

## THE PROGRESSION TO EXCELLENCE

We do not have too much experience in observing how a company moves from near bankruptcy to excellence. A few companies in Japan went through the transformation and their stories are given briefly in reference (15). In general, based on these experiences, it appears that the transition tends to follow these stages:

### STAGE 0:

THE MANAGEMENT EXPRESSES CONCERN ONLY OVER MARKET SHARE, PROFITS AND RETURN ON INVESTMENT.

### STAGE 1:

THE MANAGEMENT IS CONCERNED ABOUT QUALITY OF THE PRODUCT BECAUSE OF IMPACT ON WARRANTY COST AND CUSTOMER COMPLAINTS, LOSS OF MARKET SHARE. THE ACTION TAKEN IS TO ADD MORE INSPECTORS.

### STAGE 2:

MANAGEMENT RECOGNIZES THAT CONTROL OF THE PRODUCTION PROCESS WILL LEAD TO LESS WASTE AND A LOWER COST TO OBTAIN ACCEPTABLE PRODUCTS. Q.C. IS ADDED TO MANUFACTURING.

### STAGE 3:

THE RESULTS OF Q.C. ARE LIMITED BY REACTIONS OF PERSONNEL SO MANAGEMENT BEGINS TO EMPHASIZE QUALITY MANAGEMENT. MANUFACTURING INTRODUCES STATISTICAL QUALITY CONTROL.

### STAGE 4:

MANAGEMENT ASKS THAT S.Q.C. AND QUALITY MANAGEMENT METHODS BE APPLIED TO ALL DEPARTMENTS WHICH BORDER ON THE PRODUCTION DEPARTMENT. (PURCHASING, TRANSPORTATION, WAREHOUSING, ETC.)

### STAGE 5:

MANAGEMENT APPLIES QUALITY MANAGEMENT PRINCIPLES TO R&D, AND TO ENGINEERING. (THERE IS CONSIDERABLE RESISTANCE BECAUSE THESE DEPARTMENTS HAVE A HARD TIME BELIEVING THEY HAVE ANYTHING TO DO WITH QUALITY PROBLEMS).

### STAGE 6:

MANAGEMENT RECOGNIZES THAT QUALITY MANAGEMENT PRINCIPLES WILL BE USEFUL IF APPLIED TO ALL DEPARTMENTS OF THE ENTERPRISE.

### STAGE 7:

MANAGEMENT PROCLAIMS (AND ACTS ACCORDINGLY) THAT "CWQC IS THE COMPANY POLICY".

SPECIFICALLY, THIS MEANS:

QUALITY IS FIRST PRIORITY  
CUSTOMER ORIENTED DECISION CRITERIA  
PERSONNEL POLICIES RESPECT HUMANITY  
ALL DEPARTMENTS COORDINATE AND COOPERATE  
ALL EMPLOYEES INVOLVED IN IMPROVEMENT  
GOOD COMMUNICATION BASED ON  
FACTUAL DATA  
STATISTICAL QUALITY CONTROL  
SOLID RELATIONS WITH SUPPLIERS

# **QUALITY DEFINED**

**Quality consists of freedom from deficiencies.**

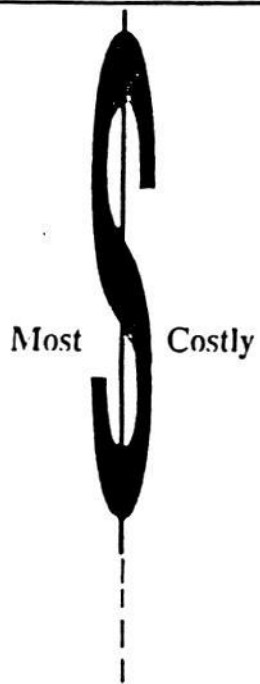
**Quality consists of those product features which meet the needs of customers and thereby provide product satisfaction.**

**Quality is both a way of thinking and a way of doing work. It is a way of thinking that puts customer value in every part of a business. It is a way of doing work that continuously eliminates waste from every activity in a business.**

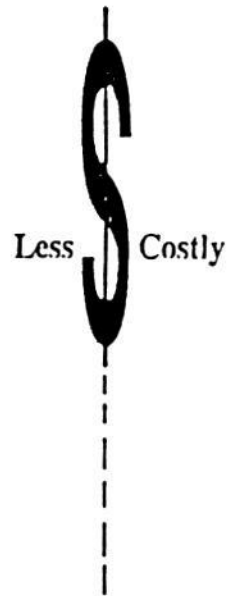
# **QUALITY DEFINED**

*CONFORMANCE TO SPECIFICATION*

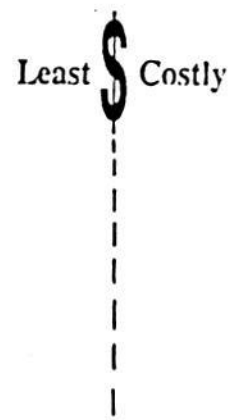
*CONFORMANCE TO REQUIREMENTS*



The customer finds defects in the product or service as delivered.



