5S – Part 1

Process Improvement

Introduction

• Competition is fierce in industry today
• To survive and grow businesses must reduce costs

  Therefore, it is critical to implement “preventive controls” to stop the generation of defects and poor results before they can take place.

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<td>Scale Up</td>
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<td>TPM</td>
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<td>LEAN MFG.</td>
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The CI Roadmap
Where and When Is Value Added?

• At the machine…
• during every successful cycle!

5S and TPM Focus

TPM focuses from the skin of the machine inward.

5S focuses from the skin of the machine outward.

What is 5S?

A systematic method to organize, order, clean, and standardize a workplace and to keep it that way.

1. SORT ............. SEIRI
2. SET IN ORDER .... SETTON
3. SHINE ............ SEISO
4. STANDARDIZE ... SEIKETSU
5. SUSTAIN ........ SEITSUKU
5S Myths

• What 5S is:
  – Foundation to achieve
    • Employee engagement
    • Cost reduction
    • Improve work flow
    • Zero accidents
  – Empowers workforce behavior
  – A process that does not end

• What 5S isn’t:
  – Cleaning area to satisfy management
  – Imposing of standards on the workplace
  – Silver bullet to productivity gains
  – Flavour of the month

Vision of 5S

• No...
  – Wandering/Searching
  – Waiting/Delays
  – Secrets
  – Obstacles/Detours
  – Extras
  – Injuries
  – Waste/Red Ink

• A work environment that is self-explaining, self-ordering, self-regulating and self-improving...

• Where what is supposed to happen does happen, on time, every time, day or night...

What Employees Say About 5S

• Pride in clean workplace
• Avoid hassle of searching for things
• Reduce defect rate by detecting problems earlier
• Easier equipment inspection improves preventive maintenance
• More usable space
• Eliminate accidents/injuries
Benefits of the 5S System

- Energize workforce
- Improve safety
- Improve efficiency
- Improve quality
- Workforce thinks

And therefore...
- Reduce waste
- Reduce cost

5S Philosophy

- Eliminate non value-added activities
- Focus on root causes, not just symptoms
- Use total participation to check process
- Provides structure to sustain system

The 5S Visual Workplace

- More than a brigade of brooms, buckets, posters and signs
- A compelling operational imperative
  - Crucial to meeting daily production goals
  - Central to war on waste
  - Vastly reduced lead times
  - Accelerated flow
Definition of Motion
Moving *without* working

Definition of Work
If motion is moving without working,
Then what is work?
Motion Triggers
The missing answer to even one of the six core questions...

Information Deficit

CORPORATE ENEMY No. 1

Six Core Questions
Requiring Visual Answers


Four Power Levels of 5S Devices
The Need Leads

- Passive
  - Addresses
  - ID Labels
  - Directions
  - Instructions
  - Maps
  - Displays

- Assertive
  - Lights
  - Andon
  - Alarms
  - Visual Displays
  - Production Control Boards

- Aggressive
  - Kanban
  - Shelf Height
  - Shelf Width
  - Bin Size
  - Container Size
  - Pallet Size
  - Aisle Width

- Absolute
  - Detect
  - Sensors
  - Limit
  - Guide Pins
  - Templates
Wheel of the 8 Deadly Wastes
*The Mother of All Measures*

Results from a range of companies that have effectively implemented visual order:
- Cut in floor space: 60%
- Cut in flow distance: 80%
- Cut in accidents: 70%
- Cut in rack storage: 68%
- Cut in number of forklifts: 45%
- Cut in machine changeover time: 62%
- Cut in annual physical inventory time: 50%
- Cut in classroom training requirements: 55%
- Cut in nonconformance in assembly: 96%
- Increase in test yields: 50%
- Late deliveries: 0%
- Increase in throughput: 15%

Trackable, Bottom-Line Results

Who Has Seen 5S Benefits?
- Improved levels of quality communication/ info. sharing
- Reduced training cycle for new employees
- Lower safety incident rates
- Improved morale
- Reduced stored parts inventory at one facility by $300,000
- Reduced safety incident rate division-wide by 1.5%
Common Resistances to 5S

“What’s so great about Sort and Set In Order?”
“Why clean when it just gets dirty again?”
“We already implemented Sort and Set In Order”
“We did 5S years ago.”
“We’re too busy for 5S activities.”
“Why do we need to implement the five pillars?”
“We’re 24/7”

A Neat And Clean Factory

• Has higher productivity
• Produces fewer defects
• Meets deadlines better
• Is a much safer place to work

Benefits of 5S Implementation

Company Benefits

• Zero changeovers
• Zero defects
• Zero waste
• Zero delays
• Zero injuries
• Zero breakdowns
• Zero complaints
• Zero red ink

product diversification
higher quality
lower costs
reliable deliveries
safety
better equipment availability
greater confidence and trust
corporate growth
First Pillar: SORT

Remove all items from the workplace that are not needed for current production (or clerical) operations.

When in doubt move it out!

