Title: Shaping the Future-Search of Superior Performance Through ISO 9000

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Abstract: A strong system of quality management, combined with the support from all functions in the manufacturing organization will lead to improved manufacturing performance. After an introduction to quality performance and its relationship to ISO 9000 and optimized production technology (OPT), this paper proposes a framework to define the motivational functions of this solid quality management system.

Shaping the Future: Search of Superior Performance Through ISO 9000

EMP-P9313

Kai Shing Cheung

ABSTRACT

A strong system of quality management, combined with the support from all functions in the manufacturing organization, will lead to improved manufacturing performance.

After a brief introduction of quality performance and its relationship between ISO 9000 and optimized production technology (OPT), this paper proposes a framework to define the gearing motivative functions of this solid quality management system.

The interpretations, here, are mostly synthesized from graphic forms or shapes to facilitate planning and implementation. The "steering gear" action not only enhances the manufacturer's control of its quality, but also achieves cost saving, on-schedule delivery, optimization of production process and boosting productivity--all these activities shaping the future superior performance.

INTRODUCTION

"Quality" is everywhere. All materials that can be seen or felt possess their physical "quality" characteristics.

Quality has been receiving a large amount of attention in recent years. There are so many valuable concepts, principles and conducts from articles, books, periodicals and magazines written on the subject. During the new era of advanced scientific technology, the concept to predict "quality" has been upgraded.

In the industrial manufacturing business , present and past success are merely foundations on which to build future growth. Under this industrial environment, they have to continuously build on their present position through quality awareness and customer orientation.

To achieve optimization, rationalization, research and development of new products and processes, the maufacturers should have the skilled expert capability of developing superior quality products and processes.

Nowadays, most of the manufacturers are in favor of some of the "Best Practices" that lead to future superior performance, such as

World class manufacturing operation
Benchmarking
The factory of the future
Beyond quality
and many others

All these subjects are favorable,impressive and splendid. However,this paper absorbs the valuable impressions from most of these immages. The object is just to bring the quality management systems into a focus, and to frame out the structure of implementation functions into a favorable shape through ISO 9000.

Reference
"Beyond Quality, Jerry Bowles & Joshua Hammond,
Berkley Business 1992

EVALUATION OF QUALITY

Quality is the conformance to customer requirements. The elements of quality are defined as the following by David Gavin in his book Manging Quality: The Strategic and Competitive Edge usining a car as example.

- -Performance
- -Features
- -Reliability
- -Durability
- -Serviceability
- -Aesthetics
- -Perceived quality

Quality control is the design of the product and process so that the conformance of the product to customer requirement is achieved.

Quality assurance is the ongoing activity that ensures products will conform to customers' requirements.

In the year prior to 1979, "Quality" was rapidly emerging as a new emphases in commerce and industry. The Technical Committee ISO was formed. "Quality" continues to grow in importance as a factor in market place success. Quality assurance continues to be a competive weapon.

ISO 9000 International Standards
In the year 1987, the Technical Board of ISO published the first five standards. These new standards were described as the refinements of all the most practical and general applicable principles of quality systems.

Reference

-Winning Manufacturing, James A Tompkins PhD, Tompkins Associates Inc. 1989 P.112

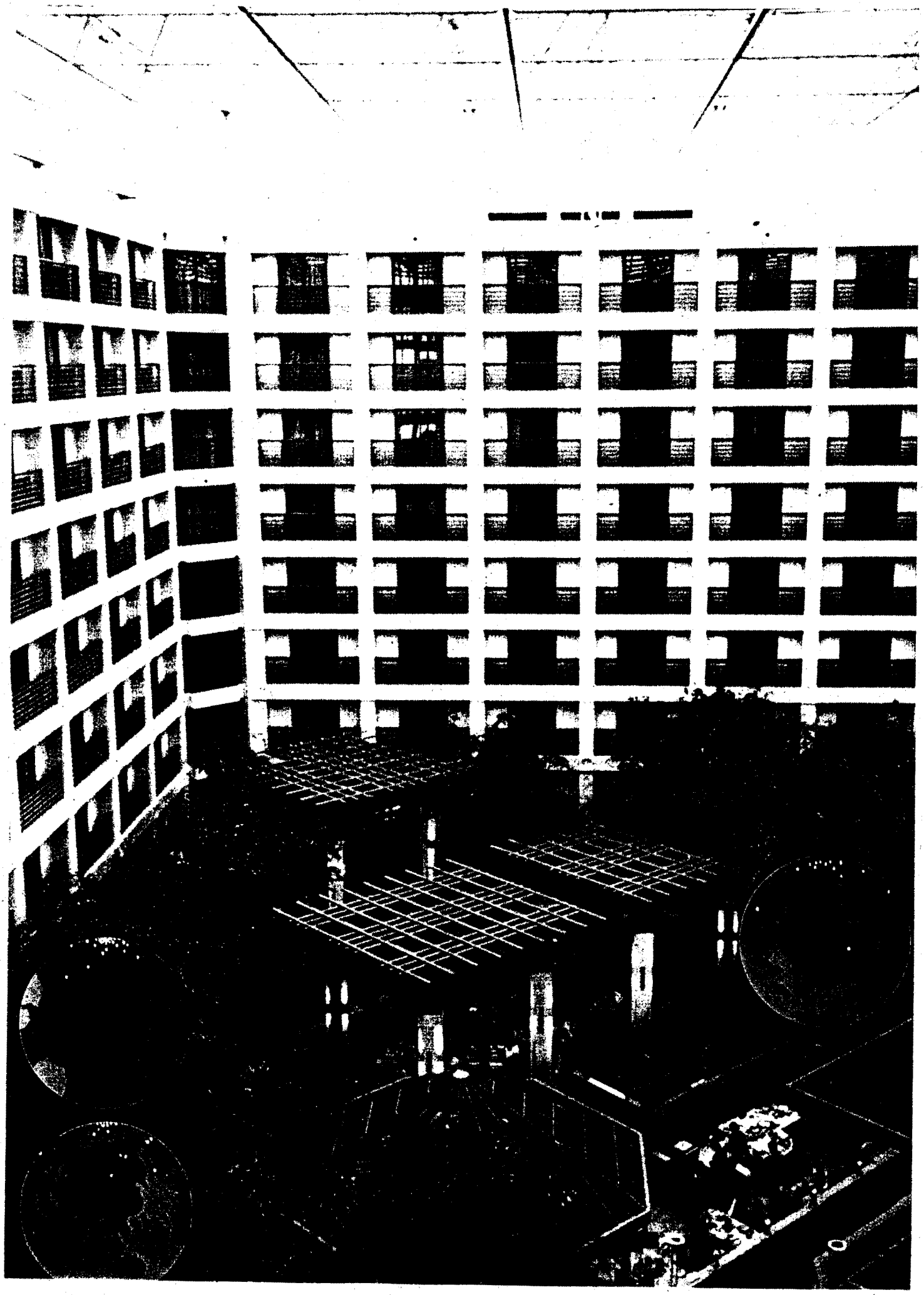
The new standards were known as ISO 9000 standard series. They were successfully created and promoted by ISO (the International Organization for Standardization). It is a world federation of national standard bodies located in Switzerland. It represents the standard bodies of over 90 countries.

