

CP PLOT

PURPOSE

Generates a subsample C_p versus subsample index plot.

DESCRIPTION

The subsample C_p index is the C_p index of the data in the subsample. The C_p plot is used to answer the question: "Does the subsample C_p index change over different subsamples?" The plot consists of:

Vertical axis = subsample C_p index;
Horizontal axis = subsample index.

In addition, a horizontal line is drawn representing the full sample C_p value. As usual, the appearance of the 2 traces is controlled by the first 2 settings of the LINES, CHARACTERS, SPIKES, BARS, and similar attributes.

SYNTAX

CP PLOT <y> <x> <SUBSET/EXCEPT/FOR qualification>

where <y> is the response (= dependent) variable;

<x> is the subsample identifier variable (this variable appears on the horizontal axis);

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

CP PLOT Y X

CP PLOT Y X1 SUBSET X1 > 2

NOTE 1

The process capability index measures the performance (i.e., the capability) of an industrial process and is defined as follows:

$$CP = (USL - LSL)/(6S)$$

where S is the sample standard deviation and where USL and LSL are user specified upper and lower specification limits. The specification limits define the range within which a product is considered acceptable (values outside this range indicate that a product is defective). Values less than 1 indicate that there are still some defectives. A value of 6S yields a range of plus or minus 3 standard deviations. For example, if the specification limits are symmetric about the mean and the calculated CP is exactly 1, this means that the specification limits fall at plus and minus 3 standard deviations from the mean (and almost all the data will fall within these limits). Values greater than 1 indicate the specification limits are even greater than 3 standard deviations from the mean while values less than 1 indicate specification limits are less than 3 standard deviations from the mean.

NOTE 2

Recall that Chebychev's theorem states that at least 75% of the variables data must fall within plus or minus 2 standard deviations of the mean and that at least 88% must fall within plus or minus 3 standard deviations. This is for any distribution. For a normal distribution, these numbers are 95.4% and 99.7% respectively.

NOTE 3

The upper and lower specification limits must be specified by the user as follows:

LET LSL = <value>

LET USL = <value>

NOTE 4

If your specification limits are not symmetric about the mean, the C_{pk} statistic may be a better choice than the C_p statistic. It is an alternate calculation of CP that adjusts for possibly non-symmetric specification limits.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

CHARACTERS = Sets the type for plot characters.
LINES = Sets the type for plot lines.

CAPABILITY ANALYSIS	=	Generate a capability analysis.
CP	=	Compute the CP statistic.
CPK PLOT	=	Generates a C_{pk} plot.
EXPECTED LOSS PLOT	=	Generates an expected loss plot.
PERCENT DEFECTIVE PLOT	=	Generates a percent defective plot.
BOX PLOT	=	Generates a box plot.
CONTROL CHART	=	Generate various types of control charts.
PLOT	=	Generates a data or function plot.

APPLICATIONS

Quality Control

IMPLEMENTATION DATE

93/10

PROGRAM

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SKIP 25
READ GEAR.DAT DIAMETER BATCH
TITLE CASE ASIS
LABEL CASE ASIS
TITLE Gear Diameter Analysis
YILABEL CP; XILABEL Batch
LEGEND 1 Process Capability
LEGEND 2 CP Plot
XTIC OFFSET 0.5 0.5
CHARACTER X BLANK
LINE BLANK SOLID
LET LSL = 0.98
LET USL = 1.02
CP PLOT Diameter Batch

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