Kaizen

15 Hour Basic Course

SESSION 4

TPS Kaizen Course

Instructor's Guide

I. Opening the Meeting

- Welcome participants to session 4 of Kaizen Training
- Create an informal atmosphere. Put the audience at ease. Remind people attendance is recorded but not tests will be given.
- Introduce yourself, and conduct participant introductions if necessary.
- Thank and or remind people to be on time to class.
- Remember to encourage participation so that the participants will most most benefit from the class.

A. Review of Session 3

- Briefly review the purpose and highlights of yesterday's observations on the plant floor

- Have the leader of each group briefly summarize to the other teams what they observed and measured on the plant floor.

B. Explanation of Session 4's Schedule

Today we will be covering steps 3 and 4 of the basic method for kaizen. Briefly I will explain what we will be covering today.

Show TP 4 - 1 "Basic Steps For Kaizen"

- Kaizen Step 3: Generate Original Ideas

  -Concerns Kaizen Ideas and Creativity
  -Methods To Develop Creativity For Kaizen

- Kaizen Step 4: Create a Kaizen Plan

II. Step 3: Generating Creative Ideas

After having completed your analysis of the current methods it is key to understand how to properly obtain creative ideas for improving those methods. Thus today we will begin by covering step three of kaizen: the basic process of generating creative ideas and topics associated with this subject.

Write on flip chart

Kaizen Step 3: Generating Creative Ideas

How do we do this? There are many good ways to generate ideas for improvement. We will study some of the more fundamental ways to generate ideas. But first I want you to be aware of barriers that get in the way of creating ideas.

A. Psychological Barriers To Creative Thinking

Question: Are inventors or so-called "idea people" born with imaginative powers and creative ability?

Everyone has imaginative power. It is really a matter of concentrating in the right way, and being aware of obtaining ideas. Anyone who says "I have no creativity", or "improvement is too hard" is giving up from the beginning. In these situations we are letting psychological barriers get in our way of thinking and clouding our minds.

Question: What inhibits our ability to think creatively?

Show TP 4 - 2 "Psychological barriers to creative ideas"

Basically you have noted some of the basic problems we run into when trying to be creative. This transparency summarizes the four typical categories of barriers we run into when trying to think creatively.

1 Force of habit

This is a huge barrier. Humans are often called creatures of habit. We all get comfortable with the way we are currently doing things and don't want to change.

2 Preconceptions or biased frame of mind

There are many instances where even if we are open to being creative, we discard some ideas immediately because of a preconception that we have. Examples of this include a total trust of some old statistic we once heard, or some other rumor not based upon fact.

3 "Common sense" -- Blinders on your thinking

Common sense can also be a powerful barrier to creativity. Using common sense however, means that we don't think "outside the box". Our mind becomes inflexible to any new idea that does not seem to fit our normal observations. Ultimately this can cloud our ability to see things objectively and separate the essential problem from our own circumstances.

4 Emotion

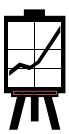
Emotion is another powerful barrier to creativity. Emotion blocks out ability to think rationally and creatively. I'm sure you've all seen situations where a good idea died because a meeting digressed into an emotional outpouring of complaints, negative feelings, or venting. Participation at Toyota or any company requires responsibility on the part of the individual.

As humans we are subject to many shortcomings and we often like to paint the world in simple terms of black and white. However, most things in life are not simple issues. It is OK to ask questions and try and get the facts.

As leaders and members of Toyota, we must be very careful not to kill ideas or proposals from others as a result of one of the above mental states. Be a good listener!

In order to develop and extend one's imagination, it is sometimes necessary to "get the rust out of our brains." We need to adopt an open minded attitude which enables us to accept new ideas and suggestions. This is essential for generating ideas for kaizen.

Next to loosen up our minds, I'd like to try a few exercises in creative thinking.



Write on flip chart:

How can I connect these dots without lifting my pen, in only 4 strokes?

Write on flip chart.

Summary

In order to give full play to our imaginative ability, you must first “get the rust out.” Develop your abilities; expand your creative mind. Even in this day and age where great advancements have been made in machinery and computers, imaginative power is one human ability which cannot be replaced.