The merits of the ISI 9000 over other national and multi-national standards are sufficient consistency for world-spread use in international trade, the accompanying terminology standard (ISO 8402), and the harmonization on an international scales. These factors support the growing impact of quality in international trade.

There are powerful forces combined to push ISO 9000 series standards into the spotlight worldwide, such as customer pressure, markt pressure (the requirement by the European Community--EC), and, in some cases, the legal pressure.

The American Society for Quality Control (ASQC) says that while campanies will not be required by law to use these standards in international business, compliance is likely to be commercially driven. The powerful market force has driven companies to achieve the goal of obtaining registration of ISO 9000 standard. At the recent meeting of the American Textile Machinery Association (ATMA) in Ft. Myers, Fla., adherence to the ISO 9000 series of quality standards was highlighted as one way to obtain a total quality manufacturing vision.

Reference
- ATMA Stresses ISO 9000 Series
Textile World May 1992 P.29



Photograph

This busy "Building Complex of Quality" reflects the customer-driven forces from the global marketplace------the customers from all over the world crowded together to search for "QUALITY".

CASE STUDY

DU PONT

Background:

The company had a foundation of quality to build, It also has a long standing commitment to quality improvement. Dozens of Du Pont busimess have received awards due to their superior quality and service. More 55 company businesses have obtained ISO 9000 quality assurance certification. An award from Goodyear has been granted to Du Pont Fibers.

Du Pont and its subsidaries span about 40 countries and 6 continents.

Global sales (1991)--$38.7 billion

EC Market--35%

Du Pont is becoming a market-focused, global enterprise while continuing to be a company driven by science and technology.

Key points:

Capturing the competitive advantages

1. People--outstanding employees
2. Meeting customer needs--high ethical standard
3. A global presence--a strong core business
4. World class manufactueing--worldwide reputation
5. Technology--superior quality
6. Environmental concern--commitment to increasing the awareness of and developing solutions to environmental issues

Performance:

In July 1992, 105 Du Pont plants or sites which had been ISO 9000 registered report substantial benefits, for examples--at one plant, on-time delivery rose from 70% to 90%

-at one site, cycle time went from 15 days to 1.5 days

-at one warehouse, error decreased by 95%

-at one site, the number of test procedures dropped from 3000 to 1000

Unique events:

Product improvement--

"Helping customers to be more successful, Du Pont become more successful too". (Du Pont Annual Report 1991)

ISO 9000 international standard implementation training program--

- To teaching people stimulation and active participation
- Training based on Du Pont experience on more than 80 (July 1992) of its own location's certification effort
- Technology center's training and consulting by Du Pont quality management

Reference

-Du Pont's Roadmap to ISO 9000 Registration, p123-p138

-Electronic, May 91, p44

- Du Pont de Nemours and Company, Annual Report 1991, 1007 Market Street, Wilmington, DE 19898

-ISO 9000, A Universal Standard of Quality, Donald W. Marquart, Management Review, Jan. 1992, p50-p52

-Training and Development, July 1992, p36-p39

MOTOROLA

Background:
The company--A winner of the first Malcolm Baldrige National Quality Award--in recognition of its superior companywide management of quality processes.

The Honor Roll:

SEMICONDUCTOR HONOR ROLL
Who makes grade in semiconductor service...

Large (over $500 million in sales)
Motorola
Texas
Intel
:
:
Mid size ($50M to $499M)
Analog Devices
Hewlett-Packward
:
:
Mich (under$50M)
Maxim integrated Products

---and customers' main concerns
Pricing
Availability
Cost control
Inventory control
Quality, reliability
On-time delivery

Source: Dataquest Inc. (From Electronics, May, 91 p.50)

The team culture:
- Embedied in total customer satisfaction.
- Basic believes in uncompromising integrity and respect for the individual.
- Focus on quality and customer service----nourishes and creative cooperated culture.
- The employees are empowered to:
  - solve problems
  - improve quality
  - reduce cycle time

Advance and thinking:
- The 6 segma crusade
- The reach of well-run enterprice--won the Baldrige and deserve to be able to move forward to secure registration of ISO 9000 in England for the mobile- phone plant. It took 14 months hard work to qualify ISO 9000 registation.
- Awards: There are more than 3000 teams from all over the worldwide companies.
  In Jan. 1991- Gold medals--8 teams
  Silver medals--14 teams
  1991 *Dan Noble Fellows--4 technologist, for outstanding technical creativity, innovative ability and productive achievements.

Key points:

- Motorola's long term efforts are directed at the following aspects:
  - Achieving the fundamental objective of total customer satisfaction.
  - Building the technological platforms to serve the new marketplace.
  - Activities include improving quality and reducing cycle times through empowered culture. -
  - Global business--In 1991, non-U.S. revenues as a percentage of the total reached 48% compared with 44% in 1990 on a international market basis. Sale exceed $2 Billion in Europe and approximately $1 Billion in Japan.
- To qualify for ISO 9000 registration:
  - Examination of the system--

    Customer order: demand in factory, WIP(work in progress)

    Ordering of materials: received, managed

    Process: cost of product, pay the vendor

    total management and documentation

    The ability of "the features" and characteristics of a product

    Service to satisfy stated or implied needs

    Improve relationship with suppliers

*It is mamed after Dan Noble, a visionary technological pioneer, former vice-chairman of Motorala and chairman of Science Advisory Board.

