



Hard Hats to Helmets

Why should I make the change?

Scott Greenhaus
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Construction Industry
Round Table

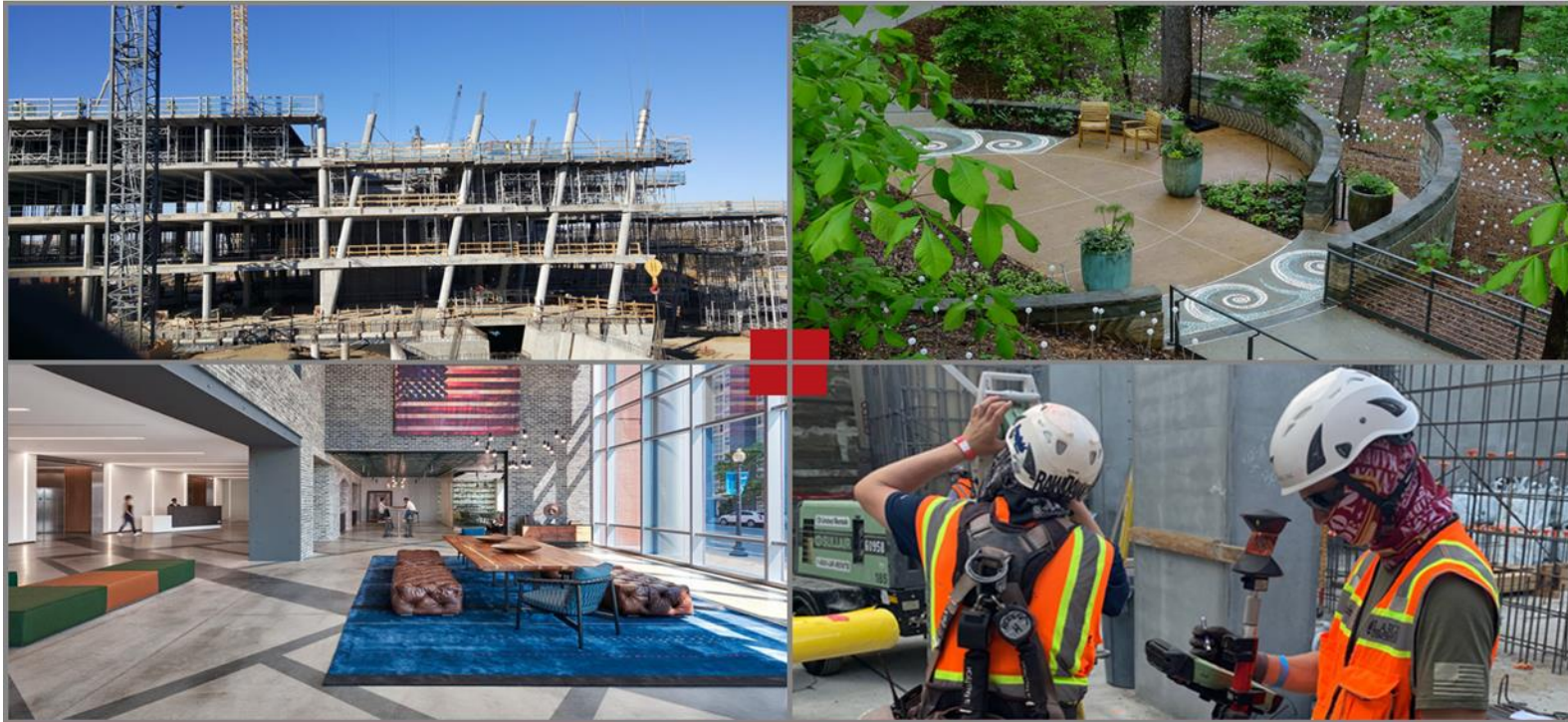


Agenda

- Introductions
- Who is ASCC and Why Hard Hats to Helmets?
- What are TBIs?
- How are the helmets different than hard hats?
- What technical and performance standards do these helmets meet?
- What about comfort, maintenance and accessories for the helmets?
- What about future technology improvements?
- H2H Website
- Next steps?



Who is ASCC?

