

Assignment 1

Qn. 1. Applying Taguchi's Principles:

Ex-1: 2 factors at 2 levels:

Full factorials: $2^2 = 4$

Half factorials: 4

Saturation: 4

Ex-2: 2 factors at 3 levels:

Full factorials: $3^2 = 9$

Half factorials: 9

Saturation: 9

Qn. 2. Taking C_p as 1.00

$$C_p = \frac{\pm SL}{\pm 3\sigma}$$

$$\therefore SL = C_p \times (\pm 3\sigma) \\ = \pm 3\sigma$$

Taking C_p as 1.33

$$C_p = \frac{\pm SL}{\pm 3\sigma}$$

$$\therefore SL = C_p \times (\pm 3\sigma) \\ = \pm 4\sigma$$

One-sided

Defect Rates:

$$\begin{aligned} f(z) &= f(3) \left\{ \begin{array}{l} \text{symmetric} \\ = f(-3) \end{array} \right\} \\ &= 0.00135 \\ &= 0.135\% \end{aligned}$$

Defect Rates:

$$\begin{aligned} f(z) &= f(4) \left\{ \begin{array}{l} \text{symmetric} \\ = f(-4) \end{array} \right\} \\ &= 0.000032 \\ &= 0.0032\% \end{aligned}$$

Two-sided

$$0.27\%$$

$$0.0064\%$$

Qn. 3 Defect Rate = $5/1000 = 0.005$

Assuming this to be 2-sided, defect rate for 1-sided: 0.0025

$$\therefore f(z) = 0.0025 \Rightarrow z = 2.81$$

$$\therefore C_{pk} = z/3 = 2.81/3$$

$$C_{pk} = 0.9366$$