B. A Creative Minds

Methods used to obtain ideas are generally called conceptual methods or problem solving methods. Many such methods are used. Before studying these, let’s take a look at some basic ways of generating ideas.

Show TP 4 - 3 “Idea Generation”

1. Clearly Separate "Idea-generation" and "judgment"

Trying to make a judgment while looking for an exceptional idea is like trying to get hot and cold water at the same time. First consider how we generate ideas. New or creative ideas are likely to be different from what we are use to. They are thus usually initially resisted, or prone to negative reaction. Creative ideas will not be generated if we pass judgment on those ideas at the same time we think of them.

2. Get As Many Ideas As Possible

Good ideas rarely appear at the outset. The more ideas that are generated the better the chance of coming up with a good one. Ideas will reinforce each other, increasing the likelihood of a good one appearing. In this case, first get quantity, then go for quality.

3. Think From Many Angles

If a lot of ideas are generated, each will be slightly different in substance leading to better and better quality of thought. Approaching or looking at a problem from various angles gives rise to new and often noteworthy ways of thinking.

Show TP 4 - 4 "What is the shape of the object?" (Top half only)

I would like to demonstrate an example of what I mean by thinking from many different angles. On this transparency are three shadows. Each of these shadows can be obtain from this one object; it all depends upon what angle you look from. Spend about two minutes thinking about what the shape of the object must be.

- After allowing trainees to think 1-2 minutes, ask one or two participants to draw it.

- Show the object afterwards. Cut the bottom off of a paper coffee cup and fold so that it looks like a triangle from the side, a circle from the bottom, and a square when viewed from straight on.

Show TP 4 - 3 "Idea Generation"

4. Combine Ideas With Others

There is an old saying that "Two heads are better than one." The number of ideas that comes up in a group is far greater than the number of ideas generated by one individual. Let's do some exercises and see how this is true.

Example1: Prepare few paper clips & place them on the OHP

For one minute I'd like to have you think about all the different uses you can come up with for a paper clip. Get as many ideas as you can.

Question: How many ideas did you come up with?

Flip Chart: List the ideas of the person with the highest total. Then list all the other ideas in the class. See how many they can add. Keep going and suggestion ideas until you get to around 20.

The main point of this exercise is that often we can come up with more ideas, and better ideas by working in a group. The highest individual only had a few ideas. Collectively we came up with many more. The same principle is true in trying to make improvements in manufacturing.

5. Generate original and creative ideas

There are two ways of generating ideas: creative thinking and analytical thinking. The analytical way of generating ideas is the way to get ideas by analyzing one method thoroughly. As the result of this, you will generate ideas. On the other hand, a creative way of generating ideas is a way of thinking that there is more than one means to reach a end. In order to get advanced creative ideas, it is more efficient to use a creative way of generating ideas.

6. Integrate

By combining various ideas, you can obtain new ideas. Also by combining ideas of others, ideas will reinforce each other. This will increase the possibility of getting better and more creative ideas.

These are the six basics of thinking to generate creative ideas.

C. Methods For Generating Creative Ideas For Manufacturing

1. Improvements For Manual Work Processes

First I would like to spend some time thinking about how we should proceed with obtaining ideas for improvement on manual operations. Let's briefly review the characteristics of manual operations.

Characteristics of Manual Work Processes

(1) In manual operations, work is advanced at the pace of the employees, hence there is potential for large variations in production volume and direct labor hours.

(2) Also it is difficult to judge when work is behind schedule, and when work is ahead of schedule.

(3) Much walking may be required if the layout is driven by the location of equipment.

(4) Unnecessary WIP is often present.

(5) In multi-process work the employees can work while walking around the equipment, however the work in-process does not move at a constant speed.

Since manual operations will often have these characteristics, it is often valuable to study them from the following angles.

Show TP 4 - 5 "Improvement Points For Manual Operations"

a) Can we improve motion of work?
b) Can we reduce variations in work time?
c) Can we separating human work from machine work?
d) Can we revise standard work in process?
e) Can we reduce walking distance?
f) Can we better balance work among employees?

Over the next few pages I will discuss each of the points in the overhead in more detail. All of these points have further opportunities for driving improvement, and following guidelines will serve as a tool to make sure you do not miss important kaizen points in manual work processes.

