INTRODUCTION

SEVEN WASTES OF MANUFACTURING

INTRODUCTION
Waste adds cost to a company's end product making it less competitive in the global marketplace. In a lean environment, waste is easily recognized and eliminated. Waste is therefore defined as, "anything that does not directly add value to the final product or contribute to the products transformation." Value Added is defined as those actions that the customer is willing to pay for that result in changes to form, fit, or function of the end product a company is producing.

PROCESS DESCRIPTION
Work may be divided into two categories: "Value Added" and "Non Value Added." Value added work includes tasks that increase the value of material. Examples of value added work include; processing, bending, shaping, assembling, etc. Examples of non-value added work include; transporting material, walking, rework, repair, inspection, etc. The basis of Continuous Improvement is the ongoing identification and elimination of waste from day to day operations. In order to eliminate waste it is important to understand what waste is and what it looks like.

SEVEN WASTES

1. CORRECTION/Poor Quality –
Is the inspection or repair of a product or service to meet customer requirements?
REASONS WHY THIS WASTE EXISTS:
- Poorly trained operators
- Lack of/or inaccurate Operator Instruction Sheets (QPS).
- Unclear standards
- Poor preventative maintenance
- Poor Workplace Organization
- Nonconforming supplier material (both internal and external).
IDEAS TO ELIMINATE WASTE OF CORRECTION:
- Implement work standards using Operator Instruction Sheets (OIS) and Work Element Sheets (WES).
- Make sure operators follow the best method to ensure quality on the OIS and WES.
- Error Proofing (error detect and error prevent).
- Six Sigma, trace defects to the root cause.

2. Over Production –
Is the production of larger amounts of an item than is necessary or producing at a rate faster than is required.
REASONS WHY THIS WASTE EXISTS:
- Long changeover times
- Lack of a level schedule
- Poor preventative maintenance, which leads to reduced uptime.
- Poor first time through quality
IDEAS TO ELIMINATE WASTE OF OVER PRODUCTION:
- Total Preventative Maintenance (TPM)
- Level schedule
- Pull system
- Operator Instruction Sheets and Work Element Sheets to ensure quality and improve first time quality.
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SEVEN WASTES OF MANUFACTURING

3. OVER PROCESSING –
Is processing work that is unnecessary because it has no connection with customer value or satisfaction.
REASONS WHY THIS WASTE EXISTS:
• Product requirements have changed but the process remains the same.
• Doing extra steps when they are not necessary.
• Unclear/undefined customer requirements.
• Lack of training or use of Operator Instruction Sheets.
IDEAS TO ELIMINATE THE WASTE OF OVER PROCESSING:
• Understand customer requirements and specifications.
• Have open and candid communication with the customer.
• Product and Process design improvements.
• Product requirements have changed but the process stays the same. We are doing extra steps when it is not necessary.

4. MOTION –
Is any movement of people or machines that does not directly contribute to the transformation of a product
REASONS WHY THIS WASTE EXISTS:
• Lack of Operator Instruction Sheets
• Poor workstation layout
• Poor part presentation, poor work place organization.
IDEAS TO ELIMINATE THE WASTE OF MOTION:
• Implement Operator Instruction Sheets (best, safest, most ergonomically correct method documented).
• Improve Workplace Organization.
• Improve workstation layout (look at parts presentation devices, the size of containers that are presented to the operator, condense the equipment layout).

5. CONVEYANCE –
Is any movement of material that is not required for “just in time” production.
REASONS WHY THIS WASTE EXISTS:
• Large batch size
• Poor plant layout
• Over production
• Lack of pull system
IDEAS TO ELIMINATE THE WASTE OF CONVEYANCE:
• Pull system with predetermined delivery routes.
• Small containers.
• Improve plant layout.
• Improve Visual Factory.
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SEVEN WASTES OF MANUFACTURING

6. WAITING –
Is operator idle between operations.
REASONS WHY THIS WASTE EXISTS:
• Unbalanced work loads between operators
• Poor use of planned maintenance/TPM resulting in unplanned downtime
• Quality issue, lack of Operator Instruction Sheet, OIS not being followed
• No pull system resulting in operators waiting on materials
IDEAS TO ELIMINATE WASTE OF WAITING:
• Utilize Work Balance Boards and redistribute work
• Cross train operators
• Operators follow the Operator Instruction Sheets
• Implement pull systems
• Improve changeover times
• Improve TPM
• Use Work Element Sheets to drive and improve quality

7. EXCESSIVE INVENTORY –
Is excess of parts or materials.
REASONS WHY THIS WASTE EXISTS:
• Lack of pull systems
• Poor quality, poor uptime
• Long changeover times
THE VISUAL FACTORY

INTRODUCTION

The goal of this Visual Factory Manual is to provide you with a set of guidelines to use when implementing Visual Factory in your area.

Visual Factory implementation is team based. You and your fellow employees (Work Group), both hourly and salaried, need to work together to develop Visual Factory solutions that will make your job more productive and efficient.

DEFINITION OF THE VISUAL FACTORY

Visual Factory can be defined as, "the use of visual controls and displays that will enable an individual to immediately recognize any deviation from the standard (what is expected) normal conditions versus abnormal conditions."

VISUAL FACTORY PROCESS

The Visual Factory is maintained by the continuous use of the 5 Key principles:

• There is nothing extra or unneeded and storage areas are clearly distinguished.
• There is a place for everything and everything is in its place. Everything can be checked quickly.
• It is a clean workplace that is maintained by constant and continual scheduled cleaning from wall to wall.
• Items, information, schedules and processes are recognizable at a glance.
• It is easy to distinguish immediately between what is normal and what is not.
• Paperwork is simplified and minimized.
• Waste and abnormalities are immediately recognizable by anyone.
• The flow of goods, deviations from standards and everything else that exists or occurs in the workplace is readily apparent at a glance.
• Standard procedures are easily understood and visually clear.
• Historical and current performance levels are apparent.
• A zero defect, zero abnormality workplace is firmly established.

