

$$\text{ex1) } n=25 \quad n=b \quad \sum x = 510,01 \quad \Sigma R = 8,89$$

$$\bar{x} = \frac{\sum x}{n} = \frac{510,01}{25} = 20,4004$$

$$\bar{R} = \frac{\Sigma R}{n} = \frac{8,89}{25} = 0,3556$$

$$UCL_x = \bar{x} + A_2 \bar{R} = 20,572$$

$$LCL_x = \bar{x} - A_2 \bar{R} = 20,228$$

CS ۱۹۸۵-۱۹۸۶ در اینجا می‌باشد

$$UCL_R = D_4 R = 2,12$$

$$LCL_R = D_3 R = 0,598$$

$$UCL_{\bar{x}} = (S_{\bar{x},05} + S_{\bar{x},05}) - D_{3,\bar{x}} = \bar{x} + S_{\bar{x},05} - \bar{x} = S_{\bar{x},05}$$

$$UCL_{\bar{x}} = S_{\bar{x},05} = 20,572$$

$$LCL_{\bar{x}} = (S_{\bar{x},05} - S_{\bar{x},05}) - D_{3,\bar{x}} = \bar{x} - S_{\bar{x},05} - \bar{x} = -S_{\bar{x},05}$$

$$LCL_{\bar{x}} = -S_{\bar{x},05} = -20,228$$

$$UCL_{\bar{x}} = S_{\bar{x},05} = 20,572$$

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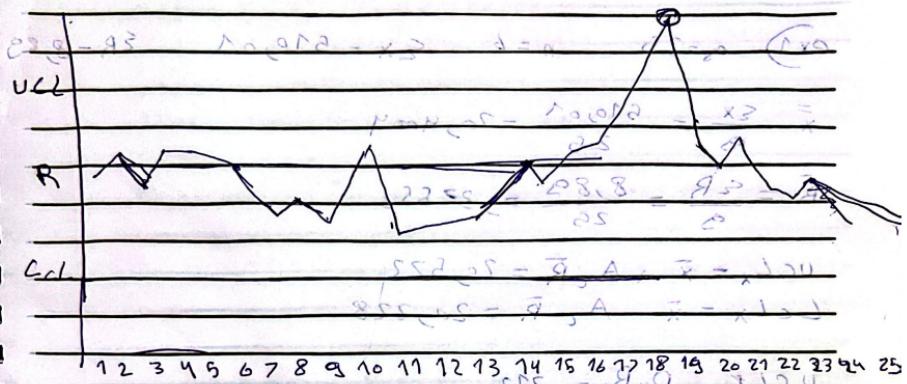
$$LCL_{\bar{x}} = -S_{\bar{x},05} = -20,228$$

$$UCL_{\bar{x}} = S_{\bar{x},05} = 20,572$$

$$LCL_{\bar{x}} = -S_{\bar{x},05} = -20,228$$

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Revised

$$\bar{X}_{\text{new}} = \bar{X}_0 = \frac{\sum x - \bar{x}_d}{n - d_d} = \frac{510.01 - (20, 62 + 20, 2)}{25 - 2} = 20, 39.826$$

$$R_{\text{new}} = \frac{\sum R - R_d}{n - d_d} = \frac{8.89 - 7.3}{25 - 2} = 1.34$$

$$X = \frac{R_0}{d_2} = 1.34134$$

$$UCL_X = \bar{X}_0 + A_6 \sigma = 20, 56.26$$

$$LCL_X = \bar{X}_0 - A_6 \sigma = 20, 23.38956$$

$$UCL_R = D_2 \sigma_0 = 1.34134$$

$$LCL_R = D_1 \sigma_0 = 0$$

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$$\text{Q1) } \sigma_3 = 25 \quad n = 8$$

$$\bar{x} = \frac{\sum x_i}{n} = \frac{13708}{25} = 548.32$$

$$S = \sqrt{\frac{\sum s_i^2}{n}} = \sqrt{\frac{670}{25}} = 96.8$$

$$UCL_x = \bar{x} + A_3 S = 573.7232$$

$$LCL_x = \bar{x} - A_3 S = 518.8668$$

$$UCL_s = B_4 \cdot S = 48.842$$

$$LCL_s = B_3 \cdot S = 4.958$$

$$UCL_x = \bar{x} + A_3 S = 573.7232$$

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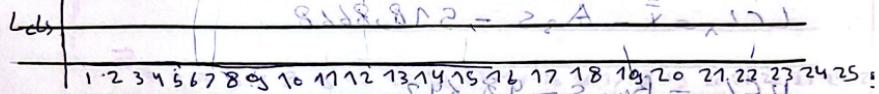
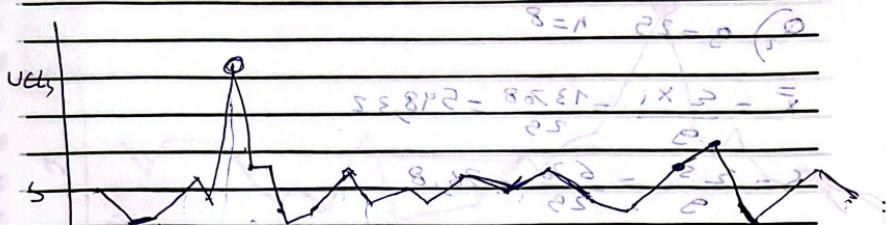
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Revised