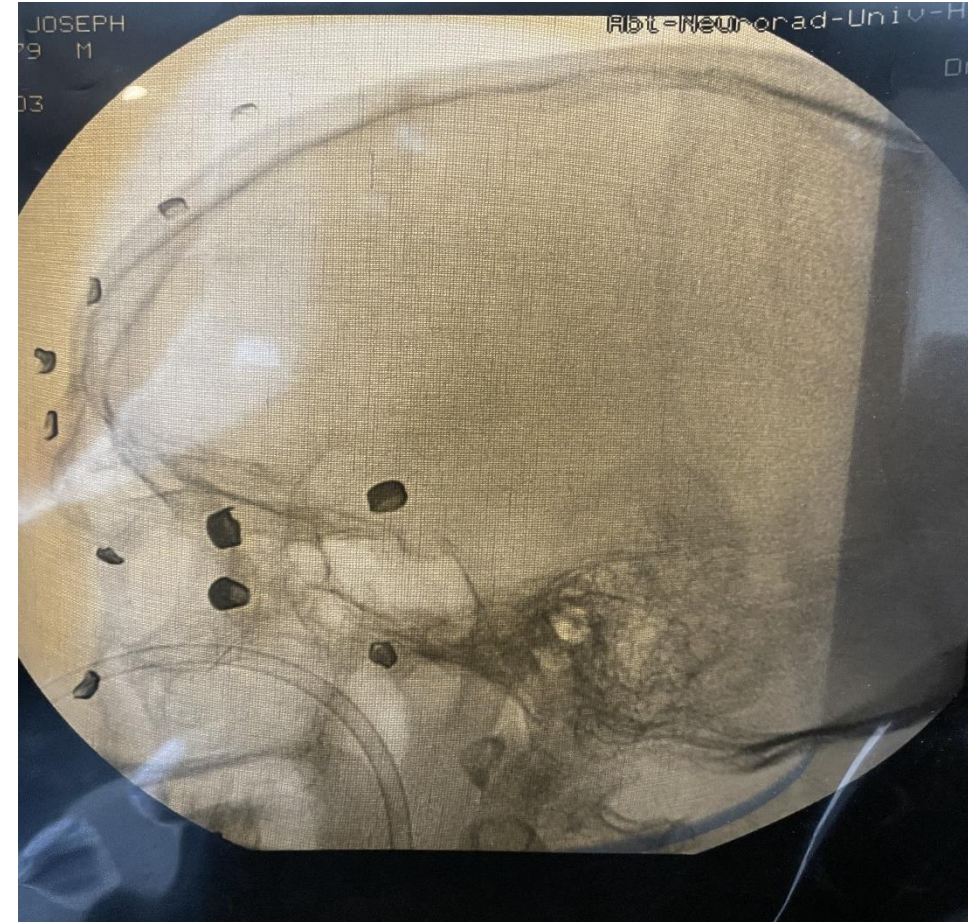


Enhancing the Capabilities of Those Who Build with Concrete

ASCC Strategic Goals and Actions

- ASCC is an extremely safety centered trade association.
- First concrete trade association with a dedicated full-time director of safety services.
- The Safety and Risk Management Council, a safety council comprised of 18-member company representatives meet monthly to develop and implement safety resources and initiatives for the association.
- Strategic goal for the SRMC- Be an industry influencer by challenging and disrupting traditional safety models.
- ASCC Strategic Goal adopted in February of 2020- H2H initiative, Influence members to transition from traditional hardhat to helmet head protection.

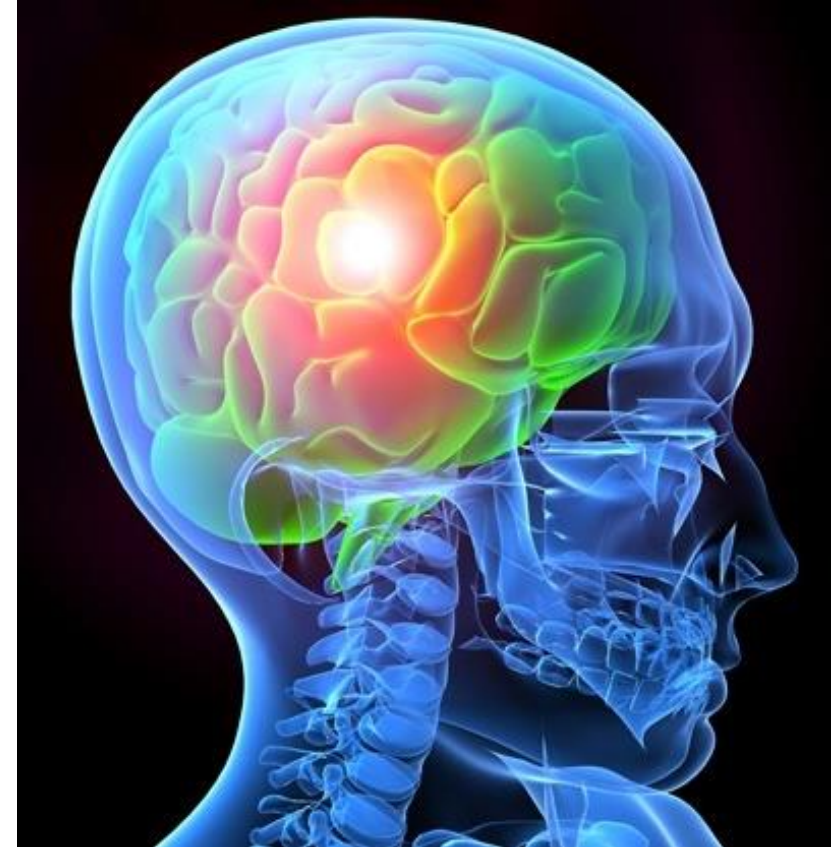
This Initiative Hits Close to Home



Traumatic Brain Injury

TBI claims average \$135,000
LTA claims average \$ 50,000

- CDC defines TBI as:
 - Blow or jolt to the head or penetrating head injury that disrupts the normal function of the brain
 - Ranges from “mild” i.e., a brief change in mental status or consciousness to “severe” i.e., an extended period of unconsciousness or amnesia after the injury. Potentially fatal.



[Home](#)

NIOSH: Construction workers at high risk for traumatic brain injuries

March 29, 2016

Morgantown, WV – Construction workers sustain more traumatic brain injuries than other type of workplace in the United States, according to a recent report from NIOSH.

