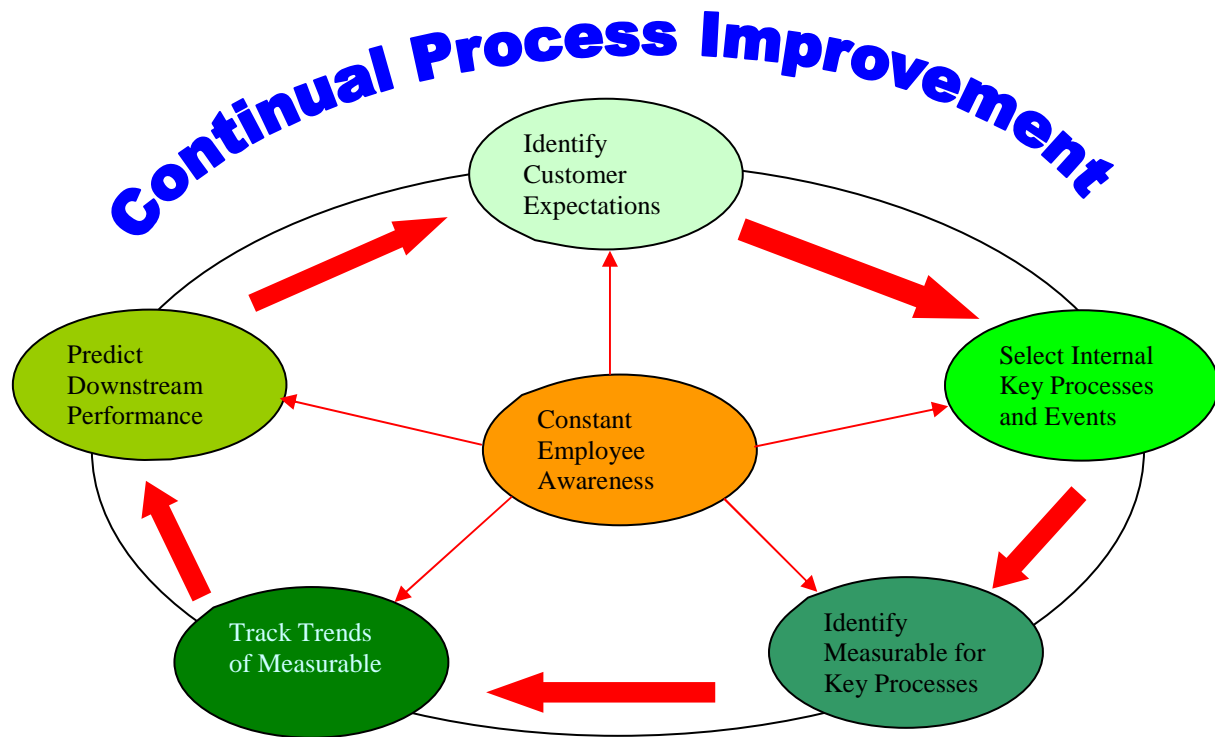


Quality Operating System – Overview



Quality Operating System

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Nutek, Inc. (Since 1987)

Quality Engineering Seminar and Software

Bloomfield Hills, MI, USA. 2014



Quality Operating System (QOS)

Course Outline:

QOS is a valuable discipline developed in the late eighties for use in all levels of business activities by Ford Motor Company's manufacturing, assembly and stamping plants. It is a set of very basic and general guidelines applicable to quality improvement efforts of products and services of all kinds. Outside Ford, the QOS discipline is also known as BOS (Business Operating System). Use of the QOS guidelines helps align company's strategic goals, achieve planned objectives, and institute quality system for continuous improvement.

This brief session will provide an overview of QOS application steps. Key information is provided about QOS. Basic elements of QOS processes like customer expectations, internal key processes, measurables for key processes, etc. are discussed in details. Attendees will have chance to apply the concepts in hypothetical business examples. By attending this session you will learn how to:

- Identify customers and their expectations.
- Identify key process elements that satisfy customer's expectations.
- Select measurable that can be used to quantitatively predict and monitor performance.
- Apply structured problem solving (8D and/or DOE) approach by forming a QOS team when measured performance indicates a problem.

Course Materials:

Seminar handout, Classroom exercises

Prerequisite:

There are no specific prerequisites for this course. Knowledge of ISO/TS 16949:2002 is desirable, but not required. Familiarity with products and services and strategic issues facing the company is desirable.

Who Should Attend

Managers, supervisors, and people at all levels involved in continuous improvement activities in the company.

Benefits Expected

Participants to this session are expected to learn the basic structure and methodology of Quality Operating System and be able to apply it in their own activities to better understand and satisfy the customer's expectations.

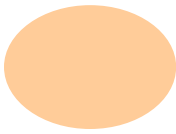
Author's Background

Ranjit K. Roy, Ph.D., P.E. (Mechanical Engineering, president of **NUTEK, INC.**), is an internationally known consultant and trainer specializing in the Taguchi approach of quality improvement. **Dr. Roy** began his career with The Burroughs Corporation as a senior project engineer following the completion of graduate studies in engineering at the University of Missouri-Rolla in 1972. He then worked for General Motors Corp. (1976-1987) assuming various engineering responsibilities, his last position being that of reliability manager. He is the author of the textbooks **A Primer On The Taguchi Method** - published by the Society of Manufacturing Engineers in Dearborn, Michigan, **Design of Experiments Using the Taguchi Approach: 16 Steps to Product and Process Improvement** published (January 2001) by John Wiley & Sons, New York, and of **Qualitek-4** software for design and analysis of Taguchi experiments. Dr. Roy is a fellow of the American Society for Quality and an adjunct professor at Oakland University, Rochester, Michigan.

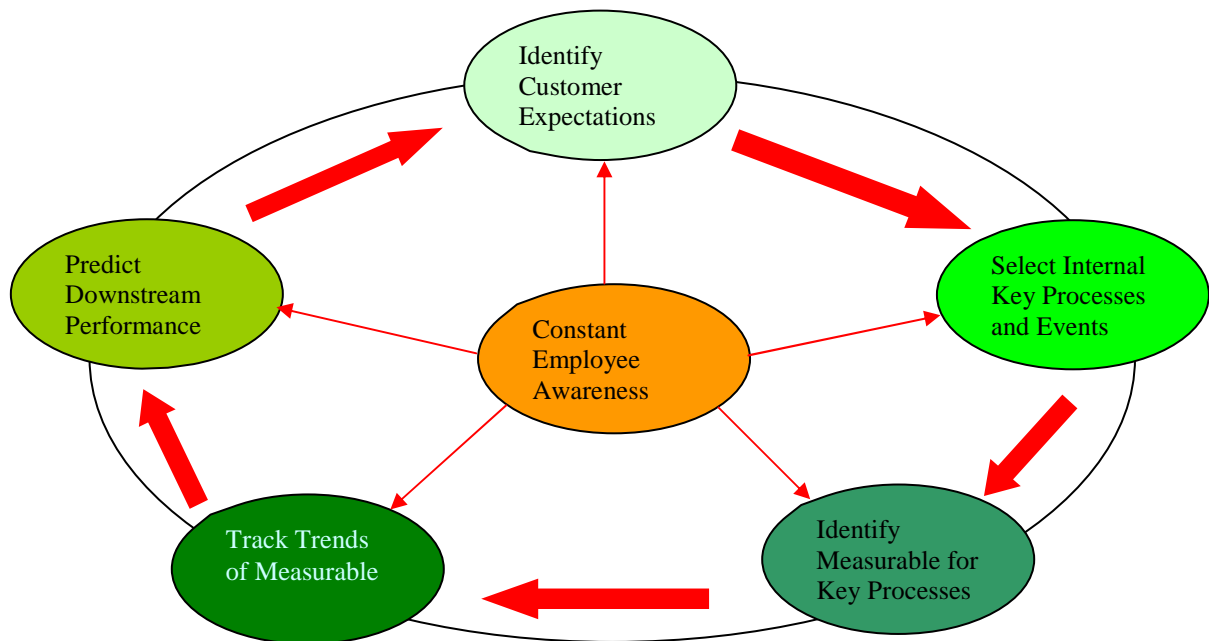


QOS Course Content

1. Introduction to QOS
2. 6-Phase Model for QOS
Methodology
3. Customer Expectations
4. Internal Key Processes and
Events
5. Measurables for Key Internal
Processes
6. Trends of Measurables
7. Downstream Performances
8. Course Reviews & Remarks



Introduction - The Six-Phase QOS Model



An Example (analogy): Pat's Diet and Exercise Plan

1. **Awareness** – Not feeling well, experiencing shortness of breath runs short of energy,
2. **Customer Expectations** - loose weight, feel more energetic, breath easily,
3. **Key Processes** – diet, exercises (What can be done to satisfy customer)
4. **Measurable** – number of calories (diet), length of time of exercise
5. **Trends** – performance of measurables over time

Problem – exercise not on target and there is no loss of weight. Corrective action may require use of 8D method.

