

RELIABILITY - AN ONGOING STRUGGLE WITH NEW PROBLEMS

— from a special Lecture at ISR&M'90 Tokyo —

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"The data presented clearly shows that Japan's home appliance manufacturers have exercised a shift regarding their principal products. In the years immediately following World War II they first concentrated on the production of radio. Indicated

here are respective market shares; the decrease in number does not mean a decrease in sales. The total market share dropped off at about this time, when they started producing refrigerators and washing machines. But the general returns from sales continued to grow. As the manufacture of radios dropped off, black and white television sets were put on the market. This was followed by color TV. In time the sales of color TV sets also diminished greatly. Now, the boom is in VTRs.

It is common knowledge that companies continually manufacture and present new products to the market. But while developing their markets in this way, new products may result in new problems. No product is ever introduced and sold without causing trouble somewhere along the line. But in the process, one new form of technology after another evolves. All of this spells competition, and Japan is a country where competition is especially fierce."

"Last year I addressed the Japan Society in New York. Facsimile machines first appeared on the market in Japan during 1969. Today there are 115 types available. At present their rate of appearance averages one new model every three days. There are also 96 types of photocopy machines available in Japan. Listening to me say things like that, someone questioned the sense of introducing to the market so many variations of the same basic equipment in such rapid succession. A person might well wonder if the technology enabling this is developed so easily. Actually it does not. In effect, all the technology wizards do is create new models by moving a button from the right side of an appliance to the left side, by redesigning the shape of exterior cases, or by introducing a

new scheme of colors. You may think doing this is silly, but continued efforts in this vein will actually lead to producing a completely different model over a period of three or four years.

Recently, innovation is based on the accumulation of what might be considered trifling efforts. Ten or twenty years of trifles - some might even think of it as mere tinkering - enables us to evolve a completely new form of technology."

"The data shows that Japan's industries have definitely changed during the past few years.

Look at 1965 - our shipbuilding industry. It suffered a devastating blow at this time when the oil crisis struck. Our textile industry also declined. But our steel industry recorded almost no fluctuation. The yellow line, showing a sharp increase, represents our production of electrical machinery. Technological changes are coming thick and fast, as indicated here. Changing and being changed - these two factors cause new problems. Assuring the reliability of products in the process of changing them is no easy matter. Deeply enmeshed in such a society, we absolutely cannot run away from it.

As mentioned before, a form of 'gray technology' is needed. Otherwise we have to cope with errors every day. To that end, a corporatewide organization should be established with all employees involved so that even the slightest errors will not pass overlooked. New and excellent products can emerge by eliminating or finding solutions to such errors."

As human beings, we cannot live without food. In the same way, manufacturers must make continuous improvement, in other words, resolve problems by making the most of 'gray technology'. In order to survive in a society where technology is constantly changing and becoming more sophisticated. Recently, a new term was coined in the United States: 'concurrent engineering'. Briefly stated, all types of engineering work together to serve one and the same purpose at the same time. In Japan we have a term, too. It's 'Total Quality Control'. Enforcing this, I firmly believe, is the only way manufacturers can survive toward and into the twenty-first century.



QUALITY CONTROL IN ADMINISTRATIVE AND INDIRECT DIVISIONS

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1. Problems in promotion process of quality control

An administrative work is defined as "a means of producing information products," and indirect divisions as those which "support direct divisions which yield added values, create setups and devices which yield more added values and promote the realization of

them". In many instances, the processes and results of work related to information products, setups and devices that create higher added value are "invisible," "immeasurable" and "to assess." Even the most accurate definition cannot solve phenomena and problems (dispersion, extent of inferiority) peculiar to administrative and indirect divisions. Pointed to repeatedly as problematic factors characteristic of administrative and indirect divisions are:

- (1) The process of work is invisible.
- (2) How greatly a person is satisfied with the results of his or her work varies from worker to worker.
- (3) It is difficult to decide the specific nature of quality. Even if such decisions are made, they vary from worker to worker.
- (4) Very few written instructions for working processes are available, and the made, and the results vary from worker to worker.
- (5) There are few opportunities to reconsider if the work itself is necessary or not.
- (6) No standardized criteria for measuring the results of work has been established.
- (7) It is difficult to determine what actually should be done with "setups" to enhance added value.
- (8) It is just as difficult to determine how "devices" to realize "setups" should be designed.
- (9) In many instances it is hard to answer if productivity is increasing or decreasing since no method for measuring it is available.
- (10) Since work depends largely on individual experience, intuition and pluck, methods for advancing it defy standardization and horizontal development.
- (11) It is difficult to judge whether the result of work is a "good product" or an "inferior product." Even if inferior, it is easy to make corrections by taking emergency measures or by readjustment. Thus, permanent measures cannot be introduced nor can countermeasures be taken to prevent

such problems from happening again, with the result that they continue to occur.

