

ENRICHMENT OF QUALITY ASSURANCE

Yoji AKAO, President
Japanese Society for
Quality Control

from the article "Quality Control and Questions
it Faces in a Period of Transition" in JSQC 20 years
anniversary commemorative booklet "History of JSQC 1986-1990"



1 Securing pre-production quality

Recently newspapers have presented as a problem incidents of defective products, and it is assumed that such incidents, resulting from mistakes in design, may be

imputed to the background in which intensified competition in the development of new goods in response to diversifying market needs and the necessity of delivering merchandise by a predetermined date force the introduction of innovative techniques. In this context it becomes essential to strengthen design review (DR) so as to preclude the recurrence of defective products. It is important, though, to firmly execute quality development and reliability in securing the quality of design in its early stages so that manufactured goods will not be disqualified in the course of DR. Any and all data obtained during and from this process will be helpful in the documentation of DR.

2 Securing non-defective products

It would be possible to reduce the number of defective products to ppm if processing capabilities are kept at $C_p \geq 1.33$ and, furthermore, are secured as $C_p \geq 1.67$. Defects would still occur, though, even if the condition of management is secured. But it is possible to bring the nonadjusted rate after inspection to very nearly 100% provided processing capabilities are secured as $C_p \geq 1.67$ and the status of management is fully established. Only control charts can verify this condition, thus it has become necessary to recognize the importance of such charts even more in our age of ppm management. In other

words, it is required that greater emphasis be placed on the function of "allowing no defective products." This way of thinking is particularly essential in terms of strength and vital quality characteristics in cases where automatic inspection cannot be conducted.

3 Strengthening management

When it is naturally required that a quality assurance system be established to guarantee quality throughout a corporation, it becomes essential to structure systems which are effective, to include computerization, as the "hub" of quality assurance activities from planning and development through sales and services.

It is of course necessary to structure an organizational operation, including policy management and cross-functional management, but it is also important that practical manuals be prepared for companies introducing TQC for the first time.

TQC expands from company-wide quality control (CWQC) to group-wide quality control which also affects affiliated firms, and hopefully will evolve into worldwide quality control.

To date, TQC has made valuable contributions to companies as highly effective for their survival. Quality control management as based on long-term strategy becomes even more important when considering that companies can be profitable on the basis of their perpetuity.

Fundamentally it is essential that companies strengthen their corporate structure and gain problem-solving capabilities in order to survive. In an age of TQC, now and into the future, more and more importance will be placed on statistical quality control, and there will be increasing requests for the development of methods that meet the needs of the times. ★

DEMING CYCLE TO MANAGEMENT CYCLE

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1 DEMING CYCLE

In his Eight-day Course on Quality Control, held in July 1950 under the sponsorship of JUSE, Dr. Deming presented the "Wheel of Quality Control" in the form of eight fans (Fig. 1). He said, "The first step toward quality control is to assemble a sufficient amount of figures to prescribe the quality of products." He also emphasized that, "You cannot inspect quality into a product; you must build quality." In his "To Executives" he expressed the Wheel of Quality Control in a simpler form, one consisting of only four fans, or stages, in a circle rolling on the ground which represented the "idea of placing importance on quality" and the "responsibility for quality." This is what is called the "Deming Cycle" (Fig. 2).

While the "old method" of manufacturers constituted a straight line (Fig. 3), executives, by conducting consumer surveys, can adopt the "new method," or Deming Cycle, which proceeds through the fourth step in sequence (Fig. 4). Stressing that the new method enables consumers to purchase better products which more closely satisfy their requirements at lower prices, Dr. Deming went on to say that this method was "democracy in industry" and "the cycle is best taken on a spiral."

