

# Helmet Protectiveness and Helmet Standards

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# Helmet in 1950s



# How to Choose among Today's Motorcycle Helmets?

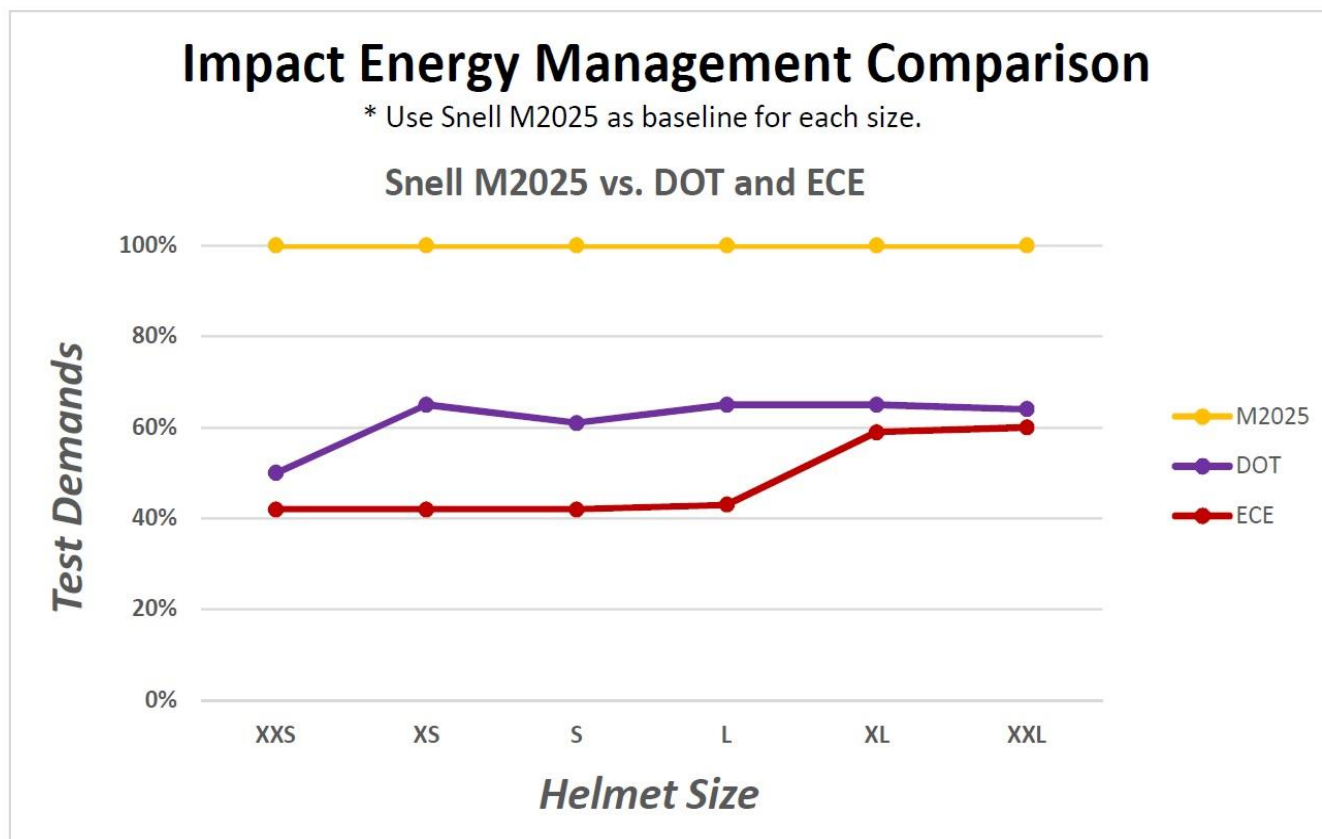


# Motorcycle Helmet Effectiveness

- NHTSA estimates that motorcycle helmet usage leads to:
- 37% reduction of crash fatality
- 67% prevention of brain injuries



