

# Impact Tester for Composite Material Testing



Jacob Brominski, Jesse Carl, Dylan Fritz, Nikita Patrushev  
Faculty Sponsor: Dr. Rungun Nathan  
Division of Engineering, Business & Computing  
Penn State Berks

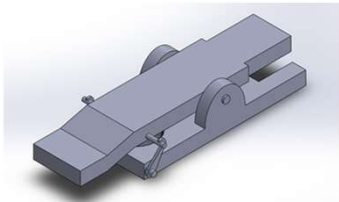


## Background

An impact tester is an important tool for studying the amount of energy per volume absorbed by different materials before they rupture. Using the designed drop weight impact tester, an impact will be applied to the test specimen by a free-falling impactor. The tester will be able to vary the impact load that is applied to the test specimen by varying the height from which the impact head is dropped, as well as using different calibrated weights for the free-falling impact head.

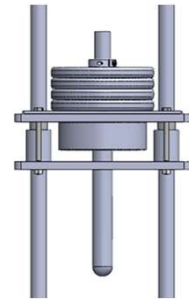
## Safety Features

- Enclosed on all sides using polycarbonate sheets
- Clear enclosure
- Locked enclosure



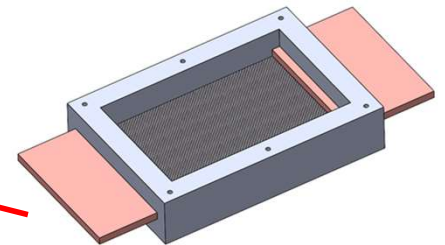
## Double-Strike Prevention

The double-strike prevention device is intended to eliminate multiple strikes to the specimen. This device will be implemented at the base of the upper section to deflect the force of the impact head back upward, preventing a second strike.



## Impact Carriage

Constructed from 6061 aluminum, the free fall of the carriage will be facilitated using both linear ball bearings and sleeve bearings. The weight can be changed in steps of 5-lbs.



## Test Specimen Retainer

Two copper plates on either side of the device will be used to apply electric and magnetic fields to the test specimen.

## Data Acquisition Methods

**Force:** The impact force applied to the test specimen will be measured using a load cell located in the impact carriage.

**Impact Energy:** Accelerometers will be mounted on the impact carriage to measure the acceleration during freefall. Using this data the impact energy can be calculated.

**Displacement:** The displacement of the test specimen during impact will be measured using a laser sensor mounted below the test specimen.

## Conclusion

This impact tester was constructed for less than \$2000 while considering stability and repeatability. This cost is considerably less than the average commercially available impact tester without sacrificing functionality.

## Acknowledgments

The team would like to extend our appreciation to Dr. Barakati, Dr. Nathan, Roy Thompson, and Penn State University-Berks.