



Aren't helmets hotter than hard hats?

Objective

- To evaluate the internal air temperature for new safety helmets when exposed to a sunny summer day. Evaluation criteria includes: helmet color, helmet air vents, and internal foam liner.



Test Samples



Vented



No Vent



Original



With Foam Liner



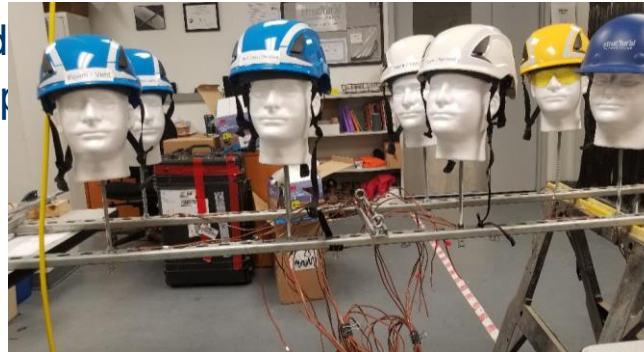
Foam Liner Removed

Test Setup

- Test performed from 9:41am until 4:05pm
- Helmets under evaluation were placed on foam head forms
- Temperature readings:
 - Recorded every 1 minute using data acquisition system
 - Type K thermocouples used
 - Placed in the air void between helmet and head