# Snell Means Premium Protection. DOT and ECE are Minimum Requirement.



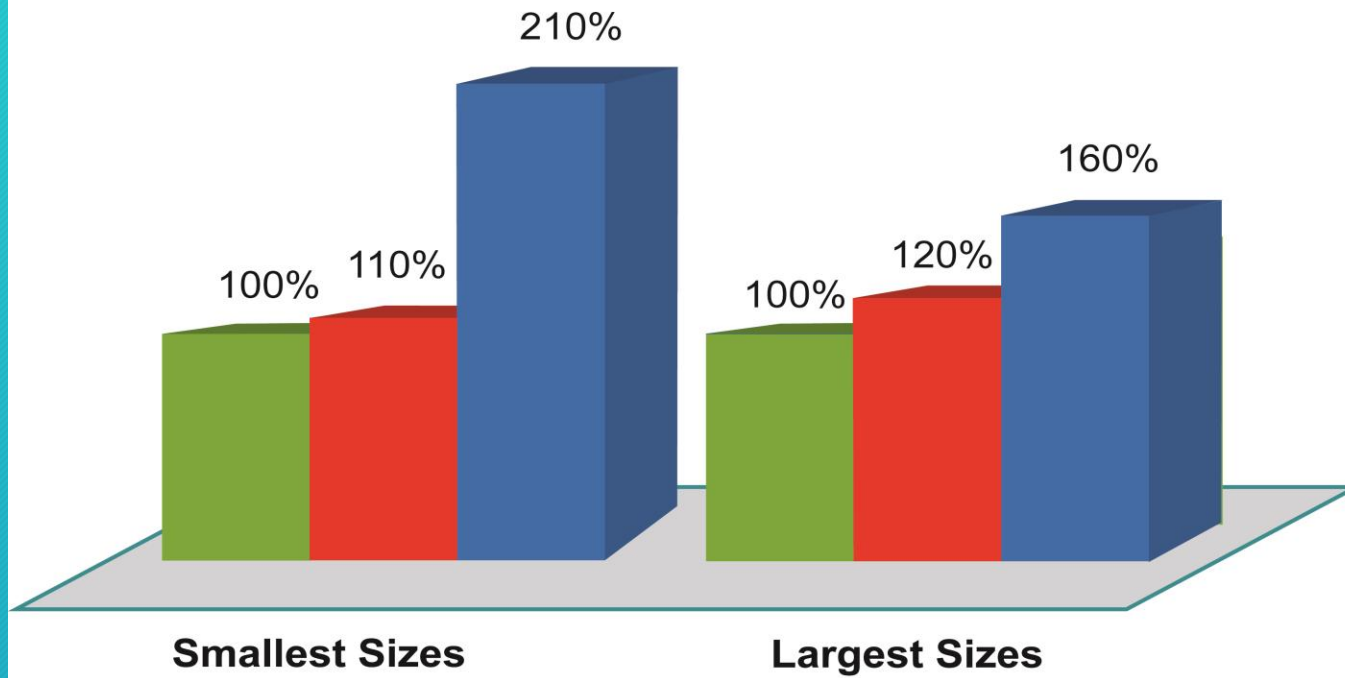
# Impact Energy Management

as a percentage of ECE demands

 ECE

 DOT

 SNELL



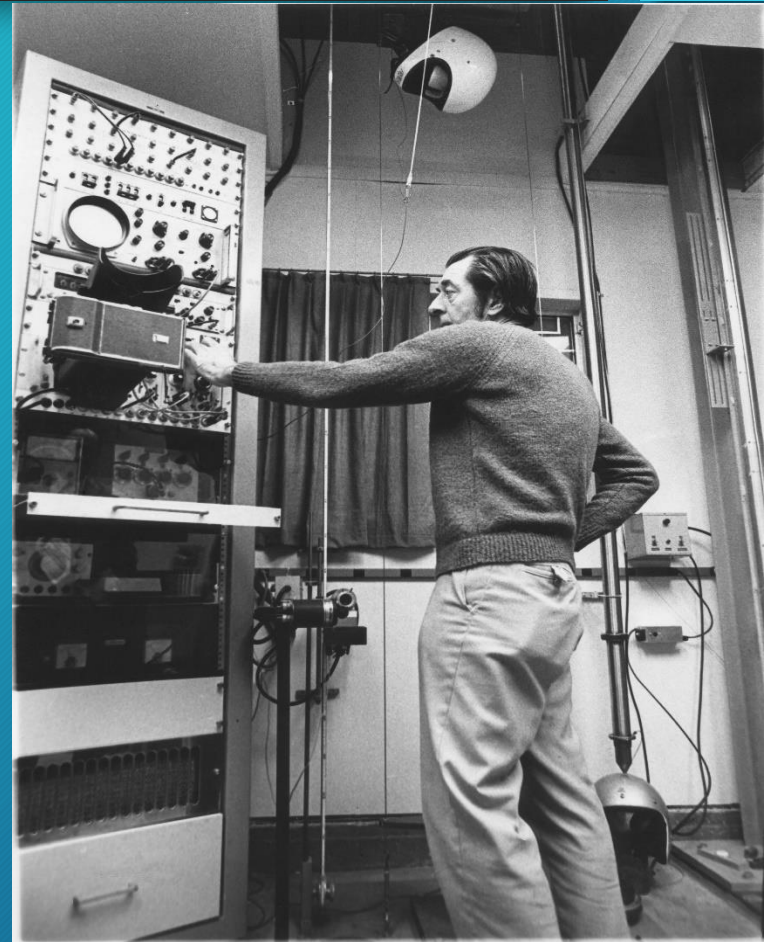
# Effectiveness of Standards

- Standards = Documents
- Effectiveness of standards depend on
  - \* Strict and independent certification
  - \* Enforceable compliance
  - \* Experience and competence
- Testing and More Testing

