STANDARDIZED
WORK

5TH SESSION

STANDARDIZED WORK & WORK STANDARDS - SESSION 5

AIM	(1) How to View And Think About Continuous Improvement. (2) Philosophy Of Managing The Shop Floor Based Upon Standardized Work. (3) Basis Of TPS As Standardization And Waste Elimination.

TITLES AND CONTENTS

No.	Title	Main Contents	Time
I	Open The Training Session	(1) Review Main Points of Session 4 (2) Explain Session 5 Outline & Schedule	
II	How to View and Think About Continuous Improvement	(1) Methods To Increase Production (2) Waste Recognition (3) Waste Elimination (4) Waste, Unbalanced & Overburdened (5) Apparent & True Efficiency	
III	Kaizen Methods Outline	(1) 6 Steps Of Kaizen (2) Kaizen Procedure	
IV	Standardized Work & Shop Floor Management	(1) Standardized Work & The Leader (2) Standardized Work & Quality (3) Standardized Work & Safety	
V	Close The Training Session	(1) Explanation Of Homework	

Things to Prepare

1	Participant Manual and Transparencies
2	Projector, Screen, Pointer
3	Work Standard, Standardized Work Forms
4	
5	
6	

Items to Distribute

1	Standardized Work Forms
2	Work Standard Forms
3	Surveys
4	
5	

Standardized Work and Work Standards - Session 5

List of Slides

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Standardized Work and Work Standards
Session 5

I. Opening The Training Session

Introductions & Greetings

- Welcome the participants to session 5 of Standardized Work Training.
- Create an informal atmosphere. Put the audience at ease. Remind people that attendance is recorded but no tests will be given.
- Introduce yourself and conduct participant introductions as necessary
- Remember to encourage participation so that the participants will most benefit from the class.

Review of Session 4

Show Slide 5 - 1 "Review The Main Points Of Session 4"

Review with the participants the main points covered in session 4:

- Standardized Work Combination Sheet
- Standardized Work Chart

Key Point: *Standardized work combination table is a tool for deciding how to most efficiently set work sequence and work allocation based upon takt time. Standardized work chart is a document posted in the work area that contains the following 3 elements: takt time, work sequence, and standard work in process*.

Main Focus Of Session Five

Introduce the following topics which we will be covering in this session:

- TPS & Waste Recognition
  - -Waste & Work
  - -Types Of Waste
- How To View & Think About Continuous Improvement
- Shop Floor Management Based Upon Standardized Work
- Procedure For Continuous Improvement (Kaizen)
- Following Standardized Work & Driving Continuous Improvement

II. How To View & Think About Continuous Improvement

<u>Methods for increasing production</u>

Today we are going to get started by discussing ways of increasing production.

Question: *How can we increase production?*
What methods might we use to increase production?

- Listen to replies, then review typical responses.

Show SLIDE 5 - 2 "Typical Responses"

- Increase the number of workers
- Increase equipment
- Work longer
- Work harder
- Eliminate waste and overburden from the work

These are the most typical types of responses we get when consider how to achieve production and efficiency increases. Now I'd like to analyze these types of answers in a little more detail, and show the category that we want to focus on in the Toyota Production System and standardized work.

Show SLIDE 5 - 3 Methods of Increasing Production (Top half only)

<u>A. Increase Production By Affecting Work Quantity</u>

Lets look a little more closely at the first three typical ways of increasing production.

1) Increasing the Number of Workers

Increasing the number of workers is normally the easiest way to increase production. Unfortunately this is usually not an effective way of generating profit. Randomly increasing the amount of labor in a work area will increase volume, but at a cost that frequently outweighs the benefits.

2) Increasing Equipment

Increasing equipment is another method of increasing production. Generally, however, increasing the amount of equipment also means adding people to operate it. Evaluated in terms of cost reduction, however, increasing equipment is by no means cost efficient. Unless program volumes are for example, increasing by over 30%, adding machines is a very costly proposition and takes substantial time.

