Prevention through Design (PtD)

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Objectives

- Review the benefits of Prevention through Design (PtD)
- Discuss how PtD and Lean compliment each other.
- Become familiar with how to establish a PtD Process
- Identify and manage potential risks of collaborative PtD processes
What is Prevention through Design?

It’s a PROCESS

Addresses safety and health needs

During the design stage

Anticipates and prevents or minimizes hazards and risks

By designing out the risk!
Benefits of Prevention through Design

Cost Savings
- Design Out Risk
- Reduce Injury Costs

Employee Acceptance
- Involved in Process
- Collaboration on Solutions

Improved Efficiencies
- Eliminate Inefficient Processes
- Reduce Components

PtD = ROI
Similar to Lean

Focuses on eliminating Waste which leads to Risk.

Collaborate process that involves front line workers.

Engages everyone in the building process from Architects to Contractors.

Demonstrate additional value to Owners of collaboration with Contractors.

Can eliminate risk to Owner’s employees as well as Contractor employees.
An Overview of the Process

- **Plan**
  - Develop a PtD Project Plan

- **Assess**
  - Conduct Risk Assessment

- **Design**
  - Develop Design Expectations for Risk Reduction (DERR)

- **Review**
  - Conduct Design Review

- **Verify**
  - Monitor Construction/Installation/Process Change and Verify

- **Learn**
  - Review Project and Document Lessons Learned

*Eliminate Injuries*
**PLAN**

**Develop PtD Project Plan**

- Establish scope of the PtD Plan
- Identify key stakeholders and define responsibilities
- Establish a Design Review Team
- Determine expertise needed from internal and external sources
# Plan and Track

## Prevention Through Design Project Tracking Sheet

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>TASK DESCRIPTION</th>
<th>Start Date</th>
<th>End Date</th>
<th>Complete</th>
<th>Ongoing/Incomplete</th>
<th>Dan</th>
<th>Bruce</th>
<th>Mike</th>
<th>Status and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>1.</strong> Develop PTD project scope for inclusion in the plan.</td>
<td>Sept 20</td>
<td>Oct 5</td>
<td>complete</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Dan, Bruce, and Mike review Fred’s PTD project scope when sent by October 1. Send any comments to Fred and Mike by October 1. All reviews done by October 3rd. Status – complete added to the plan.</td>
</tr>
<tr>
<td></td>
<td><strong>2.</strong> Identify key stakeholders and develop list of responsibilities for inclusion in the plan</td>
<td>Sept 20</td>
<td>October 5</td>
<td>complete</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Dan and Bruce identify key stakeholders and develop a list of their responsibilities for inclusion in the plan. Send to Mike and Fred for review by October 5. Status – complete added to the plan</td>
</tr>
<tr>
<td></td>
<td><strong>3.</strong> Establish design review team</td>
<td>Oct 5</td>
<td>October 20</td>
<td>Ongoing</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>Dan will work with management to establish the design review team after the scope and responsibilities have been established.</td>
</tr>
</tbody>
</table>

Sample Tracking Sheet to Monitor PtD Project Progress
Design Review Team

- Management: both upper management and line supervision
- Employees
- Architects, designers, and engineers
- Safety and health professionals
- Contractors
- Suppliers of equipment, machinery or tools
- Others as needed, such as Industrial Hygienist, Purchasing, or Legal Counsel
- Insurance Broker
ASSESS

Conduct Risk Assessment

- Select Risk Assessment method
- Conduct Risk Assessment of planned process or operations
- Prioritize risks
• Commercial General Liability: General Contractor (GC)
  • Trigger: Bodily Injury (BI)/Property Damage (PD) arising from an occurrence
  • CG 2243 – full professional liability exclusion
  • CG 2279 – excludes professional services (except means and methods)
  • CG 2280 – offers limited design related errors

• Professional: Designer/Engineering
  • Trigger: Negligence/Standard of Care, doesn’t need occurrence
  • Does not cover construction means and methods (temporary jobsite structures)
  • “Other Insurance” clause
Risk Assessment Process

Sample Process from ANSI/ASSE Z590.3 – 2011
Risk Assessment

• Assess Existing and Future Buildings, Structures or Processes
• Choose the risk assessment tool.
• Meet with key stakeholders to identify tasks and hazards.
• Determine if training in how to perform a risk assessment is needed.
• Review plans to identify tasks and hazards.
• Brainstorm to anticipate sources of highest risk.
• Set priorities for risks to target for reduction.
Identifying Tasks and Corresponding Hazards

- Use a systems approach
- Examine:
  - Plans and specifications
  - Work expectations and waste
  - Common behaviors and waste
  - Similar buildings or operations (including loss history, risk assessments and job hazard analyses)
  - Maintenance procedures and waste
  - Relevant codes, standards and regulations
- Interview current or intended users
Brainstorm Future Hazards

• Building a new plant, tanks will be installed to feed the production process.

Task:
1. Workers need to climb to the top of the tank to measure fluid inside from the top.

Risks:
• Falls from Heights while climbing and working/taking readings on top of tank.
Assessing the Risks

• Questions to consider
  • What aspect of the technology or activity produces waste and risk?
  • What action or inaction causes risk?
  • Where are the potential sources of high severity injuries?
    • High/low pressure or temperature, work at elevation, unplanned energy release, hazardous material release, etc.
  • Any standard controls for common risks without performing detailed Risk Assessment (e.g. parapet or guardrail at roof perimeter)?

Develop New Controls

Can the need for workers to access the tank top be eliminated? No

Can the fall hazard be eliminated thru work process change? No

Can we engineer or guard against the hazard? No

Design Fall Arrest System and Anchor Points

Yes

Design a way to measure levels from the ground. Change the design of the tank tops. Elevation Risk is eliminated.

