

Total Quality Management

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BUT
AFTER 73 SECONDS
IT BURST INTO A FIRE BALL

RESULTING

- KILLING 7 ASTRONAUTS WORTH MILLIONS
- LOST OPPORTUNITIES
- COST OF APPRAISAL & PREVENTION
2.4 BILLIONS
- COST OF ENQUIRY COMMISSION
- LOST IMAGE

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MAJOR CAUSE: FAULTY DESIGN

FAILURE OF A SIMPLE RUBBER 'O' RING IN THE JOINT BETWEEN TWO LOWER SEGMENTS OF THE RIGHT ROCKET MOTORS DURING THE BURN OF THE PROPELLENT

HOT GASES MELTED THE STRUTS THAT HELD THE BOOSTER ROCKET

WHY?

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- ➔ **DURING LAUNCH THE GAP EXPANDS IN A FRACTION OF A SECOND**

- ➔ **THE RUBBER'O' RING ALSO SHOULD EXPAND TO FILL THE GAP**

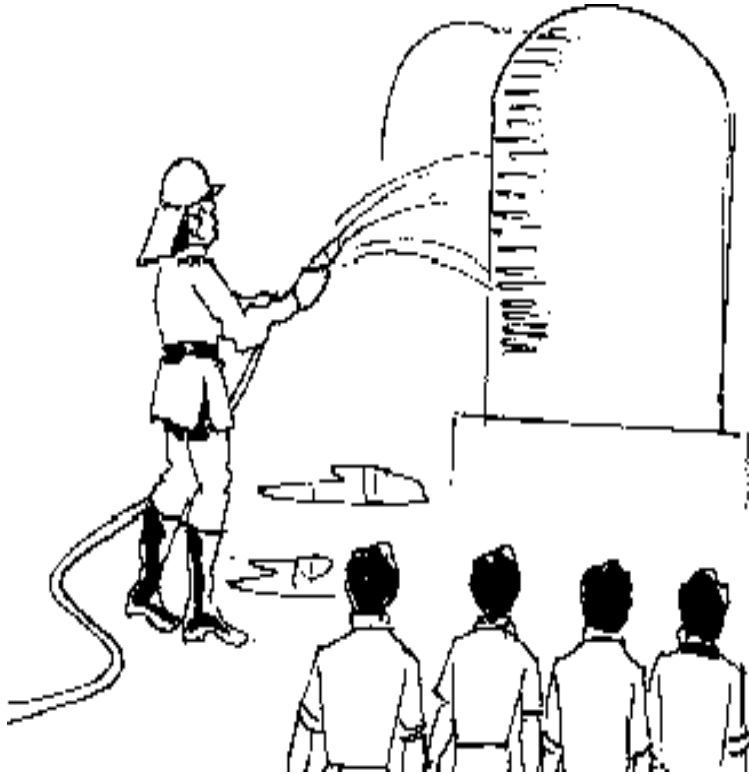
- ➔ **DUE TO ICY CONDITION ON THAT DAY RESILIENCE OF RUBBER IS AFFECTED**

- ➔ **MANAGEMENT CAUSE: AGAINST THE ADVISE OF NOT LAUNCHING AT TEMP <53°F, LAUNCHING SCHEDULED ON DAY OF TEMP 28-9° F**

3, DEC, 1984
**EARLY MORNING
DEADLY ISOCYANATE GAS LEAKED
FROM
BHOPAL PESTICIDE PLANT**

- ***3,400 PEOPLE DIED***
- ***2,00,000 PEOPLE HURT***
- ***15,000 –20,000 ARE SUFFERING FROM INJURIES***

>Rs.2000 MILLION COMPENSATION



CAUSE :

**AS IN BAYER (GERMANY) &
UNION CARBIDE(U.S)**

**IT DOES NOT HAVE
TOWERS THAT RAIN
DOWN FOAM TO
NUETRALISE ESCAPING
GASES.**

**WHAT MADE THE AMERICAN'S PINPOINT
BOMBING SO EFFECTIVE ?**

**IT WAS DUE TO A HIGH QUALITY SEMI
CONDUCTOR USED IN BRAIN PART OF
COMPUTERS THAT CONTROL MODERN WEAPON**

**THERE WERE 93 FOREIGN MADE SEMI
CONDUCTORS IN A WEAPON**

92 WERE MADE IN JAPAN

- ISHIKAWA IN THE BOOK

‘ THE JAPAN THAT CAN REALLY SAY NO’

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**AN IBM FIRM IN WINDSOR, ONTARIO
ORDERED FOR SHIPMENT OF COMPONENTS
FROM A JAPAN FIRM**

AQL: 3 FOR EVERY 10,000 COMPONENTS

**“ WE JAPANESE HAVE HARD TIME
UNDERSTANDING NORTH AMERICAN BUSINESS
PRACTICES.**

**IT WAS VERY DIFFICULT TO PRODUCE 3
DEFECTIVE PARTS**

**BUT 3 DEFECTIVE PARTS HAVE BEEN
INCLUDED AND ARE WRAPPED SEPERATELY.
HOPE THIS PLEASES”**

FROM COVERING LETTER
V.BA... M... Ph. (P... A...)
DCE

- **FORD AND MAZDA PRODUCES TRANSMISSION FOR AUTOMOBILES**
- **MORE REJECTS FORM FORD**
- **NO REJECTS FROM MAZDA**
- **DISMANTLING THE FORD TRANSMISSION REVEALED THAT THE COMPONENTS FOUND TO BE WITHIN THE LIMIT**
- **WHEREAS MAZDA COMP. WERE FOUND TO BE WITHOUT DEVIATION AT ALL.**

TAGUCHI DEFENITION OF QUALITY :-

QUALITY IS THE LOSS A PRODUCT CAUSES TO SOCIETY AFTER BEING SHIPPED, OTHER THAN LOSSES CAUSED BY INTRENSIC FUNCTIONS'

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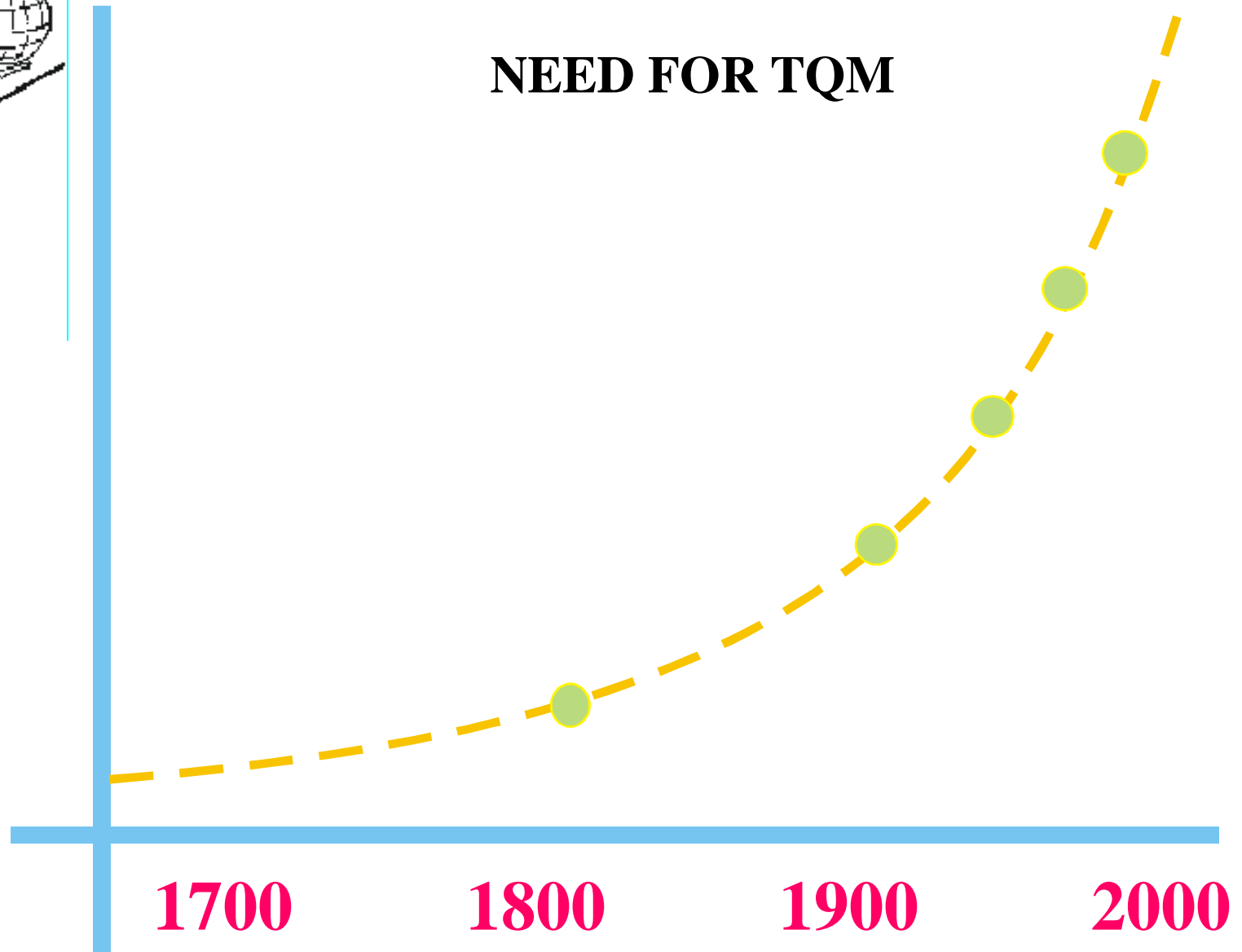
What is TQM



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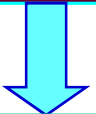


