented hardback volume constitutes the Proceedings of a Conference on Electrochemical and Optical Techniques in Corrosion held in Portugal in 1989 and has been published as part of the NATO ASI Series. Most of the currently available techniques for monitoring the various corrosion phenomena are described, with contributions from many eminent workers in the field.

The objective of the book, as stated by the editors, is to disseminate the present state of knowledge regarding measurement, theory, and instrumentation in the study of corrosion, and in this they have succeeded admirably.

By way of introduction, the first paper by Pourbaix reviews corrosion fundamentals in terms of immunity, passivity, and corrosion and illustrates how graphical representations of these phenomena (the familiar potential/pH diagrams) can be used to solve practical corrosion problems. A number of examples are given, including an analysis of the pitting of copper pipes in Brussels tap water. Although the thermodynamic equilibrium diagram is a well-appreciated concept these days and therefore, some may feel, superfluous for inclusion in a volume devoted to the state of the art, I think that Dr. Pourbaix's review is valuable in this context, since it provides an effective springboard for the rest of the book, which deals with most of the techniques designed to measure transitions between these various states.

Aimed mainly at researchers, the book is concerned with corrosion measurement in the laboratory rather than in the field, but having said that there is something here for everyone, to suit even the most esoteric application—whether it be passive film study using optical techniques such as ellipsometry and differential reflectometry or photoelectrochemistry; the investigation of pitting and uniform corrosion by electrochemical noise or linear polarization; the characterization of surface adsorption and inhibition by Raman and Infra Red Spectroscopy; or the use of Electrochemical (AC) Impedance Spectroscopy to obtain mechanistic and kinetic data. There are even comparisons between techniques such as AC Impedance and Linear Polarization Resistance using computer simulations.

Specific papers are devoted to each technique/application and each paper is accompanied by a comprehensive reference section that facilitates further study. A subject index ties the book together and allows cross-referencing between the various papers and authors. For the most part, the figures and photographs are clear and intelligible. In my view, this is primarily a text for the more advanced reader since most papers assume some prior knowledge of the phenomena being discussed. However, it is also likely to be useful to those new to the subject since it provides a good indication of the breadth and power of the methods available for the investigation of corrosion phenomena.

Of necessity in a work concerned with theoretical as well as practical advances, many of the papers have a significant mathematical content, either developing the theoretical basis of the method, or indicating the mathematical routines involved in the analysis of the data obtained, or both. However, in most cases the math can be skipped if it is not required and the essential features of the method still understood from the descriptions given in the text. Encouragingly, most of the mathematical analysis is supported by experimental data to verify the theoretical basis, thus giving the reader confidence in the reliability of the technique for a particular application.

Of particular value as far as the practical applications of electrochemical techniques are concerned are the papers devoted to their use in the study of a number of topical subjects. On atmospheric corrosion, the concept of damage functions is discussed together with the principles and use of outdoor electrochemical sensors. In terms of stress corrosion cracking and corrosion fatigue, steady state and transient techniques are shown to give useful correlations, but the measurement and analysis of spontaneous fluctuations in current or potential (current or potential noise) is highlighted as the area which appears to have the most potential for future research. In a high-temperature aqueous system, such as a power plant, it is demonstrated how the use of electrochemical techniques has contributed significantly to the development of remedial measures to reduce the incidence of pitting and stress corrosion cracking. In addition, the other practical areas covered include the characterization of biomaterial degradation and the corrosion of advanced materials, which include metallic glasses and oxide superconductors.

In his paper on high-temperature aqueous corrosion, Dr. Macdonald addresses the *raison d'etre* for corrosion research in terms of the social problems facing corrosion science and engineering. With particular emphasis on the nuclear power industry he states, "The failure to properly consider the impact of corrosion phenomena has extracted an enormous price from reactor operators and consumers and has contributed significantly to the public's mistrust of nuclear power." This pervasive deficiency, which is by no means restricted to the nuclear power industry, cannot be too strongly emphasized, and therein lies the value of books such as this, which draw together the latest available knowledge for the wider appreciation of those whose job it is to monitor and control corrosion and thereby possibly avoid the mistakes of the past.

Needless to say, I found this an excellent book with its heady mixture of theory and practice, which for me made for fascinating reading. I can thoroughly recommend it to all those in the business of corrosion research and especially to those wanting to catch up on the latest developments in their and others' fields of specialization.