VARYING LOADS AND STRESS CONCENTRATIONS

Tensile strength: The tensile strength is defined as the maximum tensile load a body can withstand before failure divided by its cross sectional area. This property is also sometimes referred to Ultimate Tensile Stress or UTS. Typically, ceramics perform poorly in tension, while metals are quite good.

Bending strength: Bending (also known as flexure) characterizes the behavior of a slender structural element subjected to an external load applied perpendicularly to a longitudinal axis of the element.

Yield strength: A yield strength or yield stress is the material property defined as the stress at which a material begins to deform plastically whereas yield point is the point where nonlinear (elastic + plastic) deformation begins. Prior to the yield point the material will deform elastically and will return to its original shape when the applied stress is removed. Once the yield point is passed, some fraction of the deformation will be permanent and non-reversible.

Factors of safety (FOS): also known as safety factor (SF), is a term describing the load carrying capacity of a system beyond the expected or actual loads. Essentially, the factor of safety is how much stronger the system is than it usually needs to be for an intended load. Safety factors are often calculated using detailed analysis because comprehensive testing is impractical on many projects, such as bridges and buildings, but the structure's ability to carry load must be determined to a reasonable accuracy.

- Many systems are purposefully built much stronger than needed for normal usage to allow for emergency situations, unexpected loads, misuse, or degradation (reliability).

- Structural members or machines must be designed such that the working stresses are less than the ultimate strength of the material.

Problem: It is necessary to shape a certain link as shown in order to prevent interference with another part of the machine. It is to support a steady tensile load of 2500 lb. with a design factor of 2 based on the yield strength. The bottom edge of the midsection is displaced upward a distance $a = 2$ in. above the line of action of the load. For AISI C1022, as rolled, and $h \approx 3b$, what should be h and b?

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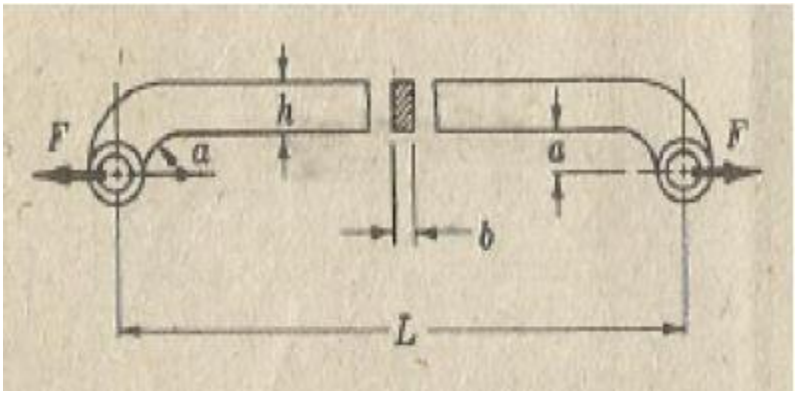

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