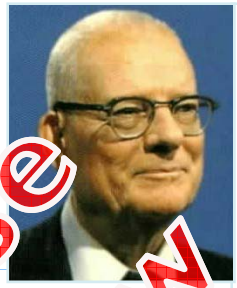
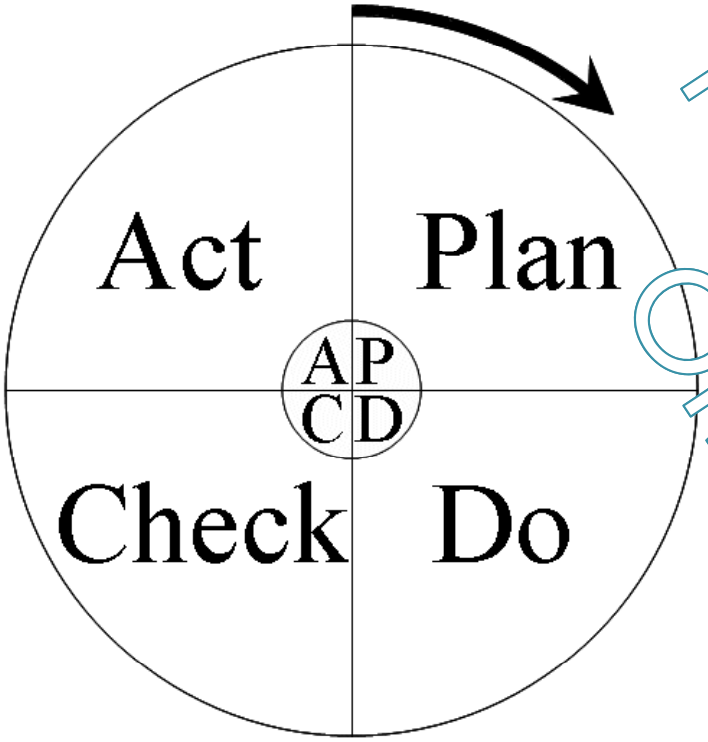
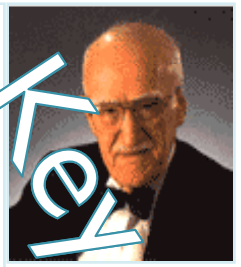
Basic Tools for Quality Improvement







Nutek

Basic Tools for Quality Improvement

Improving quality of products and services is key to maintaining competitive edge in today's business environment. Companies of all sizes, whether involved in delivery of service or manufacturing products of any kind, should practice one of the many available modern quality improvement methodologies like Six Sigma, TQM and ISO-9000. While formal implementation of any of these approaches may create strain on your resource and time, some form of quality awareness training is an effective way to change the mindset. For example, employees at all level in the organization, regardless of their roles and responsibilities, can easily learn a few basic quality improvement tools and immediately apply it in quality improvement activities within the organization.

This brief session is designed for participants with minimum education to learn a few proven quality improvement philosophies and learn how to apply common quality improvement techniques including the *seven basic tools*.

Upon completion, the attendees are able to:

- Adopt and share some common quality values
- Follow a structured approach for projects
- Be more customer focused
- Identify customer requirements and define objectives
- Commit to working as team and consensus decision
- Use fishbone diagrams, Pareto & Control charts to identify causes
- Use check sheets to gather data for analysis
- Use GANTT chart to manage put your plan into action
- Be aware of advance techniques and know where they are applicable.

Who Should Attend

- All individuals whose work affects internal or ultimate products and services of the organization
- Quality improvement specialists
- Practicing production and process professionals
- Customer service representatives
- Service and delivery professionals and managers at all levels

Prerequisites:

There are no specific prerequisites for this course

Course Content

- Course Objective and Introduction
- Quality Operating Philosophies
  - Basic Approach
  - Advanced Methodologies
- Value of Team and Consensus Decisions
- Basic Quality Improvement Tools
  1. Flow Chart
  2. Check Sheet
  3. Histograms
  4. Pareto Charts
  5. Cause and Effect Diagrams
  6. Scatter Diagrams
  7. Control Charts

- Project Schedule Management (Gantt Chart)
- Advanced Techniques (TRIZ, QFD, DOE/Taguchi, FMEA, SPC, Process Capabilities, etc)
- Implementation Strategies
- Appendix

Principal Instructors (Course Developers)

Ranjit Roy, Ph.D., P.E., PMP

- Mechanical engineer
- Industrial experience since 1973 (GM 1976 – 1987)
- Independent consultant since 1987
- Specializes in product and process design improvement technique
- Published books and developed technical software
- Adjunct professor (Oakland University, Rochester, MI since 1976)
- Fellow of American Society for Quality (ASQ)
- Provisionally certified Lead Auditor (ISO/QS-9000)

Quality & Cost Improvement Pioneers

Eli Whitney
1765 – 1825, was an American inventor and manufacturer who is credited with creating the first cotton gin in 1793.
• Interchangeable parts

Henry Ford
•Assembly Line
•Flow Lines
•Manufacturing Strategy



Eiji Toyoda Taichi Ohno Shigeo Shingo
•Just in Time and Toyota Production System
•Stockless Production
•World Class Manufacturing

