

Metallurgy for Industries

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A Monthly Newsletter

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Impact testing

A comparison of Charpy and Izod Impact Tests.

The impact test has been used extensively in mechanical testing of steel products, in research, and in procurement specifications for over three decades. Where correlations with fracture mechanics parameters are available, it is possible to specify CVN (Charpy V-notch) toughness values that would ensure elastic/ plastic or plastic behavior for fracture of fatigue cracked specimens subjected to minimum operating temperatures and maximum in service rate of loading. The notch behavior of the face-centered cubic metals and alloys, a large group of nonferrous materials and the austenitic steels can be judged from their common tensile properties. If they are brittle in tension, they will be brittle when notched, while if they are ductile in tension they will be ductile when notched, except for unusually sharp or deep notches (much more severe than the standard Charpy or Izod specimens). Even low temperatures do not alter this characteristic of these materials to a greater extent. In contrast, the behavior of the ferritic steels under notch conditions cannot be predicted from their properties as revealed by the tension test. For the study of these materials the Charpy and Izod type tests are very useful. Some metals that display normal ductility in the tension test may nevertheless break in brittle fashion when tested or used in the notched condition. It is in this field that the Charpy and Izod tests prove useful for determining the susceptibility of steel to notch sensitive behavior though they cannot be directly used to appraise the serviceability of a structure.



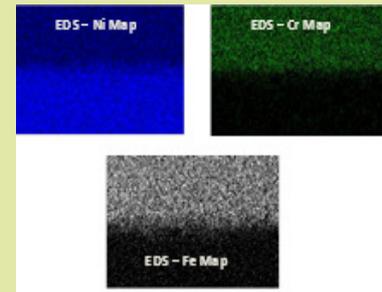
Izod test machine

Izod Impact test

The izod test involves the striker, the testing material, and the pendulum. The striker is fixed at the end of the pendulum. The test material is fastened in a vertical position at the bottom, and the notch

Microstructure of the month

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MOC: Incoloy 800H

Component: Thermo-well

Observation: Green pigmented area shows 'Cr-rich' region, white pigmented area is 'Fe-rich' and blue pigmented area is 'Ni-rich'.

Useful hints: EDS mapping is a useful tool in identifying the elements distributed in the intended portion. EDS mapping can take note of the phase affected due to preferential corrosion.

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is facing the striker. The striker swings downward, hitting the test material in the middle, at the bottom of its swing, and is left free at the top. The test is done easily and quickly to examine the quality of the materials, and test whether it meets the specific impact properties.

Charpy Impact test machine

The Charpy method includes striking an appropriate test specimen with a striker fastened at the end of a pendulum. The test piece is secured horizontally in place at both ends, and the striker hits at the center of the test material, behind a machined notch. The notch is positioned away from the striker, fastened in a pendulum. The test material usually measures 55x10x10 millimeters. The Charpy method has a machined notch across one of the larger faces. There are two types of charpy notches, viz. V-notch or a U-notch. The V-notch, or a V-shaped notch, measures 2 millimeters deep, with a 45 degree angle and 0.25 millimeter radius, parallel to the base. The U-notch, or keyhole notch, is 5 millimeters deep notch, with a 1 millimeter radius at the bottom of the notch. Higher speeds and collision energy could be achieved in a vertical style fall. This method proved to be reliable, and gave qualitative collision data.



Charpy V Notch Test

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