10 Steps to become a Lean Enterprise

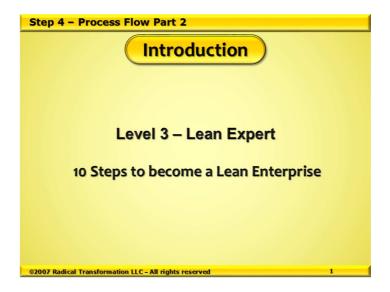
Lean Expert Training Course

Step 4
Improve Process Flow
Part 2

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Please note that some of the screens in the online course have been omitted from this workbook. This is to protect any proprietary information that may be included in the pictures.



Welcome.

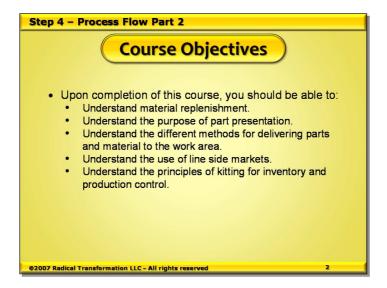
We would like to welcome you back to our next module in this online training course.

This training module is called "Step 4 – Improve Process Flow Part 2."

This module is a continuation of our Lean Expert online course series called "10 steps to become a Lean Enterprise."

This program has been specifically designed to demonstrate our step by step methodology that will allow any organization to become a Lean Enterprise.

Let's continue your lean journey!



Course Objectives

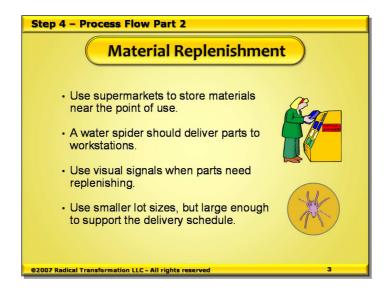
Here are the course objectives for Step 4 Improve Process Flow Part 2.

We specially designed this course to give the information you need to get a full understanding of each step required to become a Lean Enterprise.

Upon completion of this course, you should be able to:

- Understand material replenishment.
- Understand the purpose of part presentation.
- Understand the different methods for delivering parts and materials to the work area.
- Understand the use of line side markets.
- Understand the principles of kitting for inventory and production control.

Now we are going to work through each course objective.



Material Replenishment

The most effective material replenishment process uses supermarkets or line side markets that are located at a point of use, near to the work cell. A person known as a 'water spider' completes the replenishment process.

What is a water spider?

The name comes from the Toyota Production System (TPS). The person who replenishes the line or cell is a "mizusumashi" which translates into "water spider". However, a water spider is usually much more than a material handler. They are highly skilled workers who can perform any job in a cell or work area. Sometimes the workers in a cell will take turns at being the water spider.

A water spider is responsible for procuring, handling and delivering materials, parts, subassemblies, and kits to each workstation in a cell or on a line. Why do they do this?

It is a non-value added activity for line workers to get their own materials, etc. If they walk away from their workstation the production line will stop. A water spider replenishing several workers is an effective method of eliminating waste and allowing the workers to continue producing. The water spider will replenish the line frequently to maintain the flow of products to meet customer demand (takt).

The line workers will have some type of visual signal to inform the water spider to replenish the supplies at their workstation. The signal could be an andon, a flag, or an audible signal such as a buzzer or bell.



Parts Presentation

1n this screen you see examples of how parts are stored and presented to the assembly workers.

Presenting parts to a worker in a cell will eliminate the waste of excessive motion because of the multiple handling of the parts.

This occurs when a worker has to spend time turning and aligning the part to achieve the correct orientation so it fits into an assembly.

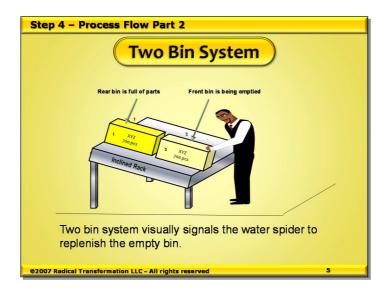
These additional activities will increase the assembly cycle time and the defect rate.

If the product is assembled thousands of time throughout the year, a few extra seconds of cycle time will increase the cost of the unit.

If the part has to be turned and aligned several times to orient it, there is a greater chance of it being dropped or bumped.

On a precision unit this would cause damage and the part would require rework. This is waste, which would add cost to the finished product.

Parts can be stored and presented in the correct orientation to make it easier for the worker to pick up, align, locate, and assemble the products.



Two Bin System

A two-bin system is used to signal the water spider when an empty bin needs to be replenished.

These bins hold the correct quantity of parts to give the water spider enough time to refill the empty bin.

A replenished bin is placed back onto the inclined table. When the next bin is empty, the water spider repeats the same process to replenish it.

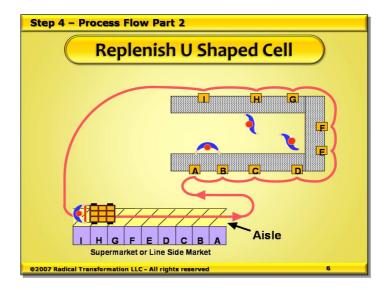
The inclined table design allows the water spider to supply the components from behind the line or outside of the cell area.

The design takes into consideration the ergonomics of the workload. It should eliminate or minimize any bending, stretching, twisting, or lifting.

Materials are labeled and organized. They are put into their assigned locations on the inclined table and arranged in order of use, i.e. first item, then second item, etc.

