Demo Week 3

Tuesday, June 14, 2022 8:04 PM

$C_p = \frac{USL - LSL}{6\sigma} = \frac{18 - 10}{6\sigma}$

a)

$n = 5$, $K = 25$, $\sum_{i=1}^{25} R_i = 81.32$, $\sum_{i=1}^{25} \bar{x}_i = 376.417$, $d_2(5) = 2.326$

$\hat{\sigma} = \frac{\bar{R}}{d_2}$

$\bar{R} = \frac{\sum R_i}{K} = \frac{81.32}{25} = 3.252$

$\hat{\sigma} = \frac{3.252}{2.326} = 1.398$

$C_p = \frac{18-10}{(1.398)(6)} = \boxed{0.954}$

$C_p < 1.33$, process is NOT capable

b)

$p = \left(\frac{1}{C_p}\right)(100) = \left(\frac{1}{.954}\right)(100) = 104.85\%$

$\bar{\bar{x}} = \frac{\sum \bar{x}_i}{K} = \frac{376.417}{25} = 15.06$

C_p is not at 14 (mean) so not the correct capability ratio. Use C_{pk}

BP: $\bar{x} = 7$, $s = 1.41$, $n = 8$

EM: $\bar{x} = 9.92$, $s = .96$, $n = 13$

95% CL, $\alpha = 0.05$

$\bar{x}_1 - \bar{x}_2 \pm t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

DOF

$\nu = \left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2 \approx 9 \Rightarrow t_{\alpha/2} = 2.26$ ← From table

$\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}$

$\boxed{0.8367 \leq \mu_1 - \mu_2 \leq 3.30}$

Midwest: $n = 100$, $p = 85\%$, events = 85 $\hat{p}_2$

West Coast: $n = 200$, $p = 90\%$, events = 180 $\hat{p}_1$

80% CL, $\alpha = 0.2$

$\hat{p}_1 - \hat{p}_2 \pm z_{\alpha/2} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$

$z_{0.10} = 1.2815$ (From Excel)

$.9 - .85 \pm (1.2815) \sqrt{\frac{(.9)(.1)}{200} + \frac{(.85)(.15)}{100}}$

$\boxed{-0.0032 \leq p_1 - p_2 \leq 0.1032}$