JUSE

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"Japan's Reliability with the Development of Electronics Industry"

Outline of Keynote Speech at 18th Symposium on Reliability and Maintainability

by Prof. Noboru TAKAGI, Chairman, Organizing Committee

This year marks the thirtieth anniversary of Japan Electronic Industry Development Association founded in 1958. In the same year JUSE established a Reliability Committee. In other words, the history of Japan's reliability coincides with the development of Japan's electronics industry.

In reviewing the development of the last thirty years, the period may be divided into three stages:

The first period (1958 to 1967) marked the time when Japan avidly absorbed everything from overseas, particularly from the U.S. The Japanese directed their efforts towards assimilating information and broadly applying them. In other words, this was a period of "Take and Take."

In the second period (1968 to 1977) the Japanese learned to produce components, satisfying MIL standards, for consumer electronics. Japan's reliability is unique in that it promoted reliability for consumer electronics components. From about the middle of this period, Japan reached the level, where she would "Give and Take."

The third period (1978 to today), saw the emergence of industries which overtook the U.S. Japan's production technology and ICs have achieved the standard where Japan can "Give and Give."

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After thirty years, Japan is at a turning point. At the beginning of 1975, the Ministry of International Trade and Industry (MITI) initiated research on a "large-scaled project" in order to develop, in collaboration with the private sector, LSIs and eventually VLSIs.

As a result, Japan is now capable of mass producing 1 megabit DRAM and also producing 4 megabits. What is more, NTT (Nippon Telephone and Telegraph) has successfully developed 16 megabits as well. The future target will be the AI (artificial intelligence). MITI is taking the initiative in developing the fifth generation computer. This will enable the application to expert system, natural language processing, voice recognition among others. Furthermore, a number of different fields, such as the electronics and computer industry will combine to play a major role in such future developments as the sixth generation computer (nervous system computer) and high temperature superconducting material, etc.

The reliability engineers must keep pace with these developments for the success of advanced technical developments.

RE Management Course (4 days)	RE Lecture on Probability Paper (2 days)
RE Basic Course (15 days)	RE Lecture on Failure Analysis (3 days)
RE introductory Course (4 days)	RE Lecture on Reliability Test (3 days)
RE Lecture on FMEA-FTA (2 days)	RE in Practice Course (6 days)
RE Lecture on Design Review (3 days)	(RE: Reliability)

On the other hand, the number of participants for education and training courses for engineers are increasing each year. As of June 1988, JUSE offers nine such courses which are held regularly. It is indeed a welcoming fact that the total number of participants to these nine courses for the year 1987 were 4,219, and carries great hopes for the future.

"Human Reliability"

From Special Lecture at 18th Symposium on R & M

by Prof. Isao KURODA, Faculty of Human Science, Waseda University

Recently, we are witnesing a number of accidents and hazards at mammoth technology systems. The analysis reveal the 70% of such accidents are caused by human factors (HF).

The rapid speed of technological development has resulted in a so-called technical hierarchy within a company; i.e. executive who is only familiar with the vacuum tube technology, transistor general manager, IC manager, LSI chief clerk and software clerk.

While the technology system are becoming larger and more complex, the human thinking or his ability to control such systems have not caught up with this advance.

In 1975, Prof. Norman Rasmussen made a projecting of probable incidence of system accidents in his report entitled "WASH1400." According to his projections, the possibility of an accident such as the 1986 JAL Flight 123 air crash is only once in 1,000 years, and an accident such as that of the Chernobyl nuclear power station would occur once in every 10,000 years. In spite of the statistically low rate of incidents likely to occur they take place due to the HF. It is rare for an accident to be caused by a single factor. In most cases it is a "chain of factors" that lead to an accident. This is the problem of design, which gives rise to the problem of HF.

HF is defined as follows: "Any deviation or defect within a given sophisticated system, caused by interaction between man and the system. All such factors that exist wherever man exists, i.e. planning, design, operation, maintenance, control, management, administration, etc. are called human factor."

It may be said that the underlying factor causing recent accidents in large systems is a "chain of such factors." The causes of human error may be categorized into the following six types:

(1)Error due to assiduity (ex. the Chernobyl accident)
(2)Error due to belief (ex. the Korean Airline accident)
(3)Error due to impatience
(4)Error due to adsentmindedness
(5)Error due to pressure of work (ex. the Three Mile Island accident)
(6)Error due to ignorance

The relation between man and other factors may be expressed as four Ms or five Ms. If the Mission (M) is too ambitious, man is likely to concentrate his attention only on one point and lose perspective.