2 DEMING CYCLE TO MANAGEMENT CYCLE (1)

In his "Introduction to Quality Control" Dr. Ishikawa introduced the Deming Cycle with "progress" added in the name of the "Principle of Quality Control," specifying the seven steps of "What is management?" (Fig. 5). These were the steps of jobsite management, which included "3. Education and training," and "7. Checking the results of corrective meas-

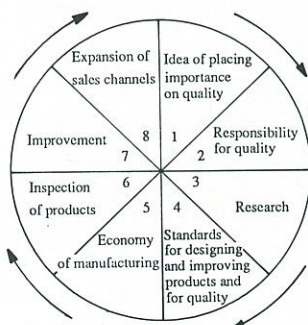


Fig. 1 WHEEL OF QUALITY CONTROL

ures." It appears that the way of thinking on the part of management toward the Deming Cycle started to differ clearly at that time. In his lectures on management of quality control held during 1954 and in "A Special Introduction to the Japanese Edition" of his Quality Control Handbook (First Edition), Dr. Juran explained the "various stages of management," saying that the first step among them was a "definition of the thing to be regulated, i.e., the control point" (Table 1).

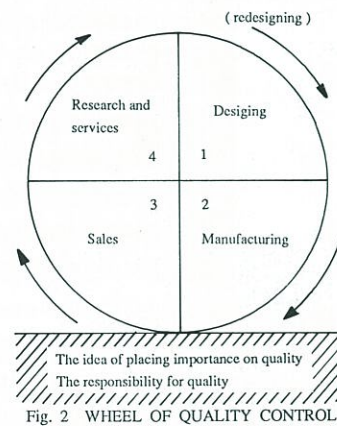


Fig. 2 WHEEL OF QUALITY CONTROL

Table 1. VARIOUS STAGES FOR MANAGEMENT

1	Choosing control points
2	Defining units of measurement
3	Generalizing systematic methods and practical execution for measurement
4	Selecting the standards for execution
5	Interpreting the difference between practical execution and the standards
6	Determining what action should be taken
7	Taking actions that suit such determination

Various ways of thinking developed from 1954 to 1956. Mr. Inoue, then Managing Director of Sumitomo Denko, explained three steps of "control or management" in his paper "How Management Should Be," appending "action" to them as a fourth step. Mr. Shibusa then established four steps, "standards," "doing work," "examining results" and "correcting," and presented an "expositive diagram of feedback" as an idea upon which quality control is based. The important point is that the concept of "feedback control" was presented explicitly here.

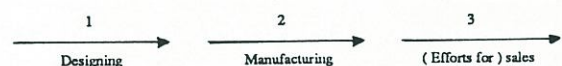


Fig. 3 OLD METHOD

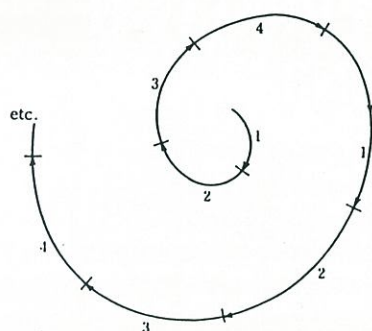


Fig. 4 THE CYCLE IS BEST TAKEN ON A SPIRAL

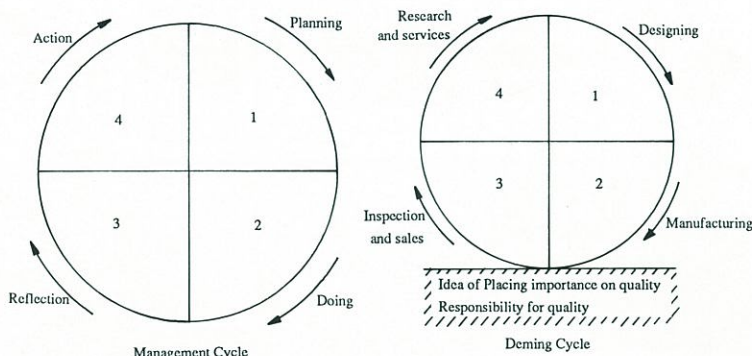


Fig. 6 MANAGEMENT CYCLE AND THE DEMING CYCLE

Important developments thus far made in the process of Deming Cycle to management cycle are:

- (a) The concept of feedback control was introduced.
- (b) The four steps, standardization and planning, execution, differences in standards, and corrective action, have been clarified.
- (c) The management cycle prior to that time was described later as S (Standardization) - D (Doing) - C (Checking) - A (Action).

