Kaman Music Quality Awareness Workbook

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How Can We Manage Quality?

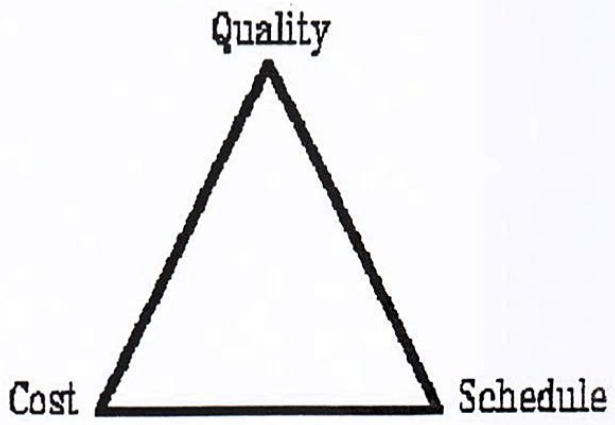
The purpose of this Section is to introduce the fundamental ideas and concepts of quality management. These concepts are:

* All work is a process
* In order to understand and improve our process, we must first understand the Four Absolutes of Quality Management.

ALL WORK IS A PROCESS

Whatever task we do is a process, a series of actions that produces desired results. In our work processes these results are the products and services which fulfill the needs and wants of our customers.

In the Quality Improvement Process, a customer is defined as any individual or group that is affected by the specified work process or a step within that work process. In order to meet all of the customer's needs, we must identify all of their requirements of the products and services that we offer them. There are customer requirements for quality, cost and schedule - all three criteria must be met by the work process each and every time before we can say our work process is one of "Quality." So that, we are not just talking about a quality product or service anymore, but a whole quality system, one that produces the required output at the required time for the required cost, every time. We will come back to this "Quality Triad" many times throughout this course.



Requirements describe the desired product or service. If a customer wants a black guitar or a FAX reply by 4:30 p.m., then "black" and "FAX reply by 4:30 p.m." are the stated requirements of that product or service.

Many times our customers communicate their requirements in terms of goodness or comfort level. Examples in our business are that the musical product must be "state of the art" or we need this order shipped "ASAP." We as suppliers must clarify these requirements, and use our knowledge of our process to translate these expectations into more specific requirements that we can act upon.

Understanding all of our processes and their internal requirements will help us meet our customer's requirements. This is the driving force behind the desire for quality improvement at Kaman Music.

THE FOUR ABSOLUTES OF QUALITY MANAGEMENT

In order to operate, manage and improve our work processes we need to use proven principles, the Four Absolutes of Quality Management.

We have many questions about quality:

* What is the definition of quality?
* How do we make quality happen at KMC?
* What performance standard will we use to measure our process?
* How can we actually measure quality?

QUALITY

OK, what is the definition of quality?

Quality = Conformance to Customer Requirements

Identifying Output and Input Requirements

PROCESSES FLOW

Every process we could study is part of a larger process. Each process can also be broken down into smaller parts. For example, if we drive to work in the morning, that process can be broken down into steps. One of those steps is starting the car. That step can be broken down into other steps, such as inserting the key into the ignition.

SCOPE:

* from the initial activity
* to the final activity

A specific scope enables us to clarify each part of the critical process:

* Outputs
* Customers
* Output requirements
* Inputs
* Suppliers
* Input requirements

Figure 2.1 represents the way we will identify first the outputs, then the customers of the process, and finally the requirements for those outputs. FIGURE 2.1:

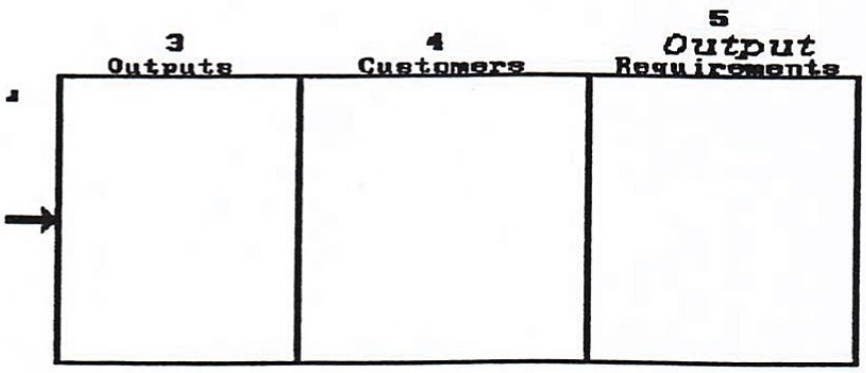
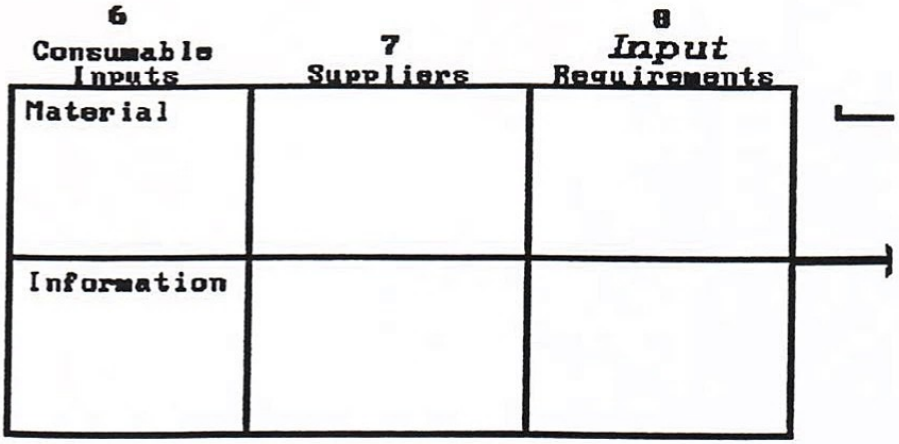