Performance:

Quality is the cornerstone of effective cost management. Motorola"s quality efforts have resulted in saving of $2.2 Billion over the last 5 years (before Dec. 1991), including more than $700 Million in 1991, from the whole group of companies due to:

- Reducing of defects in the manufacturing process.
- Continually upgrade skills and find new ways of doing thing.
- Invest $70 Million more in 1991 to provide at least one week training for every employee.

Unique events:

The team culture represents a powerful force that enables Motorala to compete with the finest companies in the world and succeed in a new market-driven world.

Quality initiatives of the whole setup:

1. "Six-sigma" quality--3.4 Defects per Million products, by 1992 converted the yield language to ppm.
2. Total cycle-time reduction--closely- related to six-sigma quality--total system time saving including design, manufacturing, marketing and administration.
3. Product and manufacturing leadership--product development and manufacturing disciplines, teamwork and simultaneous engineering.
4. Profit improvement--customer driven approach--long term.
   -to commit the resources
   -to give customers what they need
5. Participating management--teamwork approach to achieve greater efficiency and improved quality.

Reference

-Closing the Quality Gap, Alexanderhiam, 1992
Prentice Hall Professional Publishing, Engwood Cliffs
NJ07632 1922 PP.227, 239, P.259

-Electronic May 1991 P.43 P50

-Motorola Inc. Annual Report 1991

-Quality in America, How to improve a Competitive Quality Program V. Daniel Hunt, Business One Irwin,
Homewood Illinois 60430

Major Benefits of Being ISO 9000 Registered

1. The company benefits by a reduction of costly and time-consuming audits, and the number of incoming inspections by the customers.
2. The evidence of documented quality system and compliance with a non-biased criteria assured by an indepedent third party provide customers with adequate assurance that the company has an effective quality system in place.
3. The employees get better training and knowledge of jobs and quality systems. They will also adopt a "prevention" attitude which has been implemented throughout the organization.
4. There is a greater focus on the needs of customers which enables the company to compete in the world market.
5. Customers become more receptive to forming customer/supplier partnering relationships with the company.
6. Finally, the company gets enhanced marketability through use of a recognized logo(mark) and certificate number on letterheads sales specs. This has been a very successful marking,tool.

This is an abstract from "Ten Major Benefits of Being ISO 9000 Registered". Les Schnoll,ISO Program and Quality Auditing Manager of Dow Corning reports the benefits.

Inadequacies of existing ISO 9000 series standards

Certain major groups of users or potential users have identified a number of needs that are not easily met with the ISO 9000 series. Larger companies request to document a generic quality plan that can be adapted to the specific requirements of certain particular contracts. In the mean time, it is important to preserve the simplicity of ISO 9000 series application for smaller companies. The ISO Technical Committee (ISO/TC176) took actions at the meeting in Interlaken, Switzerland in October 1990 to reckon these critical issues in formulating future policy for international standards. More new vision are listed in the "Evolution" section of the paper. There are some other critics as follows:

Some critics of ISO 9000 based quality systems argue that such systems cannot ensure the quality of a production process, unless that specific process has been included in a quality evaluation. The focus of this issue is on those companies who produce products according to several different specifications, including specifications that were not part of the initial evaluations.

The ISO 9000 performance

Actually, the shift away of ISO 9000 based quality system from a purely technical viewpoint, so embedded in traditional quality control , is a major advantage. Quality systems' assessments reflect this point, and are highly concerned with management structures.

Unlike quality awards. the ISO 9000 registration means that the assessment of the company's quality system is periodically repeated. The continuous surveillance by such registrar accreditation boards provides confidence that the performance of the registrar itself does not drop below a level of minimum acceptability. This proves the company's capability of superior performance to serve the customers round the clock and through out the years.

Reference

-ISO 9000 Internation Standards for Quality Management 2nd Edition, Internation Organization for Standazation, Case Postate 56, CH 1211, Genive 20 Swizerland ISBN 92-67-10172-2, 1992

EVOLUTION

The ISO 9000 standard series on quality assurance-- issued in 1987-- is to be reviewed approximately every 5 years.
First scheduled revision in 1992
More extensive revision planned in 1997

Existing standards:
9000 Quality Management and Quality Assurance Standards
9001 Model for Quality Assurance--Design, proddction, installation and servicing.
9002 Model for Quality Assurance--Production and installation.
9003 Modil for Quality Assurance--Final inspection and test.
9004 Quality Management and Quality System Elements--Guidelines.

New standards:

9000-3 Guidelines for the application of ISO 9001 to the development, supply and maintenance of software,
9004-2 Quality management and quality system elements, part 2--Guidelines for services.

Additional documents under consideration:

Guidelines for--Quality improvement (to be 9004-4)
Quality plans (to be 9004-5)
Configuration management (to be 9004-6)

Strategic plan for revision:

For international standard implementation in the Quality Avena during 1990's--Vision 2000 will be the basis in anticipating some critical features of standards by the year 2000.

Reference
"Obtaining EC Product Approvals After 1992: What American Manufacturers Need to Know, Sara E.Hagigh,Business America February 24,1992
Additional
Reference for the front Page
_Facts and Fiction of ISO 9000 Registration,Harr C.W.Gundlach and Willem F. Deken,Dutch Council for certification 011-31-Compliance Engineering P28 3438-12604

IMPLEMENTATION OF QUALITY SYSTEM

Four-phase process (based on Du Pont's experience)

Phase 1. Gain the management commitment needed for ensuring necessary leadership and support, and develop a strategic plan to implement and guide the registration effort.

Phase 2. Develop an organization to implement ISO 9000 and train employees who will be involved in the implementation effort.

