

Homework 3
Assigned 9/5/12, Due: 9/12/12

From Mott, Machine Elements in Mechanical Design, Chapter 2

Define Hooke's law.

Define Poisson's ratio.

What are the principal constituents in steels?

What are the principal alloying elements in AISI 4340 steel?

How much carbon is in AISI 4340 steel?

Name four materials that are typically used for gears.

Describe the properties desirable for the auger blades of a post hole digger, and suggest a suitable material.

What types of stainless steels are nonmagnetic?

What is the principal constituent of bronze?

Describe the bronze having the UNS designation C86200.

Name two typical uses for bronze in machine design.

Compare the specific strength of AISI 1020 hot-rolled steel with that of AISI 5160 OQAT 700 steel, the two aluminum alloys 6061-T6 and 7075-T6, and titanium Ti-6Al-4V.

Compare the specific stiffness of AISI 1020 hot-rolled steel with that of AISI 5160 OQAT 700 steel, the two aluminum alloys 6061-T6 and 7075-T6, and titanium Ti-6Al-4V.

Use the matweb website to determine at least three appropriate materials for a shaft design. An alloy steel is preferred with a minimum yield strength of 1035 MPa and a good ductility as represented by an elongation of 10% or greater.

Use the Alcoa website to determine at least three appropriate aluminum alloys for a mechanical component that requires moderate strength, good machinability, and good corrosion resistance.

Use the INTERZINC website to determine at least three appropriate zinc casting alloys for a structural component that requires good strength and that is recommended for die casting.

Use the Copper Development Association website to recommend at least three copper alloys for a wormgear. Good strength and ductility are desirable along with good wear properties.

Locate the standard for the ASTM Standard A992 structural steel that is commonly used for rolled steel beam shapes. Determine how to acquire a copy of the standard.