Safety interventions must be emphasized in the construction industry, in which more workers died of a traumatic brain injury from 2003 to 2010, researchers said.

Traumatic brain injuries represented one-quarter of all construction fatalities during study period, according to the report. More than half of fatal work-related traumatic result of falls – particularly from roofs, ladders and scaffolds. Workers 65 and older more likely to sustain a fatal traumatic brain injury than workers 25 to 34 years old. workers at organizations with fewer than 20 employees were more than 2.5 times more likely to die from a traumatic brain injury than those who worked for organizations with more than 20 employees.

Srinivas Konda addressed the findings in a March 21 [NIOSH blog post](#). Konda is an associate service fellow in the NIOSH Division of Safety Research.

From 2003 to 2010, 2,210 fatal TBIs occurred in construction at a rate of 2.6 per 100,00 FTE workers.

AMERICAN JOURNAL OF INDUSTRIAL MEDICINE 59:212–220 (2016)

Fatal Traumatic Brain Injuries in the Construction Industry, 2003–2010

Srinivas Konda, MPH,* Hope M. Tiesman, PhD, and Audrey A. Reichard, MPH

Background Research on fatal work-related traumatic brain injuries (TBIs) is limited. This study describes fatal TBIs in the US construction industry.

Methods Fatal TBIs were extracted from the Bureau of Labor Statistics Census of Fatal Occupational Injuries.

Results From 2003 to 2010, 2,210 fatal TBIs occurred in construction at a rate of 2.6 per 100,000 full-time equivalent (FTE) workers. Workers aged 65 years and older had the highest fatal TBI rates among all workers (7.9 per 100,000 FTE workers). Falls were the most frequent injury event ($n = 1,269$, 57%). Structural iron and steel workers and roofers had the highest fatal TBI rate per 100,000 FTE workers (13.7 and 11.2, respectively). Fall-related TBIs were the leading cause of death in these occupations.

Conclusions A large percentage of TBIs in the construction industry were due to falls. Emphasis on safety interventions is needed to reduce these fall-related TBIs, especially among vulnerable workers. Am. J. Ind. Med. 59:212–220, 2016. Published 2016. This article is a U.S. Government work and is in the public domain in the USA.

Innovation In Fall Protection



Isn't There Something Better?





Hard Hats to Helmets

Why should we make the change?

Hard Hat History

Looking At The Past



1919

Bullard for mining and then Navy ship building. Made from steamed canvas, leather brim, black paint and glue



1930's

Hard hats evolved and were made from metals



1940's

MSA Skullguard fiberglass

1969

MSA in Space

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1960s

International B

[MORE INFO](#)



1961

New Helmets Introduced

In 1961, the Topgard® Helmet was introduced, which was the first polycarbonate hardhat. Polycarbonate is an extremely durable plastic that is very difficult to crack or break. A year later in 1962, the V-Gard® Helmet launched. Today, both helmets are part of the family of "best-selling helmets."



1960s

Gas Masks for the military

[MORE INFO](#)

1960 - 19

[VIEW ALL EVENTS THIS](#)



20s 1930s 1940s 1950s 1960s 1970s 1980s

OSHA Requirements

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: E
- Subpart Title: Personal Protective and Life Saving Equipment
- Standard Number: 1926.100
- Title: Head protection.
- Applicable Standards: 1910.135
- GPO Source: e-CFR

In Short: Provide ANSI Z89.1
OR Prove Equivalent
effectiveness

1926.100(a)

Employees working in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock and burns, shall be protected by protective helmets.

1926.100(b)

Criteria for head protection.

1926.100(b)(1)

The employer must provide each employee with head protection that meets the specifications contained in any of the following consensus standards.

1926.100(b)(1)(i)

American National Standards Institute (ANSI) Z89.1-2009, "American National Standard for Industrial Head Protection," incorporated by reference in §1926.6;

1926.100(b)(1)(ii)

American National Standards Institute (ANSI) Z89.1-2003, "American National Standard for Industrial Head Protection," incorporated by reference in §1926.6; or

1926.100(b)(1)(iii)

American National Standards Institute (ANSI) Z89.1-1997, "American National Standard for Personnel Protection-Protective Headwear for Industrial Workers-Requirements," incorporated by reference in §1926.6.

1926.100(b)(2)

The employer must ensure that the head protection provided for each employee exposed to high-voltage electric shock and burns also meets the specifications contained in Section 9.7 ("Electrical Insulation") of any of the consensus standards identified in paragraph (b)(1) of this section.

