

Taguchi Quality Loss Function

- Taguchi Methods is a statistical methods developed largely by GENICHI TAGUCHI to improve quality of manufactured goods.
- The philosophy of off-line quality control.
- Innovations in the design of experiments.

Definition :

- Taguchi defines Quality as “the loss imparted by the product to society from the time the product is shipped.”
- LOSS = Cost to operate, Failure to function, maintenance and repair cost, customer satisfaction, poor design.
- Product to be produced “being within specification”

Taguchi’s Vs Traditional Approach

Taguchi’s	Traditional
When a product moves from its Target will cause the loss even if the product lies or not within Limits	There is Good or Bad Products only as per Limits

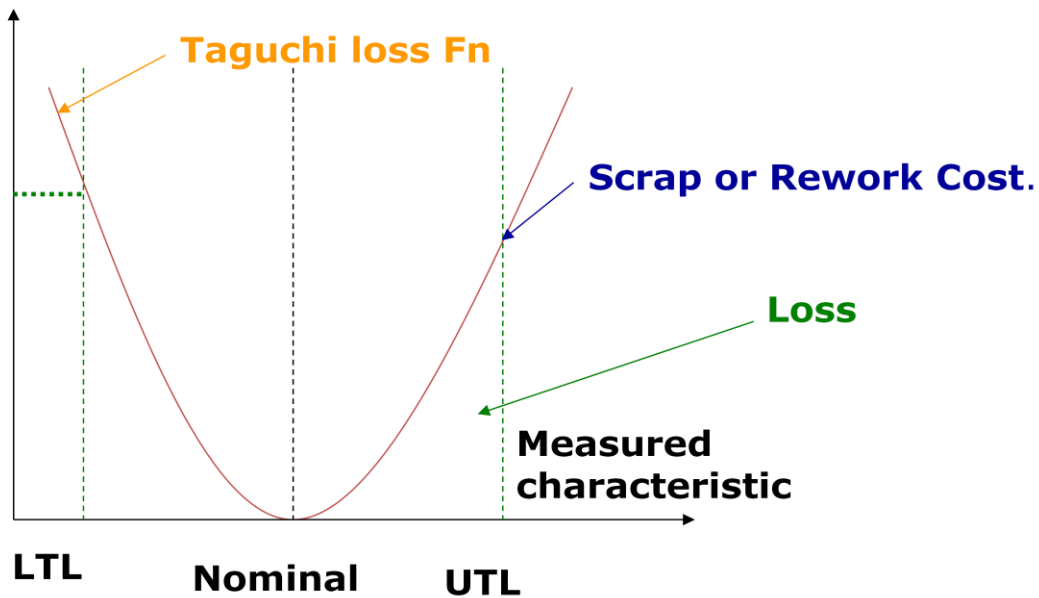
Explanation of the Taguchi method

Suppose the manufacturing specifications for a widget is 20 (plus or minus) 3 mm. Under the traditional manufacturing perspective, if the widget actually produced is less than 17 mm or greater than 23 mm, then it must be discarded. For any widget within the 17mm to 23mm range, the traditional manufacturing perspective recognizes no quality loss cost.

Under the Taguchi perspective, a quality cost is incurred whenever the actual weight does not reach the exact target value 20mm. Variations from this target value (even 19mm or 21mm value) will produce the quality loss cost.

Taguchi’s Quadratic Quality Loss Function

- Quality Loss Occurs when a product’s deviates from target or nominal value.
- Deviation Grows, then Loss increases.
- Taguchi’s U-shaped loss Function Curve.



Formula to find Taguchi's Loss Fn

Taguchi uses Quadratic Equation to determine loss Curve

$$L(x) = k(x-N)^2$$

Where $L(x)$ = Loss Function,
 $k = C/d^2$ = Constant of proportionality,
 where C – Loss associated with sp limit
 d - Deviation of specification from target value
 x = Quality Features of selected product,
 N = Nominal Value of the product and
 $(x-N)$ = Tolerance

Example :

A part dimension on a power tool is specified as 32.25 ± 0.25 . Company records show ± 0.25 exceeded & 75% of the returned for replacement. Cost of replacement is Rs.12,500. Determine k & QLF.

Solution :

Expected Cost of repair

$$C = 0.75(12500) = \text{Rs } 9,375$$

$$k = C/d^2 = 9375/(0.25)^2 = \text{Rs } 1,50,000$$

$$\text{QLF} = L(x) = 1,50,000(x-N)^2$$