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NSF

Prevention through Design (PtD)

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This presentation aims to elaborate on Prevention through Design concept, developing best practices, and examples of designing for safety in the research industry.

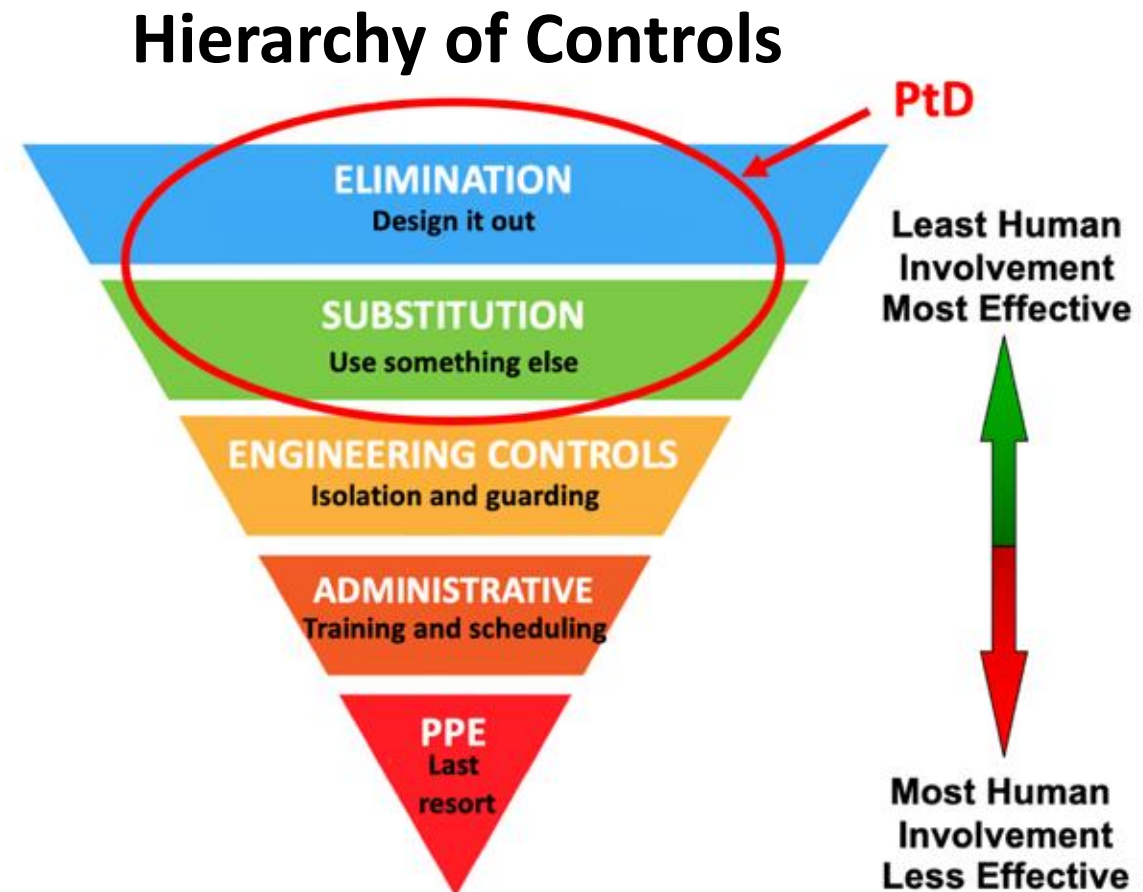
- Aka: Designing for Safety (DfS), or Safety by Design (SbD)
- The Prevention through Design concept is an initiative to prevent or reduce occupational injuries, illnesses, and fatalities through the implementation of prevention considerations in the initial stages of designing or redesigning facilities, equipment, systems, and work processes.
- PtD Involves making design decisions based in part on a design element's inherent safety risk to workers.
- ANSI standard Z590.3-2021 provides guidance on Prevention through Design.

