



# INTEGRATING SAFETY & PROCESS IMPROVEMENT FOR **SUSTAINABLE MANUFACTURING**



Bureau of Workers' Compensation



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# **INTRODUCTION AND ACKNOWLEDGEMENT**



## **INTRODUCTION AND ACKNOWLEDGEMENT**

**This package of tools was developed by Dr. Diana Schwerha of Ohio University's Russ College of Engineering and Technology's Industrial and Systems Engineering Department. Dr. Schwerha was assisted by graduate research assistants Alyssa Boudinot and Nick Loree. This research was made possible by the support of the Ohio Bureau of Workers' Compensation and their continued dedication to protecting workers' health and safety throughout their careers.**

**The first part of the research involved determining the current level of integration of safety with process improvement in manufacturing companies across the state of Ohio. The Ohio Manufacturers' Association graciously assisted us in distributing our survey to companies across the state. We would like to acknowledge their assistance on this important part of the research.**

**The next part of the research involved developing a set of Excel-based tools designed to help small and large companies alike in their endeavors to integrate both safety and ergonomics with process improvement. Over one dozen companies helped us to develop and test these tools. We are very appreciative of their time and effort in helping us develop and refine the tools.**

**The tools are designed to provide a framework for holistic process improvement that brings people, who may not normally interact and could be from different departments, together and working towards a common goal. It is the hope of both the Ohio BWC and the Ohio University team that companies can use these tools to improve their workplace to provide safe and productive work environments. You may access all of the training materials at <https://www.ohio.edu/engineering/safety-training/>. If you have any questions, please reach out to Dr. Schwerha at [schwerha@ohio.edu](mailto:schwerha@ohio.edu).**

## Introduction and Getting Started

### Integrating Safety with Process Improvement for Sustainable Manufacturing

Developed by:

**Diana Schwerha, PhD**

Graduate Students: Alyssa Boudinot and Nick Loree

Industrial and Systems Engineering, Russ College of Engineering and Technology at Ohio University



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## Acknowledgment

- This research was made possible by the support of the Ohio Bureau of Workers' Compensation and their continued dedication to protecting workers' health and safety throughout their careers.
- The Ohio Manufacturers' Association graciously assisted us in distributing our survey to companies across the state. We would like to acknowledge their assistance on this important part of the research.



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## Acknowledgment

- The Ohio University team would also like to thank the companies in Ohio that helped to develop and test the tools presented in this research.
- Without their support and collaboration this research would not have been possible.
- We would also like to thank the BWC consultants who assisted us in recruiting and working with companies.

## Purpose

- This training was designed to help companies integrate safety and ergonomics with process improvement, quality, and productivity.
- It provides a framework for ongoing improvement efforts.
- The training modules can be used together or individually.

## Who can use these tools?

- Managers or supervisors
- Safety personnel
- Safety Committees
- Kaizen or Continuous Improvement teams

## What are the tools?

- 4 Core Tools
  - Process Map
  - Prioritization Tool
  - Modular Value Stream Safety Map (MOD VSSM)
  - Training Document
- Additional Tools
  - Poke-Yoke for Safety Requirements
  - Distraction Tool
  - Safety/Process Improvement Progress Summary

## Support for each tool

- For each tool there are the following components and support materials:
  - Instructional Word Document
  - Instruction PowerPoint
  - Voiceover PowerPoint for coordinators to familiarize themselves with the tool
  - Transcript of Voiceover
  - The tool itself (Excel document)
  - Example of tool filled in (additional Excel Document)
- Also all tools can be found in one Excel Workbook if the entire package is used

## Using the tools

- The 4 Core Tools are designed to be used together to frame a continuous improvement program for both safety/ergonomics as well as productivity and quality over time.
- However, the tools can be used individually.
  - For example, a company may use the MOD VSSM for one intervention
- We recommend reading the instructions first and then listening or viewing the PP.
- The tools are meant to be used by cross-functional teams.

## Time to get started!

- These tools are meant to save time and bring personnel together from different departments.
- They allow individuals with different perspectives and priorities to dialogue.
- They can be used in facilities that have a heavy Lean or Six Sigma presence or with those that are just getting started.
- The program provides a framework for holistic process improvement all while protecting the most important asset: your workers!

## Contact Info:

- For more information, please contact Dr. Diana Schwerha at [schwerha@ohio.edu](mailto:schwerha@ohio.edu)
- The training is available at: <https://www.ohio.edu/engineering/safety-training/>



# Integrating Safety with Process Improvement for Sustainable Manufacturing

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Industrial and Systems Engineering, Russ College of Engineering and  
Technology

Northern Ohio Chapter of the ASSE  
December 7, 2016

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## Acknowledgement

- We would like to acknowledge the Ohio Bureau of Workers' Compensation for the support of this project.



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## Introduction of the Project

- Two-year project
- Initial survey to manufacturers in the State of Ohio
- Field work on developing tools focused on integrating safety/ergo with process improvement metrics
- Silos or integration?



[www.successfulworkplace.org](http://www.successfulworkplace.org)



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## So just what are Lean and Six Sigma?

- Process improvement techniques
- Lean focuses on reducing waste
  - Henry Ford, “Time waste differs from material waste in that there can be no salvage”
  - Origins in the Toyota Production System
  - Yuzo Yasuda writes that improvements came from the shop floor; over 20 millions ideas in the last 40 years
- Six Sigma focuses on reduction in variability
  - Developed by Motorola Corporation (Bill Smith)
  - Requires statistical training
  - 3.4 defects in a million opportunities
- Lean was brought to life by James Womack’s 1991 book, *The Machine that Changed the World*
- Both require teams

We will go into these in more detail later in the presentation



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## Survey Methodology

- Survey was distributed by the Ohio Manufacturers' Association in January 2016 ([www.ohiomfg.com](http://www.ohiomfg.com))
- Questions were about demographics, quality tools used in quality and safety, organizational performance and injury statistics
- Some of the questions were from the Ontario Leading Indicators Project and we were given permission by them to use them (<http://www.iwh.on.ca/olip>)
- It was approved by the Ohio University Institutional Review Board
- Survey went to approximately 950 companies and 42 completed it

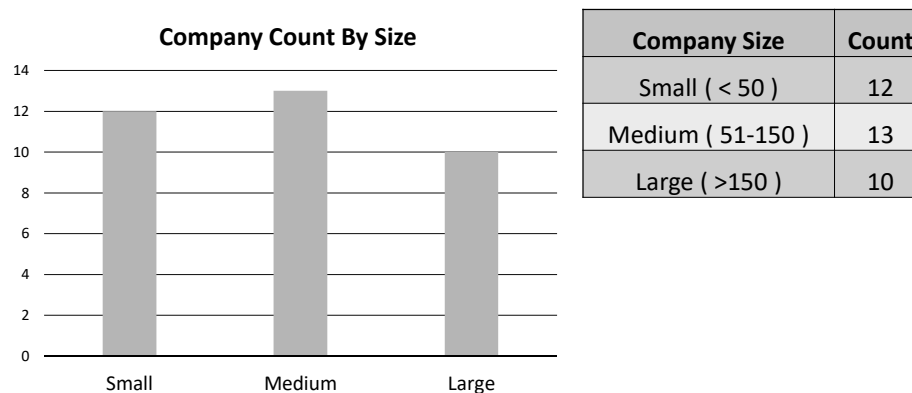


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## Survey Demographics -Company Size