Figure 2.2 represents the way we can look at the input side of our process. Inputs are looked at first, then suppliers and finally our requirements of the inputs.

FIGURE 2.2:



TOLERANCE

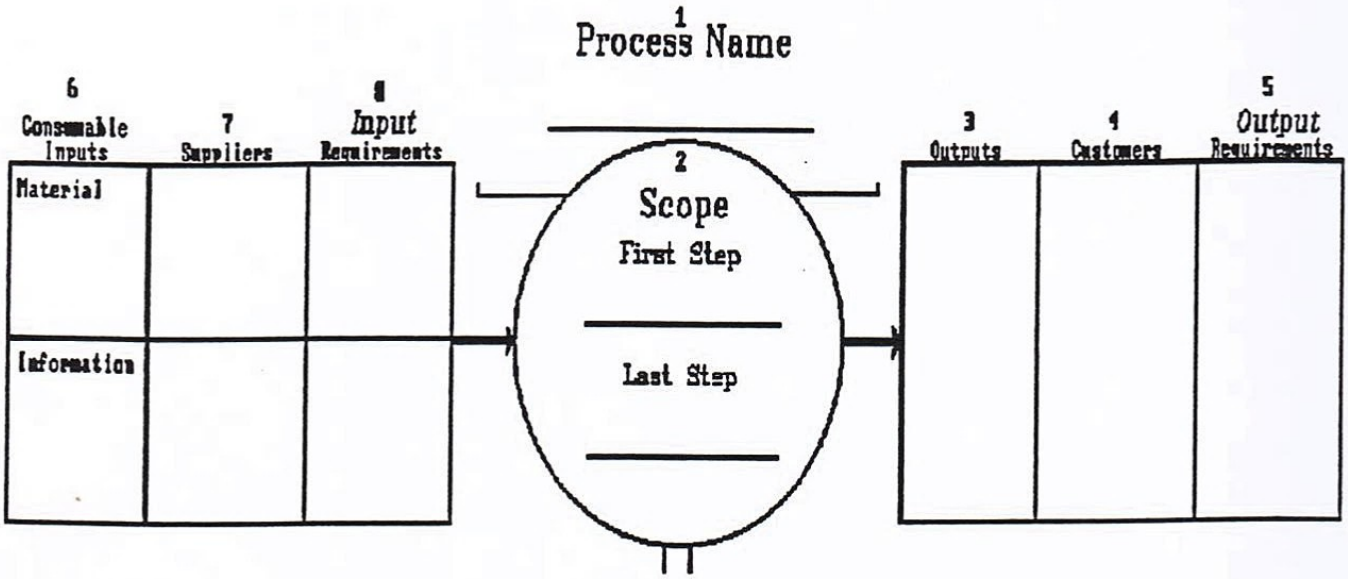
Output requirements are set in order to meet customer needs. Variations in the process which do not alter the performance of the product or service are known as tolerances. It is important to recognize the difference between a tolerance, which falls within requirements of the customer, and a defect, which falls outside of those requirements. If it is agreed between customer and supplier that some measurable, definable variation is allowed within the process, then any product or service which falls within that defined tolerance meets requirements and is a quality output.

PROCESS MODEL WORKSHEET

The Worksheet gives a clear picture of a very specific part of the process (the Scope). We then can clarify the output and input

requirements for that part of the process. Clarifying requirements is really where we begin to learn how to improve our work. The Worksheet is also a rather non-threatening way to communicate requirements and their related problem areas with customers and suppliers.

The order in which to fill out the Process Model Worksheet is both specific and important. We must know our outputs, customers and their requirements before we can decide on the inputs, who will supply them and our requirements of them. The standard order to fill out a Process Model Worksheet is:



In certain unusual cases, we may wish to identify the customer we want to satisfy, before we choose the output; or we may wish to determine the input requirements before we determine who can best supply us. However, the rule of first looking at the output side must never vary or we may miss some very important requirements and therefore not satisfy our customer the first time.

When we identify all of the requirements we can plan ways to meet those requirements the first time and every time. When we

meet the needs of our customer we have quality.

CHANGING REQUIREMENTS

As we all know, our customer's requirements do change. Our external customers in the world marketplace are always looking for new and better products and services. Our internal processes change, thus causing us to conform to new requirements. We must always adjust our processes to meet the needs of our customers, both external and internal; and in fact, set up our work process to allow for quick changes when our customer's needs change. It has been said that every time we improve, our customers find even more improvements they would like to see. This is the way of modern business. Change is inevitable in the world marketplace.