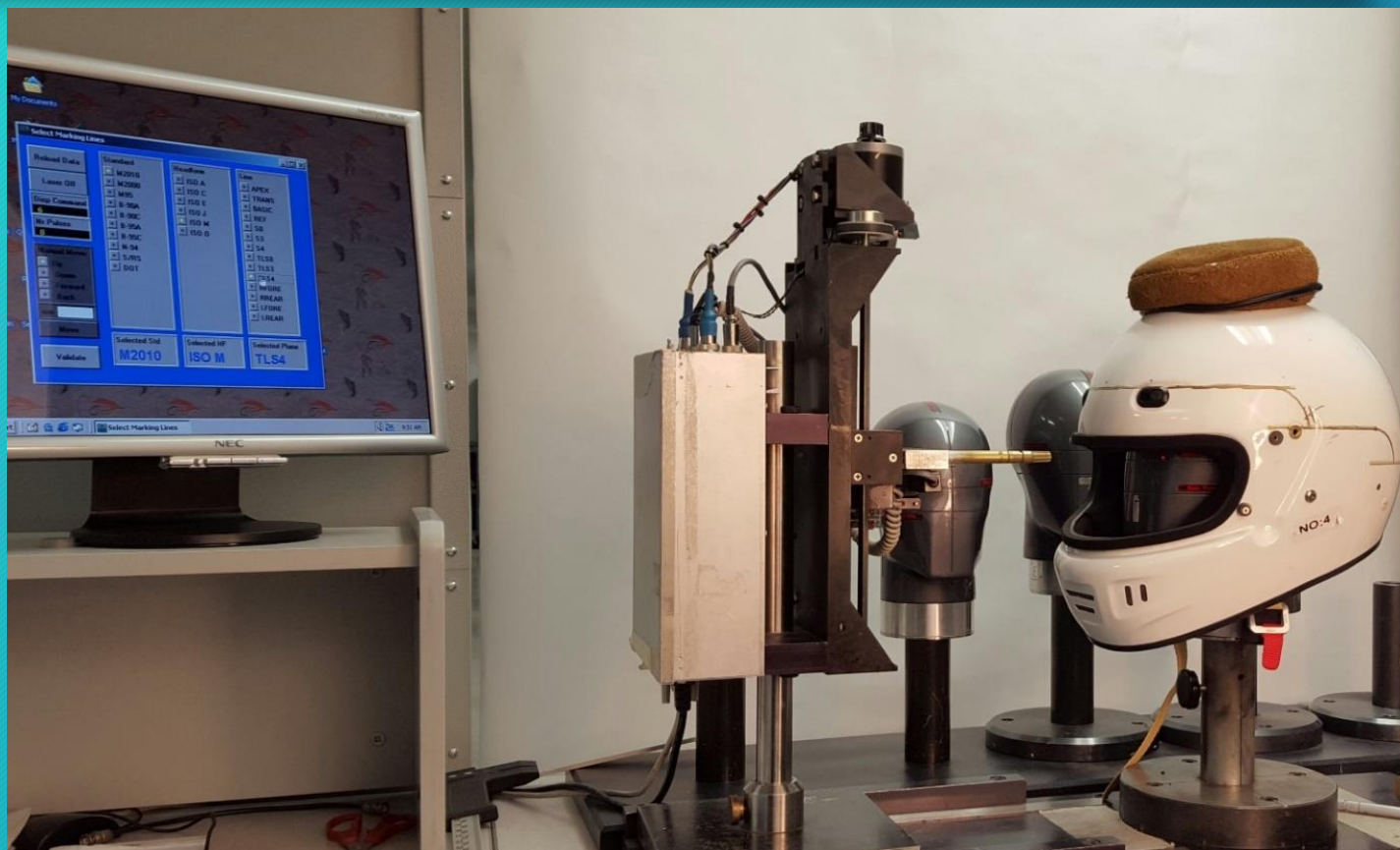
# Oldest Snell Testing Photo



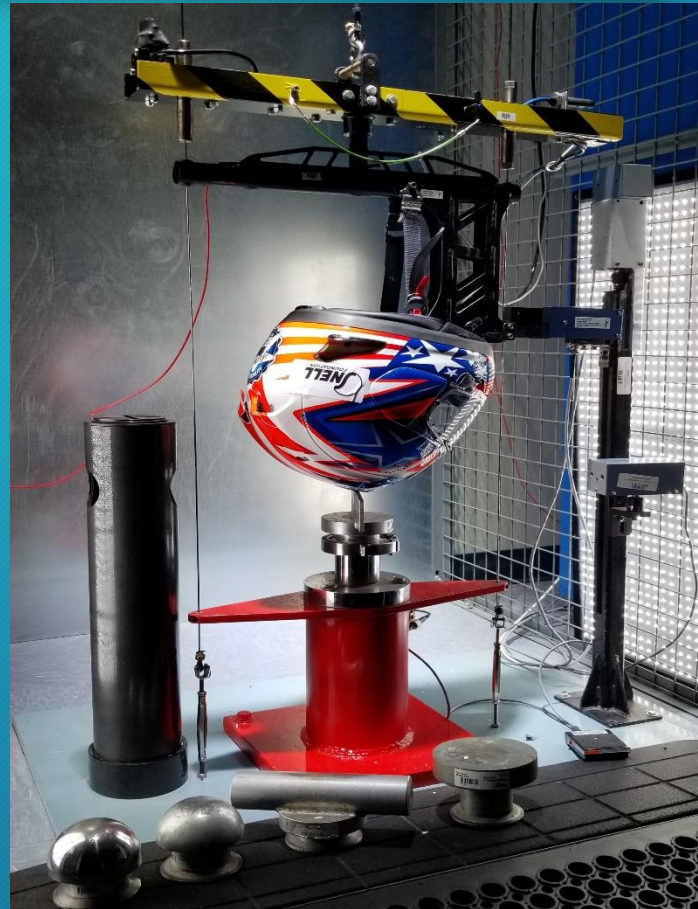
# Snell Lab in Early 1960s



# Snell Test Lab Today



# Snell Impact Testing: Scientific and Repeatable



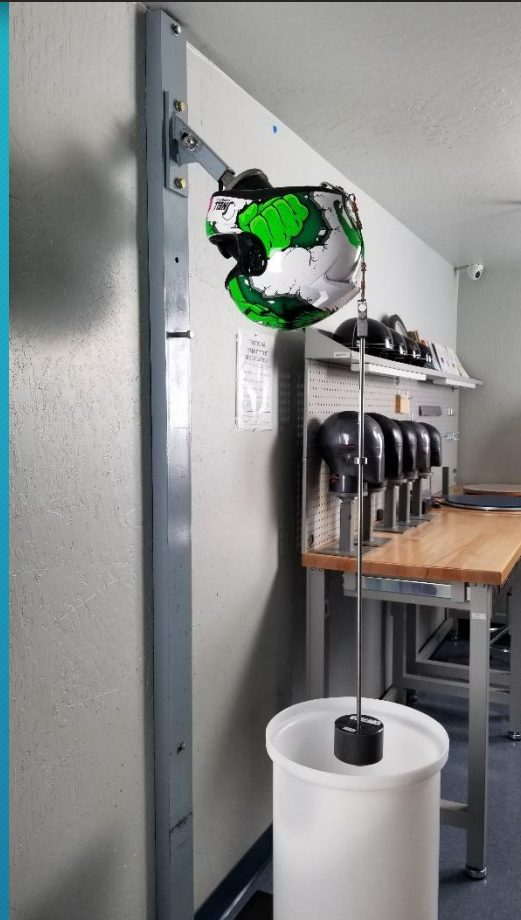
# Snell Retention Test



# Snell Penetration Test



# Chin Guard and Roll Off Tests



# Snell Face Shield and Visual Field Tests



Some fail tests.



