

STRENGTH

The measurement of how much load a material can withstand before failure. The more load a material can bear, the more strength it has. There are 3 different types of strength based on loading types, which are compressive strength, shear strength and tensile strength.



Compressive



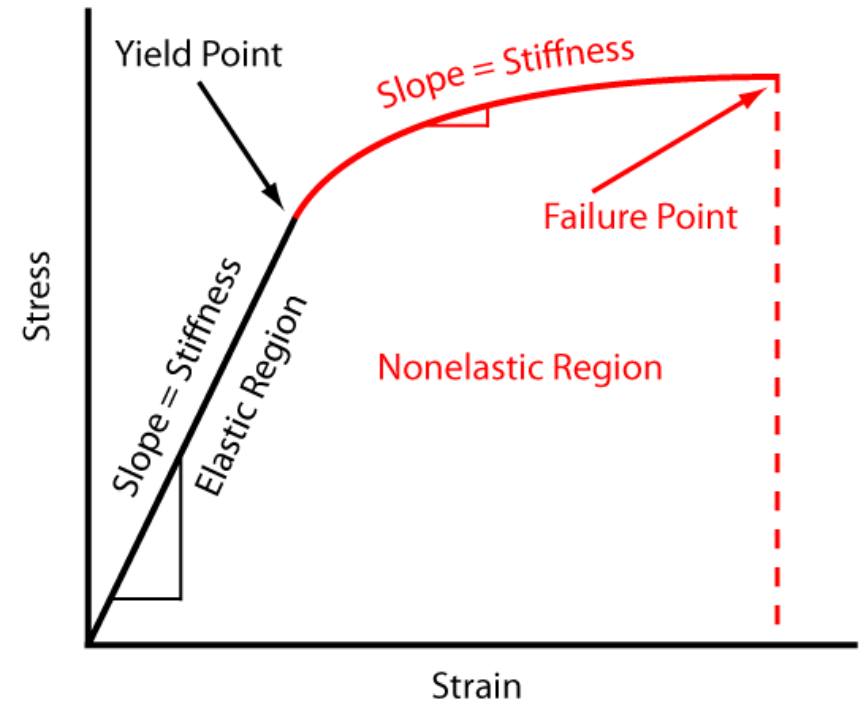
Tensile



Shear

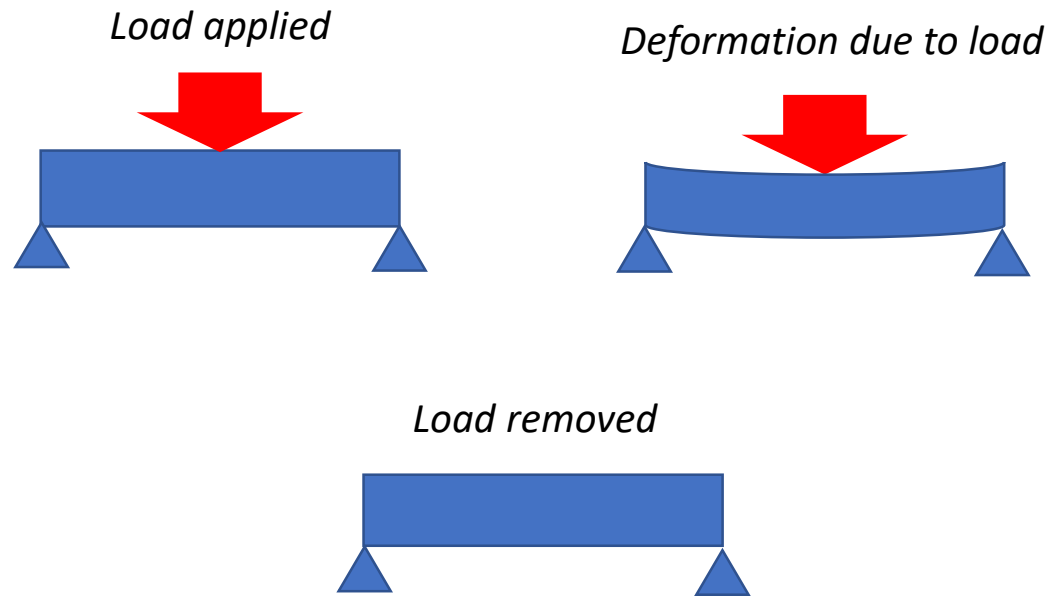
STIFFNESS

Stiffness is the ability of a material to resist deformation under stress. It is an indicator of the tendency for an element to return to its original form after being subjected to a force. The modulus of elasticity is the measure of stiffness.