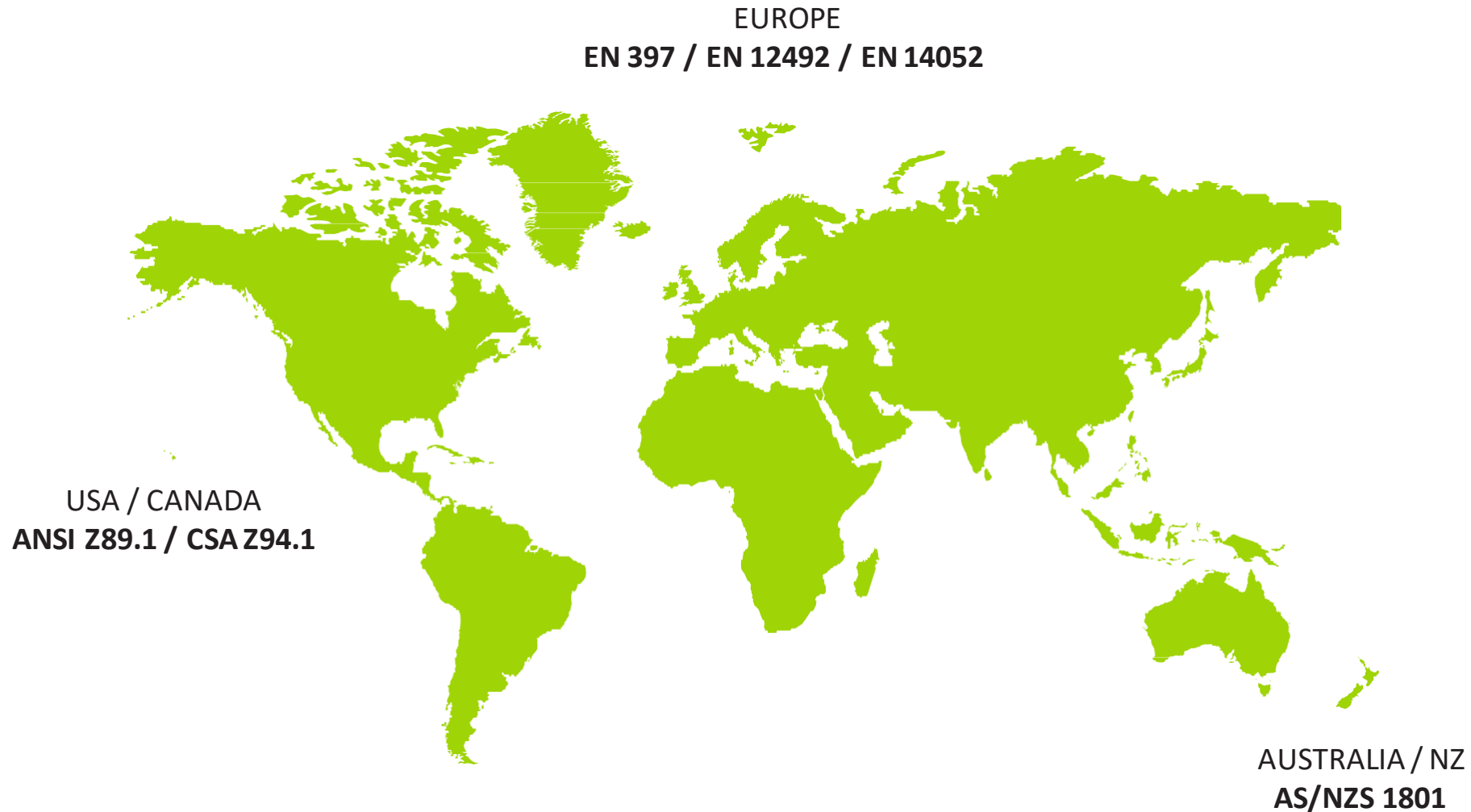
1926.100(b)(3)

OSHA will deem any head protection device that the employer demonstrates is at least as effective as a head protection device constructed in accordance with one of the consensus standards identified in paragraph (b)(1) of this section to be in compliance with the requirements of this section.

[77 FR 37600, June 22, 2012; 77 FR 42988, July 23, 2012]

What technical and performance standards do helmets meet?

Head Protection Safety Standards Worldwide



ANSI Z89.1 TYPE I and TYPE II

- **ANSI Z89.1 TYPE I** helmets are tested for:
 - Top impact absorption
 - Penetration resistance
 - Flame resistance
 - Electrical classification requirements (Conductive, General, Electrical)
- **ANSI Z89.1 TYPE II** helmets pass Type I tests **and** additional tests for:
 - Lateral impact
 - Lateral penetration
 - Chin strap requirements (if applicable*), and
 - Low/high temperature operating range
- It is important to note that an ANSI Type II helmet can be sold without a chin strap. A chin strap could be added as an accessory after purchase and not be subjected to any testing.

Breakdown Of The NIOSH Study

TABLE III. Number and Rate of Fatal TBIs per 100,000 FTE Workers in the Construction Industry by Age and Event Type—US, 2003–2010

Age group (in years)	Contact with objects and equipment		Falls		Transportation incidents		Other ^a	
	n (%)	Rate	n (%)	Rate	n (%)	Rate	n (%)	Rate
16–19	—	0.9	38 (51)	2.3	20 (27)	1.2	—	0.1
20–24	46 (24)	0.6	99 (52)	1.3	39 (20)	0.5	8 (4)	0.1
25–34	95 (21)	0.4	247 (54)	1.1	107 (23)	0.5	11 (2)	0.1
35–44	92 (18)	0.4	299 (58)	1.3	101 (20)	0.4	22 (4)	0.1
45–54	62 (12)	0.3	315 (59)	1.6	114 (21)	0.6	47 (9)	0.2
55–64	40 (14)	0.5	183 (62)	2.1	57 (19)	0.7	16 (5)	0.2
65 and older	—	0.8	88 (65)	5.2	25 (19)	1.5	—	0.5
Total	363 (16)	0.4	1269 (57)	1.5	463 (21)	0.6	115 (5)	0.1

- 1269 (57%) Fatalities from FALLS!
 - 388 (24%) fell from roofs
 - 301 (24%) fell from ladders
 - 212 (17%) fell from scaffolds/staging
 - 25 employees fell and died from the same walking/working surface
 - Small contractors(<20), foreign born, older workers > risk



Helmet Design and Testing

Expanded Polystyrene (EPS)

- First Law of thermodynamics (Law of Conservation of Energy) states that energy can neither be created nor destroyed; energy can only be transferred or changed from one form to another.
- Energy from impact involving EPS is absorbed during the crushing of foam creating heat and limiting energy from reaching the head/brain.

