Reducing the Risk of Injury Between Forklifts and Workers
Benjamin Kohbeck, ASP
Scott Reineck, MS, CSP, CHMM

Session Objectives
By the End of This Session You Will Be Able To:
• Realize how poor the visibility is on a fork truck
• Know how to get your workforce involved
• Understand what the Forklift / Pedestrian Questionnaire is asking
• Perform a Risk Assessment on an intersection
• Identify potential solutions to reduce risk
• Implement a similar process at your facility

Bemis – Who We Are
61 Facilities in 11 Countries
~ 17,000 employees worldwide
After a number of close calls, Bemis Company, Inc. launched its *Forklift / Pedestrian Aisle Segregation Initiative* in 2011.

The initiative was tracked for all locations globally. Progress reported to our Division Presidents on a quarterly basis through 2014.

### Why is This Important?

- OSHA estimates that forklifts cause the following *per year*:
  - Fatalities: 85
  - Serious Injuries: 34,900
  - Non-Serious Injuries: 61,800

<table>
<thead>
<tr>
<th>Fatal Accident Type</th>
<th>%</th>
<th>Type of Industry</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushed by vehicle tipping over</td>
<td>42</td>
<td>Mining</td>
<td>1.2</td>
</tr>
<tr>
<td>Crushed between vehicle and a surface</td>
<td>25</td>
<td>Construction</td>
<td>23.8</td>
</tr>
<tr>
<td>Crushed between two vehicles</td>
<td>11</td>
<td>Manufacturing</td>
<td>42.5</td>
</tr>
<tr>
<td>Struck or run over by forklift</td>
<td>10</td>
<td>Transportation</td>
<td>11.0</td>
</tr>
<tr>
<td>Struck by falling material</td>
<td>8</td>
<td>Wholesale trades</td>
<td>12.5</td>
</tr>
<tr>
<td>Fall from platform on the forks</td>
<td>4</td>
<td>Retail trade</td>
<td>9.0</td>
</tr>
</tbody>
</table>
The segregation of forklift and pedestrian aisles is the right thing to do:
- Lowers the amount of interactions between employees and mobile equipment
- Reduces the risk of an injury resulting from an employee being struck by a forklift
- Creates a safer workplace for our employees, contractors and visitors

Why is This Important?

Available Tools
- Three tools were developed to assist with the segregation of aisles:
  - Forklift – Pedestrian Aisle Segregation Assessment Form
    - Provides an overall assessment of the extent of aisle segregation at a facility. Target assessment score is a minimum of 70. Note that this is **not** a risk assessment tool
  - Forklift – Pedestrian Aisle Risk Assessment Tool
    - Risk assessment tool contains instructions, risk assessment form, and a summary sheet. Forklift – pedestrian aisle risk assessments should be completed for each identified interaction point
  - Forklift – Pedestrian Aisle Segregation Solutions
    - Shows examples of proven forklift – pedestrian aisle segregation tools utilized by Bemis locations
### About the Process

- This presentation outlines the process (series of steps) Bemis Company, Inc. used for this initiative
- Bemis recognizes that:
  - Each facility's overall level of risk may be quite different
  - Locations begin this initiative at widely different levels of aisle segregation
  - Some locations might not be able to achieve the target score
  - Even if a facility reaches the initiative target assessment score they can and should continue making improvements

### 6 Steps to the Process

**Step 1:** Form a Forklift / Pedestrian Aisle Segregation Assessment Team

**Step 2:** Complete the Forklift / Pedestrian Aisle Segregation Assessment as a baseline

**Step 3:** Identify Forklift / Pedestrian Interaction Areas

**Step 4:** Conduct Risk Assessments of Interaction Areas

**Step 5:** Prioritize, Develop and Implement Corrective Actions

**Step 6:** Re-assess Site Using the Forklift / Pedestrian Aisle Segregation Assessment

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**Step 1: Form a Team**

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The recommended first step in the process to segregate a site’s forklift and pedestrian aisles is to form an **Aisle Segregation Team** to lead the process.

Team members should include employees from the following areas:
- Material Handling (Forklift Operators)
- Planning / Scheduling
- Shift Supervisor
- Safety
- Shipping/ Receiving
- Warehouse

**Form an Aisle Segregation Team**

**Team Responsibilities**
- Assist with the Baseline Assessment
- Conduct risk assessments
- Work on developing solutions

**Step 2: Conduct a Baseline Assessment**

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Scott Reineck, MS, CSP, CHMM
The Baseline Assessment

- Before developing a plan to segregate forklift and pedestrian aisles a site should obtain a baseline assessment of the facility’s current aisle segregation.

- The baseline assessment is performed using the Forklift - Pedestrian Aisle Segregation Assessment form.

The Baseline Assessment

- A site’s Aisle Segregation Team can quickly complete the baseline assessment which can be used to gauge future progress in segregating aisles.

- The Bemis goal is for a facility to score at least 70% utilizing this assessment form.

- Facilities were not expected to score 70% on their baseline assessment.

- If a site could never achieve 70% it was assessed to determine its maximum realistic target.