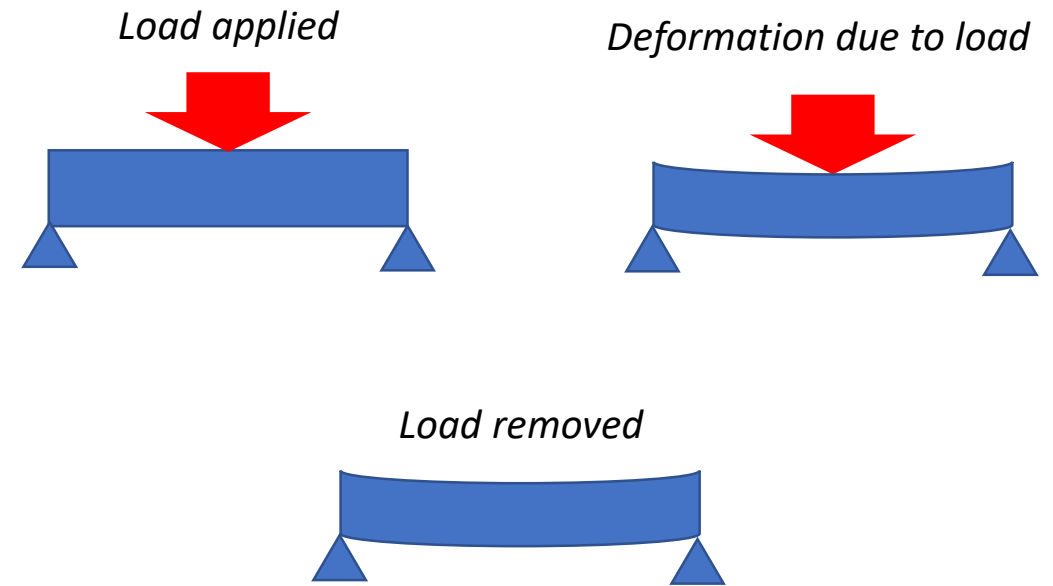
ELASTICITY

It is the property of a material to regain its original shape after deformation when the external forces are removed. This property is desirable for materials used in tools and machines.



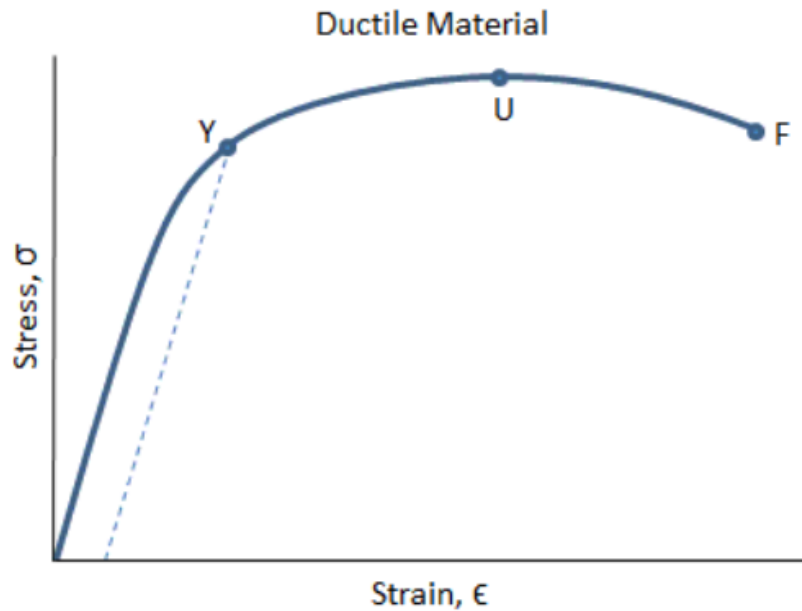
PLASTICITY

Plasticity is inverse of elasticity. It is a property of a material which retains the deformation produced under load permanently. Plastic deformation will take place only after the elastic range has been exceeded.