Civil War | WW-I | WW-II

1850 1875 1900 1920 1940 1960 1980 2000

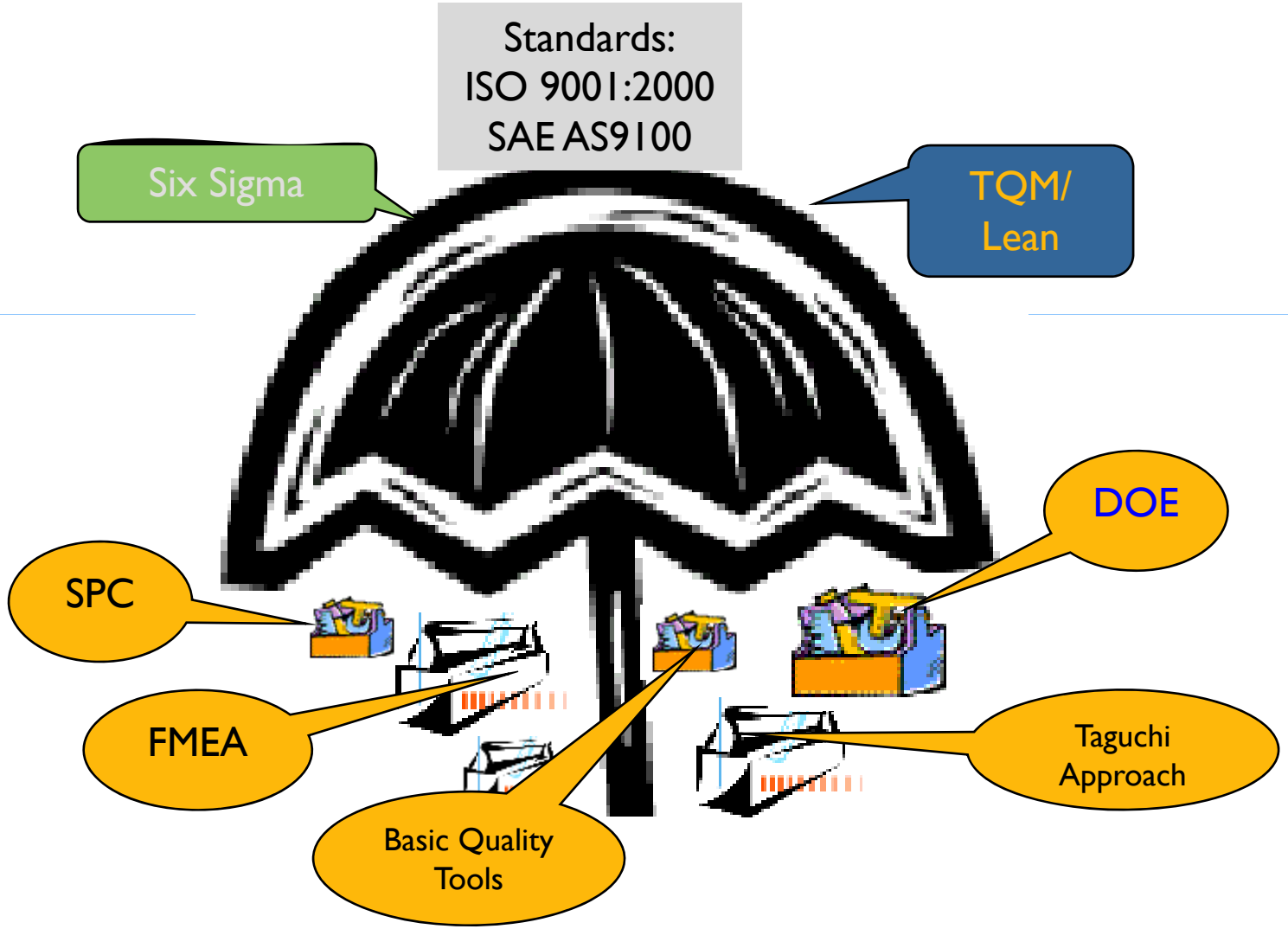
Fredrick Taylor
• Standardized work time study & work standards
• Worker/management dichotomy

Frank & Lilian Gilbreth
•Process Chart
•Motion Study




Edward Deming **Joseph Juran** **Genichi Taguchi** **Kaoru Ishikawa**
•TQM, SPC, Taguchi Methods, Fishbone Diagram ....

