Statistical Quality Control :- Applications of statistics to assure quality of products or items which are outcomes of modern large scale manufacturing process.

Quality of a product or an item is its fitness towards a definite use. Non-conformance means falling short of given specifications or standards. An instance of non-conformance of an item is called non-conformity. An item containing one or more non-conformities is a non-conforming product or item.

Quality control :-

(1) Process control.
(2) Product control.

1. Process Control : It attempts to ensure that a manufacturing process produces a minimum number of non-conforming products.

Tools for Process Control

- Control charts developed by W. A. Shewart &

2. Product Control : It attempts to ensure quality of product/item to the consumer, irrespective of the quality

maintained by the manufacturer. Generally speaking, it relates to input materials and finished products.

Tools:-

- Sampling Inspection Plans (SIP) by F.G Dodge and F.H. Romig.

Classification of Quality

Quality according to method of inspection
- (A) Attributes
- (B) Count of non-conformities
- (C) Variables.

A. Attributes :- Eg: A finished TV picture tube classified as functioning or non-functioning.

B. Count of non-conformities :- ~~Spoles~~ Spots or pores counted on a finished roll of paper.

C. Variables :- Eg: Diameter measured of a finished bowl.

(*)

CONTROL CHARTS FOR ATTRIBUTES :-

Process → Manufacturing electric bulbs
- Conforming
- non-conforming

⊛ Shewart Control Charts :- The key concept in Shewart's control charts is rational subgrouping. Variation in quality characteristics is inherent in any process. This variation is due to two kinds of causes :-

i) Variation due to chance cause, known as random variation.

ii) Variation due to assignable causes, known as systematic variation.

The aim of Shewart's control chart technique is to separate out the assignable causes from the chance causes in order to take investigative and corrective measure. Chance causes are considered allowable, and the assignable causes preventable. The approaches to divide a group of products from a given process into a number of subgroups such that variation within each subgroup is due to random causes alone but

forming such subgroups are

these variations, between work stations are subgroups if

assignable causes.

It exists is due to

The variations between to be in control if the

products are governed by random causes
It exists is due to

process the is absence of assignable causes.

Such subgroups governed are known as rational

subgroups the absence of forming such subgroups is

Such subgroups are known other ways of

forming subgroups of are heads of a ma-

chine operators the same work stations Here.

Here

Shewarts Control Charts based on rational sub groups given a process distribution with process parameter θ.

SUBGROUPS : m subgroups of items each of size n are collected from the process in such a way that variation within the sub groups are due to random causes only and variation between the subgroups are due to assignable Systematic causes. We consider a statistic

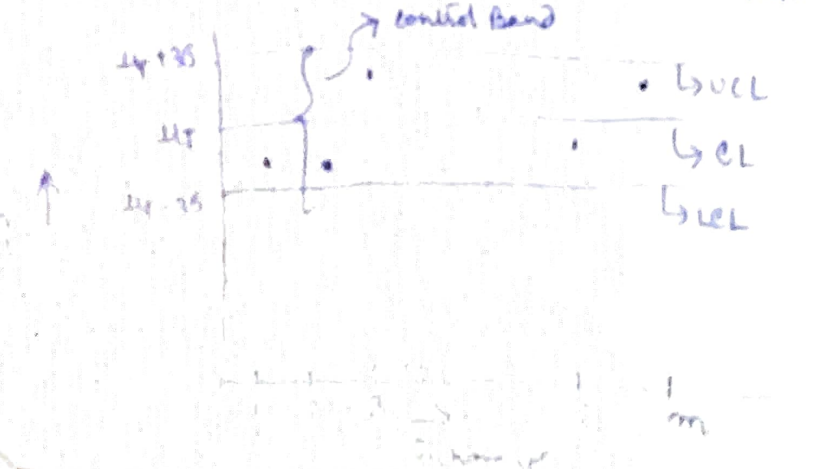
$$T = T(X_1, X_2 \ldots X_n)$$

$$\mu_T = E(T) = \mu(\theta)$$

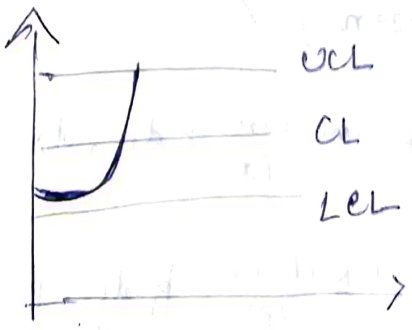
$$\sigma_T^2 = \text{var}(T) = \sigma(\theta)$$

Subgroups : 1, 2, ..., i, ... m

Statistic values : $T_1, T_2, \ldots T_i, \ldots T_m$.

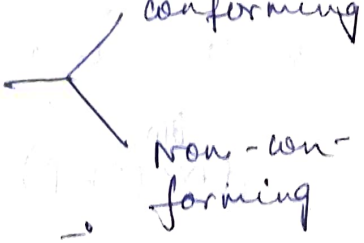


.. LCL & UCL are lower
nes respectively. The proces
control if :-
ie within the control band
do not show any definite
pattern
trol band. otherwise it
of control.



Trend

TTRIBUTES



g electric

cess Distribution

number of defective items
p is the probability that
tured by the process
n-conforming. p is the
$\sim$ Ber(p)