DESIRED OUTCOME

Implementation of the Visual Factory Process leads to a workplace characterized by:

• Zero defects - because actions to create a flawless product are apparent at a glance.
• Increased safety – because unsafe conditions are obvious.
• Improved communications – achieved through standardizing communication tools such as checklists, process control boards, signs, tags, etc.
• Increased job satisfaction – because people are allowed to make quick and effective decisions.
• Elimination or reduction of waste-of-motion, such as looking for supplies, tools, equipment, people or information.
• Elimination of waste and support of continuous improvement.
• Prevention of defects – before they occur rather than correcting them after the fact.
• Support of stop button process – which will lead to a quick response to a non-standard condition.
SECTION 1
THE FIVE KEYS (5S's)

INTRODUCTION

The 5 Keys (also called the 5S's) as applied to Workplace Organization are defined as Sort, Stabilize, Shine, Standardize and Sustain. Implementation of the 5S's is the starting point of our Visual Factory Process. This process is more than just cleaning up. It is the elimination of waste and the foundation for continuous improvement.

Workplace Organization is the basis for IN-STATION-PROCESS-CONTROL (ISPC). In order for it to succeed, Workplace Organization requires discipline and follow-up. It should be noted that Workplace Organization is not limited only to the production areas of the factory.

DEFINITION OF THE 5 KEYS (5S's)

1. **Sort (Organization)** -
   Keep what is needed and dispose of that which is not, by the application of the Frequency of Use Rule. Only required items are present and/or unneeded items are removed. Are the tools, materials, products, etc., clearly grouped, tagged, contained, and is it obvious that things belong to this area/operation? All items tagged should be done in accordance with the Red Tag Procedure.

2. **Stabilize (Orderliness)** -
   "A place for everything and everything in its place." All items are clearly in their designated place when not in use. Are there bins, racks, holders, places, etc., for everything, and are they clearly marked?

3. **Shine (Cleanliness)** -
   Cleaning and looking for ways to keep it clean. The equipment and surrounding area are not accumulating chips, dirt, oil stains or debris from operators and maintenance personnel.

4. **Standardize (Adherence)** -
   Maintain and monitor the first 3 keys. Information and knowledge is shared in visual ways so that abnormalities are clearly recognizable. The area is rich in visual factory so that even an outsider can quickly grasp the status of the area in terms of safety, quality, and productivity. Consistent application across the plant (both on the floor and in the office areas) should be apparent through the use of QPS sheets, reaction/response plans, Visual Factory Standards, etc.

5. **Sustain (Self-Discipline)** -
   Stick to the rules. Required repairs are noted and promptly performed. The first four keys (Sort, Stabilize, Shine and Standardize) are continuously followed. There are cleaning, auditing and inspection schedules conducted regularly.
SECTION 1
THE FIVE KEYS (5S's)
SORT (WORKPLACE ORGANIZATION) PROCESS

Workplace Organization of an area begins with the "Frequency of Use Rule." Utilizing this tool, Work Group members review and consensus on the location and/or placement of all items within a workstation. When reviewing items at a workstation, Work Group Members should ask the following questions:

- What is the item used for?
- How often is the item required?
- Does the item need to be kept in the location that it was found at?
- How many of this particular item is required at both the location it was found at and in the department?
- Who utilizes the item?
- How easy is it for the item to be stored and retrieved?
- What happens if the item is missing when required?

Items determined to be not required at the workstation or at some remote location need to be "Red Tagged." Red tagging is used to identify unnecessary or misplaced items in one's workplace. This would include such items that are obsolete, used infrequently, stored but not utilized in the area, etc. The Red Tag Procedure maintains the "SORT" element of the 5 Keys (S's).

**STEP 1 - FREQUENCY OF USE RULE**

This suggests that when an item has been identified by the Work Group it must than be placed into one of several categories. Each of these categories requires a different action on the part of the Work Group. The categories and resultant actions are summarized below:

<table>
<thead>
<tr>
<th>Category:</th>
<th>Action:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obsolete</td>
<td>Sell, hold for depreciation, give away or throw away.</td>
</tr>
<tr>
<td>Defective</td>
<td>Return to supplier or throw away.</td>
</tr>
<tr>
<td>Scrap</td>
<td>Remove from area.</td>
</tr>
<tr>
<td>Trash/garbage</td>
<td>Throw away or recycle.</td>
</tr>
<tr>
<td>Unneeded in the area</td>
<td>Remove from area.</td>
</tr>
<tr>
<td>Used at least once a day</td>
<td>Carry with person or keep at place of use.</td>
</tr>
<tr>
<td>Used about once per week</td>
<td>Store in area.</td>
</tr>
<tr>
<td>Used less than once per month</td>
<td>Store where accessible.</td>
</tr>
<tr>
<td>Seldom-used</td>
<td>Store in distant place, sell, give away or throw away.</td>
</tr>
<tr>
<td>Use unknown</td>
<td>Find out use or remove from area.</td>
</tr>
</tbody>
</table>
SECTION 1
THE FIVE KEYS (5S's)

STEP 2 – RED TAG PROCEDURE

Red tagging is the procedure by which unnecessary items are marked visually by the use of a red tag. Once tagged, those items will need to be moved to the Red Tag Area. Material initially identified as requiring red tagging is placed in the relevant Departmental Red Tag Area. After seven days, the item is than transported to the Central Red Tag Area.

