



NAC Executive Insights

Safety Through Design

Key Points

- Safety must begin long before construction ever starts.
- Safety is best achieved by eliminating hazards, not just managing and mitigating them.
- Expanding our basis of design to eliminate hazards holds great promise.

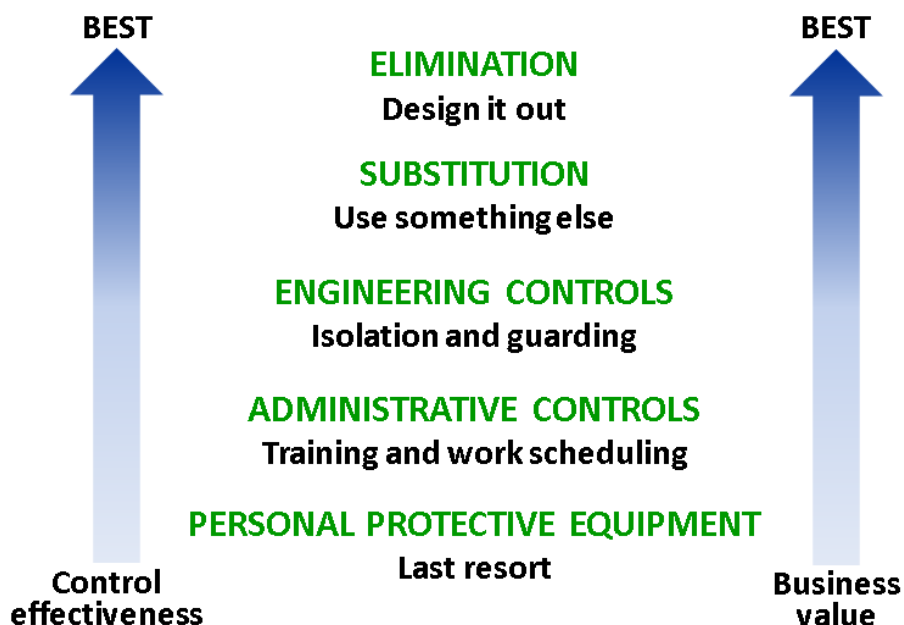
Leading owner organizations are continuing to drive safety performance improvement.

- Increasingly they will represent industry's platinum clients.

Over the years these leading owners have driven safety focus up a value chain that:

- Started with mandatory usage of PPE (personal protective equipment).
- Has administrative controls founded on training and work scheduling.
- Has engineering controls providing isolation, separation, and guarding.
- Through substitution, is driving the industry to use something else or do it a different way.

These safety focused industry leaders are now at the apex of this value chain, namely, designing out the hazard.