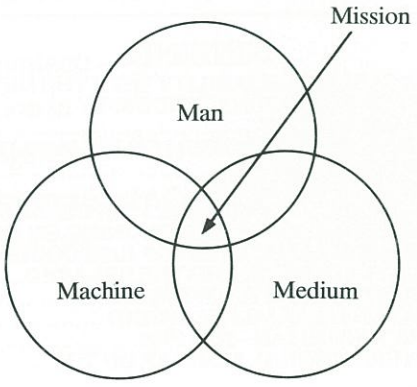
In analyzing human characteristics, one is apt to think in terms only of information processing or computer models. It is important, however, to consider his emotional models and not only the physical/chemical parameters. The questions of who should be responsible for this emotional education or where it should be provided will be the key to human reliability. The subject must be taken up in the future.

The future task will be to research "human reliability" through the use of such methods as the THERP method (Technique for Human Error Rate Prediction), currently widely used mainly in the U.S.

The Eighteenth Reliability and Maintenance Symposium sponsored by JUSE, supported by the Reliability Engineers Association of Japan, and assisted by 10 academic institutions including the Institute of Electronics, Information and Communication Engineers, was held for three days from May 31st at Nikkei Hall and Nokyo Building in Otemachi, Tokyo to discuss the theme of "Man and Reliability."

The symposium was held in the same manner as the previous time, i.e. held with fifty-three general reports and two tutorial reports, three poster sessions, three panel discussions, and question and answer periods, in three sub-groups. This year for the first time an exhibition of machines was also held.

Figure: Relation between 5 Ms and HF



INTERNATIONAL SYMPOSIUM
ON
RELIABILITY AND MAINTAINABILITY
JUNE 5—8, 1990 TOKYO

"WORLD PROSPERITY THROUGH R & M"

CALL FOR PAPERS

Outline of the Program:
Technical session which consists of paper presentation, keynote lecture by prominent expert, technical visits to plant or research facilities and other social programs.

Languages:
The simultaneous translation between Japanese and English will be provided at the paper presentations and at the lectures. All papers will be printed in English in the proceedings.

Application for papers:
About 1,000 words paper abstract in English attached with short biography and portrait photo should be submitted to the Conference Secretariat no later than September 1, 1989. All the authors will be advised by November 1, 1989 if their papers have been accepted or not. The final papers, written in English in the typing format paper provided by the Secretariat, should be submitted by March 1, 1990.

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29th QUALITY MONTH (November) 1988

"Quality First—Amicable Society to Live In"

CONFERENCES in Tokyo

8:	All Japan QC Circle Convention, Hibiya Public Hall
9 to 11:	27th QC Conference for Foreman, Hibiya Public Hall
14:	26th QC Conference for Top Management, Keidanren Kaikan
14:	1988 Deming Prize Awarding Ceremony, Keidanren Kaikan
15 to 18:	38th QC Conference for Manager & Staff, Hibiya Public Hall
24, 25:	4th QC Conference for Service Industry, Nikkei Hall
12:	19th QC Conference for Consumer, JUSE Hall

LECTURE MEETING in Local Cities

Matsue C.—2nd, Naha C.—2nd, Sapporo C.—10th, Hiroshima C.—11th, Nagoya C.—14th, Toyama C.—14th, Akita C.—16th, Kobe C.—17th, Niigata C.—18th, Maebashi C.—21st, Kohchi—22nd, Osaka C.—24th, Hamamatsu C. & Fukuoka C. are not fixed.

JUSE 46th Quality Control Symposium Discusses Education and Training on QC

The 46th Quality Control Symposium, held each spring and autumn biannually in Hakone (the nearest spa resort from Tokyo) since 1960, was held from June 2 to 4 and was participated by 130 persons.

The composition of the participants were as follows:

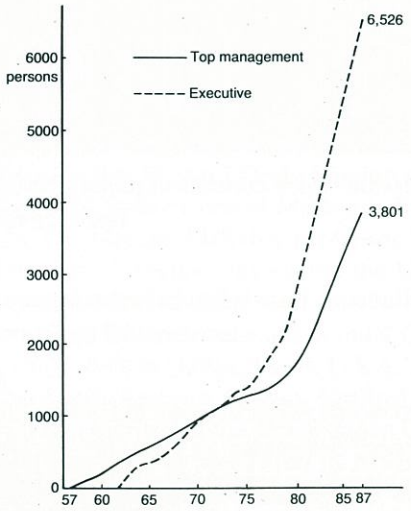
- Organizing committee members 3
- Advisors (former organizing committee members) 5
- Corporations making presentations 5
- Guest discussants (including 27 academic people) 58
- Supporting member companies 54
- Secretaries 5

Five presentations were made under the theme "Quality Control Education — Present and Future."