$$X_{\text{new}} = \bar{x} - \frac{\bar{x}_d}{s_d} = 13.08 - \frac{2.728}{2.94} = 551.428 \text{ (approx)}$$

$$S_{\text{new}} = s_0 = \frac{s_0 - \bar{s}_d}{s_d} = \frac{6.70 - 5.0}{2.91} = 2.582$$

$$LCL = S_0 - 3s_d = 7.6 - 2.20 = 5.4$$

$$UCL_X = X_0 + A_s s_d = 5.79, 8318$$

$$LCL_X = X_0 - A_s s_d = 5.23, 0253$$

~~$$UCL_S = B_3 s_d = 9.8, 8248$$~~

~~$$LCL_S = B_5 s_d = 4, 79, 188$$~~

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Q) in control \rightarrow Revised

Revised (Q)

$$X_0 - \frac{\Sigma X}{n} = \frac{2046.95}{25} = 81.862 - \frac{X_0}{25} = .x$$

$$S_0 = \frac{\Sigma S}{n} - \frac{\Sigma X}{25} = \frac{88.61}{25} - \frac{81.862}{25} = .8$$

$$B_{60} = \frac{S_0}{C_q} = \frac{.8}{.09} = 8.888 \quad UCL = A' + R = 8.888$$

$$UCL_x = X_0 + A_{60} = 82.756$$

$$LCL_x = A_{60} - A_{60} = 80.964$$

$$UCL_S = A_{60} C_q = 18.37018 -> A = .88 \quad X = 1.11$$

$$LCL_S = B_{60} C_q = 8.88871213 \Rightarrow A = .8111 \\ A = .8111 -> LCL = .555$$

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in control

(Q) Revised

$$\bar{x}_0 = \frac{\sum x}{n} = \frac{5208}{25} = 208.36 \approx 208$$

$$R_0 = \frac{\sum R}{n} = \frac{1382}{25} = 55.28 \approx 55$$

$$n=4 \quad A = 1 \quad R_{DPS} = d_2 = 3.05 \approx 3$$

$$D_2 = 4, \text{ b.g.}$$

$$d_2 = R_0 = 229.676$$

$$UCL_x = \bar{x}_0 + A_3 d_2 = 208 + 2.42264$$

$$LCL_x = \bar{x}_0 - A_3 d_2 = 208 - 1.738261 \approx 196.26$$

~~$$UCL_R = D_2 d_2 = 1.078283 \approx 1.08$$~~

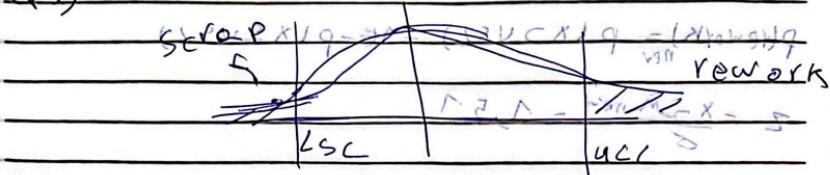
~~$$LCL_R = D_4 d_2 = 0$$~~

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(Q5)



$$LSL = 304.55 \quad USL = 306.55 \Rightarrow (M - x) = 7$$

$$M = 305.5 \quad \sigma = 25$$

$$P(\text{Scrap}) = P(X < LSL) \Rightarrow Z = \frac{x - M}{\sigma} = \frac{304.55 - 305.5}{25} = -0.38$$

$$= -0.38 \rightarrow 0.04667 * 100\% = 4.667\%$$

$$P(\text{Scrap}(X)) = P(X > USL) = 1 - P(X \leq USL)$$

$$P(X > USL) \Rightarrow Z = \frac{x - M}{\sigma} = \frac{306.55 - 305.5}{25} = 0.4$$

$$= 0.725 * 100\% = 72.5\%$$

$$P(\text{Rework}(X)) = 100 - 72.5 = 27.5$$

$$\star P(\text{Scrap}) = \frac{1}{100} = 0.1$$

$$Z = -0.38 = \frac{304.55 - M_{\text{new}}}{25}$$

$$M_{\text{new}} = 305.3225$$

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$$\text{Process width} = P(X > USL) - 1 + P(X \leq LSL)$$

$$Z = \frac{x - \mu_{\text{new}}}{\sigma} = 1.57$$

$$P(X < USL) = 0.324478%$$

$$P(X > USL) = 6.5522%$$

$$\frac{25.5 - 22.45}{2.5} = \frac{\mu - x}{\sigma} = \frac{2.05}{2.5} = 0.82$$

(b) Process capability - $6\sigma = 6 \times 2.76 = 16.572$

$$Cpk = \frac{50.8 - 22.45}{2.5} = \frac{\mu - x}{\sigma} = \frac{(18.15 - 17)}{2.5} = 0.48$$

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Cpk

$$Cpk = \frac{50.8 - 22.45}{2.5} = \frac{\mu - x}{\sigma} = \frac{(18.15 - 17)}{2.5} = 0.48$$

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