- Eliminate or reduce facility and operational hazards at the source
- Enhances the projects safety culture (*Displays upper-level management's value placed on the health and safety of the workforce*)
- Reduce the projects indirect cost
- Fewer operational delays
- Increased productivity

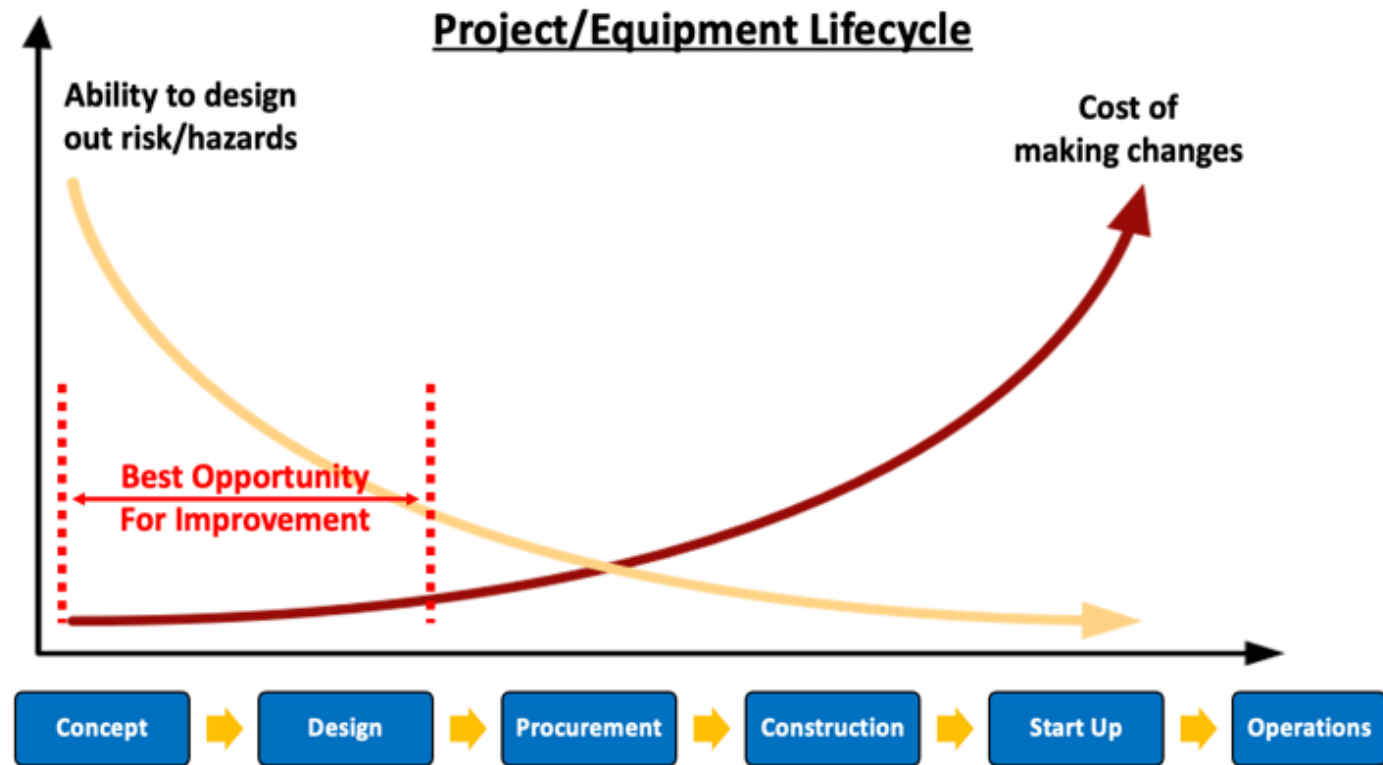
- Improve the accessibility to valves, controls, and equipment that may require continuous maintenance. If possible, locate equipment at ground level or a safe walking-working platform.
- Well-designed lab areas and workstations that support good ergonomics
- Install permanent fall protection anchor points near elevated equipment.
- Position shutoff valves and switches in well-lit areas and in sight of the equipment they control.
- Machine guards and interlocking devices
- Provide adequate headroom for equipment access points, electrical panels, and storage areas.

Implementing PtD in the design phase can effectively remove human factors that negatively impact workplace safety.