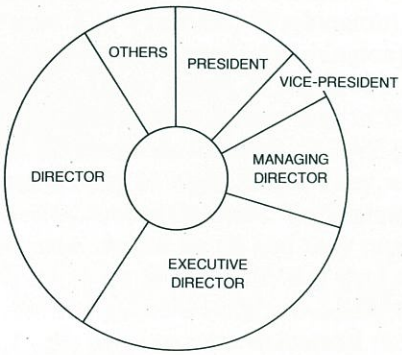
1 Quality Control Education in Engineering
   Corporate reporter: NEC IC Microcomputer Systems
2 Quality Control Education in Marketing
   Corporate reporter: Fuji Xerox
3 Quality Control Education in Trans-border Corporations
   Corporate reporter: Matsushita Electric Industries
4 Quality Control Education for Part-time Workers
   Corporate reporter: Kobayashi Kose
5 Quality Control Education for All Levels of Organization
   Corporate reporter: Toyota Motor Co. Ltd.

In Japan's quality control world there is a saying that "Quality control begins with education and ends with education." There is renewed recognition today of the role education has played as the primary source of the development of Japan's quality control. Much discussion, therefore, centered on the need for establishing a system of education which is geared to the needs of all people in business corporations and on the need for re-education after the lapse of a certain period of time. The need to reassess and re-design the contents and curriculum of education to meet the innovations in technology and changes in environment was also reconfirmed. Discussants expected the universities to play an active role as educators and leaders in this regard and agreed that much must be done in the future to improve the university education to meet these needs and to train educators and researchers.

Cumulative numbers of top management and executive participants



Job classification of participants of Top Mgt. Course (n=3801)



Comparison of the top five types of job of participants of Top Mgt. Course (every 5 years)

	1960	1965	1970	1975	1980	1985	(1987)
1	Chem	Trans	Trans	Trans	Constr	Elect	Chem
2	Steel	Rubber	Machin	Miscel	Trans	Trans	Trans
3	Trans	Chem	Rubber	Machin	Chem	Constr	Constr
4	Machin	Steel	Ceram	Chem	Elect	Machin	Elect
5	Elect	Elect	Elect	Steel	Miscel	Service	Trade

Chem: Chemical Industry, Trans: Transportation Equipment, Ceram: Ceramic Industry, Machin: Machinery, Elect: Electric & Electronic, Constr: Construction, Miscel: Miscellaneous

Total number of participants of Top Mgt. Course by job types (top 10 of '57—'87)

1. Transportation
2. Chemical
3. Electric
4. Construction
5. Machinery
6. Miscellaneous
7. Trade
8. Food
9. Rubber
10. Non-Ferros