(12) Effective methods for developing and improving the abilities of workers in administrative and indirect divisions are so few that they tend to learn or improve their own skills. Moreover, there are no clearly defined methods for developing one's abilities to attain higher achievements and for elevating capabilities to enable designing setups and devices.

(13) No distinct methods for advancing efficiency and rationalization can be found despite the desire to improve administrative and indirect divisions positively. It is extremely difficult to determine where to start and how.

It is vital to thoroughly understand "phenomena," "extent of inferiority" and "dispersion" as regards these problems and seek for their solutions from the viewpoint of quality control.

2. Needs and methods for promoting quality control

The purpose of total quality control (TQC) activities is to create a corporate environment, or production system, in which the entire workforce by means of TQC methods continue to assure their customers that their firm's products or services are well worth the money paid for them, thereby guaranteeing quality.

In general, though, it takes at least three years, usually five, and sometimes seven to eight years to upgrade a company's production system to where high standards of quality control are achieved. This shows how difficult it is to revise existing work practices to a market-oriented structure with new operational habits based on the concept of "customers first".

It is said that a company's business results are the result of its environment, or production system. In companies which have good business results, all of their members, from top management to the jobsite employees, practice the concept of "customers first." In other words, a company's business results indicate how well its clientele support it and stand as a barometer of the degree of customer satisfaction enjoyed. Conversely, with companies having poor business results, the old, inefficient (sick) production system remains almost unchanged, and they suffer from a lower rate of consumer support and provide their clientele with less satisfaction. Such firms require promotional activities, or "ideas," "setups" and "devices," to identify the causes of their deficiency and upgrade their environment based on TQC.

"Promotion" describes a movement in which certain affairs are advanced through special means in order to attain a

predetermined high goal. Work problems comparatively easy to solve are called "business affairs," not promotion. Promotion involves breaking barrier after barrier, crashing through whatever stands in the way to eventually reach the goal. Accordingly, promotion is a task involving gaining solutions to even the most arduous trials. In TQC, promotion means activities which work upon and motivate each and every division and work slot in a company so as to improve the entire corporate production system - to make it healthy. Such activities include formulating, developing and carrying out the policies of the president as well as his diagnosis concerning quality control (hearings). In concrete terms, QC education is conducted for all strata of employees and all corporate divisions, and the results of QC activities are presented for study and further improvement. TQC is a major activity in a firm which tries to change what is extremely hard to correct, and that is why promotion is necessary. In this context, the job of persons who take charge of promoting QC or TQC is highly important since it improves their company's productivity and at the same time a very honorable job which leaves mark on the history of the company and whose future is greatly expected by the top management.

Unlike cases in which activities for improving a firm's production system are directed toward goods manufactured, it is hard to judge whether quality is good or bad where QC or TQC in administrative and indirect divisions are concerned. After fully understanding QC promotion in manufacturing departments, the administrative and indirect divisions should establish their own methods for introducing QC and promote them so that they can measure up to the expectations of the company as a whole.

The following are the explanations of important factors among the functions and roles of the section responsible for the promotion of TQC activities within administrative and indirect divisions.

(1) Formulating and promoting of guidelines for TQC (medium-term execution program). When promoting activities to improve a production system in a way that involves the entire corporation, a guideline is required which shows the basic concept of the promotional activities. First, a targeted value or image must be established to concretely express the level to which administrative and indirect divisions should be raised or into what they are to be transformed during the period when the activities are conducted. The roles of each division and an executive targeted value can be made clear only by preparing a guideline. Doing so enables the entire organization to promote efficiency rationalization in a unified manner, and eliminate worthless judgements and meetings.

It is suggested that preparing the guideline be divided into shaping of "ideas, setups and devices," with development of the guideline divided into periods of "introduction, promotion and development".