NEED FOR TQM



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TRADITIONAL MODEL



REDUCE INPUT COST



LOWER UNIT COST



INCREASE PROFIT



IMPROVE RETURN



STAY IN BUSINESS

DEMINGS QUALITY CENTERED MODEL



IMPROVE QUALITY



PRODUCTIVITY UP



COSTS DOWN



PRICES DOWN



MARKET INCREASED

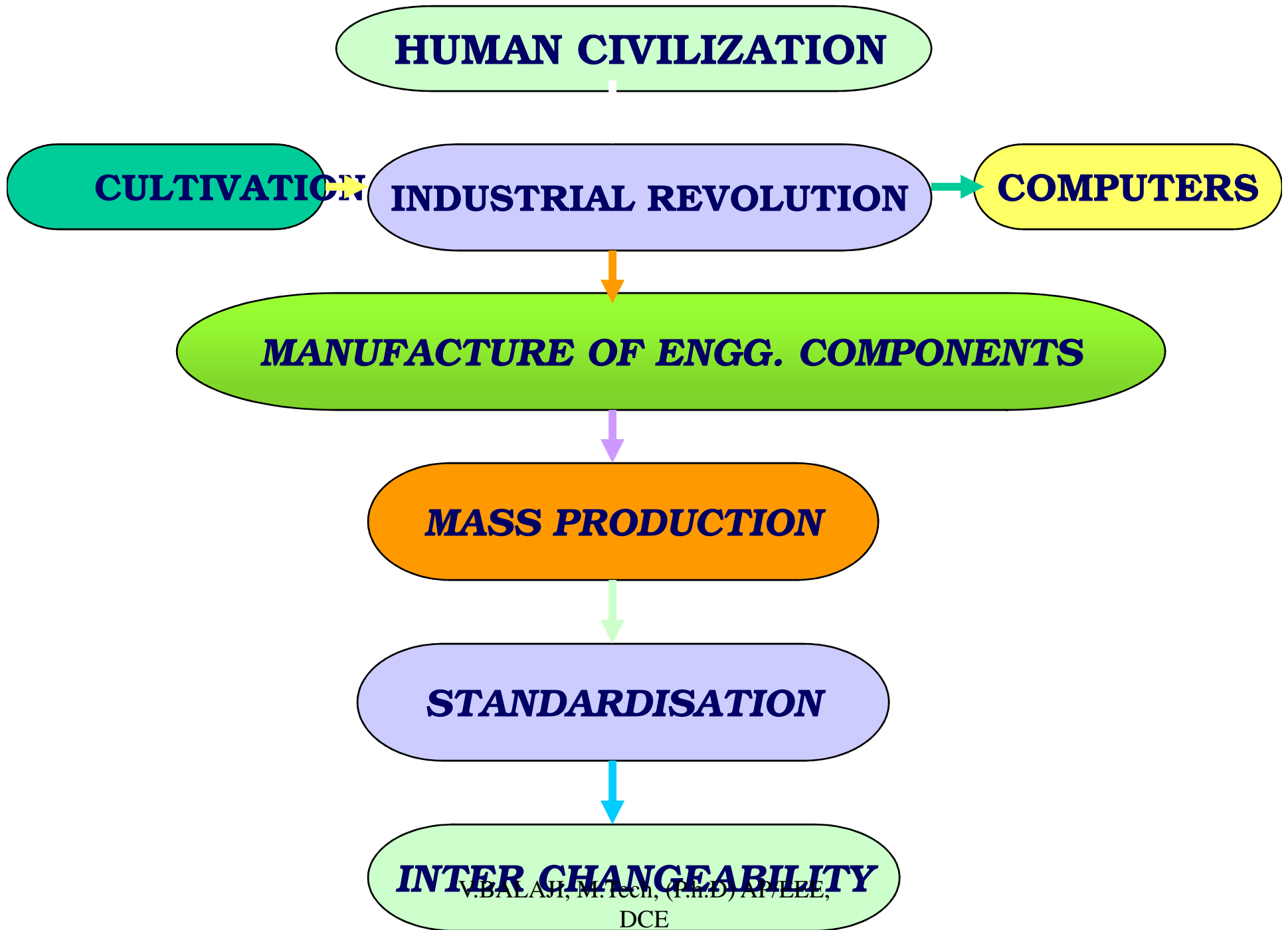


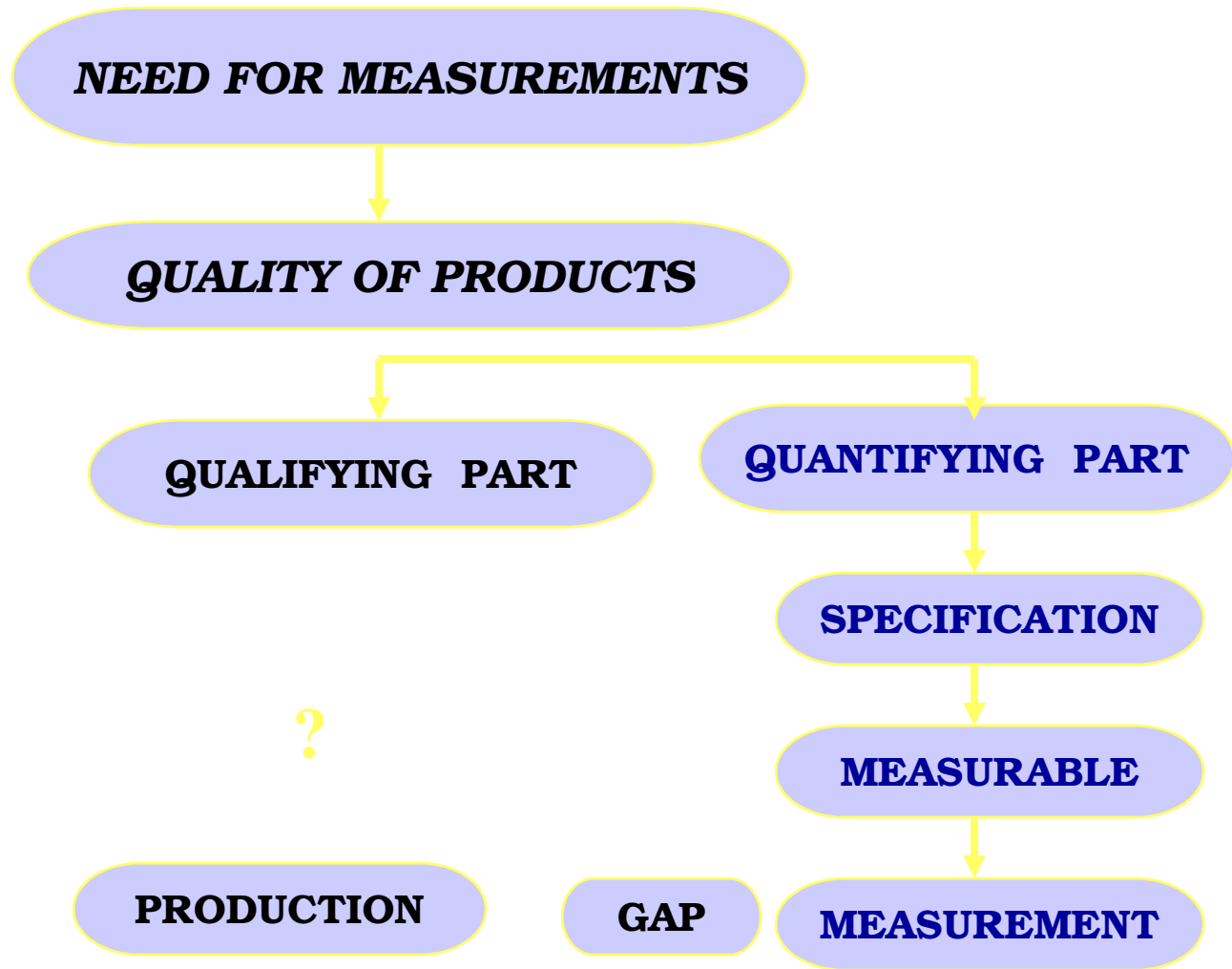
STAY IN BUSINESS



MORE JOBS AND BETTER RETURN ON INVESTMENT

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PROCESS INSPECTION

**1924 - DR W.A.SHEWARTS/BELL
TELEPHONE**

CONTROL CHARTS

1930 - INDUSTRIAL APPLICATIONS

1935 - QUALITY STANDARDS

1945 - WORLD WAR

1950s - QUALITY ASSURANCE

- TOTAL QUALITY MGMT

**1960s - COMPANY WIDE QUALITY
CONTROL**

WHAT IS QUALITY?

”Totality of features and characteristics of a product or service that bear on its ability to meet STATED OR IMPLIED NEEDS” –ISO

- **Fitness for use – JURAN**
- **Conformance to requirements- CROSSY**

DIMENSIONS OF QUALITY

- *1. PERFORMANCE / OPERATIONALITY/ FUNCTIONALITY**
- 2. FEATURES**
- 3. CONFORMANCE**
- *4. SERVICEABILITY**
- 5. RESPONSE**
- 6. AESTHETICS**
- 7. REPUTATION**
- *8. RELIABILITY**
- 9. DURABILITY**
- *10. MAINTAINABILITY**
- *11. MANUFACTURABILITY**
- 12. AVAILABILITY**
- 13. USABILITY**
- 14. REPUTATION**