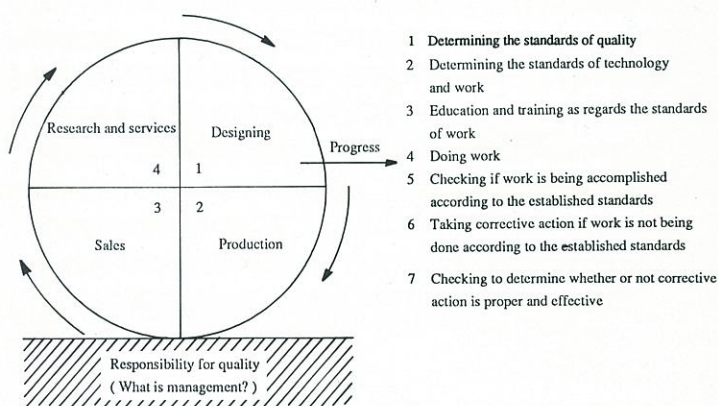


Fig. 5 PRINCIPLE OF QUALITY CONTROL

3 DEMING CYCLE TO MANAGEMENT CYCLE(2)

In January 1959 "Quality Control" magazine started to publish lectures on control charts as a series, and the management cycle and Deming Cycle were explained separately in the first installment (Fig. 6). This, it can be said, was the "birth" of the management cycle. Here, maintenance and improvement are realized gradually, with the cycle rolling from planning to doing to reflection to action and back to planning. It is stated that the activities forming a cycle are called "management." The important point here is that the cycle is presented as the one which starts not with standard, as was mentioned in the preceding section, but with planning, that has a broader concept.

With the spread of TQC, the management cycle was

employed at all strata and stages of corporate activities. There were occasional periods in which the Deming Cycle and management cycle seemed synonymous. In general, however, the management cycle, or the "PDCA Cycle," has come to stay.

The management, or PDCA, cycle has won its way among workers and clerks in all departments. Both cycles were clearly explained in "How to Operate QC Circle Activities." The text was simple and direct, presented in such a way to make it easily understood by workers and clerks (Fig. 8).

4 DEVELOPMENT OF THE MANAGEMENT CYCLE INTO PRACTICAL MANAGEMENT

In the management cycle the stage of seeing becomes more concrete, since it is divided into two phases, checking and action, as opposed to the plan-do-see cycle as used in business administration. In it the control point is used and developed as an instrument for checking. In Teijin's position-by-position control items, the control point content was separated into (1) control items (checking work that subordinates are told to do) and (2) self-imposed items (checking work that one is required to do by oneself); and, in recent years, (3) factor-related control items (checking items and checking points) and (4) result-related control items (control characteristics and control points) have established themselves.

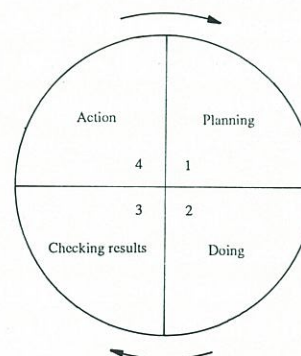


Fig. 7 MANAGEMENT CYCLE

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QC STORIES AS AN APPROACH TO IMPROVEMENT

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WHAT ARE QC STORIES?

Today the term “QC story” is used just about everywhere in QC circles. It has become an extremely popular expression, and it might not be exaggerating to say that, in a sense, it has fully acquired citizenship.

The author, admittedly superficial with respect to learning and ability, has not seen or heard about any stories, reports or literature that fully studied or researched where and when the term “QC story” originated and how it evolved into what it is now, although expository comments and studies as regards QC stories themselves have been reported and/or published in many places.

It should be noted, therefore, that reference to QC stories in this treatise is strictly based on current discussions.

“QC story” means “a story about QC” and constitutes a form of reporting wherein a series of problem-solving activities completed in the past was compiled into an example to be cited to third persons. Naturally forms of reporting vary, and QC stories are not the only and absolute means of reporting. For example, there might be a format in which conclusions or results obtained from problem-solving activities are presented first, followed by accounts of why such conclusions were reached, then of the action taken that ultimately produced such results.