6. Correlate & Predict Downstream Performance – compare process measurables (time of exercise) with performance measurables (weight) and predict achievement possibility.

After corrective action is implemented, exercise time is on target and the weight shows a reduction trend. Good correlation. Goal can be expected to meet.

Definition of QOS

Ford's definition of QOS

“QOS is a **systematic, disciplined** approach that uses **standardized** tool and practices to manage business and achieve ever-increasing levels of customer satisfaction through continual process improvement.”

QOS is ..

Systematic - follows a system, a routine ...

Disciplined – does the same thing every time..

Standardized – uses the same routine no matter the application

Why does a company need QOS?

Businesses or companies need QOS to:

- Provide a method for achieving continual process improvement
- Meet competitive pressure
- Allow measurement of performance in quantitative terms
- Meet customer goals successfully and economically

Large manufacturing companies like Ford and GM have many facilities and numerous activities within an organization. Typical activities are:

- Marketing & Sales
- Product Development
- Purchasing
- Employee Relations
- Accounting
- Quality
- Technical Affairs
- Product Assurance
- Etc.

QOS provides a set of guidelines that can be used by any of such activities to improve the performance of their respective products and services.

What QOS is and is not	
IS	IS NOT
A proactive methodology to increase customer satisfaction	Only a find and fix procedure
Applicable to all kinds of activities and industry	Applicable to engineering only
A method for preventive action as well as for building quality	A report card to reprimand
A system that encourages decision based on data	Just a method to generate data
A process to measure gaps in meeting objectives and implement improvement actions.	Simply a checklist to pass through a milestone.

QOS is Ford's version of TQM as designed for production supplier.

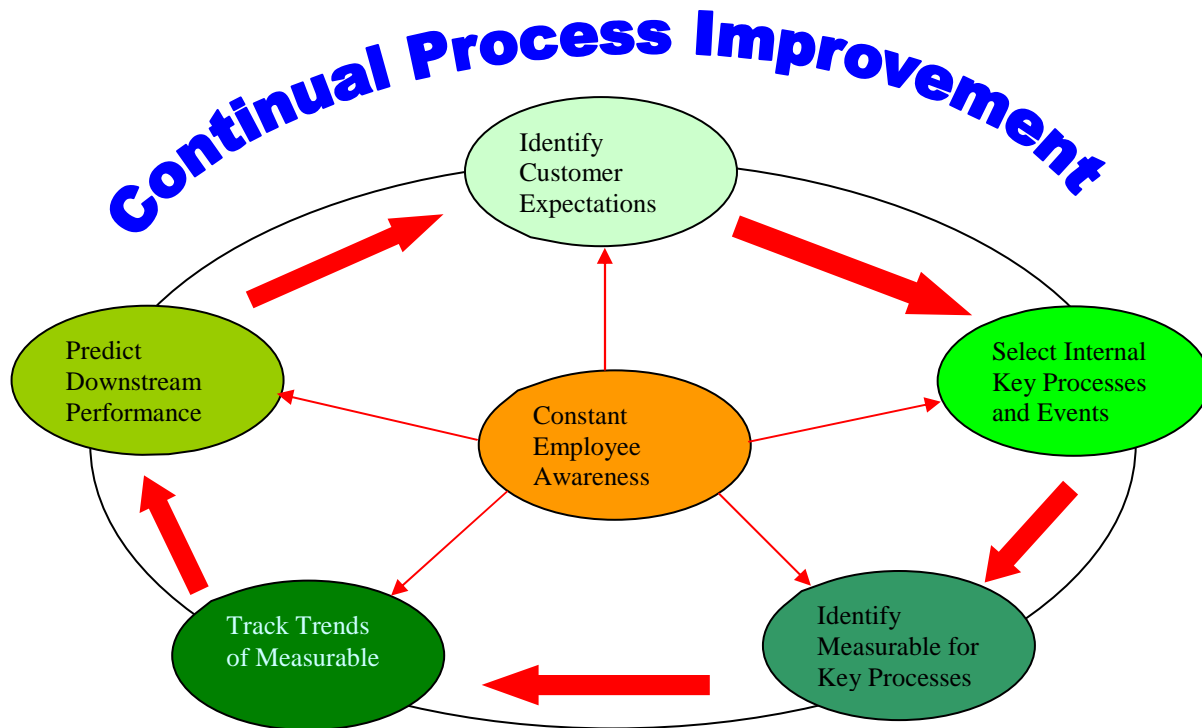
QOS Development and Application History

- 1986 QOS development team formed within Ford
- 1988 QOS is made as part of Q1 guidelines
- 1988 – 1993 Ford Engine Division, Powertrain Division, Body and Assembly, etc. institutes their own QOS



1

Constant Employee Awareness



Quality Operating System

Practice of QOS follows six phases. The key is the center, Constant Employee Awareness.” When all in the company agrees that improving quality is everyone’s responsibility, QOS teams and upper management need to do things to make all employees aware of company’s goals and values. The QOS process cycle assures that:

- Employees are aware
- Each activity (QOS team) makes it their goal to satisfy their internal customers
- Key processes to satisfy customer expectations are identified
- Measurables for key processes and performances are selected
- Process and performance measurables are tracked over time
- Performances are correlated and downstream performances are predicted

Continual Improvement – Improve upon what has been already achieved as competition also improves.

Ford's 6-Phase QOS Model

- There are six phases in Ford's QOS model
 - o Employee Awareness + FIVE phases of applications
- Why is QOS needed in your company
 - o Formalized structure of QOS
 - o Need for continual improvement
- Characteristics of QS teams

These elements of the 6-Phase QOS models are described in the following pages.



Why is QOS needed in your company?

- Work as teams and standardize improvement efforts. ‘Make all horses pull the cart in the same direction’
- Shift emphasis on upstream activities. ‘Put the horses before the cart.’
- Take actions on customer quality
- Establish a common meeting and discussion format, hold regular QOS meetings

- All in the company needs to do what affects bottom line and what is important to the company
- Improve communications within the activity.
- Share goals; make all focus on the objectives.
- Institute discipline to consistently follow and practice standard process.
- Repeat improvement process on a continual basis.



Characteristics of QS teams

- Have upper management support
- Can be created at any level of activities
- Members in a cross-functional team are from a number of areas
- Allows more teams simultaneously working in different activities of the company



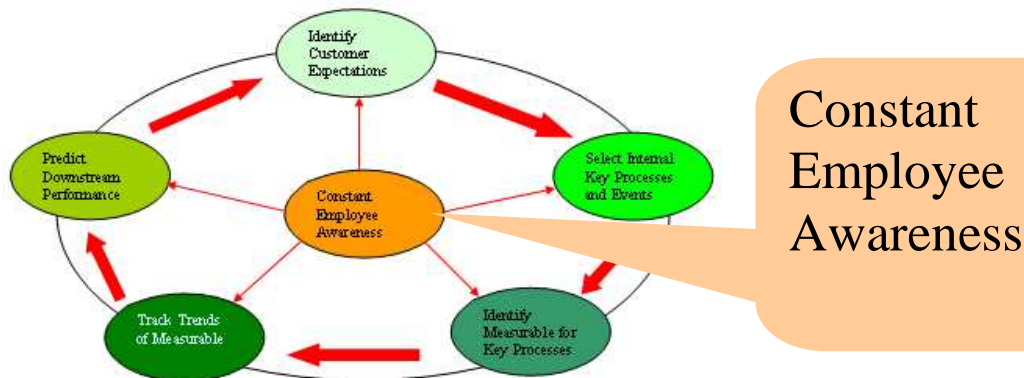
“Problem breeds problems, and the lack of a disciplined method of openly attacking problems, breeds more problems.”

- Phil B. Crosby

Class Exercise: Miller Muffler

Mike and Molly Miller are owners of a chain of Muffler shops in the local Detroit Metropolitan area. They started their business in early 70's and have been servicing owners of automobiles of all kinds replacing mufflers, shock absorbers and a few other underbody parts. The Millers own 25 shops, a head office for management personnel, and employs over 350 people. Their competitors are several other muffler repair shops, some full service gas stations, and collision shops with car dealerships.

The advancement in the corrosion resistance properties of the replacement and new mufflers has caused overall reduction in the aftermarket sales. Many competitive repair shops have closed, but others have been doing well with newly established reputation of improved customer service. To counter the sagging revenue, Mike and Molly are looking for ways to increase their customer base by improving customer satisfaction and also adding new replacement parts to service. They are aware of the QOS process and wish to apply it to their business.



