Impact Testing of Materials

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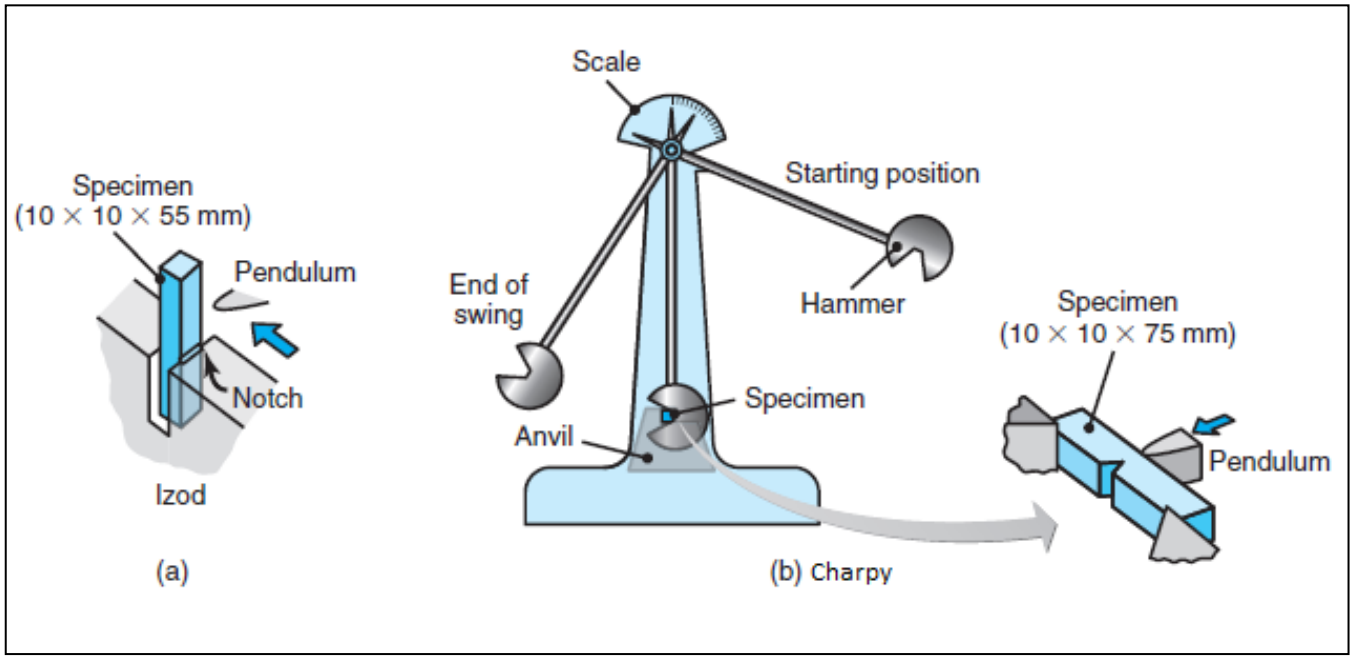
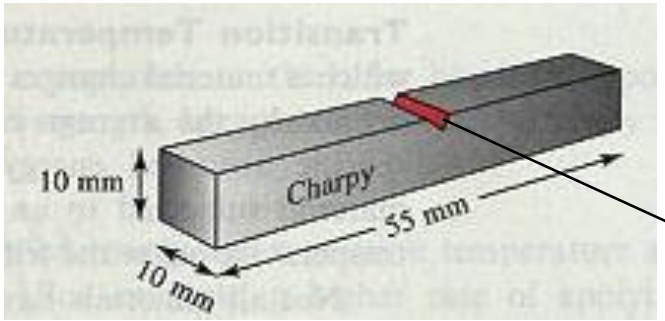
Impact Testing