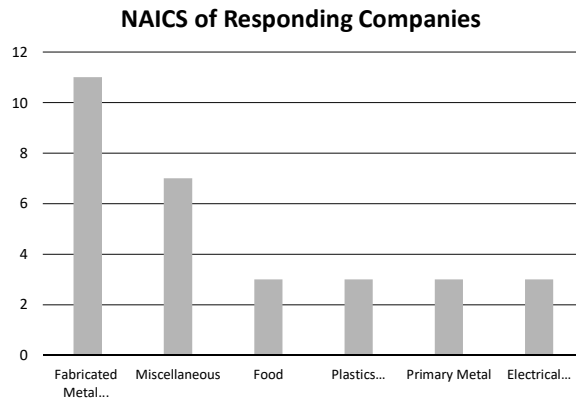
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## Survey Demographics - Company Type

Top 6 NAICS Codes (All Manufacturing)



Code	Name	Count
332	Fabricated Metal Products	11
339	Miscellaneous	7
311	Food	3
326	Plastics and Rubber Products	3
331	Primary Metal	3
335	Electrical Equipment, Appliances, and Components	3



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## Survey Demographics – Safety Function Location

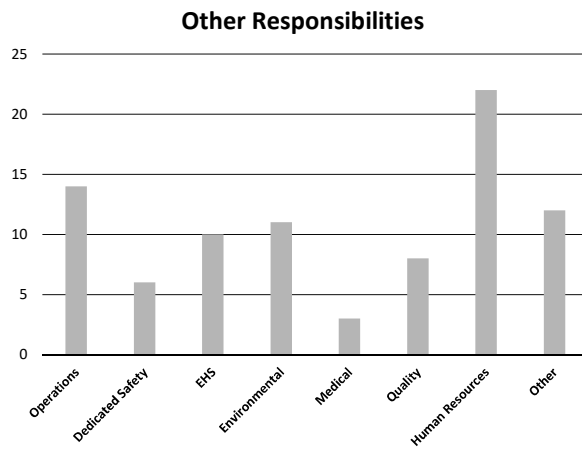


Department	Count
Human Resources	16
Operations	9
Quality	1
Independent Dept.	7
Other	3



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## Survey Demographics – Safety Person Additional Duties

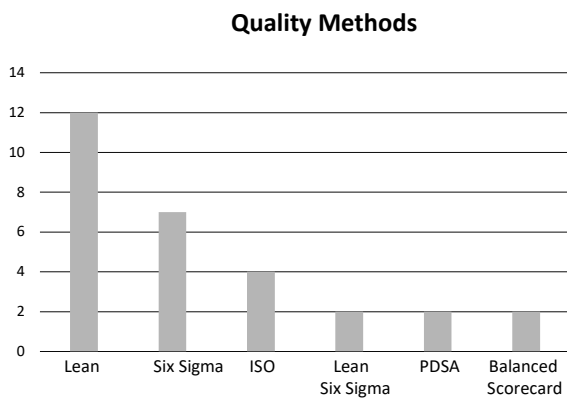


Additional Duty	Count
Operations	14
Dedicated Safety	6
EHS	10
Environmental	11
Medical	3
Quality	8
Human Resources	22
Other	12



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## Quality Improvement Tools

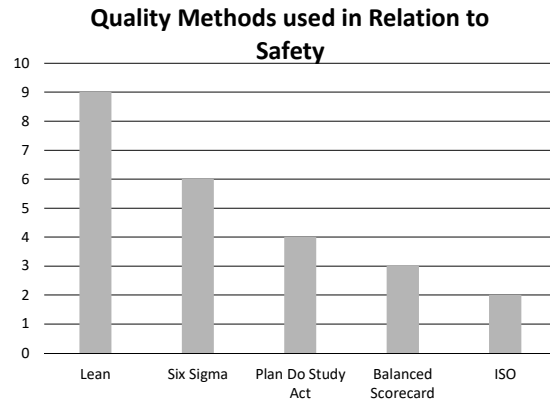


Quality Method	Count
Lean	12
Six Sigma	7
ISO	4
Lean Six Sigma	2
Plan Do Study Act	2
Balanced Scorecard	2



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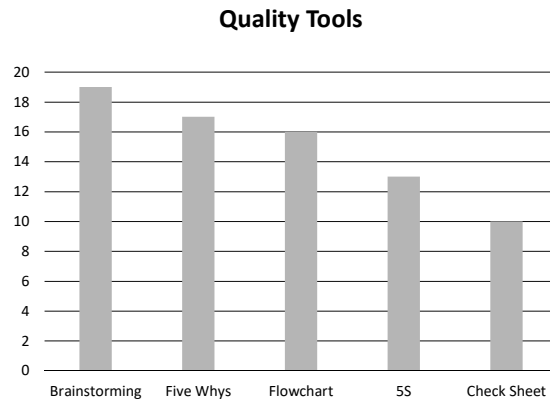
## Quality Improvement Tools Used in Relation to Safety



Quality Method	Count
Lean	9
Six Sigma	6
Plan Do Study Act	4
Balanced Scorecard	3
ISO	2



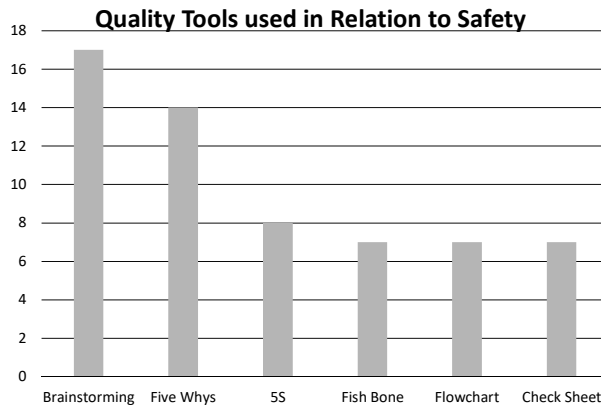
## Quality Improvement Methods



Quality Tool	Count
Brainstorming	19
Five Whys	17
Flowchart	16
5S	13
Check Sheet	10



## Quality Improvement Methods Used in Relation to Safety



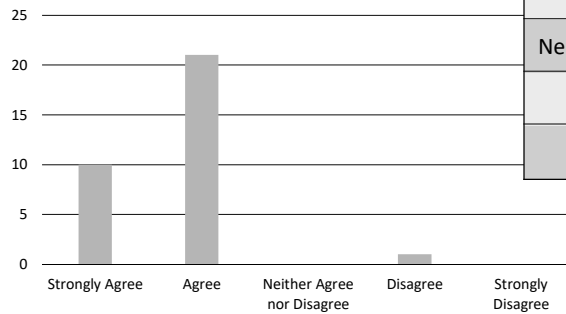
Quality Tool	Count
Brainstorming	17
Five Whys	14
5S	8
Fish Bone	7
Flowchart	7
Check Sheet	7



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## Ontario Leading Indicators Project (OLIP) Questions

Organizational Performance Metric



Workers and supervisors have the information they need to work safely

Strongly Agree	10
Agree	21
Neither Agree nor Disagree	0
Disagree	1
Strongly Disagree	0

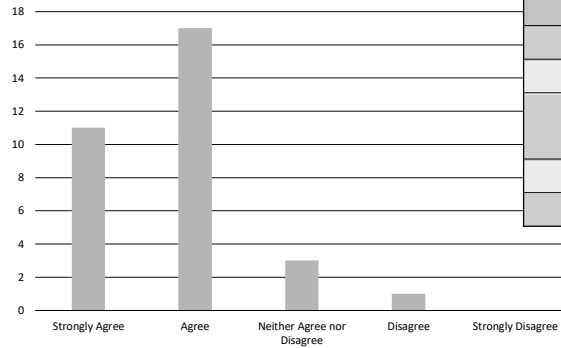


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## Ontario Leading Indicators Project (OLIP) Questions

Organizational Performance Metric

**Everyone has the tools and/or equipment they need to complete their work safely**



Strongly Agree	11
Agree	17
Neither Agree nor Disagree	3
Disagree	1
Strongly Disagree	0



