

# Statistical Process Control ( S P C )

## Common mistakes committed in Statistical Process Control ( S P C )

When SPC is properly understood and implemented it will be a very powerful tool helps both operators and management to control and improve the process. Whereas many SPC applications are having lot many problems in them. Some of the most common problems are explained below:

- **Control limits are adjusted too often :**

If the process is under statistical control and is a stable one, there may not be any need to adjust the limits. The obvious question would be when to adjust the limits.

Limits are adjusted only if..

- a) To verify process improvements
- b) When the process inputs are significantly changed ( which may result in change in CPk)

We should ensure whether the computer protocol automatically adjusts the control limits.

- **Control limits are incorrectly set :**

Some of the common errors would be

- a) Forcing the limits to be symmetrical about the product nominal or some other arbitrary target value.
- b) Failure to use process data to establish the limits.
- c) Fixing control limits even without homogenization
- d) Arbitrarily setting the limits to some predetermined values( Eg 50% of the tolerance range. We should understand the formula for establishing control limits do not make use of product specifications.

- **The range chart is not plotted :**

There is a wrong notion, that controlling the average alone will ensure process control. Whereas, without a range chart process variability (piece-to-piece variation) will not be understood completely.

- **Points plotted beyond a control limits are ignored :**

The general excuses are :

- a) “I ensured the sizes of few parts afterwards...”
- b) “It is only one point which has exceeded...”.
- c) It is a very clear case of assignable cause is ignored.
- d) This cannot be just like that ignored as a “Statistical freak”, may result in reduced Cpk.

- **Poor or no knowledge on Non-random patterns :**

- a) The common misconception is, that process is out of control when points go beyond the limits.
- b) Within the limits also there could be non-random patterns such as unexpected trends, cyclic patterns, runs, hugging of control limits
- c) Seven or more consecutive points in one side of the chart (in case of X-bar average) may be a clear case of run.

- **Charts are completed and duly filed (!), without any analysis :**

- a) Management to take the initiative to introduce a system in place to ensure periodical analysis and suitable actions.
- b) SPC charts are for process controlling and improving not just to satisfy the auditors.
- c) If analysed properly, one can gain lot of clues from a control chart.

- **Charts are plotted and maintained by someone other than the operators concerned :**
  - a) The best way to implement SPC is to provide adequate knowledge to the operators concerned and making them responsible to plot control charts.
  - b) I have seen the good practice of Operators plotting the Control charts - in very few organizations. One such organization is Lucas TVS, Pondicherry plant.
  - c) As long as someone else is checking the process/product characteristics and charts are plotted, the ownership is under question mark.
  
- **SPC training doesn't end with a practical hand holding in respective work area :**
  - a) Most of the organizations pay very little attention towards this.
  - b) A classroom education on any subject is a beginning but not an end
  - c) Equal importance to be given by the management to ensure an atmosphere for implementation.
  - d) Without this, the money spent for the training is only an expenditure but not an investment.
  - e) It is ideal to ensure implementation within two weeks' time for better effectiveness.
  
- **Applying SPC to the process, whereas wrong control chart is selected :**
  - a) It is of paramount important to introduce right control chart for the right purpose.
  - b) One example would be Introduction of X-MR chart for controlling a process parameter.
  - c) I have seen in one place, wherein X-bar R control chart was deployed to control a Blanking process.
  - d) The process being very consistent, the range chart was not sensitive at all.
  - e) Here the ideal option would be X-bar S chart.
  - f) A wrong control chart will yield absolutely no results.

- **Mixing more than one process in a single chart :**

- a) This is generally happening where the machine is having multiple stations such as multiple head drilling
- b) Though this may appear to one machine, each spindle must be considered as a separate process
- c) The same logic is applicable for multiple cavity mold also.

- **Control limits are not reviewed and adjusted based on the data :**

- a) This is almost as bad as adjusting the limits too often.
- b) Based on the behavior of the process, control limits to be recalculated and adjusted by an SPC expert.
- c) All apparent changes to the process should be validated before any changes to the limits.

- **Using SPC charts without having control limits in them :**

- a) This may be acceptable in 2 situations viz. Stability check through control chart and in the initial stage of SPC application, where our interest is to gather data.
- b) But for the above situations, control charts without control limits are not acceptable.

- **Fixing the control limits based on the Product specification :**

- a) This is a very common error.
- b) This will never help to statistically control the process and to achieve the required CPk.

- **Corrective actions are not recorded:**

- a) This is a great mistake as will lead to loss of knowledge base.
- b) Over a period of time, the organization will lose the grip over the process.
- c) It would be ideal to introduce a coding system for the causes and the corrective actions.
- d) Recurring problems would be analyzed based on this record.

**Best Wishes for bringing a Better  
Process Control through right  
control charts and SPC practices!**



## Program Topic

# Measurement Systems Analysis

( MSA 4<sup>th</sup> Edition )

**Resource Person :** **A V Manivannan**, Principal Consultant & Trainer

**Practical exposure** to Understand the Concepts & the application of statistical techniques to estimate the Capability & performance of measuring / inspection systems

Get your **e-Certificate** after successful completion of the course

**Program Date & Time :** 16-03-2018 (Friday) & 17-03-2018 (Saturday) [ 2 days ] 09.00 am to 05.00 pm

**Target Participants :** Engineers & above - from QA, SQA, Manufacturing ,NPD & other engineering functions

Date	Course Deliverables
16 <sup>th</sup> March 2018 (Friday)	<ul style="list-style-type: none"> <li>✓ MSA –what &amp; why</li> <li>✓ Role of statistics in MSA. Terms and MSA over view</li> <li>✓ Key Changes in the 4th Edition</li> <li>✓ Application of Statistics on MSA               <ul style="list-style-type: none"> <li>- Sigma factor</li> <li>- Accuracy ( Bias ) &amp; Precision</li> <li>- Confidence level with a Case study</li> <li>- t distribution with a Case study</li> </ul> </li> <li>✓ MSA on Variable systems               <ul style="list-style-type: none"> <li>- Stability check with a Case study</li> <li>- Bias with a Case study</li> </ul> </li> </ul>
17 <sup>th</sup> March 2018 (Saturday)	<ul style="list-style-type: none"> <li>- Linearity (Numerical method ) with a Case study</li> <li>- Linearity (Graphical method) - an introduction</li> <li>- Gauge R &amp; R studies</li> <li>- Range method with a Case study</li> <li>- Average &amp; Range method with a case study</li> <li>- Significance of ndc</li> <li>✓ MSA on Attribute Systems               <ul style="list-style-type: none"> <li>- Kappa method, Effectiveness, False alarm &amp; Miss rate with case studies</li> <li>- Signal detection method</li> </ul> </li> </ul>

**Program Fee: ~~Rs. 4500~~ Rs.3,900/- (incl. GST) per participant**  
(Complementary Work book, Stationary, Refreshments & Lunch)

### Venue:

**THE VIJAY PARK Hotel**

Next to Arumbakkam Metro Station, Near CMBT Bus Stop, Arumbakkam, Chennai.

### Corporate offers :

No. of participants	Program fee ( incl. GST )
3 employees from the <u>same</u> company	Rs.3,600/- per head
4 to 6 employees from the <u>same</u> company	Rs.3,300/- Per head

**Participants are encouraged to bring**

- **Scientific calculators**
- **their cases for clarifications**

**Last date of Registration:** 14-03-2018 ( Wednesday )

**For Registration:**



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