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Getting Started with Prevention through Design

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Introduction

If you ask someone in the safety profession, "Do you want to reduce risk and save money at the same time?" the answer is always a resounding "yes." That's why the concept of Prevention through Design (PtD) has gained so much momentum in the past few years.

PtD is an invaluable tool that allows organizations to address safety measures early in the design process, which has proven to decrease risk and save money. Risk is minimized by eliminating hazards before they're created and applying solutions higher in the Hierarchy of Controls. Costs are reduced in two ways: in applying the initial solution, and by minimizing injuries, reducing claims, and decreasing lost production time.

Applying PtD can have a dramatic impact on an organization's overall safety program, since it applies to all aspects of safety—from fall protection to electrical safety to confined spaces. PtD principles can be used when designing process upgrades, renovations, demolitions and new construction.

Even if you conceptually agree with PtD, how do you begin implementing it in your organization? This paper explains key principles for getting started with PtD, and concludes with how one organization implemented the process.

In the Beginning

While the PtD concept can be applied to any project, it is ideal to have a coordinated PtD program that is accepted throughout the organization. In 2011, a new consensus standard related to this concept, *Prevention through Design Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes,*[i] was published by the American National Standards Institute (ANSI). This standard provides guidance on roles, responsibilities, review processes, and documentation that enhance the implementation of PtD principles.

In addition, the graphic in Exhibit 1 shows a sample process for planning and implementing a PtD program[ii]. By developing the program before implementing PtD on projects, the stakeholder

will understand the benefits and processes required to be most successful. Without developing a program, more time will be spent during implementation to educate team members and gain buy-in for cooperation.

It's also important to note that management backing is essential to develop and maintain a PtD program. When managers hold design teams accountable for minimizing risk, everyone is more motivated to ensure that safety is considered early and often. Ideally, this becomes part of an organization's culture, and everyone embraces the idea of addressing safety throughout a project's continuum.

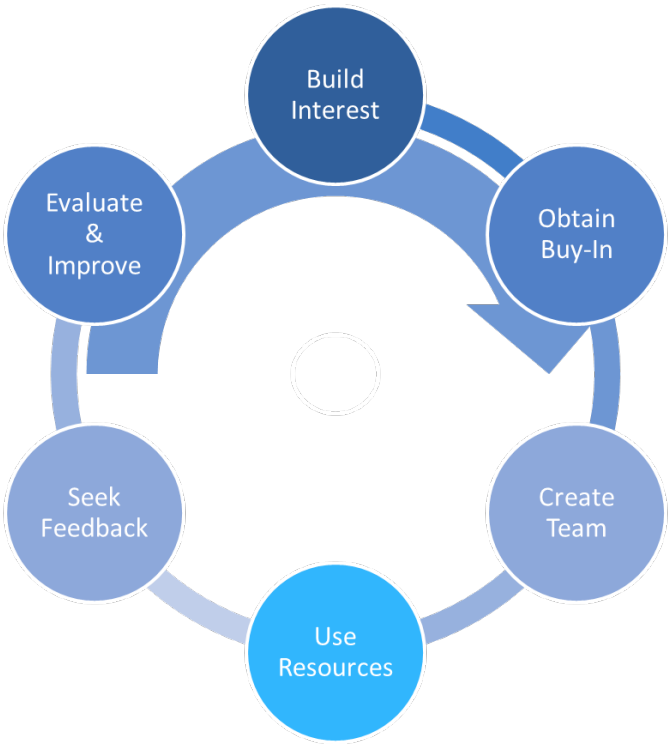

Exhibit 1: This graphic shows a sample PtD Program Development Cycle

Applying Prevention through Design

When applying PtD, the project manager (PM) has a high level of responsibility. The PM must understand the project, as well as the PtD process, and identify the necessary team members, including representatives from safety. For PtD to be completely successful, representatives from safety should be involved with the project team from the onset of the project.

The chart below shows a typical design process. In many organizations, safety is not engaged until the very end of the design process or after the construction or installation is complete. Waiting to address safety issues affects more than just overall safety and cost. Ongoing operations and maintenance can be impacted as well. Consider adding roof penetrations for a

roof-top fall protection solution: these penetrations are not only more costly, but they also create significant maintenance issues.

With PtD, representatives from safety are engaged throughout the process, as indicated by a red "S" in Figure 2. By engaging safety professionals throughout the process, the project can more thoroughly address safety for construction, operations and ongoing maintenance activities.