Many Disciplines and Tools for Quality

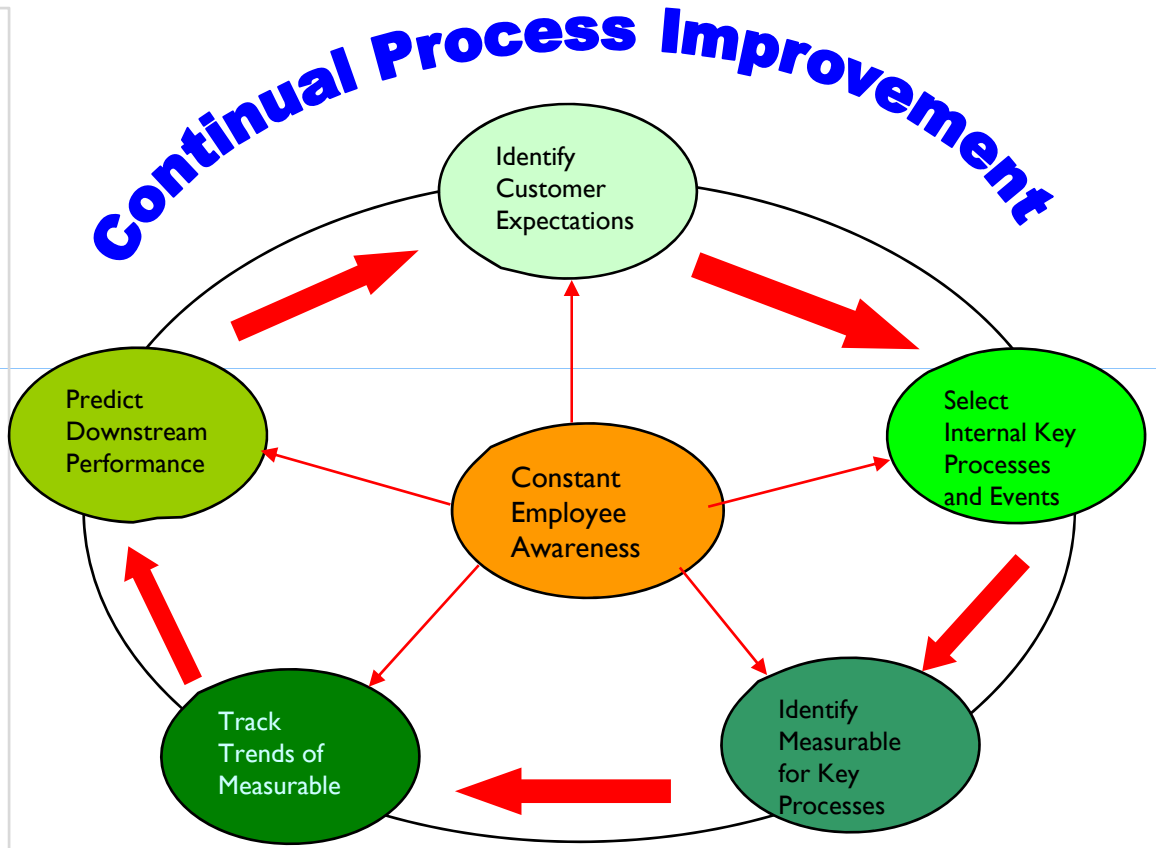


Quality Operating System

- One such quality operating principle was followed by Ford Motor Company in early 1990's.

- It is a very simple set of steps that businesses of all kinds can benefit from.

- Let's quickly review the steps in this method.



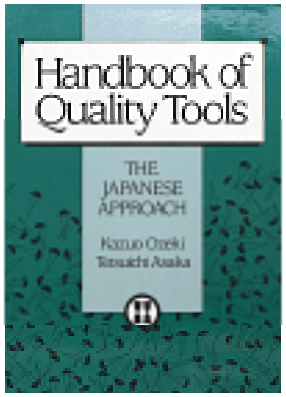
Identify Customer Expectations

Who are customers and what are their expectations?

CUSTOMER
- Internal customer
- External customer

EXPECTAIONS
- Specific needs
- Process & measurable to satisfy them

STRATEGY
- Satisfy expectations



Seven Basic Quality Tools

Flow Chart, Check Sheet, Histograms, Pareto Charts, Cause and Effect Diagrams, Scatter Diagrams, Control Charts.

These fundamental quality control (QC) tools were first emphasized by Kaoru Ishikawa, professor of engineering at Tokyo University and the father of *quality circles* in Japan. They were identified for the average person to analyze and interpret data. These tools have been used worldwide by companies, managers of all levels and employees.

Basic Tools and Their Utilities

Tools	Use and Utilities
1. Flow Chart	Understand process and depict situation in graphical form.
2. Check Sheet	Find facts by collecting and recording data.
3. Histograms	Identify problems and their relative importance.
4. Pareto Charts	Separate "Significant few" from Trivial many" causes.
5. Cause and Effect Diagrams	Generate and capture ideas.
6. Scatter Diagrams	Study trend and predict behavior.
7. Control Charts	Study performance learn about *common* and *special* causes of variation.

Advanced Quality Improvement Technique:
FMEA, SPC, DOE (Taguchi Method, Robust Design), QFD, TRIZ, etc.

1. Flowchart

"A **flowchart** (also spelled **flow-chart** and **flow chart**) is a schematic representation of an algorithm or a process." - Wikepedia

The **process flowchart** was first introduced by Frnak Gilbreth in 1921. He used it show as a graphical and structured method for documenting process activities.

Flow Charts:
Understanding and Communicating How a Process Works

Also known as Process Maps and Process Flow Diagrams

Flow charts are useful tools for communicating how processes work, and for clearly documenting how a particular job is done. It is an effective way to clarify understanding of the process, and helps thinking about where the process can be improved.

It can be used to:

- Define and analyze processes
- Build a step-by-step picture of the process for analysis, discussion, or communication
- Define, standardize or find areas for improvement in a process

Most flow charts are made up of three symbols:

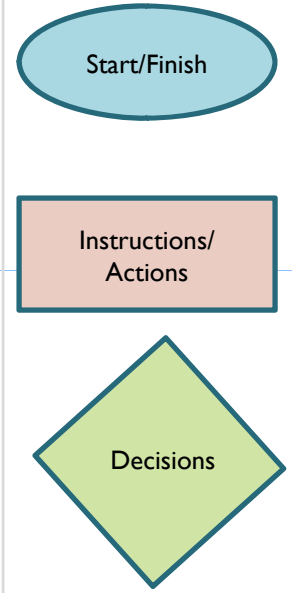
Elongated circles, which signify the start or end of a process;

Rectangles, which show instructions or actions; and

Diamonds, which show decisions that must be made

Within each symbol, write down what the symbol represents. This could be the start or finish of the process, the action to be taken, or the decision to be made.

Symbols are connected one to the other by arrows, showing the flow of the process.