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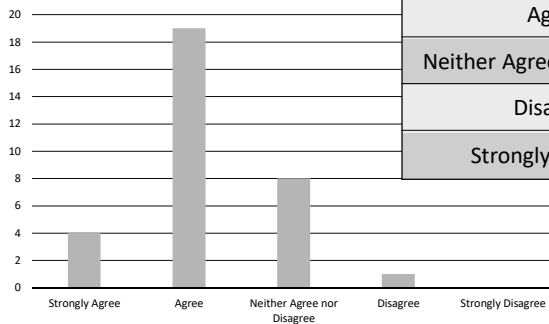
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## Ontario Leading Indicators Project (OLIP) Questions

Worker Participation

**OHS decisions are frequently based on consultations with, or suggestions from, workers**



Strongly Agree	4
Agree	19
Neither Agree nor Disagree	8
Disagree	1
Strongly Disagree	0



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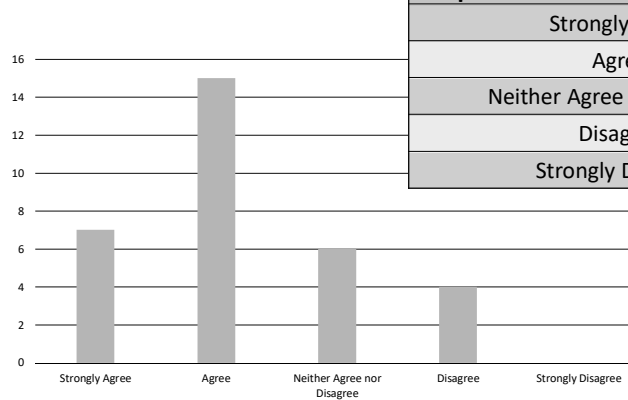
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## Ontario Leading Indicators Project (OLIP) Questions

### Worker Participation



Teams of workers from various parts of your company are frequently used to solve problems about working conditions

Strongly Agree	7
Agree	15
Neither Agree nor Disagree	6
Disagree	4
Strongly Disagree	0



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## Lean Definition

- Lean focuses on reduction in waste (non-value added items)
- Tadimitsu Tsuruoka, a Honda engineer, identified seven sources of waste:
  - Overproduction waste
  - Idle time waste (waiting time/queue time)
  - Delivery waste (transport/conveyance waste)
  - Waste in the work itself
  - Inventory waste
  - Wasted operator motion
  - Waste of rejected parts
- **Let's think about how those areas intersect with safety/ergonomics?**



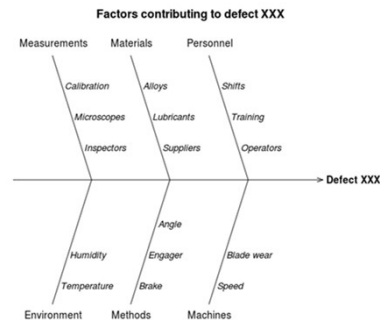
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## Lean Tools

- 5S or 6S
- Value Stream Mapping
- Process Map
- Spaghetti Diagram
- Fishbone Diagram
- FMEA
- Statistical Methods



**Approach is that it's best to eliminate the problem rather than to reduce the number of defects**

- Fishbone By DanielPenfield - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=9401181>



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## 5S (6S)

- Sort
- Straighten
- Shine/Sweep
- Standardize
- Sustain
- Safety

“A place for everything and everything in its place”



Realkaizen.com



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## Benefits of 5S

- Allows everyone to be involved in Lean
- Assists in waste elimination
- Provides smoother workflow
- Reduces employee stress
- Provides a systematic approach of continuous improvement
- Focuses on the process and not the person





# **MODULE ONE**

## **Process Map**

## **PROCESS MAP**

**Purpose:** The purpose of the Process Map is to bring together employees who complete different aspects of the entire process. By bringing together expertise employees from different task backgrounds, they can expand their understanding of the entire process and collaborate to make overall improvements to safety and/or production.

### **Instructions:**

#### **- Header**

The header should include all team members working on this tool, the start and finish date, and the number of steps to complete the entire process.

#### **- Each Step Block**

There should be a complete block for each step in the process. It will document the starting product (i.e. raw material) and then what product leaves that station. The item written in for finished product (if complete in Excel) will automatically populate the following block's starting product. A brief description of the task (what is done to transform the product), a picture, any ergonomic or safety concerns, and any productivity concerns should also be described. These items should be completed for each step of the process.

#### **- Opportunities to Improve**

From discussion among the task experts and detailing each step of the process, opportunities to improve ergonomics/safety and/or production should be assessed. For example, the employees at step 1 may be able to make a minor change in their process that drastically improves the safety risks at step 5. By looking at the process in a holistic manner, the team may be able to make incremental changes to improve the overall process.

## **PROCESS MAP- SUPPLEMENTAL DOCUMENT**

**Purpose:** this document can be used in addition to the main process map. It is a word document that can be used to illustrate the process and diagram the flow of the material. This can also be done on any tools the company has (i.e. white board or jumbo note pad).

# Process Map



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## PURPOSE

- Bring together employees who complete different aspects of the entire process.
- Expand their understanding of the entire process and collaborate to make overall improvements to safety and/or production.

PROCESS MAP

Team Members:		Start Date:	
		Projected Finish Date:	
		Total Steps: 6	
Step 1:		Step 2:	
Starting Product:		Starting Product:	
Finished Product:		Finished Product:	
Description of Task:		Description of Task:	
Picture:		Picture:	
Ergonomic/Safety Concerns:		Ergonomic/Safety Concerns:	
Productivity Concerns:		Productivity Concerns:	



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# HEADER

- Should include:
  - All team members working on the tool
  - Start date
  - Finish date
  - Number of steps to complete the entire process

Team Members:	Start Date:	
	Projected Finish Date:	
	Total Steps:	6



# EACH STEP BLOCK

- Should be a complete block for each step in the process
- Will include:
  - Starting product (i.e. raw material)
  - What product leaves that station
  - A brief description of the task (what is done to transform the product)
  - Picture
  - Any ergonomic or safety concerns
  - Any productivity concerns

Step 1:	
Starting Product:	
Finished Product:	
Description of Task:	
Picture:	
Ergonomic/Safety Concerns:	
Productivity Concerns:	



# OPPORTUNITIES TO IMPROVE

- From discussion, opportunities to improve ergonomics/safety and/or production should be assessed.
- For example, the employees at step 1 may be able to make a minor change in their process that drastically improves the safety risks at step 5.
- By looking at the process in a holistic manner, the team may be able to make incremental changes to improve the overall process.

Opportunities to Improve Ergonomics/Safety:	Opportunities to Improve Productivity:



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# SUPPLEMENTAL DOCUMENT

- Used in addition to the main process map
- Word document, used to illustrate the process and diagram the flow of the material
- Can also be done on any tools the company has (i.e. white board or jumbo note pad).

PROCESS MAP  
SUPPLEMENTAL DOCUMENT

Instructions: Use the blank box below to illustrate each step of your process and how they are connected.



