IMPROVED SAFETY THROUGH A PROACTIVE LEAN APPROACH
Objective

By the end of this overview, you will:

• Understand the basics of Lean
• Understand the basics of the Safety and Health Model
• Understand how lean tools integrate with your safety programs
Agenda

• Lean Overview
• Safety and Health System Model Overview
• Lean Daily Management
  ▪ Visual Metrics
  ▪ Baseline Metrics
• Lean Tools
  ▪ Root Cause Analysis Tools
    ➢ 5 Why
    ➢ Cause and Effect
  ▪ Rattlesnake Hunts
  ▪ 5S / 6S
  ▪ Kaizen Events
Defining Lean

*Lean is:*

“A systematic approach to identifying and eliminating waste (non-value-added activities) through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection.”

The MEP Lean Network
Lean = Eliminating Waste

Typically 95% of all lead time is non-value-added (NVA).

- Defects
- Overproduction
- Waiting
- Non / Underutilized people
- Transportation
- Inventory Excess
- Motion Excess
- Extra processing (NVA)
Traditional Safety

- Safety Training
- Policies
- Slogans
- Regulations
- Committees & Councils
- Contests & Rewards
- Safety Meetings
- Reprimands

Fewer Accidents
Why Change

- 94% of accidents occur because of unsafe actions, at-risk behaviors or poor decisions
- 6% of accidents occur because of unsafe conditions, OSHA violations, Dangerous equipment

Therefore, compliance is necessary but not sufficient for great safety.
Safety is about people and behavior is the challenge
Safety and Health System Model

Management Leadership and Employee Involvement

Worksite Analysis

Hazard Prevention and Control

Safety and Health Training
Safety Systems and Lean Manufacturing

Management Leadership and Employee Involvement
- Lean Daily Management
- Kaizen Events

Worksite Analysis
- Gemba Walks
- Rattle Snake Hunts
- Audits

Hazard Prevention and Control
- 5S / 6S
- 5 Why
- Cause and Effect.

Safety and Health Training
Lean Dailey Management Is

• The practices and tools used to monitor, measure and sustain the operation of Lean Manufacturing systems (Lean Production)
• Identifies where actual performance fails to meet expected performance
• Components of System
  ▪ Leader Standard Work (Engine)
  ▪ Visual Controls (Transmission)
  ▪ Daily Accountability (Controls)

Typical Start for Lean Management Systems: Visual Controls

Fuel of system is: Discipline
Lean Daily Management and Safety

- Leader Standard Work
  - Safety Audit
- Visual Controls
  - Safety Measuring System
    - Performance Metrics
    - Baseline Metrics
- Daily Accountability
  - Work Place Hazard Identification
  - Gemba Walks
Balanced Approach to Measuring Safety

- Results
- Severity
- Recordable
- Cost

- Process
- Training
- Audits
- Compliance
- Analysis

- People
- Perceptions
- Workers
- Supervisors
- Managers

- Culture
- Behaviors
- Conditions

Improved Safety
Visual Metrics

Line Graph Showing Leading Indicator Findings

Green Cross
Baseline Metrics

Private Industry: Injury and Illness Incidence Rate By Year

Incidence Rates (2014)
### Incidence Rate By Hazard Type (2014)

<table>
<thead>
<tr>
<th>Hazard Type</th>
<th>Private Industry</th>
<th>Manufacturing</th>
<th>Transportation and Warehousing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculoskeletal Injuries</td>
<td>31.9</td>
<td>36.3</td>
<td>89.9</td>
</tr>
<tr>
<td>Contact with objects</td>
<td>24</td>
<td>37.5</td>
<td>43</td>
</tr>
<tr>
<td>Fall to lower level</td>
<td>5.3</td>
<td>4</td>
<td>13.7</td>
</tr>
<tr>
<td>Fall on same level</td>
<td>16.6</td>
<td>11.4</td>
<td>30.4</td>
</tr>
<tr>
<td>Slips of trips without fall</td>
<td>4</td>
<td>3.2</td>
<td>9</td>
</tr>
<tr>
<td>Over exertion in lifting or lowering</td>
<td>10.7</td>
<td>11.2</td>
<td>30.8</td>
</tr>
<tr>
<td>Repetitive露</td>
<td>2.7</td>
<td>6.4</td>
<td>3.6</td>
</tr>
<tr>
<td>Exposure to harmful substances or environments</td>
<td>4</td>
<td>5.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Transportation</td>
<td>5.1</td>
<td>2.3</td>
<td>25</td>
</tr>
<tr>
<td>Fires and explosions</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Violence and other injuries by person or animal</td>
<td>4</td>
<td>0.5</td>
<td>2.9</td>
</tr>
</tbody>
</table>