Phase 3. Identify and develop procedures, policies, and practices to meet ISO 9000 requirements. Also, prepare a quality manual and document the system. Many companies use the following four tiers:

- -A quality manual which outlines policies and objectives that relate to specific aspects of the system.
- -Procedures that provide process descriptions and flow-charts of activities, telling what, who, where, and why an activity is carried out.
- -Work instructions must be revised and integrated into the overall documentation system.
- -Forms are used to collect information, and records are kept to provide evidence that quality activities are being carried out.

Phase 4. This final phase involves working with a registrar to to achieve quality system registration. The registrar's initial visit and a pre-assessment allow for midcourse corrections and help determine the company's readiness for the final audit.

IMPLEMENTATION

of

The Quality Management System

based on

THE ISO9000 QUALITY REQUIREMENT SYSTEMS

Manufacturing Elements Involved
(Proposed Framework)

In the manufacturing organization , all the elements involved play an important part in the activities. Backing up by ISO 9000 philosophy, the system structure can be firm and sound. However, in daily practice, all the departments may have to face many problems, even though most of them are well experienced in their fields. We can imagine, the unforeseen enviroment and the market situation changes all the time. The customers are influenced by the market pressure to put pressure onto the manufacturer. They might request for quick delivery(rush purchasing during the tie schedule season)new model small batch lot order, with a stringent specifications(sometimes are over requested)and in very low price, and probably many others.

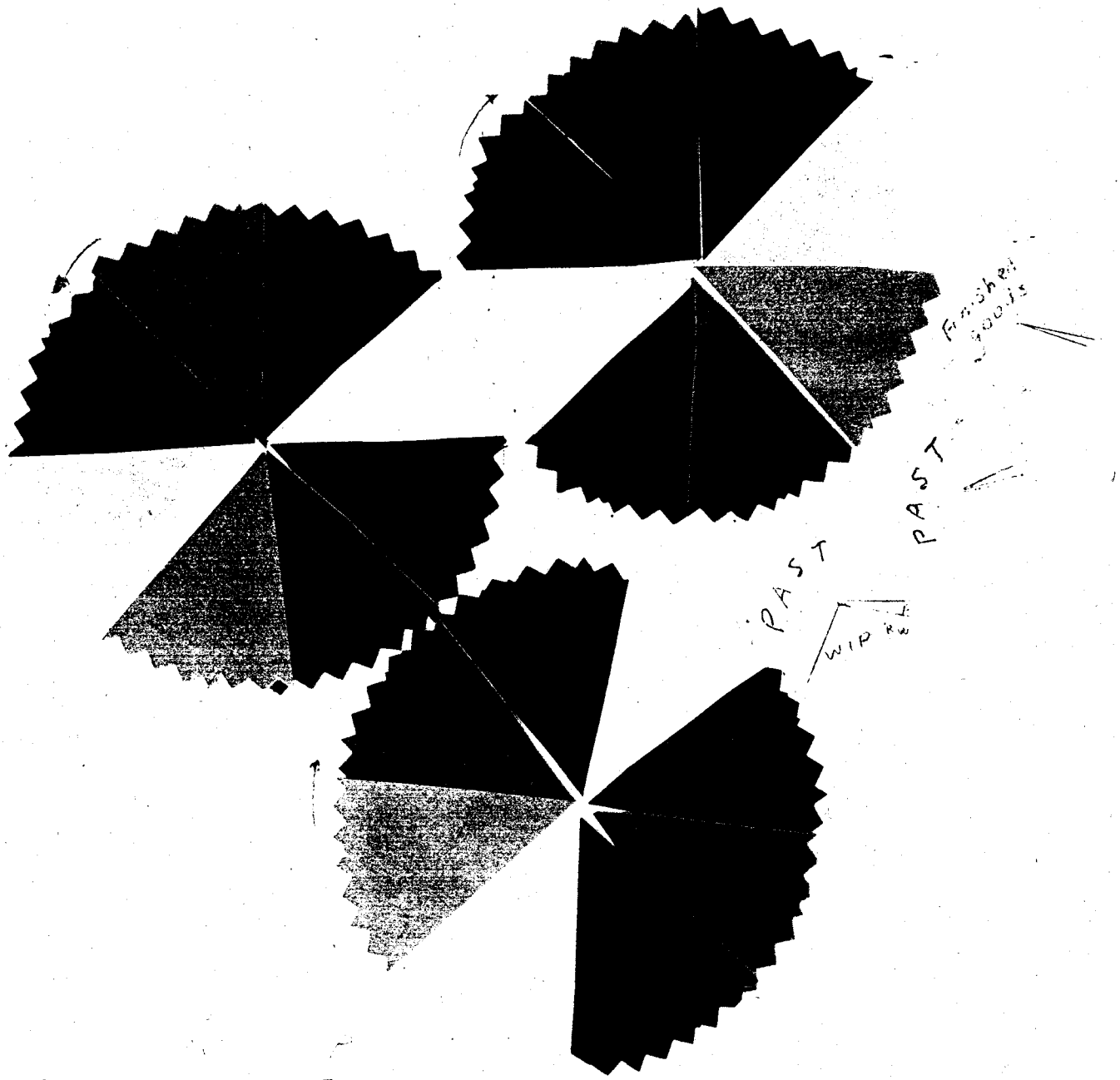
Gearing up

In order to put all these irregulatity factors into good order, we have to set out the plan by gearing up all departments involved. To stregthen the force by motivating the gearing function through the medium of ISO 9000 guidelines. Quick response and take immediate action to link with steeling committe to solve promplems.

Employ optimized production technology (OPT) alongside with many other quality management systems to smooth the gaps and bottle-necks. .Rationalized measures for the optimized production procedues will be finally achived through the close linkage of ISO 9000 relation. It gears up the Management Section on one hand and links with the Production Section on the other hand. The close relationship between Section and Section, Department and Department are indicated in similar colors where they are playing similar functions in the operation activities.

The proposed framework is defined as " Gear Motivation Diagram", the element involvement of different functions are self-explanatory, through their'coloring group' as indicated on next page.

Gear Motivation Diagram



Red
Yellow
Rose
Green
Orange
Mint
Pink
Blue

The quality system requirement are grouped into two sections according to ther functional characteristics.

