Answer on Question #55468 – Math – Statistics and Probability

The no. of defects in 20 pieces of cloth each of 100 meter length is given below:

2, 1, 3, 3, 1, 6, 4, 3, 7, 10, 2, 2, 6, 4, 3, 2, 1, 5, 6, 4.

Draw the appropriate control chart and interpret the result.

Solution

A Control chart is made for decision making by management reviewing the value of statistic if it is outside the threshold limits.

The statistic here is number of defects: x. We have N = 20.

Average of x is $\bar{x} = \frac{\sum x}{N} = \frac{75}{20} = 3.75$

Standard deviation of x is $s = 2.657$

Standard error is $SE = \frac{s}{\sqrt{20}} = 0.5916$

Warning levels for x:

$x = \bar{x} + 2SE = 4.9332$ and $x = \bar{x} - 2SE = 2.5668$

A piece is accepted with a warning if

$\bar{x} - 3SE < x < \bar{x} - 2SE$ or $\bar{x} + 2SE < x < \bar{x} + 3SE$

Accepted range:

$\bar{x} - 3SE < x < \bar{x} + 3SE$

$1.9752 < x < 5.5248$

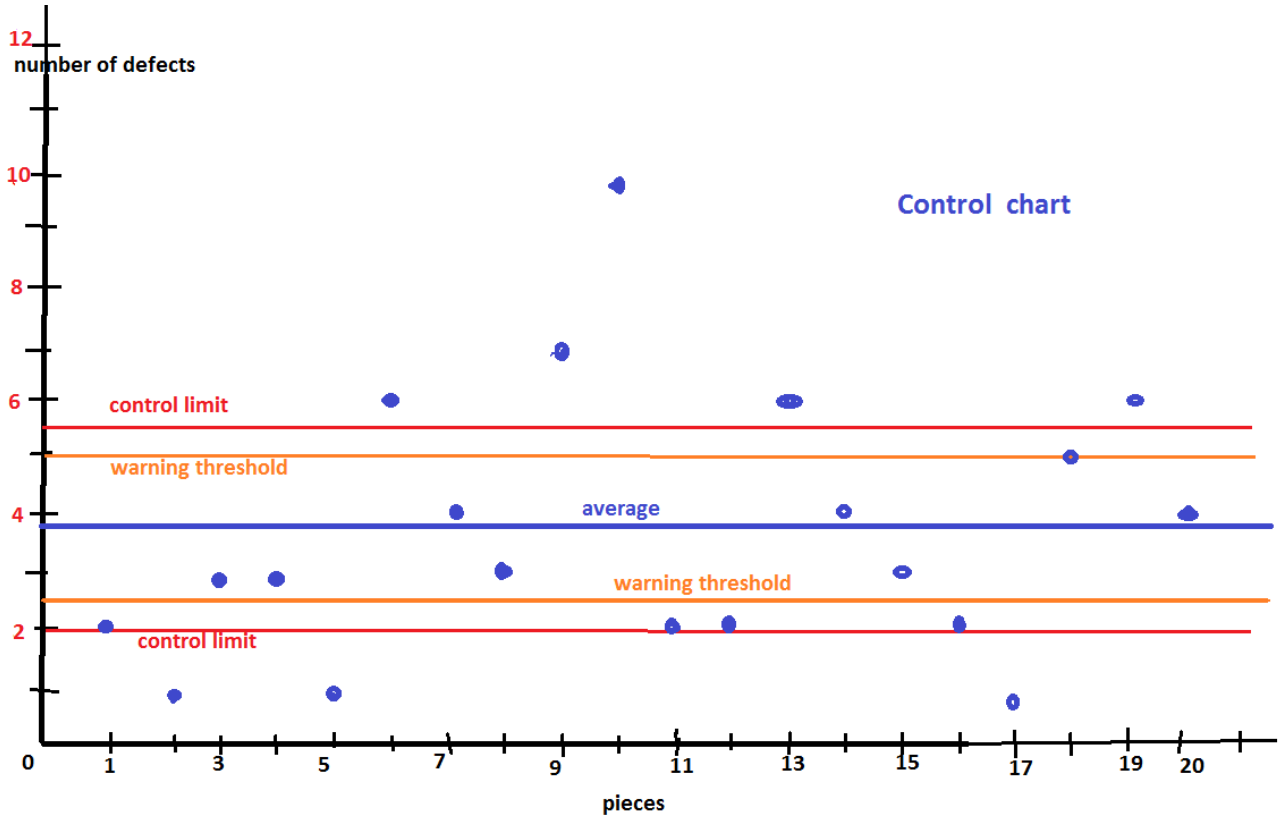
Rejection threshold levels: control limits.

rejected if: $x > \bar{x} + 3SE$ or $x < \bar{x} - 3SE$

So the pieces with number of defects: 1, 6, 7, 10, will be sent for quality assurance and process verification, the cause analysis.

Normally, for a good process, 99.7% of the values should be between the control limits. Here we have 8 values of 20 being outside the control range.

The manufacturing process needs to be reviewed.


Control chart
number of defects
12
10
8
6
4
2
0
control limit
warning threshold
average
warning threshold
control limit
1
3
5
7
9
11
13
15
17
19
20
pieces