There are other forces that can also cause changing requirements. Available technology, government regulation, and company policy are some examples of outside influences at work in the Process. With all of these changes, it is important to remember that the definition of quality will always be conformance to requirements. For Kaman Music to remain competitive in our ever changing market, satisfying our customer's needs will always be the main objective. That is why this is the First Absolute of Quality Management.

The System is Prevention

PREVENTION IS PLANNED

Prevention is nothing more than making sure that a negative occurrence does not happen. There is no way to build quality into a process at the end, and inspection of the output to determine if it conforms is a very expensive way to ensure that the customer receives conforming output. To improve the process we must prevent misunderstanding and confusion by making sure all requirements are clear to the customer and supplier. We must eliminate opportunities for error within the process. We must find ways to make sure nonconformances never happen.

To set the stage for improvement, we must first establish policies to ensure that everyone works toward the same goals. We will state the overall goals first, then set smaller goals which move us toward meeeting the main ones.

In order to realize policy requirements, we must have a system in place that is capable of producing the desired results.

There are four stages to prevention:

* Define all outputs
* Define all inputs
* Proof the process
* Operate and manage

We can use these four stages to design new work processes in our organization. However, most of our work processes are already in place and we would not want to start our business from scratch again.

In the case of existing processes, we can use the four stages to study the process, increase our understanding of it, and improve it by removing opportunities for error.

DEFINING OUTPUTS

In order to determine what is needed to make a process operate with Zero Defects, we must first know what the customer expects from the process.

DEFINING INPUTS

We then identify all of the elements, or inputs, that affect the process we can divide them into two basic groups: those elements that are used up during the process and those that control and define the process during its operation.

A process is really defined by its controlling inputs (those elements that affect the process and are not used up during the process)

THE CONTROLLING INPUTS

* Performance standards
* Facilities and equipment
* Training and knowledge
* Documentation/Procedures

Examination of the controlling inputs allows us to examine our work process more precisely. We can begin to identify the requirements of the process itself.

PROOFING

Before we put a new process into full scale operation, or before implementing a change to a process, we need to prove that it works.

There are two phases of proofing:

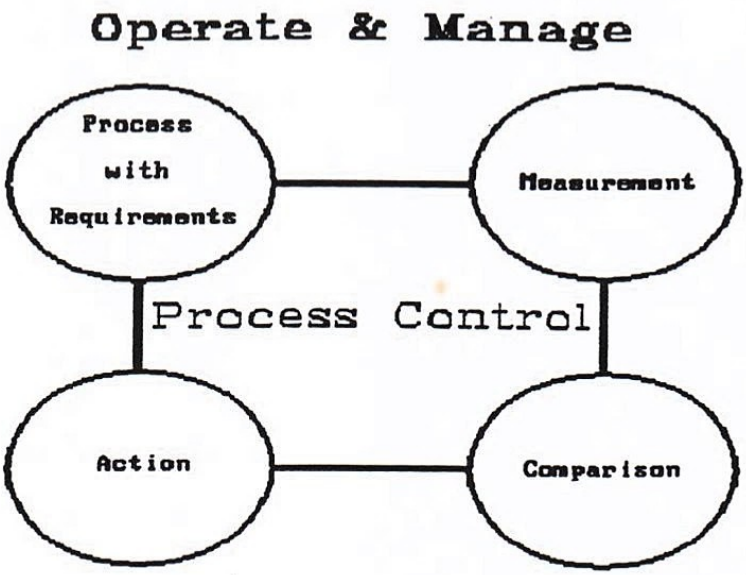
* Trial
* Evaluation

TO OPERATE AND MANAGE

To operate, manage and improve a process once it is running, we use a four stage method:

* Operate the process with clear and concise requirements.
* Measure the results against the specified requirements.
* Compare the results to the specified performance standard.
* Take action, when performance standard is not met, to correct or improve the process.

To illustrate this method we can use a diagram of four circles. If and only if all four stages of the cycle are present do we have a "closed loop" where we can control the process.



Zero Defects

The performance standard of Zero Defects means that management commits to make all requirements clear and make the necessary resources available to meet those requirements and that individuals within the organization commit to meet those requirements the first time, every time, or take immediate action to eliminate and prevent nonconformance.

COMPARING PERFORMANCE

We compare the results of our process with the requirements, and we ask how often we need to meet those requirements.

PERFORMANCE TRIAD

There are performance standards for three main areas:

* Quality
* Cost
* Schedule

WHAT STANDARD CAN WE USE?

BEFORE: That's Close Enough

Threshold of pain?

AFTER: Zero Defects

Threshold of pain?

Committing our organization to produce Zero Defects in all of our work processes helps us to meet the requirements the first time, every time, by emphasizing that the old standard of "that's close enough" does not meet our customer's requirements now or in the future. To ensure that we keep our performance standard in mind, we always look at this controlling input first.

ZERO DEFECTS - A PERSONAL COMMITMENT

Philip Crosby wrote in his book Quality Is Free:

****People are conditioned to believe that error is inevitable. We not only accept error, we anticipate it. Whether we are designing*

circuits, programming a computer, planning a project, selling the product, typing letters, completing an account ledger, or assembling components, it does not bother us to make a few errors, and management plans for these errors to occur. We feel that human beings have a ''built-in'' error factor.