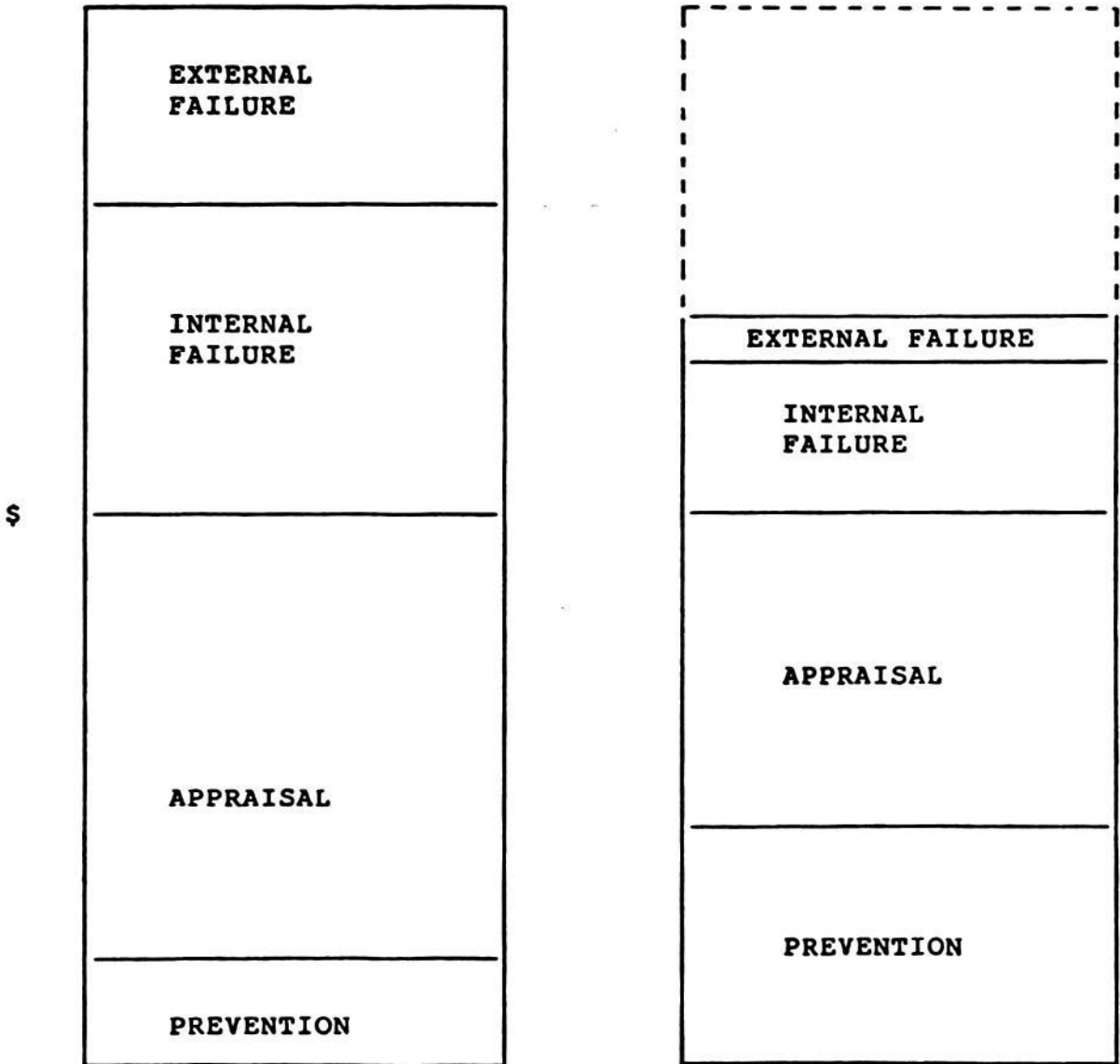
Defects are discovered and corrected during the internal operations of the company.



The company's quality management system is designed and carried out to *prevent* defects.