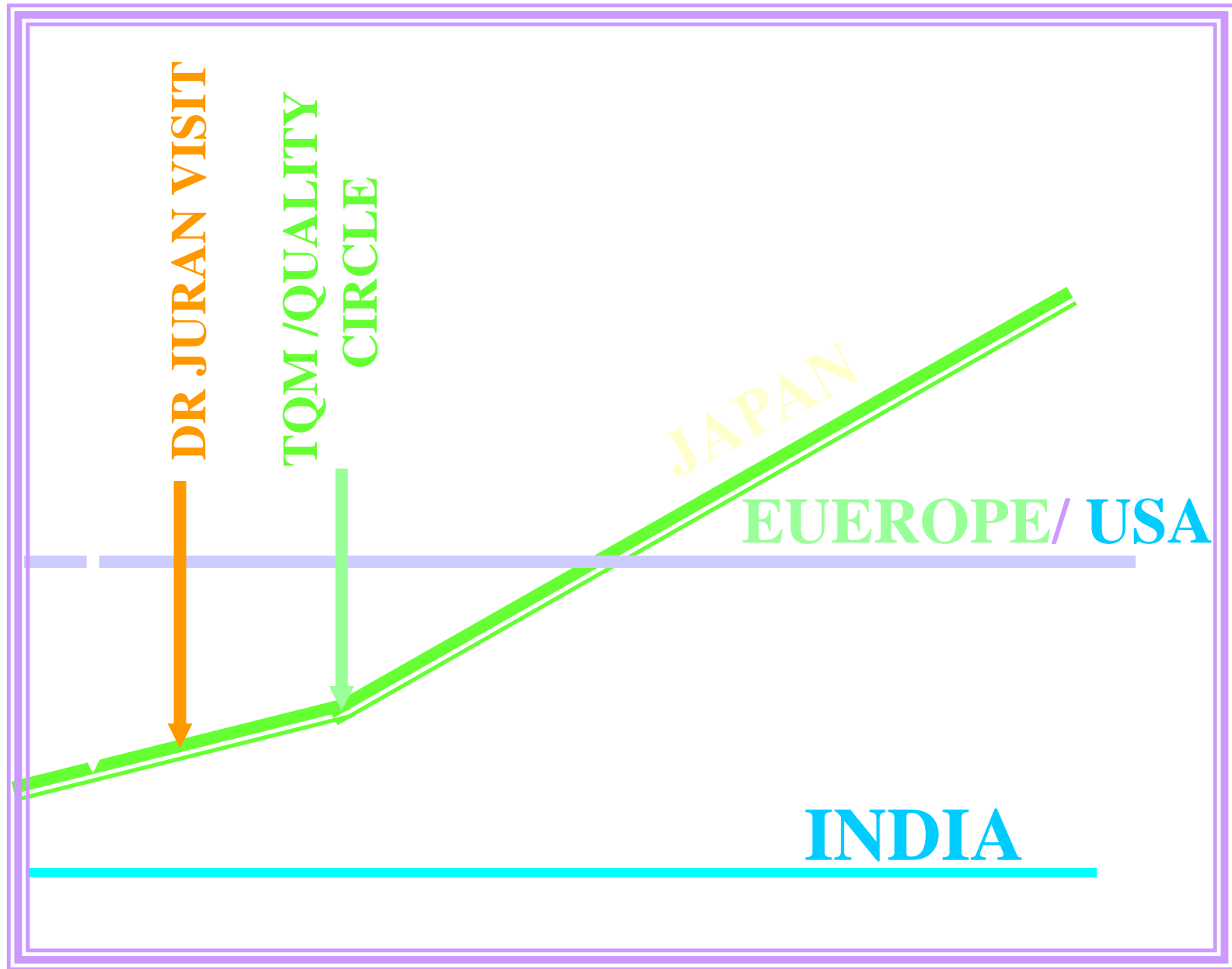
7 STAGES OF CWQC



US STYLE TQM 40%

JAPANESE STYLE CWQC 100%

↑
QUALITY



1950

1960

1970

1980

1990

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YEARS

$$CWQC = QM \times QA \times QT \times QC$$

Quality Assurance
to the customer

Quality Teams at
executive levels

Quality Circle

TQM CONCEPTS

CUSTOMER IS THE KING

RIGHT FIRST TIME

BENCH MARKING

SYNERGY IN TEAM WORK

INVOLVEMENT

VALUE ADDITION

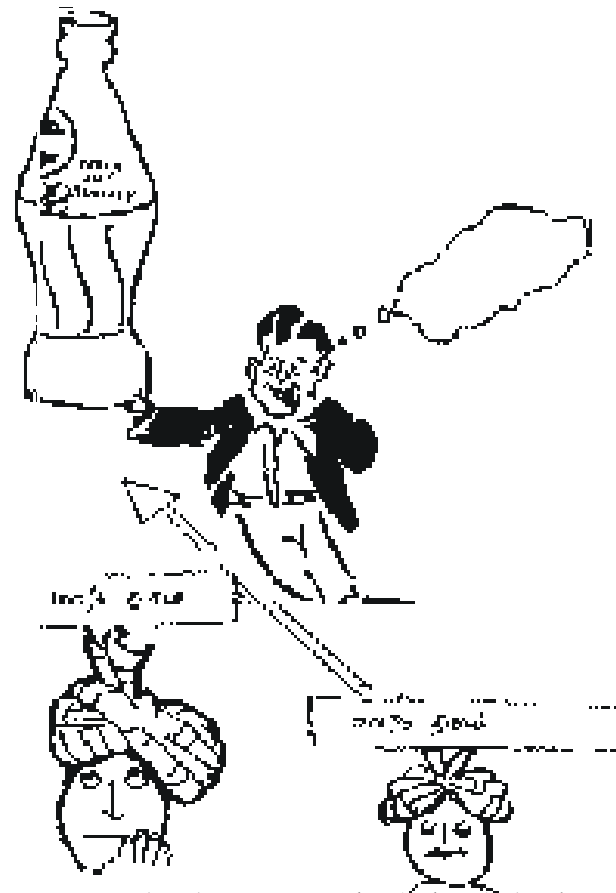
CONTINUOUS IMPROVEMENT

EDUCATION AND TRAINING

PREVENTION Vs DETECTION

MANAGEMENT COMMITMENT

CUSTOMER IS THE KING



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RIGHT FIRST TIME

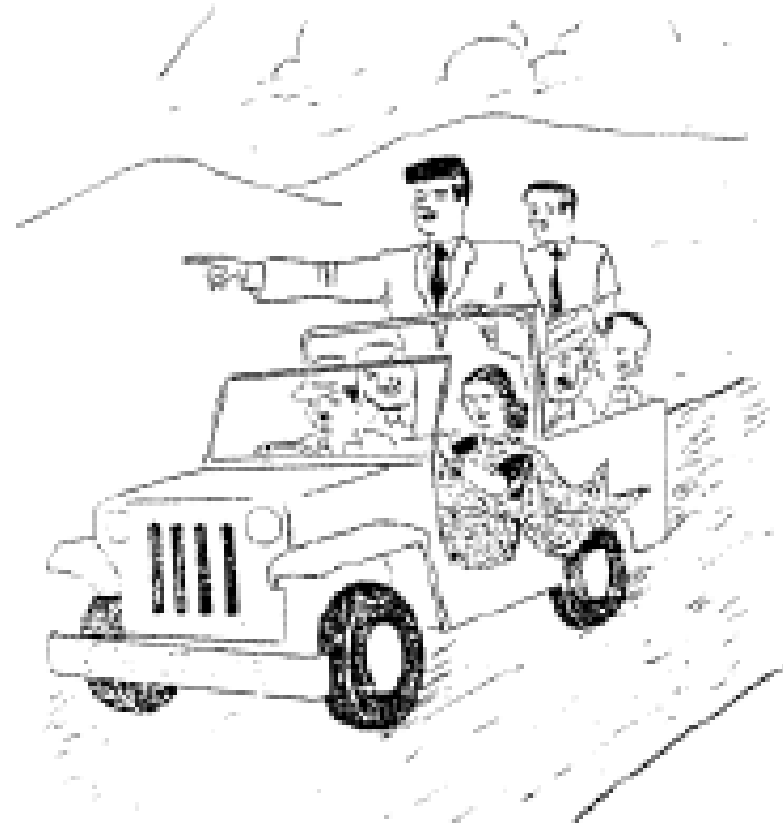


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BENCH MARKING

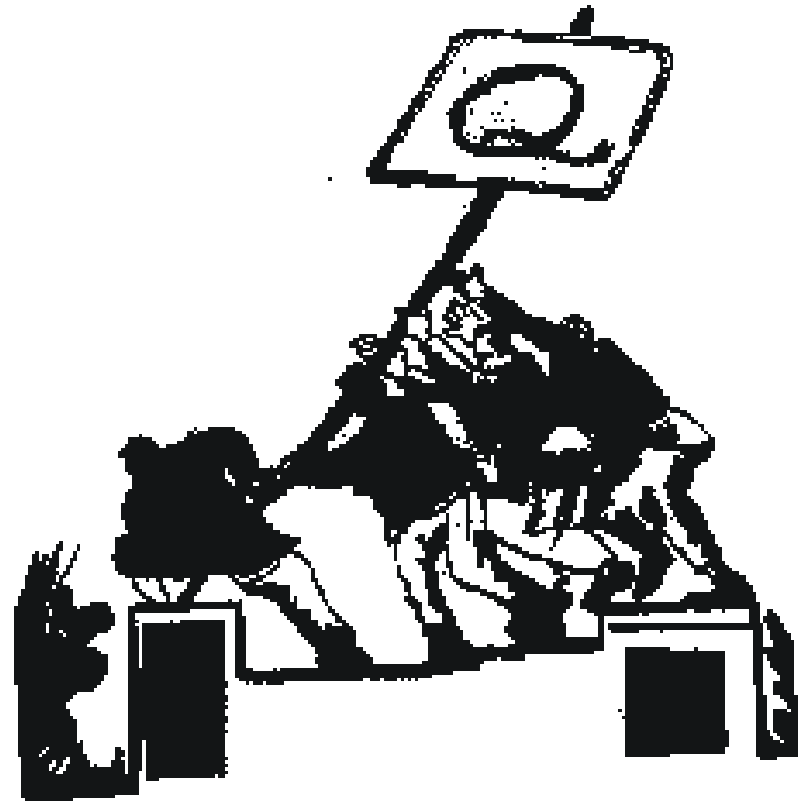
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SYNERGY IN TEAM WORK



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TEAM WORK



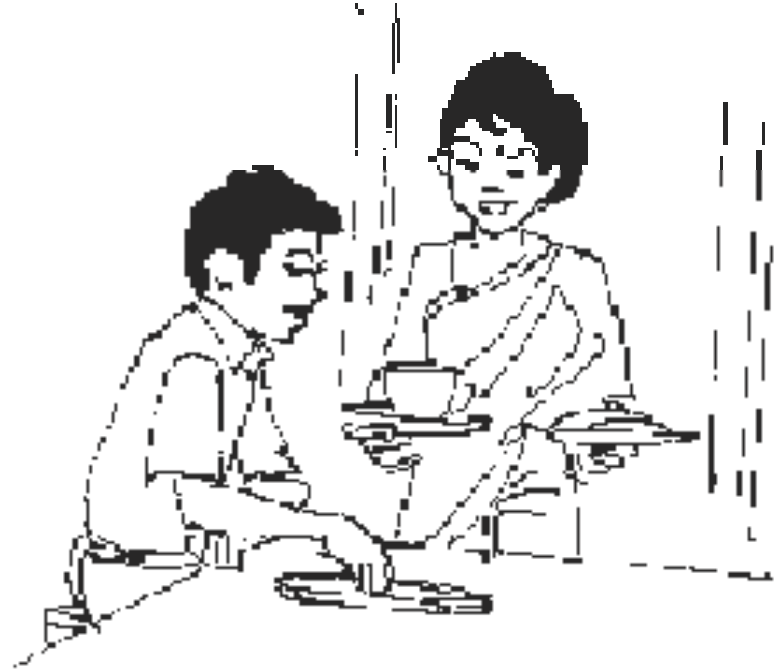
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TEAM WORK

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INVOLVEMENT



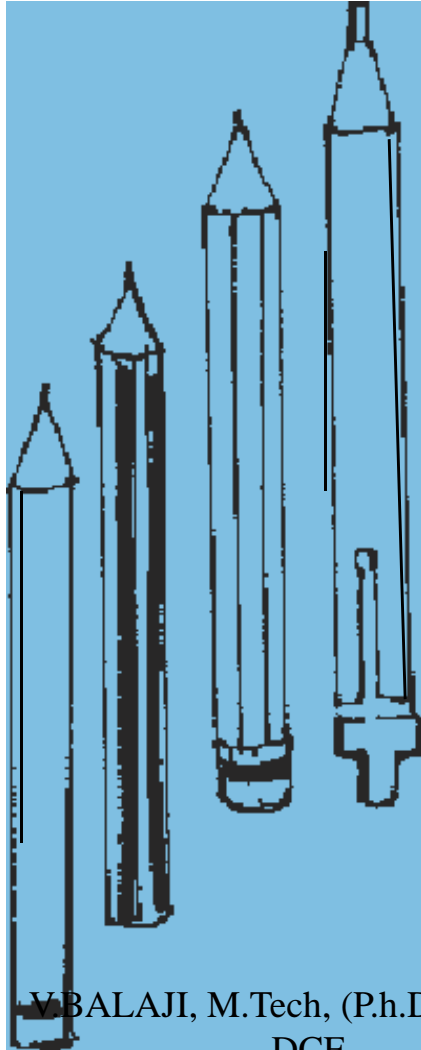
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CONTINUOUS IMPROVEMENT



