



Lesson 13 – Introduction to Quality




Lesson 13

Introduction To Quality

quality is the ability of a product or service to consistently meet or exceed customer expectations



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The Evolution of Quality

- . Industrial revolution - smaller jobs, more specialization and less responsibility for the final product
- . Early 1900's - product inspection introduced - [Fredrick Winslow Taylor](#)
- . 1924 - statistical control charts - [W. Shewhart](#) of Bell Laboratories
- . 1930, - acceptance sampling - H.F. Dodge & H.G. Roming of Bell Labs
- . WWII - statistical methods began to be more widely accepted, especially in statistical sampling techniques
- . 1950's - quality assurance, statistical quality control methods introduced to the Japanese - [W. Edwards Deming](#)
 - "cost of quality" concepts - [Joseph Juran](#)
 - "total quality control" including product design and materials - [Armand Feigenbaum](#)
- . 1960's - "zero defects" emphasize employee performance - [P. Crosby](#)
- . 1970's - quality assurance methods throughout the entire process

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Quality – What Is It?

"The degree of excellence of a thing"
(Webster's Dictionary)



"The totality of features and characteristics that satisfy needs"
([American Society for Quality Control](#) – ASQ)

Fitness for consumer use – meet or exceed customer expectations



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Quality – What Is It?



Mercedes



Hyundai



Porsche



Beetle

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Dimensions of Quality

Performance - characteristics of the product or service
Aesthetics - appearance, feel, smell, taste
Special features - extra characteristics
Conformance - customer's expectations
Safety - risk of injury or harm
Reliability - consistency of performance
Durability - useful life of the product or service
Perception - reputation
Service after the sale - handling of complaints, customer satisfaction



Porsche

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Examples Of Quality Dimensions

Dimension	(Product) Automobile	(Service) Auto Repair
Performance	Everything works, fit & finish Ride, handling, grade of materials used	All work done, at agreed price Friendliness, courtesy, Competency, quickness
Aesthetics	Interior design, soft touch	Clean work/waiting area
Special features Convenience High tech	Gauge/control placement Cellular phone, CD player	Location, call when ready Computer diagnostics
Safety	Antilock brakes, airbags	Separate waiting area

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Examples Of Quality Dimensions

Dimension	(Product) Automobile	(Service) Auto Repair
Reliability	Infrequency of breakdowns	Work done correctly, ready when promised
Durability	Useful life in miles, resistance to rust & corrosion	Work holds up over time
Perceived quality	Top-rated car	Award-winning service department
Service after sale	Handling of complaints and/or requests for information	Handling of complaints

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The Determinants of Quality


Quality of Design - intention of designers to include or exclude features in a product or service designed to meet a customer/client need/want/requirement.- it represents the inherent value of the product or service in the marketplace

- . Poor design can result in manufacturing or service problems
- . Customer disapproval

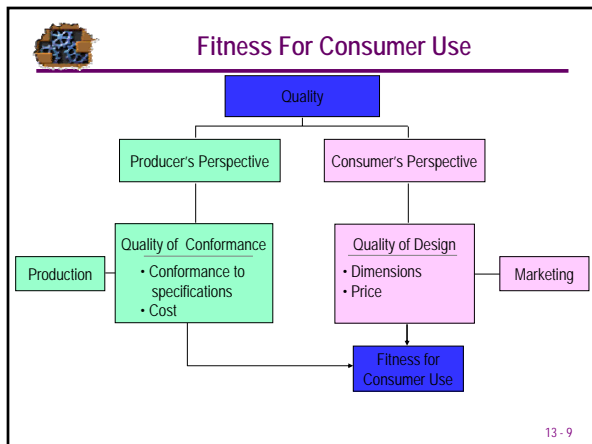
Quality conformance - the degree to which the goods or services conform to the intent of the designers

- . Requires customer education/awareness as to the intended use of the product/service (e.g. Electrical requirements, medication instructions, attorney advice)

Ease of use
Service after delivery

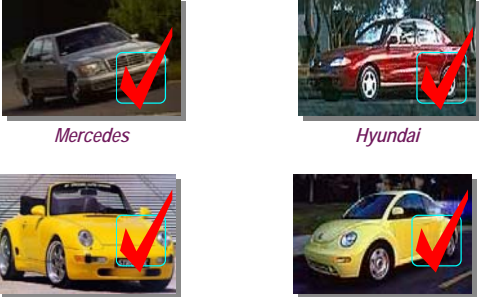


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Quality – What Is It?



