IIT & CII - FACE Certified Food Professional Course

Webinar

Improve Efficiency of Food Production through 3M & 5S
Program Structure

- Efficiency Parameters
- Identify Waste, Strain, Inconsistencies & Eliminate (3M)
- Organise your Workplace with 5S
Customer Expectations
When do we consider our operations Efficient

- Increase in productivity
- Reduction in Search Time
- Reduction in cycle time
- Reduction in inventory, WIP
- Reduction in defects, rework & scrap
- Better space utilization
- Increased customer satisfaction
Eliminating Muda, Muri and Mura
(3M = Waste, Strain, Inconsistency)
WHY REDUCE WASTE?

Price = Cost + Profit.

Transformed to

Price − Cost = Profit

Decided by market

Wasteful activities in processes

Very much function of cost
Reducing costs vs. Cutting costs

× Cutting costs
  • Temporary measure
  • Reversible
  • Painful/drastic

0 Reducing costs by waste elimination
  ➢ Genuine cost reduction (Not just reduction of expenses)
  ➢ Irreversible
  ➢ People acceptance
  ➢ Impacts both top and bottom line
Total Cost

- Material Cost
- Processing Cost
- Energy Cost
- Others

The Pie chart is not to the scale and is indicative only
**Business as Usual**

Customer Order → Waste → Product Shipment

Time

**Lean Process**

Customer Order → Product Shipment

Time (Shorter)
Reduce Cost

Depending upon the manufacturing method

- Processing
- Conveyance
- Inspection
- Stagnation

Useful Job from customer point of view

Waste

Worthless Job does not increase value to the process

Remove Waste

Actual movement for Reducing Cost
3 M

MURI – STRAIN
MURA – INCONSISTENCY / IMBALANCE
MUDA – WASTE
What is Muda, Muri & Mura

- For example, suppose you need to transport 12 tons of material with a 4 ton capacity truck...

Material Source: Toyota Training Handouts
What is Muda, Muri & Mura

![Image of a truck](Image)

\[ X \times 2 = \text{MURI} \]

To make 2 trips, carrying 6 tons at a time is **Muri** (overburden)...

**Material Source:** Toyota Training Handouts
What is Muda, Muri & Mura

$X \times 6 = \text{MUDA}$

Making 6 trips, carrying 2 tons at a time is Muda (waste)...

Material Source: Toyota Training Handouts
What is Muda, Muri & Mura

What is Muda, Muri & Mura

A mixture of the two is Mura (unevenness)

Material Source: Toyota Training Handouts
What is Muda, Muri & Mura

3 trips, carrying 4 tons at a time, eliminates Muda, while at the same time no causing Muri.

Material Source: Toyota Training Handouts
What is Muda, Muri & Mura

12 TONS

X 3 = NO 3M’s

X 2 = MUDA (waste)

X 2 = MURI (over burden)

Capacity : 4tons

MURA (unevenness)

Achieving such a balance everywhere in the company is one of the primary aims of the Toyota production system. Elimination of the “3Ms” is always in the Toyota employee’s mind, as everyone tries to keep waste down without causing overburden.

Material Source: Toyota Training Handouts
Elimination of MUDA (Waste)

What is MUDA?

Operation = Work + MUDA

Work = Increases value of production

MUDA = Increases cost of production

Kaizen (Improvement) = Work

Total amount of labor

No Change in labor

Do Kaizens for Muda removal

\[
\text{Work} + \text{MUDA} \rightarrow \text{To 100%}
\]
How to look for waste: Motion mind

Example: Simple Mixing operation

All operations are composed by 3 elements such as 1. Value adding motion,
2. Auxiliary motion, 3. Waste motion

1. Reach for the Ingredient & Spoon  → Auxiliary motion
2. As it is too far, arm is lengthened further  → Waste motion
3. The ingredient is brought close to the Mixer  → Auxiliary motion
4. Mixing  → Value added motion
5. Return the Spoon to the original position  → Auxiliary motion
6. As it is too far, arm is lengthened further  → Waste motion
Waste Identification