STEP 3 – WEEKLY HOUSEKEEPING/SAFETY INSPECTIONS/5S

"It does no good to determine cleaning assignments if the assignments are not carried out. When it comes to maintaining the first 3 keys (Sort, Stabilize and Shine), unless everyone knows exactly what they are responsible for doing and exactly when, where, and how to do it, the first three keys will not have much meaning.” Therefore, it is important that Work Group Members have been assigned tasks geared to their own work area.

REQUIRED FOLLOW UP

• Continue to manage the First Key, SORT, through both the:
  • Continuous application of the Red Tagging Process.

Weekly Housekeeping/Safety Inspections/5S's tours by the designated audit teams.
SECTION 1
THE FIVE KEYS (5S's)

Workplace Orderliness may be summarized as, "A place for everything and everything in its place". Those items identified as being required at the workstation by Work Group members need to be strategically arranged to ensure:

- Safety
- Quality
- Increased job efficiency by having items placed at their point of use.
- Reduced ergonomic

It is suggested in the that Work Group Members may wish to utilize as their first step in stabilizing their workstations, is to document the current situation by creating a location map showing:

- The current layout of equipment and supplies in the work area
- The flow of activities between those areas

When arranging workstations, Work Group Members next to remember these questions:

- Can the item be located easily?
- Is each item easily accessible?
- Is the placement of the item compatible with the operator and or product?
- Does the item's placement minimize alignment, adjustment, or reorientation?

DESIRED OUTCOME

Implementation of the Stabilize (Workplace Orderliness) Process leads to a workplace characterized by:

- The elimination of waste, particularly the Waste-of Motion.
- Revisions to the Workstation layout that improve workflow efficiency.
- Implementation of location indicators.
- Preparation of locations and/or containers for required items. Making certain to limit space physically and visually to prevent accumulation.
- Implementation of addresses (signs) for:
  - Correct location
  - Proper item name (name and number)
  - Correct quantity indicated by min/max indicators

REQUIRED FOLLOW UP

Continue to manage the Second Key, STABILIZE, through the continuous development and implementation of location indicators.
SECTION 1
THE FIVE KEYS (5S's)

SHINE (WORKPLACE CLEANLINESS) PROCESS

Workplace Cleanliness is characterized by the removal of grime, dirt, dust and fluid leaks where they exist implemented to eliminate the source of the problem. Things Work Group Members need to consider when implementing "Shine" into their workplace to include:

- Cleaning as part of everyday work for all employees
- Finding ways to keep their workplaces clean at all times. Examples of this include steps taken to eliminate sources of contamination.
- Cleaning as part of the daily inspection.

DESIRED OUTCOME

Implementation of the Shine Process (Workplace Cleanliness) includes steps taken to address each of the following issues:

- Correction of any unsafe conditions found during "Housekeeping/Safety Inspections/5S's inspection tour.
- Determination of the level of the problem for a particular source of contamination.
- Determination of cleaning targets addressing:
  - Inventory; rough, in process, finished parts and purchased parts
  - Equipment; machines, tools, work & gauge tables, cabinets, desks, chairs, bookcases, etc.
  - Space; floors, work areas, walkways, walls pillars, ceilings, windows, shelves, closets, lights, etc.
- Agreed upon cleaning assignments that include:
  - Work areas divided into specific cleaning areas.
  - People who work in the area are given specific cleaning assignments.
  - Methods and procedures for cleaning
  - How often an item is cleaned.
- Identified cleaning tools that:
  - Allow for the completion of each cleaning assignment.
- Development of a "Cleaning Specification Sheet" for each machine and workplace.
- Implementation of the "Lubrication Specification Sheet" for each machine.

REQUIRED FOLLOW UP

Continue to manage the Third Key, SHINE, through the implementation of cleaning as part of both everyday maintenance tasks and the TPM process.
SECTION 1

THE FIVE KEYS (5S's)

STANDARDIZE (WORKPLACE ADHERENCE) PROCESS

Workplace Adherence is a state in which the first three keys, Sort, Stabilize and Shine, are thoroughly backsliding or failure to sustain Sort, Stabilize and Shine by:

- Having an established set of guidelines that identify normal versus abnormal conditions in the workplace.
- Sustaining the guidelines that were established through the use of checklists and QPS sheets.
- Having in place a plan allowing Work Groups to respond quickly to abnormalities.
- Establishing Plant Standards for labelling, addressing, colour codes and indicator lines.

DESIRED OUTCOME:

Implementation of the Standardize (Workplace Adherence) Process creates a workplace environment in which:

- Reduced clutter in the workplace.
- Items are organized more effectively
- Workstations, workplaces, etc. are cleaner
- Cleaning of workstations, workplaces, etc. is easier.
- The plant has developed and documented guidelines and standards.

REQUIRED FOLLOW UP:

Continue to manage the Fourth Key, STANDARDIZE, through the continuous application of the following actions:

- **Check** – to make certain that information is shared on all items so that there is no searching or errors.
  - Make available information about Safety, Quality, Delivery, Cost, Morale and Environment.
- **Standardize** - how organizing and cleaning will be done in an area and make standards visible so that any abnormal conditions are easily and immediately recognized.
  - Utilize visual images such as pictures and/or drawings to communicate standards (i.e. "Before" and "After" pictures).
- **Maintain and Devise** – methods for sustaining adherence to the current set of conditions and prevent deviations from standards.
  - Prevent accumulation at workstations, ensure that everything is returned to its designated location and maintain cleanliness (i.e. clean-up after yourself).
- **Monitor** – effectiveness of the control efforts.
  - Utilize the Housekeeping/Safety Inspections/5S's checklist to monitor the workplace on a frequent basis.
- **Improve** – effectiveness by working continuously.
  - Utilize the Housekeeping/Safety Inspections/5S's checklist to develop a set of action plans if something is found to be out of order in the workplace.
SECTION 1
THE FIVE KEYS (5S's)

SUSTAIN (WORKPLACE SELF-DISCIPLINE) PROCESS

Workplace Self-Discipline may be summarized as, "Sticking to the Rules," that have been established in Group members are tasked with the responsibility to maintain and sustain the process improvements implemented in their workplaces. This is accomplished by:

- Training everyone in the area about the standards and their purpose as it relates to both the area and the plant.
- Assisting other Work Group Members develop an "adherence to standards" mindset.
- Making the standards as visual as possible in the area.
- Conducting regularly scheduled Housekeeping/Safety Inspections/5S's evaluations.
- Managing the Fifth Key (SUSTAIN) through adherence and Housekeeping/Safety Inspections/5S's evaluation plans.
- Continuing efforts on the part of the Visual Factory Committee to evaluate and improve the standards.