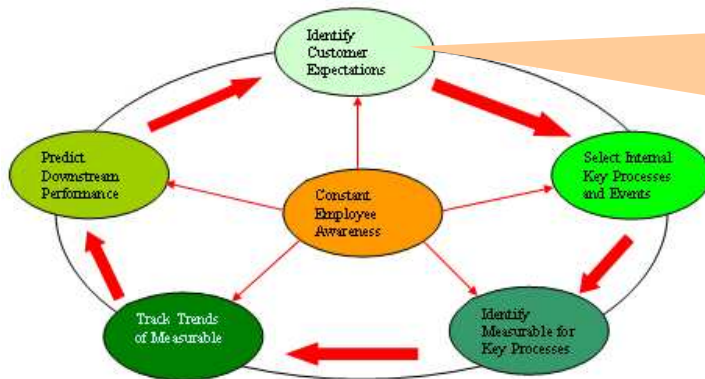
Group Activity 1: Constant Employee Awareness (15 minutes):

Place yourself in the shoes of Mike and Molly, the owners of the Miller Muffler shops. You realize that it is essential for your business success to have all your employees be made aware of important things related to the business.

Task 1. Work as a group and brainstorm all possible options Mike and Molly Miller might do to initiate and institute “Constant Employee Awareness” within the company.

- Write at least FIVE ideas to communicate information in the organization
- Share & explain your ideas with the class (when all groups are ready)

2 Customer Expectation



Identify Customer Expectations

This is the first step in application of QOS.

- Who are customers?
- How are expectations determined?
- What kind of data need to be gathered?

“If you are totally customer-focused and you deliver products and services your customer wants, everything else follows.”

- Roger Enrico, CEO, *Pepsico, Inc.*

Who are customers and what are their expectations?

CUSTOMER

- Internal customer
- External customer

EXPECTATIONS

- Specific needs
- Process & measurables to satisfy them

STRATEGY

- Satisfy expectations



- Customers can be internal or external. External customer is the final customer. Internal customers could be coworkers, management, or people in other activities of the company. Both internal and external customers must be satisfied as long as there is no conflict. Be aware that each level of QOS may have different customers.
- All your customers may be people from downstream activities. You need to identify them and find out what they want (What are their expectation, what can you do to make them happy).
- The success of QOS will depend on being able to satisfy customers. To satisfy them you must know what they want and what you can do (process within your activities) to make that happen. To assure satisfaction you must accurately know the customers expectations in specific terms and relate them to internal process measurables.

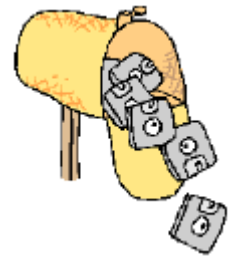
Measurables – Things that can be measured in quantitative terms.

Examples:

Process – Exercise,	Measurable – Length of time of exercise
Process - Dieting,	Measurable – Calories intake of food
Performance – Weight loss	Measurable - Weight lost in pounds

Means of Gathering Customer Expectation Data

- Customer comments
 - Satisfaction survey
 - Field performance data
 - Phone calls
 - Direct contact & visit
 - Focus group
 - Benchmarking data
 - Market research
- Etc.



- Be aware that customers will change expectation. Once the expectations are identified, a procedure must be in place to periodically evaluate the changing expectations and compare performance against it. Market research, focus group, satisfaction surveys are good too for this purpose.
- Be aware of the customer make up and how the product is used. Collect data from sample large enough to cover all kinds of customers
- Compare collected expectations and prioritize if there are many to address at one time. (Use pareto chart to sort expectations when too many are involved)
- Find elements most critical to the customer and determine how it can be measured. In other words, ask yourself if you made the improvement desired, what will indicate to the customers that things are better.

Facts about Customer Behavior

Research has shown that:

- (1) Dissatisfied customers (business or individual) tend not to complain.
- (2) Complaints often do not directly identify the sources or causes of the problem
- (3) Complainers tend to be the heaviest users of the product.

Additional Discussions/Notes about CUSTOMER Expectations:

Who? Customers are the direct users/beneficiaries of output (product or service) of your process.

Type: Internal & External

Expectations: Customer expectations are defined and demanded by customers. These are attributes of your products or services that you must meet to satisfy the customers.

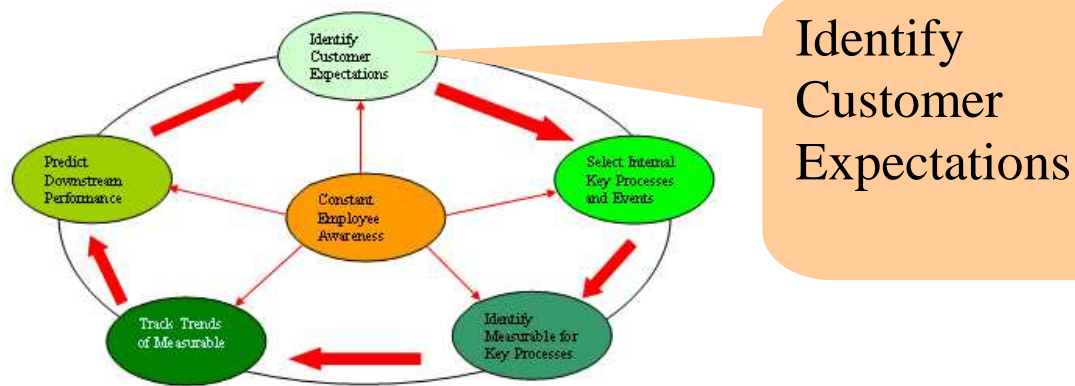
Type of Expectations: Customer may have *expressed* or *implied* expectations. The implied expectations are those that are unwritten, very basic, otherwise difficult to clearly communicate, e.g., customers of a calculator expects batteries I it, customers of an automobile expects all wheel on it, etc.

Determination Methods: Market research, warranty, face-to-face meeting, site inspection, written agreement, work orders, warranty records, focus group, satisfaction survey, verbal feedback, phone calls, competitive benchmarking, third party review, news media reports, etc.

Do you expect customers to change their expectations?

Customers have the right and rationale to change their expectations. Generally it will change over time because of the enhancements to products and services by the competitors. The improvements are generally brought about by technological innovations and production methods. You must, therefore, periodically update your knowledge of customer expectations. You can use the same method used before or different ones if necessary to identify the changing expectations.

Class Exercise: Miller Muffler



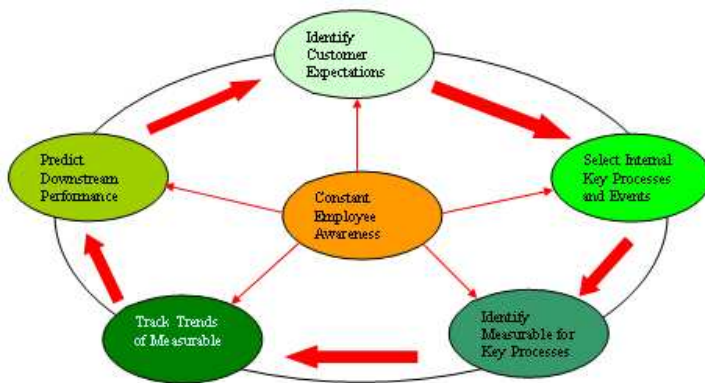
Group Activity 2: Customer Expectations (15 minutes):

1. Assume that you (or group) are an employee of the Miller Muffler (select any one position from the following):

Mechanic - Shop Manager - Accounting - Maintenance - Purchasing - Sales and Marketing - Other administrative/staff management personnel

2. Based on your role in Miller Muffler, discuss and determine who your internal and external customers are.
 - Internal customers (list 2 – 4)
 - External customers (list one or more)
3. Brainstorm to identify methods you could employ to learn what the customers specifically expects from your products and services.
 - Method 1.
 - Method 2.
 - Method 3.
4. Based on your customers **ASSUME** (for this exercise) and establish one or more expectations of customers that you would want to satisfy.
 - Customer expectation 1.
 - Customer expectation 2.
5. Present and explain the customer expectations to the class.

3 Key Internal Processes and Events



Select Key Internal Processes and Events

Strategies:

- Review your system and current work practices
- Study how Advance Product Quality Planning (APQP) is being applied
- Examine each step of the production processes

“My belief is that the process must be controlled to obtain better products and effects.”

- *Dr. Kaoru Ishikawa*

What are Internal Key Processes & Events?

- Identify processes that are very basic to operations.
- The processes should have a direct bearing on customers' expectations.
- Key processes are those that have significant consequence if not done right.
- When key processes and events are too many, order them from most influential to the least one.