Comparative Cost Of Defects

C O S T   O F   Q U A L I T Y



**S P C**  
**Supplier Process Customer**

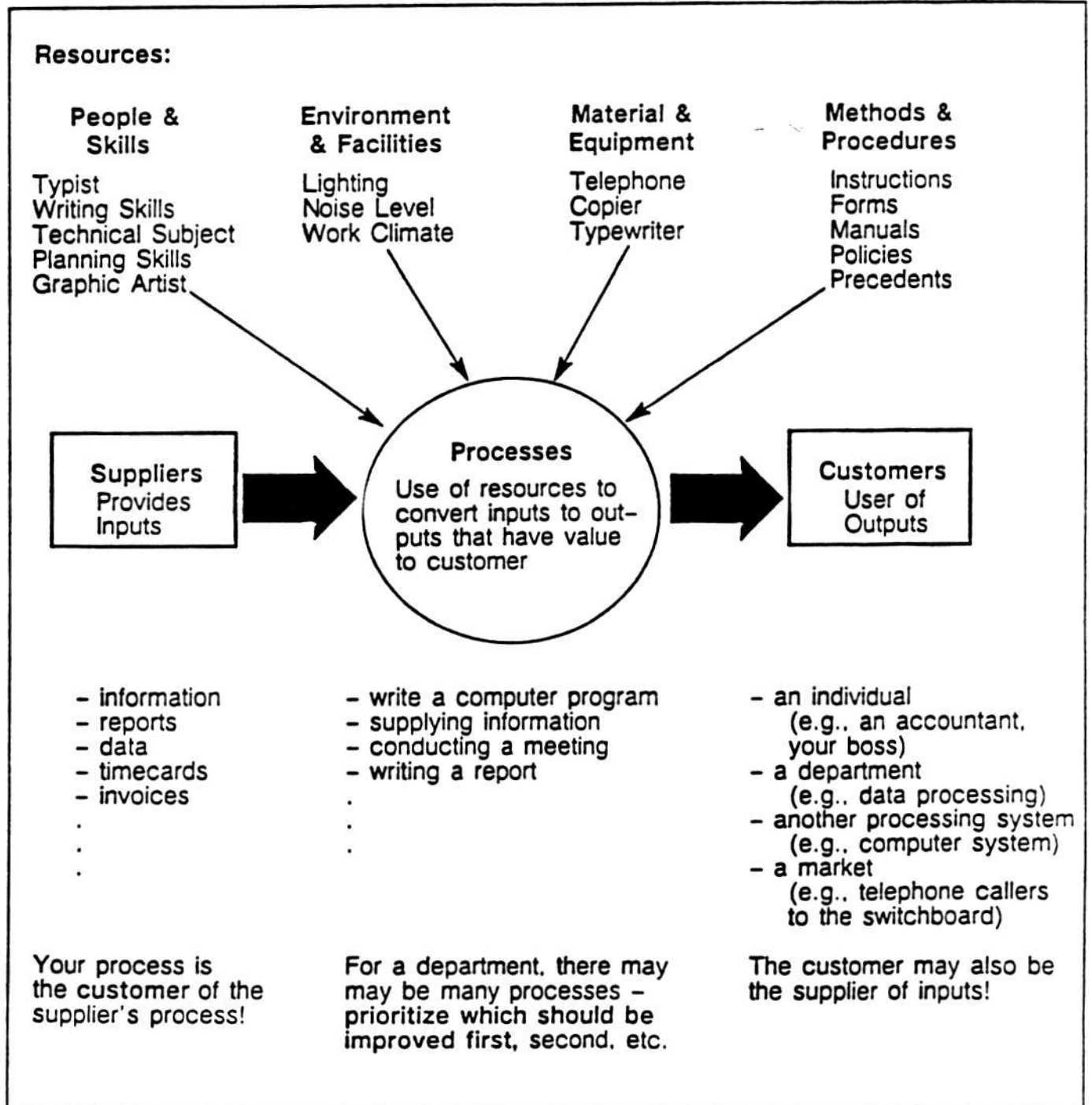
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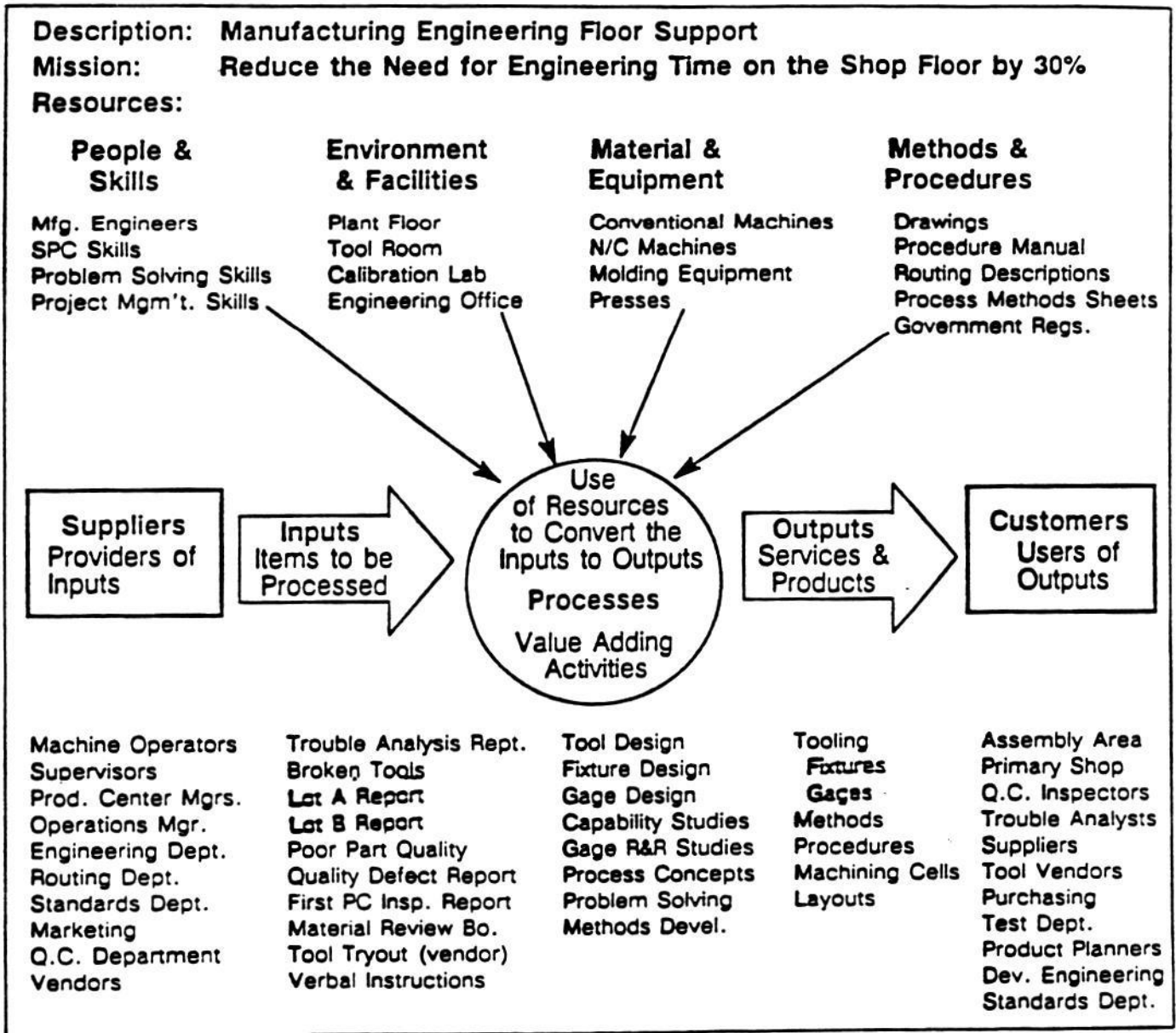
Your job is a process.  
Your department is a process.

## PROCESSING SYSTEM

IDENTIFYING YOUR BASIC PROCESS IN A DIAGRAM IS A GOOD START TO PLANNING FOR IMPROVEMENT. IT IS HELPFUL FOR FACILITATING DEPARTMENTAL ACTIVITY ANALYSIS, AND FOR GETTING A SYSTEMS VIEWPOINT FOR A MULTIFUNCTIONAL PROCESS.