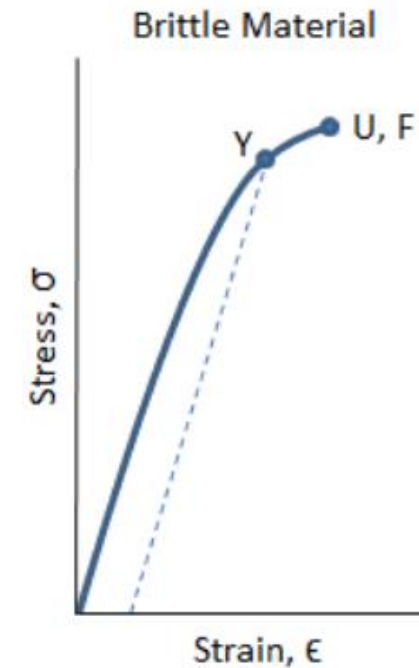
DUCTILITY

Ductility is the property of a material enabling it to be drawn into a wire with the application of a tensile force. A ductile material must be both strong and plastic. The ductility is usually measured by the terms, percentage elongation and percentage reduction in area.



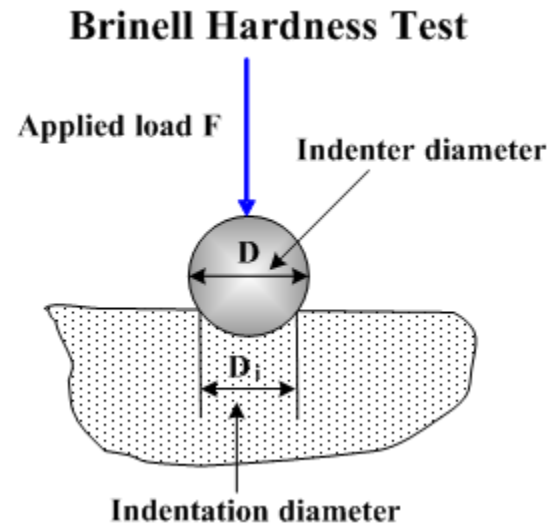
BRITTLENESS

It is the property of breaking of a material with little permanent distortion. Brittleness of a material is opposite to ductility property. Brittle materials are withstanding compression load. When subjected to tensile loads snap off without giving any sensible elongation.



