Tools for Any Production to Control Quality of Product

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Abstract

The Statistical quality control of any production process for a product by using statistical tools is of 100% best quality for a product of any use for daily life. Quality means level or standard for any production process, example water supply, cold drinks, food and other type of a product for any use of daily life. We can use tools of statistical quality control for any production process say Walter A. Shewart control chart and sampling inspection plan. control chart compare for the production of products in daily life and get better result for any product also give accuracy of quality product , we can use in use in daily life, similarly sampling inspection plan we use lot by lot inspection then get better result for any product good quality. Both statistical tools get better result of any product good quality of standard mark then we use in daily life.

Keywords: *Statistical quality control, production process, quality of standard, inspection plan, Walter A. Shewart control chart.*

1. Introduction

1.1 Statistical Quality Control

We mean the various statistical techniques applied for separating allowable variation from preventable once, so that we may know as quickly as possible when assignable causes are operating in the process, in other words, attempt is to be made to a certain the present of (assignable) causes of variation as soon as they occur [1]. So that the actual variation can be supposed that it is due to the inevitable or random causes. If it is so "a production process is said to be in a state of statistical control, if it is governed by chance causes alone, in the absence of assignable causes of variations".

1.2 Shewhart's Control Chart

The most common working statistical tools in quality control are the shewhart's control charts. The discovery and the development of the control charts were made by a physicist Walter. A Shewart of bell- telephone laboratories is based on the theory of probability and sampling. It enables us to detect the presence of assignable causes of variations in the process and control our process at desired performances, and bring the process under statistical control. It provides us a very simple but powerful graphic method of finding, if a process is in statistical control or not. Its constructions is based on plotting of $(3 - \sigma)$ limits and a sequence of suitable sample statistics, for example; mean $(\bar{x})$, range (R), Standard deviation σ etc., commuted from independent sample, drawn at random from the product of the process. Any sample point, going outside the $(3 - \sigma)$ control limits is an indication of the lack of statistical control, i.e., presence of some assignable causes of variations, which must be traced, indentified and eliminated. A control chart, consist of the following 3 horizontal lines:

A central line (*C.L.*) is to indicate the desires standard or performances of the process or level of the process. There are two types of control limits defined as:

(i)Upper control limits (U.C.L.)

(ii) Lower control limit (L.C.L.)

In the control charts, U.C.L and L.C.L's are usually plotted as dotted lines and central line (C.L.) is plotted as a bold line. If *t* is the statistical under consideration, then these values depend on the sampling distribution of *t* and are giving by

U.C.L.= E(*t*) + 3 S.E.(*t*) (1)

L.C.L.= E(*t*) - 3 S.E.(*t*) (2)

1.3 Shewart's Control Charts

1.3.1 Tools for Statistical Quality Control

The most important statistical tools for data analysis are quality control of the manufactured products is the following [2]:

(1). Control chart for variables;

(2). Control chart for fraction defective;

(3). Control chart for the number of defectives;

(4). Control chart for the number of defects per unit.

1.4 Control Charts for Variables

These charts are designed to achieve and maintain a satisfactory quality level for a process, whose product is amenable to quantitative measurement like thickness length of a diameter of a screw or nut, weight of bolts, tensile strength of yarn of steel pipes, resistance of a wire etc. The observations on such units can be expressed in specific units of measurements. In such cases quality control involve of central tendency and dispersion of the characteristic. The variables under consideration are of continuous character. The Control chart for variables is

(1). Control chart for Mean;

(2). Control chart for Range;

(3). Control chart for S. D.

This is designed to control the variation in the process average. The control limits for mean chart when the standards are given are as follows:

U.C.L. = mean – A (S.D.)

L.C.L. = mean + A (S.D.)

C.L. = mean

The control limits for mean chart when standard are not given are as follows:

U.C.L. = double mean – A mean (S.D.)

L.C.L. = double mean + A mean (S.D.)

C.L. = double mean

1.5 The Construction of Mean Chart

Control chart for Mean is drawn on a graph paper by taking the sample number along the x- axis and statistics along the *y* –axis and U.C.L., L.C.L. plotted as dotted horizontal line and C.L. Plotted as dark horizontal line, those points going outside limits called out of control.

1.6 The Sampling Inspection Plan

Sampling inspection is a procedure, whether a lot of manufactured articles of the same type from a repetitive process should be accepted or rejected on the basis of the information supplied by random samples from the lot under consideration. It is also called an acceptance sampling. When sampling inspection methods are applied to continuous manufacturing process, they are after use full in helping to control the quality of the product. Sampling inspection is necessary to accept or to reject a lot, because 100% inspection is too expensive or the population is destructive. Sampling inspection mainly serves the following purposes. Sampling inspection is a procedure, whether a lot of manufactured articles of the same type from a repetitive process should be accepted or rejected on the basis of the information supplied by random samples from the lot under consideration. It is also called an acceptance sampling. When sampling inspection methods are applied to continuous manufacturing process, they are after use full in helping to control the quality of the product. Sampling inspection is necessary to accept or to reject a lot, because 100% inspection is too expensive or the population is destructive. Sampling inspection mainly serves the following purposes [3]:

(i) It protects the purchaser against poor or inferior quality.