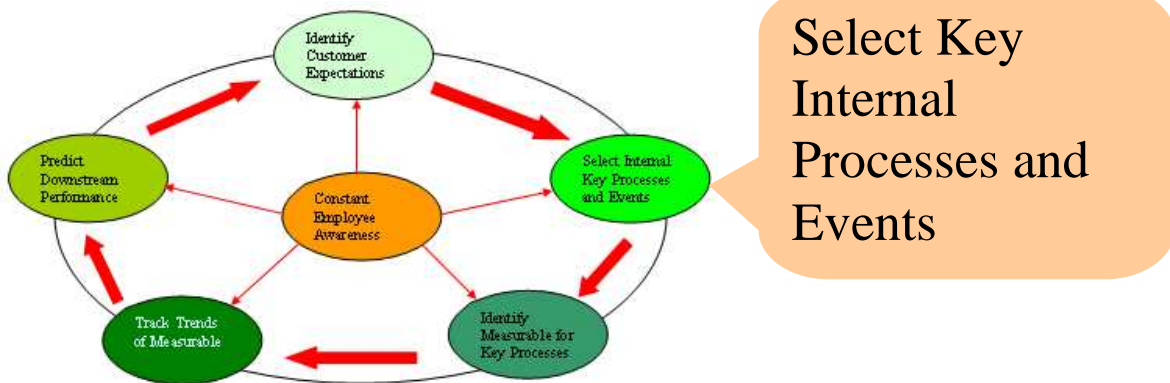
- The Thing to do after customer expectations are identified is to select internal key processes and events. Some examples are:

Manufacturing Processes: Material procurement, Machining, Plating, Painting, Assembly, etc.

Staff Processes: Hiring Personnel, Training, Accounts receivable, Attendance, etc.

- The key processes and events should have direct relation to customer expectation.
Example: If customers expect the **knife** to be sharper, how the **handle** of the knife is made is not related to expectation, but the method of **sharpening** the knife or how its **material** is selected could be the key processes.
- **QOS** is not limited to manufacturing or production operations only. It can be applied to all aspects of your business.
- When there are too many processes and events, address the more important ones first.

Class Exercise: Miller Muffler



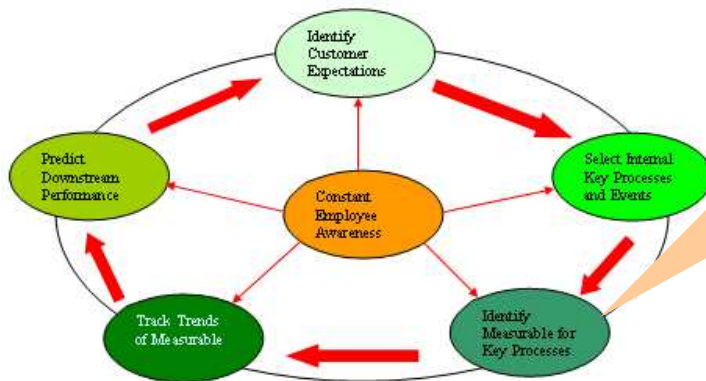
Group Activity 3: Key Processes and Events (15 minutes):

1. Assuming you (or group) are the same employee of the Miller Muffler, brainstorm and list all the processes and events within your job responsibilities. (**Hints:** Think of how the job gets done, list activities, draw work flow or process diagram, arrange activities in their normal sequence, etc.)

2. Select and prioritize those processes that have *direct influence* on the customer expectations you identified before.
 - Process with most influence on the customer expectation
 - Process or activity with second most influence, etc.

3. Present and explain the key processes you selected to the class.

4 Measurables for Key Processes



Identify Measurables for Key Processes

“If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it.”

- Dr. James Harrington,
Former Chairman of ASQ

Internal Key Processes Measurables

Purpose

- Gauge performance of a specific aspect of the business.
- Track progress toward goals.
- Indicate *upstream* performance of the current process

Scope

- Reduce a long list of measurables to a “significant few”.

Upstream – activities that take place early in the process.

Downstream – activities which take place later in the process and are impacted by activities that take place earlier in the process.

Measurables – are “yardsticks” used to measure and monitor performance. They play two important roles:

- a. They examine how good you are doing in specific aspect of the process.
- b. They provide a means to monitor progress toward the goal of the process aspect.

You need to be very familiar with the key processes before selecting appropriate measurables. The measurables you select should correlate the performance with the key processes and also with the customer expectations.

QOS depends on being able to measure processes and performances in quantitative terms.

Process and Measurable Examples

Internal Key processes	Potential Measurables
Shipping – Products packaged, recoded in database, shipping documents prepared, shipped.	- Number of packages shipped
Accounts Payable – Invoice received & verified, secure approval, issue checks, and mail payments.	- Number of days elapsed between receipt of invoice and payment - Number of invoices paid per week.
Training – Develop program, register attendees, and deliver training.	- Number of employees completing training. - Number of applications resulted after training -
R&D – Pursue research on new ideas, demonstrate production feasibility, make prototypes, etc.	- % of projects made to production. - Number of publications in professional journals
Product Development – Parts designed or sourced out.	- % of parts sourced to production supplier - % of part design readied as planned.

Other examples of key processes and measurables:

Painting - Number of rejects, number of touchups in a shift, % uniformity, etc.

Drafting – Number of parts completed, % of time spent in corrections,

Engineering Analysis – Number of design recommendations generated, % of design recommendations incorporated in design, etc.

Advance Quality Planning - % of gauge *repeatability* and *reproducibility* completed, % of FMEAs completed, % of control plans completed, % of process potential studies completed.

Attendance - % of meeting attended (creative approach: To check how many staff comes to work early, the boss schedules meeting in the early morning.)



Type of Measurable

There are two common types of measurables:

- Process (Production Focus)
 - Manufacturing
 - Engineering
 - Training
 - Test & Validation

- Result (Customer Focus)
 - Surveys
 - Audits



Depending on the processes or activities measurables apply, they are grouped into two categories; process measurables and result/performance measurables.

4. All measurables must be in quantitative terms. In case they are subjective evaluation, try to express subjective evaluation in a numeric scale.
5. Mesuarbles must show data that indicates performance of the selected processes.

Brainstorm and prioritize list of measurables:

6. Collect existing data for measurables
7. Gather new data
8. Review and evaluate collected data
9. By consensus, determine the most desirable quantifiers for each measurable

(Note that the term measurable often also refers to the process or activity that representing the key process)

Notes on Key Processes and Measurables:

How can you identify the key processes?

The key processes or sub-processes are identified by examining each customer expectation, and selecting the process or sub-process that has the most impact on meeting the customer expectation.

What are measurables?

A Measurable is a quantifiable indicator of how the process is performing, or how well the customer expectation is being met. All measurables are expressed in numbers. They may have units of measurements as appropriate. The measurables are of two types:

- **Process Measurables** – It indicates how well the processes are performing, and also indicates how well the results (measurables) are expected.
- **Result measurables** – It tells you how you have met your customer (external and internal) expectations. It is expected to show improvement only after the key processes are improved
 - **External customer expectations**, e.g., customer satisfaction, on-time delivery index, warranty return, etc.
 - **Internal customer expectations**, e.g., strategic goals and objectives.

How are result measurables identified?

Result measurables are direct measures of internal and external customer expectations (cost, quality, deliver time, etc). They are identified by reviewing customer expectations.

Example:

Suppose that the internal customer expectations are reduction of variable cost by 7%, reduction of rework and warranty to 2%, and achieve on-time delivery, the potential measurables will be variable cost, percent rework & warranty, percent on-time delivery respectively.

What are some characteristics of measurables?

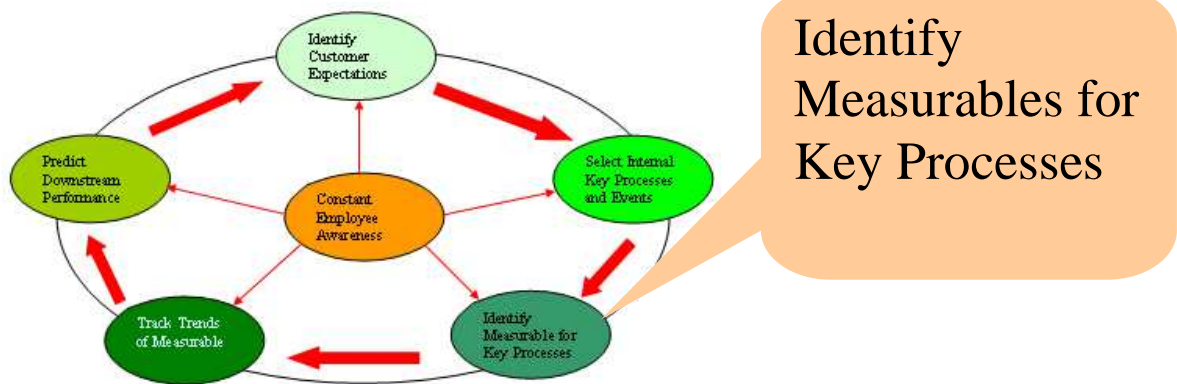
10. Obvious (of obvious importance to business)
11. Actionable (it helps define course of action)
12. Accessible (easily obtained)
13. Understandable (easily understood and simple)
14. Agreed upon (all understood and agreed. Assures team focus.)
15. Predictive (relates well to performance and can be used to predict expected results)

How are goals set?

Each measurable must have a goal. Set it by benchmarking, industry standard, customer requirements, etc.