If the individuals listening to such reports were in fact third persons who were not involved in the problem-solving activities described, then we can say that QC stories, with their clear and logical structure and objective, are relatively superior to other forms of reporting in that they make the listener understand the positioning and process of problem-solving activities as actually carried out, and evaluate, judge and become convinced of the worth of such activities from an objective point of view.

More generally speaking, the key to making third-person listeners fully understand and become convinced of a QC story is how to put the listeners in the same position as those who were directly involved in the problem-solving activities... in other words, to have the listeners simulate in their mind the same process as was carried out by the persons directly involved. Cited as typical examples of narratives are Kodan

(storytelling) and Rakugo (comic monologue), two forms that have been handed down through many generations in Japan. By faithfully reproducing the process of problem-solving activities actually conducted, QC stories have the characteristic that they make listeners feel as if they were resolving whatever the problems together with the persons who actually did it.

When the two major characteristics of QC stories, namely, the objectivity of logical structure in problem-solving, and the reproductiveness of the process of problem-solving activities, are carefully examined, it should be found that these two traits are really employed as a “concrete process of solution” when problem-solving action is conducted. In short, QC stories that are simply stories intended to be told about the results of problem-solving activities obtained from QC activities emerge as showing a “scientific approach to resolving problems rationally.”

Thus the author believes that, to make a clear distinction between “QC stories as a narrative” and “QC stories as an approach to solving problems,” it would be more appropriate to call the latter a “problem-solving method in the form of QC stories.”

STEPS AND IDEAS OF QC STORIES

The steps of QC stories have been discussed in many places and various forms of representing them (the number of steps, what to call them, etc.) have been proposed. Basically it is felt that all of them essentially refer to the same content but in different ways, but for our classification purposes here QC stories can be divided into the following eight steps:

- 1 Establishing a theme
- 2 Reasons for establishing a theme
- 3 Grasping the present situation
- 4 Analysis
- 5 Countermeasures
- 6 Confirming effects
- 7 Preventing retrogression
- 8 Questions left unresolved and planning for the future

The definitions and fundamental ideas included therein concerning these eight steps are as specified below. It should be noted, however, that the following explanations adhere

strictly to the concept of QC stories as an approach to solving problems, not merely as a form of reporting.

1 Establishing a theme

Clarifying what to change and what it should become, namely, the purpose or aim of the problem-solving activities to be undertaken.

- (a) Reflecting the clear “will” of the persons who actually carry out problem-solving activities.
- (b) Starting with “problems related to results” currently involved.
- (c) Stating goals (items, values and dates for attaining goals) expressly.

2 Reasons for establishing a theme

Clarifying why the problems should be resolved, or the “ground” or “background” for such problem-solving, on the basis of fact.

- (a) Showing how the facts are evaluated.
- (b) Making relative comparisons concerning the seriousness of whatever the problems, the urgency of need, etc.
- (c) Stating expressly the “universe” to be dealt with.

3 Grasping the present situation

Clarifying the degree of dispersion under the current situation (the extent of wrongness as related to the results) in relation to the problems treated, on the basis of facts as observed from various standpoints.

- (a) Dividing the result-related problems into strata and classifying them.
- (b) Grasping the characteristics of dispersion.
- (c) The point is how much dispersion was found.
- (d) Sorting out the information discovered.

4 Analysis

Clarifying, on the basis of fact, reasons why result-related dispersion found in the course of grasping the present situation actually occurred.

- (a) Establishing and verifying hypothesis.
- (b) Clarifying the structure of causal sequences in the basis of fact.
- (c) The point is how thorough analysis can be made.
- (d) Sorting out the information analyzed.

5 Countermeasures

Listing, evaluating and selecting countermeasures to be taken as a means to remove whatever the “group of causes” discovered in the course of analysis, and initiating appropriate action.

- (a) Dividing into strata countermeasures to be taken according to the levels of causes.
- (b) Exactly evaluating several proposed countermeasures and choosing the proper ones.
- (c) Selecting countermeasures to remove factors that may

halt the execution of countermeasures.

