ME 498 Manufacturing Data and Quality Systems

Defining Quality – A Recap
Recap: qualitative definitions of quality

- Quality means
  - Fitness for use
  - Conformance to requirements

- Relevant concepts
  - Nonconformity/defect
  - Nonconforming/defective Unit

- Kano model
Recap: qualitative definitions of quality

Garvin’s quality dimensions

1. **Performance**: will the product do the intended job?
2. **Reliability**: how often does the product fail?
3. **Durability**: how long does the product last?
4. **Serviceability**: how easy is it to repair the product?
5. **Aesthetics**: what does the product look like?
6. **Features**: what does the product do beyond the basic performance?
7. **Perceived Quality**: what is the reputation of the company or its products?
8. **Conformance to Standards**: how compatible is it with the standards?
Recap: quantitative definition of quality

- Quality is evaluated by the variability, and it is inversely proportional to the variability.
- Quality improvement is the reduction of variability in processes and products.
Recap: cost of quality

- **Cost of Quality (COQ):** The costs associated with providing poor quality products or services. (American Society for Quality)

Four categories of COQ:

- **Prevention Costs:** costs associated with efforts directed toward nonconformance prevention
- **Appraisal Costs:** costs associated with measuring, evaluating, or auditing products, materials, components, etc.
- **Internal Failure Costs:** costs associated with product failures that are discovered prior to product delivery
- **External Failure Costs:** costs associated with product failures that are discovered after it is supplied to customer
Recap: quality improvement philosophies

- Continuous quality improvement through **PDCA**

Walter A. Shewhart (1891–1967)

- Trained in engineering and physics
- Long career at Bell Labs
- Developed *the first control chart* in about 1924
- Father of statistical quality control

![Control Chart Diagram]

**Time**

**UCL**

**Average**

**LCL**

**mm**
Quality guru: W. Edward Deming

• W. Edward Deming (1900–1993)
• Met Walter Shewhart at Western Electric
• Long career in government statistics, USDA, Bureau of the Census
• During WWII, he worked with US defense contractors, and deployed statistical methods
• Sent to Japan after WWII to work on the census
• Japanese adopted many aspects of Deming’s management philosophy
• Well-known for 14 key principles
Quality guru: Joseph M. Juran

- Born in Romania (1904–2008), immigrated to the US
- Worked at Western Electric, influenced by Walter Shewhart
- Emphasizes a more strategic and planning oriented approach to quality
- Juran Institute is still an active organization promoting the Juran philosophy and quality improvement practices
- https://www.juran.com
- Well-known for Juran Trilogy
A story: That’s Not My Job!

• This is a story about four people named Everybody, Somebody, Anybody and Nobody.

• There was an important job (quality) to be done and Everybody was sure that Somebody would do it. Anybody could have done it, but Nobody did it.

• Somebody got angry about that, because it was Everybody’s job.

• Everybody thought Anybody could do it, but Nobody realized that Everybody wouldn’t do it.

• It ended up that Everybody blamed Somebody when Nobody did what Anybody could have.

Who is responsible for quality control in manufacturing?
Quality engineer

• A quality engineer works within a wider team of quality professionals with the overall aim of maintaining the quality of the final product.
  • Devising quality tests (monitoring)
  • Creating documentation
  • Defining quality criteria
  • Fixing quality issues

• Successful quality engineering ensures that final products are safe and meet customer expectations while keeping the manufacturing process as effective and cost-efficient as possible.

• Quality engineers work with various stakeholders, at every part of the manufacturing process, e.g., design teams, suppliers, manufacturing teams, and customers.

• Quality engineering is about more than just identifying problems – it’s about understanding the underlying issues and developing successful fixes, changing practices where necessary to ensure that standards are maintained.