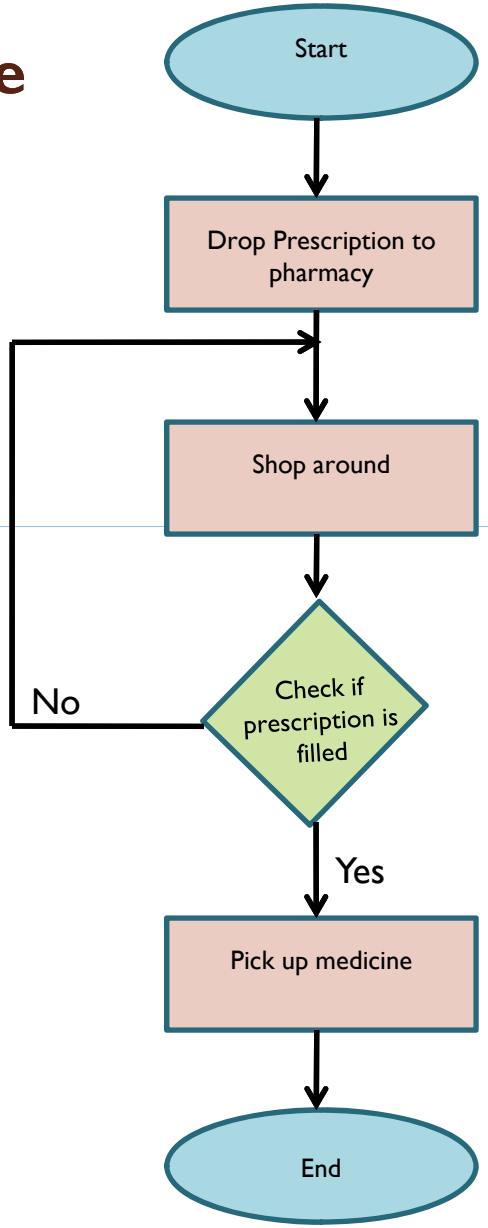


Example: Prescription Medicine

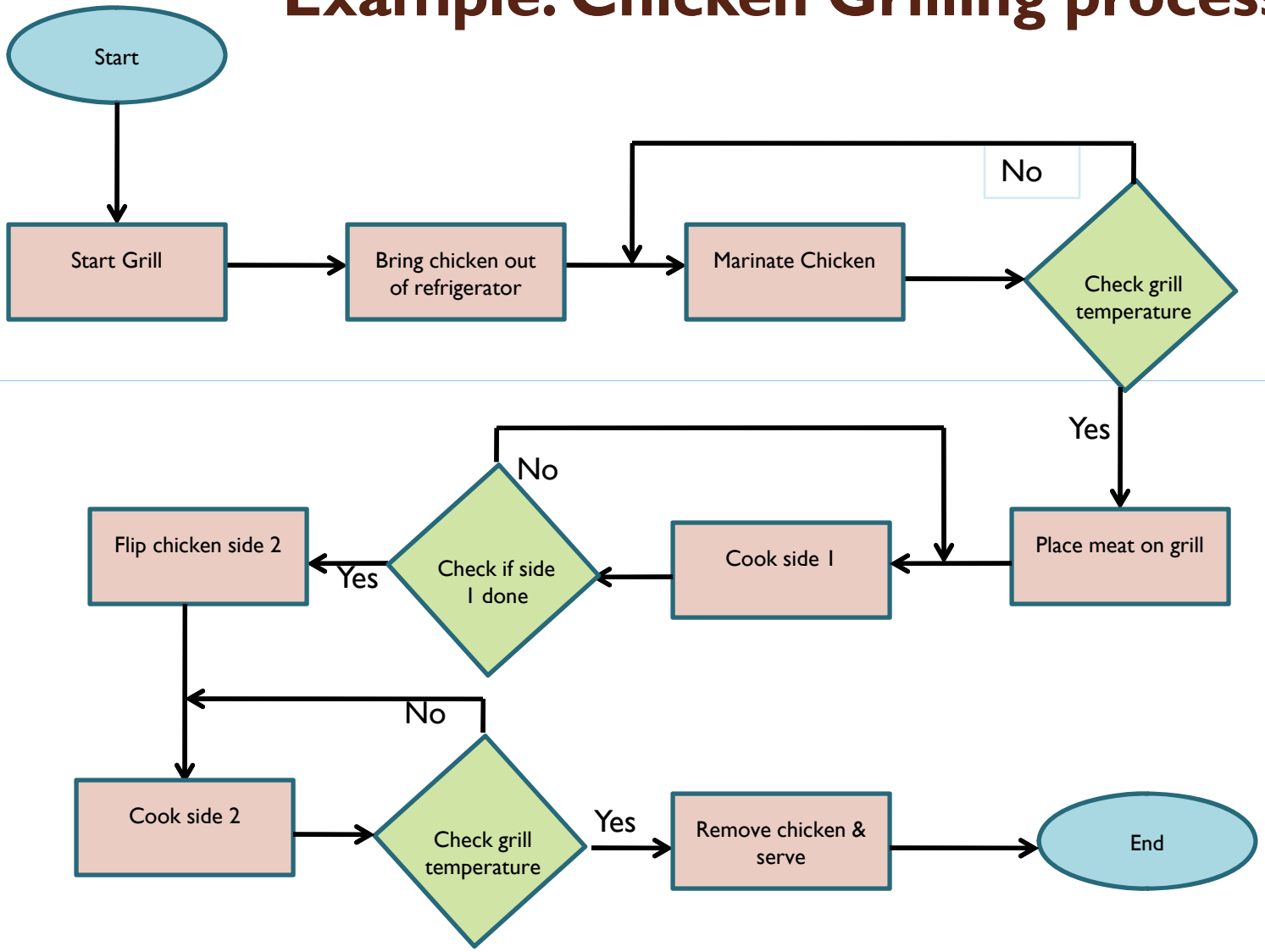
In typical run to the drug store, the activities include:

- *Drop off prescription*
- *Shop around while the prescription is being filled (or do other things)*
- *Check to see if prescription is filled*
- *Pick up medicine if it is ready*

This can be shown in a *flowchart* as shown at right.