As for the "shaping of ideas," decisions should be made as regards the following five points:

1. A united corporate slogan
2. A slogan developed according to fiscal year

3. A targeted value for improvement
 4. A definition or signification concerning the promotion of efficiency and rationalization in administrative and indirect divisions
 5. An involvement of personnel in the administrative and indirect divisions
- (2) Formulating and promoting methods to apply a guideline throughout the company (shaping of setups)
1. Establishment and operation of a TQC committee
 2. Forming and operating TQC promotion committees for respective corporate divisions.
 3. Promoting policy control, daily administration control, quality assurance and standardization
 4. Education, training and QC Circle activities
 5. Activities to make proposals for improvement
- (3) "Shaping of devices" for carrying out promotion throughout the company as planned

TQC means that each individual employees conduct quality assurance activities by practicing QC themselves, and it is recommended that the "shaping of devices" as listed below be taken into consideration.

1. What is called "top management's diagnoses or hearings," wherein top management examines and assesses the activities of administrative and indirect business affairs in its division, should be scheduled every six months and carried out according to the plan.
2. QC education should be conducted "to make not only an innovation in consciousness but also in action." This is accomplished through repetition. It is most effective to let participants choose their own theme and then follow up.
3. Office texts for internal use should be prepared for administrative and indirect divisions. These manuals should carry QC terminology, QC Tools, Seven Management Tools, QC stories, case histories, etc. The text must be thin and easy to comprehend.
4. A meeting for presentation of cases wherein improvement is realized through QC should be held once a year under the supervision of a division's general manager and section chiefs. Meetings for mutual exchange can be held, as deemed necessary, for horizontal diffusion of the knowhow.
5. A general meeting of QC Circle should take place once a year, too, with the attendance of top management, and with general managers and section chiefs taking charge of reviewing.
6. Public relations and hearing activities should be conducted, such as recruiting of slogans and mottoes, publishing of a QC news sheet, utilizing of house organs for reports, and production of videotapes that introduce excellent cases of improvement for reference by other corporate divisions and departments.

3. Ways to advance QC education

QC is said to be an innovation in consciousness. And QC education plays an important part among promotional activities in that it changes of seeing and thinking from non-QC-oriented to QC-oriented way. To acquire new ways

of seeing and thinking requires programming QC-oriented ways of seeing and thinking about things into a person's mind. In other words, people must cultivate a habit (constitution) of a new way of thinking. To accomplish this demands continuous QC education. Without it, a constitution will not become a habit, rather it will return to what it was.

The true meaning of "QC starts and ends with education" is that it ranks it as extremely important to improve the constitution, or production system, of a company to where its employees thoroughly understand by using their mind, persuade themselves to act through the body, and perform the action by using their hands and feet.

The task of administrative and indirect divisions is to produce an invisible product, or "information products". Producing information products has little in common with the manufacturing division, where materials are processed or components are assembled into finished goods. Accordingly, there are certain difficulties in utilizing the manufacturing division's QC-oriented ways of seeing things and thinking about them, or any other established QC method as they are. QC education is of particular importance in that, based on a full comprehension of the administrative and indirect divisions' special way of considering QC, it dispels their way of thinking and doubts about QC and convinces that they really must conduct QC activities.

The personnel in administrative and indirect divisions usually have simple questions about QC and TQC, a few examples of which are:

1. "How is our work related to QC and TQC?"
 2. "We think that QC and TQC are what the divisions in charge of parts, materials and products should have. They have nothing to do with us."
 3. "We think that QC may be effective among direct divisions in a sense that it creates added value. But it has little effect on our division, which is a supporter of direct divisions."
 4. "Without QC, we have already improved in many ways. QC has no appeal for us."
 5. "You may say that there is some difference in ways of working. But nobody has complained about us for the past twenty years. So what's wrong with the way we've been doing things?"
 6. "Even though administrative work seems to be of a predetermined nature, it is frequently interrupted by unexpected inquiries and urgent matters. It is impossible to work according to any fixed rules."
 7. "You say that our personnel in the later processes are our customers, but we've always worked thinking that way. It's embarrassing to be asked so abruptly at this late date if our customers within the company are satisfied with us."
 8. "Sometimes our superiors suddenly ask for detailed materials. What should we do if we're asked after we've stopped working on them, with the idea that they're no longer needed? We'd be scolded."
- Such doubts and questions sound reasonable. It is not wrong to say that one's company so far has worked that way. But it would not continue so in the future, and there are reasons for that: It was perhaps all right in an age when administra-