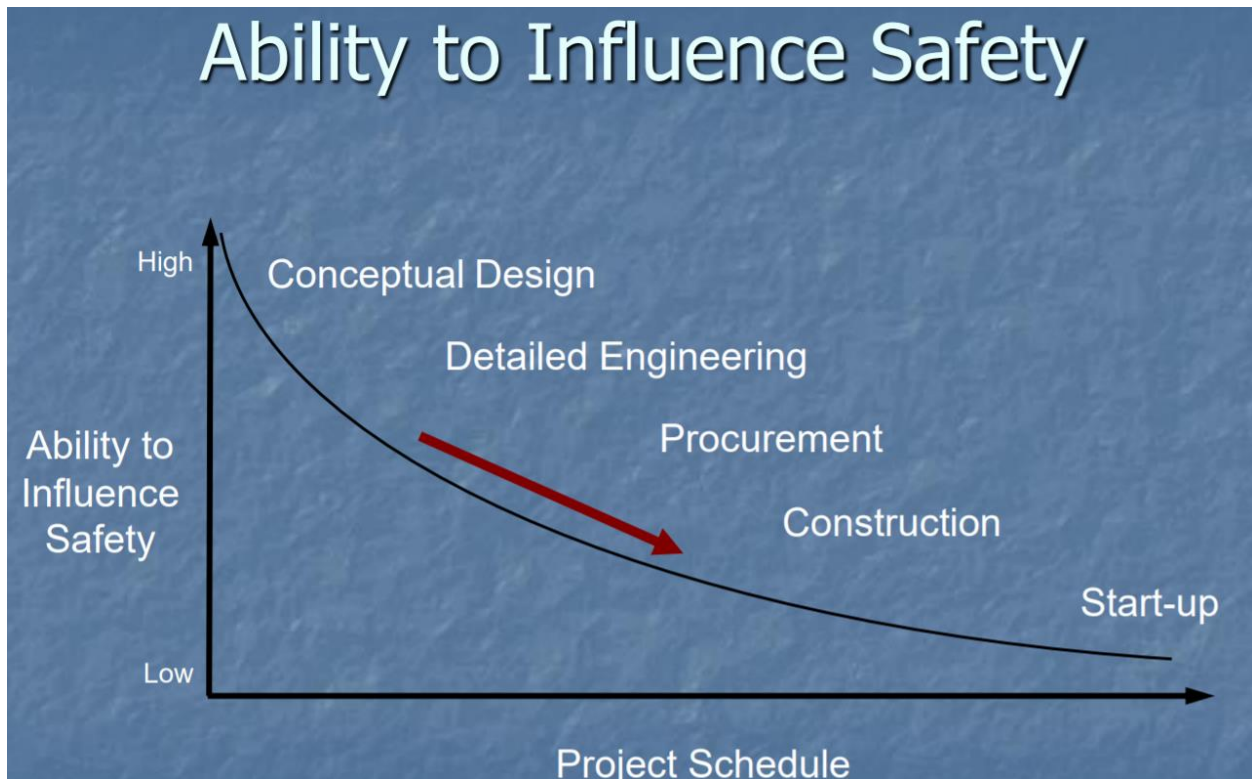
These efforts, called such things as safety through design, hazard elimination, sustainable safety, and prevention through design, represent an area that will grow in focus and in the short term offers the potential to be a key differentiator.

The Need

Construction of the projects our industry designs is one of the most hazardous occupations. In the U.S., it represents about 8 percent of the U.S. workforce, but 20 percent of fatalities, or about 1,100 deaths annually with another 170,000 serious injuries. Half of these fatalities are due to either design-related issues (37 percent) or to situations where design has played a role (14 percent). Some studies show even higher contributions when injuries are considered (63 percent).

The Norm

The norm has not been to consider construction and operations and maintenance (O&M) safety at the conceptual design stage (the point when the ability to influence safety is the highest), but rather to leave it to each project participant to consider for its portion of the activity. An engineer may feel ill-equipped to recognize hazards; may have concerns about dictating means and methods that could expose them to greater liability; or think he/she does not have a legal, regulatory, or contractual requirement to assess their designs for created hazard.



The Realities

Litigation, especially related to death or serious injury, spares few parties. The American Society of Civil Engineers (ASCE's) Policy Statement 350 on construction site safety states that design engineers have responsibility for "...recognizing that safety and constructability are important considerations when preparing construction plans and specifications," and further extending the role of the professional engineer to the design or details of critical elements of temporary construction.

Although contracts typically state that designers are not responsible for the safety of construction workers, engineering canons of ethics create an ethical obligation to take action to prevent a serious injury if a hazard is imminent and obvious. The question remains as to whether a similar ethical obligation exists if reasonable actions could be taken to prevent injuries that are not as imminent or obvious.

The ever growing focus on safety, especially among tomorrow's platinum clients, demands we do better, perhaps even lead.

Some Examples

- **Modular construction:** reducing work at height; integrating ladders and work platforms with fall arrest systems and tie-off points.
- **Standardization of Nuts and Bolts:** reduces tool sets/tripping hazards; reduces clutter at workface.
- **O&M safety addressed at conceptual design:** all valves accessible from one side of equipment, from fixed platforms (equipment acts as wind barrier in arctic conditions; longer valve stems eliminate climbing over and under cold slippery metal; fixed platforms provide better traction); special damper prevents backflow of exhaust air during fan maintenance.
- **Building Information Modeling (BIM):** provides for member labeling and erection sequencing; linkage to hazard analyses undertaken to inform the constructor.

About the Author

Bob Prieto has been a NAC member since 2011. He is a senior executive who is effective in shaping and executing business strategy and a recognized leader within the infrastructure, engineering, and construction industries.