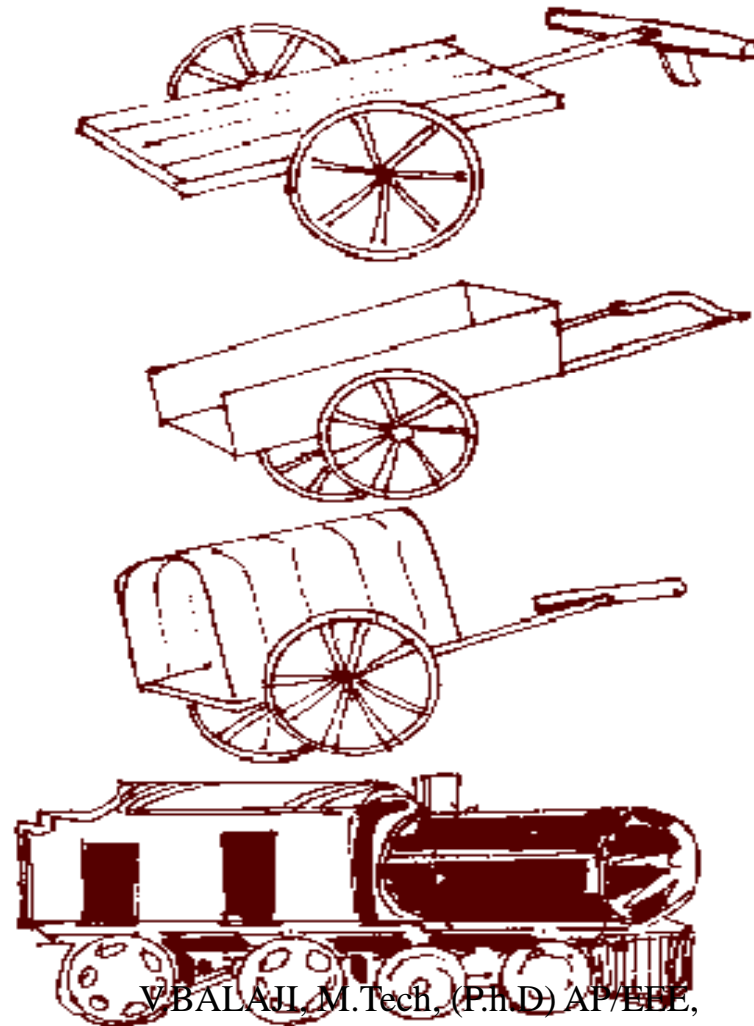
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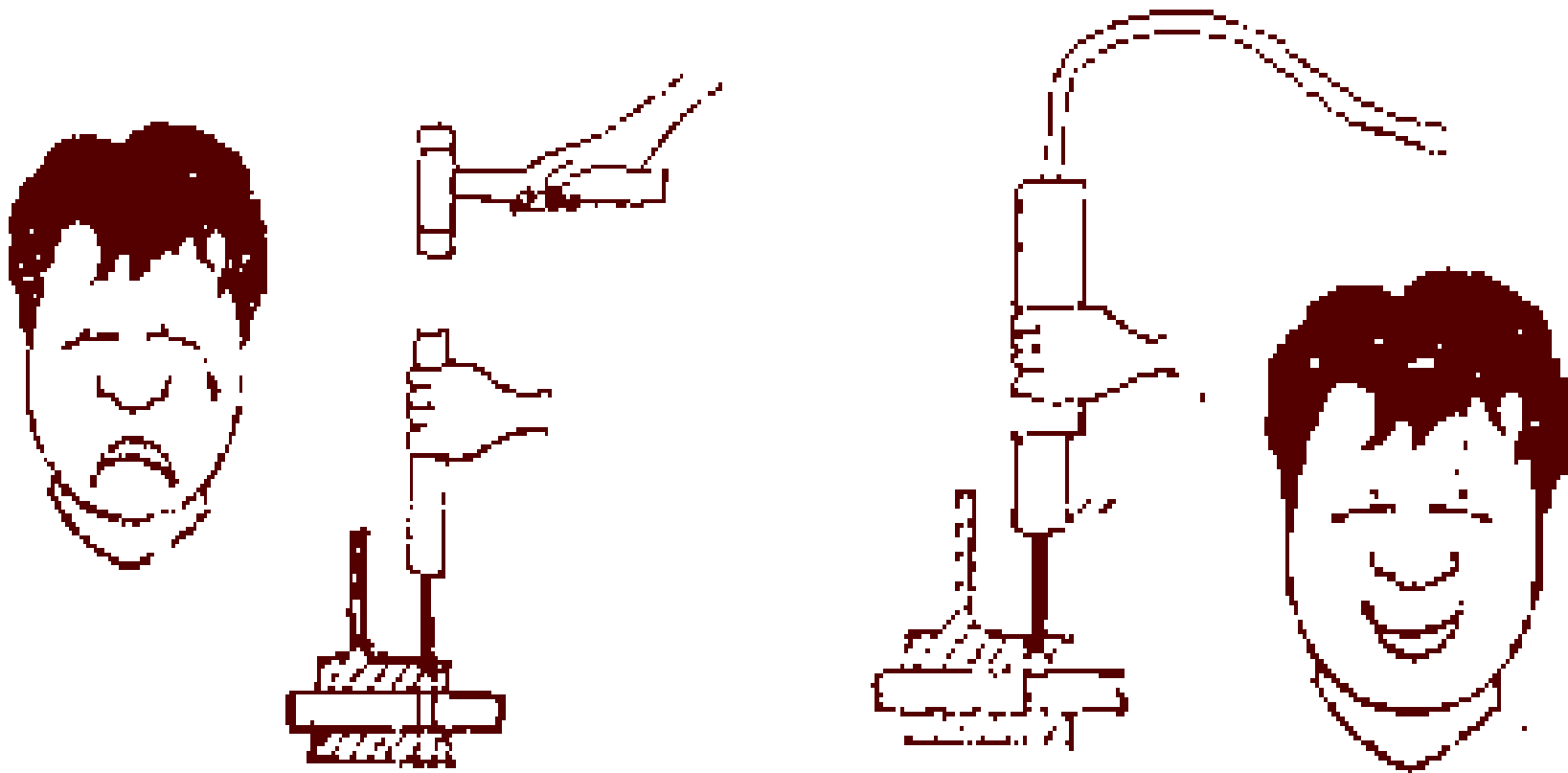
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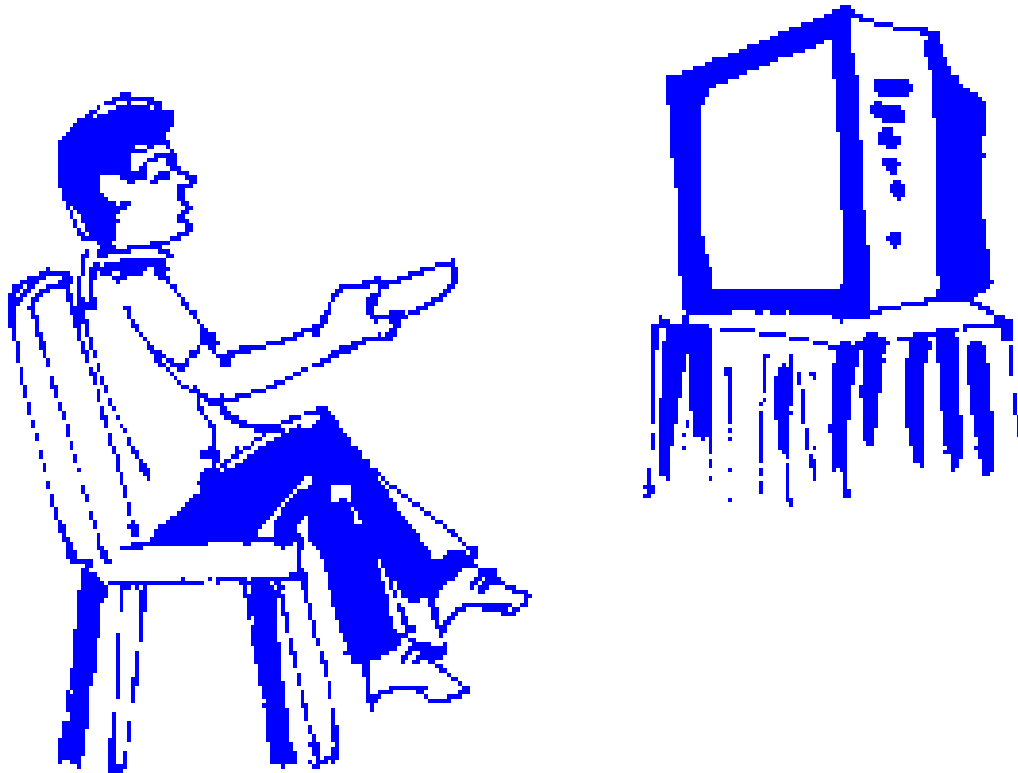
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CONTINUOUS IMPROVEMENT



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CONTINUOUS IMPROVEMENT



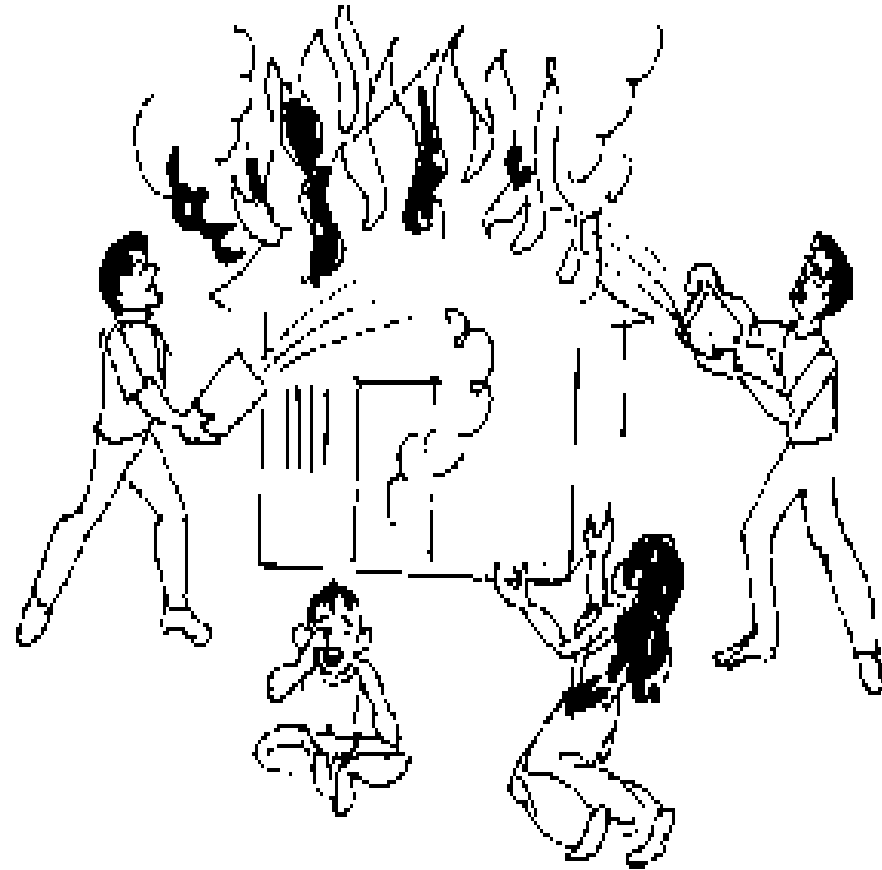
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UNDERSTANDING OTHERS



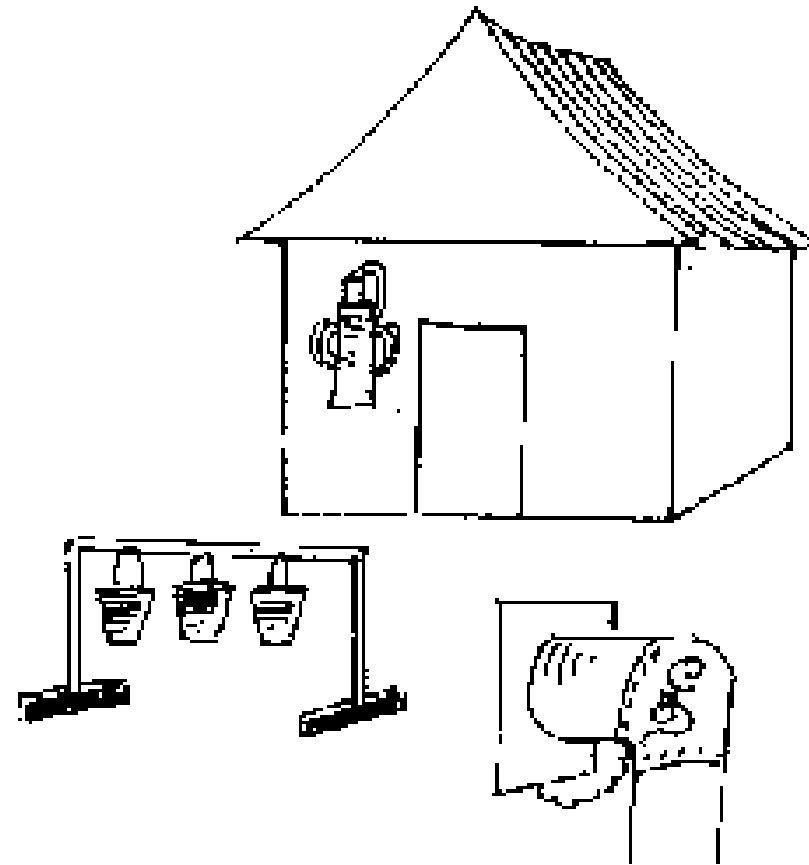
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PREVENTION VS DETECTION