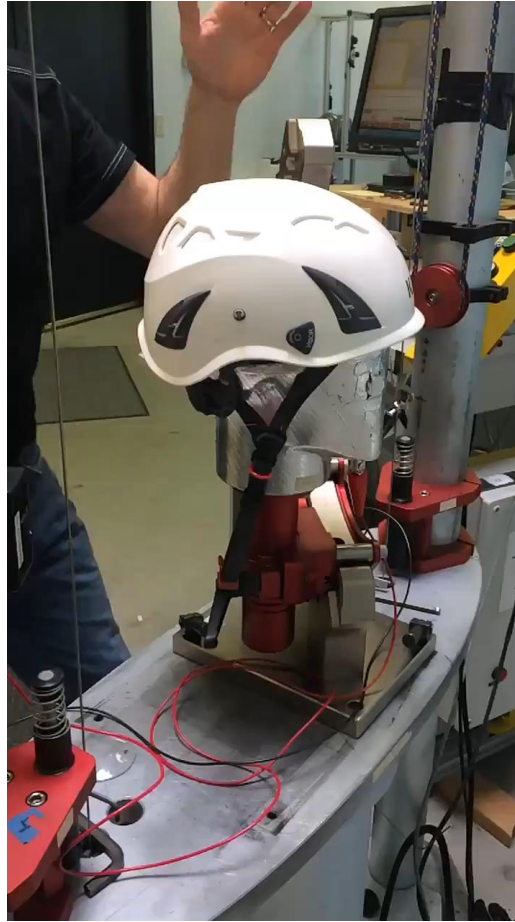


Helmet Testing

Force Transmission



Apex Penetration



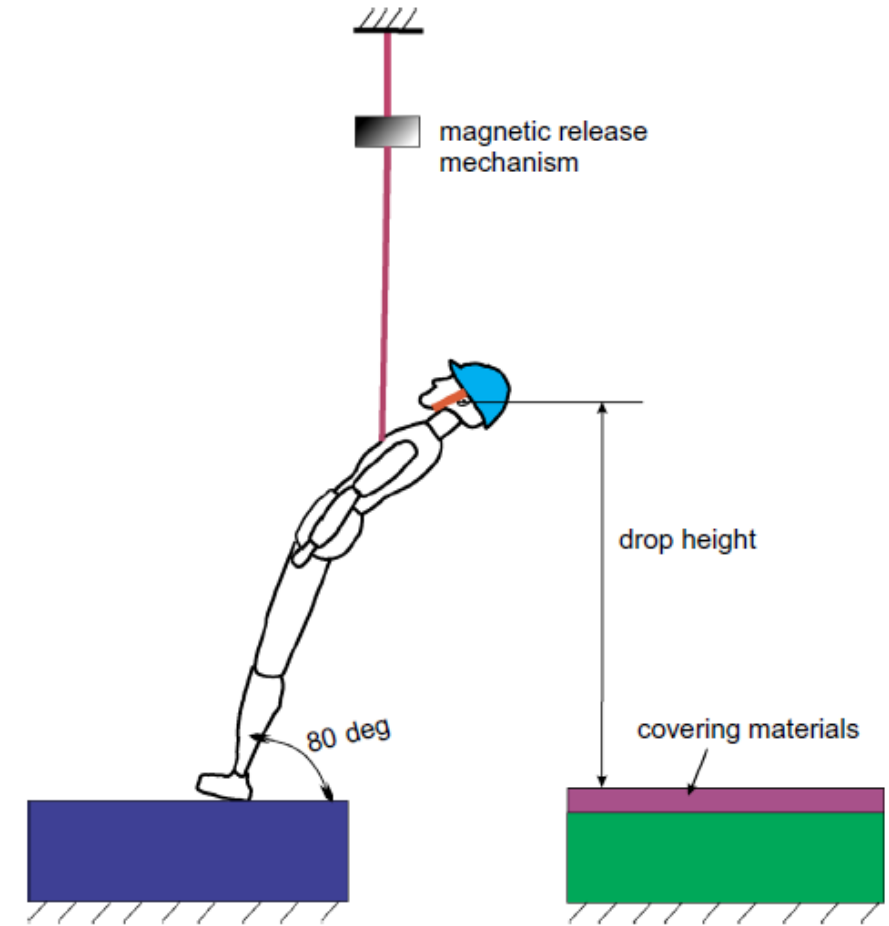
Impact Attenuation



Helmet Effectiveness

- Evaluation of the Fall Protection of Type I Industrial Helmets¹
 - Without a hard hat or helmet – 100% probability of serious head injury
 - With a traditional hard hat ~ 65% probability of a serious head injury
 - With a helmet ~ 25% probability of a serious head injury
 - Note: In the automotive industry < 50% is the generally accepted permissible limit