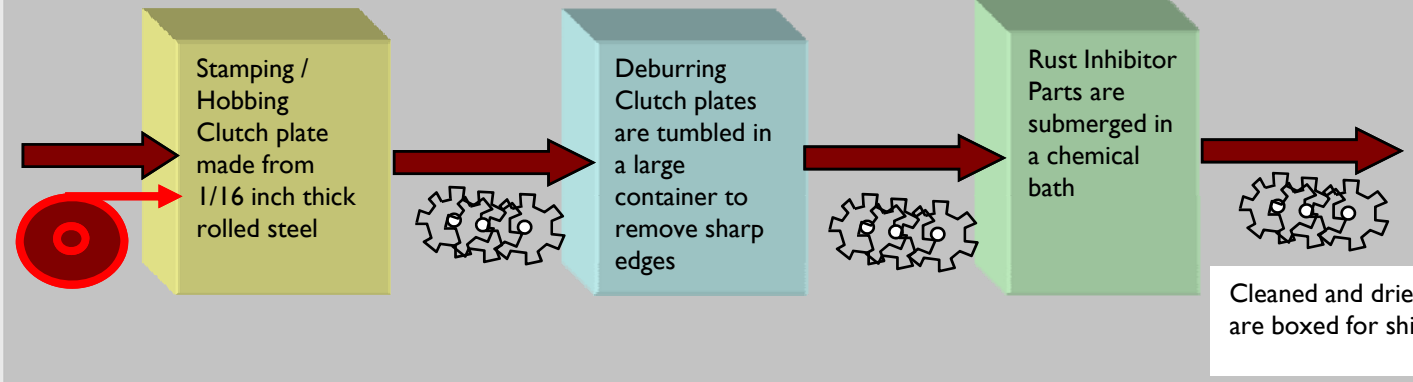
Example: Chicken Grilling process



Clutch Plate Rust Inhibition Process

The Clutch plate is one of the many precision components used in the automotive transmission assembly. The part is about 12 inches in diameter and is made from 1/8-inch thick mild steel.

Figure: Clutch Plate Fabrication Process

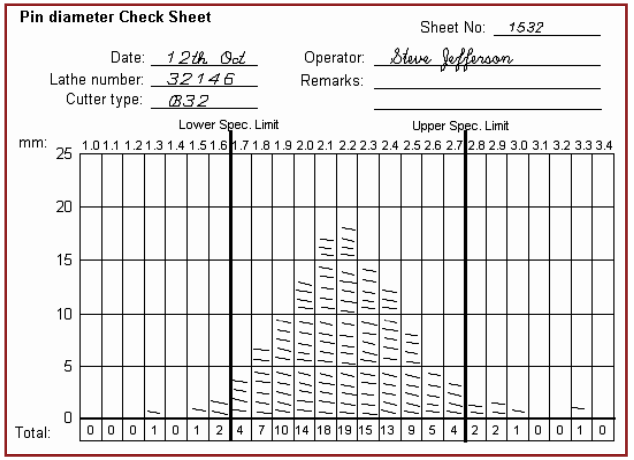


Group Exercise: Flowchart

Do it as a group

1. Select an activity/process
2. Identify tasks (3 – 5 tasks and 1 or 2 decision points)
3. Draw FLOWCHART
4. Review and refine chart

Present your process to the class and show your FLOWCHART.

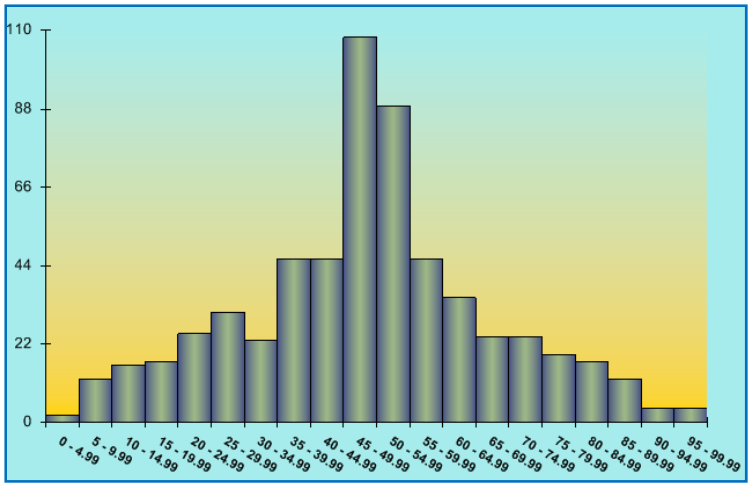


2. Check Sheet

"The **check sheet** is a simple document that is used for collecting data in real-time and at the location where the data is generated." – Wikipedia

The check sheet is made of a blank piece of paper and is used to record quantitative or qualitative information quickly. Often it is also called as tally sheet when the data collected is quantitative. Often it forms the Histogram in front of the person collecting the data so they can see how it builds up.

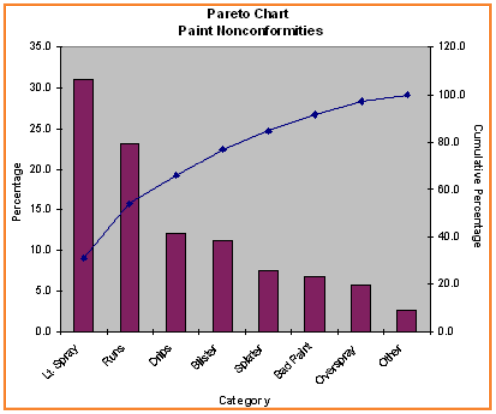
The Check Sheet is one of the first seven quality tools.