3) Working Longer

Another traditional way of increasing production is by working longer. Working longer typically means overtime and usually results in working weekends or holidays. This method of increasing production may be effective if done for relatively short periods of time, however, overtime as a long term solution can be counterproductive when we consider the impact it has on worker morale, workplace safety, as well as wear and tear on the equipment and machinery.

The problem with the above three methods of increasing production is that they are costly, and rest upon the premise that the outputs of labor, time, and machines are fixed and can not be changed. Hence the *quantity* of work being done being done must be altered to create a corresponding increase in production output.

Key Point:

Have the audience realize that this is a very traditional way of thinking about production. It implies that 1 person with 1 machine can make 100 parts in one hour, and that the only way to make more is by adding more people, machines, or working longer.

B. Increase Production By Improving Work Quality

There is however, another way to think about methods for increasing production. This second way of thinking relies upon the practice of improving the *quality* of work performed instead of the *quantity*.

Show SLIDE 5 - 3 Methods Of Increasing Production (Bottom Half Only)

4) Work Harder

One way of increasing production without adding machines, people, or work time is to just work harder. In certain situations, like for expedite orders or other emergency situations it may be possible in the short term to increase production by working harder. We have all faced this type of instance before. However, we all also know that this is a very poor long term solution. Working harder can only be sustained for short periods of time. Over the long term it can result in injury, frustration, and a decline in moral. For this reason we should eliminate the need to do it when possible.

5) Eliminate Waste

Fortunately there is a another way to effectively and efficiently increase production without increasing the number of people, machines, working harder, or working longer. At Toyota, we do this by identifying elements of waste in the process and then taking steps to eliminate it. Elimination of non value adding activities in the process and product will lead to easier, more efficient work, that is less costly, and easier to maintain. For reasons of cost, productivity, and efficiency we should first consider elimination of waste before we resort to any other method of increasing production or efficiency.

Key Point:

Make sure that everybody understands that "working harder" and "eliminating waste" are both aimed at increasing production by affecting the quality (not quantity) of work performed. Specifically in TPS, however, we want to focus primarily on <u>waste elimination</u>. It is almost always possible to increase production by first changing the way in which we work. For example, by reducing walk or waiting time, changing job sequence or layout, we can enable an employee on one machine, in one hour, to produce 120 parts instead of 100.

WASTE RECOGNITION

<u>Definition of Waste</u>

Now I'd like to shift gears and try and define what we mean by waste. The intent of the Toyota Production System is to raise productivity and reduce costs by setting standards aimed at the elimination of waste. It is very important then to understand and be conscious of waste. Let's take a closer look at what we mean by "waste".

Question: *How would you define waste?*

- Listen to responses, use below examples if necessary.

Examples: Actions that increase cost more than necessary.
Actions that lower quality.
Actions that damage tools and equipment.
Actions that do not meet objectives.
Other

Answer: *Waste refers to various action in the production process that result in increased costs without adding value.*

<u>Work and Waste</u>

In the course of doing continuous improvement we aim to streamline the process by eliminating waste. In order to really understand what we mean by "waste" it is important to learn what we mean by "work". Useful work, or value added work, is defined as work which "advances the process". It refers to actions which raise or increase the value of the part produced. Conversely, behavior which does not add value is waste.

Show SLIDE 5 - 4 "Work & Waste"

This overhead shows the relationship between work and waste. As you can see, any motion involved in manufacturing can be thought to consist of 1) waste, 2) accompanying work, and 3) value added work.

1) Pure Waste

As we briefly discussed above, waste is any element of the operation that does not add value to the product. Later we will categorize waste into 7 specific types.

2) Incidental Waste

Often there are forms of waste that are necessary for the current state of the process. In TPS we call these forms incidental or auxiliary waste. This type of work may be essential for executing tasks directly related to production, however, it still adds no value to the product.

Examples include: walk time or conveyance that can not currently be eliminated or reduced further. They add no value but are stuck as part of the current process.

3) Value Added Work

As its name implies value added work is that which actually adds value to the product. This includes processing, such as machining, stamping, casting, forging, welding, molding, painting, or assembling. The higher the proportion of work that adds value, the greater the efficiency of the operation.

