Unit IV
TOM TOOLS and TECHNIQUES-II

QUALITY FUNCTION DEPLOYMENT

Quality Function Deployment is a planning tool used to fulfill customer expectations.

Quality Function Deployment focuses on customer expectations or requirements, often referred to as voice of the customer.

QFD TEAM :

There are two types of teams namely

1. Team for designing a new product
3. Team for improving an existing product

BENEFITS OF QFD :

1. Improves Customer satisfaction

Creates focus on customer requirements
Uses competitive information effectively
Prioritizes resources
Identifies items that can be acted upon

2. Reduces Implementation Time

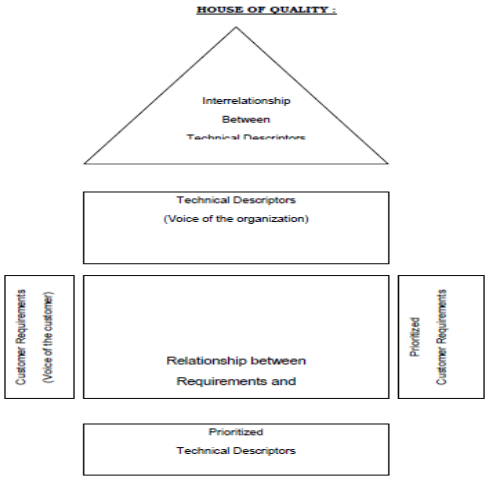
Decreases midstream design changes
Limits post introduction problems
Avoids future development redundancies

3. Promotes Team Work

Based on consensus
Creates communication
Identifies actions

4. Provides Documentation

Documents rationale for design
Adds structure to the information
Adapts to changes (a living document)



THE STEPS IN BUILDING A HOUSE OF QUALITY ARE :

1. List Customer Requirements (WHAT"s)
2. List Technical Descriptors (HOW"s)
3. Develop a Relationship Matrix Between WHAT"s and HOW"s
4. Develop an Inter-relationship Matrix between HOW"s
5. Competitive Assessments

a. Customer Competitive Assessments
b. Technical Competitive Assessments

6. Develop Prioritized Customer Requirements
7. Develop Prioritized Technical Descriptors

TAGUCHI'S QUALITY LOSS FUNCTION

Taguchi"s Quality Loss Function concept combines cost, target and variation in one metric with specifications being of secondary importance.

Taguchi has defined quality as the loss imparted to society from the time a product is shipped. Societal losses include failure to meet customer requirements, failure to meet ideal performance and harmful side effects.

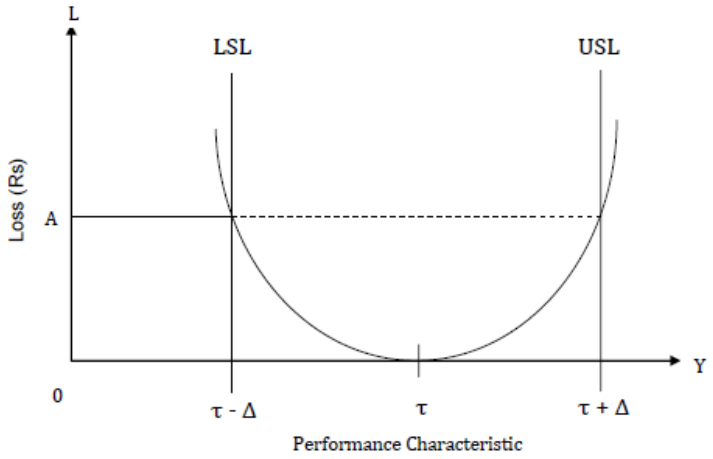
CUSTOMERS PERCEIVE QUALITY AS MEETING THE TARGET RATHER THAN JUST MEETING THE SPECIFICATIONS.

There are three common quality loss functions

1. Nominal - the - best.
2. Smaller - the - better.
3. Larger - the - better.

NOMINAL – THE – BEST :

Although Taguchi developed so many loss functions, many situations are approximated by the quadratic function which is called the **Nominal – the – best** type.