Goals to be: *aggressive, yet attainable, agreed upon, clearly beneficial to the business and flexible.*

Class Exercise: Miller Muffler



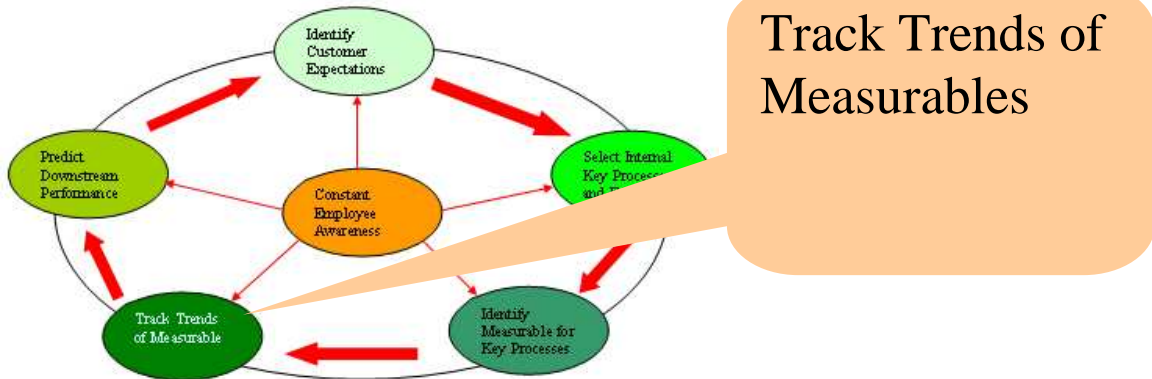
Group Activity 4: Measurables for Key Internal Processes (20 minutes):

1. Chose one of your key internal processes you identified in the last exercise and write a brief (3 – 5 sentences) description of the process including the goal or outcome of this activity.
 - What is the process all about?
 - What is input to this process and what is output

2. Brainstorm and list some measurables (**must be in quantitative terms**) that could be used to indicate how well that process is being accomplished.
 - i. How do you measure the outcome of the PROCESSES?
 - ii. How can you compare how well you are doing the process?

3. Present and explain the measurables you selected to the class.

5 Trends of Measurables



“Symptoms need to be transformed into root causes before problem can be permanently solved.”

- Dr. James Harrington,
Former Chairman of ASQ

Trends of Measurables

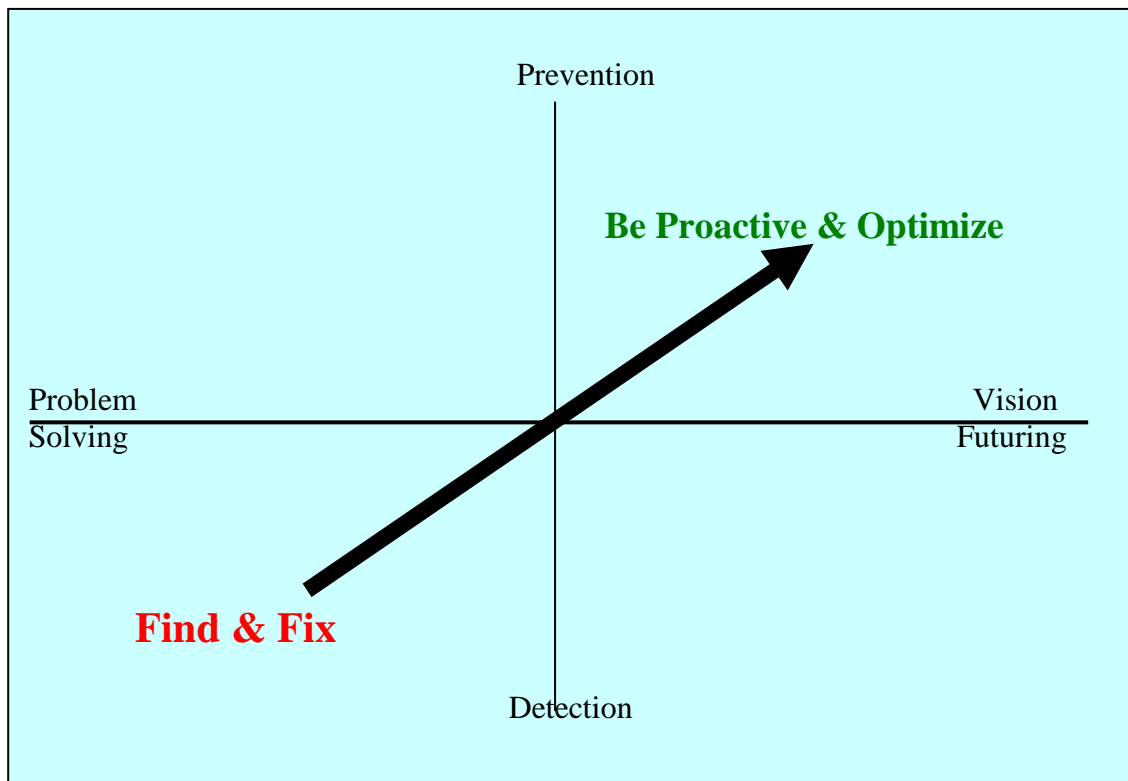
Purpose – Track progress of measurables against goals.

Method – Generally presented in Trend Chart or Pareto Chart. Trends, good or bad, are examined.

Source of Data – Use existing data when possible.

- The progress of the measurables should be tracked against the goals. It is important to:
 - i. Collect data timely and maintain accurate records
 - ii. Make sure the data correlate with goals.
 - iii. Analyze data systematically to look for trends and to identify special causes of problems if present.
 - iv. Share data with everyone in the team and display them when appropriate.
- Diagrams and Charts are tools that provide employees with measurement of processes. Necessarily, they need to be quick to produce and easy to understand.
 - **Trend Chart** – shows how well measurables do with respect to goals.
 - **SPC chart** - helps you identify special causes for the problem and gives you a handle on the natural variability in the system. If special causes are found, you will need to eliminate them in order to continue to meet customer expectations.
 - **Pareto Diagram** – identifies the ‘trivial’ many from the ‘vital’ few. It helps you pick those that have significant impact.