## EXAMPLE - PROCESSING SYSTEM DIAGRAM



### SUGGESTIONS:

1. DESCRIBE THE PROCESS AND ITS PURPOSE FIRST. IF ANALYZING A DEPARTMENT, AGREE ON A ONE-LINE MISSION STATEMENT BEFORE BEGINNING.
2. IDENTIFY CUSTOMERS OF THE PROCESS/DEPARTMENT, AND WORK BACKWARDS THROUGH OUTPUTS, PROCESS, INPUTS, SUPPLIERS, THEN RESOURCES LAST.
3. DISCUSS HOW WELL THE MISSION IS BEING ACCOMPLISHED, THINGS THAT GO WRONG, PROBLEM AREAS, ROADBLOCKS, ETC.



## PROCESSING SYSTEM

**Description:**

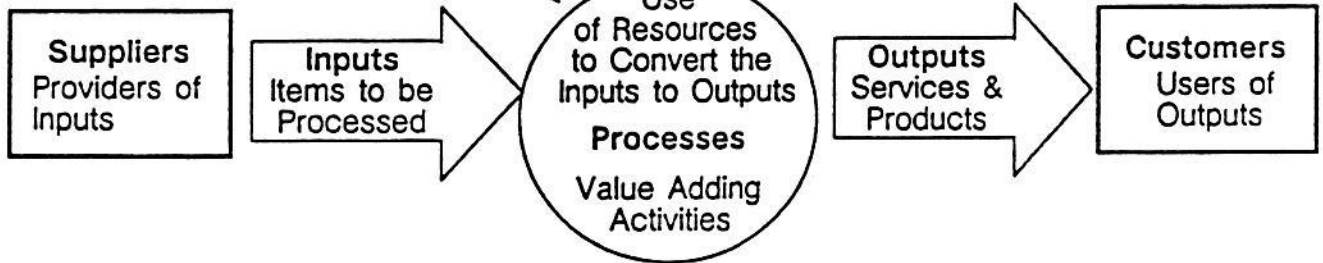
**Mission:**

**People &  
Skills**

**Environment  
& Facilities**

**Material &  
Equipment**

**Methods &  
Procedures**


**Sequence:** Determine the mission, then work from customers back through the system to suppliers.

# DEMING'S 14 POINTS

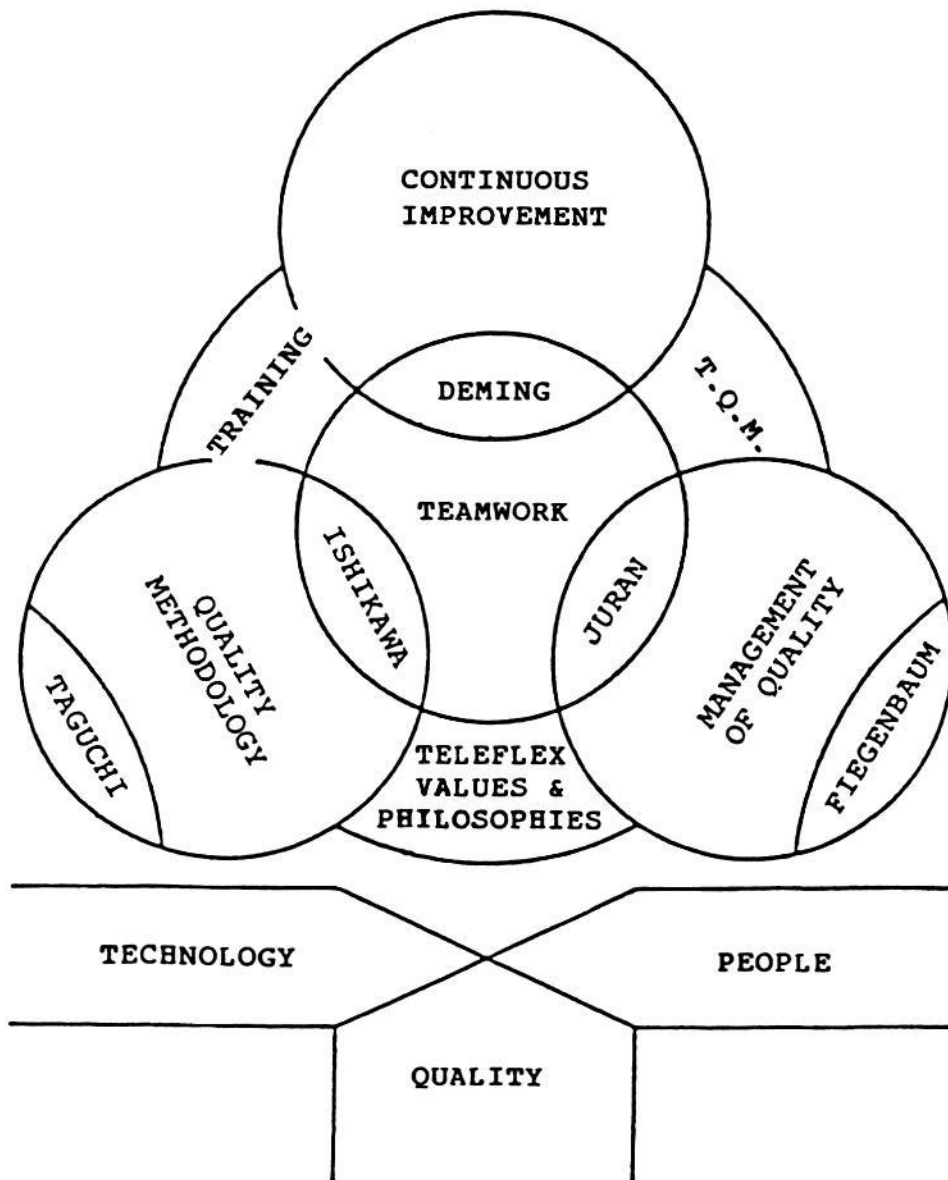
