



Prevention through Design

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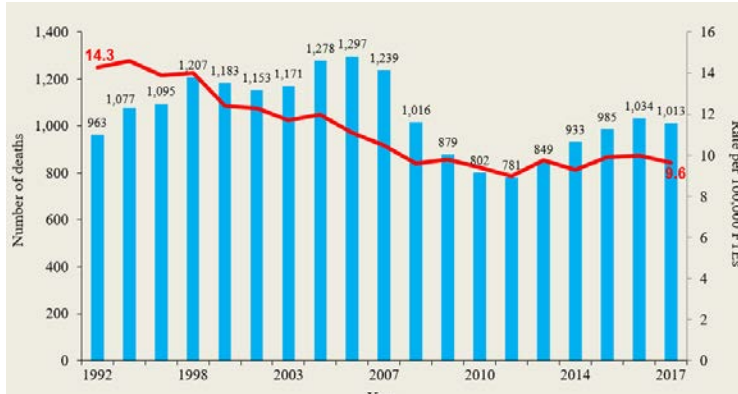
11 March 2020 at:



DISCLAIMER: *The findings and conclusions in this presentation have not been formally reviewed by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.*

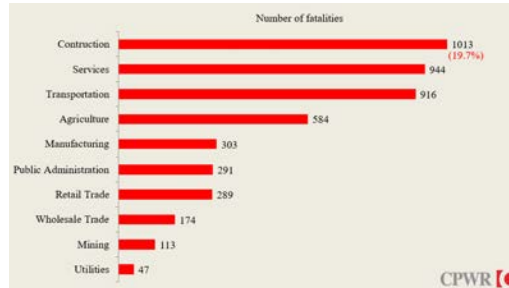


Number of Fatalities in Construction, 1992 - 2017 (All employment)



Source: U.S. Bureau of Labor Statistics, 1992-2017 Census of Fatal Occupational Injuries (Death numbers were from BLS online database), and Current Population Survey. Calculations by the CPWR Data Center.

Fatal Injuries by Major Industry 2017 (All employment)



CPWR

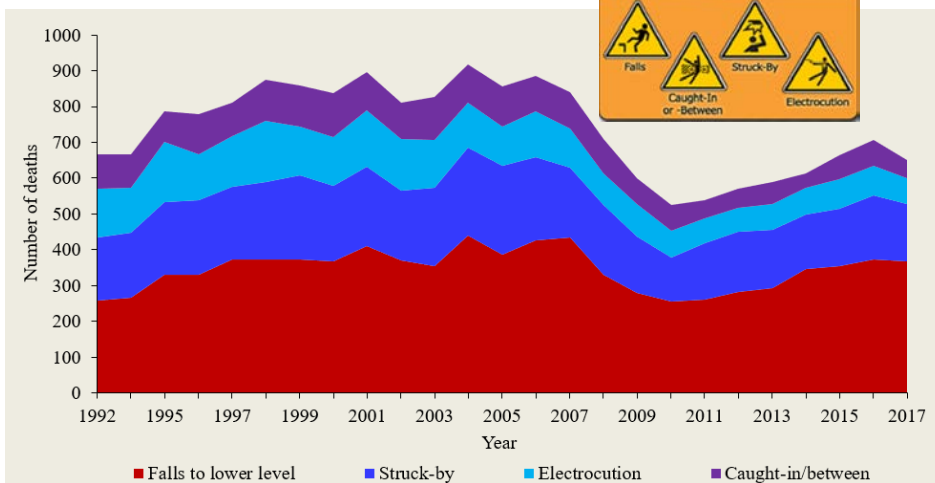


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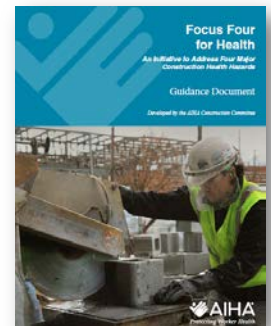


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Construction Focus Four, 1992-2017 (All employment)



Source: U.S. Bureau of Labor Statistics, 1992-2017 Census of Fatal Occupational Injuries. Numbers were from the online BLS database.

