

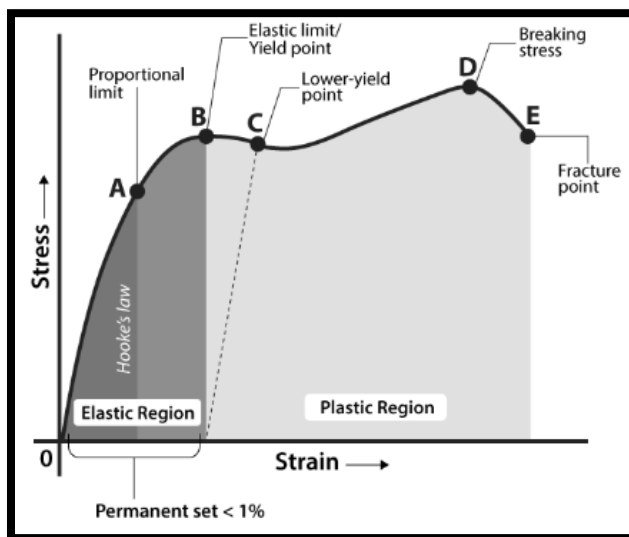
MECHANICAL PROPERTIES OF SOLIDS

STRESS-STRAIN CURVE

Stress-Strain Curve

When we study solids and their mechanical properties, information regarding their elastic properties is most important. We can learn about the elastic properties of materials by studying the stress-strain relationships, under different loads, in these materials.

The material's stress-strain curve gives its stress-strain relationship. In a stress-strain curve, the stress and its corresponding strain values are plotted. An example of a stress-strain curve is given below.



Explaining Stress-Strain Graph

The different regions in the stress-strain diagram are:

(i) Proportional Limit

It is the region in the stress-strain curve that obeys Hooke's Law. In this limit, the stress-strain ratio gives us a proportionality constant known as Young's modulus. The point OA in the graph represents the proportional limit.

(ii) Elastic Limit

It is the point in the graph up to which the material returns to its original position when the load acting on it is completely removed. Beyond this limit, the material doesn't return to its original position, and a plastic deformation starts to appear in it.

(iii) Yield Point

The yield point is defined as the point at which the material starts to deform plastically. After the yield point is passed, permanent plastic deformation occurs. There are two yield points

(i) upper yield point

(ii) lower yield point.

(iv) Ultimate Stress Point

It is a point that represents the maximum stress that a material can endure before failure. Beyond this point, failure occurs.

(v) Fracture or Breaking Point

It is the point in the stress-strain curve at which the failure of the material takes place.