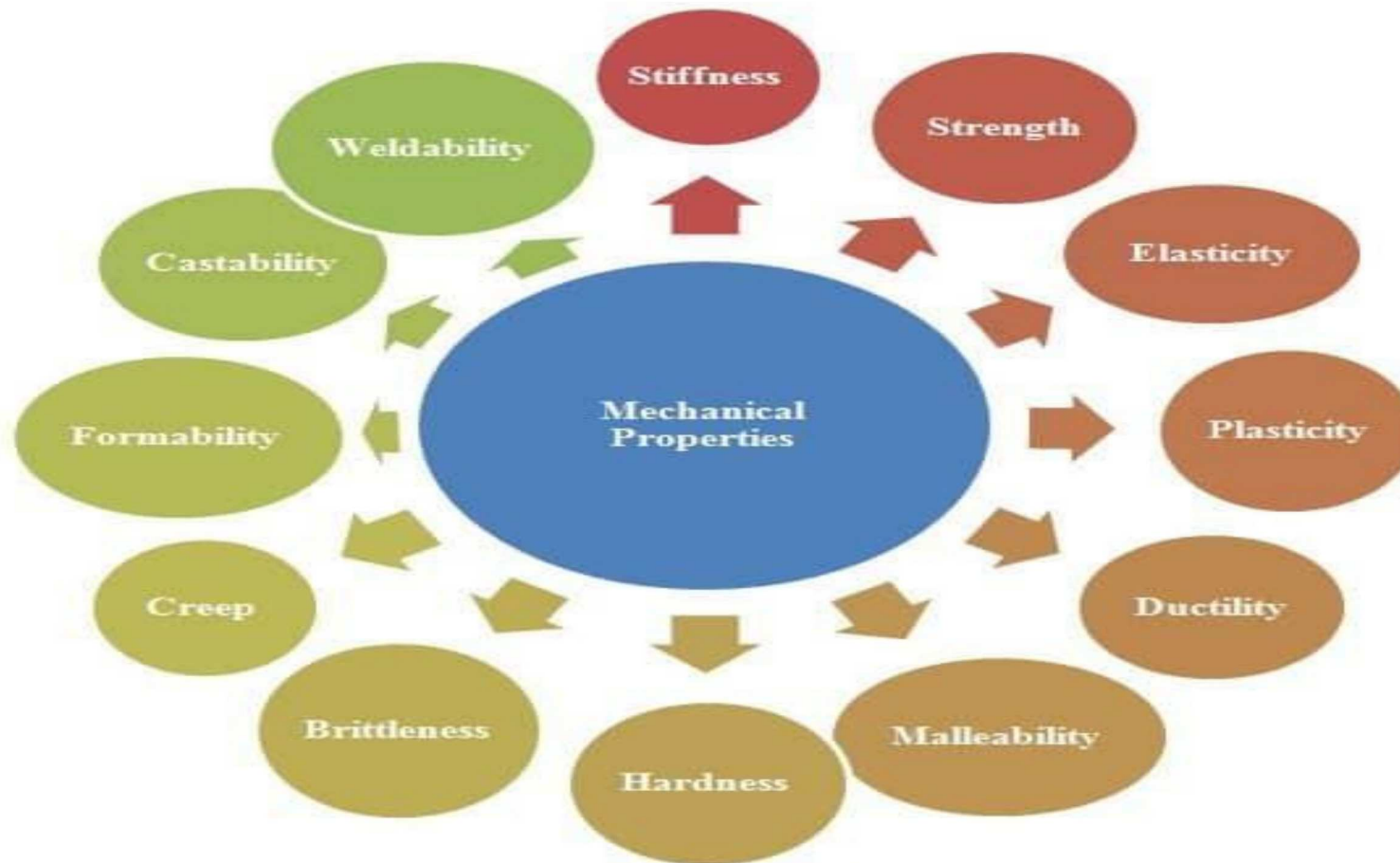


Properties of Materials



Properties of Materials

- Strength - It is the property of a material which opposes the deformation or breakdown of material in presence of external forces or load. Materials which we finalize for our engineering products, must have suitable mechanical strength to be capable to work under different mechanical forces or loads.
- Toughness - It is the ability of a material to absorb the energy and gets plastically deformed without fracturing. Plastic deformation means the permanent change in shape due to applied force. Its numerical value is determined by the amount of energy per unit volume. Its unit is Joule/ m³.

Properties of Materials

- Hardness - It is the ability of a material to resist to permanent shape change due to external stress. There are various measure of hardness – Scratch Hardness, Indentation Hardness and Rebound Hardness.
 - Scratch Hardness is the ability of materials to the oppose the scratches to outer surface layer due to external force.
 - Indentation Hardness is the ability of materials to oppose the dent due to punch of external hard and sharp objects.
 - Rebound Hardness is also called as dynamic hardness. It is determined by the height of “bounce” of a diamond tipped hammer dropped from a fixed height on the material.

Properties of Materials

- Hardenability - It is the ability of a material to attain the hardness by heat treatment processing. It is determined by the depth up to which the material becomes hard.
- Brittleness - Brittleness of a material indicates that how easily it gets fractured when it is subjected to a force or load. When a brittle material is subjected to a stress it observes very less energy and gets fractures without significant strain. Brittleness is converse to ductility of material. Brittleness of material is temperature dependent. Some metals which are ductile at normal temperature become brittle at low temperature.

Properties of Materials

- Malleability - Malleability is a property of solid materials which indicates that how easily a material gets deformed under compressive stress. Malleability is often categorized by the ability of material to be formed in the form of a thin sheet by hammering or rolling. Malleability of material is temperature dependent. With rise in temperature, the malleability of material increases.
- Ductility - Ductility is a property of a solid material which indicates that how easily a material gets deformed under tensile stress. Ductility is often categorized by the ability of material to get stretched into a wire by pulling or drawing. . With rise in temperature, the ductility of material increases.

Properties of Materials

- Resilience - Resilience is the ability of material to absorb the energy when it is deformed elastically by applying stress and release the energy when stress is removed.
- Fatigue - Fatigue is the weakening of material caused by the repeated loading of the material. When a material is subjected to cyclic loading, and loading greater than certain threshold value but much below the strength of material. microscopic cracks begin to form at grain boundaries and interfaces. Eventually the crack reaches to a critical size. This crack propagates suddenly and the structure gets fractured.

Properties of Materials

- Creep – Creep is the property of a material which indicates the tendency of material to move slowly and deform permanently under the influence of external mechanical stress. It results due to long time exposure to large external mechanical stress with in limit of