- Complacency
- Lack of knowledge or awareness
- Fatigue
- Distractions
- Pressure or stress
- Lack of resources



- Move safety upstream in the design process
- Eliminating hazards and controlling risks to workers “at the source” or as early as possible in the life cycle of a facility or equipment, offers the best ability to implement improvements and reduces the direct and indirect cost.



➤ Barriers

- Not all research professionals possess sufficient expertise in occupational safety and mandatory standards that govern how tasks are performed safely.
- Communication: The success PtD requires that design reflects input from all stakeholders, including designers/engineers, management, safety team, and operations personnel

➤ Potential Solutions

- Include safety representation during the design process
- Promote 10-hour and 30-hour OSHA courses for science and engineering staff
- Invite operational staff representatives to design reviews

➤ PtD Tools

- Risk Assessments and Hazard Analysis
- Strong review committee

We can't change the past, but we can learn from it to create a safer future as our research and facilities evolve.

What did we do well?



What could we improve?



Mistakes to avoid



Upgrades, Retrofit, New Construction

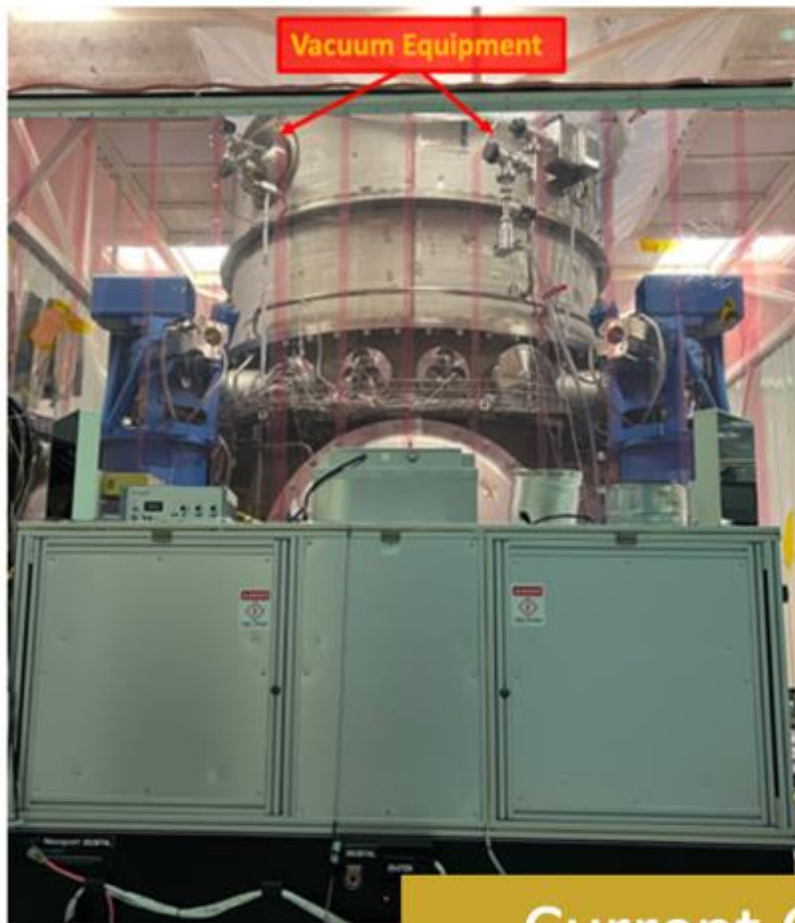


Prevention through Design

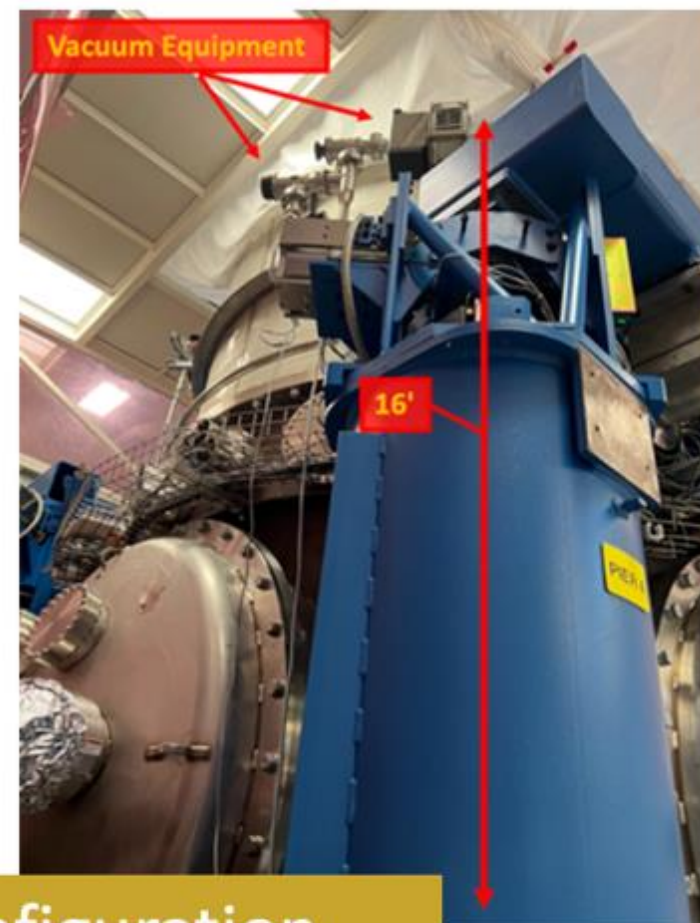
- Equipment Placement vs. Fall Protection capabilities