# Experience and Expertise

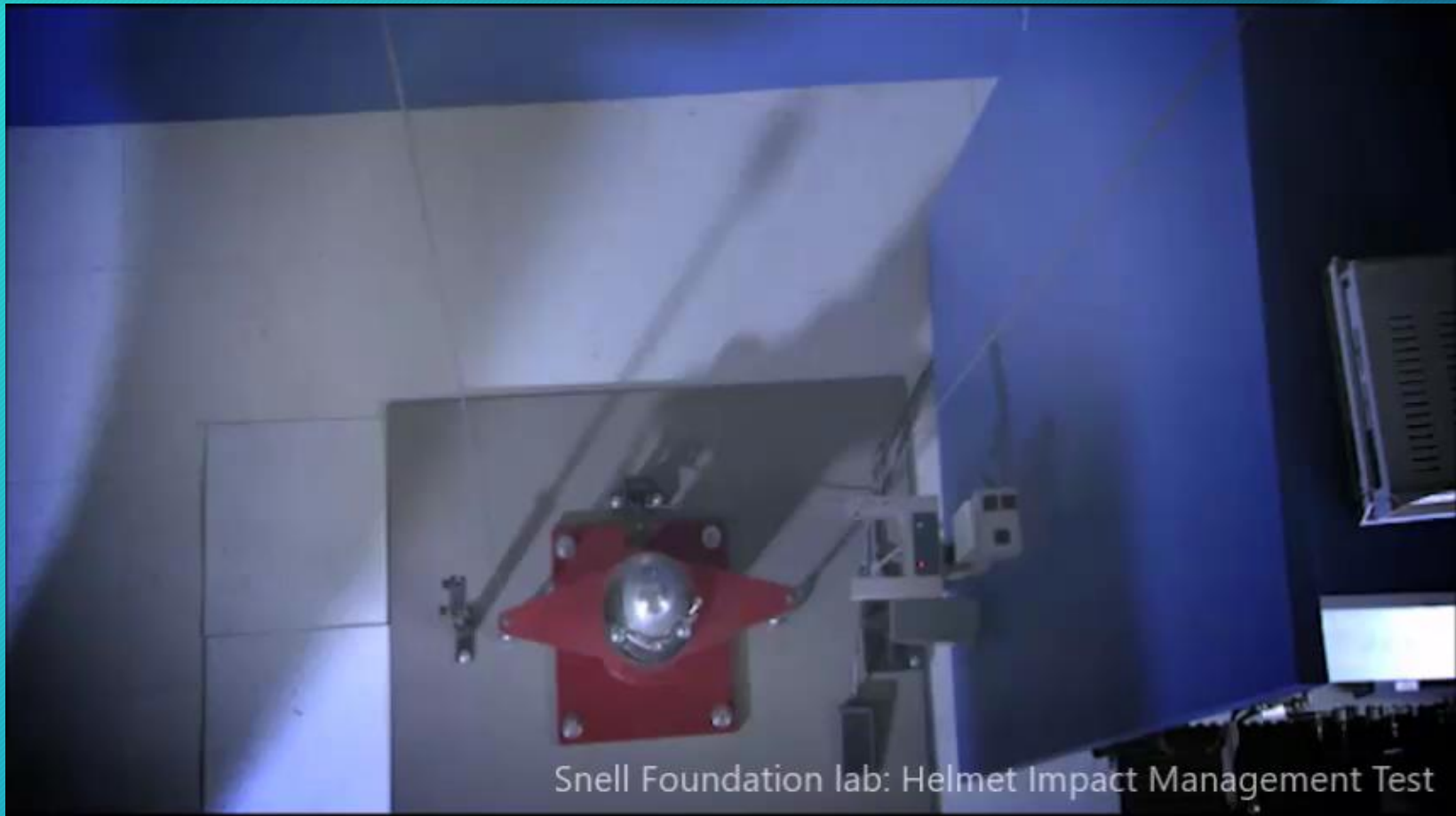


# Snell Tests For Public Safety

- Snell Web Site Helmet List
- Updates Each Day
- Certified Helmets by Name and Size
- Decertified Helmets Noted