If you critically observe work carried out at a manufacturing site, you'll notice that the proportion of value-added work (net work) is very small, and "work" which does not add value is large. Looking carefully at work methods, equipment, and materials, you can find waste everywhere.

Even in world class manufacturing companies the amount of true value added work being performed at any operation is usually very low. The closer you learn to look the more you see waste and opportunity for improvement. The ability to recognize and eliminate waste is critical, and plays a fundamental role in TPS.

TYPES OF WASTE

Next I'd like to introduce the 7 categories in which we typically divide waste.

Show SLIDE 5 - 5 "Types of Waste". .

The seven classification of waste in TPS are:

(1) Waste of correction/repair
(2) Waste of over-production
(3) Waste of processing
(4) Waste of conveyance
(5) Waste of inventory
(6) Waste of motion
(7) Waste of waiting

- Describe each kind of waste as follows:

<u>Waste of Correction/Repair</u>

Waste of correction arises from having to correct defects. All material, time, and energy involved in repair is waste. Even if a defective part can be repaired, its quality is often inevitably impaired. In addition, time, materials, energy, and labor costs are required to make repairs. All repairs raise costs. Consequently, attention should be given to avoiding the waste of repair.

- Ask for examples of repair / correction from the audience, or provide some of your own.

Waste of Over-Production

The waste of over-production results from excessive production. This kind of waste can be further classified into two sub-categories.

1) Producing more parts than required
2) Producing parts earlier than required (right part but wrong time)

Both forms of waste are undesirable, however, particular attention must be paid to the latter since parts should not be produced earlier than necessary. Quite often we make parts because that is what the schedule called for. However, if we are not making exactly what we are suppose to be shipping next, we have a major problem on our hands.

In TPS, we focus on the concept of Just-In-Time. We try to make only what is needed, when it is needed, in the quantity needed. Making too much or too soon is waste.

Waste occurs when an operator uses a machine simply because it is big, expensive, and capable of making lots of parts. Ignoring the required production volume and producing too much is waste. Keep this in mind - producing things that don't sell is waste.

- Ask for examples of overproduction, or provide some of your own.

In general, we consider the waste of over-production to be the most serious. This is because it can create other kinds of waste as a result. Producing more parts than required results in unnecessary use of labor-hours, equipment, electricity, oil, and other resources.

Producing more parts than needed and producing parts earlier than needed brings about an increase in the number of pallets and skids required to hold them. Extra storage space is required. Depending on the quantity produced and the types of parts, warehouse storage may even be required. Enhanced stock control, first-in-first-out, and re-handling parts becomes necessary. All of these activities increase work, yet add no value to the final product.

Finally, excess or buffer stock tends to hide the real causes of problems. As a result, the need to do continuous improvement or make repairs of machinery and equipment becomes less obvious.

Show SLIDE 5 - 6 "Waste Of Over Production Invites Other Waste"

In this way, the waste of over-production precipitates other kinds of waste. Costs keep rising and quality may be adversely affected. Maximum attention must therefore be paid to controlling and eliminating the waste of over-production.

Return To SLIDE 5 - 5 "Types Of Waste

Waste in Processing

The waste of processing refers to any unnecessary work done to the part. Anything which does not contribute to advancing the process, to the accuracy of the formed part, or exceeds specification, is a waste of processing. There are many instances of parts being processed excessively. For example, parts which only require rough surfaces (non critical surfaces not apparent to the customer) may be excessively finished. Redundant inspection or checking may also be thought of as an example of waste in processing.

- Ask for examples from the audience, or provide some of your own.

Waste of Conveyance

The waste of conveyance refers to waste incurred by unnecessarily transporting parts. Parts should be moved only to the extent required to meet JIT production.

Both the transport of parts and information is important. However, it must be minimized. Transportation itself adds no value to the product.

- Ask the audience for examples, or provide some of your own.

Waste of Inventory

The waste of inventory refers to holding excessive stock. The result of holding a greater amount of running inventory than necessary between processes, or from purchasing an excessive quantity of materials is waste.