LIGO Initial Design

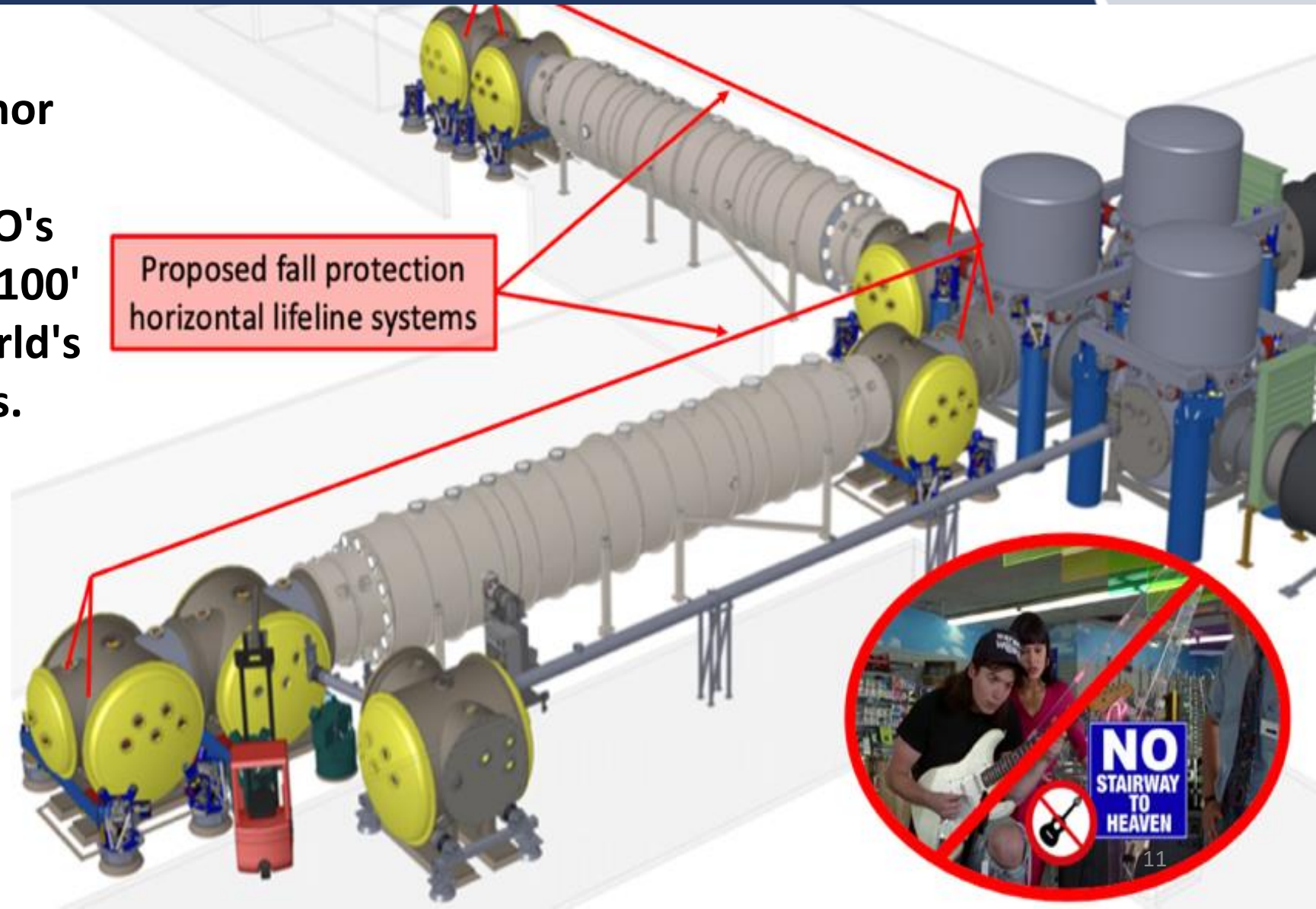


Current Configuration

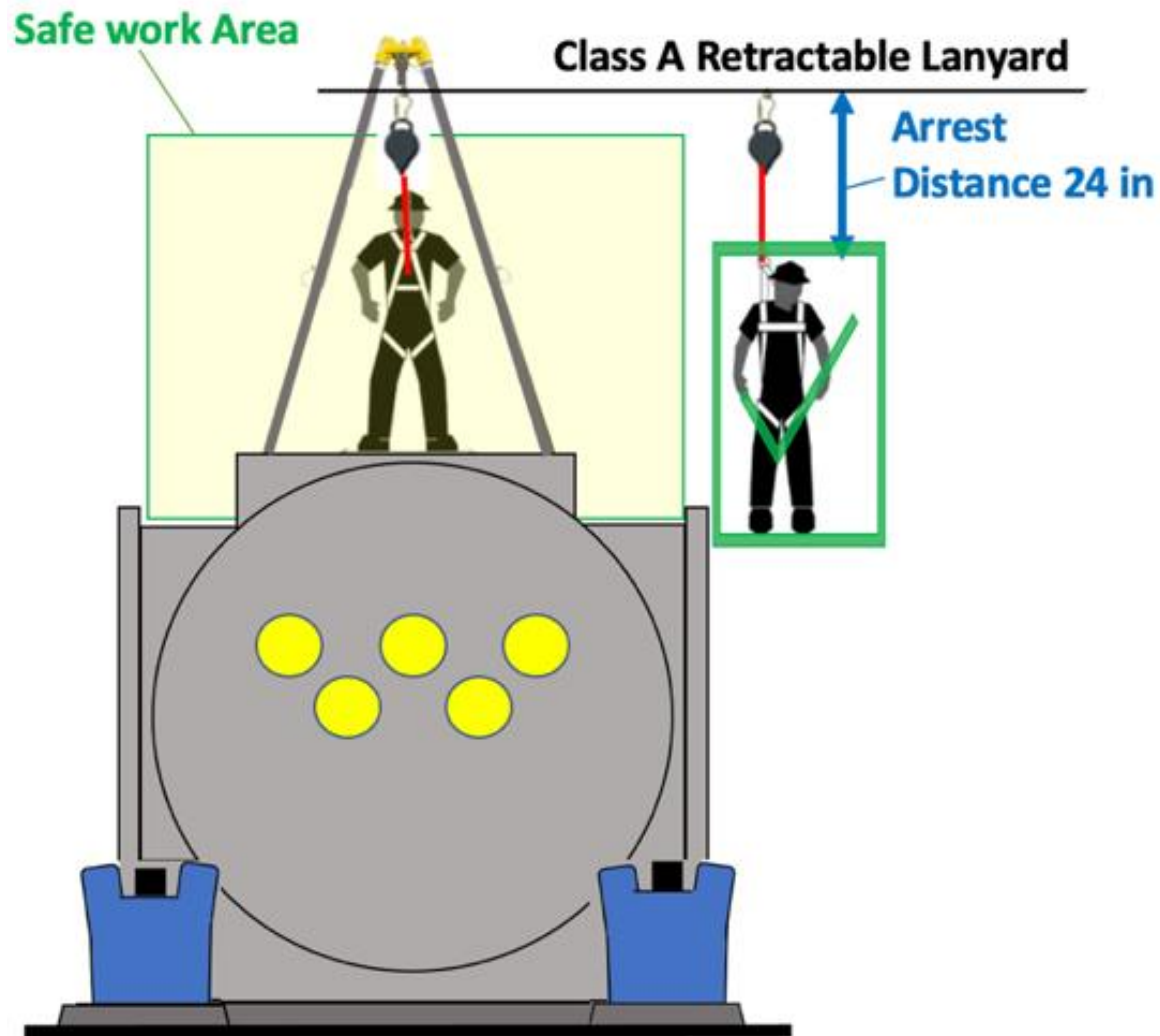


When conventional fall protection methods meet a non-conventional facility.

Personal fall protection anchor lines work great for most industries. However, for LIGO's case, it's similar to hanging a 100' guitar string to one of the world's most sensitive instruments.



HAM Chamber Tripod Anchor System



BSC Fall Protection Anchor point



INSTRUCTIONS

1. Place clamp over flange as shown.
2. Tighten bolt to 90 ft/lbs

Capacity—1 worker, max weight 400lbs including tools and equipment