# Tough Linear Impact on Hemi Anvil



Snell Foundation lab: Helmet Impact Management Test

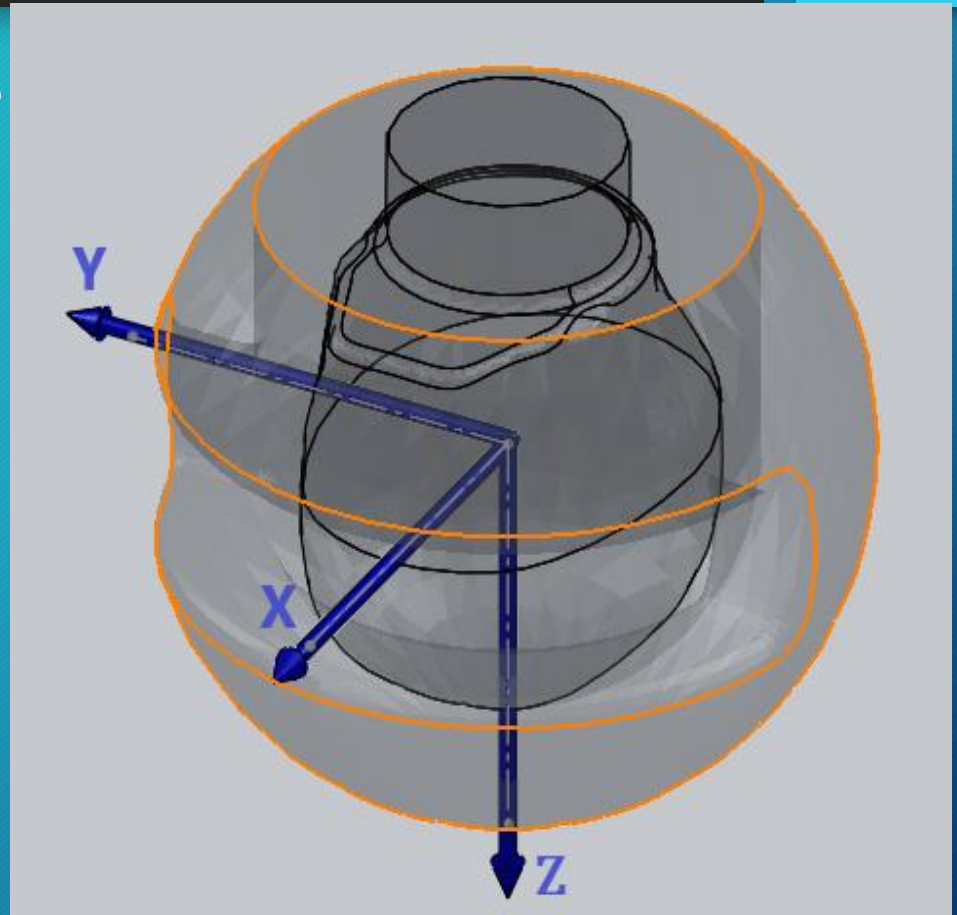
# Current Snell M2025 Standards



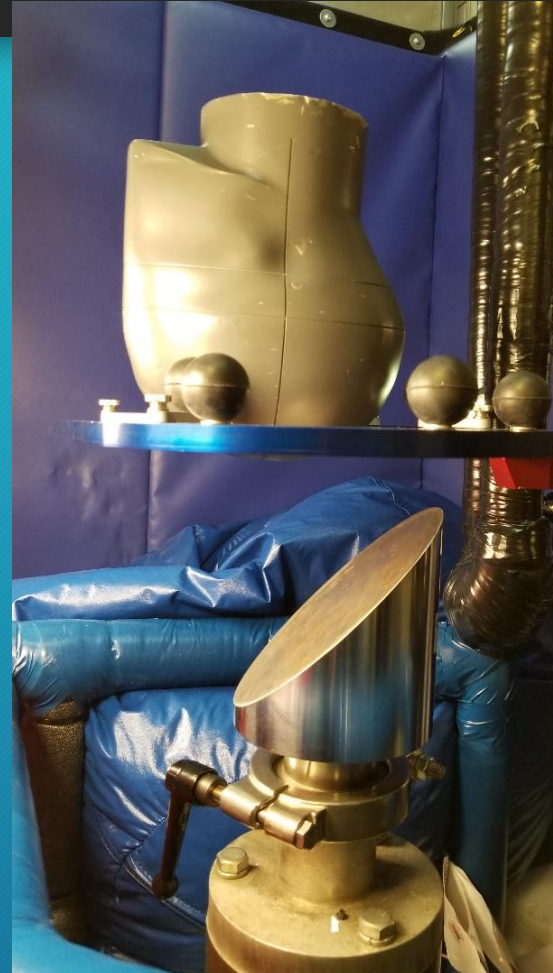
# New M2025 Oblique Impact Test

## Evaluate Rotational Forces

- 2 extra helmets 3 oblique impacts each
- 8m/s oblique impacts
- $<10,000 \text{ rad/s}^2$  rotational acceleration
- $< \text{BrIC } 0.78$



# Wireless Head Form for Oblique Impact Test



# Instrumentation & Confidence Check Setup

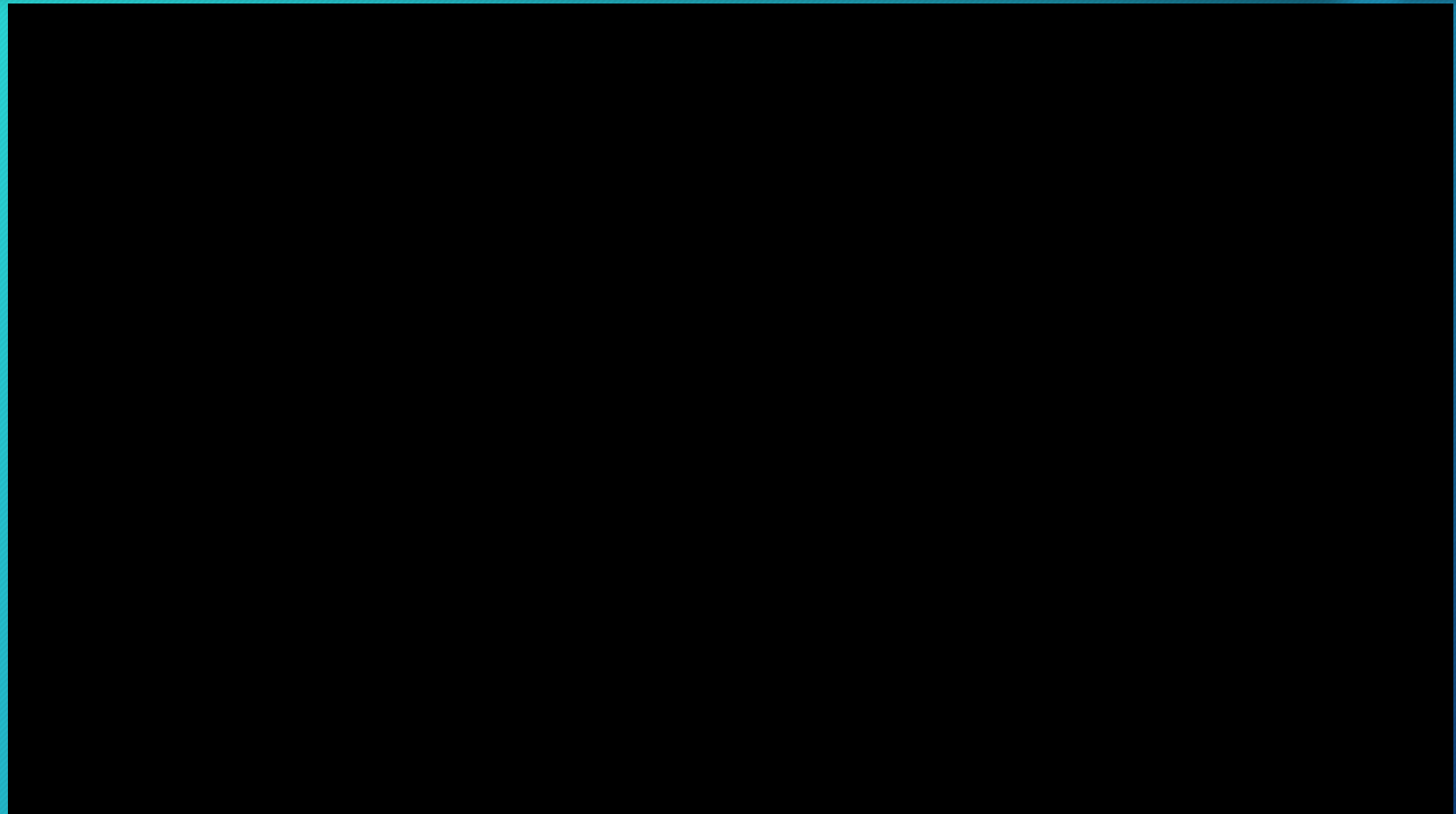
Confidence check is a crucial part of any testing protocol.