QOS Focus – Proactive than reactive



Y-axis

Prevention - # of failure/problems prevented

Detection - # of problems after it occurred

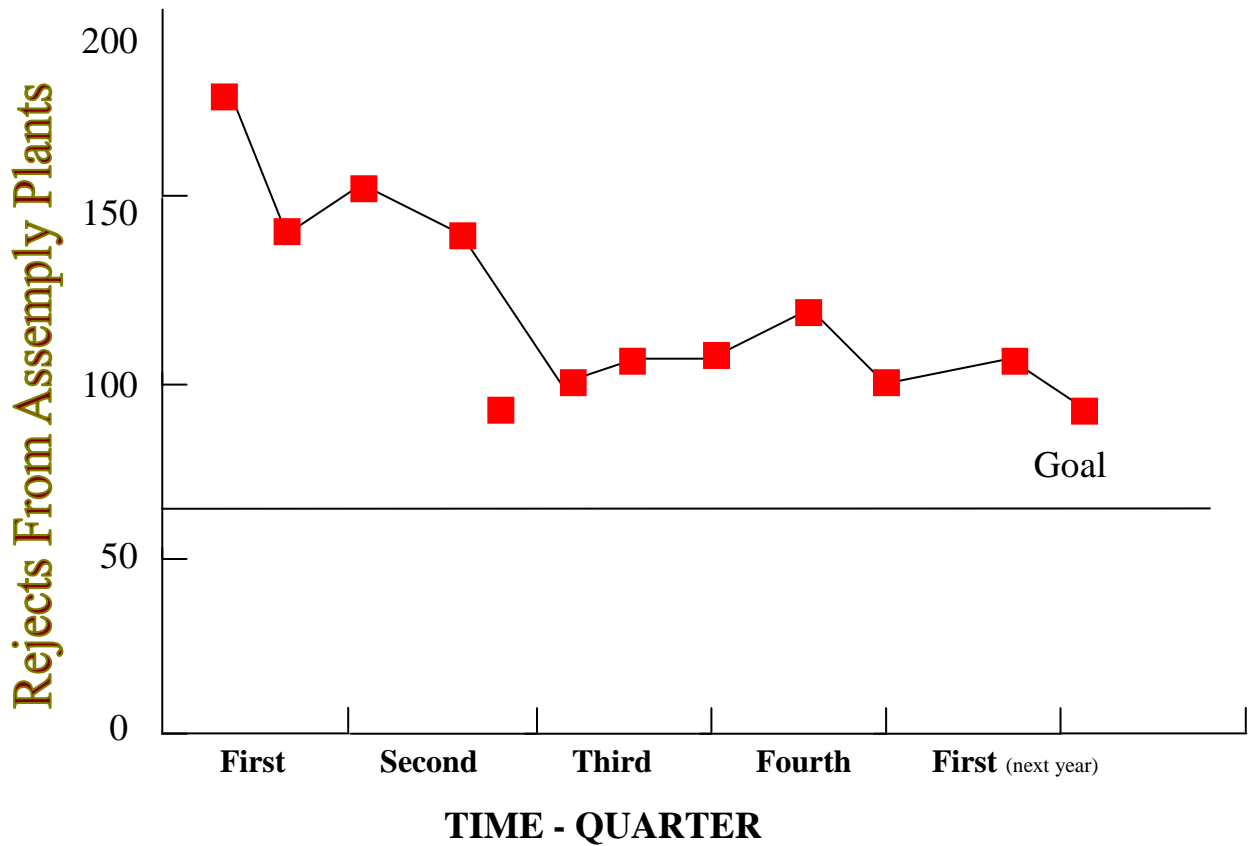
X-axis

Problem Solving - # of problems actually solved

Vision Futuring – # of anticipated future problems and preventive actions taken

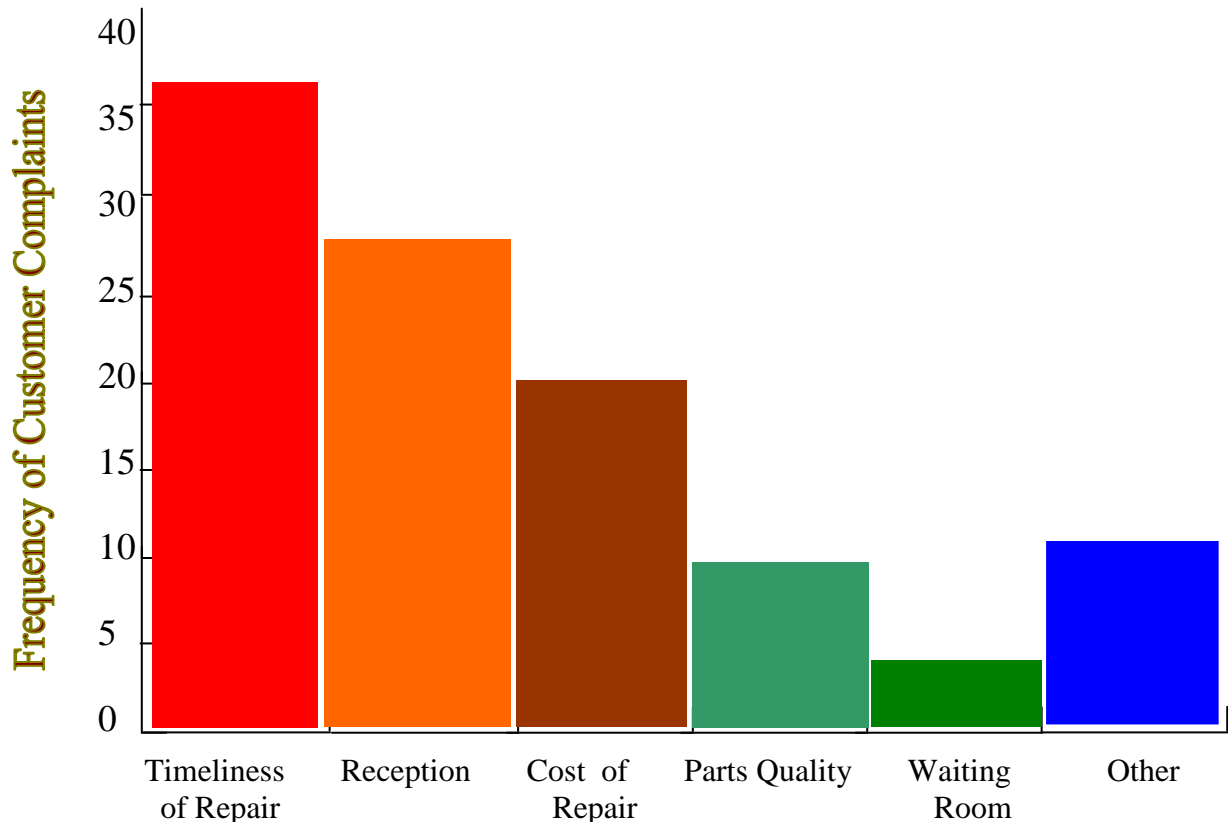
4. Ideally, the **Optimization line** should be **45 degrees** inclined
5. Desirable, we should be always be in the first quadrant

Run/Trend Charts are a common way to graphically display the trends of observed data within a specific period of time.



6. Run chart is a simple X-Y chart employed to graphically represent the observed data. The time period is normally selected as the x-axis.
7. It is a common practice in the industry to plot the recorded data like scraps, rejects, yields, machine downtime, field failure, durability, service time, operating range, mean time between failure, etc. against time over which the data is collected.

Pareto Chart helps you display the relative importance of all the problems or conditions about which data is collected. It allows you to separate the more significant ones from the insignificant many. (The following is an example chart for an automobile dealership.)

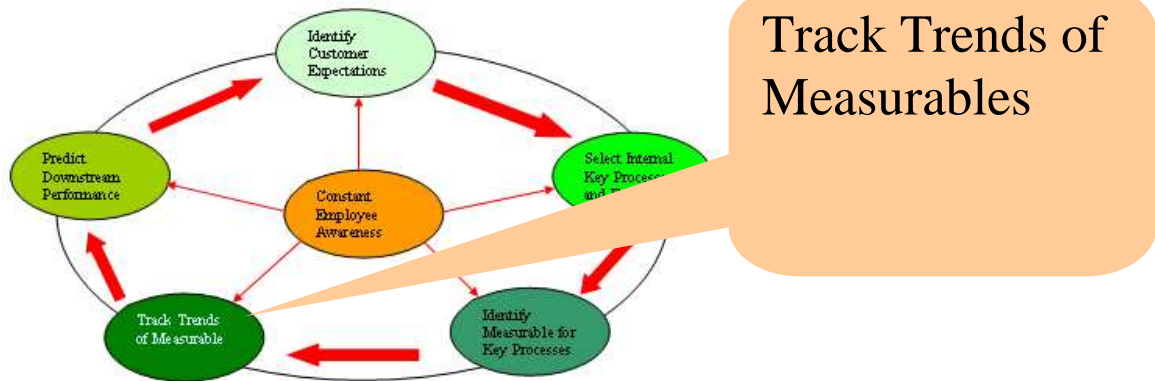


Process Element – Types of Complaints (Year 2001)

Pareto charts helps:

- a. Determine which problem must be addressed when and in what order
- b. Identify important ones and direct attention to the ones that can make bigger impact to customer expectations.
- c. Allocate resources in more objective manner (handle the tallest bars first rather than working on the smaller bars)

Class Exercise: Miller Muffler

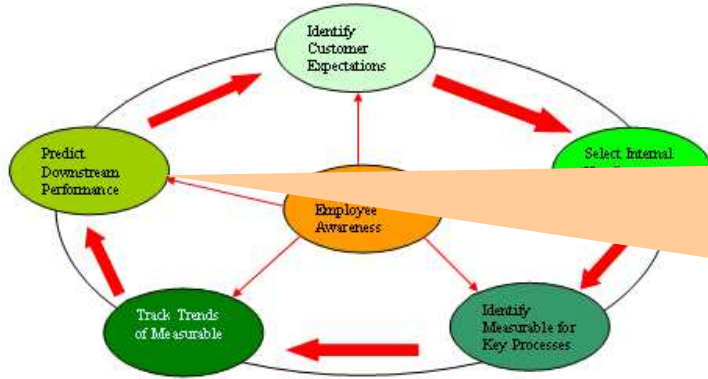


Group Activity 5: Trends of Measurables (15 minutes):

- Supposing that you have collected data (ASSUME a set of appropriate data) on the measurables you identified in the last phase, what quality tools would you use to track the measurables?
 - Identify tools you will use (Normal distribution, Pareto chart, Bar graph, Trend Plot, Pie chart, etc.)
 - Show a sample plot for each type of measurables/data.

- Present and explain the kind of observations you will make from such data analyses.

6 Downstream Performances



Predict Downstream Performances



Why spend all this time finding and fixing and fighting when you could have prevented the problem in the first place?"

- Phil Crosby, Author, *Quality is Free*

Predicting Downstream Performance

Method

- Trend charts allow prediction of downstream performance.
- Familiarities with the trends allow proactive addressing of the customer concerns.

Benefits

- A QOS can identify exact process element for improvement to keep up with changing customer expectations.

- An effective QOS can **stop customer concerns** before they surface. Often, through the use of QOS you are able to **predict performance**. It can **give you early indication** of any deterioration in process performance before it turns into a problem.
- The experience with completed QOS can help you **identify** where process improvement can be achieved. Such knowledge can help you to be ready with improvement strategy in case the customer expectations change over time.
- Prediction of **downstream performance** based on analysis of data, you can objectively use such information **to better manage the resources** like *Men, Machines, Materials, Support Staff, Time, Tools & Equipments, Methods*, etc.