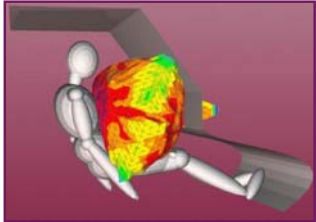
Mercedes *Hyundai*

Porsche *Beetle*

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The Consequences Of Poor Quality

- . Loss of business
- . Liability
- . Productivity
- . Costs



Failures will occur. The prevailing quality philosophy is that *prevention is the best cure for quality problems. (An ounce of prevention is worth a pound of cure).*

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Costs Of Quality

When considering the “costs of quality” we must consider:

Failure costs - costs caused by defective parts, products, or faulty services

- . **Internal** - failures discovered during production (e.g. rework, problems, material/product losses, downtime)
- . **External** - failures discovered after delivery (e.g. warranty, returned goods, liability claims, penalties)

Appraisal costs - costs of activities designed to ensure quality or uncover defects (e.g. in-line inspection, final inspection, field testing, crash test dummies, crumpled cars)

Prevention costs - costs of preventing defects from occurring (e.g. training, working with vendors, quality control procedures, quality improvement programs, extra attention in design and production)


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 **Quality Guru's**

W. Edwards Deming - 14 point prescription for quality
Joseph M. Juran - stressed management methods
Armand Feigenbaum - quality as a "total field" - customer
Phillip Crosby - quality is free, zero defects
Kaoru Ishikawa - quality circles, problem solving methodology
Genichi Taguchi - cost of poor quality, robust product design

Continual Improvement
Management Methods
Total Quality
Quality Circles
Product Design



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 **Deming's 14 Points**

1 - Create constancy of purpose	7 - Instill leadership among supervisors
2 - Adopt philosophy of prevention	8 - Eliminate fear among employees
3 - Cease mass inspection	9 - Eliminate barriers between departments
4 - Select a few suppliers based on quality	10 - Eliminate slogans
5 - Constantly improve system and workers	11 - Remove numerical quotas
6 - Institute worker training	12 - Enhance worker pride
	13 - Institute vigorous training & education programs
	14 - Implement these 13 points

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 **Quality Awards**

The Malcom Baldrige Award - The Malcom Baldrige National Quality Award is the centerpiece of the Baldrige National Quality Program. This award, which since 1988 has been presented annually by the President to recognize performance excellence, focuses on an organization's overall performance management system. *It does not certify product or service quality.*



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Categories For The Baldrige Award

Business: Manufacturing companies or subsidiaries that produce and sell manufactured products or manufacturing processes or produce agricultural, mining, or construction products.

Healthcare:

Education:




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Characteristics Of A Baldrige Winner

The major characteristics of a Malcolm Baldrige Winner are companies/organizations who have:

- . formulated a vision of what they thought quality is and how they would achieve it.
- . senior management involvement
- . carefully planned and organized their quality effort to be sure it would be effectively initiated.
- . vigorously controlled the overall process.



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Criteria For The Malcom Baldrige Award

The Baldrige *Criteria* for Performance Excellence is updated each year to provide a systems perspective for understanding performance management. They reflect validated, leading-edge management practices against which an organization can measure itself. With their acceptance nationally and internationally as the model for performance excellence, the *Criteria* represent a common language for communication among organizations for sharing best practices. The Criteria are also the basis for the Malcolm Baldrige National Quality Award process. The *Criteria* include *leadership, strategic planning, customer & market focus, information & analysis, human resource development & management, process management and business results*.



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 **Criteria For The Malcom Baldrige Award**

Leadership - The organization's leadership system and senior leaders' personal leadership


Strategic Planning - How the organization sets strategic directions and how it develops the critical strategies and action plans

Customer and Market Focus - How the company determines requirements, expectations, and preferences of customers and markets

Information and Analysis - The selection, management, and effectiveness of use of information and data to support key company processes and action plans, and the company's performance management system




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 **Criteria For The Malcom Baldrige Award**


Human Resource Focus - How the company enables employees to develop and utilize their full potential, aligned with the company's objectives

Process Management - How key processes are designed, implemented, managed, and improved

Business Results - The organization's performance and improvement in key business areas



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 **Quality Awards**

The Deming Prize - The *Union of Japanese Scientists and Engineers (JUSE)* invited Dr. Deming to Japan in July 1950. He held a series of lectures and seminars during which he taught the basic principles of statistical quality control to executives, managers and engineers of Japanese industries. His teachings made a deep impression on the participants' minds and provided great impetus in implementing quality control in Japan.