Improvement Possibilities For Work Motion

First we will discuss improvements that can be made in motion related to work. Depending upon the level of skill in employees, very large differences can occur in work motion. In order for operations to be performed efficiently, waste in work motion must be found and eliminated.

A. Focus Points For Improving Work Motion

The following points will all relate to A. Improving Work Motion.

Tip 1: Learn to watch the body posture for kaizen points

-Are they working with bent or stretch backs?
-Does the angle of the body suddenly change?
-Can anything be done while walking?
-Does the direction of motion suddenly change?

Tip 2: Learn to watch the hand movements for kaizen points

-Are both hands moving efficiently? Any waiting?
-Are movements by the hands too large?
-Any motions where the hands just hold position?
-Is the work too up/down or right to left?
-Is the finish position OK? Move to the next step OK?

Tip 3: Learn to watch the line of eye sight for kaizen points?
-Does the angle of the body suddenly change?
-Are hands spaced from tools & parts correctly?
-Are parts, tools, gages, in position OK?
-Is there any searching or groping motion to locate something?

Tip 4: Learn to watch the feet for kaizen points
-Any movements away from the flow of the work?
-Any work where there is a long stoppage?

We have studied the basics of Therblig analysis and you can break down any individual motions that might need further study for kaizen. We can obtain ideas for kaizen by focusing on work elements and motion one by one. But it is often easier to obtain ideas by looking at some of the following items as well.

Show TP 4 - 5B "Other Unique Items To Investigate"

What would happen if we:

1. Change angle of part tray, or shelf height?
2. Change quantity of part box, or pallet size?
3. Change size or height of chute, or table height?
4. Change position or angle of tools, jigs, parts?
5. Change order of work sequence?
6. Change start method?
7. Reduce number of trips by carts, etc.?
8. Use both hands?

All of these items can help you improve by cutting seconds out of the work process, and make the job easier and more efficient at the same time.

B. Focus On Variations In Work Element Time

Depending upon how you set Standardized Work and if it is followed, deviations can occur in the time required to do a job. The larger the variance, the more unstable the work element is.

Tip 1: Look at work that only occurs periodically.

For improvement possibilities focus on jobs like, inspection, die changes, part delivery, etc. Consider:

a. Can time be shortened?
b. Can the job be broken down?
c. Can an off line person do it?

For these type of jobs ideas may be generated by considering

a. Can the quality check, inspection area, or position of tools/jigs be changed?
b. Can a little of the work be done each cycle? (instead of all at once)
c. Can the die change be made easier? i.e. by use of casters, rollers, tables?
d. Have the die change, inspection, or part delivery done by a "call" method for an off line person.

2. Are there work elements that have significant time variations?

Even when some jobs are standardized, there are often individual work elements that experience extreme time variation. While learning to teach this class we practiced on an outside mirror line in Grand Haven. At station one where the actuator was assembled, we observed many people struggling to put a rubber

boot seal on the part. It could take anywhere from 3 to 9 seconds each time. This one element could cause a bottle neck at station one, which then slowed the whole line down. Remember, if veteran workers experience fluctuations in work this will result in bigger fluctuations for inexperienced workers. These type of problems need to be given high priority. Below are some items and tips on what to investigate for improving work with large time variations.

a. Is There Poor Workability?
    -Is the work hard to see, is there a lot of hand searching?
    -Is there a lot of adjustment?
    -Are lots of special knacks required?
    -Is there an element of muri / overburden in the job?
    -Are the tools easy to use?
    -Is the precision of tools/fixtures etc. good?

b. Is The Quality & Shape Of In-Coming Parts Good?
    -Are there any bad parts mixed in?
    -Is the part shape and precision good?
    -Are parts easy to take from the box?
    -Is repair work occurring?

c. Are There Any Wrong Or Missing Parts?
    -Are parts in their specified location?
    -Are the parts displayed clearly and easy to see?
    -Are work standards / standardized work created?
    -Are parts being delivered in small quantities.
    -Are kanban cards collected, sorted, and parts ordered?

Investigate carefully each of these points for improvement, and consider ideas for each point needing kaizen.