PARTICIPANTS ALLOCATION OF JUSE COURSES ON QUALITY CONTROL AND THE RELATED

—from JUSE Statistics of Participants

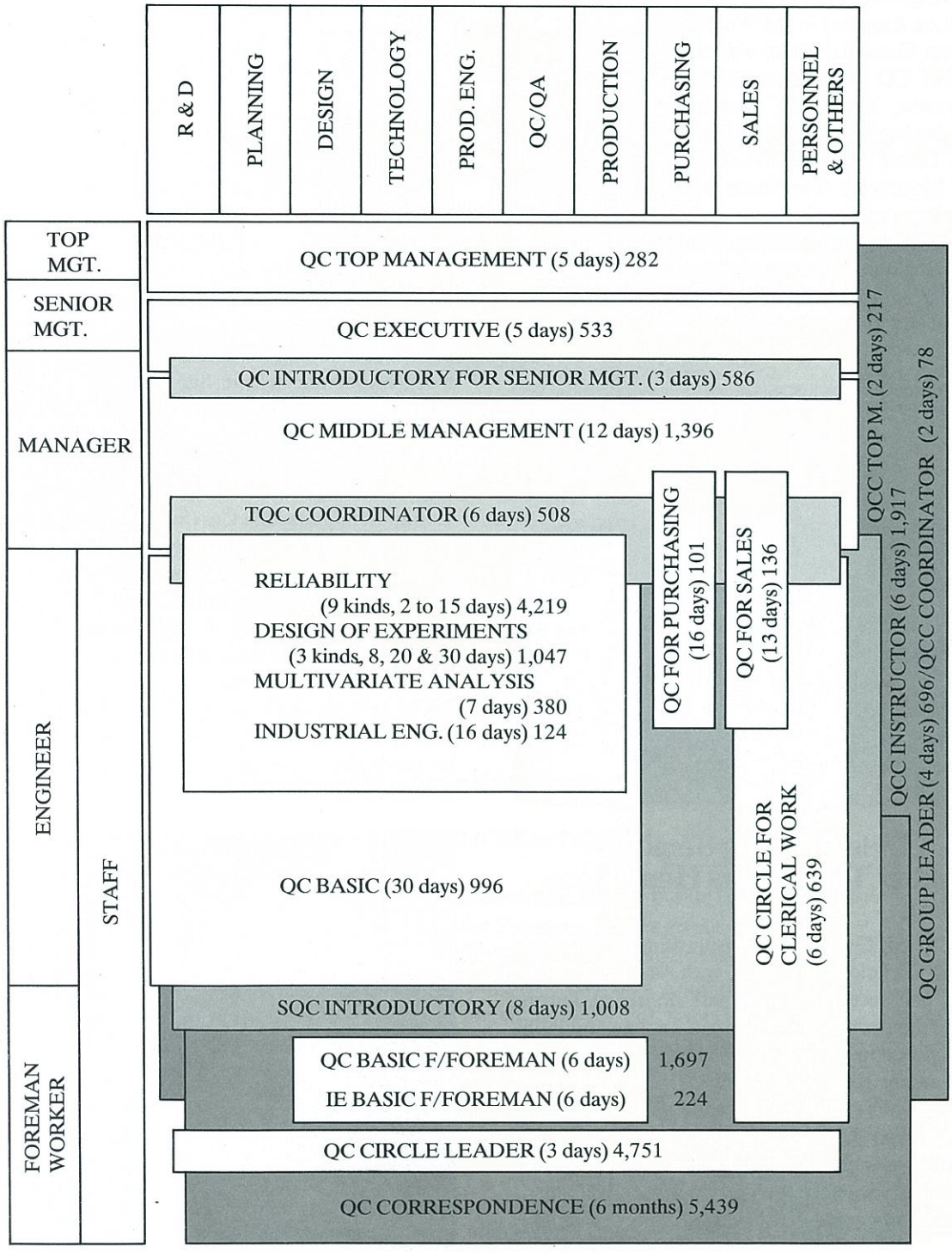
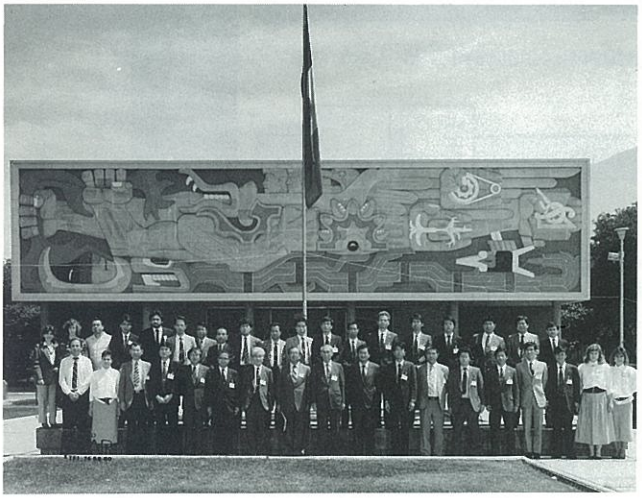


Figure at the end of each course shows total number of participants in 1987 fiscal year respectively.

20th QC Circle Study Team Visits U.S.A. and Mexico

JUSE sponsored 22 member (Leader: Mr. H. Tsutsumi, Advisor, Aisin Takaoka Ltd.; Coordinator: Dr. I. Kusaba, Professor, Musashi Institute of Technology) 20th QC Circle Study Team left on March 21 for a two week visit to U.S.A. and Mexico. The Study Team visited HEWLETT-PACKARD CO. (San Francisco), NEC AMERICA, INC., Oregon Plant, HUGES AIRCRAFT CO. (Los Angeles), TOYOTA AUTO BODY CALIFORNIA (Los Angeles) in the West Coast.

In the East Coast the Team visited FLORIDA POWER & LIGHT CO. (Miami) and in the Midwest, ROLM CORP. (Austin, Texas). In Mexco the Team visited MYLSA (Monterrey). The Study Team also participated in the "QC Circle Conference" which has been held in Miami and Monterrey. The Team reported that the visit to various places and exchange with the "Quality Circle" members of the host corporations were indeed very stimulating. The unexpected and welcome experience was the "home stay" program arranged by Florida Power & Light Co. of Miami which contributed much to the understanding of America.



