

Course Summary

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Course Summary

1. Evolution of Quality Design & Control

- Quality revolution
- Historical perspective
- Modern Quality Philosophy
- Quality & the Engineering Design Process
- Strategic View of Quality Improvement: Variation, S/N
- Contrasting approaches: increasing S versus reducing N

2. Conceptual Framework for Quality

- Deming's Philosophy
14 Obligations of Top Management
- Traditional view of quality
Engineering Specifications
- Taguchi's definition of quality
Loss function
- Cost-of-quality

3. Statistics Review

- Characterizing data
 - Probability distributions
 - Normal distribution
 - Calculating and working with probabilities
 - Sampling distributions
In particular for sample means
 - Normal probability plot
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- Hypothesis testing
x's and xbar's; α and β risk; Type I and II errors

4. Concept of SPC

- **Origin & Characteristic Behavior of Variability**
- **Process Behavior over time**
- **Shewhart's ideas - economic control**
- **Control chart - process management**
- **Process of SPC**

5. Statistical Basis for Shewhart Control Charts

- **Control charts -- connection with hypothesis testing principle**
- **X-bar control chart**
- **R control chart**

6. Control Chart Details

- Mechanics of chart construction
- Interpreting control charts
- Example - cylinder boring process
- Graphical techniques (Scatter diagram, Pareto chart, cause & effect diagram)

7. Rational Sampling

- Sample size, frequency, selection considerations
- Consecutive vs. distributed sampling
- Stratification and Mixing

- Chapter 8 -- Workshop #1

9. Process Capability

- Process capability vs. process control
- Calculating capability: %, Cp, and Cpk
- Boring example revisited
- Variation in Assemblies
- Statistical assignment of tolerances
- Loss function
- What happens when things go wrong....

10. Roll Mill Process Case Study

- Workshop #2

11. Control Charts for Individuals

- X and Rm
- EWMA Charts

- Regression
- Autocorrelated data -- time series
- Reliability
- 6 sigma

13. Control Charts - Attribute Data

- Definitions (defects, defectives, operational definitions)
- Binomial distribution
- p chart
- np chart
- p chart variable sample size charts
- Poisson distribution
- c chart
- u chart

14. Case Studies for Attributes

- Press 120 -- Molding process
- Accounts payable process

Final Thoughts

- **Many of you will be leaving MTU -- good luck!!**
- **You have a great education -- your potential is unlimited -- don't settle. Be ambitious -- aim high!!**
- **Never stop learning. A degree is only a first step.**
- **Got questions?? -- contact us.**
- **As time goes by, you will look back fondly on your days at MTU. Stop in one of these days (or drop us a note) & let us know how you are doing.**