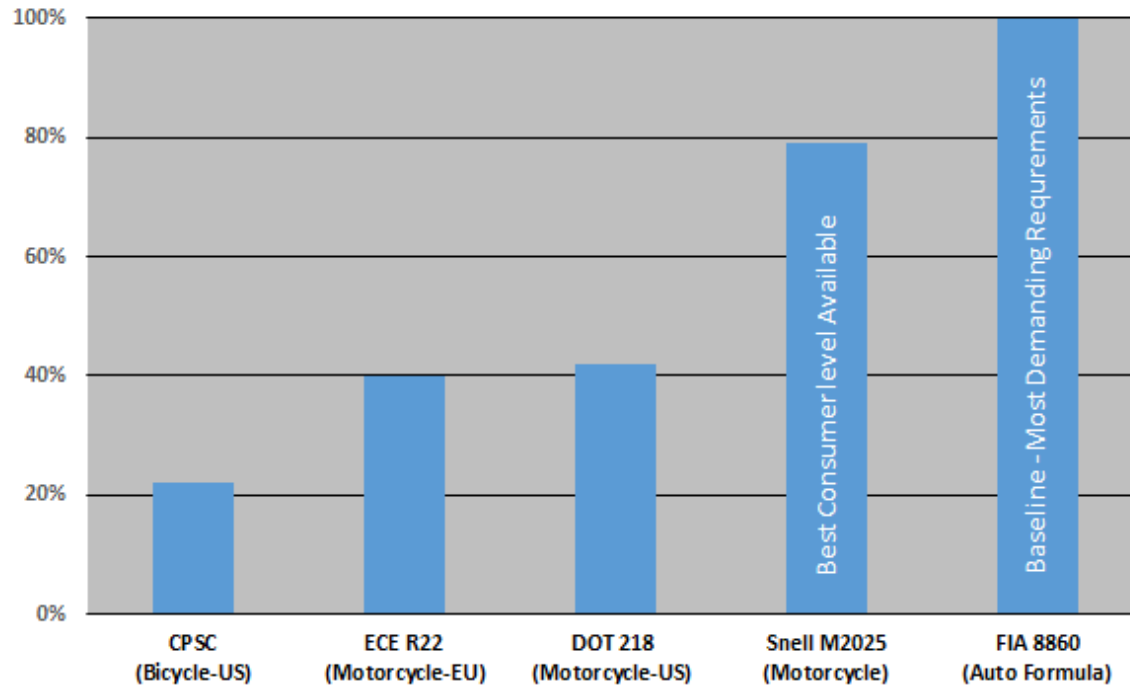
- iCono 6-sensors (3 DTS uniaxial accelerometers + 3 DTS gyro sensors) by MASDE (Spain) - currently version 3
- Custom design magnesium alloy sphere - inter-laboratory confidence checks
- Oblique MEP mounted on top of the 45 degree steel anvil



# M2025 Oblique Impact



## Impact Energy Management - Hemispherical Impact



\*M2025 & DOT 218 - Estimated single impact capability based on double impact testing.