Table 1 Curricula of QC education for administrative and indirect divisions - Proposed plan -

QC for administrative work (collective education)		Learning about QC based on personal experiences	
		OJT	Assessment
Freshmen	1 History of administration 2 Kinds of administration 3 Quality of administrative and indirect division	QC Circle (Matters with which a person is troubled or embarrassed)	QC Circle meeting for presentation (once every three or four months)
Employees of middle standing	4 The need for QC in administrative and indirect divisions 5 The QC-oriented approach <ul style="list-style-type: none"> • QC equipment • QC stories (8 hours)	QC Circle (Expectations of later processes; responsible mainly for taking inventory)	QC Circle meeting for presentation (once every three of four months)
Section chiefs	<ul style="list-style-type: none"> • Management cycles • Daily management • Policy management (8 hours)	Themes for improvement (Studies of life; execution and guiding for inventory-taking)	Diagnosis by heads of divisions (once every six months)
Managers Deputy general managers General managers	<ul style="list-style-type: none"> • Management cycles • Daily management • Policy management (8 hours)	Themes for inter-sectional improvement (Study of life in their own division)	Diagnosis by top management (once every six months)

Table 2 Standard for the effects of QC education

Grade	Standards of educational effects	Content of standards	Effective educational content
A	Comprehension level	To understand what QC is, and what QC-oriented ways of thinking are	Lectures: 1. What are administrative and indirect divisions ore. 2. What QC is. 3. Sowing examples (including exchanges)
B	Conviction level	To understand the usefulness in work and to apply it in one's own work	Practical exercises: 1. Participate in QC circles using 2. Do practical exercises with one's own theme for improvement 3. Individual guidance
C	Action and habitual practice level	Apply QC to one's own work, make several rounds of PDCA to master what QC means, and form the habit of using QC	1. Policy management 2. Daily management 3. Examination and diagnosis by superiors 4. Presentation of one's personal experiences

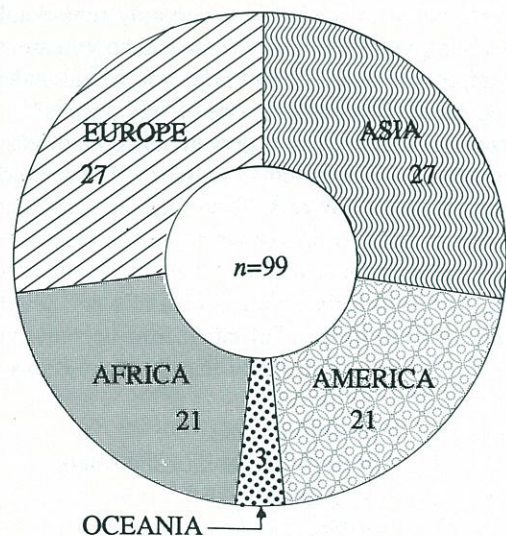
tive work ran secondary to the production of merchandise. But along with the shift from an industrial to an information society, the value of goods is assessed not only by their hardware aspect; their worth now includes software and service. Thus far, administrative and indirect divisions have maintained a position as cost centers which freely use corporate funds. They were like by players in a movie. But that is changing. It might be said that they are row upgrade to supporting actors. In companies, the rate of increase in the number of personnel assigned to administrative and indirect divisions is higher than among other divisions. A numerical increase in personnel means an increase in costs. Cost increases in turn make it necessary to pay for the expenses by making profits through sales of goods or other business activities; if not, corporate management would not be able to run.

In other words, administrative and indirect divisions are expected to become profitmaking groups just like the manufacturing and sales divisions are. In order to transform administrative and indirect divisions from the old-fashioned "windingup, cost-consuming" type into the modern "positive, profit-making" type, a curricula of QC education and standards for measuring the educational effects should be established. Tables 1 and 2 show effective working arrangements.

Of particular importance in this is the preparation of standards for measuring the educational effects on trainees. Each trainee should set a certain goal for personal attainment, and this should be followed by an assessment as to whether he or she has achieved this goal after completion of the training period. The assessment must be done by the trainees' superiors. It is desired that the level of QC education be raised by making rounds of management cycles (PDCA).