SORT (1st Pillar)

- Reduce problems and annoyances in the work flow
- Improve communication amongst employees
- Product quality is increased and enhance productivity

Waste Leads to Errors and Defects

Unneeded equipment/inventory:
- results in quality defects
- makes designing equipment layout more difficult
- creates extra inventory-related costs
- requires extra pallets/carts for unneeded transportation of paper

The more there is, the harder it is to sort out needed inventory from unneeded inventory.
Problems Avoided by Implementing Sort

- Overcrowded workplace
- Storage items physically block communication amongst employees
- Wasted time
- Costly/unneeded inventory
- Excess stock-on-hand hides production problems
- Stagnant process flow

Overview: Sort (Red-Tagging)

A simple method for identifying potentially unneeded items in the factory, evaluating their usefulness, and dealing with them appropriately.

Red-Tagging

Put red tags on items in the factory that need to be evaluated as "necessary" or "unnecessary"

Red Tags Ask:
- Is this item needed?
- If it is needed, is it needed in this quantity?
- If it is needed, does it need to be located here?
Red Tag Holding Area

An area set aside for use in storing red-tagged items that need further evaluation:

- Central (company-wide)
- Local (each department/production area)

Steps in Red-Tagging

1. Launch the red-tag project
2. Identify the red-tag targets
3. Set red-tag criteria
4. Make red tags
5. Attach red tags
6. Evaluate red-tagged items
7. Document the results of red-tagging

Launch the Red-Tag Project

- Organize a team
- Organize supplies
- Organize a time schedule to perform red-tagging
- Set aside a local red-tag holding area
- Plan for disposal of red-tagged items
Identify Red-Tag Targets

Set Red-Tag Criteria

- Items needed for that schedule are kept in that location
- Items not needed for the schedule can be disposed of or stored in a separate location
- Factors that determine whether or not an item is necessary
  - usefulness of the item to perform the work at hand
  - frequency with which the item is needed
  - quantity of the item needed to perform this work

Make Red-Tags

- Category - Provides a general idea of the type of item (e.g., a warehouse item or machine)
- Item name and manufacturing number
- Quantity - Indicates the number of items included under this red tag
- Reasons - Describes why a red tag has been attached to this item
- Division - Name of the division responsible for managing the red-tagged item
- Value
- Date
Example of a Red-Tag

**Red-Tag**

**Use For:**
- Tag File No.
- Safety
- Excess Parts
- Inventories
- Materials
- Equipment
- Machines
- Conveying

**WORK ORDER # _____________________________________________**

**CATEGORY: ________________________________________________**

*(From Above)*

**QUANTITY: _________________________________________________**

*(Current Needs From Above)*

**NAME  /  MANUFACTURER _______________________________**

**NAME /  SUPPLIER _______________________________**

**REASON FOR EXCESS: ______________________________________**

**DOLLAR VALUE OF EXCESS ITEM: **$

**DATE OF TAG: ______________________________________________**

**PERSON APPLYING TAG: __________________________________**

**PERSON RESPONSIBLE FOR ELIMINATION OF EXCESS, OR RESPONSIBLE FOR REMOVAL:**

**DISPOSAL METHOD:**
- Discard
- Return
- Move to Red Tag Storage Site
- Move to separate Storage site
- Other

**Disposal Complete:** X

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**Attach Red Tags**

The best way to carry out red-tagging is to do the whole target area quickly, if possible, in one to two days

**Disposition Methods**

- **Attach Red Tags**
  - **Step 5**
  - **Treatment Description**
    - **Throw it away** Dispose of as scrap or incinerate items that are useless or unneeded for any purpose
    - **Sell** Sell off to other companies items that are useless or unneeded for any purpose
    - **Return** Return items to the supply company
    - **Lend out** Lend items to other sections of the company that can use them on a temporary basis
    - **Distribute** Distribute items to another part of the company on a permanent basis
    - **Central red-tag area** Send items to the central red-tag holding area for redistribution, storage or disposal

**Evaluate the Red-Tagged Items**

- **Keep item where it is**
- **Move item to a new location in the work area**
- **Store item away from the work area**
- **Hold item in the local red-tag holding area for evaluation**
- **Dispose of item**

*Use criteria established in Step 3 to evaluate what to do with the red-tagged items*
Document the Results of Red-Tagging

- Each company needs to create its own system for logging/tracking necessary information

- Allows company to measure the improvements and savings produced as a result of red-tagging

Red Tag Log

Types of Unneeded Items

- Defective or excess quantities of small parts and inventory
- Outdated or broken bits of machinery
- Outdated or broken tools and inspection gear
- Old rags and other cleaning supplies
- Electrical equipment with broken cords
- Outdated posters, signs, notices, and memos
Places Where Unneeded Items Accumulate

- In rooms or areas not designated for any particular purpose
- In corners next to entrances or exits
- Along interior and exterior walls, next to partitions, and behind pillars
- Under desks and shelves and in desk and cabinet drawers
- Near the bottom of tall stacks of items
- On unused management and production schedule boards
- In tool boxes that are not clearly sorted

The Second Pillar: Set In Order!