### Incidence Rate By Industry (2014)

[Bar chart showing incidence rates by industry.]
Incidence Rate By Nature Of Injury Or Illness (2014)

<table>
<thead>
<tr>
<th>Injury Type</th>
<th>Private Industry</th>
<th>Manufacturing</th>
<th>Transportation and Warehousing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprains, Strains, tears</td>
<td>35.4</td>
<td>31.6</td>
<td>106.8</td>
</tr>
<tr>
<td>Fracture</td>
<td>8.6</td>
<td>10</td>
<td>17.6</td>
</tr>
<tr>
<td>Cuts and lacerations</td>
<td>7.6</td>
<td>10.9</td>
<td>9.1</td>
</tr>
<tr>
<td>Amputations</td>
<td>0.5</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td>Bruises</td>
<td>7.9</td>
<td>7.7</td>
<td>18.4</td>
</tr>
<tr>
<td>Heat / burns</td>
<td>1.4</td>
<td>1.7</td>
<td>0.4</td>
</tr>
<tr>
<td>Chemical burns</td>
<td>0.4</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Carpal tunnel</td>
<td>0.7</td>
<td>1.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Tendonitis</td>
<td>0.2</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Multiple traumatic injuries</td>
<td>2.8</td>
<td>2.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Soreness pain / including back</td>
<td>16</td>
<td>13.1</td>
<td>35.1</td>
</tr>
<tr>
<td>All others</td>
<td>14.9</td>
<td>18.8</td>
<td>27.2</td>
</tr>
</tbody>
</table>
Safety Inspections / Audits

• Audits
  - Compliance Based
  - Focus is on “Things”
    - Are fire extinguishers in their correct location and not blocked
## Workplace Safety Survey

<table>
<thead>
<tr>
<th>Chemical Storage &amp; Safety</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chemical containers properly labeled, stored, &amp; closed when not in use.</td>
<td></td>
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</tr>
<tr>
<td>2. Chemicals segregated and stored by compatibility.</td>
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<tr>
<td>3. Peroxide formers dated at purchase and again upon opening.</td>
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<tr>
<td>4. Peroxide formers disposed of within proper time frames.</td>
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<tr>
<td>5. Secondary containment used where appropriate.</td>
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<tr>
<td>6. Vacuum equipment trapped and/or filtered.</td>
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<tr>
<td>7. Chemical storage areas free of ignition sources.</td>
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</tr>
<tr>
<td>8. Refrigerators/Freezers properly labeled.</td>
<td></td>
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<tr>
<td>9. Refrigerators/Freezers properly rated if flammable liquids are stored within.</td>
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<tr>
<td>10. Fume hoods and/or biosafety cabinets not used for general storage.</td>
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<tr>
<td>11. Cryogenic materials stored properly and proper PPE available.</td>
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<tr>
<td>12. Flammable liquids in containers over 4 L are in approved safety cans.</td>
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<tr>
<td>13. Corrosive storage cabinet used if more than 10 gal of corrosives present.</td>
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<tr>
<td>14. Chemicals purchased in amounts that can be used within a reasonable time.</td>
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<tr>
<td>15. Chemical stocks purged of old, out-dated, and unusable chemicals.</td>
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</tr>
<tr>
<td>16. Chemical inventory up to date and copy sent to EH&amp;S.</td>
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</tr>
</tbody>
</table>

## Compressed Air and Compressed Gases

<table>
<thead>
<tr>
<th>Compressed Air and Compressed Gases</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air compressors equipped with pressure gauges and pressure relief valves.</td>
<td></td>
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</tr>
<tr>
<td>2. Compressed air piping, hoses and fittings in good condition.</td>
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</tr>
<tr>
<td>3. Compressed air 30 psi or less for machine/parts cleaning, 10 psi for clothing.</td>
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<tr>
<td>4. Compressed air cleaning nozzles with chip/particle deflection device.</td>
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<tr>
<td>5. Gas cylinders w/30 lb or more water capacity have valve protection capability.</td>
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<tr>
<td>6. Gas cylinders legibly marked as to their contents.</td>
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<tr>
<td>7. Gas cylinders stored away from high heat, flames, etc.</td>
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<tr>
<td>8. Gas cylinders stored in secure area and secured from tipping or falling.</td>
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<tr>
<td>9. Gas cylinders transported on cylinder carts.</td>
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</tr>
<tr>
<td>10. When in use, gas cylinders kept away from elevators, stairs, and ramps.</td>
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</tr>
<tr>
<td>11. Valve protectors used when cylinders not in use or when being transported.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>12. Liquefied gas cylinders (acetylene) always shipped and stored valve-end up.</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Workplace Hazards

A “WORKPLACE HAZARD” is:
An unsafe condition or practice (Act)
That could cause injury or illness to an employee
Job Hazard Analysis