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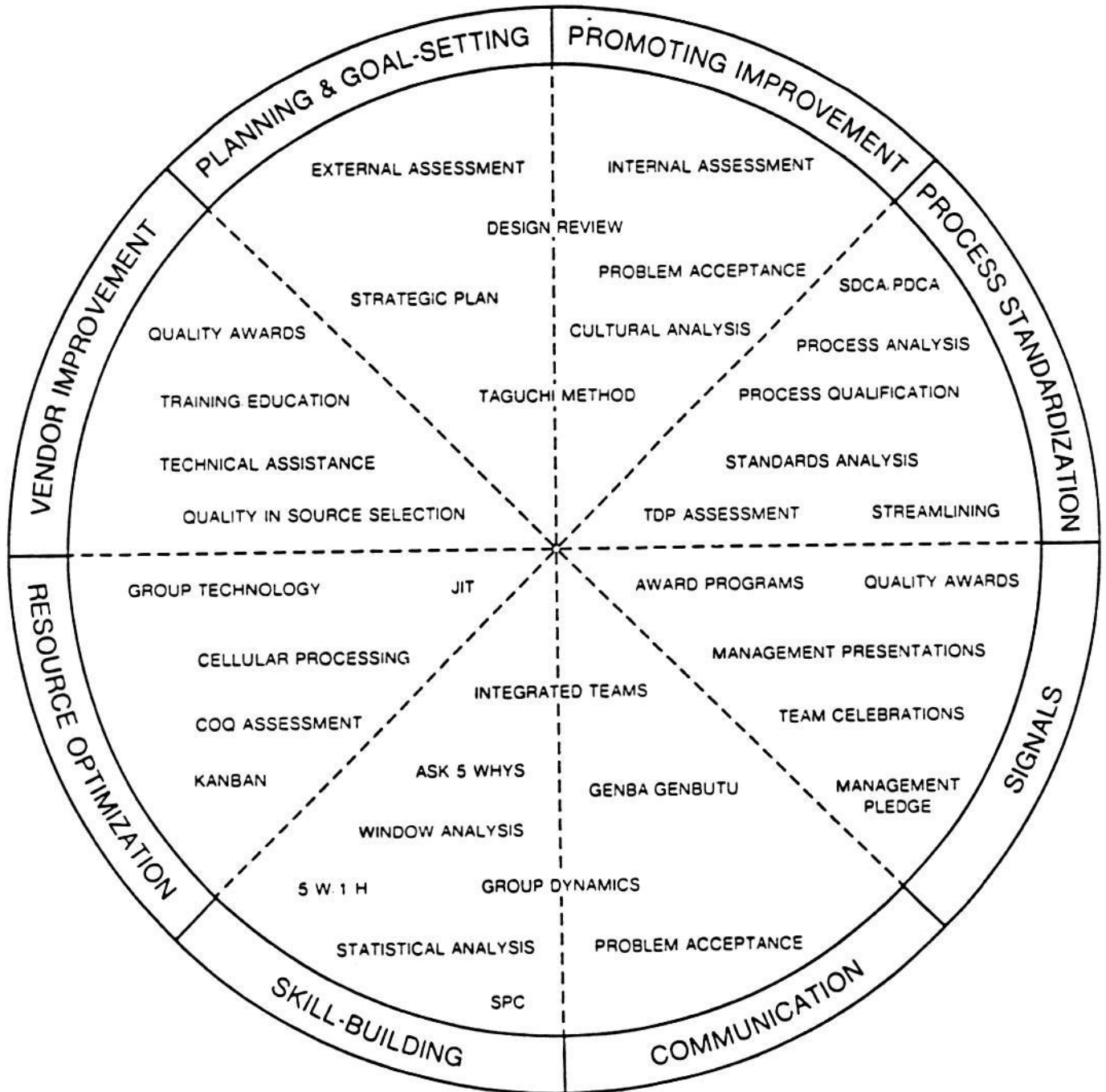
1. INNOVATE
2. IMPROVE JOB TRAINING
3. LEARN THE NEW PHILOSOPHY
4. REDUCE NUMBER OF SUPPLIERS
5. TEACH STATISTICAL TECHNIQUES
6. ELIMINATE UNSUITABLE MATERIALS
7. EXAMINE IMPACT OF WORK STANDARDS
8. PROVIDE HIGHER LEVEL OF SUPERVISION
9. GET RID OF NUMERICAL GOALS, SLOGANS
10. ELIMINATE DEPENDENCE ON MASS INSPECTION
11. RECOGNIZE THE TWO SOURCES OF QUALITY PROBLEMS: FAULTY SYSTEM AND THE WORKER
12. INSTITUTE VIGOROUS TRAINING PROGRAMS IN NEW SKILLS
13. MAKE MAXIMUM USE OF STATISTICAL KNOWLEDGE AND TALENT
14. DRIVE OUT FEAR: ENCOURAGE OPEN, TWO-WAY COMMUNICATION