3. Histogram

The histogram is a summary graph which shows the count of total number of data points that fall in various ranges

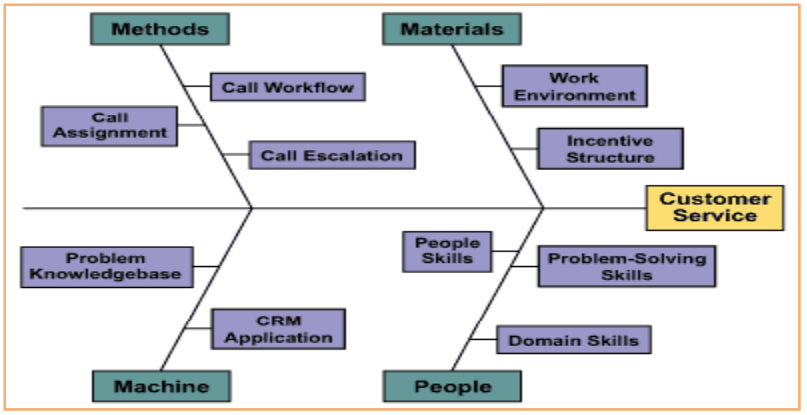
The word *histogram* is derived from Greek: *histos* 'anything set upright' (as the masts of a ship); *gramma* 'drawing, record, writing'.



4. Pareto Chart

"A **Pareto chart** is a special type of bar chart where *the values being plotted are arranged in descending order.*" – Wikipedia

The Pareto Chart is named after Vilfredo Pareto of Italy who used it for study of population & wealth distribution. The chart was popularized by Joseph M. Juran and Kaoru Ishikawa which they often used to represent most common sources of defects, the highest occurring type of defect, or the most frequent reasons for customer complaints, etc. Their use gives rise to the 80 – 20 Rule which implied that 80 percent of the problems stem from 20 percent of the causes.

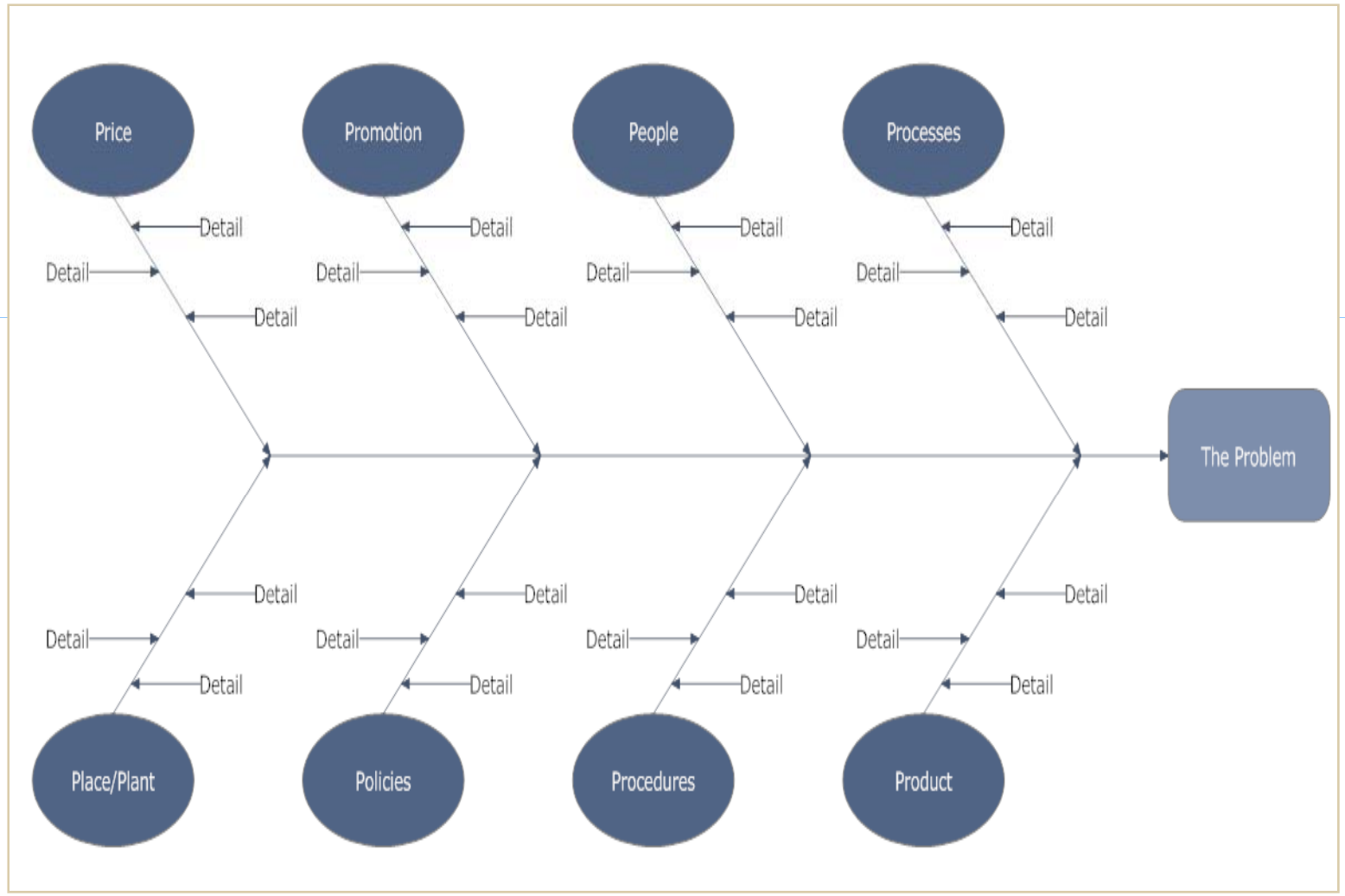


5. Cause-And-Effect Diagram (Ishikawa Diagram)

"It is simply a diagram that shows the causes of a certain event." - Wikipedia

The **Ishikawa diagram or fishbone diagram** or **cause-and-effect diagram** is the brainchild of Kaoru Ishikawa, who pioneered quality management processes in the Kawasaki shipyards in 1960. The diagram generally can reveal key relationship among various variables and possible causes identified may provide additional insight into process performance.

