



# Process Capability

## ? What is It

Process capability (Cp) is a measure of the **relationship between the voice of the process (VOP) and the voice of the customer (VOC)**. It is essentially a ratio of the customer requirement (specification) and the expected process variation.

## 🕒 When

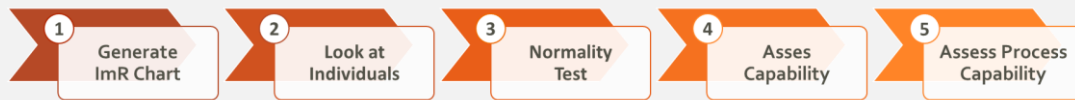
- Determine if the process is **"in control"**.
- Discover any disparity during the manufacturing process to reduce **variability**.
- Used in the **Analyze** phase of the **DMAIC**.

## 🎯 Goals

- Meet **customer requirements**.
- Control process **variation**.
- Define **realistic tolerances** for product dimensions.

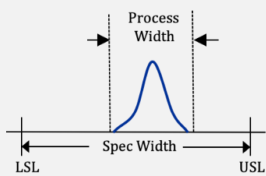
## 📊 How

Steps:



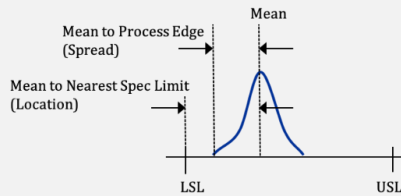
$$C_p = \frac{\text{Specification width}}{\text{Process width}} = \frac{USL - LSL}{6\hat{\sigma}} \quad C_{pk} = \min \left[ \frac{USL - \text{Process mean}}{3\hat{\sigma}}, \frac{\text{Process mean} - LSL}{3\hat{\sigma}} \right]$$

$$C_p = \frac{\text{Specification Width}}{\text{Process Width}}$$



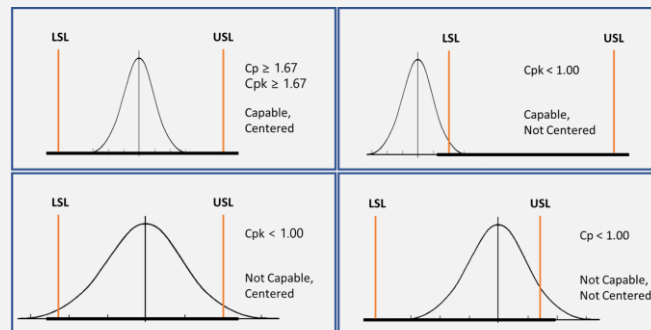
**Cp** accounts for only the spread (or variation) of the process.

$$C_{pk} = \frac{\text{Distance from Mean to Nearest Spec Limit}}{\text{Distance from Mean to Process Edge}}$$



**Cpk** accounts for both the spread and location of the process.

Assessing Process Capability:



## 📌 Example

## 👉 Hints

- Process must be in **"Statistical Control"** before conducting a process capability.
- If the process is in control, process capability can **predict compliance** of customer requirements.
- For **process design**, use Cp and Cpk.