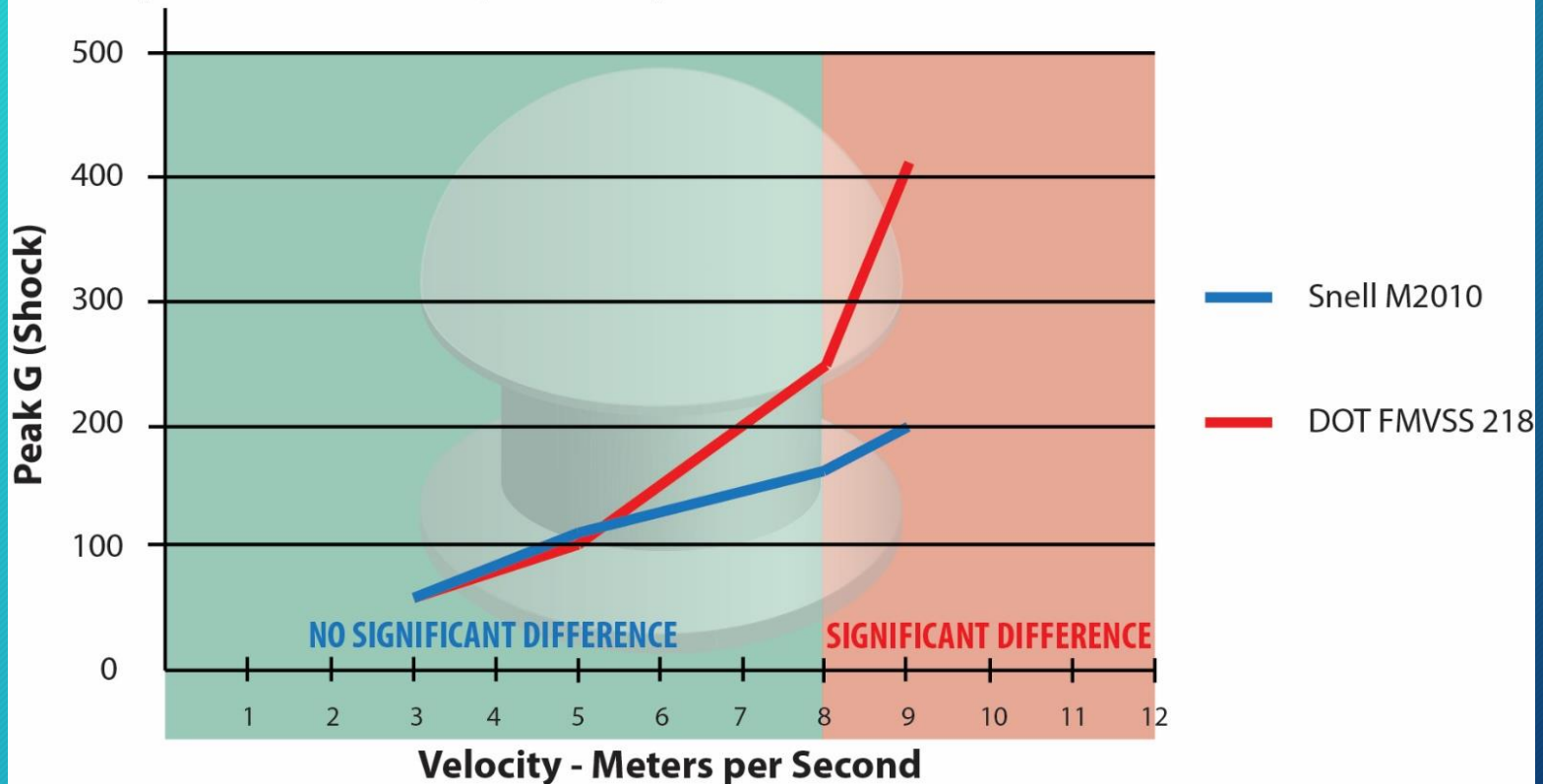
ECE - Estimated based on guided fall vs free fall and hemispherical versus kerbstone impact surface.

Unpublished: Snell Foundation Inc. 2024



# Snell Premium Level of Impact Management

Hemispherical Anvil Impact Response - 57-59 cm (ISO J) Sized Helmets



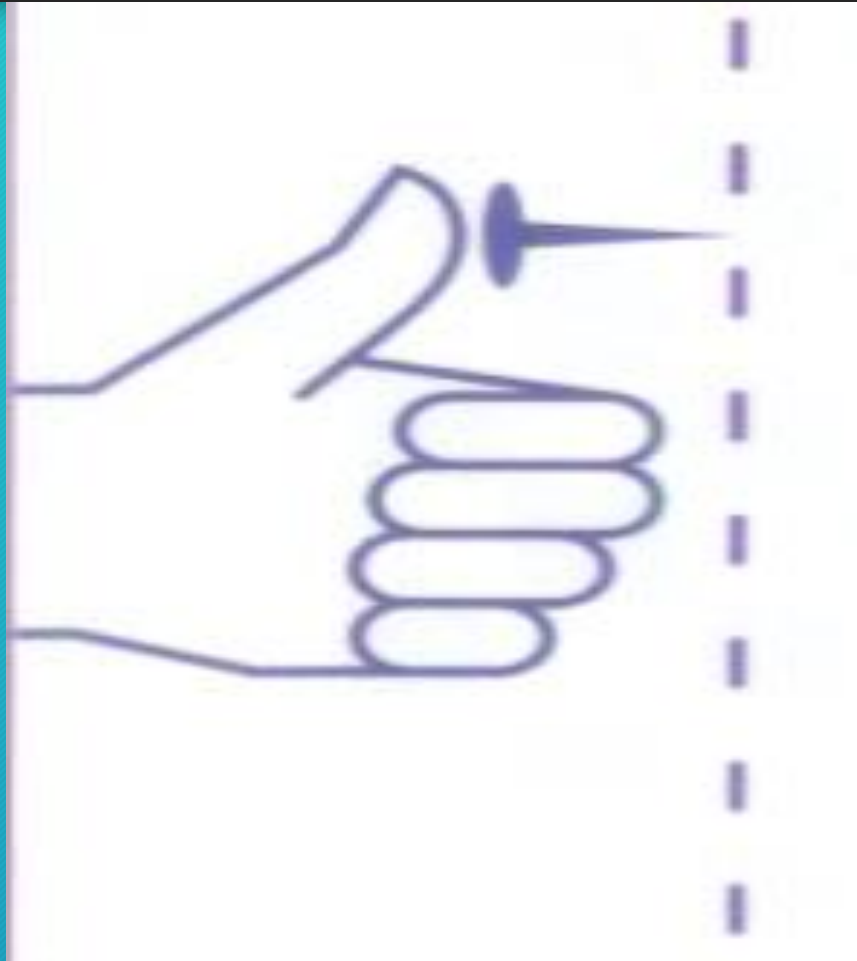
# Snell Helmets Save Lives.



