ABSTRACT

TITLE:	The Design of a Helmet Impact Tester
AUTHOR(S):	Shafer, Brendan; Bock, Kevin; Watkins, Scott; O'malley, Steven; Hullinger, Luke
PRESENTED AT:	2014 Undergraduate Research and Creative Activities Symposium, Fort Lewis College

ABSTRACT: Using a helmet during high-risk activities is one way to prevent traumatic brain injuries. Because helmets play such a vital role in protection, it is important that their quality is improved where possible. The purpose of this project is to design an apparatus that is capable of testing helmets to aid in the research of helmet design. This apparatus will simulate impact conditions to which different kinds of helmets are exposed. It will also record the reaction of the helmet to these different conditions. This helmet impact tester uses energy from gravity to initiate an impact. The helmet is fastened to a head-form the same way it would be attached to a human head. This head form is attached to a carriage arm that has its drop guided by two linear high precision bearings that slide down two rods. The helmet, head-form, and block carriage arm's drop is guided to an impact surface at the base of the tester. This impact surface is interchangeable and impact speed is variable to simulate different types of impacts. By testing helmets and simulating different types of impacts, a greater understanding of how they fail can be gained. With knowledge of the way these helmets fail, suggestions to how to improve them can be made including different geometries and materials.