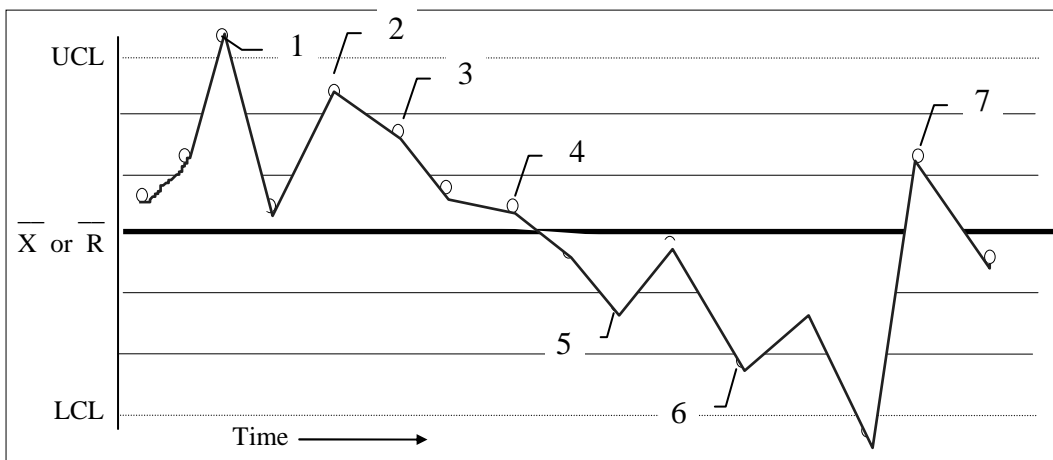
Downstream - events which take place later in the process and are influenced by those that happens early in the process (Upstream)

Example: *Surface finish from a milling process (upstream) of a cylinder bore will have impact on the quality of engine assembly operation (Downstream).*

Control Chart Interpretation (SPC)

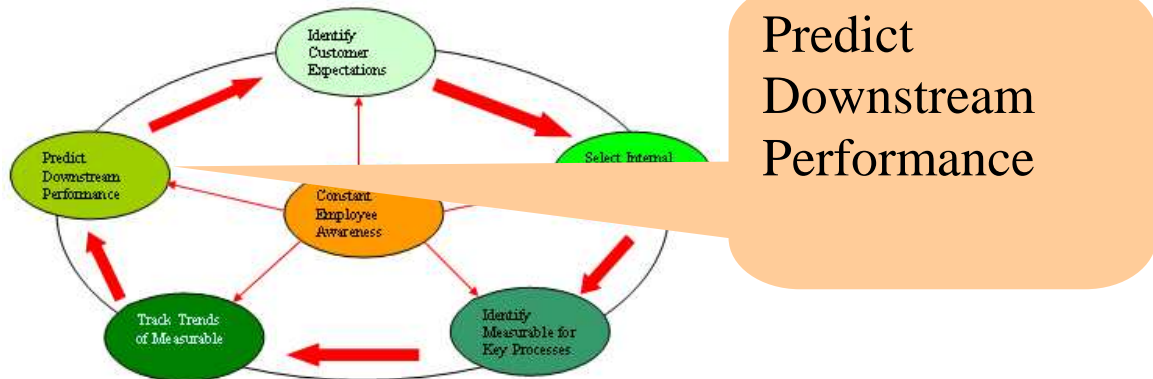
General guidelines for detection of probable out-of-control situation. Each of the following situations will signal the presence of special cause of variations.

Conditions	Probability
1. A point is beyond the upper or lower control limits	0.135 %
2. Two out of three consecutive points are beyond the two standard deviation away from the centerline.	0.153 %
3. Four out of five consecutive points are beyond one standard deviation away from the centerline.	0.277 %
4. Six consecutive points are in an upward trend.	0.139 %
5. Eight consecutive points are above the centerline.	0.391 %
6. Eight out of ten consecutive points, taken from left to right, shows upward/downward trend.	.069%
7. Second of two consecutive point is at least four standard deviation above/below the first one.	0.234



The number next to a point indicates the condition of out-of control

Class Exercise: Miller Muffler



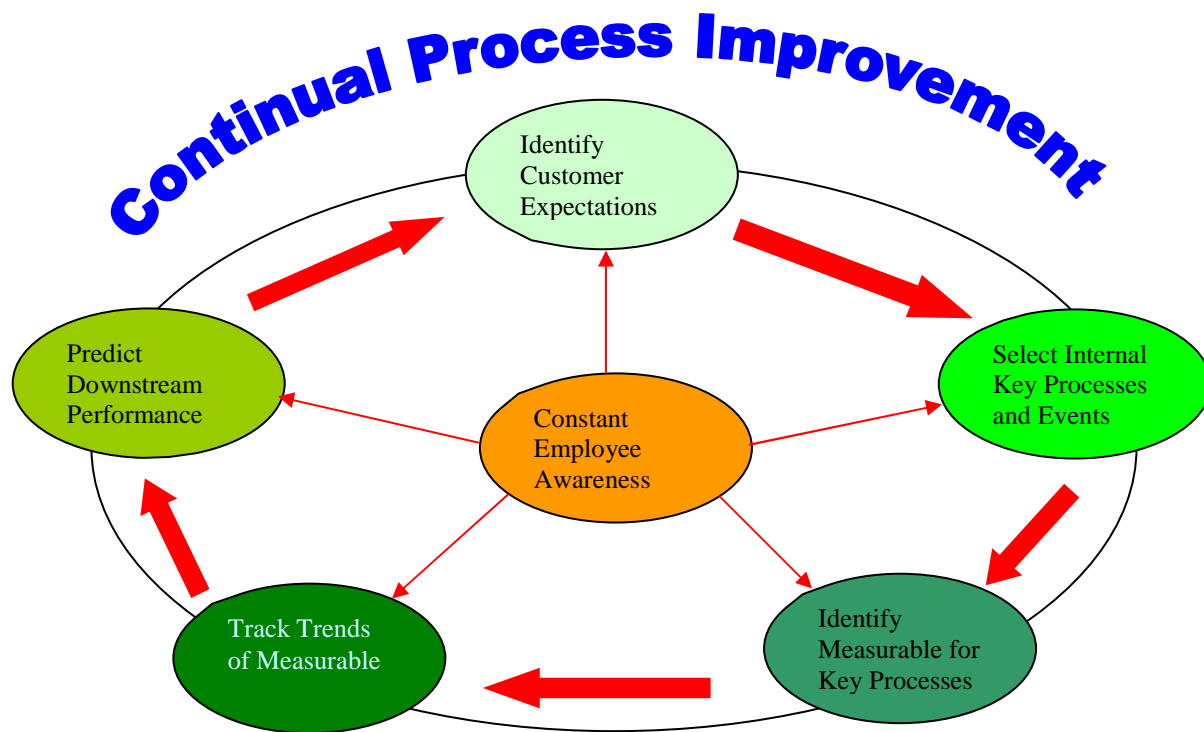
Group Activity 6: Downstream Performance (10 minutes):

1. Assuming that you have analyzed trends of some of the measurable you selected for your processes, discuss how they correlate with the information you collected about the customer expectations. (This is the final step in the project that requires performance data. Based on the assumed data in the last exercise, you will make conclusions and predictions along the following lines).

- Does the trend correlate with results (if process is improved, RESULTS improve)?
- Is it possible to make a prediction when the goals/customer expectations will be met?
- Is it possible to predict what will happen in future?

1. Present and explain how close are you or when you can meet customer expectations.

Reviews and Remarks



Quality Operating System

- 6-Phase Model for QOS Methodology
- Customer Expectations
- Internal Key Processes and Events
- Measurables for Key Internal Processes
- Trends of Measurables
- Downstream Performances

“Even if you are on the right track, you’ll get run over if you just sit there.”

- Will Rogers

Remarks:

QOS provides a basic structure for all to

follow to improve customer satisfaction. It can be applied by all activities whether it deals with a product or service, and by all with or without any technical background.

Driving Questions:

- Based on what you know about your current processes, are you able to predict what your customer will receive?
- Do you know what your customers exactly want?
- Do you know which of your process elements have the most impact on what the customers want?
- Do you know what your customers are likely to expect next year?
- If you have limited resource, do you know where to put your money to make the most improvements?

How to Enhance Employee Awareness:

At the center of the QOS cycle is constant employee awareness. The key to awareness is involvement of all employees which ensures their commitment to meeting customer expectations.

Employee's Role

QOS is a team effort that requires participation by employees at all levels. All employees should be aware of QOS measurables and their impact on company's overall performance. To facilitate QOS success, management is to empower the team with resources and removing any obstacles to continual improvement.