<table>
<thead>
<tr>
<th>Task Description: Worker reaches into metal box to the right of the machine, grasps a 15-pound casting and carries it to grinding wheel. Worker grinds 20 to 30 castings per hour.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sequence of Basic Job Steps</strong></td>
</tr>
<tr>
<td>Break job into basic steps that tell what is done first.</td>
</tr>
<tr>
<td><strong>Potential Accidents/Hazards:</strong></td>
</tr>
<tr>
<td>What accidents could occur to the person doing the step (i.e., struck by or against; caught in, fall, etc.).</td>
</tr>
<tr>
<td><strong>Recommended Job Procedures</strong></td>
</tr>
<tr>
<td>What exactly should the person do or not do to avoid the accident.</td>
</tr>
<tr>
<td>1. Reach into metal box to right of machine, grasp casting, and carry to wheel.</td>
</tr>
<tr>
<td>a. Struck by falling parts. Picking up casting, employee could drop it onto foot. The casting’s weight and height could seriously injure the worker’s foot or toes.</td>
</tr>
<tr>
<td>1. Remove castings from box and place them on a table next to the grinder.</td>
</tr>
<tr>
<td>2. Wear steel-toed shoes with arch protection.</td>
</tr>
<tr>
<td>3. Change to protective gloves that allow a better grip.</td>
</tr>
<tr>
<td>4. Use a device to pick up castings.</td>
</tr>
<tr>
<td>b. Contact with sharp burrs and edges of castings can cause severe lacerations.</td>
</tr>
<tr>
<td>c. Strains to lower back from reaching, twisting, and lifting 15-pound castings from the floor.</td>
</tr>
</tbody>
</table>
Lean Tools and Safety

Improved Safety Performance

- 5 Why Cause and Effect
- Kaizen Events
- 5S / 6S
- Gemba Walks Rattlesnake Hunts

Metrics

Lean Daily Management
Cause and Effect Diagram (Fishbone Diagram)

- Chemical Spilled From Machine Burns Operator
- Machine
- Man
- Material
- Environment
- Measurement
- Methods
- Cause
• A method of root cause analysis
• How can the actual root-cause of the problem be determined?
5 Why: Why Did The Worker Injure Himself

**Why 1**
- Why did the worker injure himself?
- Because he fell from a ladder

**Why 2**
- Why did he fall from a ladder?
- Because he was not holding onto the ladder and overbalanced backwards

**Why 3**
- Why was he not holding onto the ladder?
- Because he was using both hands to remove a large section of guttering

**Why 4**
- Why was he using both hands to remove the guttering?
- Because the system of work for gutter replacement was flawed so it was not possible for the worker to maintain three points of contact with the ladder

**Why 5**
- Why was there a flawed system of work in place?
- Because the job had not been properly planned in advance
Rattlesnake Hunt

Background

• Waste is the enemy!
• One of the first steps towards educating people is to help them see and identify waste. By seeing waste in a visual way, associates will remember what to look for.

Set up and tools needed:

• 3 teams of 3-5 people
• Conference room with 3 walls
• 3 Digital Cameras
• Computer and Printer
• Prizes
• Rattle Snake Tags – see next slide - print out yellow or on yellow paper.

Key Benefits:

• Employees learn to see waste for themselves: safety issues, maintenance issues, other bottlenecks, etc.
• Proactive action to eliminate issues before they bite us.
Elements of 6S

Safety – Identify potentially unsafe conditions and actions, and proactively take action to avoid occurrences

Sort - Perform “Sort Through and Sort Out,” by placing a red tag on all unneeded items and moving them to a temporary holding area. Within a predetermined time the red tag items are disposed, sold, or moved. “When in doubt, throw it out!”

Set in Order - Identify the best location for remaining items, relocate out of place items, set inventory limits, and install temporary location indicators.

Shine - Clean everything, inside and out. Continue to inspect items by cleaning them and to prevent dirt, grime, and contamination from occurring.

Standardize - Create the rules for maintaining and controlling the first 4 S’s and use visual controls.

Sustain - Ensure adherence to the 6S standards through communication, training, and self-discipline.
Safety Issues

Material Handling Issues

Trip Hazards

Electrical Cabinet Cleared
What Is A Kaizen Event

• A cross functional group of people who study a process, identify all possible types of waste, then make changes to eliminate as much waste as possible.

• A Kaizen Event lasts only 3 - 5 days!

• It is the engine that powers radical change and **Continuous Incremental Improvement.**
Local Magnet Rep for Canton Area

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  ▪ Manufacturing Liaison
  ▪ Office: 330-458-2062
  ▪ Cell: 330-418-0476

• Gwido Dlugopolsky
  ▪ Senior Lean Consultant
  ▪ Cell: 440-915-6847