- Ask the audience for examples or provide some of your own.

Stock is often a security measure taken in case an emergency situation arises. At the same time, however, stock increases waste. It tends to hide the real causes behind the emergency or breakdown. Serious or chronic problems go unnoticed. As a result, real causes are overlooked; improvements are not made and the recurrence of problems will not be prevented.

Waste of Motion

The waste of motion refers to actions of team members or machinery which do not add value during the work process. One example of the waste of motion is that of a team member searching for parts in a storage area because there are none nearby.

Waste of motion also occurs when machines are not laid out properly. When machines and floor team members are separated from each other, it becomes inconvenient and a lot of time and effort is wasted in walking.

Waste of Waiting

Waiting is a form of waste. One example is when due to the poor combination of human and machine work individuals are forced to stand and wait while a machine performs a certain operation. Another instance may be when an entire assembly area is halted while a Team Leader or material handler searches for needed materials or supplies.

- Ask for examples or provide some of your own.

UNEVENNESS AND OVERBURDEN

Now we have thoroughly covered the concept and types of waste. Remember that eliminating waste is a goal of the Toyota Production System. It cannot be ignored when taking measures to reduce costs.

Now let's take a look at two other less famous, but equally important factors that relate to waste: unevenness and overburden. These are factors related to waste which cause variations in the process, output, quality, safety, and raise costs.

Show SLIDE 5 - 7 "Waste, Unevenness, and Overburden".

Unevenness

Unevenness refers to the phenomena of process fluctuations that result when production schedules are not constant or reliable. Typically what happens is that out of our fear of shutting down the customer we keep enough parts, material, and people around to always be prepared for the maximum demand that can be placed upon us. Consequently, for normal or low periods of demand we have far too many items on hand compared to what we really need.

The effects of unevenness are manifested in many different ways. For example, if the quantity of parts used varies from day to day, inventory will fluctuate. No matter how good our computer systems are, inevitably errors will result that may create instances of temporary material shortages. Or, in a work area where manual work is performed, when the amount of work performed by each team member is different or uneven it is difficult to truly grasp where the waste, problems, or inefficiencies exist in a system.

Overburden

There are limits to the abilities of both machines and team members. If, for example, the maximum welding rate of a spot welding robot is 20 points per minute under optimum conditions, it will be difficult to perform work at a faster rate.

In the case of team members, individual differences result in differences in working speed. For example, if a new worker is made to do a job at a rate based on the speed of a more experienced worker, the newer worker will likely fall behind. Performing work under such conditions jeopardizes quality and safety. This is potentially a case of overburden in comparison to one's individual ability.

Overburden on team members can result in fatigue and constitute unsafe working practices. Overburden on machinery and equipment leads to breakdowns and defects. Understanding the concept of overburden does not mean jumping to the response of anyone who feels tired or overworked. As leaders however, we must pay attention to newer team members and see that they get adequate training through Job Instruction. Additionally we must be on the lookout for opportunities to have people rotate more in areas with strenuous processes, or make difficult jobs easier through continuous improvement.

Key Point: *Remember, by eliminating waste, unevenness and overburden, we can hold production costs down*, *and improve key measurements*.

UNDERSTANDING EFFICIENCY

Improvements in efficiency that ignore the production schedule or customer demand will result in the waste of overproduction and push overall company efficiency in the wrong direction. True improvements in efficiency display their value by lowering costs. When evaluating efficiency, a key factor to consider is the necessary production quantity. We must analyze how the necessary items can be manufactured, at the right time, with the fewest labor-hours possible. Broadly speaking, there are two types of efficiency: True and Apparent.

Apparent Efficiency and True Efficiency

Show SLIDE 5 - 8 "True Efficiency & Apparent Efficiency"

Apparent Efficiency refers to raising efficiency by increasing production without regard for sales, and represents an "efficiency" only in terms of numbers. For example, if we increase production from 100 units to 120 units while keeping the number of workers constant, is this an improvement? It is not true efficiency when the production schedule only calls for 100 units.