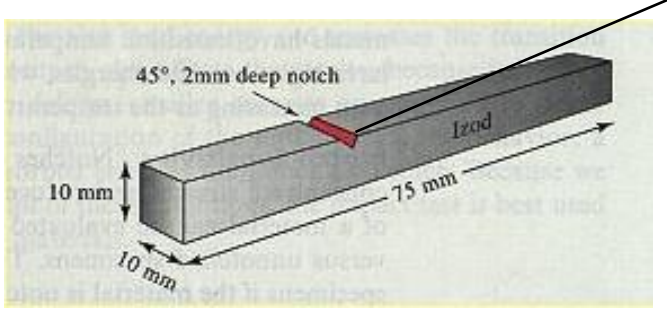
- Two standardized tests, the **Charpy** and **Izod,** are used to measure the **impact energy.**
- For both Charpy and Izod, the specimen in shape of a bar of square cross section, into which a V-notch is machined.
- The load is applied as an impact blow from a weighted pendulum hammer that is released from a cocked position at a fixed height *h*.
- The specimen is positioned at the base. Upon release, a knife edge mounted on the pendulum strikes and fractures the specimen at the notch, which acts as a point of stress concentration for this high velocity impact blow.
- The pendulum continues its swing, rising to a maximum height *h'*, which is lower than *h*. The energy absorption, computed from the difference between *h'* and *h*, is a measure of the impact energy.

Impact Testing

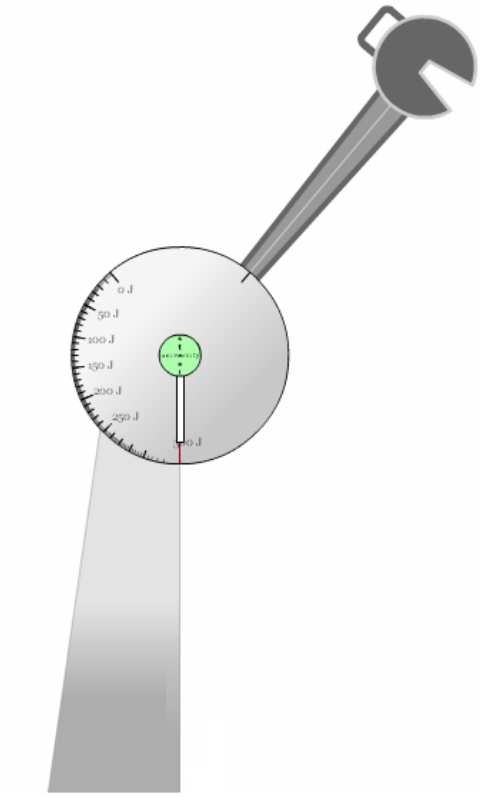
To measure the toughness of the materials.