*However, we do not maintain the same standard when it comes to our personal lives. If we did, we would resign ourselves to being shortchanged now and then as we cash our paychecks. We would expect hospital nurses to drop a certain percentage of all newborn babies. We would expect to go home to the wrong house by mistake periodically. As individuals we do not tolerate these things. Thus, we have a double standard - one for ourselves and one for the company.****

Adopting the standard of Zero Defects means dropping this double standard in our lives by making a personal commitment to not accept nonconformance.

SETTING GOALS

It takes more than just this attitude to improve quality in our organization, it takes action. To help get us started on the journey to improvement, we can set goals.

Long-term goals, of Zero Defects, should drive the short-term goals. Short-term, intermediate, goals drive the immediate action taken for improvement. Without goals there is no direction and probably no process improvement.

Goals must be measurable.

Goals must be realistic

* not too difficult
* not too easy

The best goals are set by individuals in the process

The Third Absolute of Quality

The performance standard of Zero Defects means that management commits itself to make all requirements clear and make the necessary resources available to meet those requirements. Individuals within the organization commit to meeting the requirements the first time, every time, or take immediate action to eliminate and prevent nonconformance. We must all work together to "DO IT RIGHT THE FIRST TIME".

Measurement

WHY MUST WE MEASURE FOR QUALITY?

The most important reason for measurement is that it takes the subjective account of what a situation is and objectively quantifies it. Just as we needed to find a definition for quality that can be understood the same by everyone (conformance to requirements), we must also quantify our problems in a way that is clear for everyone. This is accomplished by measurement of the process.

Measurement is accomplished by comparing some element of the process to a rule within the process.

Measurement allows the process to communicate to us how it is operating. We, in turn, can communicate to others.

Before we can get a clear picture of what needs improving we must decide what to measure.

SO, WHAT SHOULD WE MEASURE?

Ask the individuals in the process what should be measured. This simple sounding rule is the key to quality improvement. No one knows the work process better than the ones involved in it. When individuals come up with their own suggestions of what to measure, you can bet they will be more involved during the rest of the improvement process.

The part of the process to measure is determined by what we want to find out about the process.

If we want to know how a process is working overall we can look at the output side to see if we are meeting our customer's requirements all of the time.

We can study the process itself by looking at the controlling input requirements. If there are times when the process require-

ments are not met, we can be sure that it will create problems for the process' output requirements. We could look at the material and information inputs to find out if our requirements of them are met all of the time. It will be difficult to meet output requirements it the inputs are not right to begin with. One word of caution: It is extremely important to measure the process, not the people within it. Nothing can stunt the growth of quality improvement faster than finger-pointing. Measure nonconforming things, not people.

HOW WILL WE MEASURE THE PROCESS?

There are three stages to measurement, for quality improvement:

* Identify
* Count
* Communicate

There is a handy set of ten questions which, when answered thoughtfully, will follow through all three stages. We will now cover the question, grouped under the headings to which they correspond.

IDENTIFY

Question 1. What process is to be measured?

Question 2. What specific elements are to be measured? Output or input?

Question 3. Why was this requirement chosen?

COUNT

Question 4. How will the data be collected?

Question 5. Who will be responsible for data collection?

COMMUNICATE

Question 6. What kind of chart will be used and how will it be labelled?

Question 7. Who will be responsible for recording the data?

Question 8. Who needs to be aware of the data?

Question 9. How will the information be communicated to those who need it?

Question 10. Who should be responsible for taking action based on the results of the measurement?

The Cost of Quality

We have defined quality as conforming to customer requirements. We can measure whether or not those requirements have been met, and how much it costs us to make outputs conform to requirements. Measurement can also tell us how much it will cost us if we do not improve our processes.

If we could put a price on nonconformance we could gain appropriate attention from the company's management to solve problems. We could prioritize nonconformances to decide which ones are most important to correct first. And, we could keep track of how we are doing with improvement on an item by item basis or on a company-wide basis.

We call our measurement of quality "Price of Nonconformance," or PONC for short. PONC is the cost of doing things wrong the first time. It is measured in wasted dollars, wasted time and wasted energy. It directly affects the profitability of our company and, we believe, it is a price that need not be paid.

PONC is only one part of Kaman Music's operating expenses. But, when we improve our work processes, we reduce this expense which lowers overall expenses, thus freeing up more money for improvement and profit.

WHAT ARE THE OTHER EXPENSES?

Other expenses include the cost of doing business, or error-free costs, and the Price of Conformance (POC).

Error-free costs are the costs of operation as it was originally designed to work. Planned scrap, rework or other nonconformance is not included in error-free cost. In fact, we should look at our process to see if nonconformances are built in. If they are, we should work to remove them at the earliest opportunity.

Error-free costs could include:

* Labor
* Materials
* Energy
* Facilities and equipment

Price of Conformance (POC) is the cost of making sure things get done right the first time. Some of these costs might include:

* Proofing of processes
* Process audits
* Preventative maintenance
* Quality Improvement Process

The difference between error-free cost and Price of Conformance is that POC is money spent above and beyond normal operating costs that will prevent nonconformances from happening and ensure conformance to requirements.