- Establish competence of ELIMINATING ALL WASTES at all process for providing value to people

Material Waste

Equipment Waste

Operation Waste

Rs

Financial Loss

Life Time Loss
Types of MUDA (Waste)

- MUDA of Overproduction
- MUDA of Stock
- MUDA of Conveyance (Transport)
- MUDA of Waiting
- MUDA of Operation Itself
- MUDA of Movement of Worker
- MUDA of Production of Inferior goods
## Common Wastes

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Admin Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defects</td>
<td>Incorrect data entry, Incorrect information on document</td>
</tr>
<tr>
<td>Over production</td>
<td>Processing paperwork before the next person is ready for it, Creating reports no one reads or needs.</td>
</tr>
<tr>
<td>Waiting time</td>
<td>System downtime, Waiting for approvals, Waiting for supplies,</td>
</tr>
<tr>
<td>Unnecessary processing</td>
<td>Re-entering data, unnecessary reports, excessive reviews</td>
</tr>
<tr>
<td>Unnecessary transportation</td>
<td>Extra steps in the process, distance traveled</td>
</tr>
<tr>
<td>Excess Inventory</td>
<td>Transactions not processed, Data which is not organized or fully Utilized.</td>
</tr>
<tr>
<td>Motions</td>
<td>Extra steps, extra data entry, difficult physical movements</td>
</tr>
<tr>
<td>Underutilized employees</td>
<td>Limited employee authority and responsibility for basic tasks</td>
</tr>
</tbody>
</table>
Overproduction

- Producing too much.
- Occurs because products are made earlier or faster or more than is needed by the next process.
- Uses extra space, raw materials, utilities, transportation, scheduling costs.
Inventory

- Raw material, parts, WIP, supplies, finished goods, Quarantined material are all inventory.
- Uses extra space, transportation, labor, interest on materials.
- Inventory sitting around gathers dust, deteriorates, becomes obsolete, gets damaged in handling.
Transport

- All forms of transportation are waste.

- Transportation waste is caused by poor plant layout, poor cell design, use of batch processes, long lead times, large storage areas, scheduling problems.
Waiting

- Operator remains idle waiting for the next operation.

- Some causes for waiting are machine downtime, lack of parts, line stoppages, long changeover times, batch flow of material.
The right tool can be picked up at first look.
Motion

- Extra unneeded movements like excessive walks, lift heavy loads, bend awkwardly, reach too far, etc. are waste.

- Strenuous and tiring motions.

- Redesign workplace layout to take advantage of the ergonomics.
MURI and MURA

- MURI – Strain
- MURA - Imbalance
**KAIZEN SHEET**

**Machined Components Division**

<table>
<thead>
<tr>
<th>Machine</th>
<th>861</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line/Area</td>
<td>L-10</td>
</tr>
<tr>
<td>Date</td>
<td>Jan 2013</td>
</tr>
</tbody>
</table>

**Kaizen Theme:** To eliminate the fatigue of operator

**Problem:**
To start the operation cycle operator has to press 7 push buttons causing excess fatigue.

**Analysis:**

<table>
<thead>
<tr>
<th>Operator Fatigue while operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator has to operate 7 push buttons to start the operation</td>
</tr>
<tr>
<td>Original machine design</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Root Cause:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original machine design</td>
</tr>
</tbody>
</table>

**Idea:** To provide a modified PLC software operating with a Joy stick.

**Countermeasure:**
Modify PLC program for autocyce

**Before Counter Measure:**

**After Counter Measure:**

**Benefits/Results after Implementation:**
1. Operator fatigue to start the operation is totally eliminated.
2. Easy to operate for NEW operators also.

