# *Operations Management - Quality Control*

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| **Quality Program** |
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| ***Quality******Planning*** | **🡪** | ***Quality******Assurance (QA)*** | **🡪** | ***Quality******Control (QC)*** |
| Define Quality,Set Quality Standards,Create Quality Plan |  | Implement Quality Plan |  | Monitor Quality Planand Improve Quality |
|  |  | **🡪** | **🡨** | **🡪** |
| Process Control ChartsAcceptance Sampling |  | Quality Reports,Quality Audits |  | Change Management,Method of Assignable Cause |

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| **Statistical Quality Control** |
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|  |  |  |  |  |  | SQCStatisticalQualityControl |  |  |  |  |  |  |
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|  |  | SPCStatisticalProcessControl |  |  |  |  | AcceptanceSampling |  |  |
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|  | Variables(Continuous) |  |  | Attributes(Discrete) |  |  | Variables(Continuous) |  |  | Attributes(Discrete) |  |
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| **Quality Concept** |
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| PROCESS |  |  |  |  |  |  |
| 🡺 | Product | 🡺 | Product | 🡺 | *Customer* |
|  |  |  |  |  |  |
|  |  |  |  |  | 🡪 |  |
|  |  |  |  |  | Sample,n |  |

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| Acceptance Sampling. Compare quality characteristic from sample with acceptance number or rejection number and make decision about a lot. |
| Statistical Process Control. Examine quality characteristic from sample on process control chart and make inference about the control of the process. |

***Statistical Process Control***

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| *Simple Process Control Chart* |
| For instructional purposes, assume the random sample from an experiment is { 3,4,4,5,5,5,6,8 }Sample size is 8, Sample Mean is 5, Sample Variance is 2. [ n = Sample Size; Sample Mean =`X = SX/n ; Sample Variance = S2 = S(X–Mean)2/n ]Construct a Process Control Chart. |
| Control Chart is defined as: Mean ± 3 \* (Standard Deviation of Mean) |
|  Control Chart: Mean ± 3 \* (Standard Deviation of Mean)Which is equivalent to: Mean ± 3 \* ( √ ( Variance of Mean ) ) Which is equivalent to: Mean ± 3 \* ( √ ( Variance / n ) ) | The “3” is standard.Standard Deviation = √VarianceVariance of Mean = Variance/n |
| Substitute values: Sample size, n=8, Mean=5, Variance=2 Mean ± 3 \* ( √ ( Variance / n ) ) 5 ± 3 \* ( √ ( 2 / 8 ) ) 5 ± 3 \* ( 1 / 2 ) 5 ± 3/2  |
| Therefore, the process control chart becomes:Center Line = 5Upper Control Limit = 5 + 1.5 = 6.5Lower Control Limit = 5 – 1.5 = 3.5Quality characteristic is measured and plotted on the process control chart to control the process. |
| **Statistical Process Control Chart**

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| Upper Control Limit: 6.5 |   |
|   |
| Center Line: 5.0 |   |
| time |
| Lower Control Limit: 3.5 |   |
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**Common Process Control Charts**:

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| Chart | Description |
| P-chart | Proportion of an Attribute characteristic (an Attribute is a Discrete Measurement) from a known sample size |
| C-chart | Count or frequency of an Attribute characteristic (an Attribute is a Discrete Measurement)from a defined interval of consideration.  |
| M-chart | Mean of a Variable characteristic (a Variable is a Continuous Measurement) from a known sample size  |
| R-chart | Range of a Variable characteristic (a Variable is a Continuous Measurement) from a known sample size |