EML2322L – MAE Design and Manufacturing Laboratory

TURNING, MILLING & DRILLING PROCESSES (HW #1) (REQUIRED READING)

Name: _____ **Lab Period (i.e. W2-3):** _____

Grader's Initials: _____

Text: *Cutting Tool Applications*

Author: George Schneider Jr.

Description: This material introduces manufacturing processes used to complete your laboratory assignments. **WORK INDIVIDUALLY TO ANSWER THESE QUESTIONS. FOLLOW ALL DIRECTIONS AND READ THE QUESTIONS CAREFULLY.** The assignment is due at the beginning of your laboratory session the second week of class.

Do not let the amount of information in these chapters overwhelm you; **focus on the material pertinent to answering the following questions.** Each question lists the corresponding section(s) in which the answer(s) can be found; **read the entire section(s)**. Refer back to these informative chapters to reinforce the concepts learned on the equipment during the semester. **Many questions on the weekly quizzes and final exam come from this required reading homework assignment.**

Messy work or answers not written on these assignment pages will be penalized 25%, as will submissions which omit the correct lab period on the cover page. Attach additional pages if necessary.

- **Turning Discussion:** Turning Tools and Operations (CH. 4)
  Turning Methods and Machines (CH. 5)
- **Milling Discussion:** Milling Cutters and Operations (CH. 12)
  Milling Methods and Machines (CH. 13)
- **Drilling Discussion:** Drills and Drilling Operations (CH. 8)
  Drilling Methods and Machines (CH. 9)

Availability: These chapters can be downloaded free of charge online at the following location: http://www2.mae.ufl.edu/designlab/Lab%20Assignments/CTA_Online_Book.zip

(If the link does not work, type it into your web-browser directly.)

TURNING DISCUSSION

1. [§4.1] Define *lathe turning.*

2. [§4.1, §4.2] Graphically illustrate and describe nine common lathe operations (i.e. turning, facing, profiling, chamfering, parting, threading, boring, drilling & knurling). Use the back side of the page for additional space if necessary. Click this hyperlink to view videos of these processes.

3. [§4.4.1] Define 3 common methods of work holding for lathes and circle the most common.

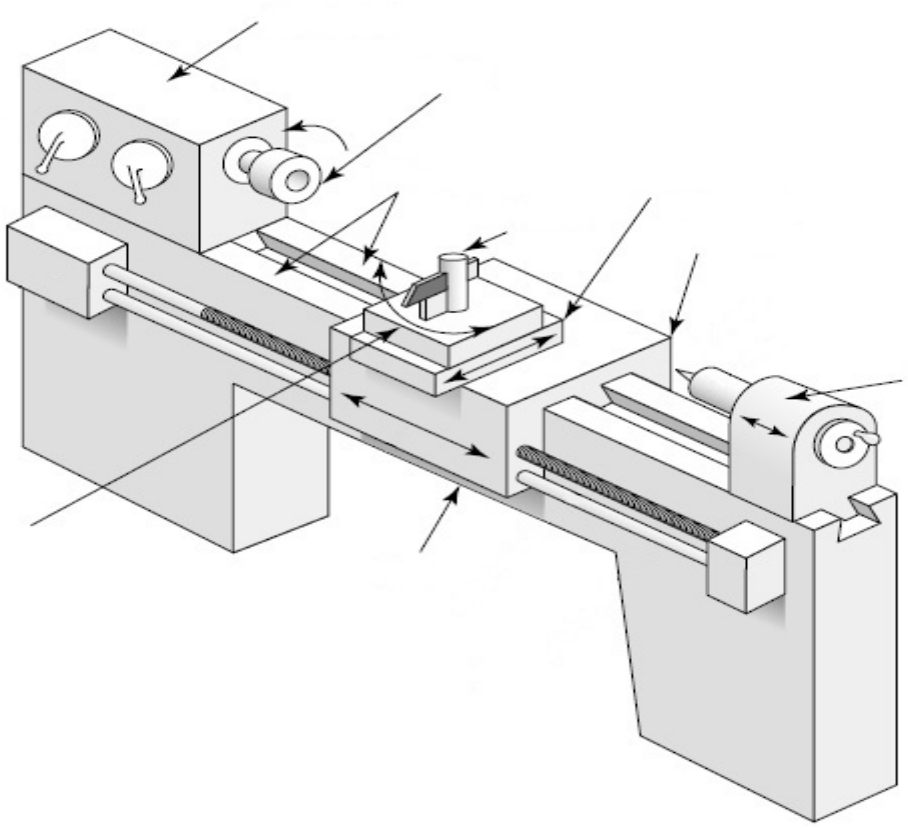
   A.

   B.

   C.

4. [§4.4.2] TRUE / FALSE: All standard tool holders are designed to cut with the cutting edge or point located on the centerline of the machine and workpiece? (Circle the appropriate answer (T / F))

5. [§5.1, §5.2] On the following illustration of an engine lathe clearly label the *headstock, spindle, (guide)ways, tool post, cross slide, carriage, tailstock, bed and the X & Z axes of motion* (do not label any other components). **This nomenclature is important for understanding the TA instructions in lab.**



6. [§5.2, §5.3] What are the physical and functional differences between an engine lathe and a turret lathe (be specific)? What is the primary advantage of each type?

MILLING DISCUSSION

1. [§12.1] Define *milling.*

2. [§12.2, §12.3] Define *face milling* and *end milling* and draw examples of each as in Fig. 12.2. Click this hyperlink to view videos of these processes.

3. [§12.2] From what material are most solid milling cutters and drills made? Hint: its acronym is *HSS*. For reference, higher quality and higher productivity cutting inserts and drills are typically made from tungsten carbide, which being similar to ceramic, can withstand more heat, but is more brittle, and more expensive. HSS is still widely used because of its toughness and cost.