In appreciation, **JUSE** created a prize to commemorate Dr. Deming's contribution and friendship and to promote the continued development of quality control in Japan. The prize was established in 1950 and annual awards are still given each year.

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Quality Awards

Industry, regional, and company awards

- [Institute of Industrial Engineers](#)



- [NASA](#)



- [European Quality Award](#)

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Quality Certifications

ISO - International Organization for Standardization - purpose is to promote worldwide standards that will improve operating efficiency, improve productivity, and reduce costs

- Truly international in scope
- Certification required by many foreign firms



ISO 9000 series - quality management and assurance

- ISO 9001 - Suppliers and Designers
- ISO 9002 - Production
- ISO 9003 - Inspection and Test
- ISO 9004 - Quality Management

ISO 14000 - environmental performance

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ISO Accreditation

European registration

- 3rd party registrar assesses quality program
- European Conformity (CE) mark authorized

United States 3rd party registrars

- [American National Standards Institute](#) - ANSI
- [American Society for Quality Control](#) - ASQ
- [Registrar Accreditation Board](#) - RAB



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You Know It When You See It

"quality is not something you inspect into a product/service, it is the result of the mental attitude of the person who is producing or delivering a product/service, either you have the mental attitude or you do not ... if you do not, you can be trained to have it ... some people choose to ... some do not

... at any rate, in your business careers it will be easy to spot those who have it and those who do not ... you will know it when you see it"

Hodges, 1998

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Total Quality Management

refers to the quest for quality that involves everyone in the organization.

- Two key philosophies:
- . Continual improvement
 - . Customer satisfaction



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Total Quality Management

TQM may be defined as managing the entire organization so that it excels on all dimensions of products and services that are important to the customer.

- . *Marketing, sales, R&D*
- . *Engineering*
- . *Purchasing*
- . *Personnel*
- . *Management*
- . *Packing, storing, shipping*
- . *Customer service*



Total Quality management is a broad concept rooted in the Deming philosophy. It involves the following concepts:

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Elements Of Total Quality Management

- . Determine what customer (target market) wants
- . Design a product to meet or exceed wants and make it easy to produce and easy to use
- . Design a production process to *do it right the first time*
- . Track results and use them to guide future improvements
- . *Continuous improvement* - get a little better each day
- . *Benchmarking* - learn from those who do "it" best
- . *Employee empowerment* - responsibility/authority at source
- . *Team approach* - spirit of cooperation, shared problem solving
- . Decisions based on *facts* rather than opinion
- . Knowledge of *Quality Tools/Methodologies*
- . *Supplier quality* - make vendors part of your team

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Shared Problem Solving – The Quality Circle

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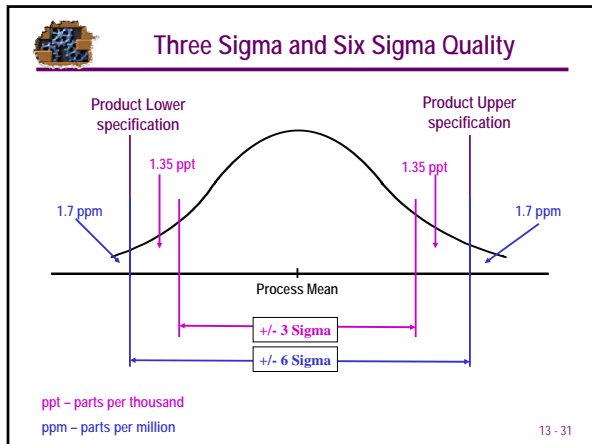
Three Sigma and Six Sigma Quality

Statistical methodologies for achieving continual process improvement and reducing process variability

- Basically these are the same concept which are designed to reduce process variability
 - Program designed to reduce defects
 - Requires the use of certain tools and techniques
- Statistically process variability (standard deviation) is such that
 - Six sigma: no more than 3.4 defects per million
 - Three sigma: no more than 2.7 defects per thousand

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Three Sigma and Six Sigma Quality