COMPANY WIDE QUALITY WITHIN TELEFLEX

A SYNTHESIS OF PHILOSOPHIES, SYSTEMS AND METHODS



# TQM TECHNIQUES AND TOOLS



## Who Should Attend Workshops and Why

Workshops		Participants	Managers, Trainers, Project Teams of Specialists Customers and Suppliers							
			Admini- trative Functions	Sales & Marketing	Product Engrg.	Quality Assurance	Manufac- turing Engrg.	Production	Materials Mgmt.	
API	Administrative Process Improve. • Defining the Process • Determining Customer Needs • Measuring and Improving		*	*	*	*	*		*	Improve office efficiency and department effectiveness
TTL	Training & Team Leadership • Presentation Skills • Team Leadership • Training Process		*	*	*	*	*	*	*	Develop and improve presentation skills and local leader effectiveness
SMWI	SPC & Team Methods • Project Teams • Problem Solving • SPC & Measurement System			*	*	*	*	*	*	Implement project teams, basic statistical process control, and measurement system analysis
SMWII	Manufacturing Process Improve. • Adv. Process Control Capabil. • Short Runs/JIT • SPC Software				*	*	*			Utilize broader and more effective manufacturing applications of SPC
SMWIII	Engineering Statistics • Regression/Correlation • Statistical Comparisons • Computer Applications				*	*	*			Develop skills to apply methods upstream in engineering
SMWIV	Reliability Engineering • Program Management • Methods • Software Reliability				*	*				Prevent design problems and assure that products are reliable
SMWV	Taguchi Methods • Parameter Design • Tolerance Design • Computer Software				*	*	*	*		Optimize product performance and minimize process variation
SMWVI	Advanced Taguchi Methods • Advanced Designs • Analysis of Variance • Tolerance Design				*	*	*			Utilize advanced methods and dynamic applications
BD	Team Structured Problem Solving • Problem Solving Process • Eight Disciplines • Statistical Tools				*	*	*	*		Integrate team problem solving with all the statistical methods
TSQA	Total Supplier Quality Assurance • Existing Products • New Product Launch • QFD/BD					*			*	Integrate effective supplier quality throughout product cycle
CQE	Certified Quality Engineering • Management Aspects • Statistical Aspects • Practical Aspects					*	*			Provides overview of quality management and preparation for CQE Exam
QFD	QFD Project Mgmt. System • Product Planning • Product Development Planning • Process Development Planning • Production Planning			*	*	*	*	*	*	Utilize project system to simultaneously achieve high quality, low cost and on time

# STATISTICAL METHODS APPLICATIONS

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1. DESIGN/PROCESS TECHNOLOGY DEVELOPMENT
2. PURCHASED MATERIAL & COMPONENTS
3. PURCHASED PROCESS EQUIPMENT
4. PROCESS SETUP APPROVAL
5. MONITOR PROCESS PARAMETERS/CHARACTERISTICS
6. OPERATOR/PROCESS EVALUATION
7. TEST EQUIPMENT PRECISION/ACCURACY
8. PRODUCT CHARACTERISTICS - OUTPUT RESULTS  
(PRODUCT PERFORMANCES)
9. ECR/DEVIATION CONTROL
10. PRODUCT/PROCESS IMPROVEMENT
11. OPTIMIZATION - RELIABILITY

# QUALITY MANAGEMENT IMPLEMENTATION

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- Quality Management Committee Formed
  - Include function managers
  - Evaluate situation and develop plan
  - Appoint Quality Projects Manager
- Management Overview Session
- Committee Finalizes Plan
  - Trainers identified and trained
  - Training materials identified and customized
  - Pilot projects identified
    - Develop key elements of Q.A. System
    - Customer requirements - improve quality
    - New products/processes from the beginning
    - Reduce costs of existing products
    - Improve productivity
- Form Teams
  - Start with pilot projects
  - Train Teams as needed
  - Develop project plans and identify obstacles
- Form Supplier Subcommittee/Teams
  - Train Supplier Project Teams
- Management Review of Alternative Solutions
- Implement Project Team Recommendations
- Measure Results
  - Quality Improvement
  - Productivity Improvement
  - Cost Reduction
  - Improve Reliability
  - Competitive Position Improvement
- Recognize Project Team Accomplishments, Awards
- Evaluate Progress and Adjust Strategy
- Expand Employee Awareness, Training Communication and QC Circles
- Form New Teams
- Institutionalize for Continuous Improvement

# THINGS WE'VE LEARNED ALONG THE WAY

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- MANAGEMENT PARTICIPATION IS VITAL.
- LINK SPC TO BUSINESS OBJECTIVES AND PLAN.
- THE FIRST BREAKTHROUGH IS IN LEARNING. TOP DOWN AT FIRST FOR TRAINING IS BEST FOR SETTING THE EXAMPLE.
- PEOPLE LEARN BY FOLLOWING THE EXAMPLE OF THEIR BOSS. FOR EXAMPLE, PARTICIPATE IN EVERY WORKSHOP.
- TRAIN, AS NEEDED, IN TEAMS. OTHERWISE PEOPLE FORGET IN 30 DAYS.
- IDENTIFYING THE CAUSES OF PROBLEMS IS DEFINITELY THE HARDEST PART TO DO. TEAMS ARE THE KEY.
- LATER, THE INFORMATION AND IMPROVEMENT RECOMMENDATIONS FLOW FROM THE BOTTOM UP.
- EXPAND THE SCOPE OF EMPLOYEES AND ISSUES.
- SYSTEMATIC USE BY TEAMS OFFERS THE BIGGEST ROI.

A RECENT ARTHUR ANDERSEN SURVEY OF INDUSTRY MANAGERS FOUND THAT THE LACK OF UNDERSTANDING OF THIS QUALITY IMPROVEMENT PROCESS IS A PRIMARY OBSTACLE TO IMPROVED COMPETITIVENESS.



# Typical measures of Process Performance By Department or Function

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## **Marketing Sales/Service**

- Time to process engineering changes
- Error in filling out dealer orders
- Customer complaints
- Time of transit of parts to customers

## **Engineering**

- Time to process engineering changes
- Change requests
- Number of engineering design changes
- Failure time of product

## **Manufacturing**

- Downtime
- Amount of scrap or rework
- Level of inventory
- Outgoing quality

## **Administrative**

- Time to process travel expense reports
- Computer downtime
- Idle time of company vehicles
- Time filling orders from stockroom

## **Management**

- Number of accidents; related time loss
- Percent of overtime
- Wasted man-hours due to the system
- Training and educating employees

# TYPICAL CRITERIA FOR MEASURING IMPLEMENTATION

## Statistical Methods Control

- % Of measurement systems capable (repeatable & reproducible) for control characteristics
- % Of identified characteristics that are in control and capable
- Cpk for all identified characteristics
- % Process properly charted
- Cost reduction due to improvement projects or ROI by project
- Number of quality improvement projects completed and in-process
- Number of problem solving teams