Yes

Eliminate the hazard by changing a process

Yes

Design guardrails for the tank top
Workers must periodically climb to access top of tanks to take measurements from top of tanks.

- Redesign of tanks/process to integrate measurement systems with gauges at ground level so that workers can take measurements without need to access top of tanks.
- Process/equipment change eliminates the need for the part of the task that has risk.
- Climbing and top of tank measurement no longer done since workers don’t need to be at elevation to perform task.

Collaborate with the customer to work on both risk and waste!
Develop Design Expectations for Risk Reduction (DERR)

- Use the Hierarchy of Controls to select the most effective risk reduction strategies.
- Develop Design Expectations to address priorities from the Risk Assessment.
- Provide to Architects/Designers for inclusion in project design planning.
- Communicate guidance on PtD process expectations.
DERR – What Can Be Done to Reduce Risk

• Creates a guide for designers, architects, engineers:
  • What you want to see (or not see) in current and future designs to reduce risk.

• Consider the life cycle of what is being designed:
  • Construction, use, maintenance and disposal.

• Use the Hierarchy of Controls to select most effective solutions.

Hierarchy of Controls

1. Elimination:
   - Design out the hazard

2. Substitution:
   - Replace with lower risk alternative

3. Engineering:
   - Physically isolate the hazard

4. Warnings:
   - Signs and labels; automatic and manual warning systems

5. Administration:
   - Training, organization and methods of work

6. Personal Protection:
   - Equipment to individually protect each worker
Example DERR’s

Design to Reduce Risk During Construction

• Design components that can be pre-fabricated off-site or on the ground to avoid assembling or erecting at heights and to reduce worker exposure to falls from heights.¹

Design to Reduce Risk for All Users

• Walkway surfaces shall be slip resistant under expected environmental conditions and use.²
• Design chemical processes to be conducted in closed systems, where feasible.³

Design to Reduce Risk for Maintenance

• Where feasible, systems shall be designed to avoid confined space entry.³
• Design the structure so that maintenance can be performed at ground level or safely from the structure, for example, positioning air-conditioning units and lift plant at ground level.¹

¹ Safe Design of Structures: Code of Practice July 2012 Safe Work Australia
² ASTM: F1637 – 13 - Standard Practice for Safe Walking Surfaces
³ ANSI/ASSE Z590.3 – 2011 - Prevention through Design Guidelines
Conduct Design Review

- Review Drawings/Plans/Process Designs for improvement opportunities.
- Verify plan adherence to DERR.
- Communicate variances.
- Develop alternative control plans with vendors.
Roof Fall Risk Elimination

- A design review revealed no guardrails or safe access to the roof.
- No guardrail designed around the Green Roof.
- Workers access the roof through a window to perform maintenance.
Prevention through Design
Monitor Construction /Installation Process

Change and Verify

- Monitor and verify Implementation of expectations.
- Address needs that arise for change.
- Ensure effective communication with vendors.
Monitor Construction

• Drain Pipe location was identified as a risk factor during the Design Review and location was redesigned to eliminate the trip/fall hazard.
• Design changes were not communicated.
• During the monitoring of construction the issue was found and corrected.
LEARN

Review Project and Document Lessons Learned

- Review the overall PtD process for improvements.
- Update the DERR’s for use on Future Projects.
- Discuss Lessons Learned and what can be done to eliminate or reduce missed opportunities on future projects.
Lessons Learned

• Lesson Learned - post construction changes can be costly.

• Design Review Team learned the vault covers were slippery at one finished entrance.

• Mats placed on them to cut down on slip fall exposure blocked required venting.

• Working with the utility and Design Review Team, the size of the covers was reduced, the vault relocated and the metal covers treated with a slip resistant material.
Renovation

• You may have a smaller Design Review Team.
  • Encourage employees impacted by the renovation to participate.
  • Take advantage of the knowledge and experience of front line workers.

• Take this lessons learned from current sites to your renovations.
  • Use the opportunity to correct issues that produce risk.

Servicing lighting can be costly and high risk.

Design to reduce risk during maintenance.
Evaluate All Risk

• Have your Design Review Team look at all aspects of the design both contractor and owner employee exposures.

• It could save lives, dollars and prevent a liability incident.
Roadmap to Risk Reduction

1. Develop PIQ Project Plan
   - Establish scope of PIQ plan
   - Identify key stakeholders and define responsibilities
   - Establish a Design Review Team
   - Determine expertise needed from internal and external sources

2. Conduct Risk Assessment
   - Select Risk Assessment method
   - Conduct Risk Assessment of planned process or operations
   - Prioritize risks

3. Develop Design Expectations for Risk Reduction (DERR)
   - Develop design expectations to address priorities from the Risk Assessment output
   - Provide to Architect/Designers/Planners for inclusion in project design planning
   - Communicate guidance on PIQ process expectations
   - Use the Hierarchy of Controls to select the most effective risk reduction strategies

4. Conduct Design Review
   - Review Drawings/Plans/Process Designs for improvement opportunities
   - Verify plan adherence to DERR
   - Communicate variances
   - Develop alternative control plans where needed

5. Monitor Construction/Installation/Process Change and Verify
   - Monitor and verify implementation of expectations
   - Address needs that arise for changes
   - Ensure effective communication with vendors

6. Review Project and Document Lessons Learned
   - Review the overall PIQ process for improvements
   - Update the DERR’s for use on future projects
   - Discuss lessons learned and what can be done to eliminate or reduce missed opportunities on future projects
Summary

• PtD can provide ROI with cost savings, improved efficiency and reduced injuries.
• Start early in the design phase for best results.
• Focus on the highest risks.
• Use the Hierarchy of Controls for most effective solutions.
• Define and communicate expectations for designs that will reduce risk.
Questions and Comments