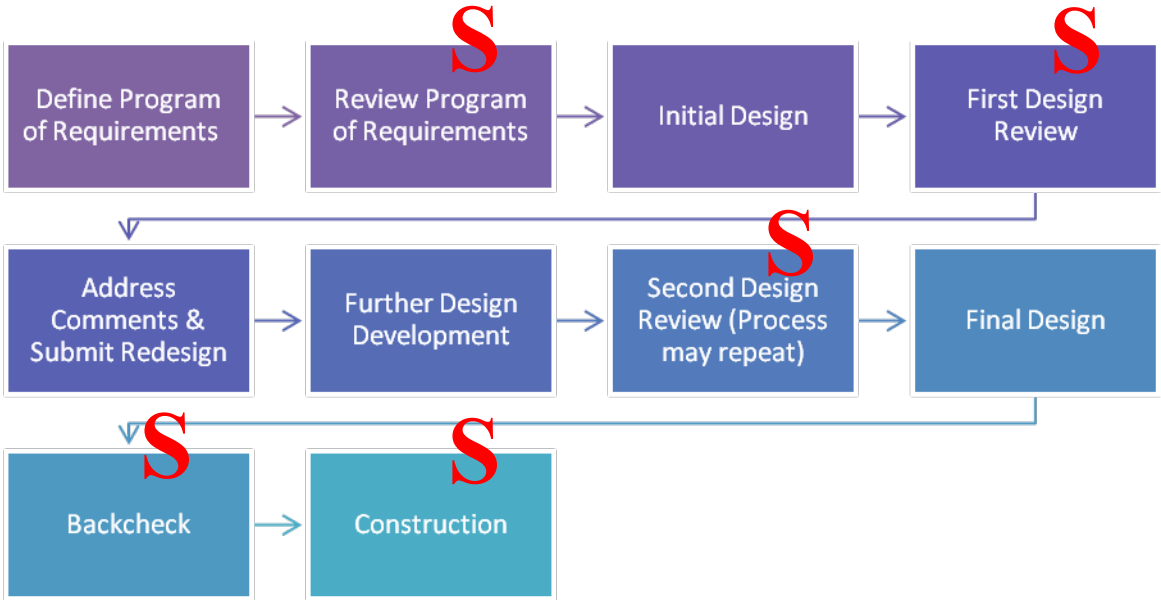

Exhibit 2: This diagram shows a typical design phase flow

What are you looking for?

The goal of involving safety personnel early in the process is to catch and correct safety issues before they become problems for operations personnel, maintenance workers, employees or visitors. So, it's critical to understand exactly what to look for during reviews.

The following list highlights main items to consider when reviewing programs and designs:

- Basic project information (project goals, location, operations, disciplines needed)
- Confined space
- Electrical safety (control panels, junction boxes)
- Environmental issues, including hazardous materials and air quality
- Ergonomic issues
- Fall protection (ladders, openings, unprotected edges)
- Fire protection (sprinkler placement)
- Lockout/Tagout (placement of machinery)
- Maintenance and operational tasks
- Regulatory compliance for all safety aspects

Safety reviews should also include coordination with other disciplines. It is likely that talking to representatives from other disciplines will shed more light on an issue and facilitate compromise and consensus. It is also helpful to talk to maintenance workers, who may encounter

the safety issues or use the potential solutions. Sometimes this is accomplished through one-on-one conversations. Other times, dialogue in a group setting results in the best solutions.

Case Study

For PtD principles to work—whether a formal PtD program is in place or not—safety personnel need to be engaged early in the design process. Simply because of their background and focus on safety issues, safety personnel will recognize potential hazards while they're still lines on paper—before funds are spent on construction. These potential hazards will become even more apparent when the safety professional has been involved in previous projects where safety issues have been designed and installed—and had to be dealt with post-construction.

Before Prevention through Design

Safety engineer Sam Safety is frustrated about his current project. He is managing fall hazard mitigation for his company's newest building—a three-year-old office building that received LEED certification. It is an impressive building that is functioning well for the users. However, the safety of the building's maintainers was not considered during design.

On this building, Sam has identified many fall hazards and ADA issues that would have been obvious to him during the design phase. If he had been part of the project team, he could have prevented those hazards Instead; he's now managing a $350,000 project to correct them. What a waste!

The hazard that bothers him the most is a roof walkway pad that is within 2 feet of the roof edge. If he had seen that on the plans, he would have immediately inquired about the proposed height of the parapet. Certainly, after being told that the parapet was proposed at 18 inches, Sam would have required modifications—saving his company hundreds of thousands of dollars.

Prevention through Design – without a program

While working through his current project, Sam Safety overhears that his organization is planning to build a new facility next year. He is determined not to encounter the same mistakes on this new building, so he sets out to get himself or another safety professional involved in the early stages of the project. This is what he did:

1. Approach the supervisor and explain the consequences (costly repairs) of lack of inclusion of a safety specialist in the early planning and design stages of the previous project
2. Obtain supervisor support to approach project management
3. Approach project manager in charge of project team assignments and
    - Explain circumstances and consequences of previous project
    - Obtain permission to engage with project documents and become part of project team
4. Obtain back design documents
5. Review documents, providing comments on safety concerns
6. Participate in subsequent team meetings and design reviews

Fortunately, Sam was able to engage with this project in the early stages, before significant design had occurred. If he had heard about the project in a later stage of development, he could still engage by taking steps 1-6 noted above. The back design documents may be more extensive,

and the safety suggestions may be more challenging to implement depending on how far the design process has progressed.

