



ASQ CRE Prep course

Lesson II. A. 7. g.

SPC and Process Capability

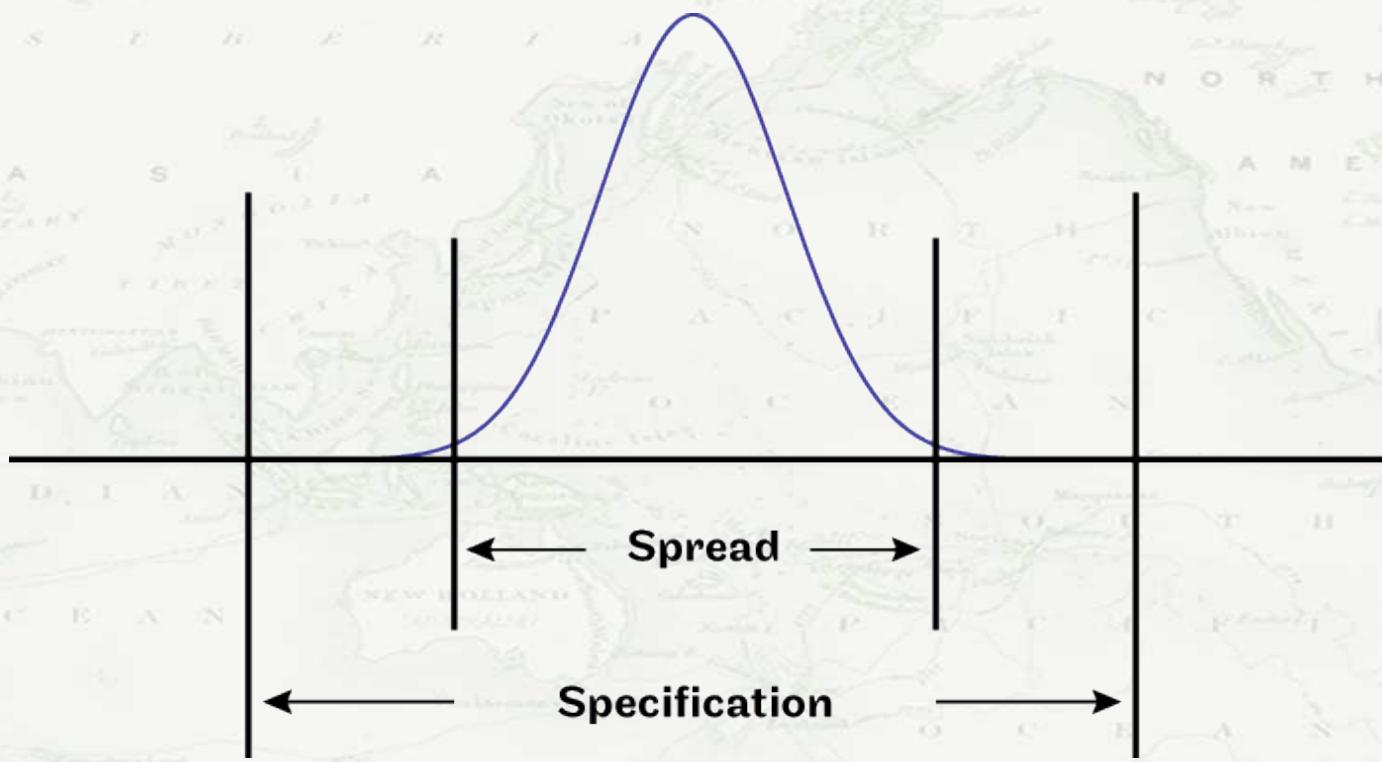
Process Capability

The background image is a high-angle aerial photograph of a coastal landscape. It features a series of steep, rocky cliffs on the left, with white-capped waves crashing against them. Behind the cliffs, the land rises into green, rolling hills and mountains. A winding road cuts through the hills, and a small, scattered town with numerous houses is nestled in a valley on the right side of the image.

So what, your stable, is that good enough?

PROCESS CAPABILITY INDICES

Spread vs Tolerance



Comparison & Actions

- 1. Do nothing – everything is in spec**
- 2. Change the specifications**
- 3. Center the process**
- 4. Reduce Variability**
- 5. Accept the losses**

C_p

The Capability Index

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

$C_p > 1.33$ – Capable

$C_p = 1$ to 1.33 – Capable with tight Control

$C_p < 1$ – Incapable

C_R

The Capability Index

$$C_r = \frac{6\sigma}{USL - LSL}$$

C_R > 1.00 – Incapable

C_R = 0.75 to 1 – Capable with tight Control

C_R < 0.75 - Capable

C_{pk}

$$C_{pk} = \min \left[\frac{USL - \bar{X}}{3\sigma}, \frac{\bar{X} - LSL}{3\sigma} \right]$$

- **Takes into account centering (distance from specifications)**

C_{pm}

$$C_{pm} = \frac{USL - LSL}{6\sqrt{(\mu - T)^2 + \sigma^2}}$$

- **Emphasis on centering on a target value.**

Stable and
Capable?



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Standard Normal and z-values