Performance Lab Testing for Evaluating Faceguard Effectiveness (2018-031)

Novel method and apparatus for Measurement of Faceguard Structural Stiffness

Market Overview

This novel faceguard test determines the structural stiffness for all newly manufactured facemasks, serving to reduce head injuries among athletes due to the use of inadequately performing protective gear. In response to the high rate of severe traumatic brain injury and skull fracture during football play, in 1974 the National Operating Committee for the Standards of Athletic Equitment (NOCSAE) developed a safety protocol to evualuate football helmets. The standard for assessing the faceguard component of these helmets has been largely unaltered since then. Clemson Headgear Impact Performance Lab (CHIP) testing has demonstrated that the current apparatus is ineffective in evaluating the performance of the facemask at the design, structural, or material levels. The current test also destroys the facemask, rendering it unusable. Clemson researchers have developed a novel method and apparatus for testing faceguard effectiveness, without destroying the facemask, developing parameters that more accurately reflect the impact and strain the faceguard undergoes during sporting activities.

Technical Summary

This technology comprises four main improvements over the existing NOCSAE stiffness apparatus and test. First, the CHIP test allows for a degree of lateral and rotational movement of the facemask during testing, as well as reducing the load applied to the facemask. Combined, these two factors reduce the likelihood of permanent damage to the mask during testing. Furthermore, the load is applied using a 6” diameter plunger, as opposed to a 1”, and the deformation of the mask is limited to 5mm from 3 inches. These factors reduce the likelihood of permanent facemask damage, and also achieves the goal of generating data spanning a spectrum of differences across facemask design.

Application

Athletic Equipment, Protective Headgear, Facemask, Faceguard, Athlete Safety

Development Stage

Testing

Advantages

- Allows for lateral and rotational facemask movement, reducing permanent deformation of the facemask
- Applies a laod to the facemask at 100 mm/min ensuring the facemask does not splinter or break during testing
- Uses a 6” diameter plunger to apply force to the facemask, ensuring a broader distribution of force that allows for greater nuance of measurement

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Provisional	United States	62/747,510	N/A	2018-031	Dr. John DesJardins Dr. Gregory Batt

About the Inventors

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Dr. John Desjardins received his Ph.D. in Bioengineering from Clemson University in 2006 and has worked for over 25 years as a biomechanical research engineer. He has co-authored over 300 peer-reviewed conference or journal publications in the areas of biomechanics, biomaterials tribology, implant design, rehabilitation and more. Along with being the Hambright Leadership Professor, Dr. DesJardins is the director of the Laboratory of ORthopardic Design and Engineering at Clemson. His research interests include total joint replacement, orthpardic biomechanics and biomaterials.

Dr. Gregory Batt

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Dr. Gregory Batt received his Ph.D. in Mechanical Engineering from Clemson University in 2013. Prior to coming to Clemson University he was a product design manager for whitewater kayaks at Perception Kayaks USA. Dr. Batts is the Director of the Package Testing Laboratory and Chair of the Technical Devision at the International Safe Transit Association, holding a seat on their Global Board of Directors. His research interests and recent activites have been in the areas of experimental test development and dynamic modeling.

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