True Efficiency is an increase in efficiency by producing customer demand with the fewest labor-hours and materials possible, and is an improvement in efficiency that results in substantial reductions in cost. A true example of efficiency is to produce the same number of units with fewer labor hours, materials, or defects.

When production demand increases, consider first if we can produce with the same number of manpower hours. Conversely, when the production volume declines, we must consider how to raise efficiency by using fewer manpower hours.

Efficiency is used in various ways as a standard for evaluating productivity in manufacturing. What we must always first consider, however, when discussing efficiency is "what is the customer demand?".

<u>Individual Efficiency and Total Efficiency</u>

When considering how to raise company efficiency by elimination of waste, we must look at efficiency in terms of each process, the whole line encompassing those processes, and the whole plant which contains many lines. It is crucial to institute improvements in efficiency that affect the whole plant.

Individual efficiency refers to raising the efficiency of an individual process, line or machine. As leaders, we must focus on not only individual processes in our own area but also learn to think systematically on the whole value chain in the plant.

Total efficiency relates to improvements at the process and line level that equate to numerical benefits that can be observed throughout the whole plant. In leading continuous improvement, it is critical to learn to think in terms of total efficiency.

When we think only about individual efficiency it is easy to mistakenly drive improvements that are actually only apparent and not true.

Example: Explain the following.

Let's assume we have a manufacturing cell that assembles a product. Let's say that by removing a few haphazardly placed items we lower standard work in process by half. Can we truly report to our boss that we have reduced inventory by 50%? Probably not with any confidence. This type of example illustrates what is an "individual efficiency" that has little impact upon the whole.

A total efficiency approach would look at how much material do we have from the receiving dock all the way through to the point of customer delivery. Can we change the frequency of incoming shipments? What will be the impact? Can we deliver more directly to the work area? Can we reduce inventory at preceding or following processes? Can we reduce the number of times we handle material? What is the total effect of doing this in terms of space saved, time saved, or quality improved?

As leaders we tend to think of improvements in efficiency and quality only for our own processes. We need to also focus on the total system as well.

Key Point::

As I stated earlier, thinking only about individual efficiency can easily lead to improvements in apparent efficiency. Never lose sight of what the customer demand is, and how everyone is affected.

Human Work and Machine Work

Next, I would like to talk about the concept of human work and machine work. This is a key notion for the elimination of waste and the effective combination of work at the work site.

Human Work refers to work that cannot be completed without human action. Examples of human work are: picking up materials, putting materials in a machine, operating the controls of a machine, and performing manual operation.

Machine Work refers to work or incidental work that equipment, which has been started by human hands or other means, automatically performs. Machine work includes: automatic machining, inspecting and conveying. Examples are: paint robots, die cast machines, molding machines, rotary presses, glass cutting, and some precision measuring devices.

Understanding the distinction of human work and machine work is basic to multi-processing handling work, and is quite effective in creating standardized work to enhance work efficiency. Most often it is poorly thought out interfaces between man and machines that lead waste in a system. If team members are relegated by unintentional design, to waiting for machines or observing machine operation, then this implies that we do not value their time or human capability to perform.

As leaders, we need to be conspicuously aware of the distinction between human work and machine work (usually this becomes obvious when creating standardized work combination sheets). Employees are our greatest resource in the company and we need to utilize this human capital in the most production way.

III. Kaizen Methods Outline

Continuous Improvement: Definition

Now we are going to talk about a general procedure for conducting basic kaizen. In the Toyota Production System we define continuous improvement as the setting of standards aimed at the constant elimination of waste with responsible involvement by all employees. It is not the work of only certain employees, rather it is something that should be carried out by all employees according to their respective situations. Sustainable continuous improvement cannot be dictated from the top, or from the outside of an organization. Individuals must themselves recognize the need to improve and possess the desire to see it through.

Continuous improvement can focus on making small incremental improvements as well as larger break through improvements. What is more important, however, is that the continuous improvement process, like problem solving, follow a scientific method. Scientific in this instance does not mean overly complex or academic--it means following certain steps and check points to help ensure that you do not run into problems halfway, or fail to achieve expected results.