## Supplier Quality Improvement

- % Purchased parts with control characteristics identified
- % Suppliers using SPC
- % Certified suppliers
- % Reduction in supplier base
- Cost of procurement reduction
- Price versus total cost analysis
- % Reduction in discrepant material received
- Multidiscipline supplier rating system results

## Quality Training

- Number of local trainers by subject
- % Of necessary people trained focused by department and by subject

# TYPICAL CRITERIA FOR MEASURING IMPLEMENTATION

## Control Characteristics

- % Of all new and existing product/processes reviewed for control characteristic identification

## Cost of Poor Quality

- Identification and improvement in the cost of poor quality as a percent of sales, manufacturing costs or profits: appraisal, internal failure, external failure, total costs including multiplier effect and hidden costs
- Number of claims and litigations

## Quality Management

- Evaluate element development using the Planning Matrix

## Overall Measures

- Customer quality awards
- Long term contracts
- Improved market share
- Longer warranty periods
- R/100
- Things gone wrong

TQM CATEGORY		TOP MANAGEMENT COMMITMENT	OBSESSION WITH EXCELLENCE	ORGANIZATION IS CUSTOMER DRIVEN	CUSTOMER SATISFACTION	TRAINING	EMPLOYEE INVOLVEMENT	USE OF INCENTIVES	USE OF TOOLS
STANDING → DESIRED DIRECTION	5	CONTINUOUS IMPROVEMENT IS A NATURAL BEHAVIOR EVEN DURING ROUTINE TASKS	CONSTANT, RELATIVE IMPROVEMENT IN QUALITY, COST, AND PRODUCTIVITY	CUSTOMER SATISFACTION IS THE PRIMARY GOAL	MORE CUSTOMERS STATE INTENTION TO MAINTAIN LONG TERM BUSINESS RELATIONSHIP	TRAINING IN TQM TOOLS COMMON AMONG ALL EMPLOYEES	PEOPLE INVOLVEMENT: SELF-DIRECTING WORK GROUPS	GAINSHARING (CROSS-FUNCTIONAL TEAMS)	STATISTICS IS A COMMON LANGUAGE AMONG ALL EMPLOYEES
	4	FOCUS IS ON IMPROVING THE SYSTEM	USE OF CROSS-FUNCTIONAL IMPROVEMENT TEAMS	CUSTOMER FEEDBACK USED IN DECISION-MAKING	STRIVING TO IMPROVE VALUE TO CUSTOMERS IS A ROUTINE BEHAVIOR	TOP MANAGEMENT UNDERSTANDS AND APPLIES TQM PHILOSOPHY	MANAGER DEFINES LIMITS; ASKS GROUP TO MAKE DECISION	MORE TEAM THAN INDIVIDUAL INCENTIVES AND REWARDS	DESIGN AND OTHER DEPARTMENTS USE SPC TECHNIQUES
	3	ADEQUATE MONEY AND TIME ALLOCATED TO CONTINUOUS IMPROVEMENT AND TRAINING	TQM SUPPORT SYSTEM SET UP AND IN USE	TOOLS USED TO INCLUDE WANTS AND NEEDS IN DESIGN	POSITIVE CUSTOMER FEEDBACK; COMPLAINTS USED TO IMPROVE	ONGOING TRAINING PROGRAMS	MANAGER PRESENTS PROBLEM, GETS SUGGESTIONS, MAKES DECISION	QUALITY-RELATED EMPLOYEE SELECTIONS AND PROMOTION CRITERIA	SPC* USED FOR VARIATION REDUCTION
	2	BALANCE OF LONG-TERM GOALS WITH SHORT-TERM OBJECTIVES	EXECUTIVE STEERING COMMITTEE SET UP	CUSTOMER NEEDS AND WANTS ARE KNOWN	CUSTOMER RATING OF COMPANY IS KNOWN	TRAINING PLAN DEVELOPED	MANAGER PRESENTS IDEAS AND INVITES QUESTIONS, MAKES DECISION	EFFECTIVE EMPLOYEE SUGGESTION PROGRAM USED	SPC* USED IN MANUFACTURING
	1	TRADITIONAL APPROACH TO QUALITY CONTROL - INSPECTION IS PRIMARY TOOL (CONTROL OF DEFECTS, NOT PREVENTION) - BETTER QUALITY = HIGHER COST - SIGNIFICANT SCRAP AND REWORK ACTIVITY - QUALITY CONTROL FOUND ONLY IN MANUFACTURING DEPARTMENTS MBO IMPROPERLY USED FOR ALL DEPARTMENTS							

Benchmarking Matrix

\*SPC USED AS AN EXAMPLE

AN EXAMPLE OF A GUIDE TO ASSESS STATUS OF TQM IMPLEMENTATION  
 (Develop your own to suit your own needs)

## Planning for Quality: The Improvement Matrix

Division and plant management staff and steering committees can evaluate their current situation on quality using the Improvement Plan Matrix. Each row presents one of 10 elements of modern quality. Each column represents the next step in the evolution of quality planning,

training, and implementation. An operation depicts its status by identifying the square on each row that describes what methods and actions they have initiated. The matrix focuses on manufacturing and suggests a comprehensive plan for initiating continuous improvement.