DESIRED OUTCOME

The Sustain Process creates a workplace environment in which:

- All workers have had proper training.
- There is consensus from all workers with regards to the plan and correct procedures are mindset.
- Management is committed to encouraging and supporting continuous improvement in the workplace through the use of recognition.
- A Housekeeping plan to SUSTAIN the hard work that has been developed and implemented.
- Housekeeping/Safety Inspections/5S's evaluations are used and promoted as a standardized way of evaluating conditions and activities and to promote continuous improvement.
- Timely evaluation of targets and goals are utilized to promote continuous improvement activities in the workplace.
- Everyone is trained, coached and supported by management in the Five Key activities.

REQUIRED FOLLOW UP

Continue to manage the Fifth Key, SUSTAIN, through the ongoing support and direction of local plant management, the Visual Factory Champion, both the salaried and hourly Coordinators and members of the Visual Factory Steering Committee.
SECTION 2
TEAM SIGNAGE

REQUEST FOR SIGNAGE

All signs to be produced in house shall be requested by completing a "Signage Request Form." This request form may be obtained from the appropriate office. The following are suggested standards for signage.

IDENTIFICATION OF TERRITORY

TEAM DEPARTMENT AREA & TEAM OASIS

- Your team office should have a 16" wide team colour band (or bands if more than one team occupies the same office) encircling the outer walls at a height just above the first floor office door.
- Your team oasis is an area on the plant floor used for team meetings, problem solving sessions, breaks, lunches, etc. If space is at a premium in your department, the office conference room may be used as an oasis at the team's discretion.

DEPARTMENT SIGNS

- Department Signs designate the team area. These will be made of white with black vinyl letters, or white coated aluminium with painted or vinyl lettering.
- Department Signs will be hung on the outside of the Team Office Building on each wall having an entrance door, and on walls next to major aisles.
- Department Signs should also be hung in the main aisles surrounding the department area.
- Hang your signs at a right angle to the wall, with the bottom 12 feet from the floor. It should be double sided so it can be read from 2 directions.
- The size of your sign depends on the space the letters and numbers required.

SIGNS WITH TEXT ONLY

- All large permanent signs (22 inch minimum height) will have black letters on a white background.
- A 3-inch band of your team colour will outline your sign.
- Allow a 4-inch space between the colour band and the text.
- Allow a 4-inch space between lines of text.
- Your letters and numbers should be 8 inches high.

Lettering for your smaller signs depends on the application, how the signs are used and the space available.

FOR SIGNS LESS THAN 22" HIGH:

- 12 inches but less than 22” – 2-inch colour band is to be utilized on the sign.
- Less than 12” – NO COLOUR BAND is to be utilized on the sign.
SECTION 2
TEAM SIGNAGE

SIGN MATERIALS

- For office signs (inside the office, personnel and miscellaneous) and plant signs (department and office [external]), equipment and miscellaneous, use the following recommendations.

OFFICE SIGNS (Inside the office)

PERSONNEL SIGN OPTIONS

- 4” x 24” ceiling grid sign, white vinyl lettering on burgundy vinyl background on 6mm gray.
- 3/4” x 7”, white lettering on burgundy background.
- 1-1/2” x 8”, white lettering on black background.

MISCELLANEOUS SIGNS

- 3mm white with black vinyl copy.

PLANT SIGNS

DEPARTMENT AND OFFICE SIGNS

- White 3mm with vinyl letters and team colour band.
- White coated aluminium with painted black lettering and team colour band.

EQUIPMENT AND MISCELLANEOUS SIGNS

- See Office Signs/Miscellaneous Signs (Above).

STANDARDS FOR HANGING SIGNS

FOR SIGNS HUNG IN AN OFFICE

- Use Velcro, magnetic tape or push pins to mount.
- Do not use double backed tape. It is too difficult to remove.
- Ceiling grid personnel signs hang off the grid with hooks.

FOR SIGNS HUNG ON A MACHINE OR OUT ON THE SHOP FLOOR

- Hang large signs from the ceiling truss using steel chain.
- Hang smaller signs on equipment using standard plastic wire wraps through expanded metal guarding and around hydraulic and electrical piping.
  - Alternate:
    - Have holes drilled in the sheet metal and use sheet metal screws, or:
    - Use Velcro tape on signs that require frequent revisions.
SECTION 2
TEAM SIGNAGE

SAFETY SIGNS

All Hazard and Warning sign formats shall be in accordance with existing standards. See your safety engineer and/or plant engineering department for more information.

IDENTIFICATION OF ACTIVITIES, RESOURCES AND PRODUCTS

ILLUSTRATIONS AND JOB AIDS

DISPLAY TABLE

Your department should have a display table that will show the product you are making during its stages of the process. The idea is to provide a reference for team members to discuss issues that affect the product and process.