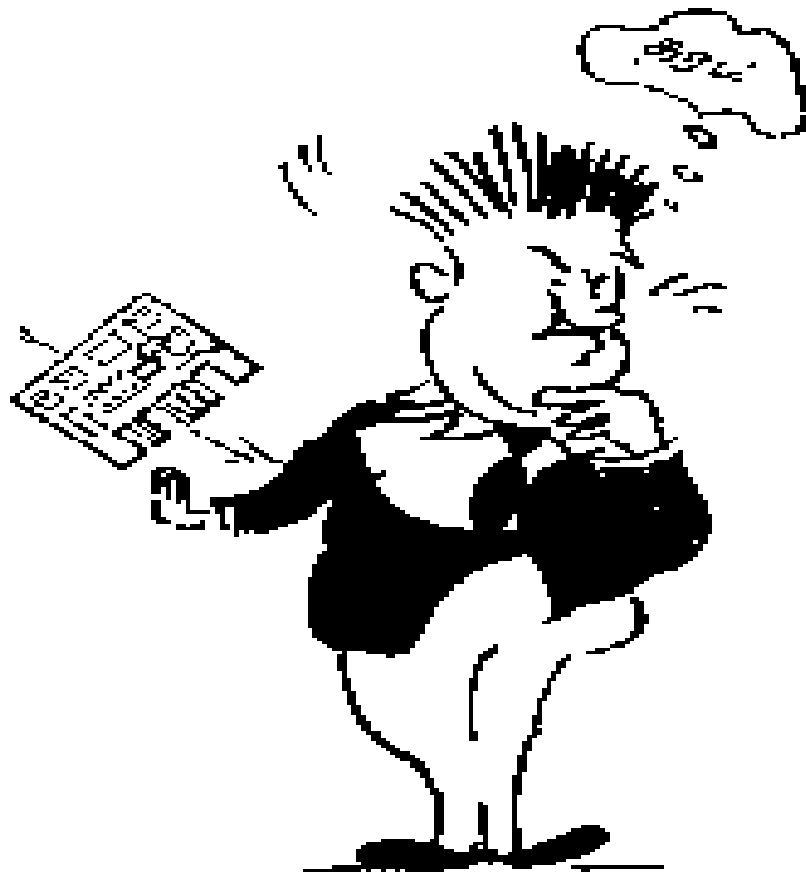
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PREVENTION VS DETECTION



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MANAGEMENT COMMITMENT



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PEOPELE BUILDING



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NO BLAME



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SENSE OF OWNING



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ATTITUDE



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BRITISH AIRWAYS



- **1981**
- ***SHODDY***
- ***INDIFFERENT TO PASSENGERS***
 - **LOSS MAKING 137 MILLION/Y**
 - ***OVER MANNED***
- **1991**
- **FOURTH LARGEST**
- **235 AIRCRAFTS**
- **160 DESTINATIONS IN**
- **75 COUNTRIES**
- **CARRYING 25 MILLION PASSENGERS**
 - **PROFIT: 246 M**
 - **TURNOVER : 4.838 B**

B.A ROUTE TO CUSTOMER SERVICE

PEOPLE FIRST

1. CUSTOMER FIRST

2. ORG/CULTURAL CHANGE

(a) PATTERN BREAKING

Demanning 59000 to 29000

Painted new

Removed

- Central Budgeting**
- Unnecessary Levels of Management**
- Old Performance Appraisal**
- *Poor Information Retrieval***

(b) EXPERIMENTING

**Service Oriented
Market Driven
Participative Management**

(c) VISIONING

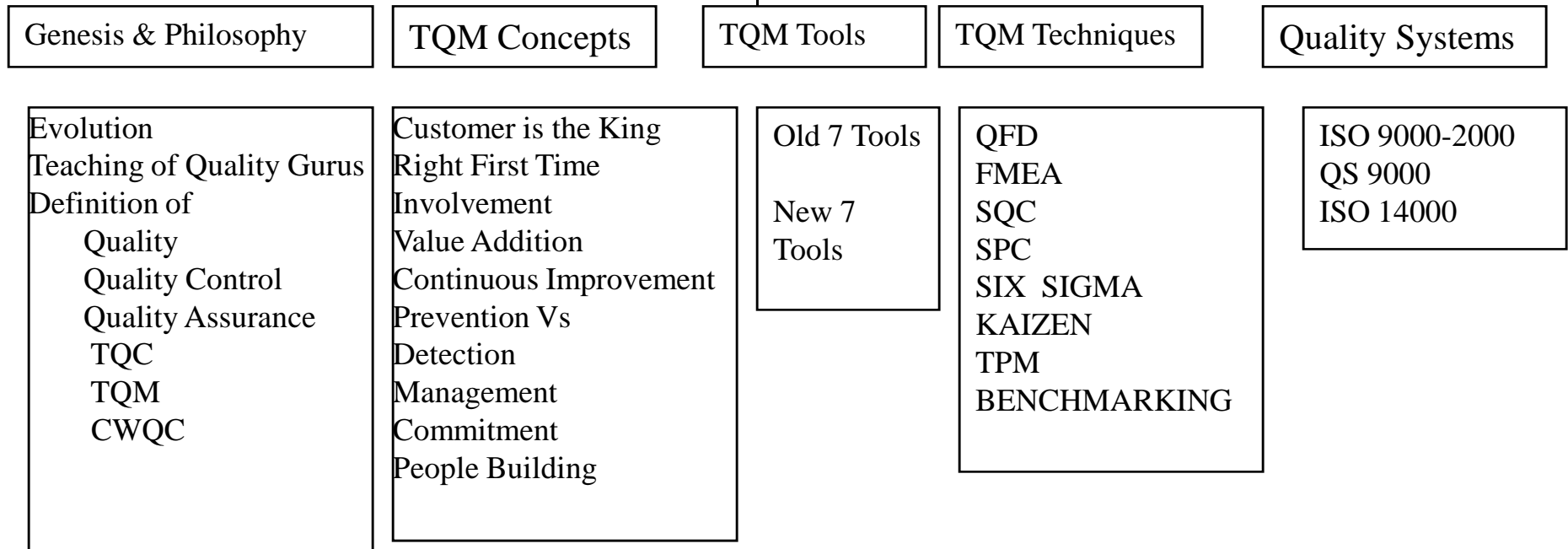
**Select NEW PERSPECTIVE
and Accordingly
REORGANIZE-RESHAPE**

(d) BONDING

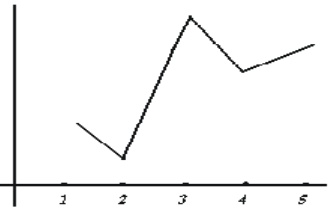
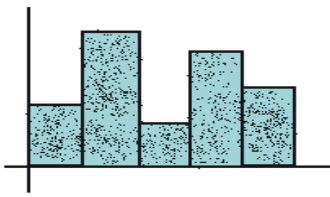
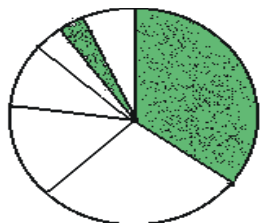
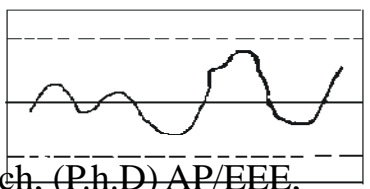
***New ways of DOING, THINKING, LEARNING ,
INTERACTING***

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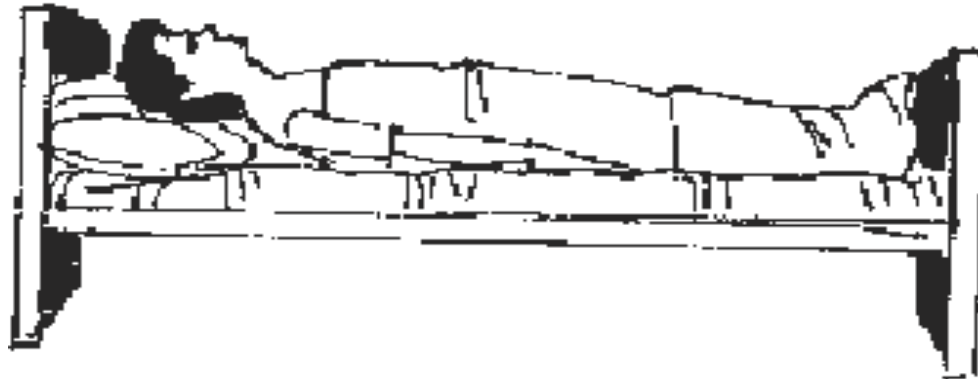
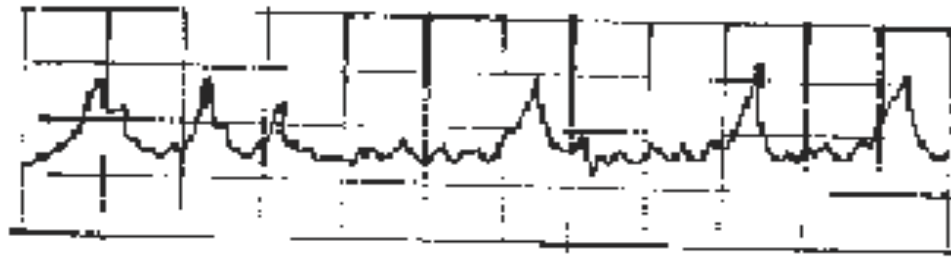
TOTAL QUALITY MANAGEMENT



TOOLS

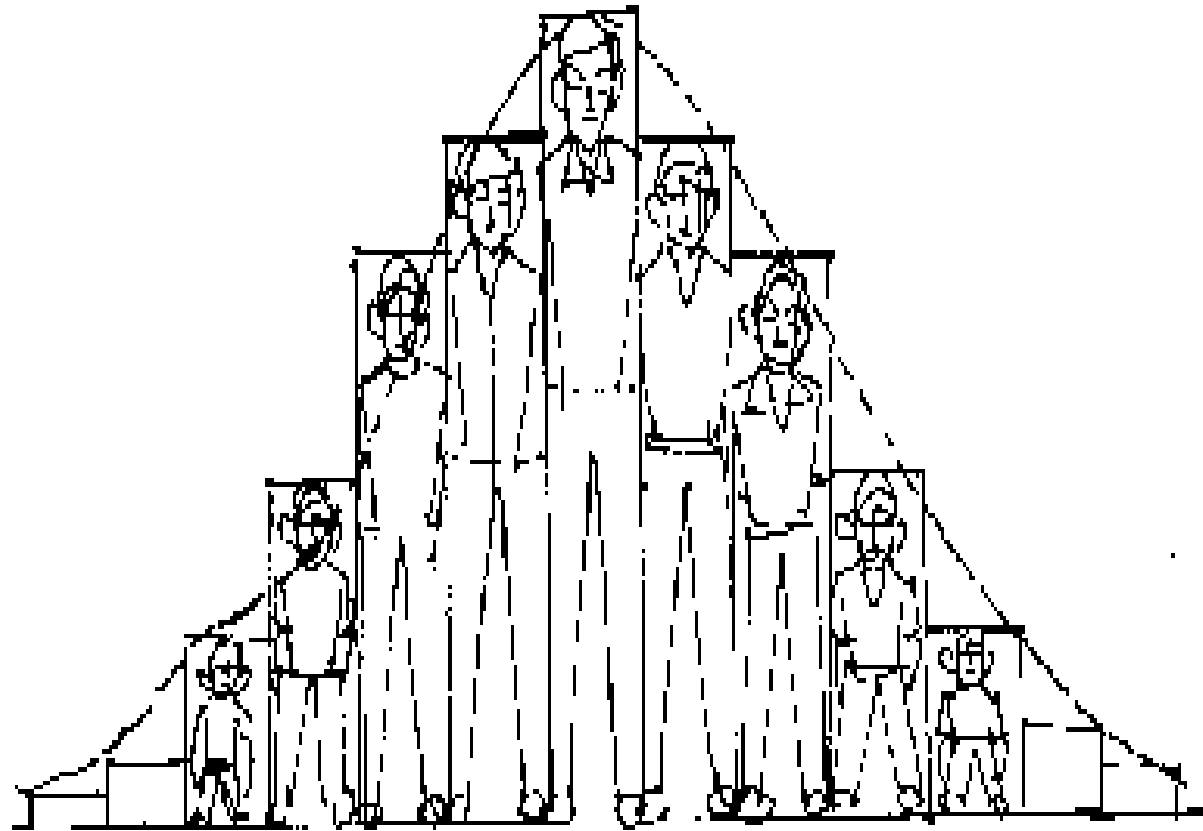
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CONTROL CHARTS