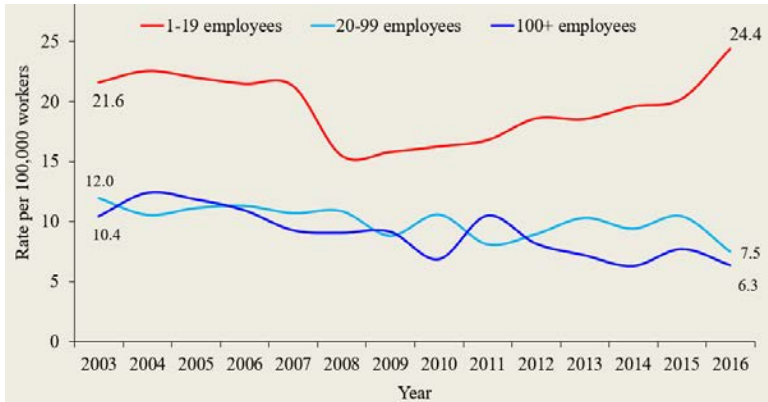


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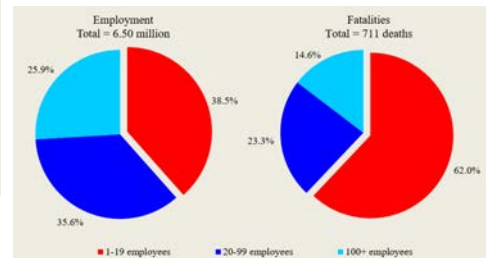
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Construction Fatality Rates, 2003-2016, by Size of Firm (Wage & Salary workers)



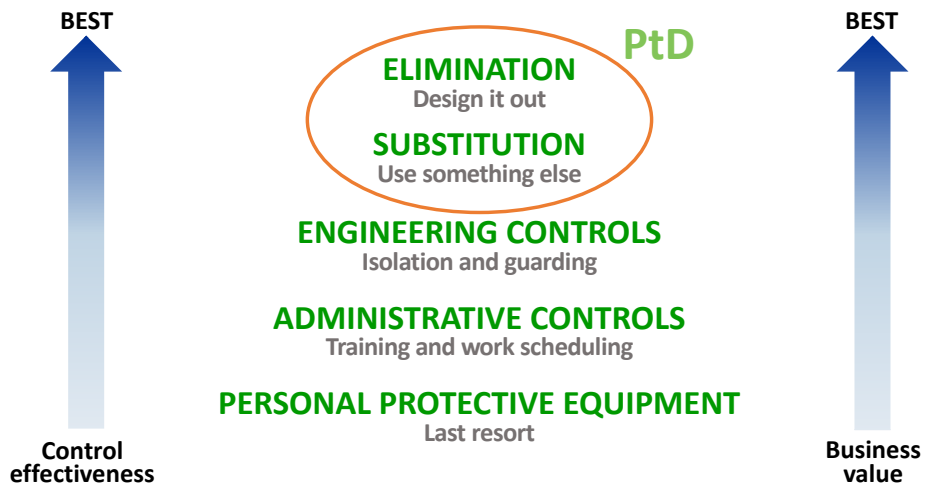
Source: U.S. Bureau of Labor Statistics, 2017 Census of Fatal Occupational Injuries (Death numbers were from BLS online database).

Construction Employment & Fatalities by Size of Firm (All employment)



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The *Priority* of PtD is "Prevention"



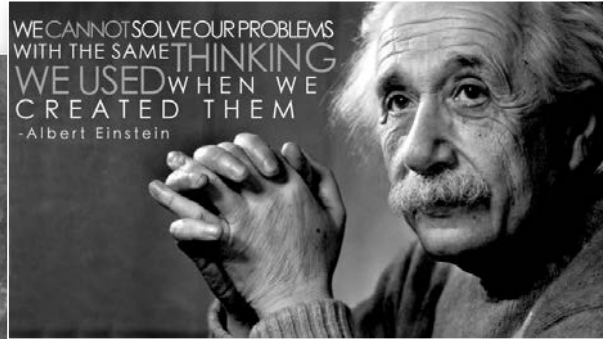
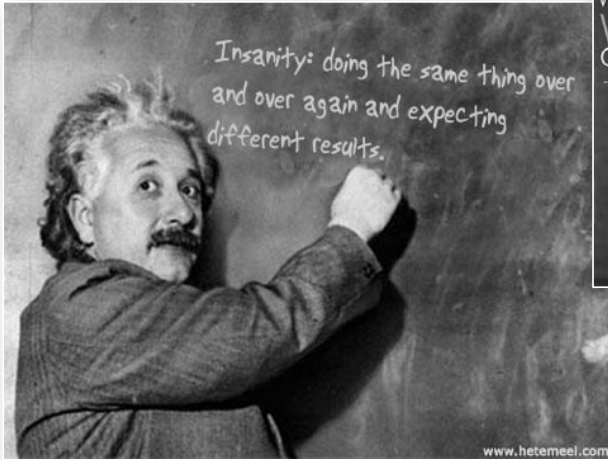
Hierarchy of Controls (HOC)



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It doesn't take an Einstein

"PtD requires a designer with a crystal ball!"