FIVE METHODS FOR CALCULATING THE COST OF QUALITY.

Several methods are available for calculating cost of quality for specific nonconformances. These include the following:

* Whole Account
* Whole Person
* Labor/Resource Claiming
* Unit Pricing
* Deviation from the Ideal

DATA COLLECTION

It is best to calculate cost of quality using actual expenditures whenever possible. When actual figures are simply not available, estimates can be used and surveys from employees in the process can approximate the expense to the company. Remember, the cost of quality is not an accounting procedure, it is a

management tool for locating and measuring waste.

Whichever way we collect data, it is important to consider all expenses related to the process. It is also valuable to study the "ripple effect" produced by the nonconformance. Ripple effects are the negative related costs to other processes affected by the original nonconformance. Ripple effects include customer dissatisfaction and lost sales. These may be difficult to estimate, but they should never be forgotten in our assessment of the Price of Nonconformance.

THE FOURTH ABSOLUTE OF QUALITY

This section has taught us how to measure quality in an objective way: the cost of quality. Once it is realized that the lack of quality costs more than making quality happen we begin to look at our work processes in a new way. We measure accurately what it costs the company internally to not do things right the first time. We know that keeping operating costs down is the key to satisfying our customers and remaining competitive in our marketplace today and tomorrow. Measurement and calculation of the Price of Nonconformance create the incentive to improve and chart our way to Zero Defects.

Teams

In this Section we will discuss the value of teamwork in solving problems and planning for improvement. There are many methods that teams can use to become more effective, and team members can use to become more valuable to the team and the organization.

TYPES OF TEAMS

There are many types of teams in our organization:

* Marketing
* Problem solving
* Production
* Quality Improvement
* Work group

TEAMWORK

A well functioning team will actually be stronger and smarter than all of the team members could be on their own. This is known as "synergy."

Group involvement produces more "buy-in" by everyone involved, since each member has a chance to participate in the final outcome.

Teams help to:

* bring together experience and knowledge from many different backgrounds.
* support cooperative efforts between groups generally involved in different aspects of the business.
* develop communication tools that can spread information about progress, or lack of progress, in our quality improvement efforts.

Teams have disadvantages, too. Dysfunctional teams can be a great waste of time and resources. Problems can occur if the team is not well designed.

* sometimes teams go along with one member's suggestion without looking into other possibilities.
* there may be agreement that action is necessary, but no one will take the responsibility to get the job done.
* jumping into action before a complete analysis of the situation can create missed opportunities.

A functional team requires more than just putting a number of individuals together in a group.

DESIGN

There are three important factors to be considered when planning a team:

LEADERSHIP SKILLS

Some leadership skills which are important for creating a functional team are:

* Ability to create an open environment in meetings, thus encouraging participation from all members.
* Developing and using communication techniques which will ensure that all sides have the chance to be heard.
* Ability to create a meeting environment where conflict is turned into productive discussion and that decisions are reached with the consent of all members.
* Making sure that, when required, action is assigned to a member who will be responsible for carrying out team decisions.

Good leadership skills are needed by both the team leader and the other members.

SELECTION OF MEMBERS

The members of a team be chosen carefully to form a cohesive group having the knowledge and energy to complete the task, but without encountering internal conflict so strong that it nullifies positive action.

EDUCATION OF TEAM MEMBERS

Although it is not always necessary, or desirable, that all members of the team be from a specific area where improvement is needed, it is important that members are aware of the process involved and its requirements.

Sometimes, a fresh pair of eyes can focus on part of the process that people who are more tied to the area may miss, or take for granted. In many problem-solving teams the ''outside'' members come up with some of the best ideas.

MEETING MECHANICS

Effective, efficient meetings all have one thing in common. There is an underlying structure that guides the team through.

Items to consider in planning meeting strategy are:

AGENDAS

The agenda should include the schedule for the next meeting so that everyone is aware of it. Agendas should be distributed to all team members before each meeting in order to allow them to prepare for the next meeting. Included with agendas, can be supporting documents and materials needed for full participation by members.

CLEAR PROCEDURES

Teams should set some standard procedures for the way meetings are to be run. When procedures for how discussions or presen-

tations are set and understood, everyone will feel much more comfortable about participating.

CLEARLY STATED OBJECTIVES

Clearly stated objectives will help the team focus on goals.

Stating objecitives reduces the chance of misunderstandings about where the team and its members are headed.

When conflicts arise during meeting interaction, restating the objectives makes it easier to get back on track.

QUIET TIME

Let members take a few moments at the beginning of a meeting to remove themselves from the tasks left outside the meeting and to prepare any materials they might have for the discussion at hand.

In particularly long meetings, or when a meeting gets too "hot" due to conflict, it is advisable to allow members a few minutes to get a breath of fresh air.

ACTION ASSIGNMENTS

Perhaps one of the most important items during the meeting is assigning clear action assignments to appropriate members of the team. The action assignment makes a member, or members, responsible for making sure the task is completed. Action assignments can be anything from gathering additional information for the next meeting to carrying out the final corrective action determined by the team.