For the above type problems, the following items can be thought of.

a. Improve The Work Method
    -Improve work requiring adjustment (eliminate need for adjustment)
    -Simplify work that requires skill or knack
    -Revise tools, parts, etc.

b. Stabilize Quality
    -Improve the stability of part quality
    -Prevent wrong parts from getting in the box

-Specify locations for parts and tools

c. Promote Standardization
-Create works standards & standardized work
-Follow work site rules
-Make infrequent jobs be at periodic intervals.

C. Separate Human Work & Machine Work For Kaizen

Thinking about how to separate human work from machine work is a very important concept for work kaizen. When a machine is in automatic cycle there are many instances where a person must stand and watch the machine. These represent opportunities for kaizen.

Look for improvement opportunities like the following instances.

1. Is anyone just watching a machine.
2. After pushing a start button do they have to wait and watch for a while?
3. Are people holding parts, or adjusting the position of things?
4. Are ejectors, chutes, and transfer devices functioning?

For the above type of instances, some of the following can be applied.

1. Eliminate unnecessary work or part trays
2. Automate part feeds.
3. Automate part ejectors
4. Set up chutes to feed the part to the next station
5. Repair and maintain damaged part trays, jigs, etc.

D. Revise Standard Work In Process.

On manual lines work in process points and pass areas are often set up without thorough consideration. For every unnecessary work in process point an unnecessary series or motions will also occur.

1. Is the standard work in process set correctly?
2. Is the standard work sequence being followed?
3. Is the work in process really necessary?
4. If the work in process is necessary, can it be limited?

For the above instances you might try:

1. Making it so that only the correct number or SWIP can be set down.

2. Clarifying visually how many pieces of SWIP should be in place.

E. Reduce Walking Distance

In a manual work line the layout often gets set up with an equipment focus that leads to wasteful walking.

Focus on the following to reduce walking distance.

1. Is the walk distance large between work points?
2. Is the walk line between points straight?
3. Is there any back and forth walking?

Think about the following ways to reduce walking.

1. Change the layout where possible. (Be cautious above future changes in production, keeping the line flexible)
2. Change the location of parts pallet, and part shelves.
3. Eliminate unnecessary obstructions.

F. Balance Work Between Operations

For lines with several employees, the work performed by each may vary and time required may not be balanced. As a focus point for kaizen, use a standardized work combination chart and ascertain the degree of variation. Investigate the time variance for the cycle and isolate the elements that are causing the largest degree of variation. Clarify what needs to be shortened.

1. Kaizen Focus For Workability
    - -Make the work so no adjustments are necessary.
    - -Change the work point to an easier place to see.
    - -Quantify the skill and knack work so that anyone can do it.
    - -Make special tools.
    - -Make countermeasures to prevent recurrence of defects.

2. Kaizen Focus For Part Quality
    - -Make rules for handling defects.
    - -Make precision problems easy to identify by standards.
    - -Change package shape and container
    - -Change design or parts

3. Kaizen Focus For Wrong Or Missing Parts
    - -Make the address and location for parts clear.
    - -Instruct and follow up in standardized work / work standards
    - -Follow kanban rules for handling parts.

-Standardize rules for conveyance.

Depending upon the subject for kaizen there are various ways to look for improvement. Generally, there is no one way to come up with ideas for kaizen. From experience on the plant floor and focusing on manual lines I have explained these 6 areas to help you identify opportunities for improvement.

There are many other ways that people have come up with over the years. Industrial engineers have composed checklists, and guidelines for years on how to improve operations. I will give you a basic feel for some of the more famous ones. The first is called Rules For Motion Economy.

Rules for Motion Economy

These rules are also called “Rules for Work Simplification.” They express the desirable forms of motion from three avenues; rules for the body, rules for the workplace, & rules for tools and material. By applying these rules to kaizen, it is possible to eliminate waste, unevenness, and overburden.

There are 22 rules for motion economy, but here we'll cover some of the most frequently used.

Show TP 4 - 6 “Rules For Motion Economy”

A. Rules for Using Different Parts of the Body

This section deals with moving different parts of the body. Since bodily motion is the most common element of work, you will find yourself using the rules set forth in this section most frequently.