- The Assessment gives increased weighting based on the hierarchy of controls.

Hierarchy of Controls

<table>
<thead>
<tr>
<th>Control</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elimination</td>
<td>Prohibit forklift traffic in an area</td>
</tr>
<tr>
<td>2. Substitution</td>
<td>Use powered pallet jacks in an area instead of forklifts</td>
</tr>
<tr>
<td>3. Engineering Controls</td>
<td>Install barrier rails</td>
</tr>
<tr>
<td>4. Warnings</td>
<td>Install proximity warning lights</td>
</tr>
<tr>
<td>5. Administrative Controls</td>
<td>Require employees to use crosswalks</td>
</tr>
<tr>
<td>6. PPE</td>
<td>Require everyone to wear safety toe shoes (very limited protection from the weight of a forklift)</td>
</tr>
</tbody>
</table>
Forklift / Pedestrian Assessment

- Five Sections to the Assessment
  - Background Information
  - Segregation Controls
  - Visible and Audible Controls
  - Forklift Controls
  - Behavioral Actions

- Total of 32 Questions

First Section: Background Information

<table>
<thead>
<tr>
<th>Background Information</th>
<th>5</th>
<th>15%</th>
<th>Percent of plant employees trained to operate forklifts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of propane forklifts on site</td>
<td>1</td>
<td>6</td>
<td>Total number of forklifts on site</td>
</tr>
<tr>
<td>Number of electric forklifts on site</td>
<td>125</td>
<td>6.25</td>
<td>Plates of forklifts per 25,000 sq ft of plant floor</td>
</tr>
<tr>
<td>Number of plant employees</td>
<td>14</td>
<td>1.25</td>
<td>Ratio of forklifts per 25 plant employees</td>
</tr>
<tr>
<td>Square footage of plant floor space</td>
<td>389,080</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scoring the Questionnaire

<table>
<thead>
<tr>
<th>Identification of Forklift/Pedestrian Zones</th>
<th>70</th>
<th>70</th>
<th>100%</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>No identification of forklift/pedestrian zones</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal (30-90%) identification of forklift/pedestrian zones</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial (60-80%) identification of forklift/pedestrian zones</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant (70-100%) identification of forklift/pedestrian zones</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete (100%) identification of forklift/pedestrian zones</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation of Physical Barriers Between Forklift and Pedestrian Zones</th>
<th>170</th>
<th>170</th>
<th>100%</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>No use of physical barriers to separate forklift and pedestrian zones</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal (50-70%) use of physical barriers to separate forklift and pedestrian zones</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial (70-90%) use of physical barriers to separate forklift and pedestrian zones</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant (90-100%) use of physical barriers to separate forklift and pedestrian zones</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete (100%) use of physical barriers to separate forklift and pedestrian zones</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section A: Segregation Controls

1. Identification of Forklift and Pedestrian Aisles

2. Installation of Physical Barriers Between Forklift and Pedestrian Aisles

3. Identification of Pedestrian Crosswalks

4. Installation of Gates at Pedestrian Crosswalks

Do not install inward swinging gates where > 50 people will use that path as a way to an Exit

5. Installation of Gates, Barrier Tapes or Doors to Control Forklift or Pedestrian Traffic

6. Forklifts and Pedestrian Aisles Don’t Share the Same Doorway
Section A: Segregation Controls

7. Restriction of Forklift Traffic in Manufacturing (Non-Warehouse) Areas

Section B: Visible and Audible Controls

1. Installation of Mirrors

2. Installation of STOP Signs

3. Installation of Informational Signs

4. Installation of Motion Detectors and Proximity Devices
Section B: Visible and Audible Controls

5. Use of High Visibility Clothing

6. Installation of Traffic Lights

Section C: Forklift Controls

1. Control of Forklift Speed (our target < 6 mph)

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>3.7</th>
<th>7.5</th>
<th>8.7</th>
<th>9.9</th>
<th>11.2</th>
<th>12.4</th>
<th>13.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (feet / second)</td>
<td>5.4</td>
<td>10.9</td>
<td>12.8</td>
<td>14.6</td>
<td>16.4</td>
<td>18.2</td>
<td>20.0</td>
</tr>
<tr>
<td>Distance travelled while driver reacts and begins to apply the brakes in an emergency (feet)</td>
<td>8.2</td>
<td>16.4</td>
<td>19.0</td>
<td>22.0</td>
<td>24.6</td>
<td>27.2</td>
<td>30.2</td>
</tr>
<tr>
<td>Total emergency stopping distance (feet)</td>
<td>9.5-10.5</td>
<td>23-26</td>
<td>26-33</td>
<td>31-39</td>
<td>36-43</td>
<td>43-54</td>
<td>48-62</td>
</tr>
</tbody>
</table>


Section C: Forklift Controls

2. Forklift Flashing Lights

3. Forklift Blue Lights
   • Added as bonus points in 2014
Section D: Behavioral Actions

1. Use of Pedestrian Aisles by Employees

2. Facility Rules and Actions (Multiple Questions)
   • No use of communication devices while walking in the facility (Mind on Task)
   • Employees on-site must look where they are walking (Eyes on Path)