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# PROCESS MAP

<b>Team Members:</b>	<b>Start Date:</b>
	<b>Projected Finish Date:</b>
	<b>Total Steps:</b>

<b>Step 1:</b>
<b>Starting Product:</b>
<b>Finished Product:</b>
<b>Description of Task:</b>
<b>Picture:</b>
<b>Ergonomic/Safety Concerns:</b>
<b>Productivity Concerns:</b>



<b>Step 2:</b>
<b>Starting Product:</b>
<b>Finished Product:</b>
<b>Description of Task:</b>
<b>Picture:</b>
<b>Ergonomic/Safety Concerns:</b>
<b>Productivity Concerns:</b>

# PROCESS MAP


<b>Step 3:</b>	
<b>Starting Product:</b>	
<b>Finished Product:</b>	
<b>Description of Task:</b>	
<b>Picture:</b>	
<b>Ergonomic/Safety Concerns:</b>	
<b>Productivity Concerns:</b>	



<b>Step 4:</b>	
<b>Starting Product:</b>	
<b>Finished Product:</b>	
<b>Description of Task:</b>	
<b>Picture:</b>	
<b>Ergonomic/Safety Concerns:</b>	
<b>Productivity Concerns:</b>	

# PROCESS MAP

<b>Step 5:</b>		<b>Step 6:</b>	
<b>Starting Product:</b>		<b>Starting Product:</b>	
<b>Finished Product:</b>		<b>Finished Product:</b>	
<b>Description of Task:</b>		<b>Description of Task:</b>	
<b>Picture:</b>		<b>Picture:</b>	
<b>Ergonomic/Safety Concerns:</b>		<b>Ergonomic/Safety Concerns:</b>	
<b>Productivity Concerns:</b>		<b>Productivity Concerns:</b>	
<b>Opportunities to Improve Ergonomics/Safety:</b>		<b>Opportunities to Improve Productivity:</b>	





# **MODULE TWO**

## **Prioritization**

# PRIORITIZATION

**Purpose:** The Prioritization tool allows decision makers to list various problems found within their facility and prioritize them based on their potential for safety and productivity risks. After problems have been characterized and ranked in the first section, this document also allows users to document recommended actions and pick tools from the BWC to use in their projects. Finally this document allows for the user to document actions taken and rescore the problem with a new adjusted priority.

**Instructions:**

**Step 1: Characterization of the Problem**

In this area, problems within the facility are described and ranked based on their potential for safety, ergonomic, and productivity risks.

1. In the first column indicate the department in which this problem is present. This will later allow for the sorting of problems by departments to highlight areas where improvement is needed most.

2. In the second column, name the problem with a unique name. This description of the problem can be brief or more descriptive.

3. In the third column titled “Potential Injuries or Ergonomic Risks”, indicate any potential safety or ergonomic consequences of the problem. If there are multiple risks associated with one problem, they can be listed in separate rows or all in one.

4. The next column is marked “SEV 1.” This is short for severity. On a scale of 1-3 indicate the severity of the potential injury or ergonomic risk, with “1” being mild, “2” being moderate, and “3” being severe.

**Table 1: Ranking Severity of Safety/Ergonomic Risks**

<b>Ranking</b>	<b>Examples</b>
<b>1 – mild</b>	<ul style="list-style-type: none"><li>• Observation is good</li><li>• Minimal observable safety/ergonomic risk</li><li>• Only a small chance that an injury or ergonomic issue may occur</li></ul>
<b>2 - moderate</b>	<ul style="list-style-type: none"><li>• Near misses</li><li>• Minor incidents</li><li>• Observation of a likelihood that an injury or ergonomic issue may occur</li></ul>
<b>3 - severe</b>	<ul style="list-style-type: none"><li>• Already had an injury as a result of this problem</li><li>• Task frequently leads to musculoskeletal disorders</li></ul>

# PRIORITIZATION

5. In the fifth column indicate any potential productivity risks based on this problem. These might include delays, quality errors, rework potential, etc. The next column is once again marked “SEV 2” for severity of productivity risk. In this column indicate the severity of the productivity risks on a scale of 1-3, with “1” being mild, “2” being moderate, and “3” being severe.

**Table 2: Ranking Severity of Productivity Risks**

Ranking	Examples
1 – mild	<ul style="list-style-type: none"> <li>• Observation is good</li> <li>• Minimal observable productivity risk</li> <li>• Only a small chance that a productivity issue may occur</li> </ul>
2 - moderate	<ul style="list-style-type: none"> <li>• Minor delays</li> <li>• A lot of variability in the process</li> <li>• Observation of a likelihood that a productivity issue may occur</li> </ul>
3 - severe	<ul style="list-style-type: none"> <li>• Already had a major productivity incident</li> <li>• Serious delay</li> <li>• High occurrence of rework</li> </ul>

6. The first column marked Priority will populate with the resulting rank (a color) of the two “SEV 2” columns. This is a will be used to rank problems within the facility. Figure 2 shows how this score is generated. Notice that a score of 3 in either category forces the overall priority ranking into the red/severe ranking.

**Figure 1: Calculating Priority**

		Safety Ergonomic Risk Level		
		1	2	3
Productivity Risk Levels	1	Mild	Moderate	Severe
	2	Moderate	Moderate	Severe
	3	Severe	Severe	Severe

7. Characterize any problems in the facility using steps 1-6 for each problem in a new row. This will provide a priority for each problem, giving decision makers insight into which problems to tackle first.

## **PRIORITIZATION**

### **Step 2: Action Plan**

This section is to be used once the priorities of the various problems have been established. Once a problem is selected for intervention, an action plan for that problem is developed.

1. In the first column of this section any recommended actions to be taken to fix the problem are listed.

2. In the second column there is a drop down menu featuring all the tools available in this workbook. Pick the tool that is most appropriate for assisting the intervention.

3. The final two columns for this section are a start and end date for the project. Enter a reasonable timeline for the intervention.

### **Step 3: results**

This section is to be filled out after some actions have been taken in the intervention. New severity numbers are assigned as a result of the actions taken. This will provide a new calculation of the priority of the problem.

1. Fill in any actions taken in the first column of this section.

2. Assign a new severity number for the ergonomic/ safety risks, then assign a new number for productivity risks.

3. These new numbers will then populate a new priority for the problem. After intervention, it is hoped that the priority of this task will change, indicating that another intervention may or may not be needed in this area.

# Prioritization Tool



## Purpose

- A facility or process may have many areas that need improvements and it may seem overwhelming
- Thus, priorities need to be set to determine which problems to tackle first
- Goal → Prioritize problems based on ergonomic, safety, and productivity risks
- Once problems are prioritized, actions can be taken and monitored in a strategic way

Prevent this feeling!





## Instructions

- This tool is best filled out by a team of individuals with a wide knowledge of the areas and processes
- This allows for as many problems as possible to be considered
- Also this document should be used to monitor the priority of problems as corrective actions are taken over time



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## Headers

- At the top fill in
  - Team Members
  - Date
- Then 3 steps for each problem
  1. Characterize the Problem
  2. Action Plan
  3. Results

Team Members:		Date:												
Step 1: Characterization of Problem					Step 2: Action Plan				Step 3: Results					
Dept.	Problem	Potential Injuries or Ergonomic Risks	SEV 1	Potential Productivity Risks	SEV 2	Priority	Recommended Actions	Tool to Be Used	Start Date	End Date	Actions Taken	SEV 1	SEV 2	Priority



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## Step 1: Characterize the Problem

- Enter the department in which a problem occurs
  - Helps identify high priority departments
- Enter a unique name for the problem
- Enter any potential injuries or ergonomic risks associated with the problem
  - Then assign these risk a severity ranking (1-3)
  - (1 = Low Risk, 2=Moderate Risk, 3=Severe Risk)

Step 1: Characterization of Problem						
Dept.	Problem	Potential Injuries or Ergonomic Risks	SEV 1	Potential Productivity Risks	SEV 2	Priority



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## Step 1: Characterize the Problem

- Here is a guide for assigning the severity of ergonomic and safety risks

Ranking	Examples
<b>1 – mild</b>	<ul style="list-style-type: none"> <li>• Observation is good</li> <li>• No observable safety/ergonomic risk</li> </ul>
<b>2 - moderate</b>	<ul style="list-style-type: none"> <li>• Near misses</li> <li>• Minor incidents</li> <li>• Observation of a likelihood that an injury or ergonomic issue may occur</li> </ul>
<b>3 - severe</b>	<ul style="list-style-type: none"> <li>• Already had an injury as a result of this problem</li> <li>• Task frequently leads to musculoskeletal disorders</li> </ul>



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## Step 1: Characterize the Problem (continued)