4. [§12.6] List six factors that influence and determine cutting speed and feed rate when milling.

   A.

   B.

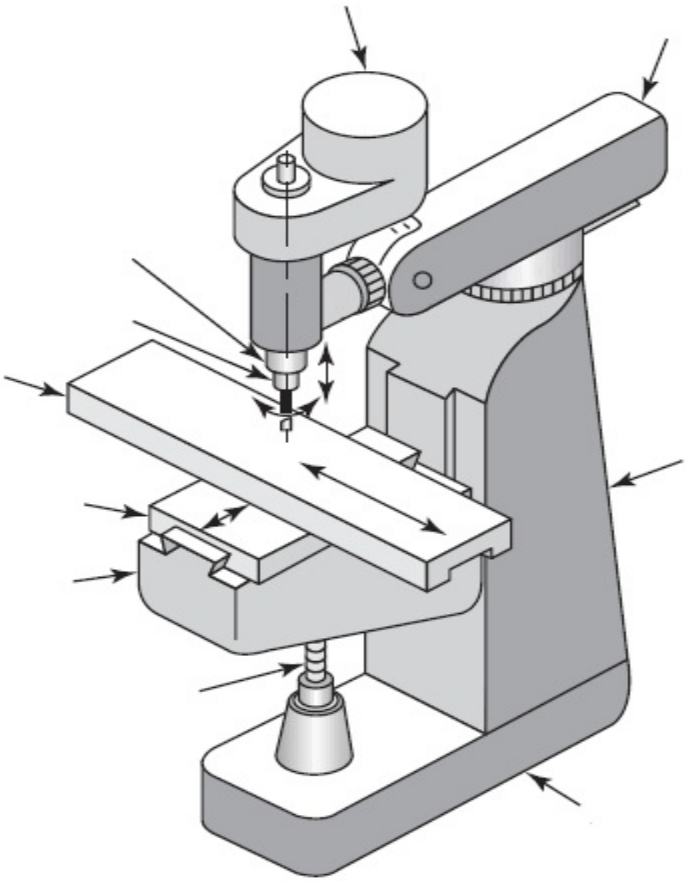
   C.

   D.

   E.

   F.

5. [§13.1, §13.2] On the following illustration of a vertical spindle column and knee mill, clearly label the *base, column, knee, saddle, table, spindle, quill, motor, overarm and the X, Y & Z axes of motion* (do not label any other components). **This nomenclature is important for understanding the TA instructions in lab.**



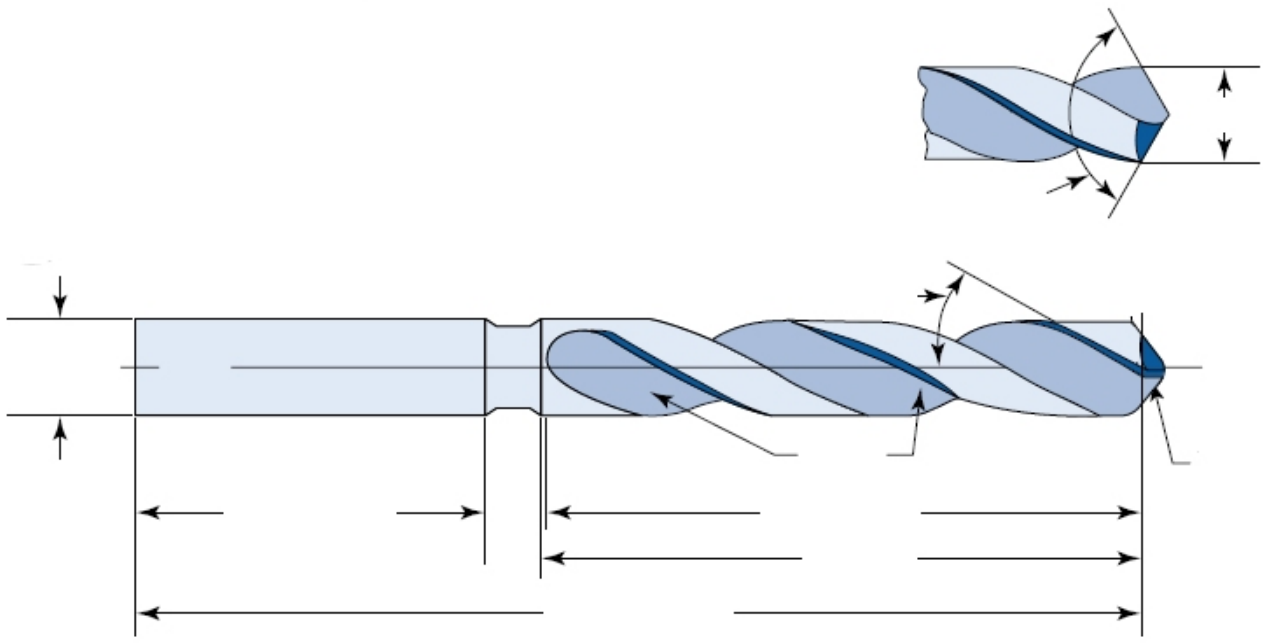
6. [§13.4.2] What is the most common type of workholding device for a milling machine? Hint: it rhymes with *nice,* but is spelled with an "s".

DRILLING DISCUSSION

1. [§8.1] Define *drilling.*

2. [§8.1] TRUE / FALSE: Drilling accounts for the majority of holes produced in industry today?

3. [§8.1] On the following illustration of a straight shank twist drill clearly label the *shank length, drill diameter, flutes, and lip (do not label any other components).* **This nomenclature is important for understanding the TA instructions in lab.**



4. [§8.4] Define six related drilling operations and sketch an illustration of each. Click this hyperlink to view videos of these processes.