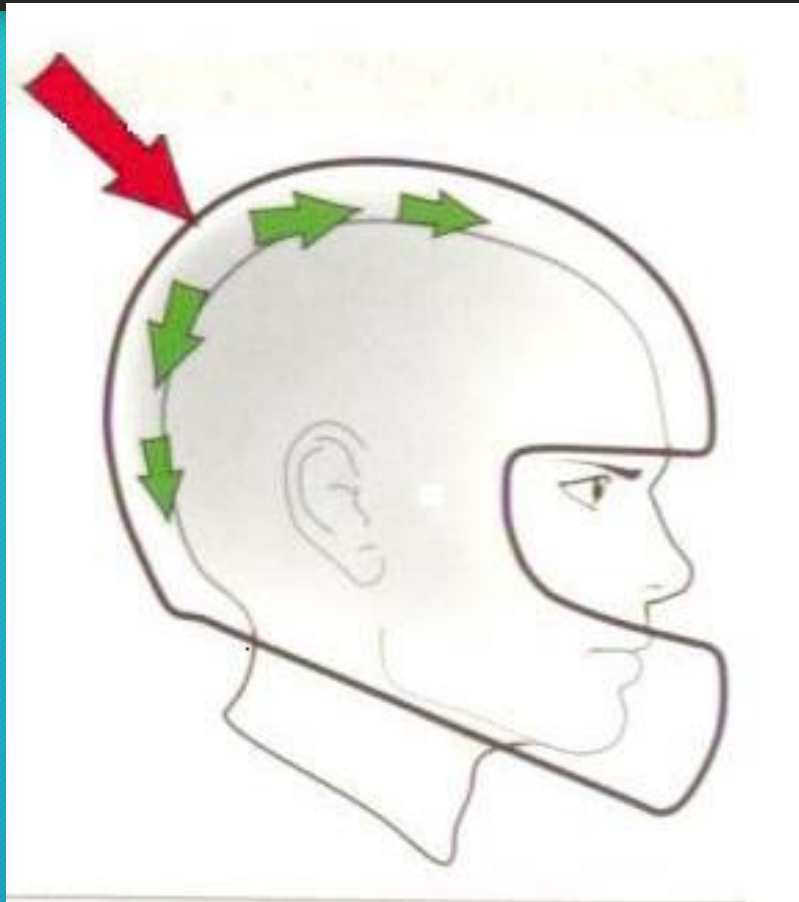
# Shell Spreads the Load. Liner Foam = More Braking Time



# Physics in a Thumb Tack



# Hard Shell /Spread the Force

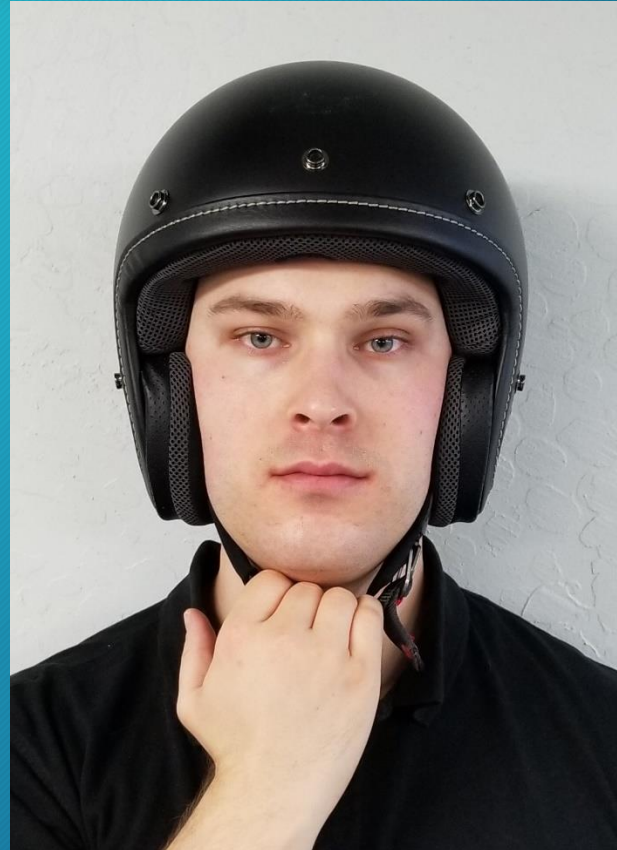


# Helmet Fit Research

- Well-fitted helmets protect better.
- Dr. Amy McIntosh reported in 2012 that children with help fitting a helmet had concussions reduced by 41%.



# Snug Fit and Strap (2 fingers)



# Helmet Dos and Don'ts

- Replace every 5 years.
- Fasten chin strap.
- Clean with only soap and water.
- Do not cut or alter the helmet liner.
- Do not put helmet near hot muffler or engine.
- Do not place helmet atop mirror or handle bar.



# Invisible Liner Impact Damage



# Sneak Attack: Melted Liner Foam



# Snell's Mission

- Evidence Based Helmet Standards
- Premium Protective Helmets
- Injury Prevention Education



We Don't Make Helmet.  
We Make helmets Safer.



# More Information

- Videos in Snell Youtube Channel
  - How Helmet Works to Protect the Brain
  - Why Helmet Standards Matter
  - Snell Lab Tour
- Snell Facebook/X -Twitter
- Call Snell Lab and Office: 916-331-5073



# Last Words

- Riders have no direct indicators of helmet protective capability
- Riders can look for indirect indicators (e.g.: a serialized Snell sticker)
- There are reasonably foreseeable crashes that will exceed a helmet's protective capabilities.
- In serious crashes riders need all the impact management capability a helmet can offer.
- [www.smf.org](http://www.smf.org) 916-331-5073 for more info