- Tabletop should be 30" x 60".
- Cover the table with consistent corporate fabric.
- Make sure the parts on the table are labelled with part number and name.
- Locate the table(s) along the production line, in the office, or in the Team Area.
SECTION 2
TEAM SIGNAGE

IDENTIFICATION OF THE TEAM

TEAM BOARDS

The purpose of the team boards is to reinforce your team's responsibility to control the processes and problem solving activities. Most of the messages pertaining to your team, such as general information, status of the current projects or performance indicators are available here.

- Team Boards are to be located within the Team Department.
- General information i.e. boat for sale, WILL NOT be posted on the Team Board. This type of information can be posted on the Employee Information Areas.
- All Team Boards will be fabricated of metal or use a dry erase board with a magnetic strip for mounting of team photos with magnetic strips.
- The headings of "Bulletins", "Quality", "Safety" and "Training" are suggested. The remaining headings are to be customized as to what is desired by each team.

- Team Boards will be finished white and laminated. The board will be finished with a light gray gloss half round frame.
- Each board will have a "TEAM" colour band with the "TEAM" name.
- Cost includes the production of ten (10) 11-3/4" x 14" x 1/8" clear acrylic document holders. Each document holder will have a black vinyl backer with Velcro strips and a "TEAM" colour band with copy.
- Each Team Board will include thirty (30) clear acrylic Team Picture Holders 2-1/2" x 3-5/8" with magnetic strips.
- The units will be equipped with a wooden cleat or metal brackets for installation.
- For teams that do not have a team colour, gray will be used for the team colour band.

INFORMATION AND INSTRUCTIONS

GENERAL INFORMATION - EMPLOYEE INFORMATION AREA BOARD

- Employee Information Boards will be located in the cafeteria and the Administration area.
- These boards will have display information that is not specific to your team but is of plant-wide interest.
- These boards will consist of 5 sections each: Training & Education, General Information, Plant Performance, Union Notices, and Personal Notices.

VISUAL OFFICE

Visual Factory Office Standards provide the processes and procedures to implement and maintain Workplace Organization and the Five Keys ("S's") in both traditional offices as well as office type areas located throughout Plant 2.

Workplace Organization is just as important in the office type areas as on the manufacturing floor. Plant cleanliness/housekeeping can have a direct impact on an employee's safety. A clean, orderly, well-lit workplace indirectly translates into a safer place of work and the production of quality products by demonstrating a high regard for the work area, the workers and the work to be performed.
SECTION 2
TEAM SIGNAGE

VISUAL OFFICE 5S PROCESS

Implementing Visual Factory Office Standards begins with the use of the 5 Keys ("5S") process:

- **Sort:** Review all materials currently stored in each location of the office.
- **Stabilize:** Determine what items need to be kept in the area to support day-to-day activities and optimize the layout or location of those items. Remove any unnecessary items or items used infrequently, (Utilize Frequency of Use Rule) by; moving them to a central location, moving them to a Red Tag Area, or throwing them away.
- **Shine:** Clean each area.
- **Standardize:** Specific to your own Plant Visual Office Standards.
- **Sustain:** It is the responsibility of each individual to maintain all areas of the plant according to the standards that have been developed and implemented.

VISUAL OFFICE STANDARDS

The following standards shall serve as a framework for the implementation of the Visual Factory Office but can obviously be tailored to your specific needs. As a minimum, all topics noted below must be implemented in each "office".

1. **Furniture:**
   - The tops of all desk, cabinets, and bookcases shall remain clear. No items shall be stored on top of any office equipment or furniture. Plants that are within reason shall be acceptable.
   - All desks, file cabinets, storage cabinets, bookcases, worktables, equipment, etc. shall be kept clean and organized.
   - File cabinets, bookcases and storage cabinets shall be clearly labelled; identifying whom it belongs to or who is responsible for its contents and when practical, the contents therein. Example of this is: All desks shall be identified with the employees name on or above the desk.

2. **Equipment/Supplies:**
   - Office equipment shared by employees shall be located in a central work area and shall be clearly labelled with name and outline of area where item is to be located when not in use.
   - All reference material, books; binders, etc., shall be clearly identifiable (apply labels if needed).
   - Office supplies shall be kept in a designated central location within the office.
   - All office equipment (printers, fax machines, copiers) shall be clearly labelled with any necessary information including a contact person and/or an assigned responsible person.
   - Supplies for office equipment shall have a designated place and be stored only in that location.
SECTION 2
TEAM SIGNAGE

3. Safety Equipment/Information:
   • Emergency phone numbers shall be posted on or near all phones.
   • Verify all required safety equipment (per plant Safety procedure) is clearly identified. All office personnel shall be aware of Safety equipment location.
   • Visible Evacuation Routes shall be posted.

4. Boards:
   • All boards shall be clearly titled. (Team Board, Information, Bulletin, etc.)
   • All items/information posted on boards shall be clearly labelled/marked.
   • Weekly verify that there are no outdated and/or inappropriate pieces of information posted on the office boards.

5. Floor:
   • Floors/aisles shall be kept clear.
   • No items shall be stored under, next to or against desk, worktables or cabinets within the office work area.
   • Storage on the floor shall only be permitted if there is a designated area that has been clearly identified with demarcation lines/labels/signs that identifies what and where items may be placed and if temporary or stored long term.

6. Conference Rooms:
   • Post signage that clearly identifies the conference room name and contact person.
   • Post document (Visual Aid, Signal Point Lesson) on how conference room should be maintained (turn lights out, clean off tables, erase white boards, etc.).

7. Office Kitchenettes/Break Areas:
   • Post document on how area shall be maintained.
MARKING TOOLS AND RACKS

The following options are for employees whose job requires the use of hand tools:

- Each operator will have his/her own personal locking toolbox, which will contain standard tools in an orderly manner to suit his/her preference for maximum work ease and efficiency.
- For security and inventory control, a locking wall or floor-mounted cabinet will be used for specialty tools. This set of tools will be for all the operators to use. Tools are to be organized in an orderly manner so as to provide instant visual identification when the full-width steel doors are open.