MEETING MINUTES

Some member of the team should be responsible for keeping minutes of each meeting. This is an excellent tool for reminding members of action assignments and objectives, too.

Meeting minutes can also be sent to individuals who are not on the team but are affected by the team's activities.

IMPORTANCE OF MEETING ENVIRONMENT

The meeting environment should encourage participation by all team members. It should be the time to discuss possibilities and decide on action to be taken.

How do we make this happen? Team leadership must continually develop the attitudes and practices of all members to do the following:

PREPARATION

Meetings without preparation are both a symptom and a cause of poor team effort. When it is evident that members are not prepared for meetings leadership should aggressively seek the reasons.

* It may be that action assignments were not clear enough.
* It may be that the member did not keep notes and meeting minutes were not out in time to remind them of their responsibilities to the team.

Leadership must find the reason and address it, or the entire team's goals are in jeopardy.

Lack of preparation is also the cause of poor meetings and wasted time. Leadership should watch for this and guard the team's meeting time as a valued resource.

LISTENING

There are two kinds of listening in our everyday lives: passive and active.

* Passive listening is what happens when people are being spoken to, without regard for their needs as listeners, or without the chance to question the speaker as to what he is trying to

communicate.

* Active listening is much more effective for development of teamwork and meeting effectiveness. Active listening is a form of two way communication.

Listen, Question, Restate

Team leadership must always be aware of which type of communication is happening in team meetings. If passive listening is the rule, leaders can take the role of the active listener until all members feel comfortable with the practice. The member who takes the meeting minutes should be especially active, to be sure to record the discussion with full understanding.

OPENNESS

It is of vital importance that all members be open during meetings. When members come into meetings, or indeed into teams, with preconceived plans for what the team is about and where it should be heading they limit the scope of ideas to one path.

One way for leadership to counteract this is to play "devil's advocate" during discussions. Either the leader or another member can look for opportunities for error in the discussion and decision making.

Care must be taken to be sure that speakers do not feel personally attacked, or they may not speak up the next time. Good team leaders will watch for this.

TRUST DEVELOPMENT

Mutual benefit, mutual respect and mutual trust are the underlying factors in any relationship. This especially goes for teams, who are trying to work together for a common goal.

Trust is not something that can be assigned or legislated. Team leaders can help develop trust within their team by practicing all of the methods of meeting environment we have discussed.

If the proper environment is developed, trust between members, both during team works and outside, will strengthen.

HOW DO LEADERS PROMOTE TEAM INTERACTION?

Openness and participation can be developed by the practice of team interaction skills which will encourage teams to come up with plans and decisions that everyone can support. These skills are:

BRAINSTORMING

The way it works is:

* Have one member record the ideas as they are mentioned.
* The leader directs one person to begin the list of ideas.
* Go around the group. Each person gets a chance to list one idea. It may be similar to a previous idea. It is good to build off one idea with others.
* Once each person has had a turn, go around the room a second time.
* If a member does not have a new idea, he will pass to the nex person. The next time around he can list another idea if one comes to him.
* Go around the room until all members pass. Make sure all ideas are listed.

During brainstorming, it is essential that no comments be made about any idea. Even a comment such as "good idea" should be avoided. All ideas should be brought out, even wild and crazy ones.

Later, when all ideas are exhausted, discussions can sort out the possible from the impossible, and quite possibly, the wild and crazy ideas can help build solid, usable ones. The team can begin to evaluate all possibilities.

CONSENSUS BUILDING

Consensus is when agreement can be reached between the members of a team on a specific issue. Voting on an issue should be avoided. It tends to form opposing groups within the team. We want to search for a decision that all members can support, even if each member feels less than total agreement. We are not looking for unanimous or blind agreement on the issue, just for the team to support the decision. Calling for a vote to end the discussion can be destructive to the team. Democracy is not the basis for team success. Just because the majority agrees that one solution is best does not make it so. There may be other solutions that could work better. Minority members become alienated from the others.

Ways to gain consensus from all members are to ask the following questions during decision making, when there are differences of opinion:

* What is it that you need in order to support this decision?
* What have we neglected to consider when coming to this decision?
* How can we change this decision to gain your support?

Consensus building is not a replacement for strong leadership. It is a way to ensure that all members have a say in the decisions made by the team, thus promoting ''buy in'' from all members.

CONFLICT RESOLUTION

When there are difficult decisions to be made and team members are concerned and committed to doing the right thing, conflict between members can arise.

Team leadership and the meeting environment can help to keep conflict to a minimum, and turn conflict into positive discussion. When conflict arises, the team leader needs to remind the members that the team has a goal.

There are many techniques used to help resolve conflict:

* Teams should establish a statement of purpose, or charter, at the beginning of their existence.
* Use meeting mechanics to make sure that all members have a chance to state their views, without interruption.
* All members of a team should receive recognition for their contribution.
* Team leaders should find something of value in each member's ideas, and restate it.

If conflict arises, use the questions listed in the consensus building section to seek common ground and build upon it. Leaders should always look for a win-win situation and push towards it.

SUMMARY

Teamwork is not only the most valuable method of quality improvement in organizations, but it may be the only true method for gaining ground on a large scale. While individuals may make improvements to their own process, it is the team which can change the way we look at the process.