 Technical References: Meets OSHA 1926 Subpart M, ANSI Z359.1-2007

The flange anchor device should be utilized in conjunction with an adjustable lanyard. Once workers are in position, all excess lanyard length should be removed to provide adequate stopping distance resulting from a freefall.

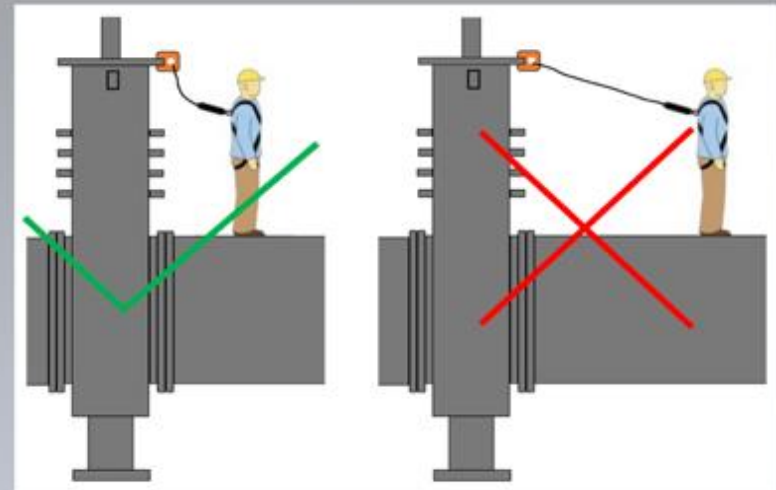
Gate Valve Fall Protection Anchor point



INSTRUCTIONS

1. Place clamp over flange as shown.
2. Tighten bolt to 90 ft/lbs

Capacity—1 worker, max weight 400lbs including tools and equipment
 Technical References: Meets OSHA 1926 Subpart M, ANSI Z359.1-2007



Additional area lighting added to ensure effective Lockout/Tagout is performed



Installing guard rails to mitigate slips and trips caused by sloped or uneven walking surfaces.



Summary

- Early consideration taken to identify potential operational hazards and risk to workers is key.
- Get the right people talking about the right things at the right time.
- You have the greatest potential to promote safety and eliminate or reduce workplace hazards during the early design phase.
- Don't manage accidents, instead eliminate the ability to have an accident by designing out workplace hazards



Please share your thoughts or questions:

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