Being the proactive safety professional that he is, Sam not only engaged with the project manager for the new building, but he also talked to each of his organization's project managers about the importance of incorporating safety in the design process. He provided examples and rationale to explain how the project budget, timeline and overall safety could be impacted if safety isn't included in the early stages.

Overcoming objections

Not all of the project managers were receptive to Sam's request to engage early in the project timeline. However, Sam was prepared to address some common objections to PtD.

Two of the primary objections Sam was prepared to address are:

1. "Adding safety into my project will affect my bottom line."

When most people think of a well-managed project, they think of one that is delivered on time and within budget. So, naturally, project managers are not interested in expanding scope and costs. While adding safety measures will add some direct costs to a project, it will save significant money in the long-term. This is especially true if waiting to address hazards will introduce ongoing operations or maintenance issues.

To overcome the concern of adding cost, it's helpful to articulate the long-term cost savings the organization can achieve. By spending a certain amount of money now, the organization can avoid the costs of developing a whole new project to address the safety issues later: additional drawings, mobilization of a contractor, potentially significant field modifications and re-working interferences.

Sometimes proving the significance of reducing long-term cost and overall risk requires research. It may be worth getting a detailed cost estimate or estimating the potential impact of added risk. If the safety professional can bring these estimates to the project manager, the safety changes are more likely to occur. Essentially, the cost issue should be reversed, asking how little safety measures will cost when implemented early versus how much they will cost if implemented after project completion.

In addition, delivering a finished project that is laden with health and safety risks should not be acceptable—even if budget and schedule are met. The potential costs of time and resources required if a violation or serious injury occurs make a convincing argument for eliminating all foreseeable risk.

2. "Safety nitpicks every detail and slows things down."

In many organizations, safety professionals have to work against the pre-conceived notion that safety "gets in the way." In reality, safety is just another discipline that must be considered when managing a project—similar to electrical, mechanical, etc. Incorporating safety doesn't necessarily mean more work. It just means thinking about the work in a different way.

Within any project team, each discipline is responsible for addressing its area of expertise and working with the rest of the team to develop appropriate solutions. By reviewing plans and drawings as part of the team, safety can provide feedback and recommendations in a timely manner. While the review may seem detailed—or even nitpicky—it is that level of detail that

ensures compliance with various regulations and codes, while allowing for operational functionality.

Performing in a way that helps the project will also help overcome this objection. It is important that the safety professional provide timely reviews and meet or exceed deadlines for providing comments. In addition, offering potential solutions to the issues is beneficial. In Sam Safety's example of the roof walkway pad located adjacent to an unprotected edge, the safety professional should provide potential solutions with estimated costs and an analysis of the effect on safety when pointing out the issue. This way you aren't just pointing out problems, you are helping the project manager address the safety concern.

Other objections about PtD may also be raised, so it's important to predict what these concerns may be. Depending on an organization's culture, safety professionals may have to be politely persistent to affect change. Be prepared to do your homework, articulate justifications, and persuade others along the way.

Prevention through Design – with a program

Thinking back to Sam Safety's situation, he was working to incorporate safety in an organization that didn't have a formal PtD program in place. But, what if they did?

Instead of taking on the legwork required to get involved in the project, safety would automatically be called upon to be a part of the project team. The initial work of establishing need, gaining credibility, and developing processing for PtD would already be in place, and all parties would be aware of the procedures and expectations. When these expectations are understood by all parties, including safety on the project team becomes commonplace—sometimes to the point where a team is "lost without their input."

When a PtD program is in place, safety personnel are at the table for the following steps in the project timeline:

- Defining program of requirements
- Initial design review
- Second design review (and potentially more)
- Backcheck
- During construction

By having safety personnel involved in these key steps of the project process, life threatening safety hazards can be minimized in the most efficient way possible. When a PtD program is in place, no time is lost in getting the right team together, backtracking to address safety issues or allowing hazards to be introduced in new projects. Risk, time and cost are reduced when the entire team considers safety throughout the project timeline.

Conclusion

Sam's story shows the power of PtD, and the importance of creating and using a formal PtD program. Reading his story may indicate that the outcomes were reached quickly, but please remember that proper, effective, practical, and safe designs are only achieved through a series of meetings and reviews that can be time consuming. But, the time put into the design of a project is extremely valuable when hazards can be effectively controlled, overall safety is improved, and costs are reduced.

PtD offers a method for improving safety that also enables projects to be completed on time and within budget. It is a win-win method of design that benefits not only safety professionals, but also design team members, end users, and organizational management.

Now, let's get started integrating safety during design.

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[i] American National Standards Institute (ANSI). 2011. *Prevention through Design Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes* (ANSI Z590..3-2011). Des Plaines, IL: American Society of Safety Engineers (ASSE).

[ii] For more information on this program development process, see the Safety 2012 Proceedings Paper for Session 641: Making Prevention through Design Work for You, authored by Marjory Anderson and Craig Galecka.