- Enter any potential productivity risks in the same way in the column "SEV 2"

Ranking	Examples
1 - mild	<ul style="list-style-type: none"> <li>Observation is good</li> <li>No observable productivity risk</li> </ul>
2 - moderate	<ul style="list-style-type: none"> <li>Minor delays</li> <li>A lot of variability in the process</li> <li>Observation of a likelihood that a productivity issue may occur</li> </ul>
3 - severe	<ul style="list-style-type: none"> <li>Already had a major productivity incident</li> <li>Serious delay</li> <li>High occurrence of rework</li> </ul>



## Note on Ranking System for Severity

- Based on the scores assigned, the Excel sheet will calculate a priority color as shown below

		Safety Ergonomic Risk Level		
		1	2	3
Productivity Risk Levels	1	Mild	Moderate	Severe
	2	Moderate	Moderate	Severe
	3	Severe	Severe	Severe



## Step 2: Create an Action Plan

- From Priorities in Step 1, select a problem to create an action plan for
- Enter recommended actions for that row
  - Consider using another BWC tool from the drop down box to help tackle the problem
- Enter a start and end date

Step 2: Action Plan				
Priority	Recommended Actions	Tool to Be Used	Start Date	End Date
Y				
R		Poke-Yoke for Safety Distraction Tool Process Training Mod VSSM Process Map		
Y				



## Step 3: Monitor Results, Adjust Priorities

- List the actions taken to the problem in each row
- Assign new severity numbers from 1-3
  - SEV 1: Safety and Ergonomic Risks
  - SEV 2: Productivity Risks
- The new severity numbers will be used to calculate a new priority/color
  - Hopefully it will go down from step 1!
- A new project can be selected by reviewing the priorities

Step 3: Results			
Actions Taken	S E V 1	S E V 2	Priority







# **MODULE THREE**

**Modular Value  
Stream Safety Map  
(Mod VSSM)**

## **MODULAR VALUE STREAM SAFETY MAP (MOD VSSM)**

**Purpose:** The modular value stream safety mapping (Mod VSSM) is designed to look at a specific part of a longer process. Unlike traditional value stream maps, this tool allows the team to identify more specific problems in a task that may be overlooked in a traditional VSM. Another difference between this tool and a traditional VSM is the inclusion of ergonomic/safety problems of the work task.

### **Instructions:**

#### **- Project Details**

This section is to be used as an identifier for the project, to identify specific team members, and keep a record for timing of the project.

#### **- Current State**

This section is to describe the task and how it currently operates. The problem statement should describe what is wrong with the task and what the team focuses on improving throughout the intervention. Below that is a space to describe up to 5 ergonomic/safety concerns of the current process and each one should be color coded for the severity (green is mild-limited concern, yellow- moderate concern and should be improved through this process, red- severe concern and needs to be improved immediately). Below that is a spot to document the current productivity level and how safety and production are affected by one another in the current task.

#### **- Future Plan**

This section should be completed after changes for the current task have been discussed and a plan to implement them has been developed. The safety improvements should include at least some of the concerns addressed in the current state section and how they will be improved. The productivity improvement should also relate to the previous production level and clearly identify how it will be affected by the changes. The communication plan should detail how necessary employees will be informed of the change and if documents need to be made or altered to include the updated task. Finally, the sustainability plan should detail how the process will be reviewed to ensure it is still operating with the new changes. This could include but it not limited to an audit schedule or updated training documents.

# Modular Value Stream Safety Map (MOD VSSM)



## PURPOSE

- Mod VSSM is designed to look at a specific part of a longer process.
- Difference from traditional VSM:
  - Allows the team to identify more specific problems in a task that may be otherwise be overlooked
  - Inclusion of ergonomic/safety problems of the work task

MODULAR VALUE STREAM SAFETY MAPPING (MOD VSSM)			
Project Details			
Project Title:		Start Date:	
Team Members:		Finish Date:	
Current State		Future Plan	
Task:		Safety Improvement:	
Brief Task Description:			
Problem Statement:		Productivity Improvement:	
Task Picture:		Task Picture:	
Ergonomic/ Safety Problems	1) 2) 3)	1) 2) 3)	
GREEN-mild YELLOW-moderate RED-severe			
Current Productivity Level:		Communication Plan:	Responsible Person: Due Date:
		Sustainability Plan:	Responsible Person: Due Date:





# PROJECT DETAILS

- Project Details
  - An identifier for the project
  - Specific team members
  - Keep a record for timing of the project

## MODULAR VALUE STREAM SAFETY MAPPING (MOD VSSM)

Project Details	
Project Title:	Start Date:
Team Members:	Finish Date:
Current State	



# CURRENT STATE

- Current State
  - Describe the task and how it currently operates
  - Problem statement should describe:
    - What is wrong with the task
    - The focus of the intervention
  - Task Picture to show the current set-up

Current State
Task:
Brief Task Description:
Problem Statement:
Task Picture:



# CURRENT STATE

- Ergonomic/safety concerns of the current process
  - Each one should be color coded for the severity
    - Green is mild- *limited concern*
    - Yellow- *moderate concern*, should be improved through this process
    - Red- *severe concern*, needs to be improved immediately
- Below, document the current productivity level and how safety and production are affected by one another in the current task.

Ergonomic/ Safety Problems	1)	}
GREEN-mild	2)	
YELLOW moderate	3)	
RED-severe		
Current Productivity Level:		



# FUTURE PLAN

- Future Plan
  - To be completed after changes for the current task have been discussed and a plan to implement them has been developed.
  - Safety Improvements
    - Include at least some of the concerns addressed in the current state section and how they will be improved
  - Productivity Improvement
    - Relate to the previous production level and clearly identify how it will be affected by the changes
  - Task Picture of the improved task set-up

Future Plan
Safety Improvement:
Productivity Improvement:
Task Picture:



# FUTURE PLAN

- Ergonomic/safety improvement
  - Should include at least some of the concerns addressed in the current state section and how they will be improved.
  - As before, each one should be color coded for the severity
- Communication Plan
  - How employees will be informed of the change
  - Any documents needed to be created or altered to include the updated task
  - Document who will be responsible for carrying out the communication plan and when it should be completed by
- Sustainability Plan
  - How the process will be reviewed to ensure it is still operating with the new changes
  - Could include but it not limited to an audit schedule or updated training documents
  - Document who will be responsible for carrying out the sustainability plan and when it should be completed by

1)		
2)		
3)		
<b>Communication Plan:</b>	<b>Responsible Person:</b>	<b>Due Date:</b>
<b>Sustainability Plan:</b>	<b>Responsible Person:</b>	<b>Due Date:</b>



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# MODULAR VALUE STREAM SAFETY MAPPING (MOD VSSM)

Project Details			
<b>Project Title:</b>		<b>Start Date:</b>	
<b>Team Members:</b>		<b>Finish Date:</b>	
Current State		Future Plan	
Task:		Safety Improvement:	
Brief Task Description:			
Problem Statement:		Productivity Improvement:	
Task Picture:		Task Picture:	
Ergonomic/ Safety Problems GREEN-mild YELLOW-moderate RED-severe	1)		1)
	2)		2)
	3)		3)
Current Productivity Level:		Communication Plan:	Responsible Person:
		Sustainability Plan:	Responsible Person:
		Due Date:	
		Due Date:	

# MOD VSSM Support Document

Project Details	
<b>Project Title:</b>	
<b>Meeting Date:</b>	
<b>Members attending:</b>	
<b>Describe problems and possible solutions suggested at this meeting:</b>	
<b>Quality Concerns</b>	
<b>Productivity Concerns</b>	
<b>Safety Concerns</b>	
<b>How could intervention fail?</b>	
<b>Next Meeting will be:</b>	
<b>Assignments for next meeting:</b>	
<b>Are we using supplemental tool?</b>	
<b>Are there a score from any supplemental tools?</b>	
<b>Meeting Date:</b>	
<b>Members attending:</b>	
<b>Describe problems and possible solutions suggested at this meeting:</b>	