	Base Level	First Level	Second Level	Third Level	Fourth Level	Fifth Level
Management Responsibility, Support and Participation	No PQA policy statement	Division/General Mgr. has issued policy & monitors progress	PQA Manager reports to top facility manager	Steering Committee functioning with charter and objectives (C-50, SMW I, API)	All department mgrs., implementing CSO/SPC in their departments (API)	Product & process development concurrent through multifunctional teams (CFD)
Strategic Planning Quality Input	No PQA in strategic plans	Quality verbiage included, but no specific tasks/goals	Short-term quality improvement project goals included (COE)	Quantitative PQA goals established (MBQ)	Multifunctional PQA goals established (C-50, MBQ)	Continuous quality improvement strategy used with measurement criteria (MBQ)
Cost of Unquality	No unquality cost report	Accounting reports scrap and rework. No separate management report.	Traditional cost of unquality reported (COE)	Hidden costs being identified (SMW II, VI)	Hidden costs used for justifying improvement actions (SMW II, VI, MBQ)	Continuous improvement in the costs of unquality
Training & Education	No formal statistical methods training	Overview for management conducted (QMS)	Local trainers identified, trained, and training others (TTL)	Introductory Statistical methods training of teams completed (TTL, SMW I, API)	Adv. Stat. Meth. training underway in numerous functions (SMW 5-VII)	All personnel trained in SM. Programs in place for new employees.
Control Characteristics	No control characteristics identified	Characteristics added only as problems occur	Characteristics identified at customer request, by customer or engrg. & devel.	Multifunctional ID of characteristics (SMW I, COE)	FMEA's used to identify control char. & process parameters (SMW III)	Control characteristics identified on all existing & new products & processes (SMW II, COE)
Measurement Systems	No formal system for calibration or capability analysis	Calibration of master or metrology lab equipment on a regular basis, traceable to recognized stds. (COE)	Recall system for calibrating production fixtures and measurement equipment traceable to recognized stds. (COE)	Statistical capability (repeatability & reproducibility) analyzed on control characteristics measurement equipment (SMW I)	Histories kept of calibrations, repairs and capabilities (COE)	Overdue recall notices generated, & statistically capable systems
SPC Implementation	No steering Committee Plan or SPC coordinator	Steering Committee planning underway and coordinator assigned	Steering Committee identifies pilot project, initiates team training & coordinates actions (TTL, SMW I, API)	Steering Committee decides on alternative solutions. Pilot project successfully completed, new teams formed (I, API)	SPC & team utilization expanding into all manufacturing and office areas (API)	In control & capable processes. Taguchi Meth. used for Continuous Improvement (SMW VI, VII)
Manufacturing Capability Analysis	Producibility or testability not considered during design	Producibility and testability first considered at Final Design Review (SMW IV)	Statistical manufacturing capability considered at each stage of a new product development (SMW II)	Process FMEA required prior to final design release (SMW III)	Statistical tolerancing of control characteristics utilized (SMW III)	Existing & new products & processes proven capable with periodic audits & test (SMW IV)
Supplier Controls	Only receiving inspection used	System in place to handle supplier problems, occasional supplier survey made (TSQA)	Supplier Quality Function formalized, rating system utilized (TSQA)	Mutual ID of control characteristics. Teams for solving supplier problems & sourcing eval. (TSQA)	Suppliers using Stat. Methods. Minimal receiving inspection (SMW I-VII)	Only preferred suppliers used. Improved on-time delivery. (TSQA)
Manufacturing Process Control	Process not formally controlled except when problem occurred	Traditional (nonstatistical) formal controls but variability not considered (Process instructions & stds.)	Manufacturing has responsibility for ongoing operator SPC & self-stopping of process when problem identified (SMW I)	Flow diagrams & cause/effect diagram established as a basis for corrective actions (SMW II)	Project team institutes preventive maintenance & stat. setups WIP inventory reduced (SMW II)	Worker group problem-solving, foolproofing & continuous improvement (SMW II)



Malcolm Baldrige  
National  
Quality  
Award

**EXAMINATION  
CATEGORIES,  
SUBCATEGORIES  
AND POINT  
VALUES**

1989 Examination Categories/Subcategories	Maximum Points	Percent of Total	YOUR OPERATION		
			Points	Total	Percent
<b>1.0 LEADERSHIP</b>	<b>120</b>	<b>12</b>			
1.1 Senior Management	30				
1.2 Quality Values	20				
1.3 Management System	50				
1.4 Public Responsibility	20				
<b>2.0 INFORMATION AND ANALYSIS</b>	<b>60</b>	<b>6</b>			
2.1 Scope of Data and Information for "Management by Fact"	25				
2.2 Data Management	15				
2.3 Analysis and Use of Data for Decision Making	20				
<b>3.0 STRATEGIC QUALITY PLANNING</b>	<b>80</b>	<b>8</b>			
3.1 Planning Process	30				
3.2 Plans for Quality Leadership	50				
<b>4.0 HUMAN RESOURCE UTILIZATION</b>	<b>150</b>	<b>15</b>			
4.1 Management	25				
4.2 Employee Involvement	40				
4.3 Quality Education and Training	30				
4.4 Employee Recognition	20				
4.5 Quality of Worklife	35				
<b>5.0 QUALITY ASSURANCE OF PRODUCTS AND SERVICES</b>	<b>140</b>	<b>14</b>			
5.1 Design and Introduction of New or Improved Products and Services	25				
5.2 Operation of Processes Which Produce the Company's Products and Services	20				
5.3 Measurements and Standards for Products, Processes and Services	15				
5.4 Audit	20				
5.5 Documentation	10				
5.6 Quality Assurance of Operations and Business Processes	25				
5.7 Quality Assurance of External Providers of Goods and Services	25				
<b>6.0 QUALITY RESULTS</b>	<b>150</b>	<b>15</b>			
6.1 Quality of Products and Services	70				
6.2 Operational and Business Process Quality Improvement	60				
6.3 Quality Improvement Applications	20				
<b>7.0 CUSTOMER SATISFACTION</b>	<b>300</b>	<b>30</b>			
7.1 Knowledge of Customer Requirements and Expectations	40				
7.2 Customer Relationship Management	125				
7.3 Customer Satisfaction Methods of Measurement and Results	135				
<b>TOTAL POINTS</b>	<b>1000</b>				