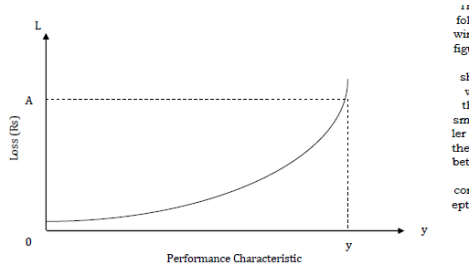
The quadratic function is shown in figure. In this situation, the loss occurs as soon as the performance characteristic, y, departs from the target τ.

At τ, the loss is Rs. 0.

At LSL (or) USL, the loss is Rs. A.

Where,
L = cost incurred as quality deviates from the target.
y = Performance characteristic
τ = target
k = Quality loss coefficient.

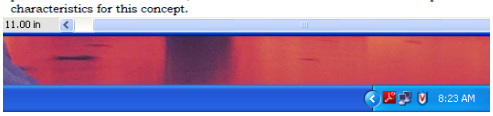
The loss coefficient is determined by setting Δ = (y – τ), the deviation from the target. When Δ is the USL (or) LSL, the loss to the customer of repairing (or) discarding the product is Rs. A.
Thus,
K = A / (y – τ)2 = A / Δ2 .



Smaller-the-better

value for **smaller – the – better** is 0. There are no negative values for the performan characteristic.

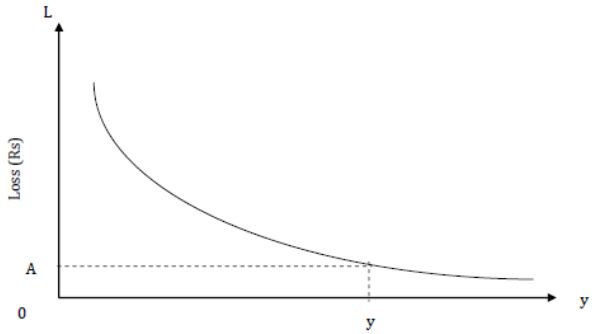
The radiation leakage from a microwave appliance, the response time for a compute pollution from an automobile, out of round for a hole etc. are the performan characteristics for this concept.



The target value for **smaller – the – better** is 0. There are no negative values for the performance characteristic.
The radiation leakage from a microwave appliance, the response time for a computer, pollution from an automobile, out of round for a hole etc. are the performance characteristics for this concept.

LARGER – THE – BETTER :

The following figure shows the concept of the Larger – the – better.



In the Larger – the – better concept, the target value is ∞ (infinity), which gives a **zero loss**. There are no negative values and the worst case is at y = 0. Actually, larger – the – better is the reciprocal of smaller –

the – better. The performance characteristics in Larger – the – better are bond strength of adhesives, welding strength etc.

TOTAL PRODUCTIVE MAINTENANCE (TPM)

Total Productive Maintenance (TPM) is defined as keeping the running plant and equipment at its highest productive level with the co-operation of all areas of the organization.

Predictive and Preventive maintenance are essential to building a foundation for a successful TPM environment. **Predictive Maintenance** is the process of using data and statistical tools to determine when a piece of equipment will fail. **Preventive Maintenance** is the process of periodically performing activities such as lubrication on the equipment to keep it running.

OBJECTIVES OF TPM :

1. To maintain and improve equipment capacity.
2. To maintain equipment for life.
3. To use support from all areas of the operation.
4. To encourage input from all employees.
5. To use teams for continuous improvement.

TPM PHILOSOPHY – CONCEPT OF TPM :

Total Productive Maintenance (TPM) is an extension of the Total Quality Management (TQM) philosophy to the maintenance function.

TPM has the following steps:

1. Management should learn the new philosophy of TPM.
2. Management should promote the new philosophy of TPM.

Training should be funded and developed for everyone in the organization.

