ITCD 301-001 Tool and equipment design: Fall 2010

Homework # 1, **Due date - September 20, 2010, before 11.55 PM EST**

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The following questions may be adapted from fundamental of tool design, 5th edition, SME. Make sure to note (**provide references**) from where you are supporting the answers. Try to get the answers from the journal article rather than Google search.

1. Identify and list five materials that are ductile and malleable.

Zinc

Lead

Tin

Silver

Gold

<http://chestofbooks.com/crafts/metal/Metal-Worker-Assistant/Malleability-And-Ductility-Of-Alloys.html>

2. Identify a mold material that could be used for injection molding molds, and discuss why it is selected. What would be the typical mechanical properties for an injection mold?

Polymers could be used because they are moldable when they are hot. The properties would have to include meltability and how moldable the polymer is.

<http://en.wikipedia.org/wiki/Injection_molding>

3. Which material is used to make jigs and fixtures and state why they are considered?

Hardened steel

Carbide

Bronze

Stainless steel

They are good because they can be hardened to resist wear.

<http://www.scribd.com/doc/25461200/Mini-Project-Jigs-and-Fixtures>

4. Compare between D2 material H13 material in detail, regarding the composition, physical property, and mechanical property.

5. What is a stress- strain diagram? What all property information does the stress – strain diagram give? Draw a typical stress- strain diagram.

6. What type of heat treatment is usually done with H13 steel? And describe why this specific approach is used.

7. What are the main heat treating processes?

Hardening

Tempering

Normalizing

Annealing

Casehardening

<http://www.2nd-hardener.com/>

8. What are the different classes of tool steels?

Water hardening tool steels

Oil hardening tool steels

Air hardening tool steels

High carbon, high chromium die steels

Shock resisting tool steels

Hot work die steels

Tungsten and molybdenum high speed steels

Low alloy tool steels

Finishing steels

Information collected from book.

9. What is the resistance of penetration called?

Hardness

10. List any 5 mechanical properties.

Strength

Tensile strength

Hardness

Toughness

Plasticity