# MOD VSSM Support Document

<b>Quality Concerns</b>	
<b>Productivity Concerns</b>	
<b>Safety Concerns</b>	
<b>How could intervention fail?</b>	
<b>Next Meeting will be:</b>	
<b>Assignments for next meeting:</b>	
<b>Are we using supplemental tool?</b>	
<b>Are there a score from any supplemental</b>	
<b>Meeting Date:</b>	
<b>Members attending:</b>	
<b>Describe problems and possible solutions suggested at this meeting:</b>	
<b>Quality Concerns</b>	
<b>Productivity Concerns</b>	
<b>Safety Concerns</b>	
<b>How could intervention fail?</b>	

# MOD VSSM Support Document

<b>Next Meeting will be:</b>	
<b>Assignments for next meeting:</b>	
<b>Are we using supplemental tool?</b>	
<b>Are there a score from any supplemental</b>	
<b>Meeting Date:</b>	
<b>Members attending:</b>	
<b>Describe problems and possible solutions suggested at this meeting:</b>	
<b>Quality Concerns</b>	
<b>Productivity Concerns</b>	
<b>Safety Concerns</b>	
<b>How could intervention fail?</b>	
<b>Next Meeting will be:</b>	
<b>Assignments for next meeting:</b>	
<b>Are we using supplemental tool?</b>	
<b>Are there a score from any supplemental</b>	



# **MODULE FOUR**

## **Process Training Document**



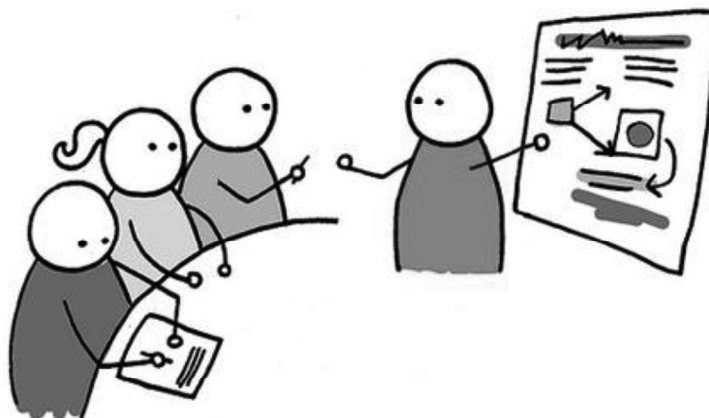


## **PROCESS TRAINING DOCUMENT**

**Purpose:** The Process Training Document is a template for establishing a standardized procedure for a task. It is meant to be kept at the task site and used for teaching new employees and as a reference while working.

**Instructions:** The task should be clearly identified and the version date is important to ensure the newest process is being used at all times. The task should be broken down into steps (6 is the default number of steps but can be changed to fit the specific task). Each step should include the goal (what will be accomplished at the end of that step), supplies needed (all things needed to complete this step from tools, parts, and safety equipment), any safety/ergonomic concerns that workers should be aware of, and a picture of the process. Each step should also include an estimated completion time. This can be a range, but is used to standardize the process and keep the workers on a comfortable but steady production pace.

# PROCESS TRAINING



## PURPOSE

- A template for establishing a standardized procedure for a task
- Keep at the task site
- Used for teaching new employees and as a reference while working

PROCESS TRAINING DOCUMENT	
Task:	Version Date:
Total number of steps: 6	Created By:
Step # 1 of 6	Estimated Completion Time:
Goal:	Picture:
Supplies Needed:	
Safety/Ergonomic Considerations:	
Step # 2 of 6	Estimated Completion Time:
Goal:	Picture:
Supplies Needed:	
Safety/Ergonomic Considerations:	
Step # 3 of 6	Estimated Completion Time:
Goal:	Picture:
Supplies Needed:	
Safety/Ergonomic Considerations:	

# INSTRUCTIONS

- Version date is important to ensure the newest process is being used at all times
- Task should be clearly identified
- Task should be broken down into steps (six is the default number of steps but can be changed to fit the specific task)
- Created by should show the team or employee responsible for filling out the document

PROCESS TRAINING DOCUMENT			
Task:			Version Date:
Total number of steps:	6		Created By:
Step #	1	of 6	Estimated Completion Time:
Goal:			Picture:
Supplies Needed:			
Safety/Ergonomic Considerations:			
Step #	2	of 6	Estimated Completion Time:



# INSTRUCTIONS

- Each step should include:
  - Goal- what will be accomplished at the end of that step
  - Supplies needed- all things needed to complete this step (tools, parts, and safety equipment etc.)
  - Safety/ergonomic concerns that workers should be aware of
  - Picture of the process

PROCESS TRAINING DOCUMENT			
Task:			Version Date:
Total number of steps:	6		Created By:
Step #	1	of 6	Estimated Completion Time:
Goal:			Picture:
Supplies Needed:			
Safety/Ergonomic Considerations:			
Step #	2	of 6	Estimated Completion Time:



# INSTRUCTIONS

- Each step should also include an estimated completion time.
  - Can be a range
  - Used to standardize the process and keep the workers on a comfortable but steady production pace



## PROCESS TRAINING DOCUMENT

Task:		Version Date:	
Total number of steps:	6	Created By:	
Step #	1	of	6
		Estimated Completion Time:	
Goal:			
Supplies Needed:			
Safety/Ergonomic Considerations:			
Step #	2	of	6
		Estimated Completion Time:	



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# PROCESS TRAINING DOCUMENT

<b>Step #</b>	<b>4</b>	<b>of</b>	<b>6</b>	<b>Estimated Completion Time:</b>
<b>Goal:</b>				<b>Picture:</b>
<b>Supplies Needed:</b>				
<b>Safety/Ergonomic Considerations:</b>				
<b>Step #</b>	<b>5</b>	<b>of</b>	<b>6</b>	<b>Estimated Completion Time:</b>
<b>Goal:</b>				<b>Picture:</b>
<b>Supplies Needed:</b>				
<b>Safety/Ergonomic Considerations:</b>				
<b>Step #</b>	<b>6</b>	<b>of</b>	<b>6</b>	<b>Estimated Completion Time:</b>
<b>Goal:</b>				<b>Picture:</b>
<b>Supplies Needed:</b>				
<b>Safety/Ergonomic Considerations:</b>				



# **MODULE FIVE**

## **Poke-Yoke for Safety Requirements**

## **POKE-YOKE FOR SAFETY REQUIREMENTS**

**Lean events can be used as a workplace intervention to improve both productivity and safety. Often times when completing a 6S, the improvement team focuses on the reorganization to improve productivity and safety regulations can take a back seat. This tool is to be used when reorganizing a workstation to ensure common safety regulations and hazards are still adhered to.**

### **Instructions:**

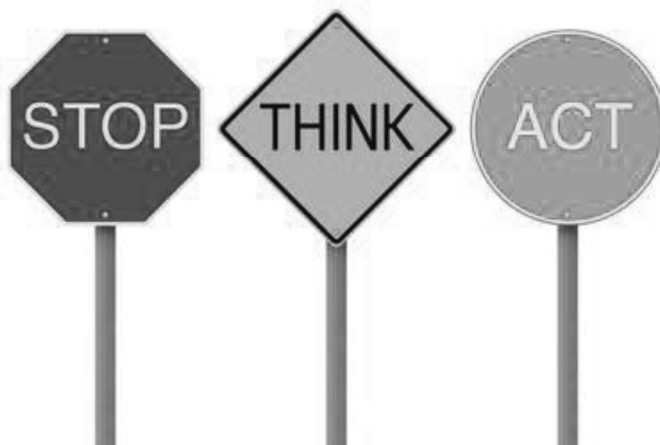
**At the top there is a section to identify the work station that is being targeted, the team members, start date, and projected finish date.**