23rd QC Circle Cruising Seminar 469 Member Team Visits Hong Kong and Taiwan

The 23rd JUSE QC Circle Cruising Seminar departed from the Port of Tokyo on July 9, with 449 trainees and 20 lecturers and secretariat members on board. During the course of the journey, it stopped in Taiwan and Hong Kong, and upon completing the scheduled training program, the Seminar returned on July 22. The vessel used for the Seminar was "Shin-Sakuramaru" (14,500 tons) of Mitsui O.S.K. Lines, Ltd.

In Taiwan, participants were divided into ten groups and visited factories where each group respectively made presentations and exchanged experiences on QC Circle activities.

The 24th QC Circle Cruising Seminar will be conducted from October 5 to 18 touring the same route.

18th Quality Control Study Mission Visits U.S.A. and Brazil

The 18th Quality Control Study Mission composed of 15 members of Quality Control Managers from 12 firms headed by Dr. Hajime Makabe, Professor Emeritus of Tokyo Institute of Technology visited the United States and Brazil from May 5 to 22.

The Mission attended the 42nd Annual Quality Congress of ASQC held in Dallas, Texas, U.S.A. They also attended the Latin America Quality Control Conference held in Rio de Janeiro and the Brazil-Japan Quality Control Symposium held in São Paulo in Brazil. They presented technical papers in each of the meetings and shared their experiences and exchanged ideas.

The firms they visited in the United States were Weyerhaeuser Paper Co. (Tacoma, Washington), Boeing Commercial Airplane Co. (Seattle, Washington), Florida Power & Light Co. (Juno Beach, Florida), AT & T Bell Laboratories (Holmdet, New Jersey) and in Brazil INMETRO (San Bernardo do Campo), FICAP (San Bernardo) making a total of eight firms. They were very warmly received by each of the firms. "Seeing is believing" was the impression shared by all and they reconfirmed the importance of actually visiting, seeing and discussing face to face. As the organizer, JUSE would like to extend its gratitude to the persons who welcomed the Quality Control Study Mission.

National Quality Award (U.S.A.) Japanese firms show strong interests

Three guest lecturers were invited from the United States to address a special lecture jointly hosted by JUSE, JSQC and ASQC Japan Section on June 23 at JUSE. The theme for the occasion was "Establishment of the National Quality Award in the United States and the trend of quality control activities in U.S. industries." The three lecturers were Dr. C. W. Reiman, Associate Director for Quality Programs, National Bureau of Standards, Mr. J. D. Ekings, President of the American Society for Quality Control and Mr. W. K. Sterett Director, Quality Improvement Department.

They were accompanying Florida Power & Light Co. Mission to Japan. The lecture was attended by 140 participants. During the question and answer session following the lecture, Japanese corporations showed keen interests in the trend in the U.S. leaving strong impressions on both the U.S. and Japanese participants.

Visitors to JUSE Jan—Jun, 1988

In the first six months of 1988 from January to June, JUSE had 511 visitors from 89 groups from 35 countries/areas. The top six of the total number of visitors by nations in the past ten years (1987—1988) remained the same. There has been a change, however, in the order of the third and the fourth from France to China, and the fifth and the sixth from Sweden to Brazil. The top ten nations are as follows:

1. Korea (148)
2. U.S.A. (62)
3. China (52)
4. France (44)
5. Brazil (32)
6. Sweden (27)
7. Poland (25)
8. U.K. (24)
9. Thailand (22)
10. Argentina (21)

Photograph: Argentine group of AOTS Trainees on Quality Management visiting JUSE on April 15.

JUSE INTERNATIONAL SEMINAR ON TQC

(Company-wide Quality Control)

from October 17 **to** 26, 1988 (8 days except weekend)
at Tsuda Hall, Sendagaya, Tokyo, JAPAN

★

for Directors, Senior Managers & Managers of corporations
by prominent, experienced leaders of TQC, including Prof. K. ISHIKAWA
Based on the successful experiences accumulated
for many years in the Japanese industries,
explanation and guidance will be given on their
concept, techniques, and **management**
together with **case studies** at Deming Prize winner companies.
and Dr. W. E. Deming will give a special lecture as the guest speaker.
JUSE's reputed educational programs, such as group discussions, etc.
with simultaneous interpretation between Japanese and English
in all lectures and textbook in English
therefore, participants are limited to 48 persons who have a good command of English for discussion.

★

FEE: ¥260,000 per person, including expenses of the textbook,
eight lunches, and transportation for case studies
(Accommodations are to be arranged and paid for by participants.)
If desired, JUSE can make reservations for them.

For detailed information please contact:

International TQC Seminar Section in
Union of Japanese Scientists & Engineers
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