Notch

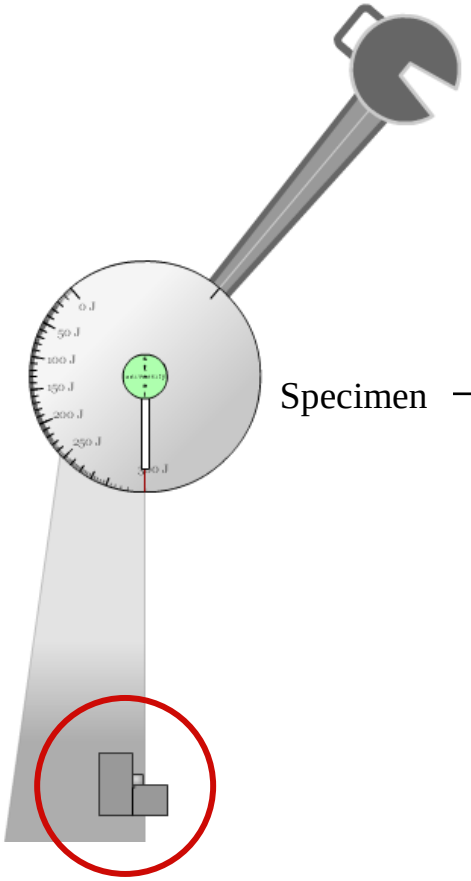


Test-specimen

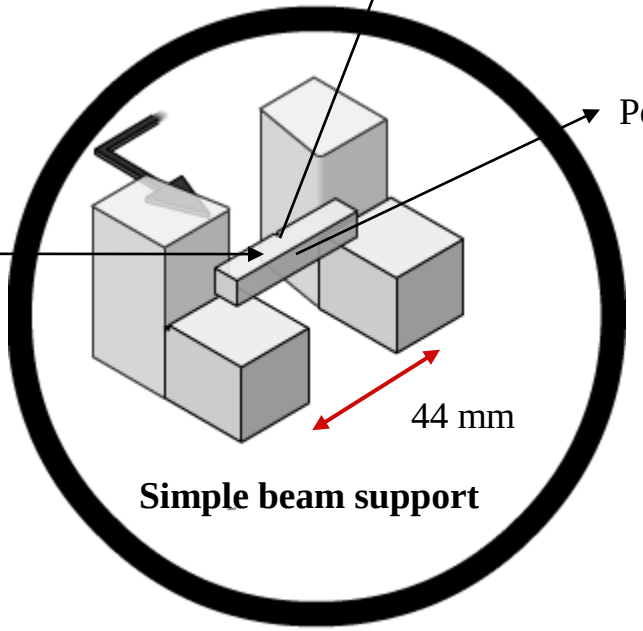


Pendulum Machine

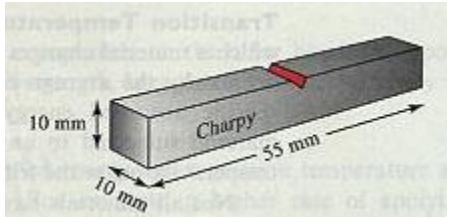
Charpy Test Setup



Specimen

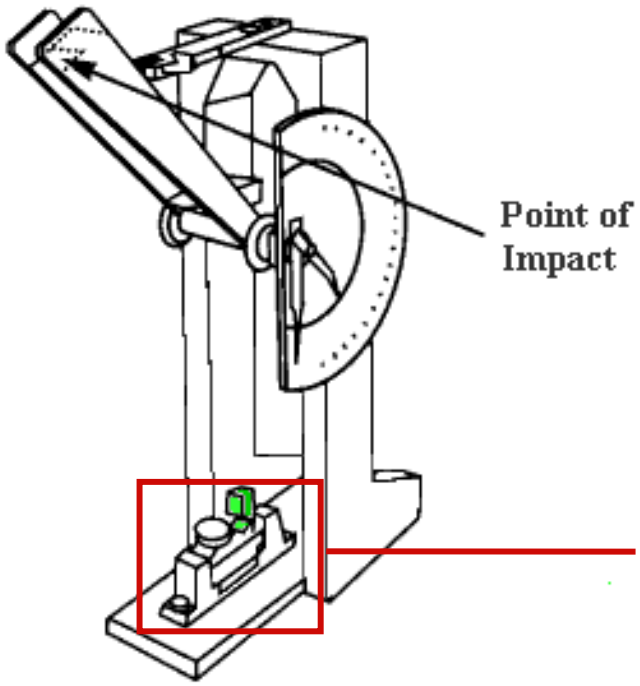


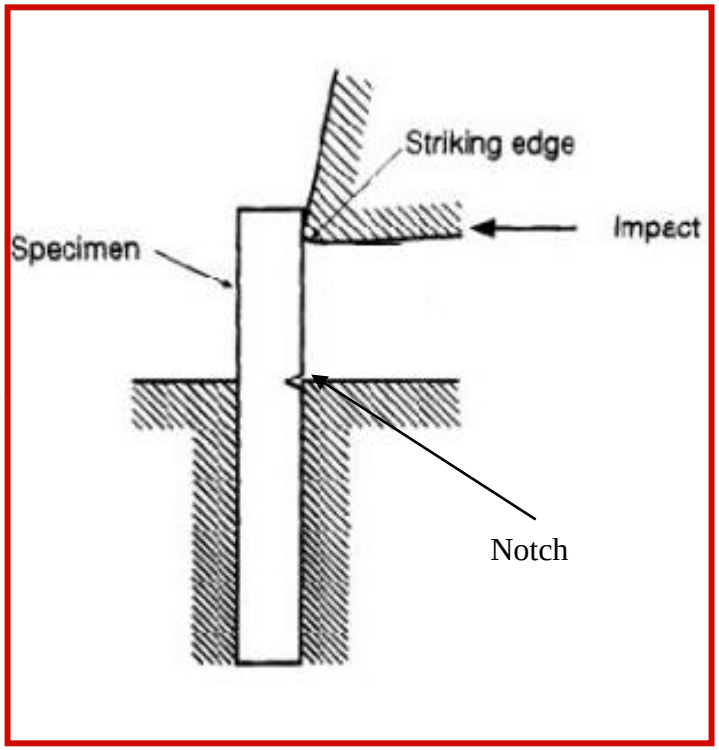
Simple beam support

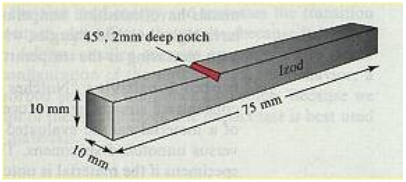


Specimen

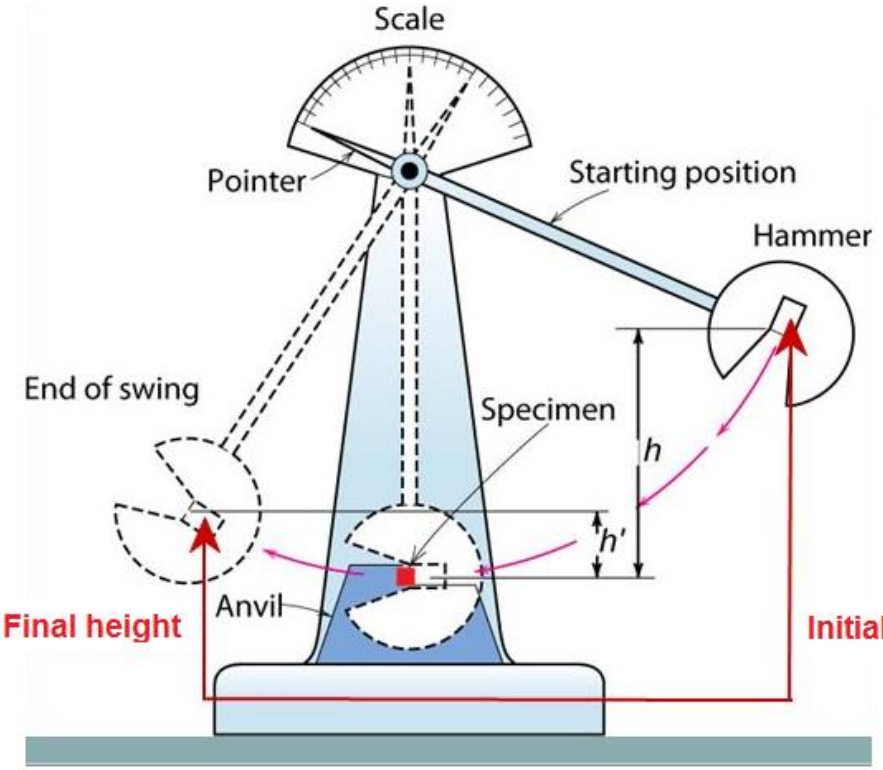
Izod Test Setup







Cantilever beam support



α - Angle of Fall
β - Angle of Rise
R - Pendulum arm

Potential Energy = mgh

Kinetic Energy = ½ mv^2

$V^2 = 2gh$,

where V is the impact velocity

Initial Height, h = R (1 - cosα)

Final Height, h' = R (1 - cosβ)

Initial Energy = mgh = mgR (1 - cosα) = WR (1 - cosα)

Final Energy or Energy after Rupture = mgh' = mgR (1 - cosβ) = WR (1 - cosβ)

Energy absorbed by the specimen

E_{abs} = WR (1 - cosβ) - WR (1 - cosα)

= WR (cosβ - cosα)