**Below this, is a list of changes 1-4 (this number can be altered to suit the needs of the current change). Each change focuses on move or update to the current task workstation. With each move, the team should clearly identify what is moved and where, how it will affect production, and how it will affect safety. This will ensure that each move made to the workstation is necessary, and will point out any potential production or safety hazards the new area presents.**

**At the bottom of the page is a list of 15 common manufacturing safety regulations. At the end of the event, these items should be reviewed to ensure all are still met by the updated work station. If 'no' is checked for any of the items, the team should revisit that work station and make appropriate changes to ensure it is complaint with these regulations.**



# Poke-Yoke for Safety Requirements



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## PURPOSE

- Kaizen events can be used as a workplace intervention to improve both productivity and safety
- Often times when completing a 6S, the improvement team focuses on the reorganization to improve productivity and safety regulations can take a back seat
- This PowerPoint is a quick refresher on common safety regulations and hazards to keep in mind when completing a Kaizen event

改 **KAI=Change**  
善 **ZEN=Good**  
改善 **KAIZEN**  
(Continual Improvement)

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# FIRE EXTINGUISHERS

There is a **36"** clearance around each fire extinguisher.



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# WALKWAYS/EMERGENCY EXITS

Walkways and emergency exit(s) are accessible and workers know the appropriate route.



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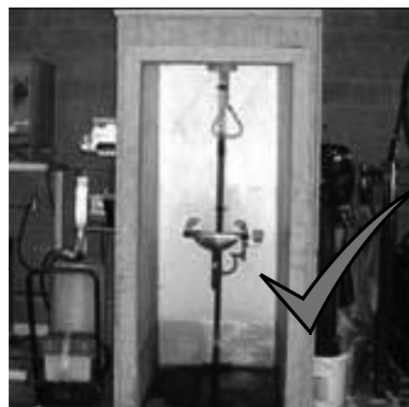
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# EYEWASH STATIONS

There is a **36"** clearance around each eyewash station.



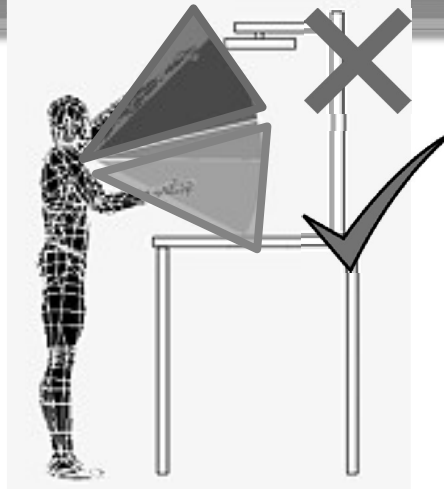
# ELECTRICAL PANELS

- The front of electrical panels has a minimum of three feet of clearance and a minimum width to be the width of the equipment or 2.5 feet, whichever is greater.



## AIR SHUT OFF VALVE

Air shut off point is within reasonable distance for employees: (tables should allow enough space if back to back and must not be too tall)



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## PHONE/EMERGENCY LIST

- There is a phone within reasonable distance from the workstation to be accessed for paging.
- The emergency phone list is located near the phone.



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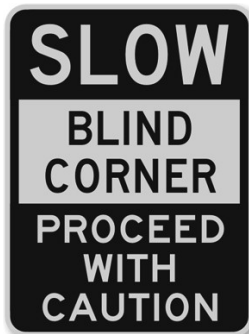


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## FORKLIFT TRAFFIC



- Employees and/or equipment does not interfere with forklift traffic.
- Blind corners are equipped with mirrors and/or warning signs.



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## FIRE SPRINKLER/SPEAKERS



- All fire sprinkler heads have at least an 18" clearance below.
- Employees in the workstation are able to hear the speakers/horns (add or relocate speakers if necessary)



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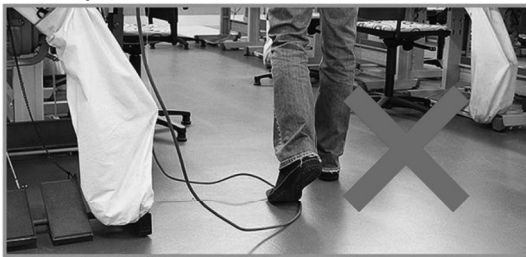
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# FLOORING/TRIP HAZARDS

- All floors are clean, dry, and slip resistant.
- Air hose lines and electrical cords are not a trip hazard.



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# STORAGE/LIGHTING

- All storage racks are bolted down to ensure stability.
- Site is properly lit



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## POKE-YOKE FOR SAFETY REQUIREMENTS

<b>Process:</b>		<b>Start Date:</b>	
<b>Team Members:</b>		<b>Projected Finish Date:</b>	
<b>Change #1</b>	<b>What is being moved and where?</b>	<b>How does the move affect production?</b>	<b>How does the move affect safety?</b>
<b>Change #2</b>	<b>What is being moved and where?</b>	<b>How does the move affect production?</b>	<b>How does the move affect safety?</b>
<b>Change #3</b>	<b>What is being moved and where?</b>	<b>How does the move affect production?</b>	<b>How does the move affect safety?</b>
<b>Is the work space still compliant with these safety regulations?</b>			
	<b>Regulation</b>	<b>Yes (X)</b>	<b>No (X)</b>
#1	There is a 36" clearance around each fire extinguisher.		
#2	There is a 36" clearance around each eyewash station.		
#3	The Contingency Quick Guide is located near the phone.		
#4	Air hose lines are not a trip		
#5	Air shut off point is within reasonable distance for		
#6	All fire sprinkler heads have at least an 18" clearance below.		
#7	Employees and/or equipment does not interfere with forklift traffic.		
#8	Employees in the workstation are able to hear the speakers/horns.		
#9	There is a phone within reasonable distance from the workstation to be accessed for paging.		
#10	Walkways and emergency exit(s) are accessible and workers know the appropriate route.		
#11	Blind corners are equipped with mirrors and/or warning signs.		
#12	All storage racks are bolted down to ensure stability.		
#13	All floors are clean, dry, and slip resistant.		
#14	Site is properly lit.		
#15	The front of electrical panels has a minimum of 3' of clearance.		
#16	Ladders are free of oil, grease and other slipping hazards.		
#17	Ladders are only on stable and level surfaces unless secured to prevent accidental movement.		
#18	Height of top rails, or guardrail is 42" ± 3" above the walking/working level.		
#19	Handrails are between 30"-37" from the upper surface of the handrail to the surface of the tread.		



# **MODULE SIX**

## **Task Distraction**



## **TASK DISTRACTION**

**Purpose:** Distractions are inevitable in work and life. However, they can be a serious safety and production concern. The goal of this tool is to identify task distractions and reduce them. By reducing the number of task distractions an employee experiences, both safety and production should improve.

### **Instructions:**

Whenever possible, this tool should be used by an observer watching an employee perform a specific task. When this is not possible, the employee performing the task can complete the form themselves, although this may not be as accurate because the tool itself may then become a distraction.

At the top, team members, a start date, and projected finish date for the task intervention should be identified. After this, there are two columns to compare the original task process and the revised task process.

On the original task process side, a thorough description of the task should be written, along with the primary reason(s) for conducting the intervention (i.e. an injury occurred at this task or this particular task is proving to be a bottleneck in the entire process). Below this is a list of 11 distraction points. While witnessing the employee perform the task, the observer should check off each distraction point that is made. At the bottom of this section is a place to score total distractions and the current production time of this task.