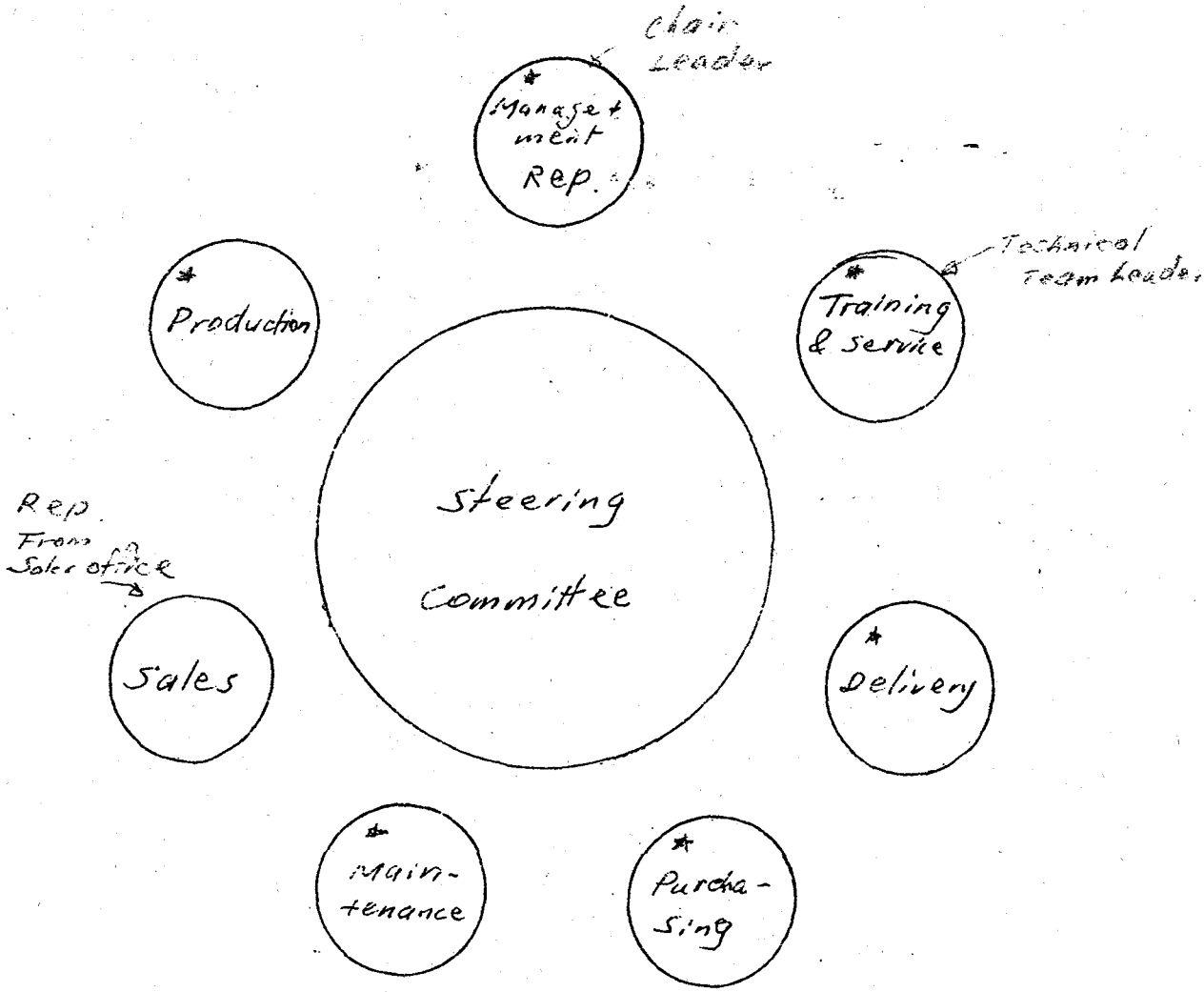
Manufactureing Management (administration)

Management responsibility	MR
Document control	DC
Contract review	CR
Purchasing and supply	PS
Handling	H
Storage	Sto
Packing	Pac
Delivery	Del

Production

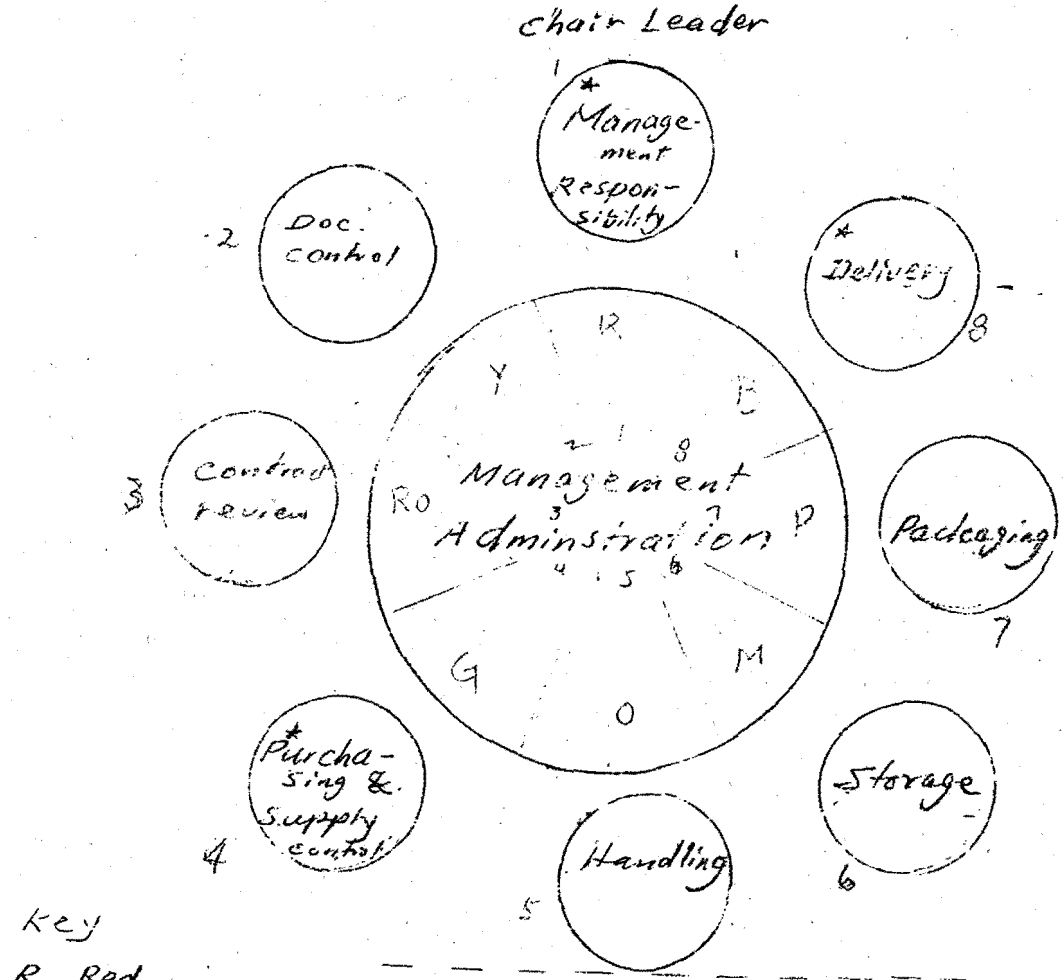
Training and service	TS
Quality system and quality records	QS, QR
Design control and change control	DC & CC
Process control	PC
Engineering maintenance system	EMS
Control of nonconforming product and corrective action	CN & CA
Calibration	Cal
Inspection, testing and sevicing	IT & S

