Roster Number: _______________

Name: ____

EML 2322L Quiz 10 (10/29/19)

Answer the following questions based on the information presented in class. You can use **your** notes but do not speak with others.

Lab Period: (circle one) **T5-6 / T7-8 / T9-10**
W2-3 / W4-5 / W7-8 / W9-10
R2-3 / R4-5 / R7-8 / R9-10

What is the equation governing maximum peripheral tool velocity as a function of tool size?

$V = \pi \times$ ___ $\times$ ___

What is the purpose and benefit of peck drilling?
peck drilling help chips ______________________
so they don't collect inside the hole and cause the drill bit to ____________________, seize and break

What is the limiting factor for how fast a drill or endmill can rotate in a particular material?

A. maximum speed of machine spindle
B. type of taper/collet used to hold tool
C. number of flutes on the cutter
D. heat generated in the cutting zone
E. other: ___________________________________

What is the limiting factor for how fast a drill or endmill can feed (or advance) thru any material?

A. maximum speed of machine spindle
B. operator courage
C. phase of the moon at that particular hour
D. size / strength of cutting edges / lips
E. other: ___________________________________

What is the limiting factor for how deep to cut (per pass) with an endmill in a particular material (assuming sufficient flute length)?
the limiting factor is cutting tool / workpiece / machine _______________________ (which must resist the cutting forces and subsequent vibrations)

Select six factors that affect optimum cutting speed for drilling and milling:

1. strength & thermal conductivity of material
2. depth of hole
3. presence and efficiency of cutting fluid
4. type, condition & stiffness of cutting machine
5. stiffness of workpiece, fixture and tooling
6. quality of holes desired
7. whether you pay for replacement tools ☺

Based on lecture notes, circle the conditions under which you would use lower cutting speeds:

1. heavy (roughing) / light (finishing) cuts
2. when cutting stronger / weaker materials
3. to minimize / maximize tool life
4. when cutting flexible / rigid workpieces

Calculate the spindle speed [rpm] and feedrate [in/min] for a ½ inch HSS drill bit in mild steel (0.2-0.3 C) when using a manual milling machine:

from Table 1: $V \approx$ _____ ft/min
$N = 12$ in/ft × V ft/min / ($\pi \times D$ in/rev)
$N = 12$ in/ft × _____ ft/min / (π × _____ in/rev)
$N =$ _____ rpm

from Table 2: $f_r \approx$ _____ in/rev
$f = N$ rev/min × f_r in/rev
$f = 764$ rev/min × _____ in/rev = _____ in/min
scale back 60%: $N \approx 460$ rpm, $f \approx 3.7$ in/min

Calculate the spindle speed [rpm] and feedrate [in/min] used when milling an aluminum part with a 1/2 inch diameter, 2 flute HSS endmill on a manual milling machine in lab.

from Table 1: $V \approx$ _____ ft/min
$N = 12$ in/ft × V ft/min / ($\pi \times D$ in/rev)
$N = 12$ in/ft × _____ ft/min / (π × _____ in/rev)
$N =$ _____ rpm

from Table 3: $f_t \approx$ _____ in/rev
$f = N$ rev/min × f_t in/tooth × m teeth/rev
$f = 1910$ rev/min × _____ in/tooth × ____ teeth/rev
$f =$ _____ in/min
scale back 60%: $N \approx 1150$ rpm, $f \approx 9.2$ in/min

What size clearance hole would you specify for a mounting bracket that uses M6x1.0 fasteners in (A) aluminum using loose tolerances or (B) steel using more precise tolerances?

A. ____
B. ____