VISITORS TO JUSE (1980 - 1989)
Countries / Districts of Visitors



Top Twenty by Number of Visitors

- | | |
|------------|-----------------|
| 1. KOREA | 11. ITALY |
| 2. U.S.A. | 12. THAILAND |
| 3. FRANCE | 13. MEXICO |
| 4. CHINA | 14. SINGAPORE |
| 5. TAIWAN | 15. PHILIPPINES |
| 6. SWEDEN | 16. MALAYSIA |
| 7. BRASIL | 17. NETHERLANDS |
| 8. U.K. | 18. CANADA |
| 9. FINLAND | 19. AUSTRALIA |
| 10. INDIA | 20. INDONESIA |

ESSAY

QUALITY OF LIFE

Yoshito Ogisu
Head of TQC Promotion Office
Aichi Seiko Co., Ltd.

In the recent medical world, the necessity of how to lead a patient to live in a better condition rather than merely curing one's disease is considered and discussed as a question of "The quality of life".

Last summer, I heard the following story from a friend of mine who is a doctor.

Few years ago I underwent an abdominal surgery to remove a part of the large intestine. Of course I was prepared to experience some side effects but since I was very troubled with my condition of having to interrupt important meetings or discussions, I went to my doctor about this. The matter was simply brushed off with his comment of "compared to a matter of life and death, something to that extent is nothing". Of course medically those troubles were to be expected and I was making satisfactory progress. But I was quite distressed with the fact that the reactions corresponding to such negative qualities were neglected. However, with this "quality of life", I am sure that such matters would some day be taken up to be discussed and feel very pleased.

The advancement in medicine is certainly remarkable and perhaps I am given its benefit far more than you are, and to which I appreciate deeply, and I hope you would understand that above mentioned matter is one of "my desires".

The purpose of medicine is to prevent and cure diseases and since the customers are patients, "to live in a better condition" can be considered a progress. There lies the significance of "the quality of life", however when we look around fields other than medicine, in principle, if there is a quality to satisfy demands, then that satisfaction is obtained and if a higher demand is satisfied, the level of satisfaction becomes greater. Dr. Mazuro, psychologist, stated that there are five steps in human demands.

- (Lower)
1. Physical demand
 2. Demand for stability and safety
 3. Social demand
 4. Ego/Self demand

- (Higher)
5. Demand for self realization

Following are the qualities of the goods which appropriately correspond respectively to the above 5 steps and the ages when those qualities were questioned and strongly demanded.

- (Lower)
1. Usefulness - 60's
 2. Safety, reliability 60 - 70's
 3. Anti - pollutive, economical 70 - 80's
 4. Variegated, advanced early 80's

- (Higher)
5. Sensibility late 80's

As mentioned before, the 5 steps showing the quality of products match with the changes in the ideas of quality in TQC's history. I feel that the properness of the 5 steps of human demands is verified by TQC's history.

On the premise of the 5 steps of human demands, respecting humanity which is the basis of TQC is nothing but to satisfy

ISR&M 1990 Tokyo

Session Titles and Countries presented Papers

1. Reliability Progress : International and National Activities : 4
USA, Sweden, Japan (2)
2. Reliability Design Technique : 7
USA (2), India, USSR, Japan (3)
3. Device and Component Reliability
3 - 1 Failure Analysis and Reliability Physics : 5
Japan (5)
3 - 2 Electromigration : 2
Japan (2)
3 - 3 Reliability Test : 4
Japan (4)
3 - 4 Reliability of Surface Mount Device : 3
Japan (3)
3 - 5 Soldering Reliability : 3
Japan (3)
4. Safety and Reliability Assurance : 2
USA, Japan
5. Mechanical and Structural Reliability : 5
Japan (5)
6. Computer Aided Reliability Engineering : 3
USA, France, Israel
7. System and Equipment Reliability : 4
Sweden, China, Chinese Taipei, Japan
8. Life Distribution and Data Analysis: 5
India, China, France, Japan (2)
9. Software Reliability : 5
USA, France (2), Japan (2)
10. Maintainability
10 - 1 Maintenance Support : 4
USSR, China, Japan (2)
10 - 2 Maintainability Modeling : 3
China, Japan (2)
11. Availability : 2
Japan (2)
12. Reliability and Maintainability Management : 2
Nigeria, Japan
13. Reliability on Space Program : 8
Canada, India, USA (4), Japan (2)
- (14) Poster Session I. : 19
China (6), USA, France, Japan (11)
- (15) Poster Session II. : 21
USA, China, Israel, Japan (18)

steps 4 and 5 of "Ego/Self demand" and "demand for self realization". One of the representative activities of this is the QC circle activity, as you may already be aware of.