- (d) Laying plans to execute countermeasures and managing their implementation.

6 Confirming effects

Confirming, on the basis of facts, the degree to which the countermeasures have had an effect, while watching the time difference between the schedule of countermeasures taken and the effects brought about.

- (a) Establishing the period and method of verifying the effects, judging from the relationships between the time when countermeasures are taken and the time when the desired effects result.
- (b) Confirming the effects by going back over the process of analysis thus far made.
- (c) Making a comparative evaluation between the effects anticipated at the beginning and those actually produced.
- (d) Proceeding with necessary feedback activities based on the results of evaluation.

7 Preventing retrogression

Preventing the implemented countermeasures from retrogressing by firmly installing them into the normal work routine.

- (a) Seeking conformity with routine work by basing countermeasures on the rule of standardization.
- (b) Devising a way so that regulations can be followed without difficulty.
- (c) Making a clear distinction against the countermeasure(s) specified in the preceding step (6).
- (d) Conducting preparatory activities of education and training.

8 Questions left unresolved and planning for the future

Determining what future activities are required by generally reflecting on problems left unresolved and the deficiencies of activities conducted so far.

- (a) Stating clearly problems left unresolved and whatever the defects by making a general reflection on the entire process of steps.
- (b) Expressly stating lessons learned from such reflections and how to make the best of them.
- (c) Describing concretely how to respond in the future.



This article is an excerpt from a Journal “Quality”, Vol.21 No.2 1991, pp.43-45, published by JSQC. More detailed explanation for each 8 steps can be referred to the Journal, but only written in Japanese.

(continued from Page 3)

After Komatsu Manufacturing introduced the “control points of maintenance” and the “control points of improvement and betterment” to its Flag System, control items evolved into the control items of maintenance and control, and into the control items of breaking down the present situation and making improvements, and furthermore developed into control items for daily routine regulation and those (goals) of policy management. Next the control items, which were found in the QC process chart of quality assurance in TQC activities, were positioned as one of the essential conditions for practical business administration, such as policy management, cross-functional management, etc.

It was most significant that Dr. Juran expanded the concept

JUSE 21ST QUALITY CONTROL STUDY TEAM TO EAST EUROPE

Team was organized by total 21 members including Prof. Tatsuo Ikezawa of Waseda University as a team leader and Mr. Ichiro Miyauchi, Counselor of JUSE, as a coordinator. Team members were top management and managers who are in charge of TQC implementation in private company. They left Japan on June 9 and visited 4 countries in East Europe for 14 days and returned back on June 22 by accomplishing their purpose fully.

The companies they visited and conferences they were invited are as follows.

Germany (Berlin):

BWF, TQM Meeting at Berlin Technical University

Hungary (Butapest):

VIDEOTON AUTOMATION, Hungarian Office for Standardization

Poland (Warsaw):

High Tech Lab, TQC Symposium at Warsaw Technical University

Czechoslovakia (Praha):

Motorlet, Skoda Praha Naftoue Motory, EOQ 35th Annual Conference, QC Seminar organized by Czech Society for Quality



of control points, at first positioned as one of the instruments for good management, to that of “not only the results but the management of the process (factor-related)” and “not only management but the control items for improvement.”

With the progress of TQC, business enterprises began to formulate more practical administration techniques in 1963 and 1964 as a means to improve their corporate structure in the severe environment which surrounded them. There has been a certain amount of generalization and integration afoot as regards daily management, policy management, division-by-division and crossfunctional management, and product-by-product management. As Dr. Ishikawa says, “It is for TQC to execute the management of the entire company, namely, to revolve the PDCA cycle at all jobsites with certainty. ★

JUSE 3RD SOFTWARE PRODUCTION QUALITY CONTROL STUDY TEAM TO USA, UK, GERMANY

The team composed of total 30 members including Mr. Masayuki Hoshikawa of NTT Data Communications System Corp. as a team leader and Prof. Yasuo Ishii of Tokyo University of Information Sciences as a coordinator had visited the following 9 companies and associations and had an information exchange at each company visits. Team members had a pleasure to make the acquaintance of people in those companies working in the same field. All in all, it was a fruitful and successful tour. The tour was scheduled for 15 days from April 6 to 20, 1991.