**Scope & plan for horizontal deployment:**

<table>
<thead>
<tr>
<th>Machine</th>
<th>Target Date</th>
<th>Resp.</th>
<th>Status</th>
</tr>
</thead>
</table>

**Implemented by:** V.B. Mayur

**Kaizen no.:** 1
Elimination of waste

A Sea of WIP

NOW YOU CAN SEE IT!
<table>
<thead>
<tr>
<th>Muda</th>
<th>Overproduction</th>
<th>Waiting</th>
<th>Conveyance</th>
<th>Movement of workers</th>
<th>Inferior goods</th>
<th>Stock</th>
<th>Mode of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summing up…..

Achieving profitability by 3M elimination
5S
What is 5 S?

5 S is a step wise method to Reduce Waste

- Remove unnecessary items
- Reduce the searching time of the items
- Inspect while cleaning
- Standardize arrangement to avoid misplacing
- Self discipline
Elements of 5S

- Seiri • Sort
- Seiton • Systematic Arrangement
- Seiso • Spic and Span
- Seiketsu • Standardise
- Shitsuke • Self Discipline
STEP 1
SEI RI
SORTING
Step 1 - SEIRI

**Definition**

Seiri means that

You remove all items from the workplace that are not needed for **current** production / operations.
## Step 1 - SEIRI

### Steps to doing SEIRI

<table>
<thead>
<tr>
<th>SN</th>
<th>What to do</th>
<th>Who does it</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Identify the coordinator</td>
<td>CEO</td>
</tr>
<tr>
<td>2.</td>
<td>Identify the zones</td>
<td>Coordinator</td>
</tr>
<tr>
<td>3.</td>
<td>Identify the Zonal coordinator</td>
<td>CEO/Co-ordinator</td>
</tr>
<tr>
<td>4.</td>
<td>Identify the Red tag holding area</td>
<td>Co-ordinator</td>
</tr>
<tr>
<td>5.</td>
<td>Define the Red Tag</td>
<td>Co-ordinator</td>
</tr>
<tr>
<td>6.</td>
<td>Establish Criteria for red tag</td>
<td>CEO/Co-ordinator</td>
</tr>
<tr>
<td>7.</td>
<td>Establish frequency for doing red tag</td>
<td>CEO/ Co-ordinator</td>
</tr>
<tr>
<td>7.</td>
<td>Do the red tag</td>
<td>All persons</td>
</tr>
<tr>
<td>8.</td>
<td>Identify the Review Committee</td>
<td>CEO</td>
</tr>
<tr>
<td>9.</td>
<td>Review the Red Tagged Items</td>
<td>Review Committee</td>
</tr>
</tbody>
</table>
Step 1 - SEIRI

ZONES

• The company to be divided into several small zones to include every inch of space in the company (incl Work area, office area, Security cabin, canteen, toilets, garden, scrapyard, etc)

• Each zone to have a zonal coordinator

• Take ‘Fixed Point Photographs’ (FPP) to record ‘Before’ conditions progressively (Week 1-2-3-4…..), zonewise

• ‘Worst Point photography’ (WPP) can be taken by the highest authority during his factory rounds/ audits and presented to the zonal co-ordinator for necessary actions (i.e for number of zones clubbed together)
Step 1 - SEIRI

Red Tag Holding Area

Red tag Holding area
This is an area set aside for use in storing red tagged items that need further evaluation

(Why- It gives you a safety net between first questioning whether something is needed, and actually getting rid of it)

Types of Red Tag Holding Area
Local Red Tag area – The Dept / Zones / Area can have individual red tag area to avoid mix up of items with other areas
Central Red Tag Area – Later it would be better to have a central red tag area for disposal
Step 1 - SEIRI

RED TAG

- Red Tag can be a paper tag with the following information
  - What is the item?
  - How much Quantity?
  - Why is it removed out (damaged, excess, etc)?
  - What is approx value?
  - Section from where the item is removed?

Establish the frequency of doing red tag
Step 1 - SEIRI

Criteria for Red Tag

- Every person asks to all the items around his/her workplace
  - Is this item needed?
  - If it is needed, is it needed in this quantity?
  - If it is needed, is it required very frequently?