Quality Management organization



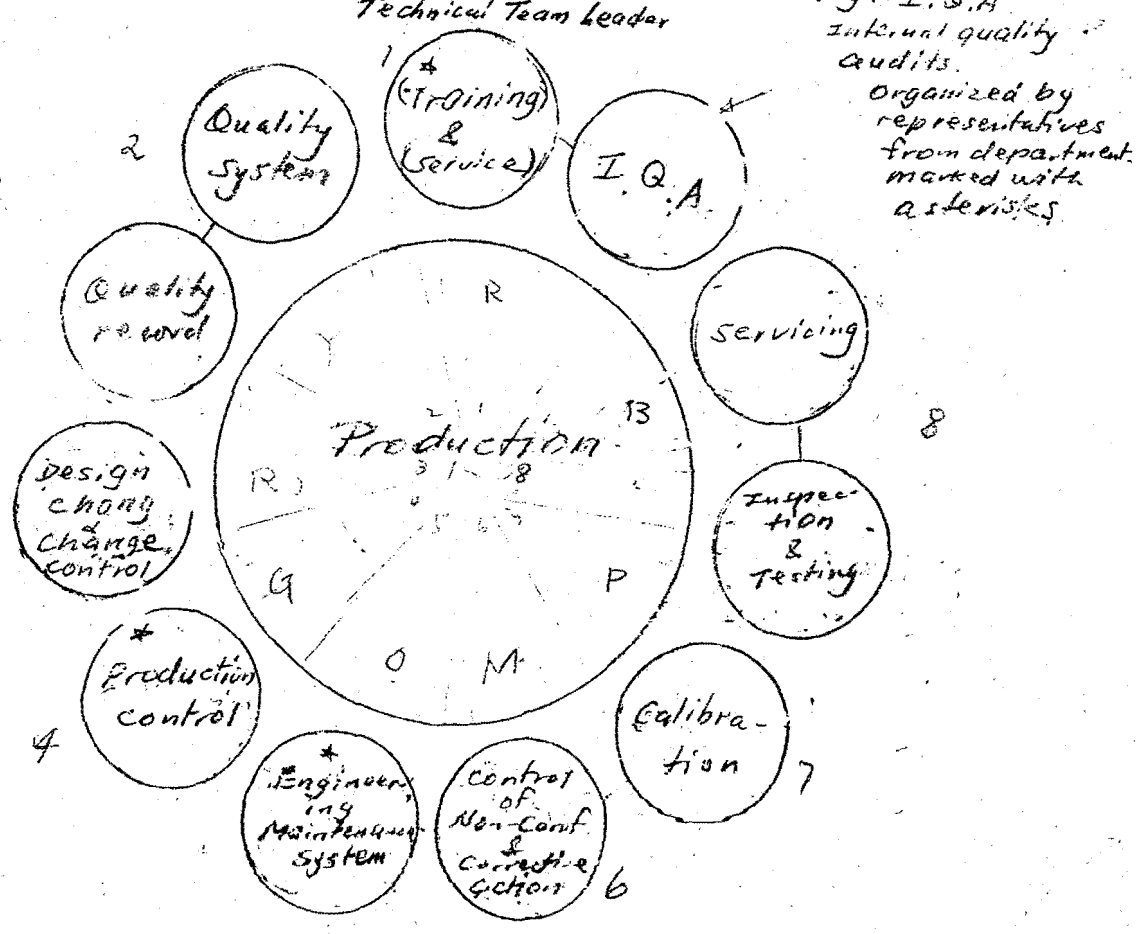
Representatives from 6 different depts shown on next page

Manufacturing Elements (Structure)