On the right side of the document is the revised task process. This side should be completed after revisions to the current task have been made and documented to reduce the number of current distractions. Once again, the observer should witness the employee perform the same task, but this time revised to minimize distractions. Each distraction that occurs should be checked off, just as before. Finally, the total distractions and production time should be documented.

At the bottom of the page is a simple area to document improvements to the process. From this intervention and raising awareness of all distractions the employee experiences, the number of distractions and production time should be reduced from the original.

## Distraction Tool



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### Purpose

- Distractions are inevitable in work and life
- Distractions can lead to safety and production issues
- Goal of this tool → identify and reduce task distractions
- Reducing task distractions will lead to safety and production improvements

**LOOK!  
A Distraction!**



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## Instructions

- Whenever possible, this tool should be used by an observer watching an employee perform a specific task
- When this is not possible, the employee performing the task can complete the form themselves, although this may not be as accurate because the tool itself may then become a distraction



## Headers

- At the top fill in:
  - Team Members
  - Start Date
  - Projected Finish Date
- After this, there are two columns to compare:
  - Original Task Process
  - Revised Task Process

Team Members		Start Date	
		Projected Finish Date	
Original Task Process		Revised Task Process	
Task Description:		Changes made to Reduce Distractions:	
Reason(s) for Intervention:		Distractions (please check all that apply)	
Distractions (please check all that apply) <input checked="" type="checkbox"/>		Distractions (please check all that apply) <input checked="" type="checkbox"/>	
A distraction led to...		A distraction led to...	
A quality error		A quality error	
A delay down the line		A delay down the line	
Employee frustration or lower job satisfaction		Employee frustration or lower job satisfaction	
The employee moving from their work station		The employee moving from their work station	
An injury or near-miss when the original task was resumed		An injury or near-miss when the original task was resumed	
A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)		A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)	

# Original Task

- Under the original task process side:
  - A thorough description of the task should be written ( include a picture if available)
  - The primary reason(s) for conducting an intervention (i.e. an injury occurred at this task or this particular task is a bottleneck for the entire process)
- Distraction Points
  - There is a list of 11 distraction points
  - The observer should check off each distraction point that affects the employee during the task
  - At the bottom, record the total distractions and the current production time

Original Task Process	Revised Task Process
Task Description:	Changes made to Reduce Distractions:
Reason(s) for Intervention:	
Distractions (please check all that apply) <input checked="" type="checkbox"/>	Distractions (please check all that apply) <input checked="" type="checkbox"/>
A distraction led to...	A distraction led to...
A quality error	A quality error
A delay down the line	A delay down the line
Employee frustration or lower job satisfaction	Employee frustration or lower job satisfaction
The employee moving from their work station	The employee moving from their work station
An injury or near-miss when the original task was resumed	An injury or near-miss when the original task was resumed
A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)	A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)
The distraction came from...	The distraction came from...
A phone or e-mail	A phone or e-mail
The employee not having the supplies they needed at their work station	The employee not having the supplies they needed at their work station
Assisting in a lower priority task than their original task	Assisting in a lower priority task than their original task
Assisting another employee who doesn't understand their own task	Assisting another employee who doesn't understand their own task
Assisting in a secondary task the employee is not fully trained on	Assisting in a secondary task the employee is not fully trained on
Total Distractions:	Total Distractions:
Production Time:	Production Time:
<b>Improvement</b>	
Total Distractions Reduced from Original:	Production Time Reduced from Original:



# Revised Task

- The revised task process side:
  - Should be completed after revisions to reduce the distractions in the task have been made and documented
  - Observer should witness the employee perform the task but this time with the revised method
  - The total distraction and production time should be documented

Original Task Process	Revised Task Process
Task Description:	Changes made to Reduce Distractions:
Reason(s) for Intervention:	
Distractions (please check all that apply) <input checked="" type="checkbox"/>	Distractions (please check all that apply) <input checked="" type="checkbox"/>
A distraction led to...	A distraction led to...
A quality error	A quality error
A delay down the line	A delay down the line
Employee frustration or lower job satisfaction	Employee frustration or lower job satisfaction
The employee moving from their work station	The employee moving from their work station
An injury or near-miss when the original task was resumed	An injury or near-miss when the original task was resumed
A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)	A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)
The distraction came from...	The distraction came from...
A phone or e-mail	A phone or e-mail
The employee not having the supplies they needed at their work station	The employee not having the supplies they needed at their work station
Assisting in a lower priority task than their original task	Assisting in a lower priority task than their original task
Assisting another employee who doesn't understand their own task	Assisting another employee who doesn't understand their own task
Assisting in a secondary task the employee is not fully trained on	Assisting in a secondary task the employee is not fully trained on
Total Distractions:	Total Distractions:
Production Time:	Production Time:
<b>Improvement</b>	
Total Distractions Reduced from Original:	Production Time Reduced from Original:



# Improvement

Improvement	
Total Distractions Reduced from Original:	Production Time Reduced from Original:

- Improvement Section:
  - A simple area to document improvements to the process
  - The number of distractions and production time should be reduced from the original

TASK DISTRACTION TOOL

Team Members		Start Date	
		Projected Finish Date	
Original Task Process		Revised Task Process	
Task Description:		Changes made to Reduce Distractions:	
Reason(s) for Intervention:			
Distractions (please check all that apply) <input checked="" type="checkbox"/>		Distractions (please check all that apply) <input checked="" type="checkbox"/>	
<b>A distraction led to...</b>		<b>A distraction led to...</b>	
A quality error		A quality error	
A delay down the line		A delay down the line	
Employee frustration or lower job satisfaction		Employee frustration or lower job satisfaction	
The employee moving from their work station		The employee moving from their work station	
An injury or near-miss when the original task was resumed		An injury or near-miss when the original task was resumed	
A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)		A cognitive delay when the employee returned to their original task (he/she had to take time to remember what they were previously doing)	
<b>The distraction came from...</b>		<b>The distraction came from...</b>	
A phone or e-mail		A phone or e-mail	
The employee not having the supplies they needed at their work station		The employee not having the supplies they needed at their work station	
Assisting in a lower priority task than their original task		Assisting in a lower priority task than their original task	
Assisting another employee who doesn't understand their own task		Assisting another employee who doesn't understand their own task	
Assisting in a secondary task the employee is not fully trained on		Assisting in a secondary task the employee is not fully trained on	
Total Distractions:		Total Distractions:	
Production Time:		Production Time:	
<b>Improvement</b>			
Total Distractions Reduced from Original:		Production Time Reduced from Original:	

# SAFETY/PROCESS IMPROVEMENT PROGRESS SUMMARY

	Date Started	Date Finished	Task	Tool Used	Improvement Measured
#1				Poke-Yoke for Safety Requirements	
#2					
#3					
#4					
#5					
#6					
#7					
#8					
#9					

# Improvement Report

This is a template to be used to summarize and report on an intervention in the work place using the OU/BWC developed tools to improve both productivity and safety.



## Team Members

- This slide should introduce the team members, what positions they hold in the company, the start date of the project and the end (or projected) end date.





## Current Process

- This slide(s) should detail the current process and include several pictures. It should include the purpose of the process, each step, materials needed, employee(s) involved, end goal (product), and estimated/average completion time.



## Problem Statement

- This slide should identify the problem with the current process. It can be several things, but each should be clearly identified and measurable. When looking at improvements at the end of the presentation, the team should go back to this statement and identify how it has been rectified.



## What Tools Used

- This slide should show what tool(s) used, why this one was selected, and show examples of the completed form. This slide should also clearly identify what was gained from using this form.



## Changes Made/New Process

- Based on the tool described in the previous slide, changes to the process should have been made. The changes should be identified (pictures is possible) and the new process outlined.



# Measured Improvement

- This slide should reference the problem statement from the beginning of this presentation. Improvements in production and/or safety should be measured and shown.
- Any future plans or sustainability plans for this task should also be addressed.



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