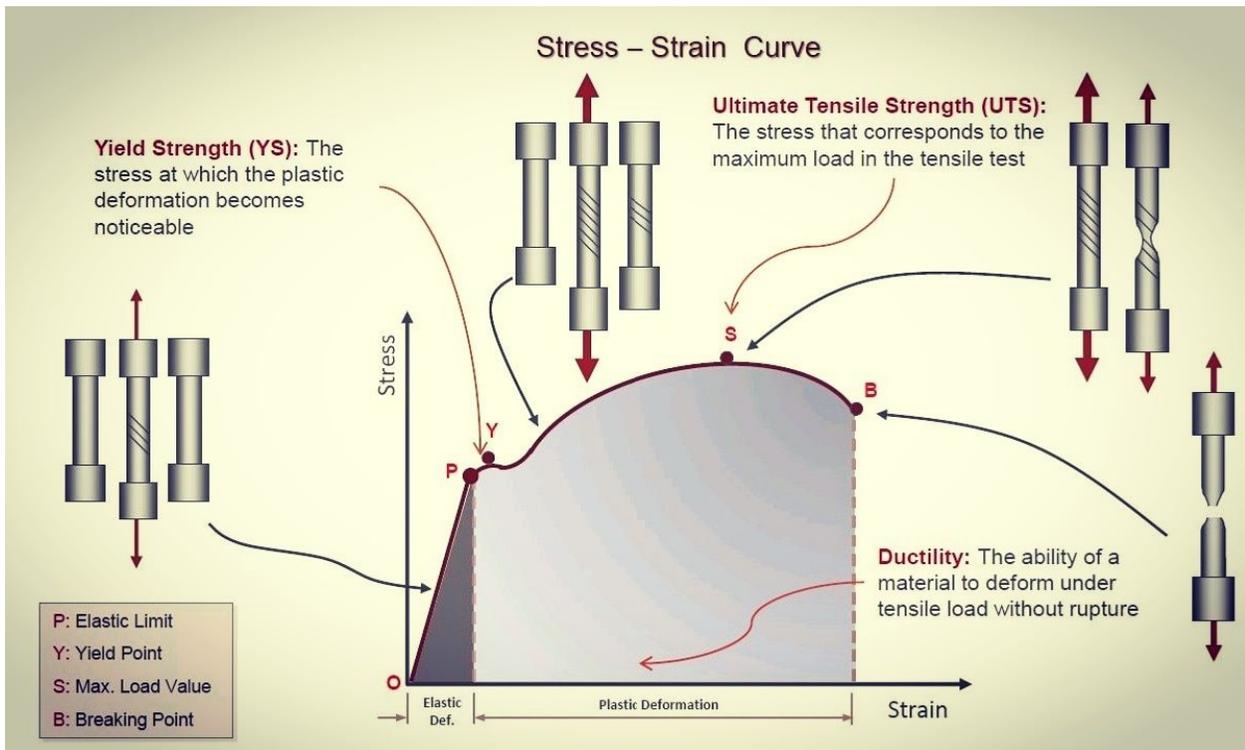


Stress-Strain curve



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Tensile Properties

Yield point: If the stress is too large, the strain deviates from being proportional to the stress. The point at which this happens is the yield point because there the material yields, deforming permanently (plastically).

Yield stress: Hooke's law is not valid beyond the yield point. The stress at the yield point is called yield stress, and is an important measure of the mechanical properties of materials. In practice, the yield stress is chosen as that causing a permanent strain of 0.002. The yield stress measures the resistance to plastic deformation. The reason for plastic deformation, in normal materials, is not that the atomic bond is stretched beyond repair, but the motion of dislocations, which involves breaking and reforming bonds. Plastic deformation is caused by the motion of dislocations.

Tensile strength: When stress continues in the plastic regime, the stress-strain passes through a maximum, called the tensile strength, and then falls as the material starts to develop a neck and it finally breaks at the fracture point.

For structural applications, the yield stress is usually a more important property than the tensile strength, since once it is passed, the structure has deformed beyond acceptable limits.

Ductility: The ability to deform before breaking. It is the opposite of brittleness. Ductility can be given either as percent maximum elongation or maximum area reduction.

Resilience: Capacity to absorb energy elastically. The energy per unit volume is the area under the strain-stress curve in the elastic region.

Toughness: Ability to absorb energy up to fracture. The energy per unit volume is the total area under the strain-stress curve. It is measured by an impact test.

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An open question:

How can we apply the information from the *Stress-Strain curve* to guide our work/life balance while achieving the most valuable things? The answers may not be as obvious as the plot shows.