For the Machining and Assembly lines, the following organization of tools is recommended.

- A possible method for tool storage could be Tool Boards located at each machine tool or group of common machine tools or assembly stations.
- The Tool Board could have outlines that would assist the operator or anyone else in identifying tool availability. This method would assist in minimizing "Internal Downtime".
- For security, the location of the boards could be inside the machine enclosures and could be in locked or unlocked cabinets that would always be visually accessible.

REFERENCE MATERIALS

- The location for all reference materials within each department could be centrally located or at each machine or assembly operation. In any case, its location needs to be readily accessible by any Operator, Service Person, Team Leader, or Engineer.

STANDARD VISUAL AID IDENTIFICATION FOR ALL EQUIPMENT:

1. Arrows for direction of rotation and flow.
   - Use: Direction of rotation on motors, belts, spindles, etc., and direction of flow
   - Vinyl Tape: 1 - 2” wide, yellow background with 1-1/2 to 3” long black arrow
   - Alternate: Stencil 1-1/2 to 3” long black or white arrow depending on the background for contrast

2. TPM Machine Numbers.
   - Primary Number: To your own facility standards.
   - Approval: Visual Factory coordinator approves numbering assigned by each team.
   - Source: Team makes the labels and installs them.
   - Machine: Appropriate Labelling
   - Tape: Black 3 ¼” lettering on orange background. 4” wide is preferred.
   - Location: Mount on main electrical panel on the upper right-hand corner close to the main Disconnect.
SECTION 3
TECHNICAL INFORMATION

STANDARD VISUAL AID IDENTIFICATION FOR ALL EQUIPMENT (CONTINUED):

3. Identifying Gauge Operating Ranges.
   - Use: Pressure Gauges
   - Process: Use yellow paint marker or green paint marker and draw two lines from the centre to the outside diameter of the gauge and connect the two line with an arc. This area designates the acceptable operating range on the gauge.
   - Alternate Process: Use yellow or green transparent label to be approximately ½ of the gauge diameter face. Cut out a pie shaped acceptable range and stick it on the centre of the gauge face. Acceptable range is area seen through the green or yellow film.

4. Proper Machine Name.
   - Source: Team makes the labels and installs them.
   - Machine: Appropriate Labelling.
   - Tape: Black 3 ¼” lettering on 4” wide white background.
   - Format: Name of machine, e.g. "Coolant System", "Grinder", "Dust Collector", etc.
   - Location: Under the operation number.

5. Operation Number.
   - Coordinator: Each team.
   - Source: Team makes label and installs it.
   - Machine: Appropriate Labelling.
   - Tape: Black 3 ¼” lettering on 4” wide white background.
   - Location: Mount in a visible location on each machine.

6. Identification (Labelling) of gauges, fixtures and tooling.
   - Coordinator: Each team.
   - Source: Team and/or supplier.
   - Settings: Marked with the unique number, visible to the naked eye.
   - Location: On body of the gauge, fixture or tooling.

7. Match marking nuts and bolts:
   - Match mark bolt head and structure or nut, bolt stud and structure with a paint stick drawing a distinct line to allow for future visual checks.
   - GREEN match mark: For bolts and nuts that are tight to torque specification when checked.
   - YELLOW match mark: For bolts and nuts somewhat loose when checked and moved when tightened to specification.
   - RED match mark: For bolts and nuts extremely loose or missing and may require corrective action if continually loose when checked.
SECTION 3
TECHNICAL INFORMATION

STANDARD VISUAL AID IDENTIFICATION FOR ALL EQUIPMENT (CONTINUED):

8. UNIQUE Number. See…
   • Coordinator: Each team.
   • Source: Team makes label and installs it.
   • Machine: Appropriate Labelling
   • Tape: Black 1 ½” Black lettering on 2 ¼” wide white background.
   • Format: Plant to establish its unique numbering system and apply throughout the facility.

9. • Location: Mount in visible location on each machine.

10. Lubrication Diagram.
    • Equipment supplier to furnish a "Lube and Checkpoint" drawing for each operation they are providing.
    • Each "Lube and Checkpoint" drawing is to identify:
      − Inspection points
      − Fill and clean points
      − Type of lubricate to be utilized
      − Part number for filter
    • Lube and Checkpoint drawings are to be posted on the main electrical panel.

11. Sight Gauge Lubricant Level.
    • The sight gage level reads at two different levels: a low level when the system is running and a high level when the system is shutdown. Both of these levels are to be marked.
    • For the labels (Fill Level (OFF) and Fill Level (Running):
      − Source: Team makes label and installs it.
      − Machine: Appropriate Labelling
      − Tape: Black lettering on a white background.

12. Hydraulic Tank and Oil Tank Labels.
    • Label Size: 2” X 3” plastic
    • Lettering: 3/16” to 1-1/4” high white or black for contrast with the background colour.
    • Format:
      − 1” 2-1/2” bar code label on top of a 2” X 3” label using black lettering on an orange background.
    • Oil Tank Label Colours:
      − Spindle Oil - Yellow
      − Hydraulic Fluid - Green
      − Fireproof Hydraulic Fluid - Blue
      − Lubrication Oil - Red
      − Grease - White
      − Automatic Transmission Fluid - Brown
12. Min-Max Level.
   • The team in conjunction with material handling personnel determines the min-max levels for rough stock and purchased parts.
   • Min-Max level identification may be done with overhead signs or rack mounted signs specifying the number of units which could be pallets, racks, boxes, totes, etc.

Sign Specifications:
   • Minimum size: 12” x 20” or as needed. Make all signs in a given area the same size.
   • Material: Computer generated black lettering on white paper, laminate and mount with 3 mm thick Sintra.