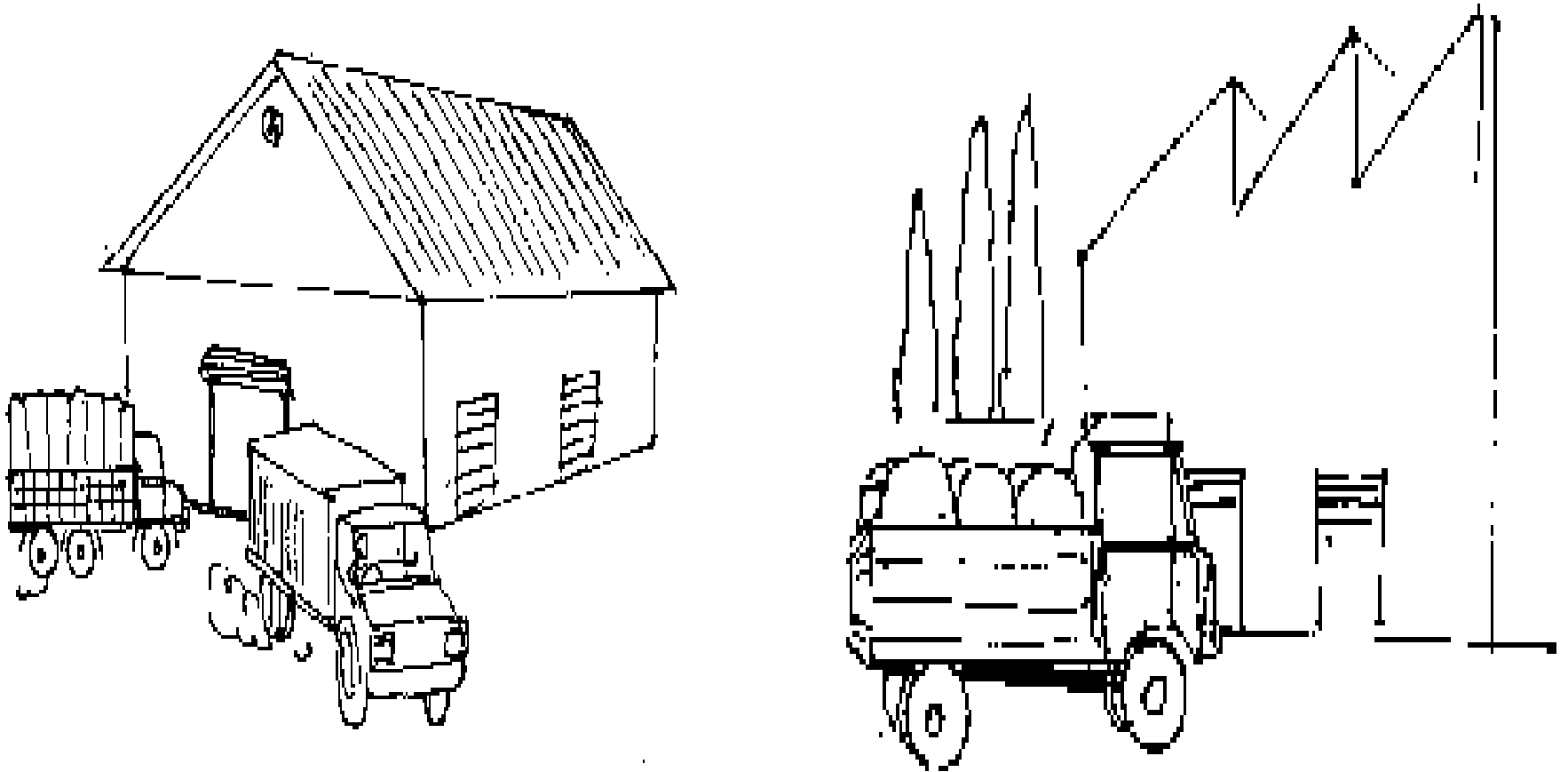
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HISTOGRAM



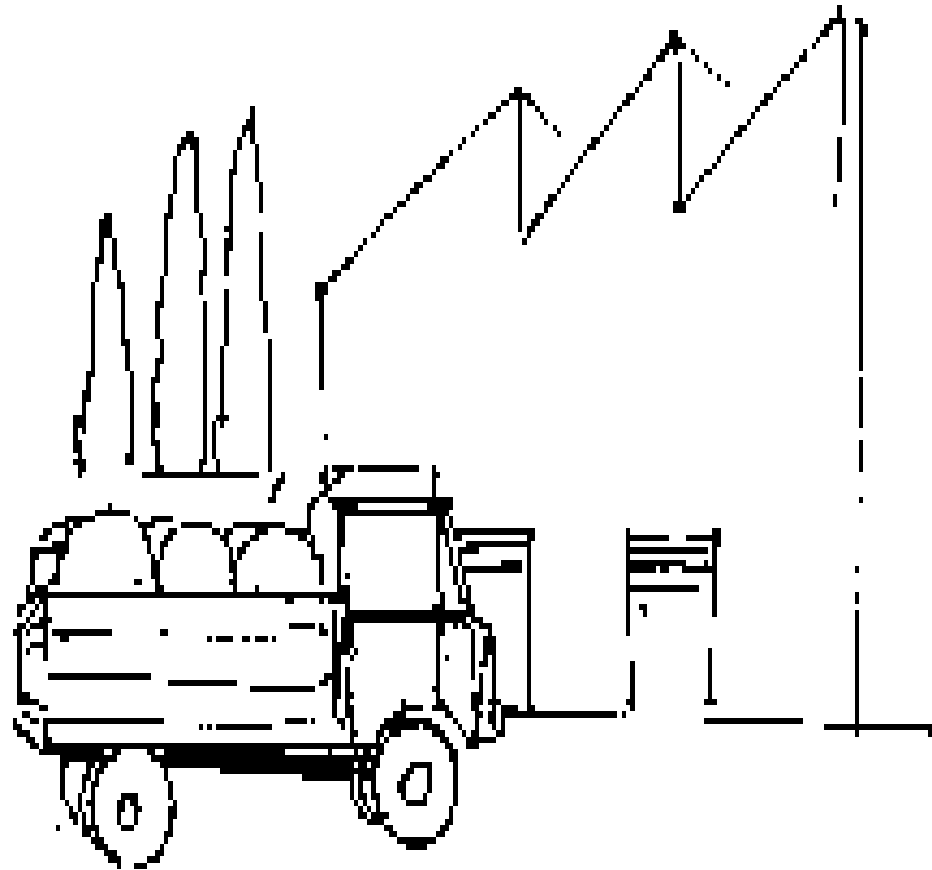
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JUST IN TIME