Some think of "PtD" as equipment designed by REALLY clever people

That isn't the way it works ...

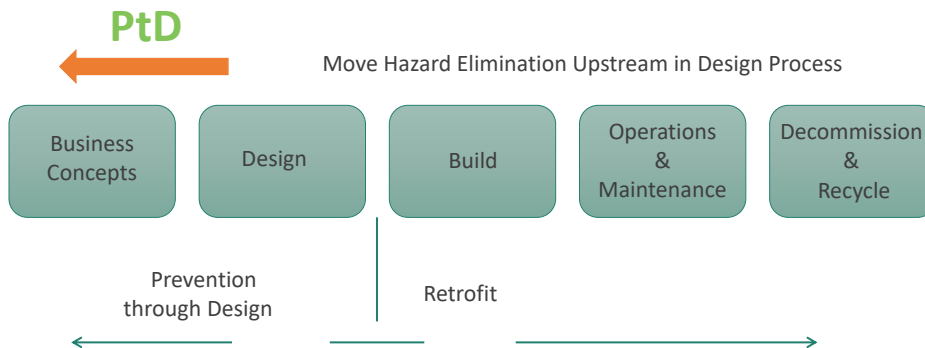


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The *Process* of PtD is "Design"



To move worker protection from an afterthought to a forethought in process, product and facility design

"Lessons Learned" are brought into Design Safety Reviews



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PtD is NOT new ...

1750 B.C., Code of Hammurabi, Law 229:
*“If a builder builds a house for someone,
and does not **construct it properly**, and
the house which he built falls in and kills
its owner, then that builder shall be put
to death.”*



(Punitive code. PtD implied!)

Hammurabi 2.0

*“My company has had a safety program for 150 years.
The program was instituted as a result of a French law
requiring an explosives manufacturer to **live on the
premises with his family.**”*

— Crawford Greenwalt
Former president of DuPont

PtD is NOT new ...



<https://commons.wikimedia.org/wiki/File:Scroll.jpg>

1440 B.C., Bible, Moses, Deuteronomy 22:8: “When you build a new house, make a *parapet* around your roof so that you may not bring the guilt of bloodshed on your house if someone falls from the roof.”

(Design code. PtD specific.)



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... and now that we're so *advanced* ...



Moses 1.0? Parapet? Railing?



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What was LEED® missing?

LifeCycle thinking

(Prior to the 2015 USGBC LEED® Prevention through Design Pilot Credit)

“Occupants” over the entire LifeCycle	Health & Well-Being (Illness)	Safety (Injury)	Ergonomics (MSD, Musculo-skeletal Disorder)
Final Building Occupant	IEQ credits, major focus	NO	Pilot credits.
Custodial Worker Occupant	Minor	NO	Minor
O&M and Construction Worker Occupant	Minor	NO	NO



1795: Earliest Recorded LifeCycle PtD?

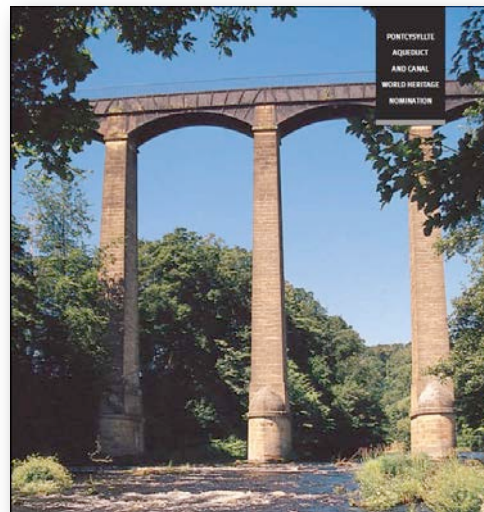
In 1795, during the Industrial Revolution, MASTER BUILDERS knew what was going on in the field, with those early Construction “Occupants” – and they changed their DESIGNS!

(notes from William Jessop to Thomas Telford, engineers):

“The work on the piers was radical in several ways ... the engineers gave unusual attention to the safety of the workforce. Jessop had written to Telford in 1795, ‘In looking forward to the time when we shall be laying the Iron Trough on the Piers I foresee some difficulties that appear to me formidable – In the first place I see the men giddy and terrified in laying stones with such an immense depth underneath them with only a space of 6 feet wide and 10 feet long to stand upon.’ He recommended that the piers be widened. In 1800 he proposed the hollow upper sections: ‘it will save five or six hundred pounds in the expence: and what to me appears most material, it will afford safety to the workmen.’”