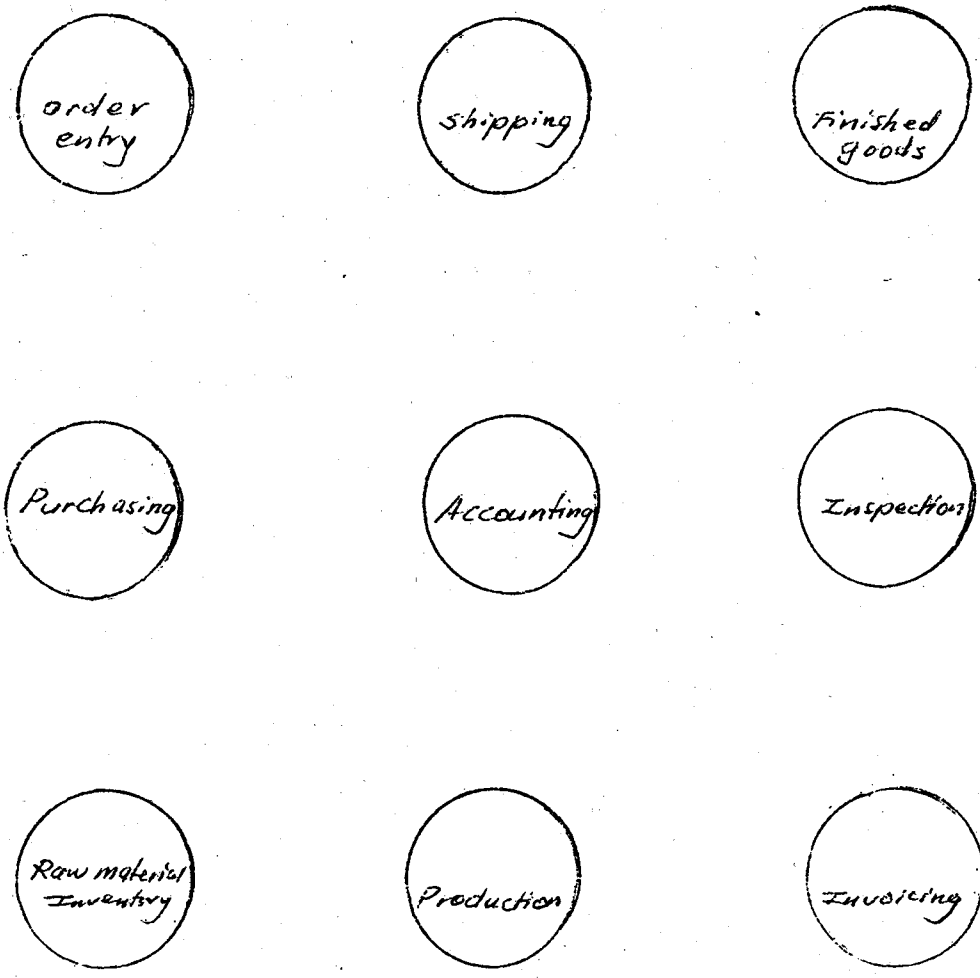


Key

R Red
Y Yellow
RO Rose
G Green
O Orange
M Mint
P Pink
B Blue



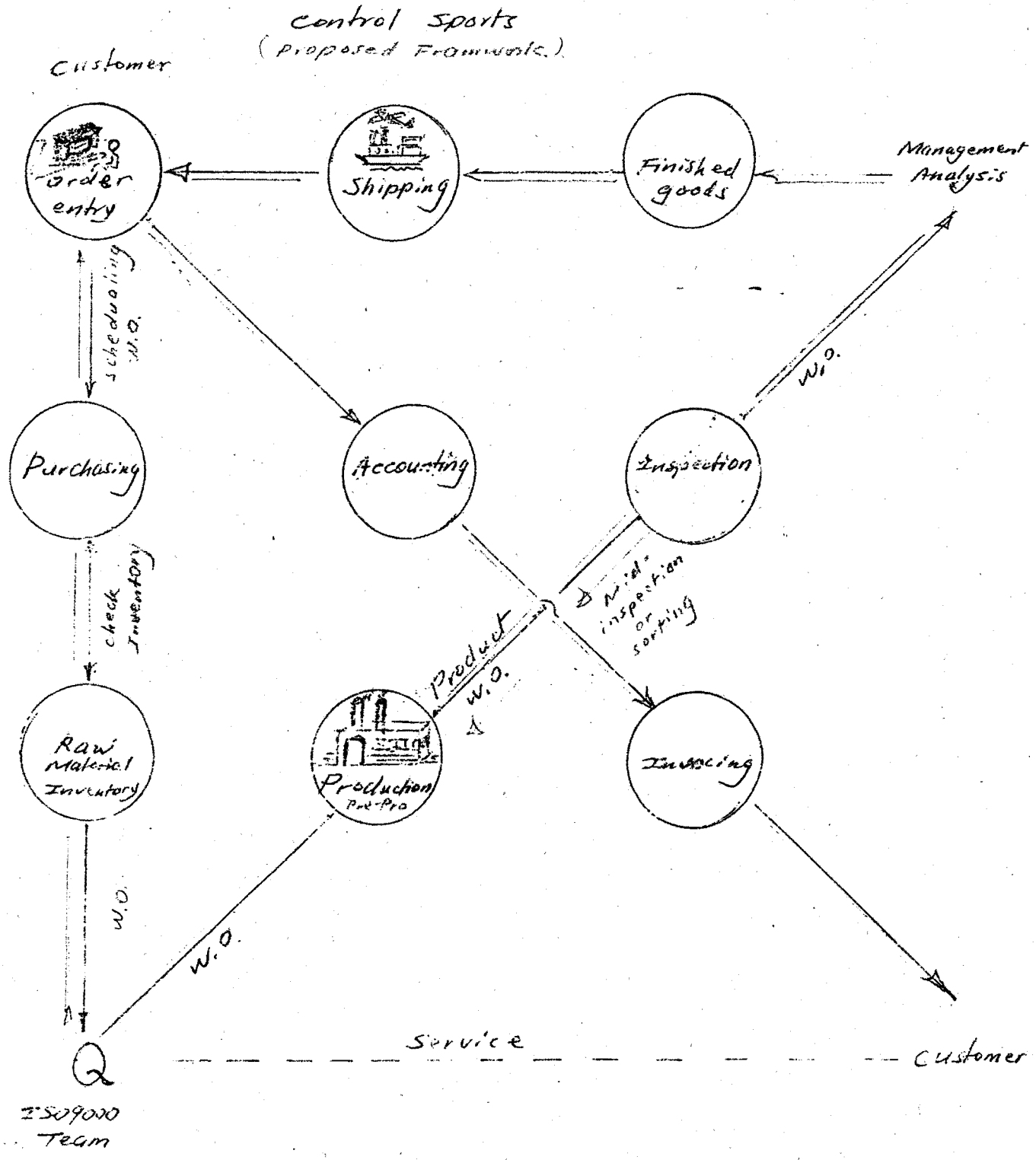
Quality control spots



Proposal

Draw 4 lines without lift pencil at one time. One stroke go through 9 spots

—"Idea from a simple Intelligent quiz"—



W.O. Work order
(Suggest to use
bar code system)

REPRESENTATIVES

Representatives of the Steering Committee:

The representatives are selected from six different departments, marked with asterisks.