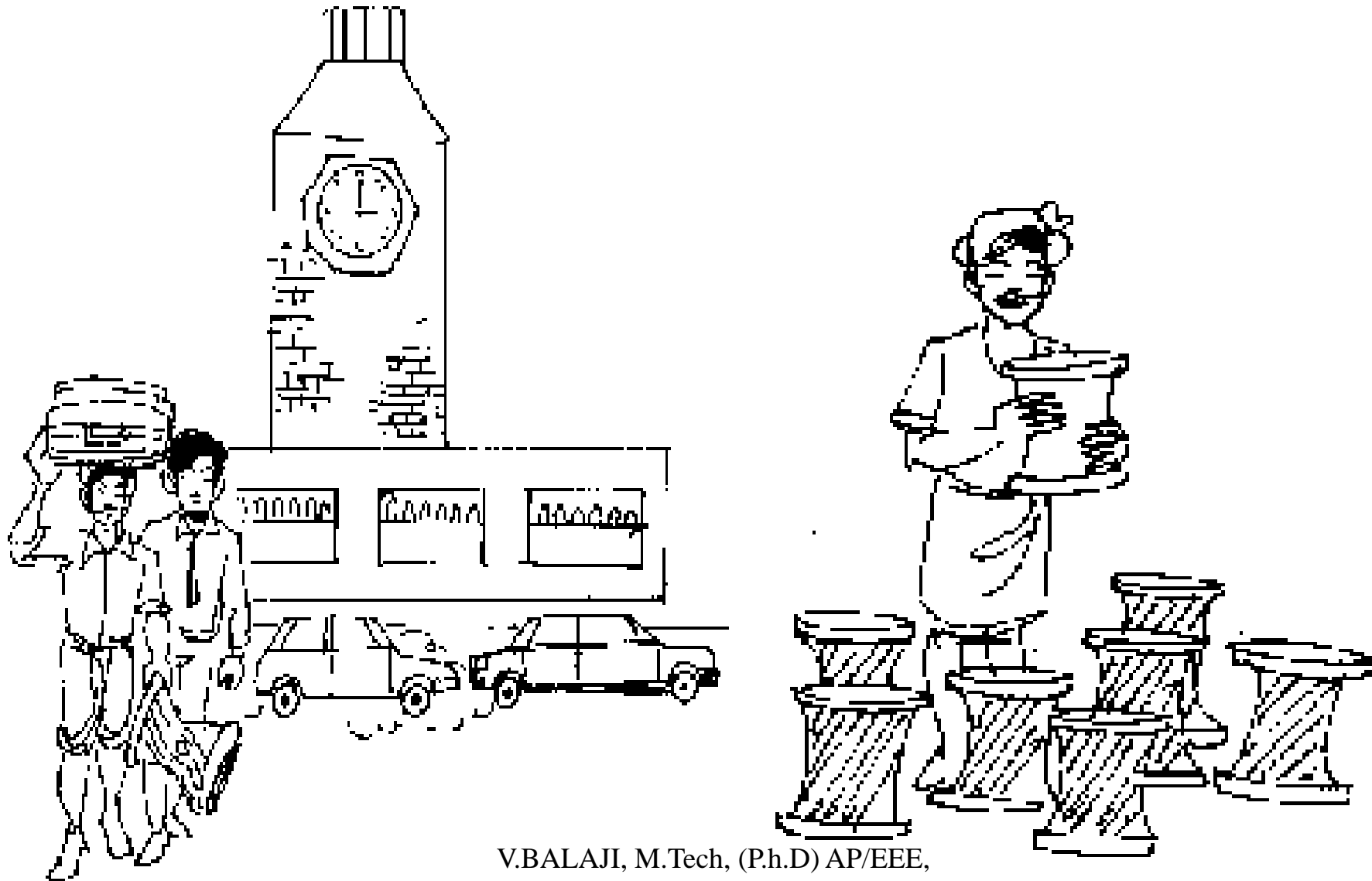
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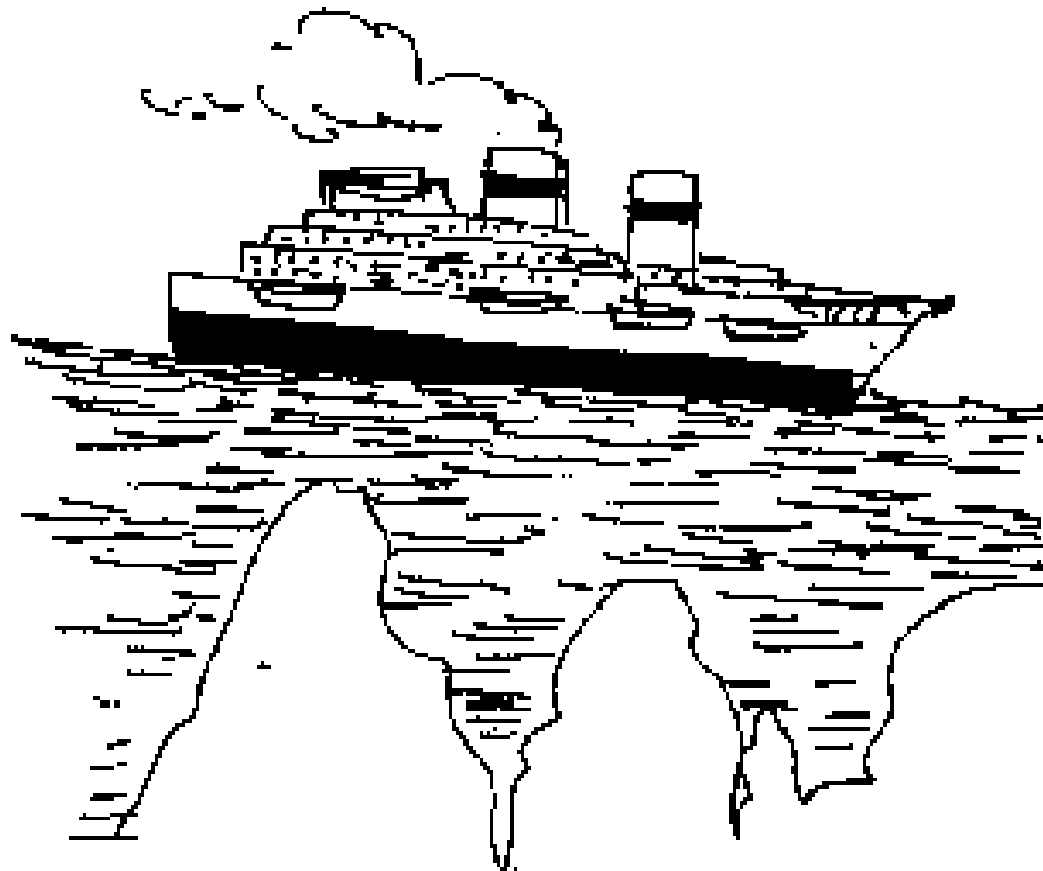
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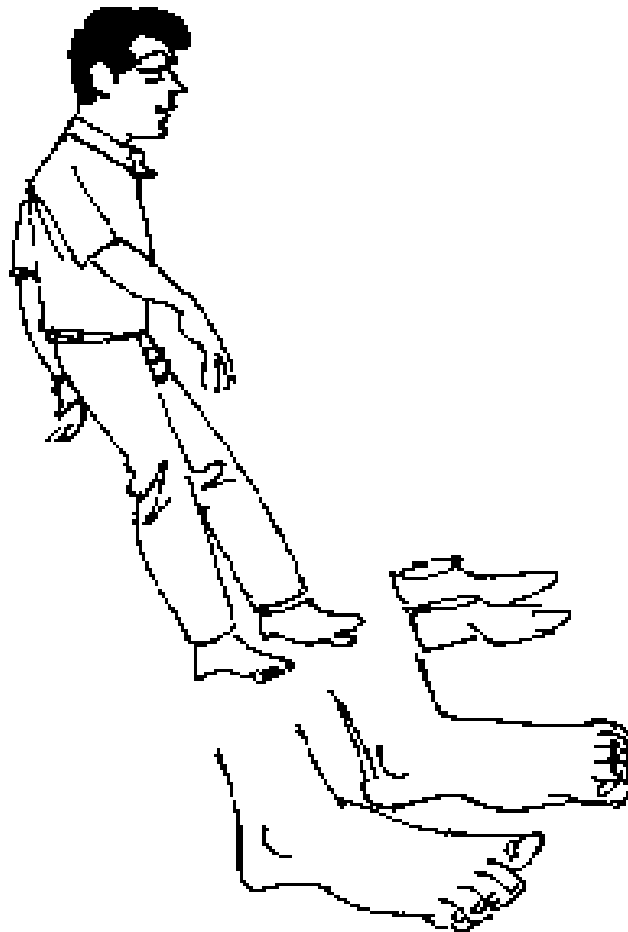
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ZERO DEFECTS



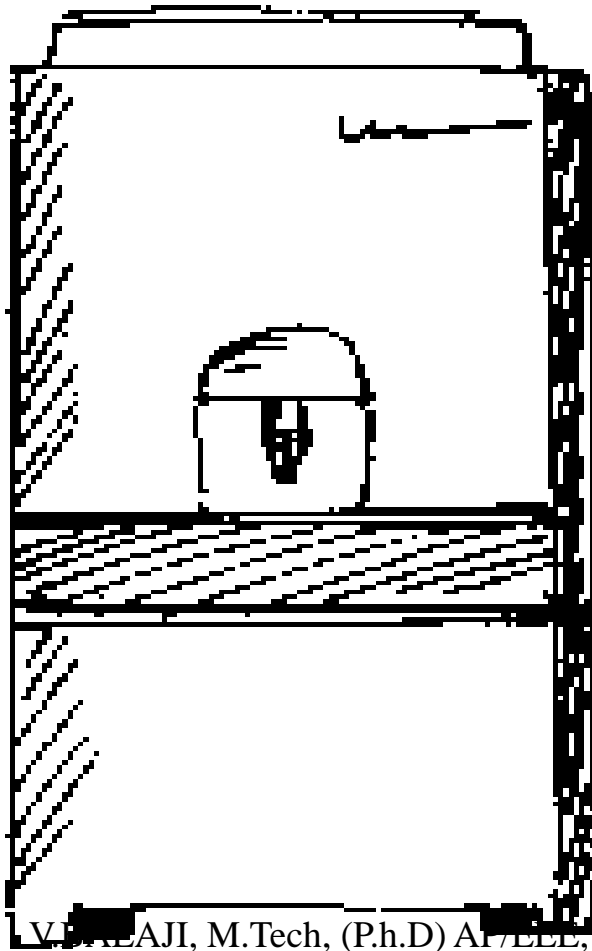
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POKA YOKE



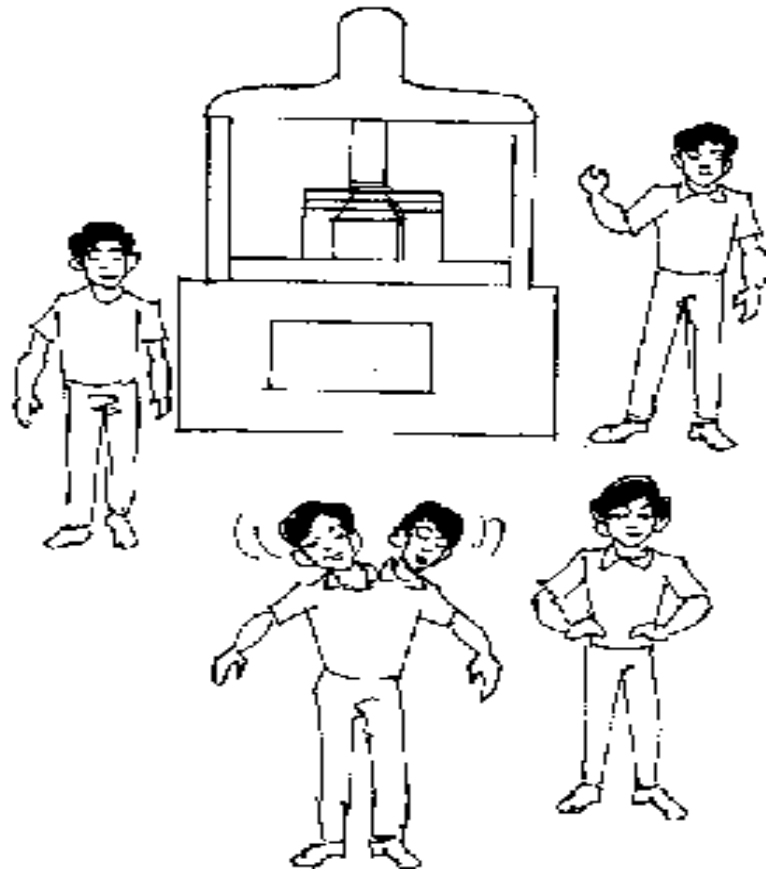
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FAILURE MODE EFFECT ANALYSIS

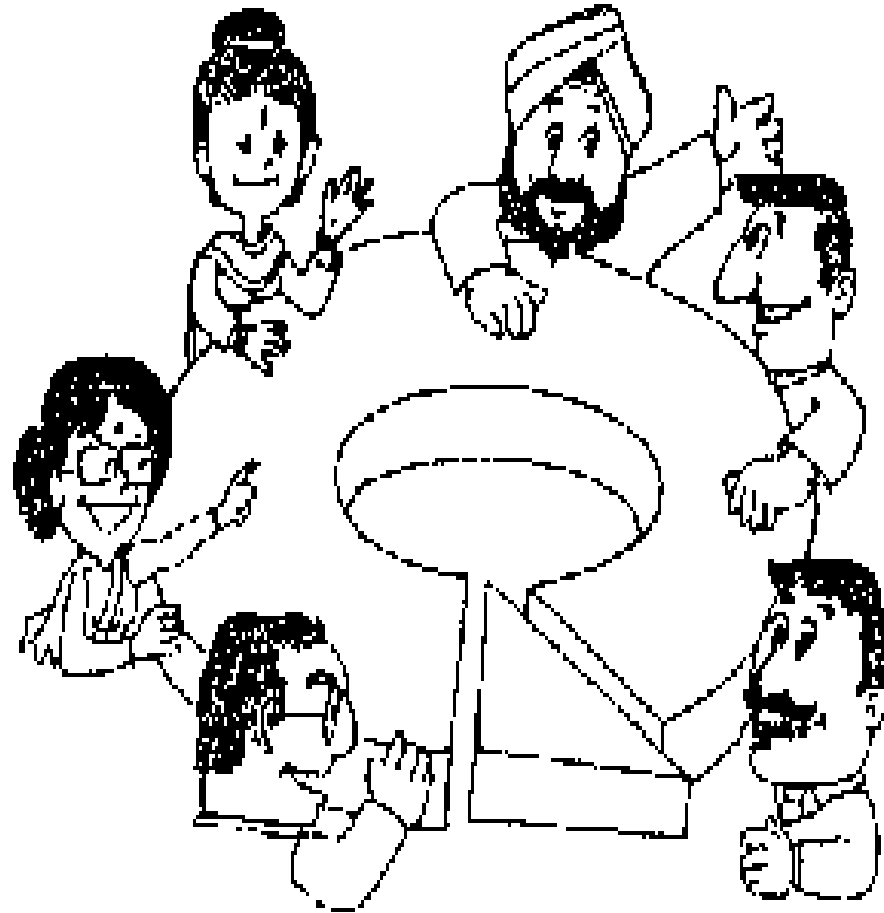


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SINGEL MINUTE EXCHANE OF DIES



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QUALITY CIRCLE

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UNIT 1. INTRODUCTION TO TQM

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DEFINITION OF QUALITY

- Quality means conformance to specifications and standards.
- Quality is the conformance to requirements.
- Quality is fitness for use.
- Quality means productivity, competitive costs, on-time delivery and the satisfaction of the customer

- The degree to which a set of inherent characteristics fulfils requirements. The requirements are the needs and expectations that are stated, generally implied, or obligatory (ISO: 9000-2000).
- Quality is what the customer says it is.
- Excellence in everything.

