# Design of Test

## Objective

The objective of this experiment was to measure the energy absorption of aluminum and steel during fracture from two different types of impact testing.

## Test Apparatus & Function

This experiment uses the Izod and Charpy machines to conduct the impact testing. Both machines use weighted pendulums to generate the force for the impact tests and use similarly sized test specimens. However, the Charpy machine secures the specimen as a simply supported beam while the Izod supports the specimen as a cantilever beam.

The machines measure the energy absorption of the material by measuring the potential energy of the pendulum just before and after impact with the test specimen.

## Precautions

1. Ensure that fragments of broken test specimens are completely removed from the machine before conducting a second test.
2. Ensure that no one is standing near the machine in the pendulum’s plane of motion when conducting the tests, and also that the lever arm is secure before removing or inserting test specimens. Have one group member hold the lever arm while others are working on the test specimens in the machine.

# Procedure

1. 12 test specimens, six steel samples and six aluminum samples, were obtained from the instructor. The dimensions of the specimens were recorded.
2. The height of the lever arm was recorded.
3. A “dry run” was performed without a test specimen in order to obtain the calibrated arm energy.
4. Four test specimens, two of each material, were placed in a furnace at 500 degrees Fahrenheit and allowed to heat up. Another four specimens, two of each material, were placed in an insulated cup filled with dry ice and allowed to cool down. While these specimens were being heated / cooled, the ambient temperature specimens were tested.
5. A specimen was placed in the Izod machine using a wedge tool to secure the specimen in place as a cantilever beam.
6. The lever arm was released and allowed to impact the test specimen. The lever arm was caught on the return swing and locked back in place to avoid obscuring the results and prevent injury.
7. The energy difference was recorded.
8. Steps 5 – 7 were repeated for the same material for all three temperatures.
9. Steps 5 – 8 were repeated for both materials.
10. A specimen was placed in the Charpy machine using an alignment tool to make sure the sample was centered.
11. The lever arm was released and allowed to impact the test specimen. The lever arm was caught on the return swing and locked back in place to avoid obscuring the results and prevent injury.
12. The energy difference was recorded.
13. Steps 10 – 12 were repeated for the same material for all three temperatures.
14. Steps 10 – 13 were repeated for both materials.