When we think of this, it may not be overstating to say that the development of TQC is indeed the improvement of "the quality of life". At least it is doubtless that TQC in Japan has greatly contributed to this "quality of life" with its basic concept of 'respecting humanity'. ★

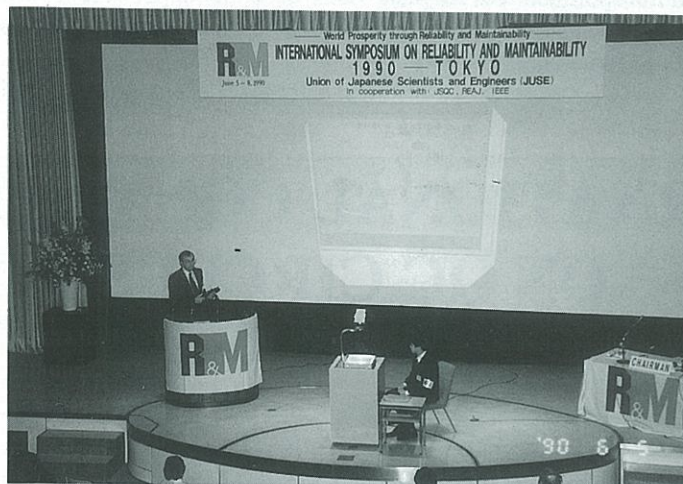
INTERNATIONAL SYMPOSIUM ON RELIABILITY AND MAINTAINABILITY 1990 TOKYO

This year marks the twentieth anniversary of our domestic Annual Symposium on Reliability, and to commemorate it an International Symposium on Reliability and Maintainability, which called for worldwide participation, was held June 5th through 8th at Keidanren Hall, Ohtemachi, Tokyo organized by the Union of Japanese Scientists and Engineers (JUSE). Altogether 622 persons from fourteen nations took part, and 111 technical papers (among them 40 papers from countries abroad) were presented.



(Above)
Dr. L. Ball and Mrs. Ball
(USA), special guests of the Symposium. Dr. Takagi (left) and Mr. Suzue
(right), both one co-chairman of the
Organizing Committee.

(Right)
Dr. G. A. Rodney,
Associate Administrator of
Safety, Reliability and Quality
Assurance, NASA (USA), gave
a special lecture at the Opening
Session.



(Left)
Successful Poster Session

JUSE INTERNATIONAL SEMINAR ON TQC FOR SENIOR MANAGEMANT

Specially for TQC Promoters, 1990
inviting Dr.J.M. Juran as a Guest Lecturer

October. 16 to 22 except 21
at Hotel Century Hyatt Tokyo

The most recommendable participant of this Seminar 1990 will be persons who in charge of the promotion for Total Qaulity Control or Total Quality Management of thier 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 432,000/person (Twin room)
B Yen 493,000/person (Single room)

Above fees includes the following:

Lecture note and transportaion fees for plant visits, accommodation fees for eight nights from 15th Monday to 22nd Monday, lunch & refreshments for six seminar days except 21st Sunday. These fees do not include dinner for each day.

* More detailed information is available at JUSE.

INTERNATIONAL CONVENTION ON QC CIRCLES 1990 TOKYO

October. 24 to 26
at Hotel Century Hyatt Tokyo

Oct.23 Tue.	Pre-Conventin Seminar on QC Circles (Option, Yen 30,000)
24 Wed.	Opening Plenary Session
	Technical Parallel Session (3 streams)
25 Thu.	Technical Parallel Session (4 streams)
	Closing Plenary Session
	Farewell Dinner (Yen 10,000)
26 Fri.	Industrial Visits in Tokyo Area (Yen 8,000)
27 Sat. to Nov. 2 Fri.	Post-Convention Industrial Tour (Option, Yen 230,000)

Papers will be Presented	Outside of JAPAN	JAPAN
Case Reports of Problem Solving	20	7
Reports of QC Circle Promotion	37	8

FEE for Technical Session

Yen 40,000/person (including Proceedings)
Yen 18,000/person for Speaker (including Proceedings)

* More detailed information is available at JUSE.