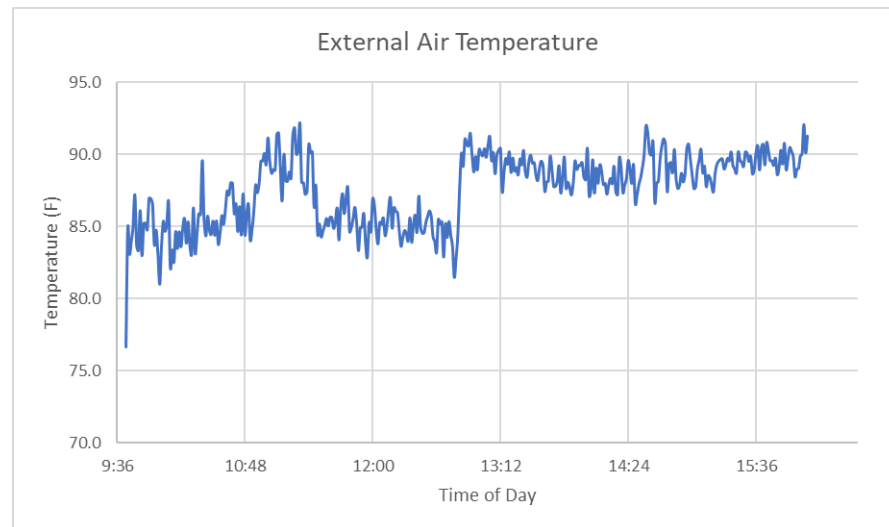
void
strap



form

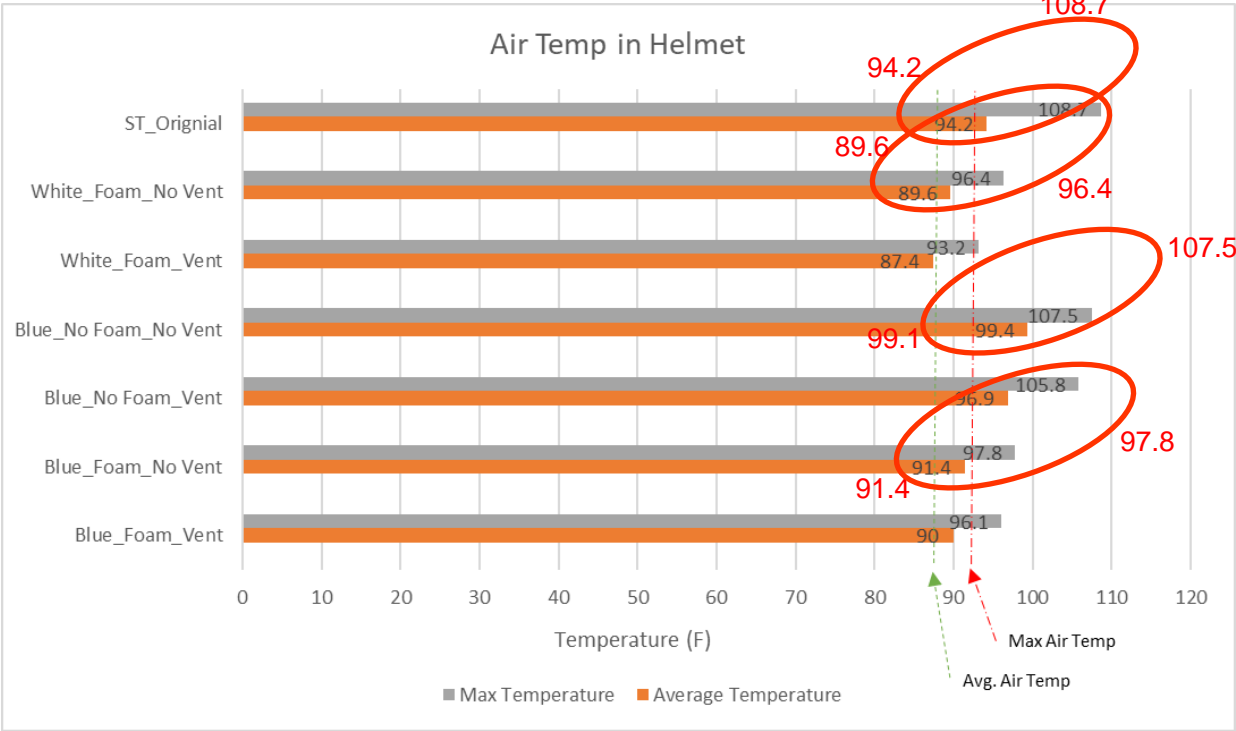
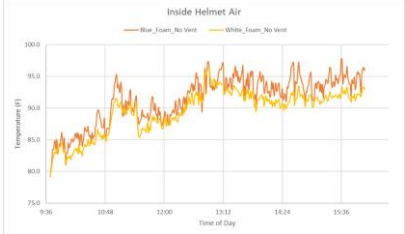
Test Conditions

- Mostly sunny day
- Max temperature = 92°F
- Average temperature = 88°F



Test Results

Max & Average Temperatures



Conclusions

Foam liners are effective

- Helmets with a foam liner have a 8-12% lower inside air temp.
- 7-8°F difference for blue
- 7-8°F difference for white

Air vents are somewhat effective

- Helmets with an air vent have a 2-3% lower inside air temp.
- 1-2°F difference for blue helmets
- 2-3°F difference for white helmets

White colored helmets are cooler than blue

- White colored have a 3% lower inside air temp. (both with foam liner)
- 3°F difference for white helmets

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

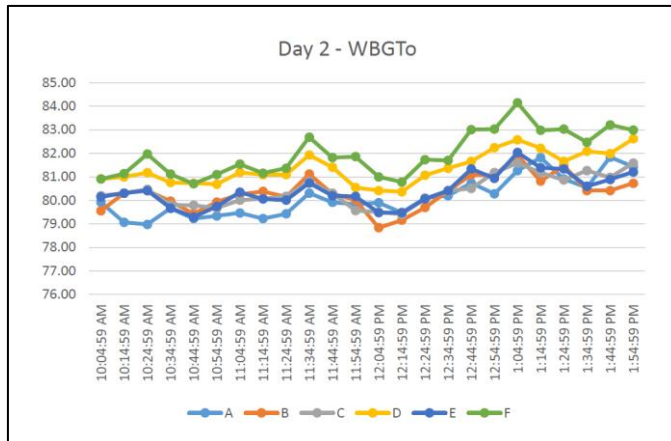


Head Protection Temperature Study

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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