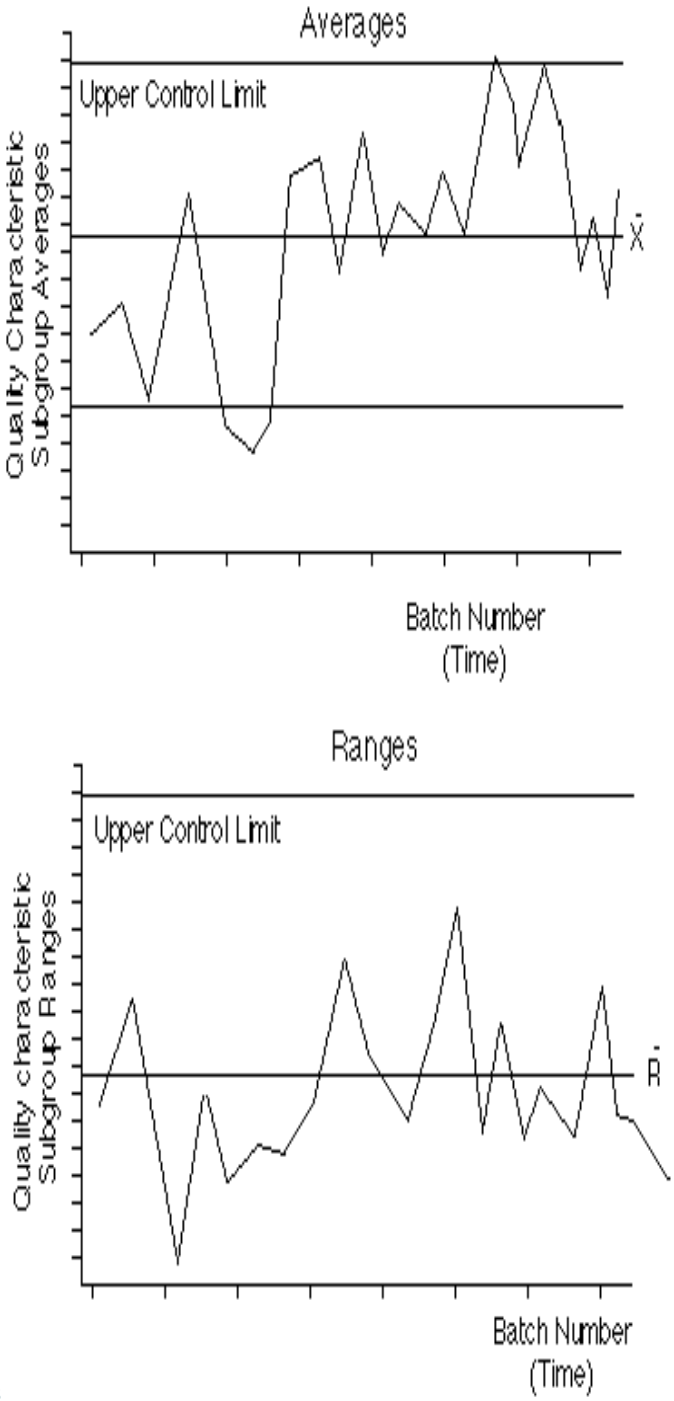
4. Areas of needed improvement should be identified.

Loss measurements to identify improvement needs are

Down time losses
Reduced speed losses
Poor quality losses

5. Performance goals should be formulated.
6. An implementation plan should be developed.
7. Autonomous worth groups should be established.

CONTROL CHARTS



Control Charts

Control charts are a method of Statistical Process Control, SPC. (Control system for production processes). They enable the control of distribution of variation rather than attempting to control each individual variation. Upper and lower control and tolerance limits are calculated for a process and sampled measures are regularly plotted about a central line between the two sets of limits. The plotted line corresponds to the stability/trend of the process. Action can be taken based on trend rather than on individual variation. This prevents over-correction/compensation for random variation, which would lead to many rejects.