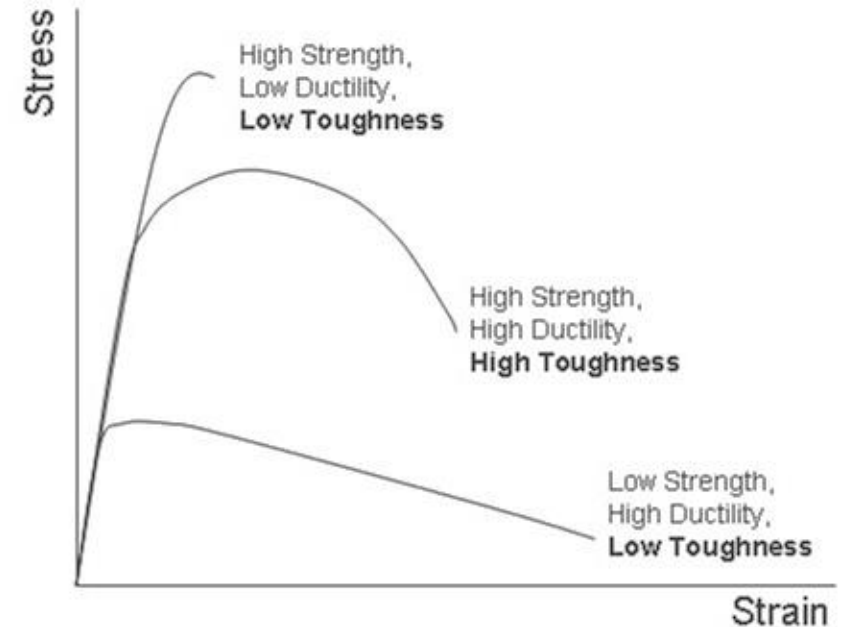
HARDNESS

Hardness is the ability of the material to resist surface abrasion or indentation. A Brinell number is the indication of the hardness of any material.



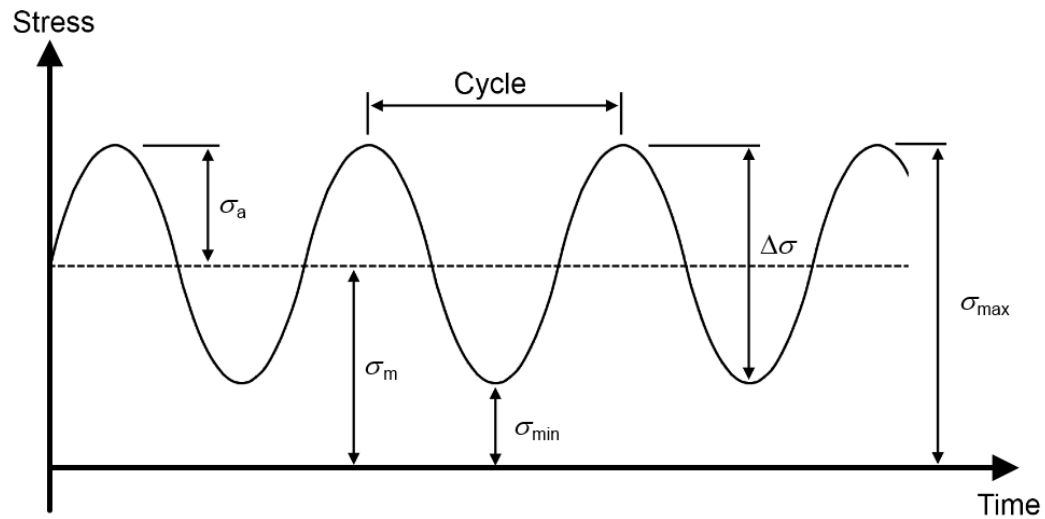
TOUGHNESS

It is the ability of a material to absorb energy without fracture. Material under cyclic and shock loading need to be tough. Bend test is done to identify toughness of the material.



FATIGUE

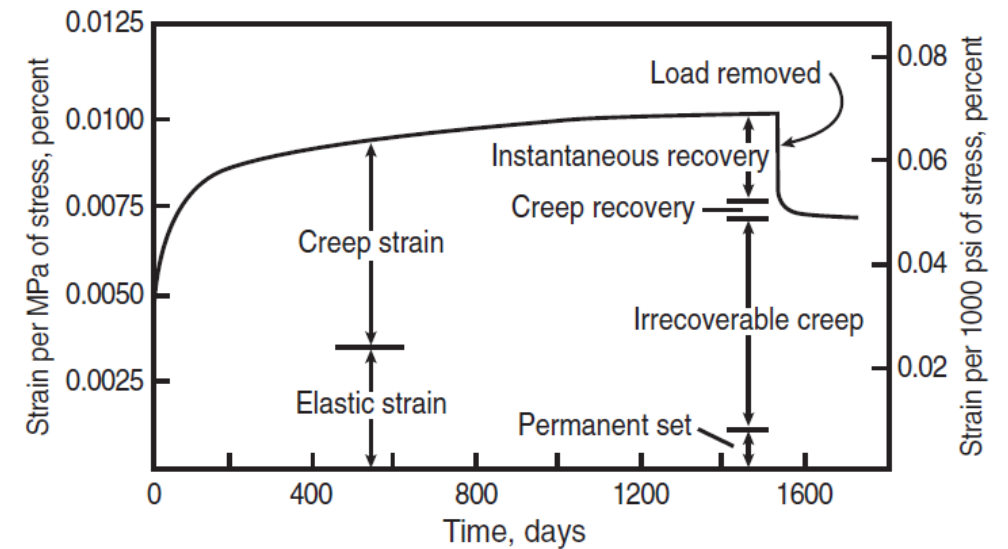
The fatigue is the long effect of repeated straining action which causes the strain or break of the material.