8 P's – Administration



Ideas for Brainstorming - Summary

8 P's for Administration

1. Process
2. People
3. Promotion
4. Price
5. Product
6. Procedures
7. Policies
8. Place/Plant

6 M's for Manufacturing

1. Man
2. Machine
3. Method
4. Mother Nature
5. Materials
6. Measurements

4 S's for Service

1. Skill
2. System
3. Suppliers
4. Surroundings

Example: High Heating Cost (List of factors/causes)

Materials

- *Natural Gas*
- *Propane*
- *Oil/Hot water*

Method

- *Duct Cleanliness*
- *Vents Open & Close*
- *Space Heaters*
- *Insulation*
- *Window Glass*

Measurement

- *Meter Reading Error*
- *Leaky Gas Tube*
- *Thermostat Control*

Machine

- *Furnance*
- *Filters*
- *Himidifies*

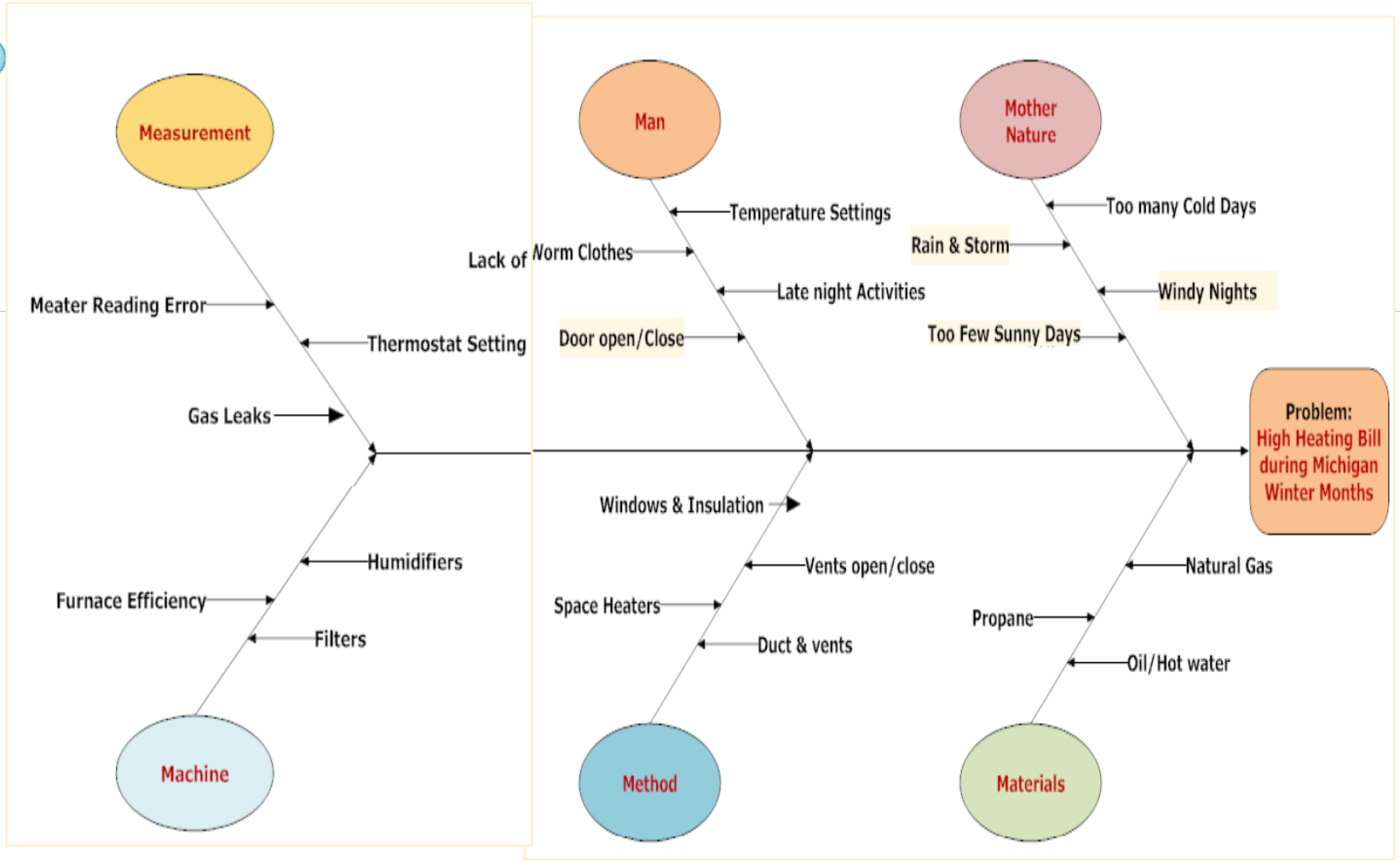
Man

- *Temperature Setting*
- *Fireplace*
- *Late night Stay*
- *Lack of Worm Clothes*
- *Excessive door open/close*

Mother Nature

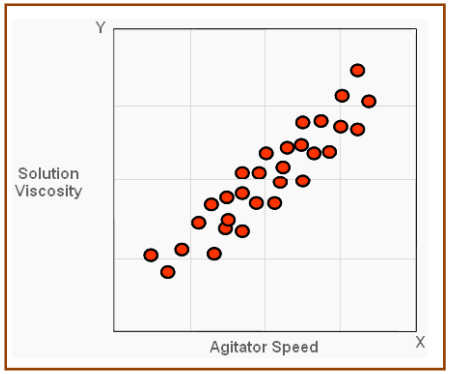
- *Too many clod days*
- *Windy nights*
- *Storm and Rain*