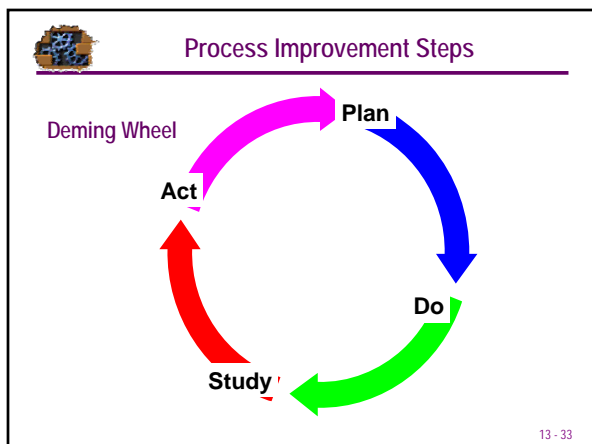
Six sigma quality has gained popularity in recent years

Six sigma teams are sanctioned by top management and are coordinated through program champions who work on the projects management deems most likely to succeed.

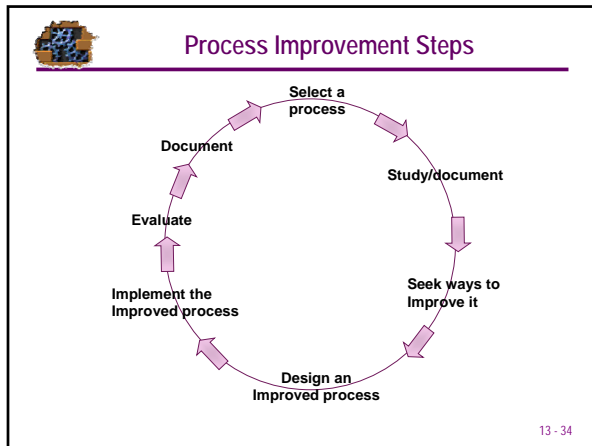
Six sigma practitioners receive certifications as they gain knowledge and proficiency in the terminology and methodology (e.g. "green" and "black" belts).

D – Define
M – Measure
A – Analyze
I – Improve
C – Control

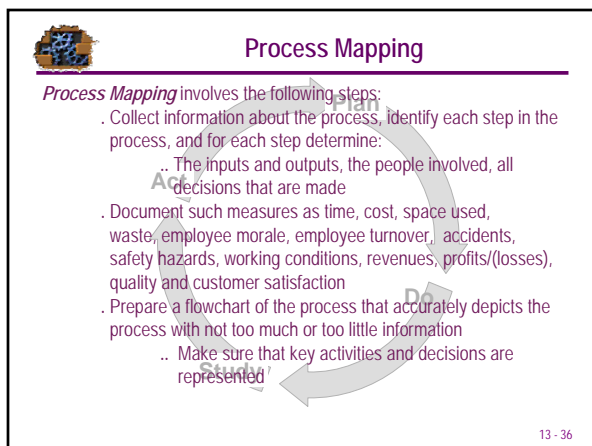
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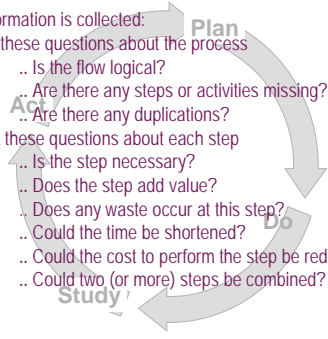




Process Mapping

Once the information is collected:

- . Ask these questions about the process
 - .. Is the flow logical?
 - .. Are there any steps or activities missing?
 - .. Are there any duplications?
- . Ask these questions about each step
 - .. Is the step necessary?
 - .. Does the step add value?
 - .. Does any waste occur at this step?
 - .. Could the time be shortened?
 - .. Could the cost to perform the step be reduced?
 - .. Could two (or more) steps be combined?

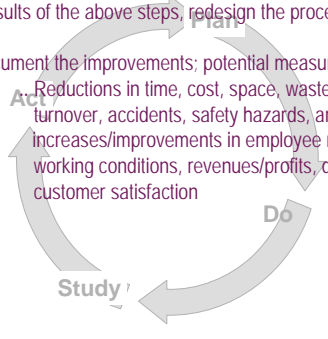


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Redesign The Process

Using the results of the above steps, redesign the process if possible.