1. Move Both Hands Symmetrically at the Same Time

This rule is the most widely used. By using it skillfully, you can do the same thing with both hands. As a result, you can do two things at the same time, thus raising work efficiency. Also, because the left and right motions are symmetrical, the body is neither bent nor twisted, hence there is no waste.

Another advantage of this rule is that because the left and right motions are the same, you will experience little mental fatigue. In thinking about this rule, avoid “holding” or “waiting” with one hand while the other is working. Take steps to use both hands effectively. A rule which is related to this is “Both hands must be used both when starting and finishing.”

2. Avoid Abrupt Changes in the Direction of Motion

Force is required to change the direction of motion of an object. Physiologically, this means a lot of work for muscles. Consequently, such actions and motion result in fatigue and must therefore be avoided.

3. Make Two-Handed Motions as Small as Possible

Another important rule is to make motions as small as possible. To this end, it is necessary to take steps so that the work in-process, tools, and finished goods removal point are as close as possible to the processing location.

4. Use Free, Unconstrained Motion

Use free, unconstrained motion. It's faster, easier, and more accurate than restricted movement. Motion that requires no particular precautions and can be performed without restraint is best.

B. Rules for the Work Place

This rule is concerned mainly with the layout of parts on work tables, and the layout of devices used to operate machines. It does not cover the layout of the plant or machines.

The layout of tools, materials, and pallets influences the amount of movement of the floor employees, the production sequence, and the production rhythm. Therefore, adequate care must be taken to ensure that the work is carried out in an economical manner.

1. Put Tools and Materials in Designated Places

If tools and materials don't have designated places, hand motions will be different for each cycle. Work will become unstable and confused. Work pace may fall off.

Doing kaizen to overcome these problems, will help to increase work efficiency. It is important to place tools in designated positions. Hang them with balances or place them in guides so that they fall into proper position by themselves even when put down quickly or roughly.

Having tools and materials conveniently located minimizes the amount of employee motion. This reduces time spent on searching for tools. As much as possible, place the tools within the range of normal motion.

2. Avoid Moving Parts Vertically; Move Parts Horizontally

Moving parts vertically (up and down) requires extra effort. To avoid waste of energy, align the heights of the machines so that parts can be moved horizontally.

3. Utilize Gravity to Help Move Parts

Many examples of this principle are visible in factories. Chutes are used to roll products down; sloping parts shelves along the assembly lines help to slide boxes into position. The advantage is lower cost, and ease of use.

4. Place Materials and Tools in the Most Convenient Position

This principle is followed in order to obtain an optimum motion sequence. Recall the rule, "Avoid Changing the Direction of Motion Abruptly?" The most convenient position is that which enables the employee to follow a short, smooth path of motion.

Note: Adjust table heights to better fit the work and the worker.

- Explain while performing the motions involved.

Generally, the optimum height for a work table is determined by hanging the upper arm down and bending the elbow at a right angle.

5. Use Suitable Lighting

Important factors to consider when choosing lighting include: strength, contrast, glare, and color. In all cases, lighting should be arranged so that it shines on the work, not in the worker's eyes directly. Especially important for paint and inspection.

C. Rules for Design of Tools and Equipment

These rules cover the construction of tools and devices themselves. They indicate the steps to be taken in order to realize "Rules for Using Different Parts of the Body."

1. Avoid Motions in which Materials are Supported by Hand

Merely supporting something by hand is non-productive. Try to use jigs or mounting tools to do this kind of work. This leaves the hands free to do useful work.

2. Don't Use General Purpose Tools for Jobs that Require Specific Needs

Sometimes general purpose tools are convenient. Unfortunately, however, this convenience does not necessarily make for efficient motion.

- For example, when performing repetitive nut and bolt tightening work, it is easier to use an ratchet wrench that matches the nut size rather than using an all-purpose crescent wrench.

3. Combine (Redesign) Tools When Possible

When using two tools in succession, it is a good idea to combine them if possible.

- For example, one end of a socket wrench can be used to change lug nuts on a tire, the other end, as a regular screwdriver to remove the tire cap.

4. Establish fixed locations for tools & material

It is important to decide on one place where you can always put tools and materials. To do repetitive work smoothly, tools and materials need to be placed in the same place.

