Statistical Process Control

? What is It

SPC refers to a scientific, **data-driven** method for quality analysis and improvement that allows us to **monitor** the manufacturing process, thus providing us with data to **prevent problems from occurring.**
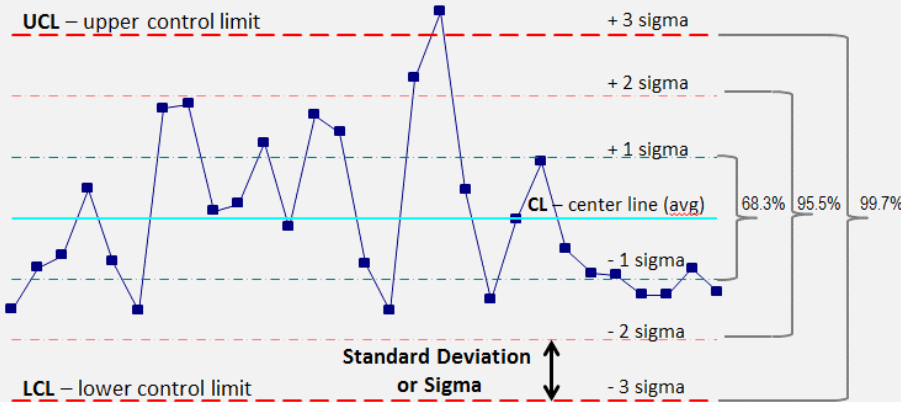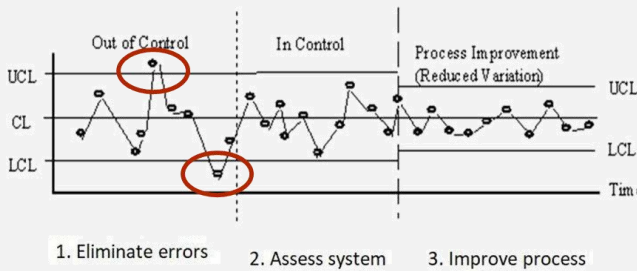
When

- To drive continuous improvement.
- To predict process performance.
- Used in the **Analyze** and **Control** phase of the **DMAIC.**

Goals

- Find and correct **problems** as they occur.
- **Predict** outcomes if the process is in control.
- Make inferences for **continuous improvement** initiatives.

How

1. Eliminate errors   2. Assess system   3. Improve process

UCL – upper control limit   + 3 sigma
+ 2 sigma
+ 1 sigma
CL – center line (avg)   68.3% 95.5% 99.7%
- 1 sigma
- 2 sigma
Standard Deviation or Sigma   - 3 sigma
LCL – lower control limit

VARIABLE DATA

length   weight   time   pressure

OFTEN CONTAINS DECIMALS

SUBGROUP SIZE		
= 1	ImR chart	
2 to 10	Xbar & XbarR chart	
> 10	Xbar & XbarS chart	

SPECIAL CHARTS		
CUSUM	Detect small shift in process	
EWMA	Small shift when size=1	
MOVING AVERAGE	For rolling trend/direction	

ATTRIBUTE DATA

errors   defects   pass no-pass   go no-go

ALWAYS CONTAINS WHOLE NUMBERS

COUNT DEFECTS	Constant sample	u chart
	Variable sample	c chart
COUNT DEFECTIVES	Constant sample	p chart
	Variable sample	np chart

A defective unit may contain more than One defect

Hints

- Perfect tool to **avoid opinions** and **"gut-feeling"** solutions.
- Focus first on having the **process "in control".** Reduce special cause variation.
- Let a software choose the right control chart: **Variables or Attributes.**

Example