An additional representative is selected from the sales department, the functional group is as follows:

Management Responsibility

Production

Sales

Maintenance

Purchashing

Delivery

Training and service

DISCUSSION

Superior quality management is a broad fancy topic. There has been a substantial amount of studies and research concerning the valuable concepts and conducts which stronly supports the success of most of the systems and programs.

As a matter of fact, there will be more confidence for the manufacturers to attain the high level of reputation back up by ISO 9000 registration, so as to expand their global market.

However, in the real production field world, there will be much complexities for the production schedule arrangement on the small batch lot orders. The marketing and sales managements are happy to receive a lot of smaller batches customized orders, because usually they can obtain better premium revenue from the high quality products, as long as the production plant has the capability to manufacture products which meet the customers' requirements and compliance on the ISO 9000 standard. The EC market customers are not patient enough to follow the regular production schedule as they have to grab the precious moment of fashion or market trend during the blooming market atmosphere. The company want to keep the potential customers and put heavy pressure on the manufacturing plant. This is a problem of quality/profit connection.

Special arrangement has to made to fulfil the quality management systems or programs as will as to meet the ISO 9000 standards. There is much difference in handling these cases compared with the way of producing regular mass production lots with the well established model of routine flow, using the existing blue print.

Focusing on the promise to carry on the optimized production technology (OPT), there are barriers in actual practice. According to common understanding, appropriate measures should be taken into consideration on the following obstacles:

BARRIERS FOR APPLICATION OF OPT

1. Insufficient machine spare parts inventory for urgent needs resulting in interruption of scheduled production delivery.

2. Lack of potential high capability administrators to handle comples documents and tough cases resulting in errors, delays or losses.

3. Insufficient budget to support a fair, safe and healthy environment for working. As a result , there will be labor shortage and the overall efficiency of the company lowered.

4. Lack of training to do quality jobs at the lowest costs without wasting time and making errors.

5. Inadequate negotiation and insufficient information from customer about their "over-requested requirements". Extra process and materials needed will cause "bottle neck" and loss.

6. Improper stringent "allowance setting" for material-saving program resulting in errors and defects, thus interrupting the shipping sxhedule.

7. Lack of highly qualified personnel with enough knowledge to solve tough problems during night duty shift in production operation.

8. Shortage of supplies of materials due to insufficient inventory for back up purposes. Suppliers of materials cannot meet urgent requests without prior booking arrangement.

9. Too much pressure to production personnel for urgent scheduled production. Rush arrangement is more risky and can influence the qulity of products.

10. Neglecting "less important" customers' schedules. The indifferent attitude will result in loss by paying air-freight charges to fulfil prompt delivery schedules or loss due to cancellation of orders. These customers will probably be the potential customers of the future.

GEARING UP by ISO 9000

Quick Response--Immediate Action

1. Improved maintenance of machinery and equipment--preventive maintenance.

2. Improved office management and/or maintenance--propose to use new advanced technology for assistance, such as MIS, IT, CAD, EDI & MRPII etc.
   Quick response to approach customers' satisfaction.

3. Better safety program--a contiuous program for discussing all kinds of errors and how to prevent them. A safe and stable working environment in addition to a comfortable and healthy working atmosphere will enchance production efficiency and ensure punctual delivery.

4. Continuous education to all people concerned about error prevention program.

5. Continuous survey--investigate customers' opinions. Sometimes, it may be necessary to educate the customers in order to obtain their cooperation, mutual understanding and compromise.

6. Reduce error rates--rationalization of production procedure to compromise OPT program. Reduced wastage, cost saving and improved efficiency should be accomplished only at a reasonable scale.

7. Reduce wasted time--increase efficiency by employing more people of high capability. Corrective action team (CAT) should be available on night duty and 24 hours stand-by.

8. Reduce delays--keep back up inventory for urgent needs due to process errors or reworks. More new ISO 9000 registered suppliers who can promptly provide specific qualified raw materials which require no pre-production testing are preferable. Never without safe-guard in bulk production.

9. Improve quality behavior and attitudes of all personnel--education and training to aim at superior quality concept.
   The ISO 9000 principles inspire the morality of the work force. The well organized steps will gear up to accomplish JIT program to achieve on time delivery.
10. Immediate attention to the customer--- The customers' success is our own success,
   It is important to assist the customers to solve their problems with pleasant behavior and attitude.

Reference
-Du Pont de Nemours and Company, Annual Report 1991
1007 Market Street, Wilmington , DE 19898
- Deming's 14 Points Applied to Services, A.C.Rosander
Marcel Dekker, Inc. 1991 P.8-10, PP.27,137
-Just-in-time Manufacturing, Richard T. Lubben
Mc Graw-Hill Book Company 1988 P.91

CONCLUSION

The maufacturing business is a crowded, fast changing and haighly competitive marketplace. The buyers or customers are always shopping around all over the world, searching for superior quality, good-value and high premium products. The most important point is quick turn over investments with minimum inventory of stocks. The manufacturers rely fully on their effectiveness of quick response to offer superior quality and good service to meet their customers' satisfaction.

Holding ISO 9000 registration is a safe and sound guide of the quality management system implementation. On top of this foundation, continuous improvement of product and successful new innovations will harmoniously prove the enormous capability of the manufacturing operation.

During this new era of advanced technology, the application of MIS, IT, EDI, MRPII or other systems in assisting quality management will be very helpful to the optimization of production process.

The proposed framework is shaping the motivative mechanism of ISO 9000 which gears up processing speeds and maximizes quality. The shape of QUALITY is growing more solid, and becomes a strong foundation for the company's journey toward "Superior Quality Performance"---SHAPE THE FUTURE, THRIVE TO FLOURISH.

Key

CAD	Computer Aided Design
EDI	Electronic Data Exchange
IT	Information Technology
MRPII	Manufacturing Resource Planning
MIS	Manufacturing Information System