5. Design Tool Handles So They Are Easy To Hold

Sometimes you may want to wrap handles and levers with cloth or tape. This increases the grip area. This rule covers not only tool handles that require force to operate but also equipment and parts, etc. Keep an eye open for ways to make the job easier and safer. You'll be surprised at what you can come up with.

Keep in mind the "Rules for Motion Economy." They will help you devise less fatiguing, economical work. Many ideas for kaizen will come to light if you utilize the results of motion analysis.

Osborne's Checklist

Another famous way of generating ideas is through the use of the "Osborne Checklist." It is a questionnaire that contains brief questions which force you to think from various angles.

As a means of facilitating creativity, Osborne mainly divided his questions into 9 categories and further into 70 sub-categories. I'll briefly explain the 9 categories.

Show TP 4 - 7 "Osborne's Checklist" and briefly explain the 9 categories.

1. Is there any way of reusing what you don't need any more? (Reuse)

Can rejected and useless items be used for something else?
Can we think of new way to use goods and materials?
Can somebody's personality and ability be used somewhere else?

2. Can a similar item be used for something else? (Borrowing)
   Are there any other things that look alike?
   Are there any imitations?

3. Can we change anything? (Change)
   Can we change the color?
   Can we change the shape?
   Can we change the sound?

4. Can we enlarge it? (Enlargement)
   Can we make it bigger?
   Can we make it longer?
   Can we make it stronger?
   Can we make it thicker?

5. Can we reduce it? (Reduction)
   Can we make it smaller?
   Can we separate it?
   Can we compress it?
   Can we make it lighter?

6. Can we substitute something? (Substitution)
   Can another person be substituted?
   Can other things and materials used instead?
   Can the work process, power, and place be substituted?

7. Can we rearrange it? (Replacement)
   Can we rearrange the elements?
   Can we rearrange it into some other form?
   Can we rearrange to another layout?
   Can we rearrange the order?

8. Can we reverse it? (Reverse)
   Can we change plus to minus?
   Can we reverse the roles?
   Can we reverse it up / down? Left to right?

9. Can we combine anything? (Integration)
   Can we mix?
   Can we combine each unit?
   Can we combine ideas?
   Can we combine elements?

Osborne’s checklist is fairly general, but makes you consider things from different angles you may not have forced yourself to consider.

Brainstorming

Brainstorming is another creative way of generating ideas. Brainstorming originally referred to a condition of "mental derangement" but now refers to a means of generating ideas.

A "Brainstorming Session" is a meeting in which people generate ideas about an issue as a technique in the process of solving problems. Brainstorming takes advantage of the energy of the group to build a chain reaction of idea generation by the group members. Generally speaking, we generate many more ideas as a group than as individuals.

The 4 Rules of Brainstorming

Show TP 4 - 8 "Four Rules of Brainstorming"

1. No criticism -- no judgment

2. Speak freely -- speak as you think, and think freely

3. Seek quantity -- the more the better

4. Think together -- use each others ideas to improve

* Explain briefly the 4 rules.

Criticism is prohibited because psychological hesitation will occur if someone criticizes which will stop the free flow of ideas. It is essential to bring out ideas freely, intuitively and without reservation. In this way, we can get various ideas from various angles which can then be combined and made even better. Through following these rules, we can get many ideas for kaizen. Let's look at Brainstorming in a little more detail.

How to brainstorm.

We don't have enough time to go into too much detail, but we can go over the main points.

1. Preparation

   (1) Prepare the brainstorming theme, or problem
   (2) Number of participants: a few to about 20
   (3) Time: 15 minutes to 1 hour

(4) Choose a quiet place
(5) Assign a "scribe" and record all ideas
(6) Explain the 4 rules
(7) Post the 4 rules

2. Success Factors

(1) Successful brainstorming has a good theme
(2) Themes to avoid:
abstract themes; themes that involve choices
big, broad, vague themes
(3) Appropriate themes: concrete, narrow in scope
(4) Communicate the theme 2-3 days in advance

3. Selecting the theme

(1) You should have a question such as: "What should we do in order to...?", not a question such as: "Which should we choose, 'A' or 'B'" (which requires judgment rather than creativity).
(2) Write down the ideas in any order.
(3) It should be concrete, not broad.
(4) It should not mix more than 2 problems.
(5) It should be narrowed down into a smaller problem if too broad.
(6) It should be handed out 2 days in advance.

