Project S.T.A.R.S.

Standardization and Testing of Advanced Retention Systems

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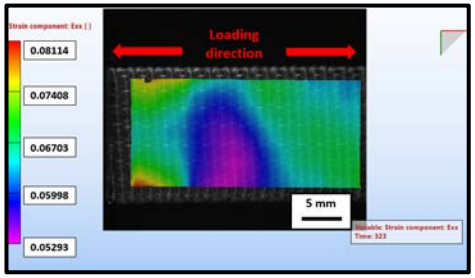
Problem Statement:

How does the accuracy of the tightness and fit of military ballistic helmet retention system straps affect the potential head injuries that can be experienced by the user?

Approach:

To perform high-speed imaging and digital image correlation (DIC) along with the use of a force sensor as the ballistic helmets undergo a drop test, a chinstrap pull-down test, and blunt-impact test. The fit will be adjusted based on a survey of comfort determined by users.

Results:



Insert photo of force sensor reading

- DIC showed that the deformation the chinstraps underwent in a sub-concussive linear impact had a strain of ~6%.
- Deformation in a concussive linear impact had ~10% strain.

Discussion & Conclusions:

- The change in force experienced by the headform as it was impacted changed as the fit was changed from “loose” to “comfortable” to “tight.”
- The “tight” fit had the most consistent force reading.
- When the helmet was subjected to the blunt impact test, the change in force indicated by the sensor was lower at the “comfortable” fit, which had a torque measurement of ~24 cm-N, than at the “loose” fit.
- Testing and analysis indicated that better-fitting military helmets are integral in preventing injuries under both sub-concussive and concussive impacts.

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