- . Document the improvements; potential measures include:
 - Reductions in time, cost, space, waste, employee turnover, accidents, safety hazards, and
 - increases/improvements in employee morale, working conditions, revenues/profits, quality and customer satisfaction

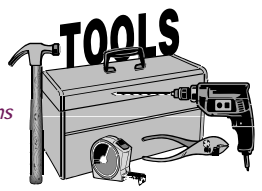


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7 Basic Improvement Tools

There are 7 basic tools available to assist the operations manager in the improvement process previously described. These tools help identify and quantify the opportunities for improvement. They include:

- . Check sheets
- . Flowcharts
- . Scatter diagrams
- . Histograms
- . Pareto Analysis
- . Control Charts
- . Cause and effect diagrams




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Check Sheets


A *check sheet* is a simple tool for recording the reasons a process may not be performing as expected. It is a simple observational method which organizes and determines the frequency of reasons.


Billing Errors **Monday**

Wrong Account 

Wrong Amount 

A/R Errors

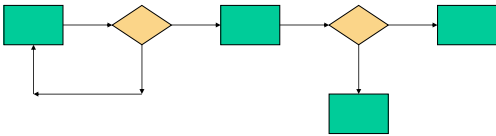
Wrong Account 

Wrong Amount 

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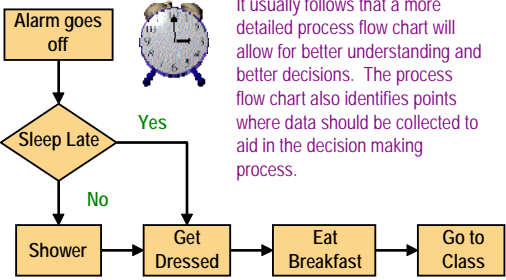
Process Flow Charts

A *Process Flow Chart* is a simple tool for recording the sequence of steps and decision points in a process. The flow chart is very useful in analyzing a process to determine the strong and weak points in the process.



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Process Flow Chart



It usually follows that a more detailed process flow chart will allow for better understanding and better decisions. The process flow chart also identifies points where data should be collected to aid in the decision making process.

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Scattergram

A *scattergram* is a simple graphical tool which can be used to identify the relationship between two variables. It can prove beneficial when setting parameters for activities within a process.

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Histogram

A *histogram* is a simple graphical tool which can be used to identify the frequency of a cause of variation. The histogram is the result of the process of identifying types of variation observed.

Category	Number of defects
Off center	10
Smearred print	7
Missing label	2
Loose	1
Other	1

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Pareto Chart

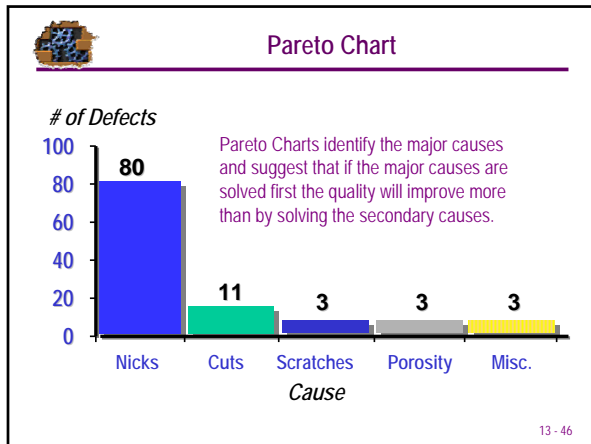
A *Pareto chart* is a histogram which shows the relative importance of problems or defects. It makes identifying and solving problems easier. It is based on the *Pareto Principle* which basically says most effects have relatively few causes and is sometimes referred to as the *80/20 rule* (80% of the problems come from 20% of the causes (people, materials, machines, etc.)

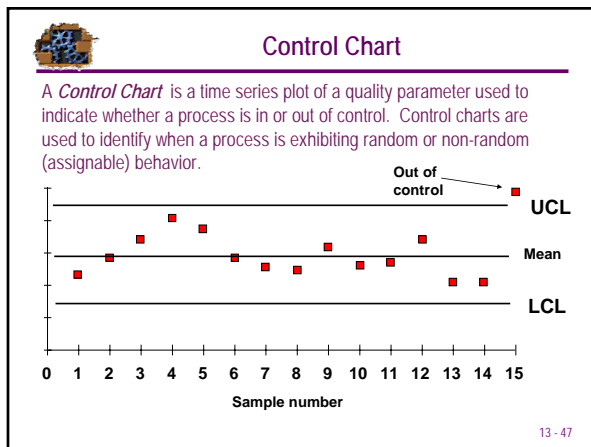
You're a quality analyst for Corning Glass.
You've collected data on 100 rejected glasses:

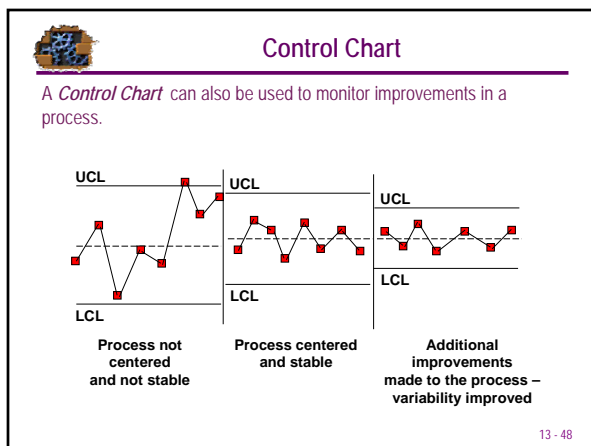
Nicks	80
Cuts	11
Scratches	3
Porosity	3
Misc.	3

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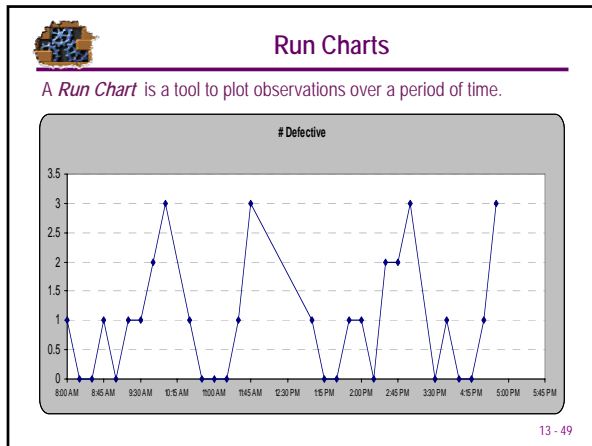
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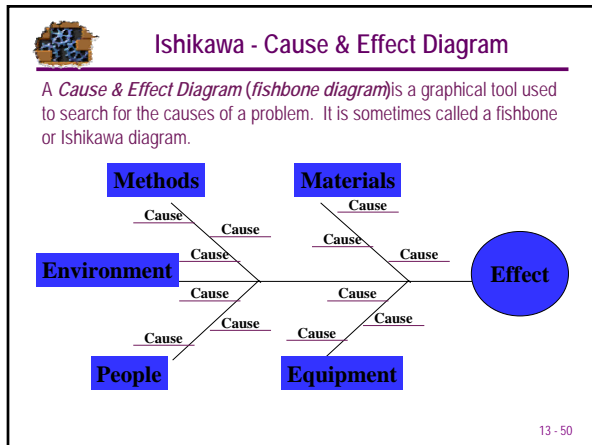


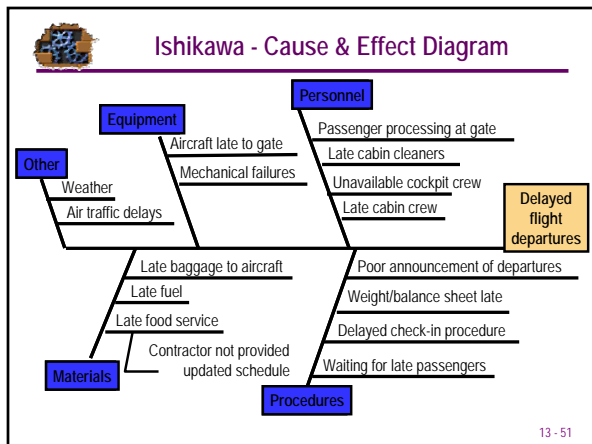





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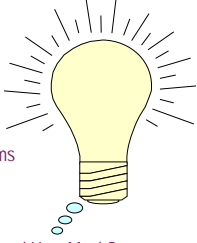


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 **Methods For Generating Ideas**

There are many ideas for generating improvement ideas. Typically they come from a collaboration of all personnel involved in the process. Some of these include:

- Brainstorming** – free flow of ideas
- Quality Circles** – groups of interested people conduct action oriented meetings to plan, do, study, and act on improvement opportunities
- Interviewing** – technique for identifying problems and collecting information
- Benchmarking**
- 5W2H** – What, When, Where, Why, Who, How and How Much?



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 **Homework**

Read and understand all material in the chapter.

Discussion and Review Questions

Recreate and understand all classroom examples

Exercises on chapter web page



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