What's the Difference between Cpk and Ppk?

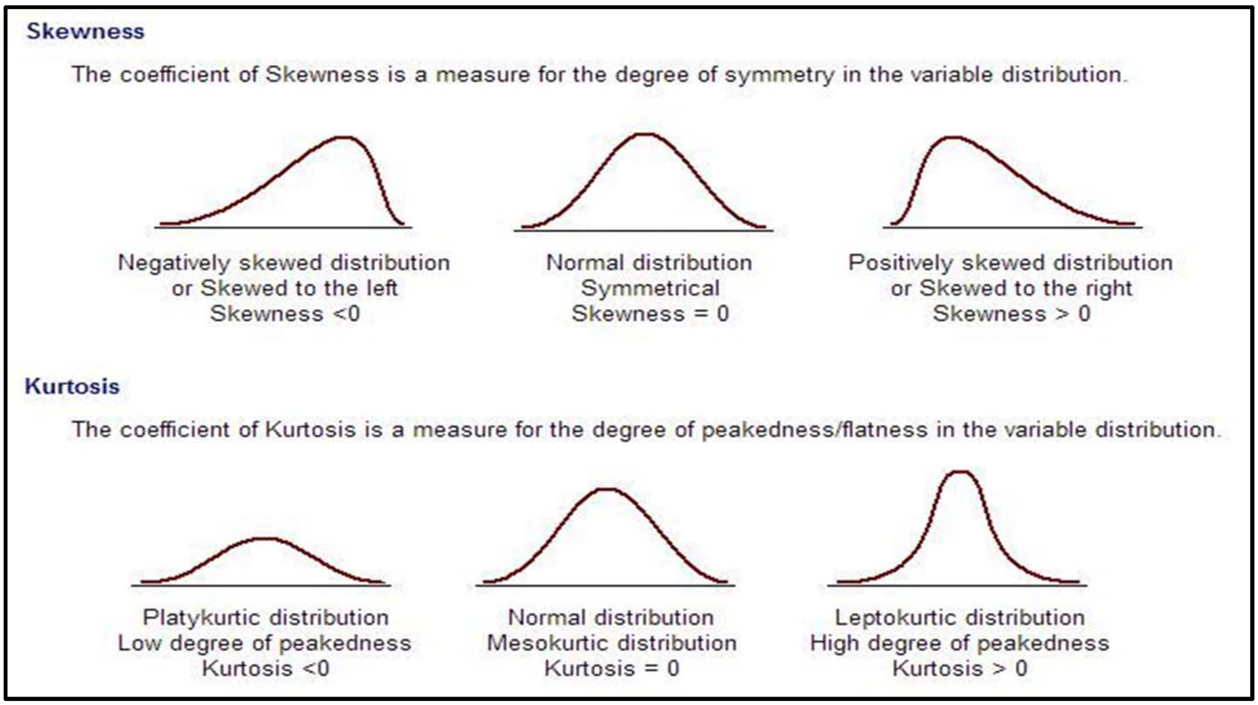
Cpk	**Ppk**
Process Capability Index	Process Performance Index
Cp, Cpu, Cpl, Cpk	Pp, Ppu, Ppl, Ppk
Sometimes referred to as "Short term" capability	Sometimes referred to as "Long term" capability
Uses $\hat{\sigma}$, an estimate of standard deviation R-bar / d2	Uses 's' as the standard deviation stdev.s
Considers only within subgroup variation	Considers overall variation
Does NOT account for the shifts and drifts between subgroups	Does account for the shifts and drifts between subgroups
Potential capability	"As viewed by customer" capability

Capability Indicies by Sampling Option

	Option #1 **Measure 100% of parts in batch**	**Option #2** **Measure a randomly selected sample of parts from batch**	**Option #3** **Measure repeated samples of parts drawn at uniform intervals across batch production**
Arthimetic mean or Average	μ, pronounced /mew/, mean of the population	$\bar{x}$, pronounced /ex-bar/, mean of the sample	$\bar{\bar{X}}$, pronounced /ex-double bar/, grand average of the sample means
Standard Deviation (measures spread of data)	σ, Pronounced /sig-ma/, Population standard deviation	s, Sample standard deviation	$\hat{\sigma}$, pronounced /sig-ma hat/, Estimated standard deviation
Formula for standard deviation	$\sigma = \sqrt{\frac{\Sigma(x_i - \mu)^2}{N}}$	$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}}$	$\hat{\sigma} = \bar{R} / d_2$
Where	N = Count of population	n = Count of sample	R-bar = Average of range vlaues from control chart d2 = Constant from Table of Control Chart Constants
Indicies used	Pp, Ppu, Ppl, Ppk, Ppm	Pp, Ppu, Ppl, Ppk, Ppm	Cp, Cpu, Cpl, Cpk, Cpm
Formulas	Pp = (USL - LSL) / (6 * σ)	Pp = (USL - LSL) / (6 * s)	Cp = (USL - LSL) / (6 * $\hat{\sigma}$)
	Ppu = (USL - μ) / (3 * σ)	Ppu = (USL - $\bar{x}$) / (3 * s)	Cpu = (USL - $\bar{\bar{x}}$) / (3 * $\hat{\sigma}$)
	Ppl = (μ - LSL) / (3 * σ)	Ppl = ($\bar{x}$ - LSL) / (3 * s)	Cpl = ($\bar{\bar{x}}$ - LSL) / (3 * $\hat{\sigma}$)
	Ppk = $[Ppu,Ppl]_{Min}$	Ppk = $[Ppu,Ppl]_{Min}$	Cpk = $[Cpu,Cpl]_{Min}$
	Ppm = (USL - LSL) / 6 * SQRT[$\sigma^2 + (\mu - T)^2$]	Ppm = (USL - LSL) / 6 * SQRT[$s^2 + (\bar{x} - T)^2$]	Cpm = (USL - LSL) / 6 * SQRT[$\hat{\sigma}^2 + (\bar{\bar{x}} - T)^2$]
Where	USL = Upper Specification Limit, LSL - Lower Specification Limit, T = Target, SQRT = Square root of		

Capability Analysis Tools

A Capabaility level of ___ Cpk	Equates to +/- ___ sigma before the extent of the process curve meets a specification limit	At which point, the expected Defective Parts per Million (DPPM) is ______
0.50	1.5	133,610
1.00	3	2,700
1.33	4	63
1.50	4.5	6.8
1.67	5	0.57
2.00	6	0.002



Sample Size	d2 (used to estimate sigma for an x-bar control chart)
2	1.128
3	1.693
4	2.059
5	2.326
6	2.534
7	2.704
8	2.847
9	2.970
10	3.078
11	3.173
12	3.258
13	3.336

Sample Size	d2 (used to estimate sigma for an x-bar control chart)
14	3.407
15	3.472
16	3.532
17	3.588
18	3.640
19	3.689
20	3.735
21	3.778
22	3.819
23	3.858
24	3.895
25	3.931