¹ published online 5 February 2022



Hard Hat vs. Safety Helmet

HARD HAT



- Standard hard hats are 60-year-old technology
- Complying with ANSI Z89.1 (top impact and top penetration)
- When falling, a hard hat will fall off your head.
- **Designed just for falling objects**
- **5 years shelf life**
- No chinstrap and no additional lining
- Overall fit hinders movements
- Few and limited accessories
- Warranty: 1 year

SAFETY HELMET



- **EPS foam all over the shell absorbs and dissipates the impact**
- **Complying with ANSI Z89.1/2015 (top impact and top penetration) AND additional side, rear and front impact according to mountaineering standard EN 12492 or ANSI TYPE II (with strap)**
- **Stays on your head during a slip, trip, or fall.**
- **Designed for Fall Protection & Heavy Impact**
- **10 years shelf life**
- Wide collection of accessories
- Warranty: 3-5 years

Hard Hats to Helmets

Why should I make the change?

Our Call to Action



Safety Helmet Initiative: Objectives

For **ASCC, Structural** and for our Industry:

- This is about **saving lives**.
- We're trying to connect all the different pieces of a solution to provide the industry a **much better** solution.
- We want to share our vision, and hope you feel passionate about being part of this.



Safety Helmet Initiative: Objectives



1. Ensure a significantly lower cost solution available in the U.S. Market.
 - Meets ANSI Type I requirements
 - Meets performance requirements of EN 12492, ANSI Type II
 - \$30-\$40 target- Current market range \$60-\$100+
2. Start saving lives: Work with manufacturers to ensure there is supply to all interested parties. Target industry organizations, industrial clients, and major general contractors to create a trickle-down affect to their specialty contractors.
3. Lobby for Change: With lower cost solutions, we can push for change to Standards and OSHA requirements without a negative impact to the industry.
4. Watch the Market Adapt: With growing interest and changing requirements, other manufactures will bring solutions to the table. Product innovation and cost reduction will follow.

What about comfort, maintenance and accessories for the helmets?

Helmet Accessories

Bracket and visors



Ear muffs



Straps and clips for headlamps



Reflective Strips



Winter padding



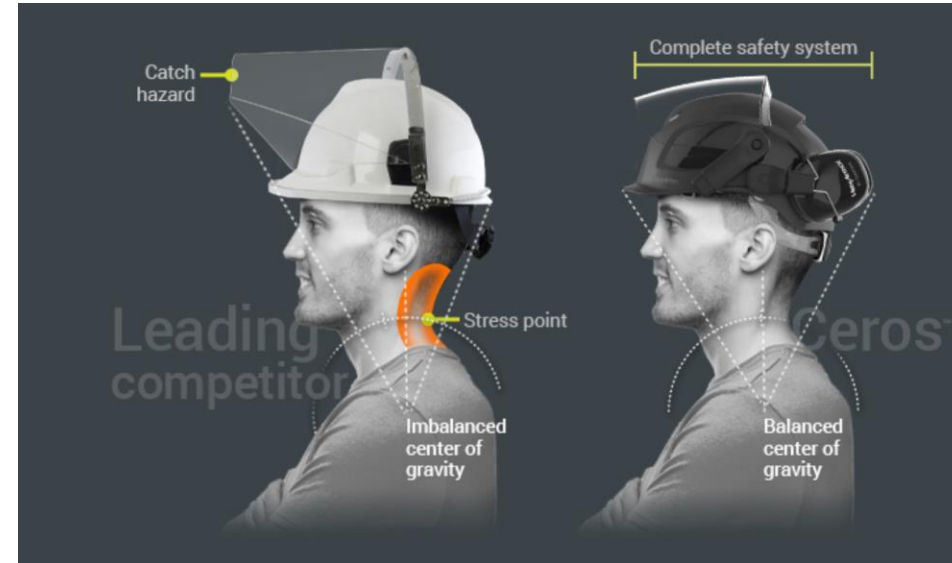
Neck shade



Helmet comfort and fit

Weight – hard hat 14 oz ~400 grams

Helmets ~450-500 grams



“I love it! It’s much more comfortable than the old hard hat” – Dave

“It feels a lot lighter on your head” – Steve

“The upgraded suspension really feels secure, and I really like how it adjusts to my head” – Ross

Aren't helmets hotter than hard hats?

Head Protection Temperature Study

Georgia Tech Enterprise Innovation Institute: Safety, Health and Environmental Services Group

- Testing Protocol
 - Six Quest Temp 34 Heat Stress monitors (WBGT)
 - Six different head protection models
 - 4 helmets
 - 2 hard hats
 - Sponge saturated with 50 mL of water to simulate perspiration and water loss was measured at the end of each testing cycle.
 - Internal and external temp. measured over 3 day period