When teams do not work well, it is the responsibility of the team leaders to discover which skills are lacking and develop them.

Analyzing Problems

Once we measure a nonconformance we can begin to identify requirements that are not being met the first time. What we do with this information is what is important. Without action, measurement is pointless.

ELIMINATING NONCONFORMANCE

In our Quality Improvement Process, there is a formal five-step method for eliminating problems forever. This Five Step Method includes:

1. Define the problem
2. Fix the problem temporarily
3. Locate all root causes
4. Take corrective action
5. Evaluate and follow-up

I. DEFINING THE PROBLEM

a. Describe the problem

b. Plan for a solution

c. The following questions should be asked during planning:

- How soon must this problem be eliminated?
- How will we know when it has been eliminated?
- Who needs to be involved in the solution?

II. FIX

There are many types of fixes:

* We could rework or repair some nonconforming outputs.
* We could scrap and replace nonconforming output.

* We could temporarily change the process to make the output conform until the permanent solution is in place.

There is a trap that many teams fall into - allowing a fix to remain a permanent part of a process, rather than continuing on to removal of the root cause.

Fixes do not remove root causes. They only keep the process producing conforming output by extraordinary means. This is expensive, demoralizing and time consuming. In the worst cases, we may end up fixing the fixes just to keep the process going.

III. IDENTIFYING ROOT CAUSES

The root cause is found in the part of the process where the nonconformance originates. It is the source of the nonconformance.

Sometimes the elements we think are root causes are, in fact generated by some defective input into that part of the process, and are not the root of the problem. And, sometimes there are more than one root cause creating the same nonconformance.

There are several ways we can use to identify root causes:

* Requirements review
* Threads of Similarity
* Opportunities for error
* Cause and effect diagram

PARETO ANALYSIS

Pareto Analysis is represented by a bar chart on which is tallied the number of times a cause creates the nonconformance. The chart is assembled with causes listed in descending order of occurrence.

A Pareto analysis helps us to identify which causes create the nonconformance most often, and which ones are less important. We can then determine which cause we should work on first. We may

also see how one cause relates to some others.

Once we have successfully identified all of the root causes of our nonconformance, it is necessary to re-examine our original Estimated Date of Completion and our Measure of Completion to determine if we need to refine these further to ensure that everyone understands what the goal is.

Corrective Action

IV. TAKING CORRECTIVE ACTION

There are four distinct phases of corrective action:

* Formulate possible corrective actions
* Select the appropriate form of corrective action
* Plan the implementation of the selected corrective action,
* and communicate the intentions.

FORMULATE POSSIBLE CORRECTIVE ACTION

After all of the possible root causes have been identified, we must determine if we should work on all of the root causes at once or one or two at a time. There may also be more than one way to eliminate the chosen root cause(s). If there are several ways, we must identify all of the possible corrective actions, and then choose the appropriate method.

SELECTING THE APPROPRIATE CORRECTIVE ACTION

Many factors affect our decision of which corrective action we should take. Some of these are:

* the cost of the corrective action
* the complexity, of difficulty, of the corrective action plan
* the amount of time we have to solve the problem
* whether or not our corrective action plan can be mistake proofed.

PLAN AND COMMUNICATE THE PLAN

Before we implement the action plan, we need to plan it well:

* All plans must be communicated to the individuals who will be affected by the changes.
* All requirements of the changes must be clarified with those indivuals who will be affected.
* Timing is crucial.
* Use a schedule of events for everyone to be aware of what is happening:

THE GANTT CHART

The Gantt Chart is used to illustrate the length of various stages of the corrective action. It shows when a phase is scheduled to begin and end. Some phases overlap.

PERT CHART

Program Evaluation Review Technique (PERT) charts are very similar to the original process flow charts we learned about in the early sections of this manual. The difference is that now we include actual dates of when we expect various steps to be taken. And, the PERT chart is used for a specific, one-time activity, not a process which is occurring over and over.

The PERT chart can become very complex if step schedules overlap. The chart must then have multiple step "strings". Multiple String PERT charts allow us to see the interrelationships of steps in the corrective action process. They can help us understand where there may be delays and difficulties during implementation.

Besides during problem solving, PERT and Gantt charts can be used for planning any new project. The PERT chart is best suited to projects that require very detailed planning, with critically timed steps. The Gantt chart is good for illustrating longer time-lines that are not so specifically scheduled. Either one can

help to communicate what will take place in a corrective action plan. The main point is to use something to make sure all people who need to know about the change do know what is going on.

IMPLEMENTATION

The process must be proofed before full implementation is allowed. If the action plan is used in several areas, it is a good idea to proof the new process in one area first, then spread it throughout the other areas. During proofing, we must follow the action plan, exactly, and document our actions and results. If we find that something must be adjusted, we must make sure the adjustment is noted in the documentation of the process.

If adjustments or changes are made in the action plan without proper documentation, we cannot evaluate the plan effectively. We may not get the results we expect, and we will not know why. Documenting the action helps to make a permanent change in the process. The change becomes part of the normal procedure.

If the corrective action is not the effective one, we will be able to follow up using the documentation to find where in the process it failed.