[UNESCO World Heritage Site nomination <https://whc.unesco.org/en/list/1303>]

Pontcysyllte Aqueduct & Canal, Wales



PtD Design Process: Collaboration among multiple disciplines brings expertise and lessons learned



World Heritage Site & PtD: How?

- How did PtD make it into a World Heritage Site nomination package from Wales?
- Could it be that PtD IS truly becoming an **expected cultural norm**?
- Policy helps: U.K. requires PtD since 1994



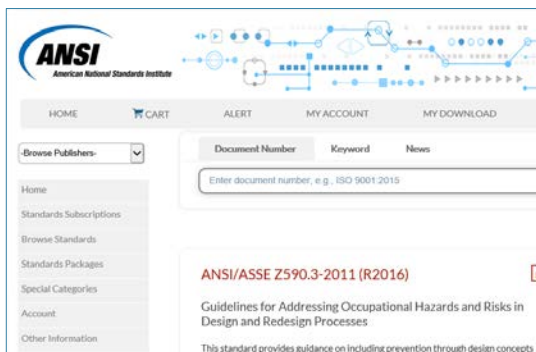
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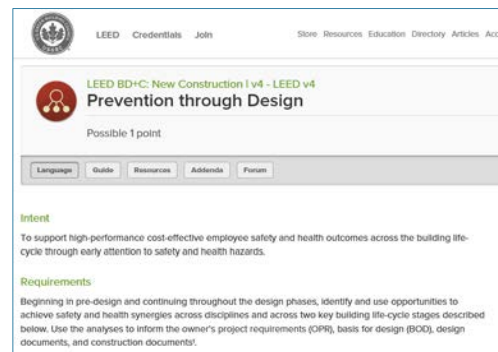
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NIOSH Prevention through Design – an Industry Standard

*“Anticipating and **designing out** hazards in tools, equipment, processes, materials, **structures**, and the organization of work is the most effective way to prevent occupational injuries, illnesses, and fatalities.” - John Howard, M.D., Director of NIOSH*



[www.asse.org/ansi/asse-z590-3-2011-r2016-/
ANSI/ASSE Z590.3 PtD Standard
\(the process for PtD design safety review teams\)](http://www.asse.org/ansi/asse-z590-3-2011-r2016-/)



www.usgbc.org/credits/preventionthroughdesign
USGBC LEED PtD Pilot Credit
(LEED-specific criteria)



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Education: Instruction Modules



www.cdc.gov/niosh/topics/ptd/pubs.html



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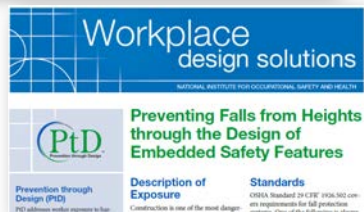
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Workplace DESIGN Solutions

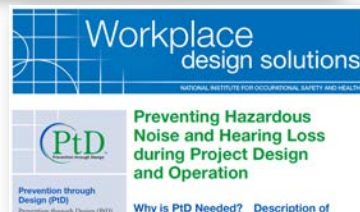
www.cdc.gov/niosh/docs/2014-108



www.cdc.gov/niosh/docs/wp-solutions/2015-198



www.cdc.gov/niosh/docs/wp-solutions/2014-124



www.cdc.gov/niosh/docs/2016-101



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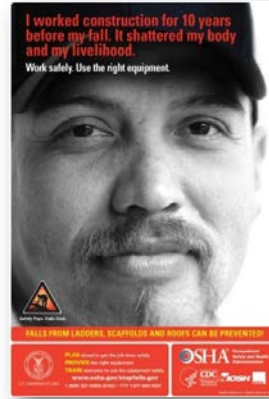
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Annual National Falls Prevention Campaign!

www.stopconstructionfalls.com



<http://www.cdc.gov/niosh/construction/stopfalls.html>
<http://www.osha.gov/StopFallsStandDown>

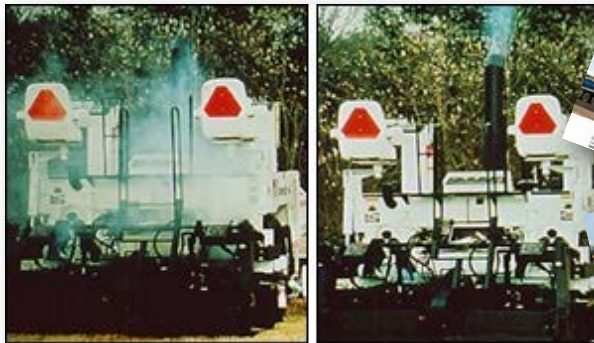


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Asphalt Paving & Milling Machine Redesign



Before-after asphalt fume emissions from highway-class pavers

Source: Cervarich MB [2008] Prevention through Partnerships.