Procedures for Basic Kaizen

Show SLIDE 5 - 9 "Basic Steps of Kaizen"

Step 1: Clarify the Goal

Before doing Continuous Improvement, clarify the goal. Identify what needs to be improved and by how much. Usually Continuous Improvement activities are assigned by manufacturing leaders. Importantly we should examine our goals against management by plan targets that exist for our department. Sometimes problems are obvious (safety, quality, workability). In addition to these cases, the leader should strive to discover problems on his or her own.

Step 2: Analyze the Present Situation

Get a clear picture of the present situation. This means when the goals of Continuous improvement have been identified, get an accurate grasp of the present situation. Don't overlook anything. You must successfully analyze the situation and root causes before moving on to the next step. For this reason you will have to be fact driven and quantitative.

Step 3: Generate Original Ideas

At this stage, try to come up with original ideas for dealing with the causes that are creating the present situation. Base your thinking on the facts. Observe the facts from a broad perspective; then proceed to formulating original ideas.

It is a good idea to make judgments over time, that is, on different occasions. Don't restrict your thinking or jump to negative conclusions. Rather, try to come up with as many original ideas as possible that might suit your particular goal.

Step 4: Make a Continuous Improvement Plan

Now you are ready to outline your Continuous Improvement plan. Review, organize, and condense your observations, facts, and ideas into a continuous improvement plan. Consider the likelihood of realizing your plan, the likely cost, and the extent to which your original goal is likely to be met. Remember there are many ways of reaching the same goal. Draw up several proposals and then consider the feasibility of successful implementation. Finally, select the best plan. Give priority to work improvements, and improvement of overall efficiency.

Step 5: Implement the Plan

Now it's time to implement the new method. When doing this, it is necessary to involve and seek cooperation across all shifts and with related departments and processes. Results will not be forthcoming if continuous improvement is done solely in your own process or area. Even excellent continuous improvement efforts can fail if related departments or groups are excluded. Talk with other team leaders and teams before implementing.

It is important when implementing a continuous improvement proposal, to give an explanation to all the team members. Obtain their understanding, request their cooperation, and then carry out training in the new procedure. Involving team members is crucial for continuous improvement success.

Step 6: Evaluate the New Method

After implementing a new method, follow up is necessary. Check the implementation situation. Evaluate the difference between the target or anticipated results and the actual benefits of your efforts. If there are any problems, devise countermeasures immediately. Bear in mind the importance of getting good results from continuous improvement.

IV. Worksite Management & Standardized Work

Daily monitoring of Standardized Work is a very important part of a team leader's job. Let's see how Standardized Work relates to important areas such as quality control and safety.

Show SLIDE 5 - 10 "How to Use Standardized Work"

1. Standardized Work and the Leader,
2. Standardized Work and Quality Control
3. Standardized Work and Safety

Standardized Work and the Leader

Let's look at the role of the leader in relationship to Standardized Work. Standardized Work is the basis for all repetitive production work performed at the manufacturing site.

Leaders are expected to direct their teams in the Standardized Work creation process. Inherently this means setting work according to takt time, establishing job sequence, and standard work in process. Once created leaders, have to monitor production plans and actual results to identify areas for continuous improvement.

Provide Training in Standardized Work

Leaders or team trainers normally train employees to perform tasks in accordance with defined standards. Common sense mandates that we must adhere to such standards and our own production system is based upon the setting of such standards

Standardized Work is designed to be performed efficiently at an established speed by an experienced team member. If a leader makes an inexperienced employee work at this rate, the employee will invariably fall behind. Accordingly,

Leaders must stay alert for problem areas and must not neglect to provide adequate opportunities for their team members to practice new tasks. Team members expend the majority of their energy performing the standards that make up their jobs. It is largely a function of leadership to think of how those jobs can be done more efficiently, and how best to facilitate that change consistent with the Scanlon principles advocated by the company. A critical leadership attribute for increasing efficiency is empathy and respect for others.