   • Part Name
   • Part Number
   • MIN – Quantity of Units; MAX – Quantity of Units
SECTION 4
FLOOR MARKINGS & PRODUCTION CONTROL

MARKINGS ON THE FLOOR FOR PRODUCTION

LOCATING MOVABLE ITEMS

Mark the floor areas in your department where all movable items (like cart parking areas, trash receptacles, tool boxes etc.) are located. The purpose of this is to provide a place for everything and to heighten awareness when an item is out of place or missing.

- Use 4 inch wide yellow lines outlining these areas on the floor.
- Further identification can be provided by hanging an overhead sign 12'-0" from the floor.
- The items themselves can be stencilled with the department name and number.

AISLES

- Mark edge of aisles with 4” wide yellow lines painted on the floor.
- The width of your aisle is to the outside of the yellow lines.

NO PARKING AREAS

- No Parking areas should be outlined and filled in with 4” wide yellow lines at a 45 degree angle with 12” spacing between these fill lines.

MARKINGS FOR PRODUCTION

CABINETS

- Cabinet shall be 6’ 0” tall.
- Cabinet shall be painted with Buff Oil Proof Enamel
- Cabinet shall be identified with in 3” high stencilled black letters on all 4 sides of the cabinet at a height of 5’ 0” to the bottom of the letters.

ERGONOMIC CHAIRS

- Identify with department number, operation number and/or station number using black 1” high lettering with 2 ¼” white background or stencil using black or white lettering for the best contrast.
SECTION 4  
FLOOR MARKINGS & PRODUCTION CONTROL

SMART PICKUP POINTS

- SMART (Synchronous Material & Replenished Trigger) pickup points are identified with three stripes of tape on the floor (red, white and blue). Each strip to be 4” wide by 16” long. On the white tape is the work “SMART” in black lettering.

BAR CODE LABEL

- The purpose of the bar code label is to identify unit loads of purchased parts when they are received into the plant.

PART WITHDRAWAL

- Material Handling personnel will place a SMART card on individual containers of parts when they retrieve them from the Market Areas and take them to your area (point of use).
- When you open this container, place the SMART card in the nearby storage bin.
- The SMART card is regularly picked up (perhaps by your Coordinator) and placed in a mailbox to be picked up by Material Handling folks and delivered to an office where the cards are sorted.
- After sorting, the SMART card is taken to the market area to pull the next load of stock and the cycle is repeated.
- If the card is misplaced, the material will not automatically be delivered as it should and the material delivery system breaks down.

COMMUNICATION OF PRODUCTION INFORMATION

- This card will be used like the SMART card, but is used for internally manufactured components.
SECTION 4
FLOOR MARKINGS & PRODUCTION CONTROL
IDENTIFICATION OF INVENTORIES AND WORK IN PROCESS

ROUGH, IN-PROCESS & FINISHED STOCK

- Identify the location of your in-process inventories with 4” wide yellow lines painted on the floor outlining the area for each row of stock.
- Hang signs overhead over each row of stock identifying it.

HAZARDOUS MATERIALS

Identification of Materials
1. All hazardous materials shall be identified with a supplier label that meet specific regulatory requirements (Federal, State and Local) and provide seven items of information:
   - Name of product; chemical name, common name, generic name or trade name.
   - Name of supplier.
   - A reference to a Material Safety Data Sheet.
   - Hazard Symbols.
   - Risk phrases-short phrases describing the hazardous properties.
   - Precautionary measures-short statements describing the precautions to be taken when handling.
   - First aid measures-short statements describing immediate steps to be taken when an accident has occurred.
2. The label shall have the following features:
   - A border with slanted hatch mark.
   - Border can be any colour that contrasts with the background.
   - It may be any size but it must be clearly legible.

Storage of Materials
1. All hazardous materials shall be stored in the department in an area designated for that purpose.
2. Use 4 inch wide yellow lines outlining this area on the floor.
3. Further identification shall be provided by hanging overhead signs 12'-0” from the floor.
4. Signs should provide the following information:
   - Identification of material being stored.
   - Max/Min levels for material being stored.
   - Identification of whether the container is full or empty.
SECTION 4
FLOOR MARKINGS & PRODUCTION CONTROL

POWERED VEHICLES IDENTIFICATION

1. Material Handling & Maintenance Vehicles
   • Material Handling Vehicles
     Paint – Yellow
   • Maintenance Vehicles
     Paint - Alert Orange

2. Vehicles permanently assigned to a department will be identified with a white square band
   stencilled with the Department Number, Vehicle Number and Capacity in the Team Colour.

3. For material handling vehicles, which are assigned on a rotating basis from department to
department, only the vehicle number will be stencilled on the vehicle in black. Assignment of
vehicles is to be posted on the Team Information Board in each department.

HOPPER IDENTIFICATION

1. Rubbish Hoppers are divided into two (2) categories:
   a) Cardboard Only - Stencil CARDBOARD ONLY in 3” high, blue letters (Helvetica)
      and also stencil the blue recycle symbol on all four sides of the hopper.
   
   b) General Waste Only - Stencil GENERAL WASTE ONLY in 3” high black letters (Helvetica).

If the object allows, locate lettering 4'-6" to 5'-0" to the bottom of the letters from the floor. It is also
recommended that trash and cigarette containers be located throughout the Plant. These would be
painted Buff and 3” high black letters (Helvetica) would be stencilled designating "Trash" or
"Cigarettes".
SECTION 4
FLOOR MARKINGS & PRODUCTION CONTROL

FIRE EQUIPMENT

LOCATIONS AND IDENTIFICATION OF EACH TYPE OF FIRE EQUIPMENT

1. Fire Extinguishers – Identified with a white two-way sign with a red symbol of a fire extinguisher and the word "FIRE" located below. Sign is placed on plant building columns containing fire extinguishers.

