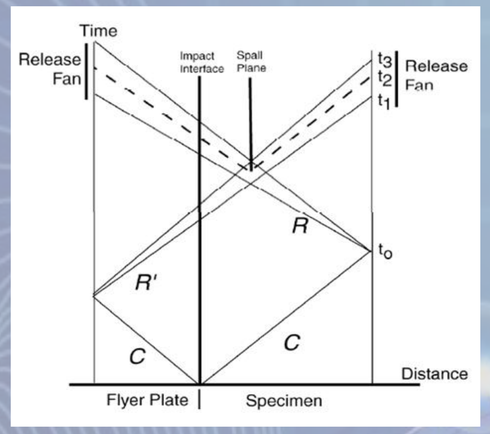
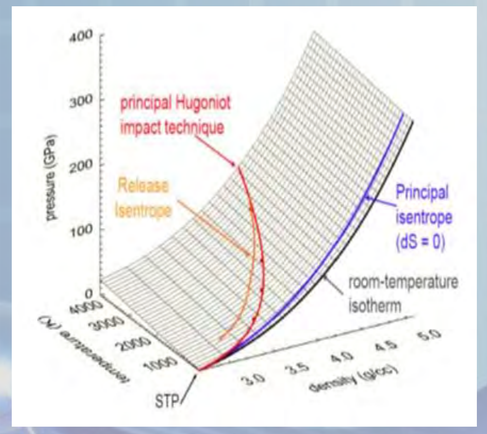
Impact Loading and Recovery of Copper

Problem Statement and Motivation

- Design 5 separate projectile and target packages to study the effects of impact and dynamic fracture in copper at various stress levels. The design will abide by the Air Force Research Laboratory standards and regulations.
- Both projectile and target will be tested at 1, 1.1, 2, 2.5 and 3 GPA of pressure after impact.
- A small time window (microseconds) in which the physics of the materials from the projectile and target are to be studied using the Hugoniot curve.
- From impact the projectile and target create shock waves that will flow through out the material. The shock waves will reflect off of free surfaces as release waves. When the release waves collide, tension is created in the material. Spall will occur if the tension is greater than the spall strength.
- To be able to study the spalling point of the material a Florida International University team last year developed a soft catch system that brings the target plate to rest over a distance of 7 feet, by having this system we are able to take the shock loaded plate and study with an electron microscope the spalling point.



Courtesy of Hammond
"Shock and ballistic properties of bainitic steels and tungsten alloys"



Courtesy of Eglin Air Force Base

Prototyping and Testing

For reasons of exact precision that is needed and material access to do the experiments, the projectiles and targets will be designed using Solidworks here at Florida International University which will then be sent to the Eglin Air Force base. The drawings will be manufactured and tested at the Air Force Research Laboratory and after the data is collected, the information will be sent back to Florida International University where modifications will be made for the next experiment.

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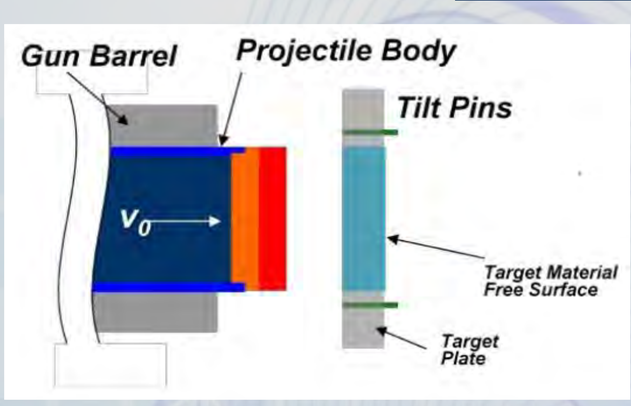
Proposed Design