Example: High Heating Cost



Group Exercise: Ishikawa Diagram

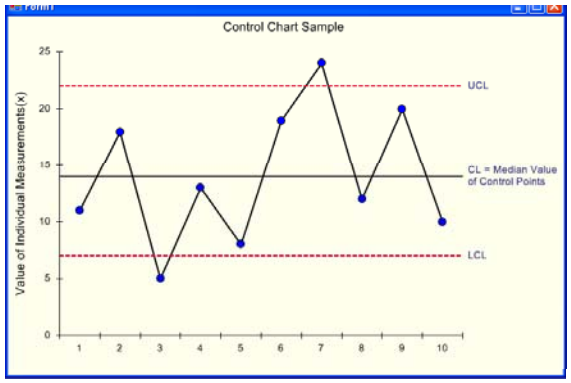
Brainstorm and Create Your Own Fish-Bone Diagram Define Problem: (One sentence) List Major Categories: List Factors under each Category: DRAW DIAGRAM	Show and share your project to the class.



6. Scatter Diagram (Trend Chart)

In a **scatter graph** or **scatter diagram** the data is displayed as a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis. It can be used to relate the dependent or independent variables under study.

An equation for the correlation between the variables can be determined by established *best-fit* procedures. For a linear correlation, the *best-fit* procedure is known as *linear-regression*.



7. Control Chart

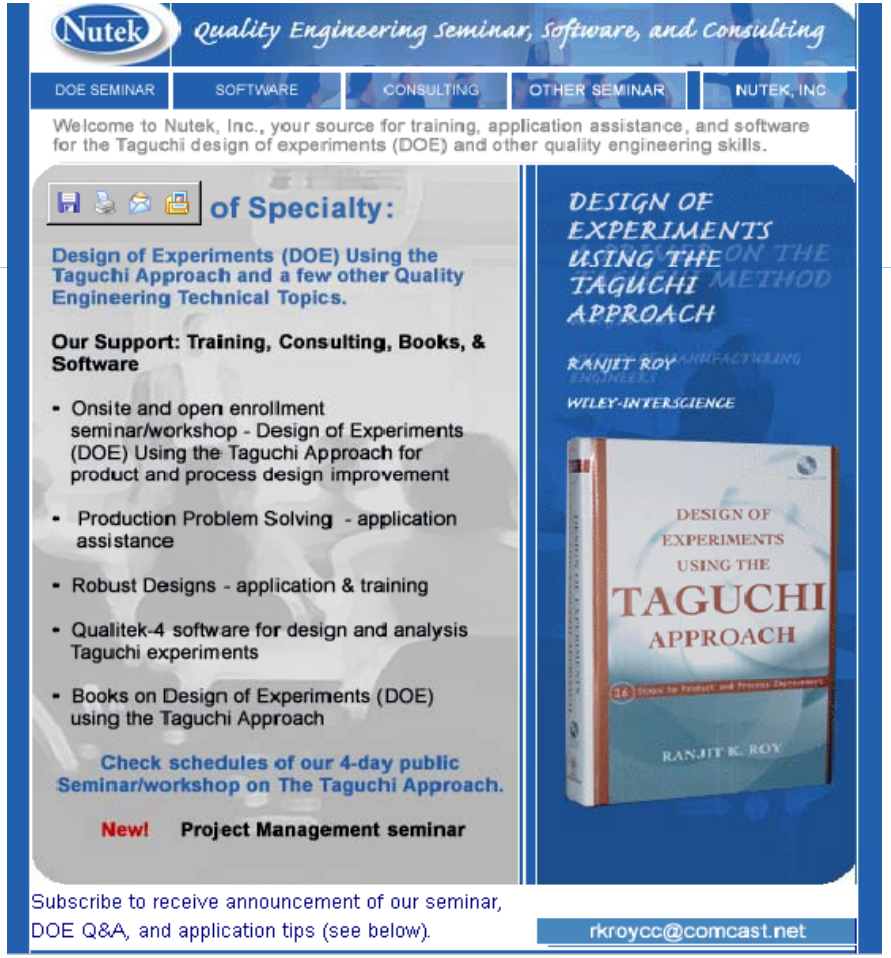
The **control chart**, (also known as the **'Shewhart chart'** or **'process-behavior chart)** is a method to determine whether a process in a state of statistical control or not. When the process is not in control, the chart can reveal the source of variation to be eliminated to bring the process back into control.

The control chart was invented by Walter A. Shewart while working for Bell Labs in the 1920s. It represents a diagram which contain all of the essential principles and considerations for process quality control.

For support and references visit our sites or contact our Sponsor.

Contact us: Ph: 248-540-4827, Support@Nutek-us.com or sponsor

Visit www.Nutek-us.com for our client list and to explore our consulting and training support services.



Thank You

- Training & Workshop
- Assistance with application
- Text Books
- Software (Free DEMO download)

Web site links:

All Seminar Topics: http://Nutek-us.com/wp-sem.html
Design for Six Sigma (DFSS) http://nutek-us.com/wp-dfss.html
Taguchi/DOE Seminar: http://nutek-us.com/wp-s4d.html
Onsite DOE seminar: http://nutek-us.com/wp-ons.html

DOE Application Support: http://nutek-us.com/wp-support.html
Consulting & Problem Solving: http://nutek-us.com/wp-sps.html
Qualitek-4 Software: http://nutek-us.com/wp-q4w.html

Project Management Training: http://nutek-us.com/wp-pmp.html

Testimonials: http://nutek-us.com/wp-q4w-eval.html
Nutek Client List: http://nutek-us.com/wp-nut.html

FREE Game and References: http://nutek-us.com/wp-free.html

Nutek, Inc.
3 829 Quarton Road
Bloomfield Hills, MI 48302.
Tel : 1-248-540-4827
Info@Nutek-us.com www.Nutek-us.com