

SPC Capability Exercise Answers

Note: Calculations are $C_{PKL} = \frac{\bar{\bar{X}} - LSL}{3\sigma}$ and $C_{PKU} = \frac{USL - \bar{\bar{X}}}{3\sigma}$

Exercise 1:

$$USL = 16.4 \quad LSL = 15.6 \quad \bar{\bar{X}} = 15.8 \quad 3\sigma = 0.4$$

$$C_{PKL} = \frac{15.8 - 15.6}{0.4} = \frac{0.2}{0.4} = 0.5$$

$$C_{PKU} = \frac{16.4 - 15.6}{0.4} = \frac{0.6}{0.4} = 1.5$$

Therefore $C_{pk} = 0.5$

Exercise 2:

$$USL = 10.2 \quad LSL = 9.8 \quad \bar{\bar{X}} = 9.8 \quad 3\sigma = 0.2$$

$$C_{PKL} = \frac{9.8 - 9.8}{0.2} = \frac{0.0}{0.2} = 0$$

$$C_{PKU} = \frac{10.2 - 9.8}{0.2} = \frac{0.4}{0.2} = 2$$

Therefore $C_{pk} = 0.0$

Exercise 3:

$$USL = 19.1 \quad LSL = 18.9 \quad \bar{\bar{X}} = 18.85 \quad 3\sigma = 0.1$$

$$C_{PKL} = \frac{18.85 - 18.5}{0.1} = \frac{-0.05}{0.1} = -0.5$$

$$C_{PKU} = \frac{19.1 - 18.85}{0.1} = \frac{0.25}{0.1} = 2.5$$

Therefore $C_{pk} = -0.5$

Exercise 4:

$$USL = 15.2 \quad LSL = 14.8 \quad \bar{\bar{X}} = 14.425 \quad 3\sigma = 0.75$$

$$C_{PKL} = \frac{14.425 - 14.8}{0.75} = \frac{-0.375}{0.75} = -0.5$$

$$C_{PKU} = \frac{15.2 - 14.425}{0.75} = \frac{0.775}{0.75} = 1.333$$

Therefore $C_{pk} = -1.333$