(ii) It provides a basis for action with regard to the product already at hand.

(iii) It provides a basis for action with regard to the production process, with a view to future production.

The Sampling inspection is of two types:

(i) Sampling inspecting by attributes;

(ii) Sampling inspection by variables.

1.7 Acceptance Quality Level (A.Q.L.)

(i) Lot tolerance proportion or percent defective (L.T.P.D.);

(ii) Consumer’s risk;

(iii) Producer’s risk;

(iv) Rectifying inspection plans;

(v) Average outgoing quality limits (A.O.Q.L.) [4], [5].

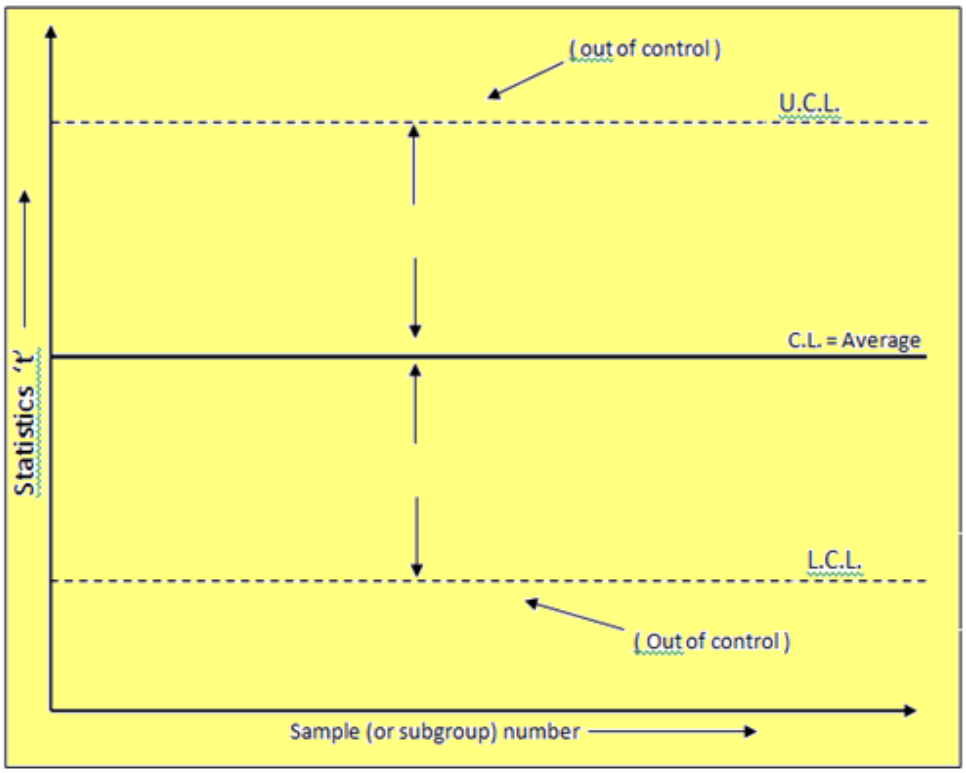

Figure 1: Control Chart Figure

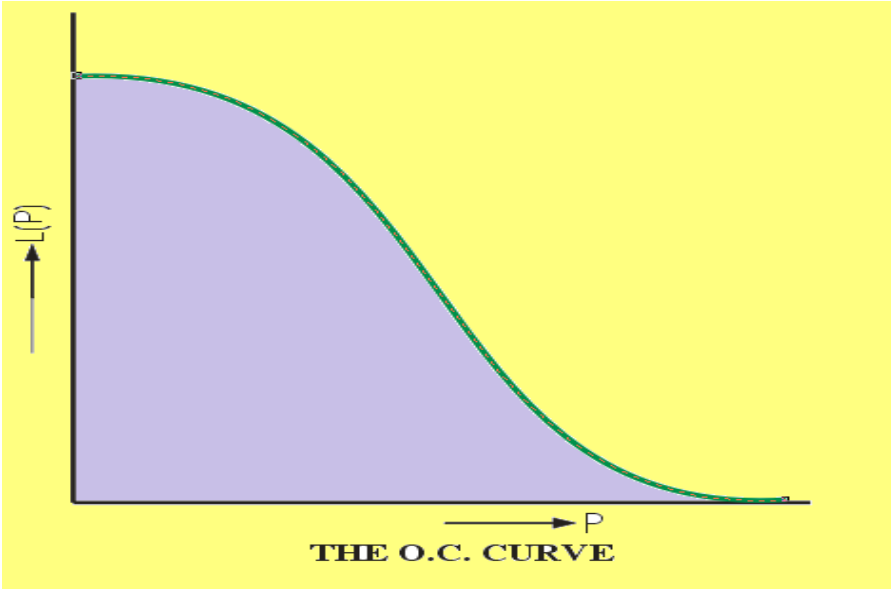

Figure 2: O.C. Curve

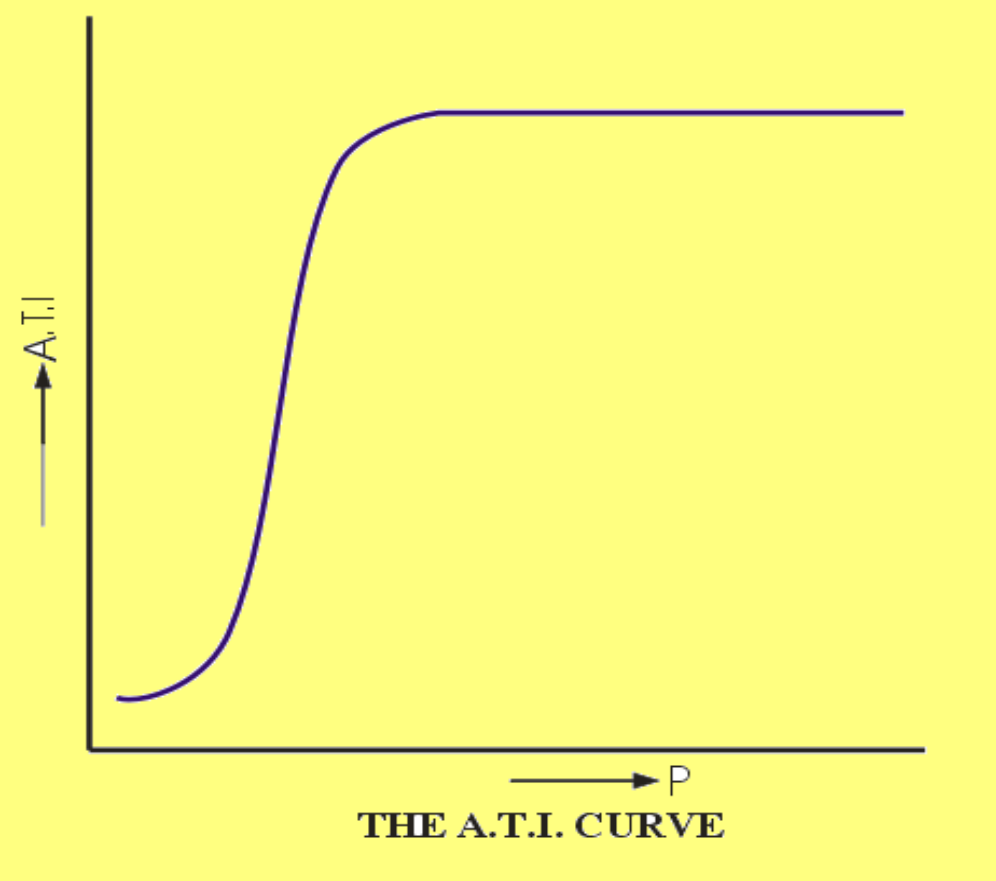

Figure 3: A.T.I Curve

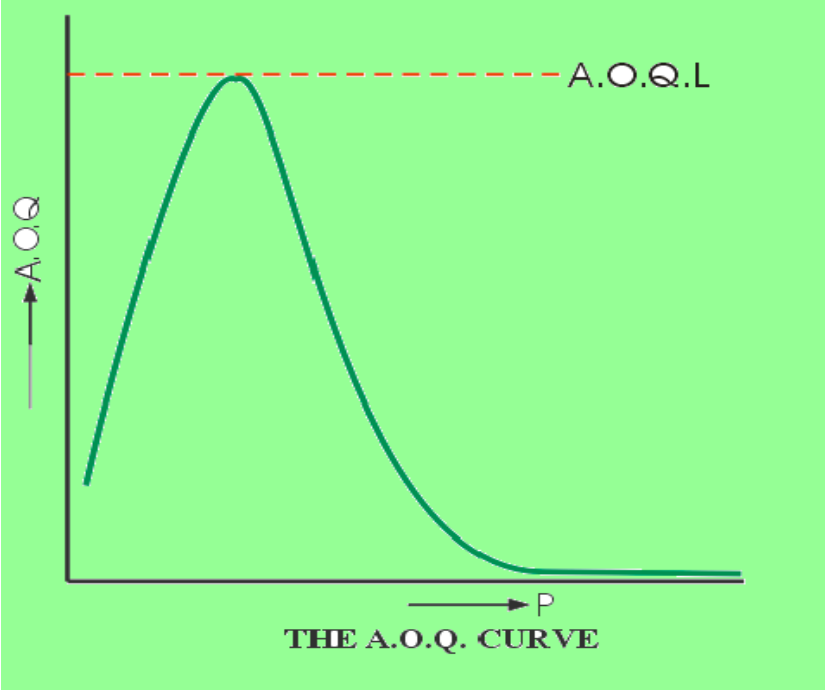

Figure 4: A.O.Q. Curve

2. Conclusion

By control chart and sample inception plan to control quality for any product, e.g. electric bulb, electric wire, bolt etc. for 100 present best quality using above tools.

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