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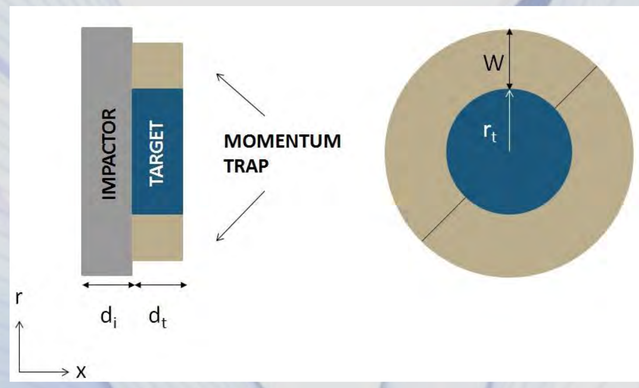
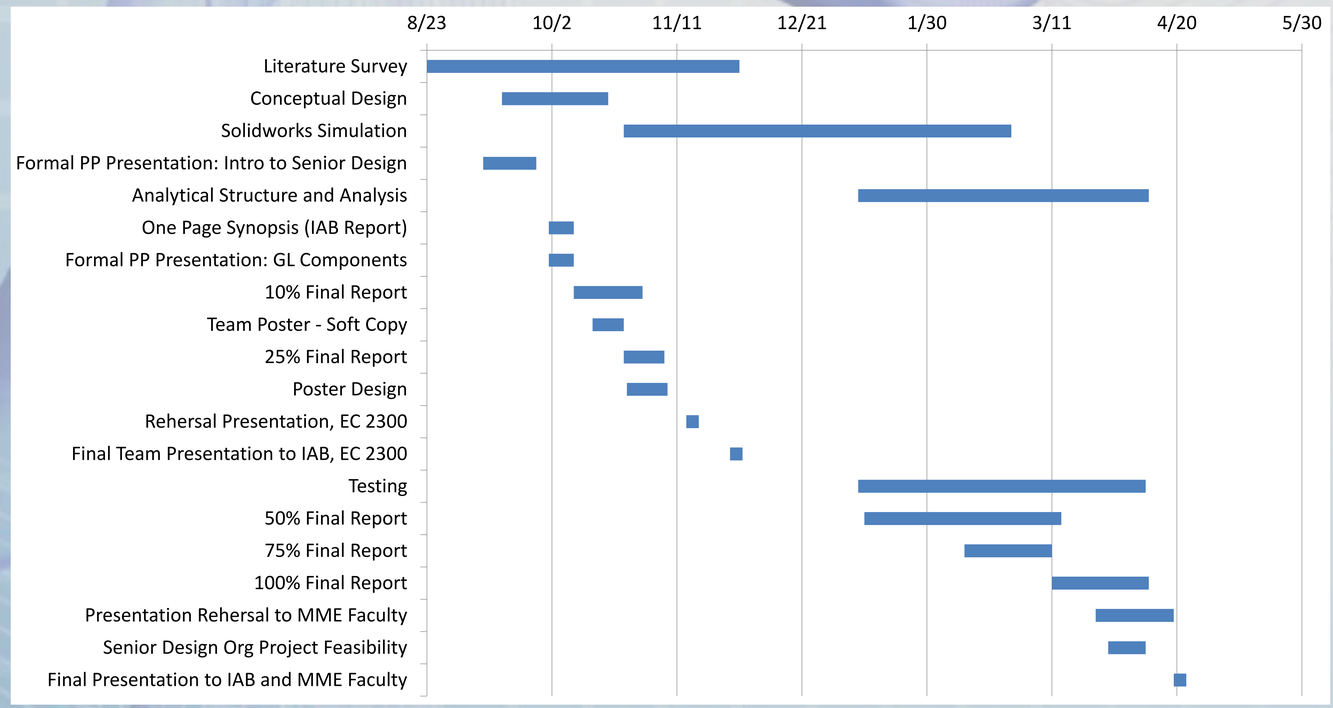
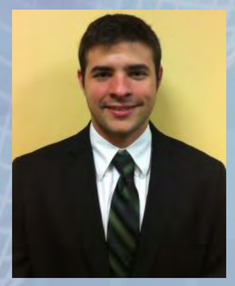


Courtesy of Eglin Air Force Base

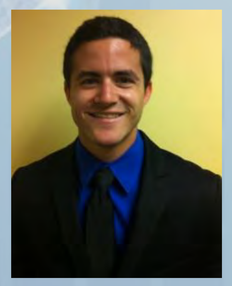
Timeline



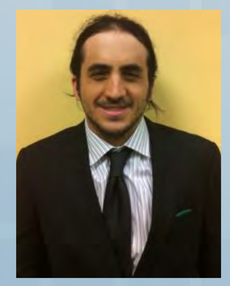
Team



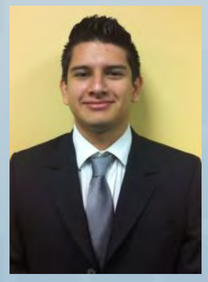
Devon Barroso



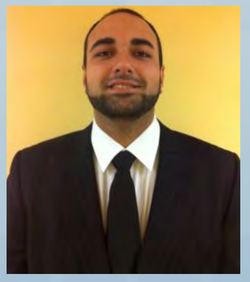
Javier Seoane



Jorge Barrera



Ernesto Vallejo



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