2. Fire Hose Locations – Identified with a white two-way sign with a red symbol of a fire hose and the word "FIRE" located below. Sign is placed on plant building columns containing fire hoses.

3. Fire Alarm Locations - Identified with a white two-way sign with a red-inverted triangle and the words "FIRE ALARM" located below.
SECTION 4
FLOOR MARKINGS & PRODUCTION CONTROL

MACHINE COLORS

- Machines: Buff Oil Proof Enamel - Modified epoxy.
- Guards (Outside): Target Yellow Enamel.
- Primer: Kem Kromik Metal Primer.
- Gages: Blue Fair Trim Enamel.
- Electrical Cabinets (Exterior): Buff Oil Proof Enamel - Modified epoxy. (Same as machines)

COLUMN MARKINGS

- Column Identification Number - Stencil/paint in black paint.
- Electrical Panel Breakers - Stencil/paint "Light Bulb" icon in black.
- Electrical Outlet - Stencil/paint in black.
- Fire Hose - Stencil/paint white "O" with red background.
- Fire Extinguisher - Stencil/paint white "X" with red background.
- Fire Alarm - Stencil/paint "Fire Alarm" in white with red background.
- Stretcher - Stencil/paint white cross with red background.
- Emergency Phone - Stencil/paint "Phone" icon in black.
- Team Colour Band - 16" wide band painted six inches below the column identification number.
SECTION 4
FLOOR MARKINGS & PRODUCTION CONTROL

PIPING COLORS

OIL TANK LABEL COLORS

- Spindle Oil - Yellow
- Hydraulic Fluid - Green
- Fireproof Hydraulic Fluid - Blue
- Lubrication Oil - Red
- Grease - White
- Automatic Transmission Fluid - Brown
SECTION 5
QUALITY CONTROL & DISPLAYING INDICATORS

MONITORING SIGNALS FOR MACHINES

The following list of monitoring equipment shall be acceptable for use in Production areas:

**Andon Board:** A column of numbers and status indicators. The number at the top of each column represents an operation on a transfer line. The indicators are different colours and show the status of that operation.

- If the number is not illuminated (red), that operation is electrically powered on.
- If the green status indicator is off, the operation is not running in auto mode.
- If the green indicator is flashing, the operation is running in auto mode but not making production rate.
- If the green indicator is illuminated without flashing, the operation is in the auto mode at production rate.
- If the yellow indicator is flashing, the operation is starved for parts.
- If the yellow indicator is illuminated without flashing, the operation is blocked.
- If the red indicator is flashing, the operation will shut down within a short time for tool change, lube fault, etc.
- If the red indicator is illuminated without flashing, the operation is not running due to a fault condition.

**STATISTICAL PROCESS CONTROL (SPC)**

Access to these charts will be on the Plant Floor Information System (PFIS). However, it is recommended that possibly some charts should be displayed, such as those critical characteristics which are difficult to control or those that exhibit continuous problems.

**RECORD OF PROBLEMS**

Plant Floor Information System (PFIS) – Each team needs to review the information available to determine what may be beneficial to display in its area. Note, that this can vary week-to-week depending on the problems or issues it is involved in at that time.
SECTION 5
QUALITY CONTROL & DISPLAYING INDICATORS

PLANT AND COMPANY PERFORMANCE
For plant and company performance postings, refer to the following reports:

SAFETY TEAM BOARD

- First Time Visit Rate
- First Time Visit Analysis
- Safety Performance (Rate per 100 employees per year)

DEPARTMENT TEAM BOARD OR MEASUREABLES BOARD

- Plant Key Data Trends for Week Ending
- Plant Productivity Tracking
- Actual Cost Trends/Weekly Cost Per Product
SECTION 6
MANUALS & IMPROVEMENT ACTIVITIES

MANUFACTURING INSTRUCTIONS AND TECHNICAL PROCEDURES

Each machining and assembly operation should have a "Manufacturing Instructions Stand" to display the following:

- 543 Chart (Pictorial)
  - Size: 8-1/2" X 11" preferred (11" X 17" maximum size is acceptable)
- Process Sheet (Written)
  - Size: 8-1/2" X 11" preferred (11" X 17" maximum size is acceptable)
- QPS Sheet (Written work elements to be performed)
  - Size: 11" X 17" preferred (Do Not Reduce!)
- Task Certification Lists
  - Size: 8-1/2" X 11" preferred (11" X 17" maximum size is acceptable)
- Gauging Instructions
  - Size: 8-1/2" X 11" preferred (11" X 17" maximum size is acceptable)
- Control Plan Chart (DCP)
  - Size: 8-1/2" X 11" preferred (11" X 17" maximum size is acceptable)
- Tooling List and Changeover List
  - Size: 8-1/2" X 11" preferred (11" X 17" maximum size is acceptable)

Some of the above information can be displayed as hanging signs instead of in the notebook, if the Team so desires.

VALIDATION STICKER

Information displayed by a team, which affects the quality of manufactured, and/or assembled parts may display a validation sticker. The decision as to whether or not a validation sticker is to be affixed to a particular piece of information is the responsibility of the team. If utilized, the sticker must be the specified colour for that year.

IMPROVEMENT ACTIVITIES

Small Group Activity (SGA) continuous improvements are displayed on the SGA boards.

Continuous improvement is monitored with Current and Future State Map gap analysis.
MISSION STATEMENT BOARD:
Same as Continuous Improvement Board except:

- **Size:** 18" X 24"
- **Material:** Medium oak picture frame with glass.
- **Color:** Black lettering on parchment paper.
- **Location:** In team offices and/or conference rooms and lobby.

Vision Statement should be displayed in the entrance for the Plant and in the Team offices and/or conference rooms.