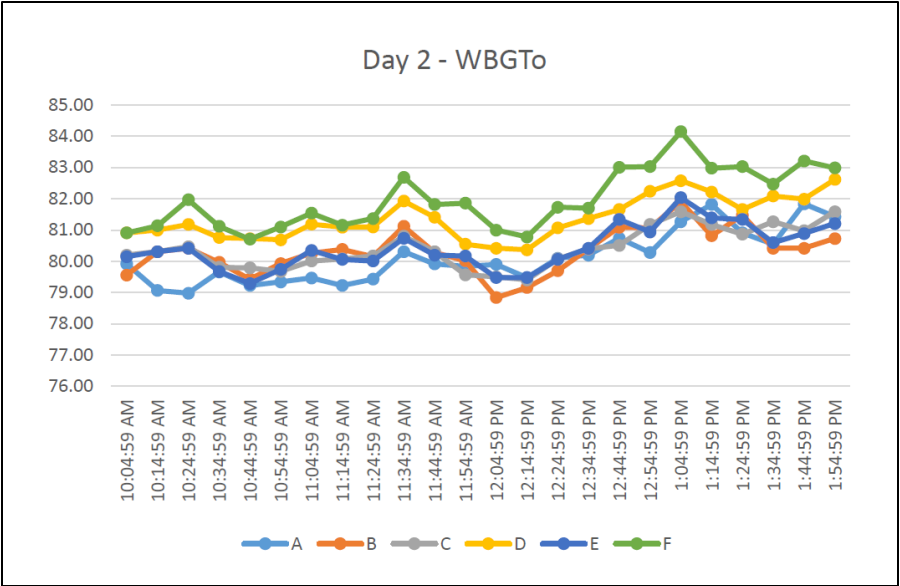


Head Protection Temperature Study

Georgia Tech Enterprise Innovation Institute: Safety, Health and Environmental Services Group

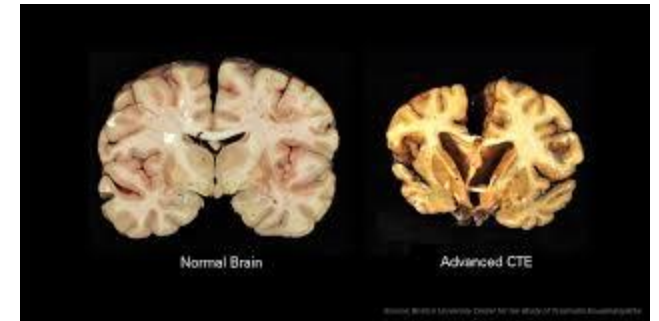
■ Results

Average Ambient WBGT _o - Control	Average External Surface of HH/Helmets	Average Globe – Under HH/Helmets	Average Dry - Under HH/Helmets	Average WBGT _o - Under HH/Helmets	Average Grams Water Loss
86.3 °F – 87 °F	89.9 °F – 94.7 °F	89.2 °F – 93.4 °F	87.6 °F – 89.4 °F	79.8 °F – 81.6 °F	20.8 g - 32.8 g



	Average external Surface	AverageGlobe internal	Average Dry Internal	Average WBGT _o Internal
A	94.7	91.3	87.6	79.8
B	91.4	90.7	88.7	79.9
C	92.7	89.2	88.3	79.9
D	92.9	91.9	89.4	80.8
E	92.7	90.9	88.3	80.0
F	89.8	93.4	88.0	81.6

New Technology

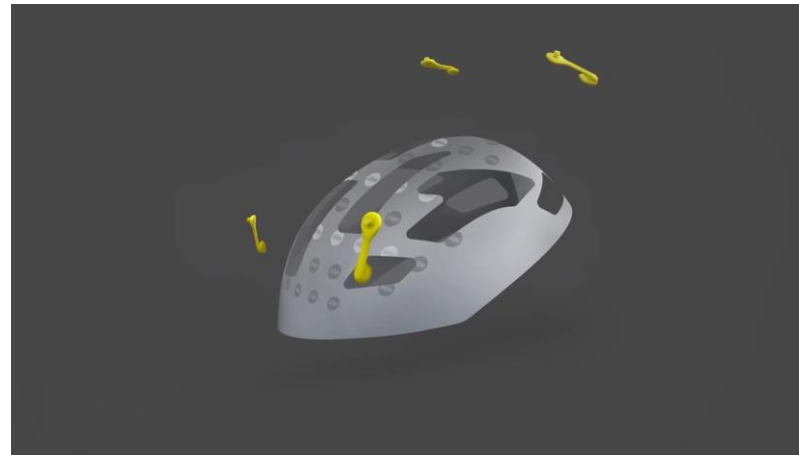
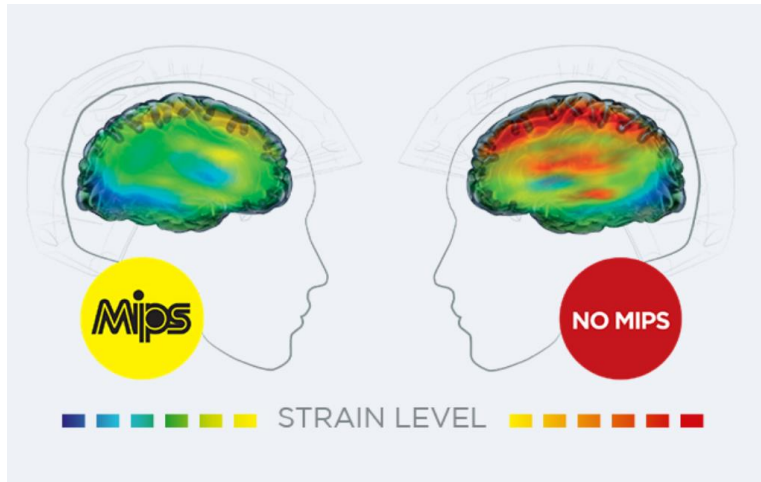