Improvement of Standardized Work

In Standardized Work, there is a very close relationship between the movements of people and physical objects. For instance, whenever the standard work in-process grows or shrinks even slightly it changes the timing in which subsequent tasks are performed. Such deviations can be discerned from carefully studying the standardized work chart.

Repeated failure to adhere to current production plans or maintain current standardized work indicates the existence of a problem. It is again leadership's responsibility to identify the factors contributing to the inability to hit production targets or attain takt time. When applicable, it is recommended and strongly urged to use such opportunities to foster team involvement to reconsider standardized work, and identify ways to improve upon standardized work.

Now let's consider certain types of things that we should be aware of when leading teams in the process of improving standardized work.

1. Leaders, directing the work team, develop standardized work

2. Solicit feedback from across all shifts, and from affected support groups about potential problems.

3. Focus primarily on takt time, job sequence and SWIP. Other problems such as design or incoming quality issues may require other support.

4. Revise standardized work to reflect all changes made.

The leader must foster an environment for creativity, and must be open to feedback from team members regarding inefficiencies and problem areas.

(2) Standardized Work and Quality Control

The most important element of quality control is to determine why defects occur and to take steps to prevent them. Obviously, when a problem arises which causes a production stop, the first thing to do is correct the problem to get production underway again. This often means finding an immediate, and perhaps temporary, solution. It is necessary, however, to go back and uncover the real cause and devise countermeasures to prevent reoccurrence.

Sometimes without thorough examination, it is difficult to uncover why a given defect has occurred. This makes it all the more difficult to figure out how to solve the problem.

Causes of Quality Defects

There are several fundamental steps involved in correcting defects. One of the most critical steps is to analyze the root cause. A another step is to formulate and implement a solution. Usually the former step of root cause analysis often does not receive the attention it deserves. Every defect has a cause. If the cause can be correctly determined, a solution can be found. Generally, failure to correct defects is often due to failure to properly assess the causes.

Root Cause Analysis and Standardized Work

Whenever quality defects occur, it is our responsibility to figure out what really caused the problem and keep it from happening again. If the root cause cannot be identified, then we cannot be confident that the problem will never happen again. In a sense some defects can never be completely eliminated. If we are correctly applying standardized work, however, it is generally easier to discover problems and get to the root cause of a problem. In some cases standardized work can help study problems and their causes. Use these techniques when applicable:

1. Repeat the Operation (duplicate the same conditions)

In this procedure, you simply perform the operation again in accordance with standards. All conditions are maintained exactly the same. This is easy to do with Standardized Work. Repeating the same task eases the process of troubleshooting. If the problem is prone to recur, diagnosis will prove fairly simple. However, if there is no defined standard for a particular task or set of tasks, the task will be performed differently. Conditions will differ every time it is done. Both of these factors make if difficult to determine the real cause of defects.

2. Make Just One Piece at a Time (as opposed to lot production)

Show SLIDE 5 - 11 "One Piece Flow"

Ideally in TPS we would produce just one piece at a time. That is not always possible so we opt for the smallest feasible lot size and work on reducing the lot size over time. Often this technique enables you to identify certain defects on the spot. This technique is similar to what one does as part of problem solving.

Producing large lots delays the discovery of quality defects. It makes it more difficult to determine what originally caused the defect.

3. Inspect Immediately After Finishing

Quality has to be built in during production. No amount of downstream inspection after the fact can add value or improve the quality of the product.

Finished items from one process should be inspected before they go on or as they are received by the following process. This is a relatively easy way to detect defects.

Final checks performed at the end of each line can reveal defects. However, it is difficult to tell where or under what conditions the defect occurred.

Try to arrange it so inspections can be done at each process as part of the work. This improves the prospects of finding the cause of the defect.

There are many ways to determine the cause. Perhaps the most important thing to remember is that you, as a leader, must patrol the work area yourself. Use your own eyes and ears. Observe and ask questions.

The best way to improve quality is to build it in or stop defects at the source. Always search for the cause of the problem, formulate a solution, and incorporate the new method into your Standardized Work.