USA:

IBM (Houston, TX), NASA (Greenbelt, MD), AT&T (Holmdel, NJ), Stratus Computer (Marlboro, MA), Boston University, Open Software Foundation Inc. (Cambridge, MA)

UK:

Center for Software and Reliability, Micro Focus Ltd.

GERMANY:

GMD (German National Research Center for Computer Science)



ASIA QUALITY CONTROL SYMPOSIUM 1991 TOKYO

— held at JUSE on May 25. —

As one of the activities commemorating the twentieth anniversary of the establishment of the Japanese Society for Quality Control (JSQC), which was feted this May, the Asia Quality Control Symposium 1991 Tokyo was held at JUSE on May 25, enjoying the cooperation of the Korean Society for Quality Control (KSQC) and the Chinese Society for Quality Control (CSQC).

Formerly the Symposium was held by KSQC and CSQC in Seoul and Taipei, the cities alternating each year. But from this year JSQC joined the Symposium. Working together, the three societies will call for participation from among QC related societies throughout the Asian district and regularly rotate organizing the Symposium.

The May 25 Symposium convened in the Conference Room of JUSE and opened with a special lecture by Prof. Song-Yong Yi of Kan-Kak University, under the theme "The Status of QC in Korea and its Contribution to Asian Countries." Following this, five presentations were made that morning:

1. "Quality - the First Thing to Do"
Y. Kondo, Prof. Emeritus, Kyoto University
2. "Prosperity through QC Cooperation in Asian Countries"
C. C. Chung, Executive Director, CSQC
3. "A Study on Vitalizing QCC Activities: Analysis of the Relationship between QCC Activities and Quality Awareness"
H. W. Kim, Prof., Honk-ek University

4. "Basic Business Principle of Our Company and Quality Activities in Overseas Plants"
S. Tsutumi, Manager, Quality Training Section, QA Dept., Matsushita Electric, Industrial Co.
5. "In Search of Quality-Taiwan Experience"
C. Y. Tai, National Chiao Tung University

In the afternoon a panel discussion was held featuring representatives of the three societies on the theme, "International Cooperation on Quality Control in Asia and Some Problems in the Future."

During the latter half of the discussion opinions of the three societies were exchanged as regards how to advance international cooperation with respect to QC in Asia during the years to come. KSQC proposed (1) promoting meetings for exchange among the three societies such as the Symposium, (2) mutual cooperation with respect to educational training, (3) sharing TQC experiences, (4) developing TQC to fit Asia, and (5) mutual assistance to improve the ability of middlelevel management to solve problems. CSQC expressed great expectations as regards financial aid from Japan to overcome the great gaps extant among Asian countries whose technological and economic factors are so different. JSQC proposed QC cooperation appropriate for each nation's industrial pattern and degree of advancement, a form of international research to promote TQC throughout Asia.

All in all, both the presentations and the panel discussion were considered highly worthwhile and fruitful. ★



↑ Prof. S. Y. Yo, President of KSQC (right) and Prof. Y. Akao, President of JSQC

← (from left to right)
Dr. C. C. Chung, CSQC, Prof. S. H. Park, KSQC
Mr. A. Harada, JSQC, Prof. N. Kano, JSQC

JUSE INTERNATIONAL SEMINAR ON TQC FOR SENIOR MANAGEMENT

Specially for TQC Coordinators, 1991

**October 14 to 18
at Keio Plaza Intercontinental Hotel**

The most recommendable participant of this Seminar 1991 will be persons who are in charge of the promotion for Total Quality Control or Total Quality Management of their companies.

They must have a good command of English for discussion. Application will not be accepted from an establishment providing more than four participants.

FEE: A Yen 480,000/person (Twin room)
B Yen 586,200/person (Single room)

Above fees includes the following:

Lecture note and transportaion fees for plant visits, accommodation fees for eight nights from 13th Sunday to 18th Friday, lunch & refreshments for six seminar days.

These fees do not include dinner for each day.

* More detailed information is available at JUSE

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