If Answer is “NO”

REMOVE FROM WORKPLACE
Identifying Red-Tag Targets

Step 1 - SEIRI

RED TAG TARGETS

- Red-tag targets
  - Types of items
    - Inventory
      - Raw materials, procured parts, processing parts, in-process inventory, assembly parts, semifinished products, finished products
      - Equipment
        - Machines, equipment, Jigs, Tools, cutting bits, gauges, dies, carts, conveyance tools, worktables, cabinets, desks, chairs, supplies
      - Physical areas
        - Floors, walkways, operation areas, well, shelves, warehouses
Step 1 - SEIRI

RED TAGGING

The best way to carry out red-tagging is to do the whole target area quickly

RED TAGGING SHOULD BE A SHORT AND POWERFUL EVENT
Step 1 - SEIRI

Review the Red Tagged Items

• The review team would consist of senior members who can take decisions on disposal, it must include personal buying new items

  ➢ First a “purchase ban” on all items red tagged till inventory lasts

  ➢ Review the items accordingly

    ✓ Keep the item where it is
    ✓ Move the items to a new location
    ✓ Store the item away from the work area
    ✓ Hold the item in the local red tag area for evaluation
    ✓ Disposal of the item
### Step 1 - SEIRI

#### DISPOSAL METHODS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throw it away</td>
<td>Dispose of as scrap or incinerate items that are useless or unneeded for any purpose.</td>
</tr>
<tr>
<td>Sell</td>
<td>Sell off to other companies items that are useless or unneeded for any purpose.</td>
</tr>
<tr>
<td>Return</td>
<td>Return items to the supply company.</td>
</tr>
<tr>
<td>Lend out</td>
<td>Lend items to other sections of the company that can use them on a temporary basis.</td>
</tr>
<tr>
<td>Distribute</td>
<td>Distribute items to another part of the company on a permanent basis.</td>
</tr>
<tr>
<td>Central red-tag area</td>
<td>Send items to the central red-tag holding area for redistribution, storage, or disposal.</td>
</tr>
</tbody>
</table>
STEP 2

SEI TON

SYSTEMATIC ARRANGEMENT
Step 2 - SEITON

Definition

Seiton means that

You arrange needed items so that they are easy to use and label them so that anyone can find them and put them away

How?

- A Place for everything and Everything in Place
- Pre-fixed Quantities in Pre-fixed locations
Step 2 - SEITON

Why?

- SEITON is important because it helps eliminate many kinds of waste in the workplace
  - Motion Waste – Person sent to find cart searched full factory
  - Searching Waste – No one can find the key to the tool cabinet
  - Waste of Human Energy – Frustrated worker gives up searching for template after two hours
  - Waste of Excess Inventory – Desk drawers are full of papers and stationary supplies
  - Waste of defective products – Items not kept back in the same location so worker picks up wrong piece for assembly
  - Waste of unsafe condition – Boxes of material kept in the walkway, causing someone to trip and get injured
Step 2 - SEITON

Deciding Appropriate location
Principles of Storing Jigs, tools, Dies for waste elimination

1. Locate the items in the workplace according to their frequency of use
   - Place frequently used items near the place of use
   - Store infrequently used items away from the place of use
2. Store items together if used together, and in sequence if used in sequence.
3. Devise a “Just let go” arrangement for tools (e.g. suspend the tools)
4. Make storage space larger than the item so that easy to put back
5. Eliminate the variety of jig, tools and dies by creating multi function jigs, tools and dies.
6. Store tools according to function or product based on the type of usage
Identifying location
Colour coding Strategy

- Colour coding strategy can be use to indicate which items is used for which part
  - Examples
    - Different colours can be allotted to different oils and the oil bath to be marked the colour of the type of oil to be used
    - If certain items are used for making the same part then the items can be colour coded the same colour and kept in a location having the same colour.
    - Inventory levels can be colour coded to indicate the critical, designed, reorder and excess levels
Step 2 - SEITON

Identifying location
Outlining Strategy

• Outlining is a method to show which jigs and tools are stored where.