Suitable Examples:
What could we do to reduce the weight?
What could we do to increase the accuracy?
What could we do to improve maintainability?

Unsuitable examples:
How to prevent plant floor accidents?
Which security device to use, 'A' or 'B'?
How should we get someone else to change?

These latter examples either require judgment outside the scope of normal kaizen work, or are policy related, or just plain belong to other people.

4. Role of the Facilitator

Usually it is beneficial to have an outside facilitator brought in for brainstorming.

The role of this person is to:

(1) Create a open, cheerful atmosphere
(2) Have participants raise their hands to state an idea; if many hands go up, choose who goes next
(3) Get all participants involved
(4) Enforce the 4 rules
(5) Summarize ideas, restate for the scribe
(6) Accept opinions even if previously stated
(7) Encourage building off of other's ideas
(8) State ideas if none are forthcoming

5. Role of the Scribe

Often you will also need a scribe. The ideal scribe is someone who:

(1) Writes neatly and quickly
(2) Summarizes verbally and then write down
(3) Writes big
(4) If many ideas, use 2 scribes
(5) After recording the ideas, work with the Session Leader to categorize and record on a chart

6. Evaluation

After generating ideas you still need some method of evaluating those ideas to see which is best. There are various ways to evaluate ideas. Impact vs. Difficulty. Cost vs. Effectiveness. Somehow you will need to:

(1) Evaluate each idea
(2) Explore feasibility of each idea
(3) Record the results of your decision.

We have looked at some ways to generate ideas; you may know others. The most important thing, whichever method you use, is to not be judgmental when generating ideas. With these basic rules, we can all become good at developing ideas.

III. Step 4: Make a Kaizen Plan

When a problem and its root cause have been identified, it is time to establish kaizen objectives and create a detailed kaizen proposal.

Bear in mind that there are many ways of achieving a goal. Draw up and study not one, but several kaizen proposals. Then, try out the proposal which you consider to be the best among them.

Question: How many different ways can you think of join steel sheets A and B to each other: *Prepare two sheets of paper to use as "steel sheets".*

Sample Answers
1. Bond A and B with adhesive.
2. Caulk them together.
3. Fix them together with nuts and bolts.
4. Weld them together.
5. Bind them with cord.

Like we just did here in this example it is good to think of different ways to implement something. Before completing kaizen proposals, always be sure to confirm the target points to be improved. Also consider fully the impact on production volume, quality, cost safety, etc. Then, study kaizen proposals which are in line with each target.

There is an element of trial and error in testing a kaizen proposal. Don't be surprised if you find it difficult to devise kaizen successfully. Generate lots of ideas; evaluate them. Try them out in the workplace. Narrow it down to those that are feasible.

A. Work Kaizen and Equipment Kaizen

Kaizen can be broadly divided into work kaizen and equipment kaizen. They are chosen according to the purpose of the kaizen performed at the manufacturing site, but basically work kaizen should take precedence over equipment kaizen.

Work kaizen is central to the development of the Toyota Production System. It is based on Standardized Work. This type of kaizen is used to determine the rules for redistributing and combining work. It is also used to indicate the layout and storage area of parts, taking into account workability. It improves work operations themselves. This kind of kaizen involves little additional expenditure. Main emphasis should be on work kaizen.

Equipment kaizen, on the other hand, is employed to introduce machinery and automatic equipment. In work kaizen, the employee methods of working are studied. Anyone and everyone should engage in this kind of work improvement. Equipment kaizen, in contrast, typically involves a special crew, or engineering team.

B. The "Direction" of Kaizen

There are various directions you can go with carrying out kaizen. The most frequent include: eliminate, combine, rearrange & optimize, simplify & standardize, synchronize, and build In-station process control.

Show TP 4 - 9 “Direction OF Kaizen

1. Eliminate

If you discover that the reason for performing work is judged to be unnecessary, there is no need to do it.