EVALUATE AND FOLLOW UP

The final step of the five is to follow up on the corrective action, to make sure it was carried out, that it works, and that it stays in place permanently.

EVALUATION

Evaluation determines whether or not the corrective action was the right one and that it worked.

FOLLOW UP

Follow up is done for two reasons: to make sure that our

corrective action remains in place permanently and to make sure that our actions did not create any new problems in the process. We can follow up with process audits, surveys and informal reviews.

PROCESS AUDITS

A process audit is an inspection of the process itself, not just the outputs.

SURVEYS

Besides full blown process audits, we can find out whether corrective action is working and if it is now part of the permanent process by surveying customers, suppliers and people within the process. Surveys can be written or oral, as long as they cover all of the information we require for follow up.

INFORMAL REVIEWS

Finally, we can address follow up of corrective action by simply reminding operators of the process to use the new system.

Examples of informal review can be even simpler than this:

* Posters reminding everyone of the change
* Memos posted on bulletin boards
* Notification in the company newsletter
* Reminders in departmental meetings

PREVENTING PROBLEMS

No matter how good we become at solving problems and using the Five Step Method of problem solving, it still means that we did not do something right the first time. Generally, we have a process that was existing before we began this journey into the Quality Improvement Process. In existing processes, problem solving can help to eliminate nonconformances and prevent them from ever returning. Use the control process to prevent future nonconformance.

SUPPLIERS AND CUSTOMERS

Each one of us is at once a supplier and a customer. We are links in a long chain of operations called the work process. Our organization is both a supplier and a customer to other organizations and to individuals outside the company.

Inside the corporation we are all internal suppliers and customers. The relationship we have with other individuals and groups in the company is a very dependent one. For any group to succeed, individuals must succeed in binding that relationship tighter, increasing the three guiding virtues of any relationship, business or personal:

* Mutual benefit
* Mutual respect
* Mutual trust

OPPORTUNITIES FOR COMMUNICATION

Once we understand the interrelatedness of each person within our organization, we can agree that open communication between all layers of the company is of prime importance. As customers and suppliers, we must learn to identif your input requirements to each other, and explain why these are the requirements. Now that we have learned that our managers and supervisors are both our customers and suppliers, we need to find better ways to let them know what we need in order to meet our output requirements the first time, every time, and they need to be receptive. For this to happen, there must be an environment that encourages this two-way communication.

There are several opportunities for communication between customers and suppliers in our daily work lives:

**One of the best opportunities to communicate occurs when we, as suppliers, go to our customers to identify and clarify our

output requirements.

**Another opportunity for communication is to work with suppliers to clarify our input requirements.

**Once we are in communication with our suppliers we can verify whether or not our input requirements are being met all of the time.

**A fourth opportunity for communication occurs when we verify with our customers whether or not we are meeting their requirements.

This type of communication can be used to compare how we are doing as opposed to our competitors. If we expect to be leaders in our industry, not just competitors, we can use this form of communication to gain insight into the direction the market is going. Caution must be used here, as our customers expect us to already know what their current requirements are, so asking them if a specific product or service meets their requirements can sometimes backfire on us, giving them a feeling of mistrust or lack of confidence in our capabilities.

MANAGING QUALITY

When we establish working relationships with our customers and suppliers, they become active partners in our process. They become part of our quality management system. We all must be committed to the basic concepts of quality management, as first described in Section 1:

* All work is a process
* In order to understand and improve our process, we must first understand the Four Absolutes of Quality Management.

As suppliers, we will assure our customers that:

* we will define quality as conformance to requirements,
* we will use prevention to make sure we conform,
* we will measure our work processes,

* we will accept no nonconformance.

As customers, we will work with suppliers to:

* help them eliminate nonconformance in their work processes,
* share knowledge of our process to gain mutual understanding of how our processes depend on theirs,
* communicate with them as we find ways to refine our input requirements so they can meet our needs more consistently.

THE INDIVIDUAL'S ROLE

Individuals must make the personal commitment to conform to requirements the first time, every time; to prevent problems in their own work areas; and to continuously look for ways to improve. There are several characteristics of individuals who commit to the Quality Improvement Process.

THEY TAKE REQUIREMENTS AND QUALITY IMPROVEMENT VERY SERIOUSLY.

THEY HAVE LONG-TERM OBJECTIVES

THEY SEEK AGREEMENT WITH MANAGEMENT ON OBJECTIVES

THEY SET SPECIFIC, MEASURABLE GOALS

THEY DEVELOP SCHEDULES FOR ACTION

THEY TAKE ACTION TO IMPROVE

SUMMARY

It would be very easy to point at other levels of the organization as the ones who need improvement most, but the only way the organization will reach quality improvement goals is through the commitment and efforts of individuals within the process.

Leadership in quality improvement exists at every level of the company, from the President, who signs the proposal to educate every member of the organization about quality improvement; to the individual, setting a goal to produce no nonconformances within their own work process. Conversely, every individual has the potential to be a leader in the Quality Improvement Process.

During this course we have discussed many concepts of quality. Some of these have just been formalizing what we could call the "common sense" approach to management. But, some of the concepts may have been rather new to many of us. It is up to all of us to take these Quality concepts and tools and use them to make Quality happen at Kaman Music Corportaion.