• Outlining means drawing outlines of jigs and tools in their proper locations
STEP 3

SEI SO

SPI C AND SPAN
Step 3 - SEISO

**Definition**

Seiso means that

You need to keep everything swept and clean

This is done with the objective of inspecting for problems and taking faster corrective actions
Step 3 - SEISO

SPI C & SPAN

*If there’s Lesser No. of Items*

*there is Lesser to Clean*

- One is Best
  - One page memo
  - One day Processing
  - One location Files
  - One copy Filing

- Reduce no of Tools
  - Reduce no. of bolt sizes
  - Use of winged nuts
  - Consolidate kinds of oil
  - Combine various tools into one
  - Any others...
STEP 4

SEI KETSU

STANDARDISE
Step 4 - SEIKETSU

Definition

Seiketsu means that

You need to create a consistent way of doing tasks and procedures.

This is done with the objective of ensuring that the condition does not deteriorate back to the condition it was before implementing 1S, 2S and 3S.
Step 4- SEIKETSU

Steps to do SEIKETSU

- **Step A : Making it a habit**
  - Decide who is responsible for 3S activities
  - Integrate 3S duties into regular work duties
  - Check on how well 3S conditions are being maintained

- **Step B : Prevention**
  - Prevent unneeded items from accumulating
  - Prevent from having to put back things
Step 4- SEIKETSU

Making it a habit

- Decide who is responsible for 3S activities
  - Everyone must know exactly what they are responsible for doing and exactly when, where and how to do it.
    - 5S maps with responsibilities and frequency
    - 3S cleaning instructions on area of 3S

- Integrate 3S duties into regular work duties
  - Visual 5S (Abnormal conditions are seen at a glance)
  - Five minute 5S (Efficient and quick solutions are given for doing cleaning)

- Check on 3S maintenance level
  - AUDIT

- Use 5 Whys to address root cause of problems
Step 4- SEIKETSU

Prevention
Prevent things from having to be put back

• There are two ways to do this
• Make it difficult to put things in the wrong place
  ✓ This relies heavily on
    ❖ discipline and
    ❖ visual controls
• Make it impossible to put things in the wrong place
  ✓ Use 5 W and 1 H approach and eliminate the need to put back
Step 4- SEIKETSU

Prevent from putting things back *(Contd.)*

- **Suspension**
  - Suspend the tools with a spring balancer. Once the use is over the operator “just let’s go” and the tool goes back to its desired position.

- **Incorporation**
  - Here create a flow of goods such that
  - Jigs, tools and measuring instruments are smoothly integrated into the process and hence stored in the place of usage.

- *Example* – fix a measuring gauge on the conveyor, eliminating the need of picking up the gauge and measuring and putting the gauge back.
STEP 5

SHI TSUKE

SELF DISCIPLINE
Step 5 – SHITSUKE: Self Discipline

**Definition**

Shitsuke means that you need to make a habit of properly maintaining correct procedures to sustain benefits.
## 5S Roadmap

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>All need to understand what 5S is about</td>
</tr>
<tr>
<td>Time</td>
<td>Time has to be allocated to do the 5S</td>
</tr>
<tr>
<td>Structure 5S</td>
<td>A Structure has to be formulated on how and when activities will be done</td>
</tr>
<tr>
<td>Support</td>
<td>Management support needed in acknowledgement, leadership and resources.</td>
</tr>
<tr>
<td>Rewards and recognition</td>
<td>Efforts need to be recognized</td>
</tr>
<tr>
<td>Satisfaction and Excitement</td>
<td>This needs to be shared in the entire organization</td>
</tr>
</tbody>
</table>
Application of Radar chart

Before

After
Thank You