CREEP

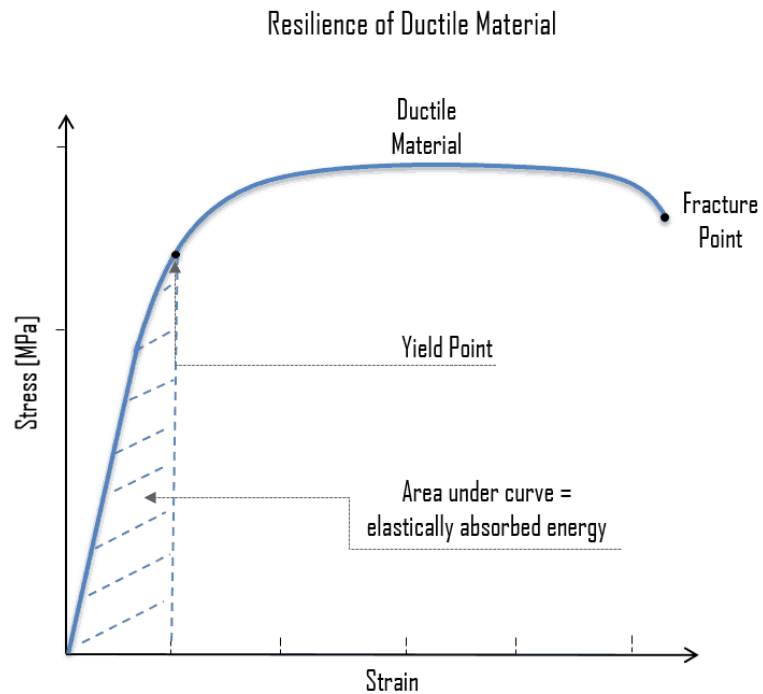
The creep is a slow and progressive deformation of a material with time at a constant force.

The simplest type of creep deformation is viscous flow.



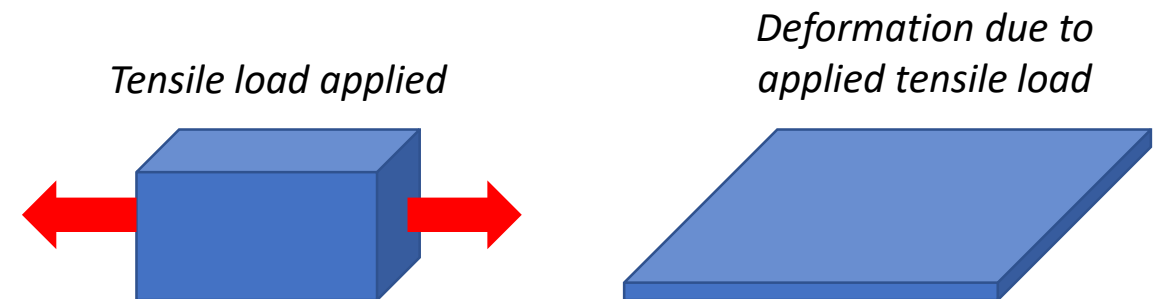
RESILIENCE

The ability to absorb energy while being elastically deformed, and releasing that energy after being unloaded. Proof resilience is the maximum amount of energy a material can absorb before permanent deformation.



MALLEABILITY

The ability to plastically deform a material or significantly change its shape without becoming fractured. It is a special case of ductility which permits materials to be rolled/hammered into thin sheets, making wire. A malleable material should be plastic but it is not essential to be so strong.



SOURCES

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