(3) Standardized Work and Safety

Show SLIDE 5 - 12 "Standardized Work and Safety"

Safety receives considerable emphasis in production activities and rightly so. When we create standardized work, proper attention must be paid in manual and automatic operations to highlight all aspects of safety.

The purpose of this slide is to show that accidents most often occur in work areas where work is not standardized. Data gathered in various manufacturing studies strongly suggest that the leading cause of injury is either due to unsafe acts or conditions. Let's examine some of these unsafe acts or conditions.

Troubleshooting and Accidents

Accidents are most common during troubleshooting and non standardized activities. Think about a time when you or someone you know were injured. Odds are that you were doing *something out of the ordinary*. When we are doing tasks that we are intimately familiar with, the chances of getting injured are very small. However, it is when we try to fix a problem, un-jam a machine, or improperly use a tool, that we open the door for an accident to happen.

Obviously, no one ever intentionally hurts themselves on the job. Usually people will go above and beyond the call of duty and perform acts that are intended to help enhance or restore production. It is during these types of instances that someone is most likely to get hurt.

In both of the above instances, part of the cause of the injury can be traced to poor standardization. If proper standards are in place, and adhered to, then the probability for a safe work environment is greatly enhanced.

Show SLIDE 5 - 13 "5S and Standardized Work"

Statistics show a high incidence of accidents occurring when tasks are not standardized, the area is unorganized, or when tasks are difficult to perform.

For this reason we put a lot of emphasis on the value of 5S housekeeping activities. Keeping an area clean and organized is one of the best ways to ensure an accident free work area.

Kaizen Never Ends

The main reason we create Standardized Work and do continuous improvement in the Toyota Production System is to secure profitability for the company. We do this by reducing costs and increasing quality, which induces customers to buy our products and ultimately benefits all of us. Only by being the high quality, low cost producer can we guarantee our future as a manufacturing company.

Every year Toyota produces more products per employee. The company works in many different ways to achieve high productivity.

One reason why the company's productivity remains so high, aside from its investment in new equipment, is that its production procedures and organizational methods are constantly being improved. These factors, combined with the dedication and creativity of all of our team members, are crucial for maintaining this high productivity.

Show SLIDE 5 - 15 "Kaizen Never Ends"

V. Close The Training Session

Summary of past 5 sessions

In the past 5 sessions we have covered a broad range of topics. Let's briefly recap what we studied.

Show SLIDE 5 - 15 "Summary Of Standardized Work Training"

Session 1	Role of a Leader, Corporate Philosophy, Importance of Cost Reduction, Aim of TPS
Session 2	TPS & Standardization, Examples of Work Standards
Session 3	Standardized Work: Process Capacity Sheet
Session 4	Standardized Work: Standardized Work Combo Table, & Standardized Work Chart
Session 5	Continuous Improvement Process

B. Homework Assignment

- Distribute homework assignment sheets to participants.

"Homework Assignment"

As part of this course you are now being asked to apply some of what you have learned. As an application assignment we will have you practice creating some work standards or standardized work.

Note: You will have to customize this assignment according to your own specific needs.

For Production Teams

Primary Focus: Re-examine current standardized work charts. Are they one the latest form? Do they correctly focus on repetitive human motion? Do they contain the 3 elements of takt time, job sequence & SWIP? Have they been updated recently (i.e. when takt time changed)?

If not, re-create standardized work for your area.

If the forms are 100% correct, conduct a percent loaded analysis with respect to takt time. Where significant margin exists for improvement, consider attempting a 10% labor or productivity improvement in the area.

Secondary Focus: Create any work standards that may need to be created.

For Non-Production Teams:

Primary Focus: Create any work standards that may need to be created.
Operation Instruction Sheets (for job, quality, or tool)
Job Procedure Sheets, In Process Check sheets, etc.
What quality problems do we face? How do our processes vary? What work standards need to be in place to solve problems or reduce variation?

Final Q & A: Answer any questions in the group.

Final Closing:

Thank everyone for their efforts and attention during the past 5 days. If possible arrange for an Operations Manager or senior person to be present at the end of session 5 to say a few word of encouragement. Make yourself available as a resource to people undertaking homework assignment.