- Arrange needed items so that they are easy to use
- Label items so that they are easy to find and put away

Set in Order
(Orderliness)
A place for everything and everything in its place.
- Determine location for all identified needed items.
- Determine how many of each item will be stored in each given location. Set height and size limits.
- Make it easy for anyone to find, use and return these items.
- Use standard equipment. Set limits.
Suggested Standards for Orderliness

To indicate locations:
• Address signboards
• Limit lines (yellow)
• Location lines (white)
• Labels

To set limits:
• Height lines (red)
• Standard container size

To indicate danger:
• Tiger tape

To communicate:
• Signboards

How to Promote Good Order

1. Workplace layout documented on chart & posted in work area
2. Individuals use blue cards to document improvements ideas
3. Ideas reviewed by those responsible; improvement action is taken
4. Teamwork promoted through effective use of 5S Maps

5S Maps: A Baseline
Implementing Set In Order Prevents Waste of...

- Motion
- Searching
- Human Energy
- Excess Inventory
- Defective Products
- Unsafe Conditions

The Set in Order pillar is the core of standardization.

Visual Controls

Any communication device used in the work environment that tells us at a glance how work should be done.
Decide Appropriate Locations

• Locate items in the workplace according to their frequency of use
• Store items together if they are used together, and store them in sequence which they are used
• Use “just let go” arrangement for tools—suspend within reach from retractable cord

Decide Appropriate Locations (cont’d)

• Storage places are larger than items stored
• Eliminate the variety of jigs, tools, and rollers needed by using ones that serve multiple functions
• Store Tools according to function or product
  – Function: job-shop production
  – Product: repetitive production

Example: Implementing Set In Order

Tools kept close at hand and stored in the order of use
Motion Economy Eliminates Waste

- Locate paper, equipment, machinery, and tools in the best locations possible
- Radical Improvement: Radical improvements are finding ways to eliminate whole procedures.
  - Removes the operation itself, together with all inherent waste
- Motion Improvement: Removing motion waste involves eliminating unnecessary motion from existing operations.
  - Removes waste inherent in the operation

Motion Metric Summary Graph

Reduction of Travel Time Due to Motion Metrics

Principles of Motion Economy to Eliminate Waste
Principles of Motion Economy to Eliminate Waste (Cont’d)

- Materials were kept on the shelf.
- Paper stand was too far away.
- Pots were lined up horizontally, causing more hand-to-eye and reach.
- Non-movable vase made smaller two-hand reach awkward.
- Pots were placed on a shelf, making them easier to see and reach.

Principles of Motion Economy to Eliminate Waste (Cont’d)

- Plastic sheets were kept on table next to the work station.
- New plastic sheets are hung on a hook in front of operator.
- Operator does not need to bend or twist.
- The previous motion of reaching is eliminated.

The 5S Map

Can be used to evaluate current locations of inventory, tools, equipment, and machinery.

Using the 5S Map involves creating a "before" map and an "after" map.
Once best locations have been decided, we need a way to identify these locations so that everyone will know what goes where, and how many of each item belongs in each location.

Location Indicator Strategies

- Signboard
- Painting
- Color coding
- Outlining

The Signboard Strategy

The three main types of “signboards” or indicators are:
- Location - shows where items belong
- Item - show what specific item belongs
- Amount - shows how many of these items belong

Signboards are often used to identify:
- Names of work areas
- Inventory locations
- Equipment storage locations
- Machine layouts
Example: Signboard Strategy

Painting Strategy

Method for identifying locations on floors and walkways

Types of divider lines:
• Cart storage locations
• Aisle direction
• Door range - shows which way door swings open
• Place markers for worktables
• Tiger marks - shows areas where inventory and equipment should not be placed, or marks hazardous areas

Example: Painting Strategy

Aisle Direction Line
Colors clearly denote which inventory, tools, and equipment are to be used for which purpose

OSHA and ANSI Color Codes

A Guide

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<tr>
<th>Color</th>
<th>Meaning</th>
<th>Application</th>
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<tr>
<td>Red</td>
<td>Fire</td>
<td>To indicate the location of the protection equipment, such as fire extinguishers, fire hose cabinets, fire alarm systems, and to mark emergency exits</td>
</tr>
<tr>
<td>Orange</td>
<td>Caution</td>
<td>To identify dangerous or hazardous materials, equipment, and areas</td>
</tr>
<tr>
<td>Yellow</td>
<td>Warning</td>
<td>To indicate the presence of hazard or danger</td>
</tr>
<tr>
<td>Blue</td>
<td>Radiation</td>
<td>To indicate the presence of radioactivity</td>
</tr>
<tr>
<td>Green</td>
<td>Safety</td>
<td>To indicate the location of first aid and safety equipment</td>
</tr>
<tr>
<td>Black</td>
<td>Miscellaneous</td>
<td>To designate fittings, hose reels, fire extinguishers, fire hose cabinets, and other fire protection equipment</td>
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Outlining Strategy

Draw outlines of jigs and tools in the proper storage position
The Third Pillar: Shine!

- Make sure that everything in the factory stays clean

The Fourth Pillar: Standardize
Maintain the first 3 pillars
- Sort
- Set in Order
- Shine

The Fifth Pillar: Sustain

Make a habit of properly maintaining correct systems and procedures