   • Installation of automatic systems on forklifts that turn the unit off if it hits something
   • Forklift operators use a visible signal to restrict employees from an area
   • Forklift operators and employees must make eye contact before passing by each other
   • Implement the “Give Me 5” process

Give Me 5 Process

Neither the pedestrian nor the forklift have the right of way

Maintain a distance of at least 5 feet between you and a forklift

Do not proceed unless eye contact and a signal has been made between you and the Forklift Operator
Section D: Behavioral Actions

2. Facility Rules and Actions (Multiple Questions) Continued . . .

- Pedestrians must use crosswalks when crossing a forklift aisle
- Forklift operators must honk their horn at all intersections and doorways
- No use of communication devices while operating a forklift in the facility
- Employees entering an aisle in a warehouse implement a visible signal to a forklift operator that there is a person inside that aisle

Step 3: Identify Areas Where Forklifts & Pedestrians Interact

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Scott Reineck, MS, CSP, CHMM

Identifying Areas of Interaction

- Prior to conducting risk assessments and identifying segregation solutions it is important that a site identify its forklift and pedestrian interaction areas
- The following simple process can be used by the Aisle Segregation Team to identify forklift – pedestrian interaction areas
Identifying Areas of Interaction

Obtain current plant diagram indicating aisles, doorways, equipment, and racking

Mark all current pedestrian aisles with a highlighter (yellow for this example)

Mark all current forklift aisles and areas with a highlighter (light blue for this example)
Step 4: Perform Risk Assessments on Areas of Interaction

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Performing Risk Assessments

- A risk assessment should be performed on each identified forklift – pedestrian interaction area.
- The Forklift – Pedestrian Aisle Risk Assessment Tool has been developed to specifically assess the risk of identified interactions.
- Sites should utilize their risk assessment results to assist with the prioritization and development of a timetable to address this initiative and with the selection of aisle segregation solutions.
Risk Assessment Tool

Risk Assessment - Severity

**Catastrophic**: Death or Permanent Disability (Amputation, Lack of motion in arm, Inability to close hand, Walking with a limp, loss of eyesight, etc.)

**Critical**: Broken bone, 3rd degree burn, 2nd degree burn over 10% of the body, torn ligaments, etc.

**Marginal**: Laceration, 2nd degree burn, deep bruise, strained muscle, etc.

**Negligible**: Small cut (no stitches), small 2nd degree burn, 1st degree burn, bruise, etc.

Risk Assessment - Probability

Consider the following:

- How close does the forklift operator need to get to employees?
- How tight is the workspace?
- Is the workspace shared by forklifts and people?
- How fast do forklifts operate?
- How good is the visibility in the area:
  - For the employee?
  - For the forklift operator?
  - Are there any permanent or typical obstructions?
- Do employees frequently look at paperwork or electronic devices instead of where they are walking?
- Do forklift operators drive like they are part of the NASCAR circuit?
Risk Assessment - Frequency

To determine frequency identify the average number of times forklift operators and workers
• Cross paths or
• In the same area (without physical barriers in place)

How Many Interactions are There?

| 3 PITs | x 4 pedestrians | = 12 interactions |

Identifying Areas of Interaction

Risk Assessment Form Example

10 x 5 = 50
Step 5: Identify and Implement Solutions to Reduce Risk

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Scott Reineck, MS, CSP, CHMM

Identifying and Implementing Solutions

- Identifying aisle segregation solutions should be done utilizing the:
  - Baseline assessment
  - Identified interaction areas
  - Risk assessment results
  - Forklift – Pedestrian Aisle Segregation Solutions
    - Feedback from employees from all affected areas
  - Utilize the Forklift – Pedestrian Interaction Area diagram to map out proposed solutions
Create An Action Plan

<table>
<thead>
<tr>
<th>Priority Scoring</th>
<th>50 - 100</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 - 49</td>
<td>Serious</td>
<td></td>
</tr>
<tr>
<td>18 - 29</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>6 - 17</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>1 - 5</td>
<td>Minimal</td>
<td></td>
</tr>
</tbody>
</table>

Identifying and Implementing Solutions

Engineering Controls

Administrative Controls

Before Improvements
Identifying and Implementing Solutions

Step 6: Re-Assess

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Re-Assess

• To gauge the effectiveness of implemented aisle segregation solutions it is recommended that a site periodically:
  • Update their Forklift – Pedestrian Aisle Segregation Assessment
  • Re-assess the risk in interaction areas using the Forklift – Pedestrian Risk Assessment Tool
Re-assess Risk

Lowering the risk of an employee being injured from a forklift or other moving vehicle is a never ending process

Each site has unique areas and risks that need to be addressed through change in process, behaviors, and by implementing physical segregation solutions

With some time and resources, you too can make your facility a safer place to work!

Summary

- Lowering the risk of an employee being injured from a forklift or other moving vehicle is a never ending process
- Each site has unique areas and risks that need to be addressed through change in process, behaviors, and by implementing physical segregation solutions

With some time and resources, you too can make your facility a safer place to work!