

Distribution of proportion of defectives is b

Where $\bar{q} = 1 - \bar{p}$

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(a) Items inspected in a day.

(b) Products produced on one production order.

If subgroup size is variable, fraction defective chart is preferable.

Purpose of fraction defective chart

To discover, identify and correct causes of bad quality.

Control limits when sample size varies

$$\text{Action limit} = \bar{p} \pm 3 \sqrt{\frac{\bar{p}\bar{q}}{n}}$$

$$\text{Warning limit} = \bar{p} \pm 2 \sqrt{\frac{\bar{p}\bar{q}}{n}}$$

Advantages of fraction defective chart

- (a) Information is available without additional cost of collecting information
- (b) Simpler
- (c) They can be used for wide range of problems.
- (d) Information can be connected to cost
- (e) Easily understood.

Problem. Draw a p control chart for the following data and state your conclusions.

Sample (each of 100)	1	2	3	4	5	6	7	8	9	10
No. of defectives.	12	10	6	8	9	9	7	10	11	8

Solution:

$$\bar{p} = \frac{90}{1000} = 0.09$$

$$\bar{q} = 1 - \bar{p} = 1 - 0.09 = 0.91$$

$$\begin{aligned} \text{UCL} &= \bar{p} + 3 \sqrt{\frac{\bar{p}\bar{q}}{n}} = 0.09 + 3 \sqrt{\frac{0.09 \times 0.91}{100}} = 0.09 + 0.0858 \\ &= 0.1758 \end{aligned}$$

$$\text{LCL} = 0.09 - 0.0858 = 0.0042$$

(See Fig. 17.15)

Problem. The following data refers to the production and number of defectives on visual inspection of 10 samples of a certain product sample size = 200

Numerical

Production order No.	1	2	3	4	5	6	7	8	9	10
No. of defectives	10	14	20	6	8	4	6	4	2	6

Construct percent defective chart. Show how many points are falling outside the control limits.

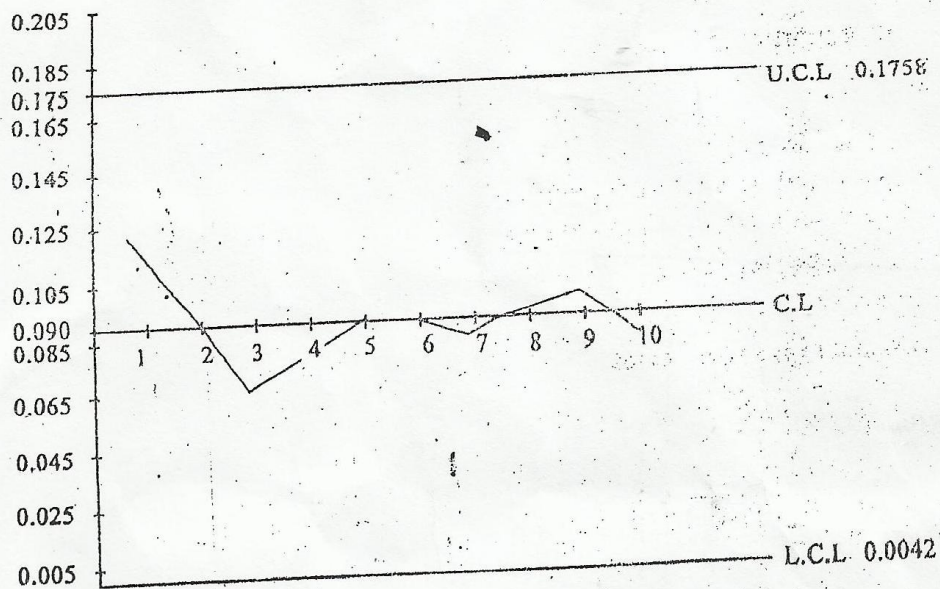


Fig. 17.16

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Solution:

$$\bar{p} = \frac{80}{2000} = 0.04$$

$$q = 1 - 0.04 = 0.96$$

$$UCL = \bar{p} + 3 \sqrt{\frac{\bar{p}q}{n}}$$

$$= 0.04 + 3 \sqrt{\frac{0.04 \times 0.96}{200}}$$

$$= 0.0814$$

$$LCL = 0.04 - 3 \sqrt{\frac{0.04 \times 0.96}{200}} = 0.014$$

Numerical Ends here

Problem. Following table gives information

Day No.	1	2	3	4	5	6	7	8	9	10
No. of castings produced	154	152	148	150	154	145	151	150	153	154
No. of casting found defective	4	2	2	4	3	4	2	2	1	4

Use each day total output as the day sample, draw up a control chart for proportion defective

Solution:

$$\text{Total number of defectives} = 28$$

$$\text{Total number of castings} = 1511$$

$$\bar{p} = \frac{28}{1511} = 0.0185$$