15 NIOSH technical reports of Partnership field studies over 11 years in 7 states

- 50 different water-spray and ventilation control designs were evaluated
- Most studies showed reductions in dust exposures
- All 15 NIOSH technical reports available online at: www.cdc.gov/niosh/surveyreports

www.cdc.gov/niosh/topics/asphalt



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OSHA Silica Standard: Construction Exposure Control Methods



- Table 1 in the construction standard matches 18 tasks with effective dust control methods and, in some cases, respirator requirements.
- Employers that fully and properly implement controls on Table 1:
 - Are assumed to comply with the PEL
 - Not required to conduct exposure assessments for employees engaged in those tasks

OSHA FactSheet
OSHA's Crystalline Silica Rule: Construction

Are You Compliant?

DEWALT OSHA DUST SOLUTIONS

ARE YOU COMPLIANT?

YOUR FIRST LINE OF DEFENSE.



What is the status of NIOSH PtD Efforts?

NIOSH Construction Program July 2019

CPWR National Construction Center July 2019

NIOSH Prevention through Design Program

NIOSH Construction Program

CPWR National Construction Center

NIOSH Prevention through Design Program

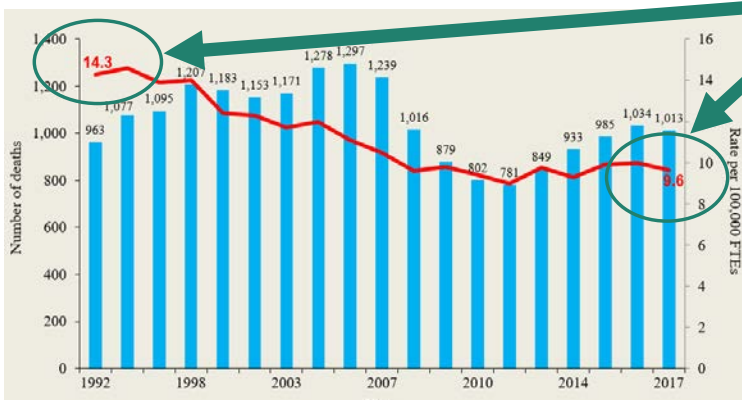
NIOSH Program Performance One-Pager (PPOP) www.cdc.gov/niosh/docs/ppop



So WHAT?

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Number of Fatalities in Construction, 1992 - 2017 (All employment)



Our fatality rates have DROPPED ...

Fatal Injuries by Major Industry 2017 (All employment)



... and yet, can practicing PtD in construction save even MORE lives?

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The U.K. now saves **SEVEN** times the lives ...

Construction Fatalities per 100,000 Full-time equivalents (FTE)

¹United States:
9.5

²Great Britain:
1.31

- ¹The Number and rate of fatal work injuries, by industry, BLS, **2018**
www.bls.gov/charts/census-of-fatal-occupational-injuries/number-and-rate-of-fatal-work-injuries-by-industry.htm
- ²Construction Statistics in Great Britain, **2019p** (pg. 11)
www.hse.gov.uk/construction/resources/statistics.htm

Think about it

- The United Kingdom has a construction fatality rate **1/7th** that of the USA.
- That MEANS: For every 7 people who die in our average construction, **6 of them would still be whole and healthy with their families ...** had they done the same work in the U.K.
- Someone **IS** doing *something different* to save lives. **What?**

What could be making the difference?

- *Disclaimer: Personal opinion based on contractors and workers spoken to.*
- Great **Worker Training** and use of **Safety Inspections** are some of the tools that save many lives in the U.K. (add **Leadership Accountability** that makes training, inspections, and corrections happen).
- **ALSO: Add PtD** – as it is foundational LAW in the U.K. since 1994.
- If I was now a corporate construction safety manager, I would focus on Worker Training, Project Inspections, Management Accountability, and PREVENTION THROUGH DESIGN.

SEE Disclaimer –
personal view only

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Verified* with the U.K.'s Bill Edinburgh

Mr. Bach was so impressed by what he saw at the Edinburgh castle, Scotland, that he interviewed "Bill" the construction manager.

Bill confirmed that the U.K. differences Mr. Bach knew of were true.



* NOTE: This does not meet NIOSH standards for validation!

This used *family vacation* standards only.

ALSO: Family Vacation standards did not include last names. Therefore, Bill is forever *Bill "Edinburgh"*

SEE Disclaimer –
personal view only

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So WHAT?

The *Ultimate* Reason



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Savings Lives, Saving Families



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