MIPS Technology



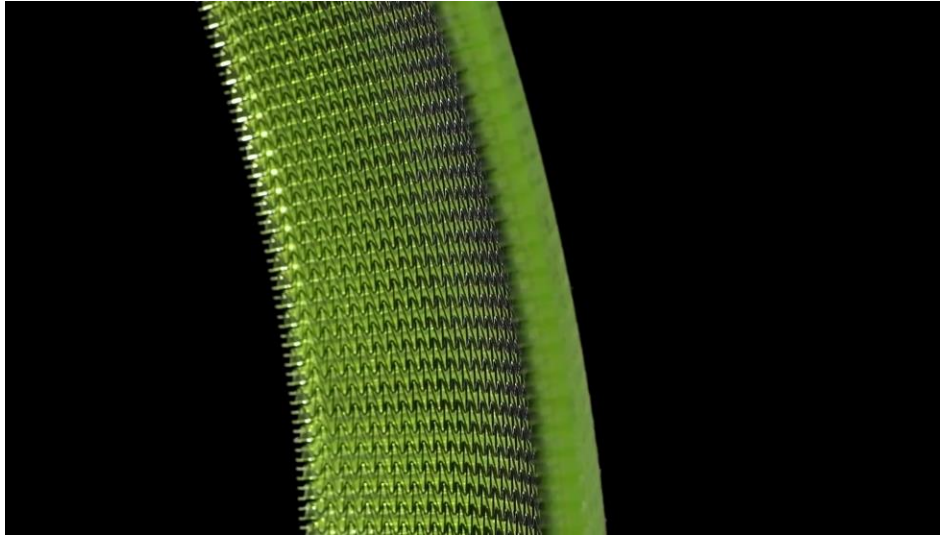
- **Multi-Directional Impact Protection System**

- Reduces rotational forces caused by angled impacts to the head.
- A helmet's shell and liner are separated by a low friction layer which allows the helmet to slide, noticeably reducing trauma to the brain in the case of oblique impacts.
- MIPS layer is located between the liner and the user's head.



Energy Absorbing Cell Technology

- A collapsible cellular structure that lines the inside of a helmet.
- It works like a crumple zone that absorbs the force of an impact before it reaches your head



Flex

First, the cells flex to reduce the initial frictional forces.



Crumple

Next, the cells crumple like a car bumper upon impact.



Glide

Finally, WaveCel glides to redirect energy away from your head.

How it works

In order to protect your head and absorb the energy created by an impact, WaveCel goes through a three-step change in material structure.

Hard Hats to Helmets



SKANSKA

Turner



H2H: You can help!



Alberici



GRANITE[®]

WELTY



H2H Website



HOME WHY HELMETS? HELMET STORIES RESOURCES ▾

Hardhats to Helmets

Traumatic Brain Injuries are responsible for 25% of all construction fatalities,
and many life-altering injuries.

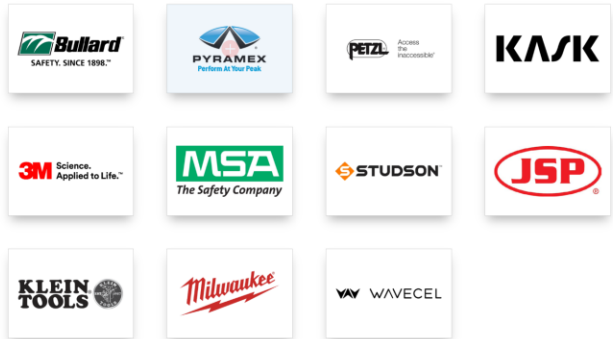
MAKE THE TRANSITION

REGULATORY
REQUIREMENTS AND
TECHNICAL
SPECIFICATIONS
RESEARCH AND
DEVELOPMENT
CONSTRUCTION
INDUSTRY ADOPTION
VENDOR
INFORMATION

www.hardhatstohelmets.org



HELMET MANUFACTURERS



Helmets work!



Case Study

Your Commitment



This **Statement of Support** relative to the change from the traditional hard hat to impact and penetration resistant helmets is made and entered into by and among the Construction Contractors signed below.

Statement

The future of the United States construction industry depends on nurturing the development of a safe and healthy environment for over 7,000,000 workers; and

NIOSH has found that the greatest number of fatal and non-fatal traumatic brain injuries (TBIs) occur in the construction industry; and

Research reveals that helmets provide significantly improved protection against TBIs than the traditional construction hard hat; and

Industry leaders, including construction business owners, general contractors, trade partners, material providers, trade associations, heavy equipment manufacturers, manufacturers of production facilities, engineering communities, government officials, and others must act and encourage the change from hard hats to helmets.

The undersigned do hereby state that henceforth their respective organizations will initiate and/or encourage open conversations relating to the change from hard hats to helmets in the Construction Industry and engage in responsible activities whose purpose is to strengthen the construction industry knowledge of TBIs and provide an optimal environment to encourage those decision makers in the construction industry to facilitate the change to helmets.

Name

Company



Thank you

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