For example, there are cases in which a manual method of moving parts from process A to process B is replaced by a gravity feed method in which the parts are passed down a chute, thus eliminating the manual labor required to transport the parts from one machine to another.

2. Combine

Regarding work that cannot be eliminated, emphasize finding the best method(s). Rearrange the work to create as simple a method as possible. To this end, we use separation and combination methods. An example of separation would be like the following: Assume that a visual inspection is performed at the final process of a machining line. It takes about 15 seconds. This inspection process can be broken down and distributed among each forming process on the line. The floor employees perform an inspection at the end of the forming process for which they are responsible. Doing this the centralized inspection at the final process can be eliminated.

An example of combining would be like the following: Two team members are working side by side. One worker cannot get his work done within task time, but the other worker has waiting time every cycle. Group leader moves tasks from the first and gives to the second worker so they both equal task time.

3. Rearrange & Optimize

Optimization means making work easier to perform. This includes making efficient use of machinery and equipment. For example, when making a work combination based on Standardized Work, if the layout used results in processes

being isolated from each other, the resulting large walking distances will cause waste. In such a case, it is necessary to partially change the layout to reduce the walking distance. Place objects in such a way that the work can be performed more easily. This raises efficiency.

The paint shop contains a sealer application process. Previously, the profile of the tip of the sealer gun nozzle was circular in almost all cases. However, this prevented the sealer from being applied satisfactorily to some areas. This problem was overcome by having the floor employees use their resourcefulness to design a suitable tip profile. This is an example of optimization.

Optimization refers to a method of reducing unnecessary walking, reducing fatigue, and utilizing the performance of machines and employees to a greater degree.

4. Simplify & Standardization

In the Toyota Production System there is no kaizen without standardization. Rules are established with this in mind. Random working speed, procedures, tools, etc., means random output and quality. It means costs go up; production lead time and safety are affected. For this reason, it is important to promote standardization.

Standardization ensures that work is performed with minimal variation resulting in products of similar quality and cost. Standardization integrates the best methods known at any particular point in time. It is collective resourcefulness. Standardization of methods, machinery, tools, etc. is a rule in TPS.

5. Synchronize

Synchronization means maintaining a balance between the flow and timing of various related processes. When operations are synchronized the right parts are present and ready for processing at the right place at the right time.
When working as a group, if employees are performing tasks, the timing of which doesn't match, smooth progress can't be maintained. For instance, if one process is completed too early or too late, work according to Task Time will be interrupted. This type of irregular production flow can cause all sorts of problems. For this reason synchronization or the Just-In-Time concept of making what is needed when it is needed in the amount needed must be maintained.

6. In Station Process Control

In the Toyota Production System, one of our two main pillars is called In Station Process Control. This pillar borrows heavily from the Toyota concept of “Jidoka”. This word means to automatically stop the line when any abnormality is detected in either the part or the machine. Usually machines are designed to automatically run all the time. Under the concept of Jidoka however, more emphasis is put on how to automatically stop the line and prevent bad parts from getting downstream.

Primary emphasis should be put on eliminating of problems or waste in kaizen. For elements we can’t eliminate then we must consider how to combine, rearrange, or simplify.

Note To Instructor:

If there is any remaining time at this point have the class work on their reports for the 5th session.

IV. Closing The Session

How was today's training? Did it make our brain more flexible? For us to generate lot's of ideas, we must clear away all the obstacles that block our creativity. Sometimes, we may worry about what others may think and as a result may decide not tell others of an idea we've had, when in fact it may have a brilliant one. As we train our people, we must make maximum use of their precious ideas and creativity; even if in first hearing an idea it may sound impractical or otherwise of no value.

I hope you have learned some ways of generating ideas through hands-on experience. Some people make decisions using simple common sense or conjecture without realizing that there is a real kaizen need that demands attention at the real place of action, the plant floor. Our people are always interested in our behavior and watching what we do. If a supervisor has a positive attitude toward kaizen and solves problems on the plant floor, then everyone will begin to do the same. That's what we want to encourage.
We'll finish now today, but let's develop the idea pursuing kaizen through using the many little ideas that our people can bring to us. A workplace is a place to use kaizen skills -- please use the kaizen skills we are learning here at your work site.

Tomorrow is our last day. See you then.