The worker would pick up the first part, then the second and so on. The parts are assembled in the same order as they are picked up from the table.

We will discuss the two-bin system in more detail in Step 6 – Implement a Pull System.



Replenish U Shaped Cell

In this screen you see an example of a U shaped cell with several part locations.

The water spider is following a defined path. In this graphic, they start the process at the beginning of the supermarket aisle (with item I) and move along, picking up parts until they reach the end of the aisle (item A).

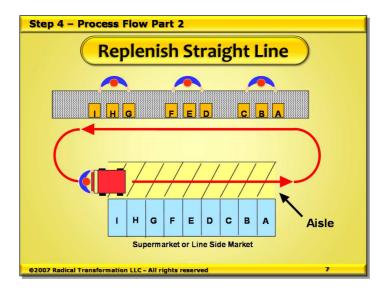
The water spider then travels to operation A, then B, and C, etc. until each of the operations in the cell have been replenished.

The water spider will repeat this process several times per day.

The time sequence for replenishing the parts at each workstation is based on customer demand or takt time. The water spider must maintain the same pulse or takt with every run they make.

If the water spider delivers the parts to the cell at a slower pace it will stop production. The workers will not be able to produce enough products to meet the customer demand.

If the water spider delivers the parts to the cell at a faster pace, the workers will not be ready to receive them. Therefore, it is a fine balance to deliver the items to the cell on a just in time basis.



Replenish Straight Line Cell

In this screen you see an example of a Straight Line work cell with several part locations.

This design follows the same replenishment procedure as the U shaped cell.

The water spider is following a defined path.

They start at the beginning of the aisle (at item I) and move along, picking up parts until they reach the end of the line side market aisle (at item A).

The water spider will repeat this process several times per day.

The time sequence for replenishing the parts at each workstation is takt time or customer demand.



Line Side Market

in this screen there are two pictures of examples of line side markets.

Line side markets are mini storage areas where a water spider or a production worker can pick up their materials or parts.

If a water spider is used to deliver the parts to the workstation, the line side market would be positioned at a point of use near to the workstation.

If a production worker is going to pick parts themselves directly from the line side market it would be positioned at the workstation.

Remember, the goal is to maintain production and not have the worker walking away from the workstation to get their parts. The line side market has to be within arm's length for easy access.

The water spider would replenish this type of line side market from the back so they don't get in the way of the production worker. If you look at the example on the right of the screen, it is inclined to allow the materials to flow to the front of the line side market.

Line side market parts and materials are replenished using min-max levels or kanban cards.

Part quantity levels are calculated to maintain the correct number to meet takt time or customer demand.

Some line side markets only hold enough parts for two hours, others hold enough to feed an eight hour workload. It really depends on the replenishment lead-time and takt time.



Kitting

Kitting is an effective method of ensuring the delivery of the correct types and quantities of parts and materials to a work area or cell.

Kitting is useful for checking if all the parts are available prior to assembling a product.

It eliminates the problem of an assembly worker discovering that a few critical parts are missing when they are halfway through the build process.

In most companies, the incomplete assembly will be quarantined. It will sit there and wait for the delivery of the missing parts to the work area. Waiting is a waste.

Another problem with an incomplete assembly is that there is a greater chance of damage during transportation to and from the shop floor.

The kitting process uses a foam pad to create an impression of the part. This helps to locate and securely seat each part into the foam. These impressions are useful to orient and present the parts to the worker.

This is a similar process to that used when creating a shadow board.

If any of the part impressions are empty, the water spider or worker can see immediately that not all the parts are available.

This is a visual signal to indicate that workers cannot start building the assembly.

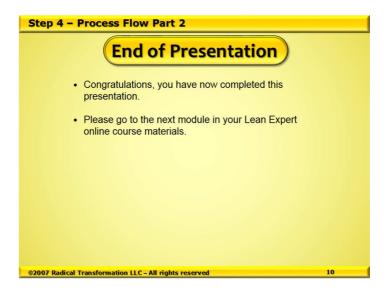
Here are some advantages and disadvantages of kitting.

Advantages of kitting:

- It can incorporate mistake proofing (Poka-Yoke).
- It can create minimal parts inventories.
- It is effective for sequencing operations.
- It facilitates the re-ordering process.
- It is a visual aid to determine if any of the parts are missing (abnormal condition).

Disadvantages of kitting:

- Quality issues not found until sometime during the assembly process.
- Handling damage can occur when parts are not covered and protected.
- Parts and materials are cannibalized by other work areas.
- Extra space required to locate the delivery vehicles such as carts, etc.



End of Presentation

Congratulations, you have now completed this presentation.

Please go to the next training module in your Lean Expert online course materials.

Reference Materials

- 1. One-Piece Flow: Cell Design for Transforming the Production Process.
 - By: Kenichi Sekine. Published by Productivity Press 2005.
- 2. Lean Assembly: The Nuts and Bolts of Making Assembly Operations Flow.
 - By Michel Baudin. Published by Productivity Press 2002.
- 3. Identifying Waste On The Shopfloor.
 - By Productivity Press Development Team. Published by Productivity Press 2003.
- 4. Making Materials Flow: A Lean Material-Handling Guide for Operation, Production-Control, and Engineering Professional.
 - By Rick Harris, Chris Harris and Earl Wilson. Published by LEI 2001.

Documents List

There are no documents required for this training module.