QUALITY PLANNING

- The objectives of quality system are initially listed.
- The customers are identified.
- The needs of the customers are listed.
- The strategic planning, which includes planning for the customer-supplier partnering, infrastructure of the organization, total involvement of the organization, information processing, education and training.

Design the product features that satisfy the customer's needs, and for optimization of the design.

Design and development of the processes.

Providing the infrastructure, establishment of teams, provision of resources, and training the personnel.

Quality improvement: Optimize the process capability and the quality control measures.

QUALITY COSTS

- Quality costs are defined as the elements of costs associated with non-achievement of product quality as envisaged by QMS.

External failure Cost

- This consists of costs incurred due to actual non-conform-ing products or service after delivery to the customer. This includes:
 - Cost of investigations on customer complaints including necessary field service.
 - Returned goods.
 - Retrofit and recall costs. Due to design deficiency the parts are redesigned, recalled and retrofitted.

Internal Failure Cost

- Costs associated with non – conforming products, such as, cost of scrap, rework, repair and reconditioning.

This consists of :

- Design failure cost: Cost due to design inadequacy, which includes design corrective actions, rework due to design changes, and scrap due to design changes.

Purchase failure costs: Cost of purchased material rejection, cost of purchased material replaced, supplier corrective action costs, rework of supplier rejects etc.

**Operation (Product / service) failure costs:
This covers a major portion. Costs associated with non-conforming product/service discovered during operations, during material review, during corrective actions, rework or repair, scrap costs, and internal failure labor costs.**

Appraisal cost

- Purchasing appraisal costs: Receiving inspection or source inspection at supplier's facility or incoming inspection and control program.
- Manufacturing (Operations) appraisal costs: Machine set up pieces or destructive testing, process control measurements, laboratory support, outside certification

- External appraisal costs: Test during field during field trials of new products and evaluation of field stock and spare parts.
- Review of Test and Inspection data.
- Miscellaneous quality evaluation costs: In dispatch rooms, storerooms, pack-aging and shipping.

Preventive cost

- Marketing / customer / user: Costs incurred in collection, continued survey of customer quality needs, including feedback, and contract and document review.
- Product / service / design: Cost of translating customer needs into designs and documents for manufacture, including field trials.
- Purchase: Cost of quality assurance of supplier parts, supplier reviews, supplier rating, purchase order technical data review, and supplier quality planning.

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. Hidden quality costs

- Cost of redesign-whenever necessary, cost of changing the manufacturing methods because of the inability in meeting the quality requirements, cost of changes in software, and the scrap cost that has not been reported.

Cost of lost opportunity

Income lost by orders cancelled or lost.

- Losing to competitors due to the inability to meet the customer's requirements
- Reduced number of repeated orders or quantity in each repeated order.
- Loss of prospective customer, due to the loss of good will.

Loss of customers, who change to competitors to fulfill their requirements

2.15. QUALITY COUNCIL

2.15.1. What is it ?

✓ A *quality council* is a team to provide overall direction for achieving the total quality culture (TQC).

✓ *The quality council is composed of :*

- (i) the chief executive officer (CEO) ;
- (ii) the senior managers of the functional areas, such as design, marketing, finance, production, and quality ; and
- (iii) a coordinator or consultant

2.15.2. Duties of the Quality Council

The duties of the quality council are :

1. To establish the core values and quality statements. Quality statements include vision statement, mission statement, and quality policy statement.

2. To establish the strategic long-term plan with goals and the annual quality improvement program with objectives.
3. To plan the training and education programmes.
4. To determine and monitor the cost of poor quality.
5. To perform and monitor the performance measures for each functional areas of the organisation.
6. To establish multifunctional project and departmental teams and monitor their progress.
7. To establish / revise the recognition and reward system periodically.

2.15.3. Responsibilities of the Quality Council Coordinator are :

- (i) To develop two-way trust ;
- (ii) To propose team requirements to the council ;
- (iii) To share council expectations with the team ;
- (iv) To empower the team ; and
- (v) To brief the council on team progress.

Thus quality councils are the instruments for creating the idea of never-ending quality improvement. In other words, it is the driver for the TQM engine.

2.15.4. Quality Structure

Fig.2.5 shows a typical quality structure involving different levels of cross-functional participation by managers.



Fig. 2.5. Typical quality structure involving different levels of cross-functional participation by managers

2.16. QUALITY STATEMENTS

Three elements of quality statements are :

1. Vision statement,
2. Mission statement, and
3. Quality policy statement.

2.16.1. What is Vision Statement ?

- ✓ *The vision statement* is a short declaration of what an organisation aspires to be tomorrow.
- ✓ It is the ideal state that might never be reached ; but on which one will work hard continuously to achieve. Successful visions provide a brief guideline for decision-making.
- ✓ The vision statement should be coined in such a way that the leaders and the employees working in the organisation should work towards the achievements of the vision statement.
- ✓ *An example of a simple vision statement is :*
"To continuously enrich knowledge base of practioners in mobility industry and institutions in the service of humanity" – Society of Automotive Engineers (SAE)

STRATEGIC PLANNING

2.17. INTRODUCTION

- ✓ **Strategic planning** sets the long-term direction of the organisation in which it wants to proceed in future. This is depicted in Fig.2.6.
- ✓ **Definition :** Strategic planning can be defined as *the process of deciding on objectives of the organisation, on changes on these objective, on the resource used to attain these objectives and on the policies that are to govern the acquisition, use and disposition of these resources.*
- ✓ **Examples of strategic planning** in an organisation may be : planned growth rate in sales, diversification of business into new lines, type of products to be offered, and so on.

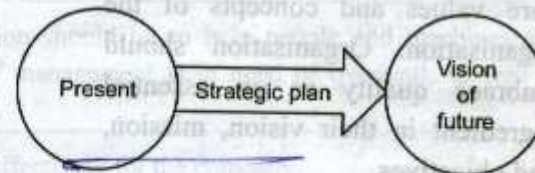


Fig. 2.6. Strategic planning

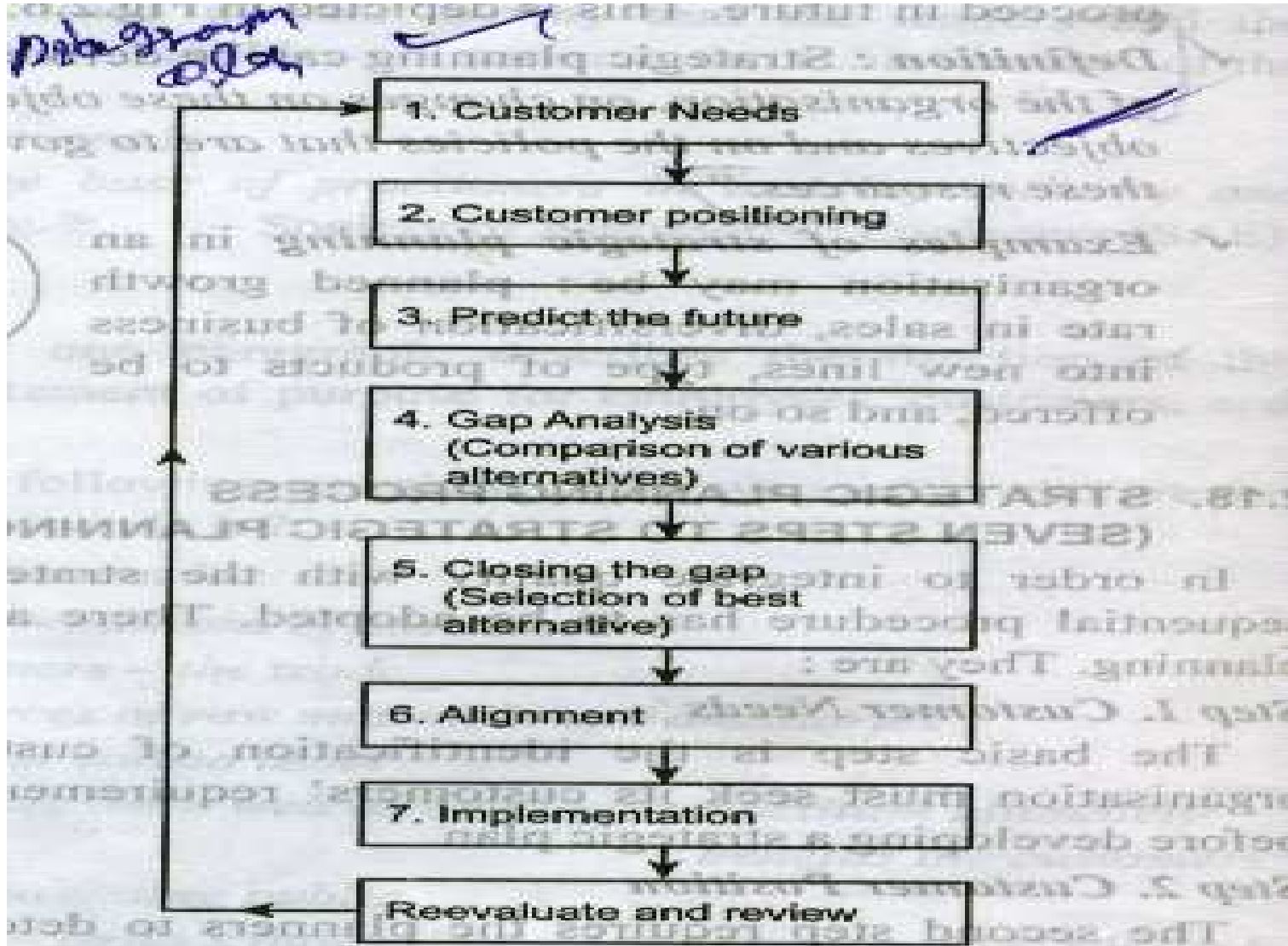


Fig. 2.7. Strategic planning cycle

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Table 2.3. Deming's 14 points on route to quality

<p>1. <i>Create constancy of purpose toward improvement of product and service</i>, with the aim to become competitive and to stay in business, and to provide jobs.</p>
<p>2. <i>Adopt the new philosophy.</i> We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.</p>
<p>3. <i>Cease dependence on inspection to achieve quality.</i> Eliminate the need for inspection on a mass basis by building quality into the product in the first place.</p>
<p>4. <i>End the practice of awarding business on the basis of price tag.</i> Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.</p>
<p>5. <i>Improve constantly and forever the system of production and service</i>, to improve quality and productivity, and thus constantly decrease costs.</p>
<p>6. <i>Institute training on the job.</i></p>
<p>7. <i>Institute leadership.</i> The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.</p>

8. *Drive out fear*, so that everyone may work effectively for the company.
9. *Break down barriers between departments*. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
10. *Eliminate slogans, exhortations, and targets for the work force* which ask for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, since the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the workforce.
11. *Eliminate work standards (quotas) on the factory floor*. Substitute leadership. *Eliminate management by objectives*. Eliminate management by numbers, numerical goals, substitute leadership.
12. *Remove barriers to pride of workmanship*. The responsibility of supervisors must be changed from sheer numbers to quality. Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, for example, abolishment of annual or merit rating and of management by objectives.
13. *Institute a vigorous program of education and self-improvement*.
14. Put everybody in the company to work to *accomplish the transformation*. The transformation is everyone's job.