Employees can support QOS development and implementations in the following ways:

- Identify and evaluate customer expectations constantly
- Identify key process elements and develop measurables
- Seek out data for measurables
- Become a champion for measurables
- Volunteer and participate in problem solving teams
- Attend QOS review meetings

Constant employee awareness and involvement in the QOS process ensures that employees are aligned and focused toward satisfying customer expectations.

Who makes up the QOS team?

The QOS team should be an efficiently working team of multiple members. The team should have a chair person (coordinator) and one or more measurable champions.

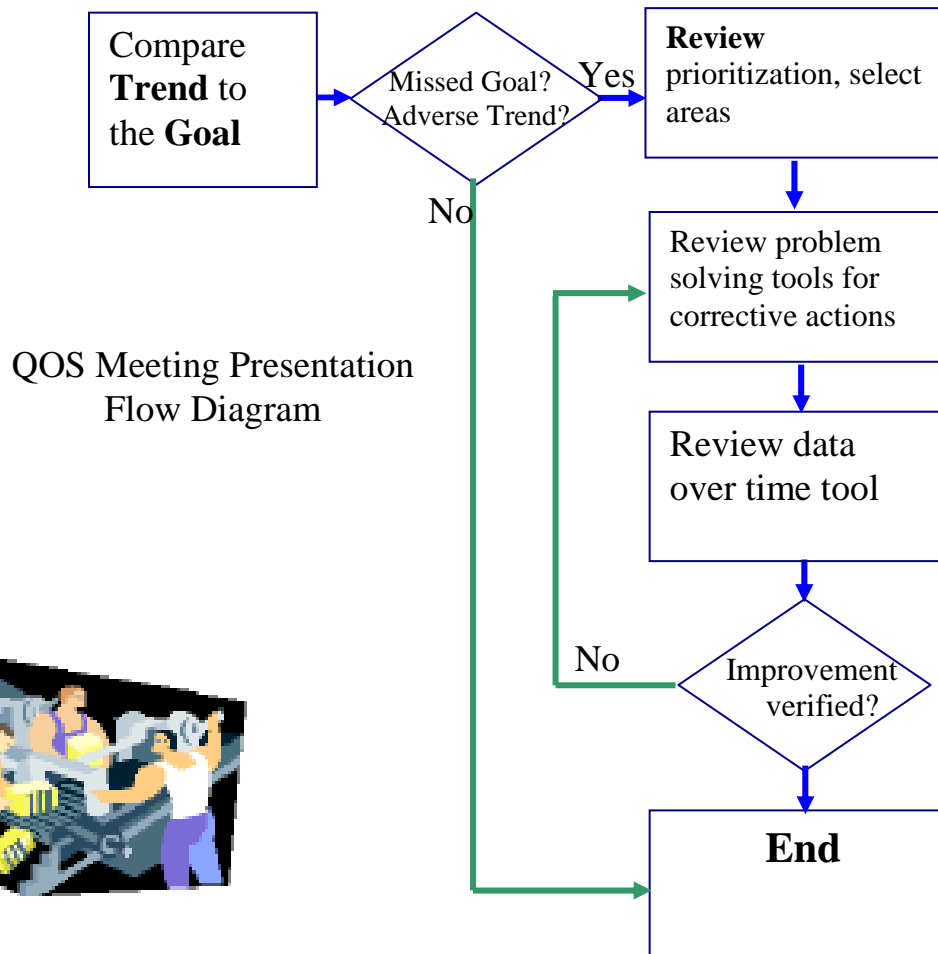
The QOS chairperson is responsible for scheduling and conducting the on-going QOS review meetings. He/ she also determines the meeting agenda and distributes the minutes of the meeting. The nature of the responsibilities makes it imperative that the chairperson be a member of the management personnel. QOS team members specializing in the measurement (Measurable champions) should lead the problem solving effort outside the QOS review meetings. Based on their research, they recommend appropriate QOS tools (measurables, charts, etc) to the QOS review meetings.

How often should QOS team meet?

Monthly. Measurable champion and other members with special assignments can meet as often as necessary.

What is discussed in QOS review meeting?

Measurable champion take turns to present their recommendations and findings. The recommended topics are discussed and decided based on consensus.



Here is what people who have applied QOS say:

“The QOS system has no hidden agenda – easy to put in place and easy to get started.”

“What used to be gray areas have become black and white and quite solvable problems.”

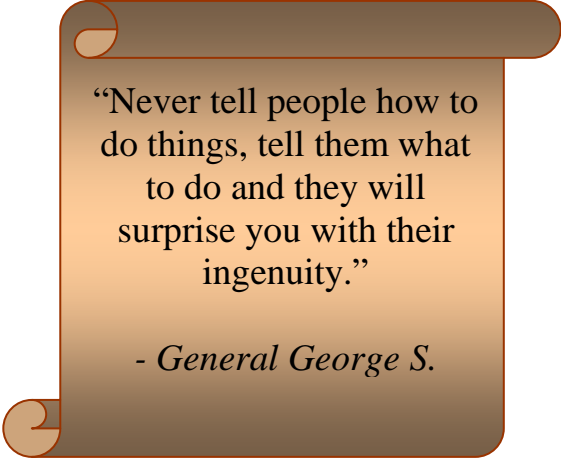
“Teams are able to make improvements without managers’ intervention.”

“All departments focus on the same agenda for continuous improvement.”

“One surprise, the system over a two-year period has:

- Reduced the cost of sales of our product by 4%*
- Helped on-time delivery*
- Improved the bottom line.”*

“Cross-functional team is a necessity. We include engineering, manufacturing engineering, production engineering, and production employees. People with hands-on experience define the problems and bring up the issues.”



“Never tell people how to do things, tell them what to do and they will surprise you with their ingenuity.”

- General George S.



QOS Application Exercises

Date & Location of meeting:

Activity/Department Name:

Activity Description:

QOS Team Members and Coordinator:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
8. _____(Coordinator/Chairperson)



Employee Awareness

1. How can you make employees aware of your QOS effort
 - a. How can employee participate in QOS meeting?
 - b. What can an employee do to initiate & participate in problem solving?
2. What method you would employ to communicate your quality improvement effort to all employees?
3. How would you communicate to all employees on a regular basis about what's important and what's being done to improve customer satisfaction?
- 4.



Customer Expectations

1. Who are your internal customers?
2. Who are your external customers?
3. What are your customer's expectations (expressed & Implied)
4. What methods can you follow to identify customer expectations?
5. Do your customers change expectations over time?
6. How would you periodically update your knowledge of customer expectations?



Internal Key Processes and Events

1. What processes (or su- processes) that have influence over how well satisfy one or more customer expectations?
2. Are your key processes all in manufacturing?
3. Are there any key processes that are in service area?
4. What method would you use to identify key processes?



Measurables for Key Internal Processes

1. How would you measure your key processes in terms of how well they are performing?
 2. Can you measure performances of key processes over time?
 3. Are you able to measure performance of the processes?
 4. Would it be convenient to measure results (*) of the processes?
- (* Results that satisfy customer expectations)



Trends of Measurables

1. How would you find out if you are meeting customer expectations?
2. Who makes up your QOS team?
3. How often do you plan on meeting?
4. Check the items you may discuss in your QOS meeting:
 - a. Track progress
 - b. Identify potential opportunities for improvement
 - c. Describe specific actions taken
 - d. Verify improvement actions taken.
5. Which among the following tools you will use to monitor progress?
 - a. Trend chart and goal
 - b. Prioritizing tool
 - c. Problem solving tools (8D, DOE, etc)
 - d. Data over time tool (Control chart)



Predict Downstream Performances

- How can you find out that you are on the 'right' track?
- How would you know that you will achieve goal?
- What performance over time data will allow you to predict future performance?
- Can you establish a trend that will allow you to predict future performance reliably?

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Program Evaluations

Program Title _____

Program completion date _____

Instructor Ranjit K. Roy & Training Location/host. _____

We appreciate your comments and suggestions. Please take a moment to let us know how we can improve and serve you better. (Please use the following numbers for evaluation purposes).

[6] Excellent [5] Very Good [4] Satisfactory [3] Poor [2] Unsatisfactory [1] Needs Improvement

1. Overall Reaction to Program: 6 5 4 3 2 1 (Circle one number)

Comments: _____

2. Reaction to Instructor: 6 5 4 3 2 1 (Circle one number)

Comments: _____

3. What should be added and/or deleted to improve this program? (Please be specific)

4. What portions of this program do you feel will be most helpful at your work? How?

5. Do you feel the training provided you enough understanding of the technique for you to be able to start applying it to your own projects if opportunities were available?

Yes No May be

6. Would you consider/recommend us for training at your facility? yes No May be

7. Would you recommend that others attend this seminar? YES NO

8. Portion of class sessions you attended 100% Over 90% over 75% Over 50%

9. Percent of class problems and assignment you completed and/or took active part: 100% Over 80% 50%

(Optional)

Your Name _____ Your Ph#/ & E-mail: _____

THANK YOU for taking the time to complete this evaluation.

