EML2322L – MAE Design and Manufacturing Laboratory

ENDMILL SELECTION ASSESSMENT

Name: _____ **Grader's Initials:** _____

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Description: This assessment gages your understanding of the material covered in the **Endmill Selection Document**, and is due at the beginning of the week 11 TA training session. As in DML, correct T/F questions which you mark FALSE.

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1. WC tools are always better to machine with because they are cheaper and tougher. T / F
2. Once endmills reach 1/2" in diameter, they are typically strong enough to cut anything we need to, and at that point larger tools just cost more money without much gain in strength / stiffness. T / F
3. Always select the largest L:D ratio for increased productivity, tool life, and surface finish. T / F
4. A tool that extends out of the toolholder or collet twice as much will be four times more flexible. T / F
5. Do not use more than 4 flutes when full-slotting in non-ferrous material like aluminum. T / F
6. The higher the number of flutes, the larger and stiffer the endmill's core diameter. T / F
7. WC tools can withstand approximately 2.5 times more heat than HSS tool alloys. T / F
8. WC is about 2.5 times stiffer than steel, which means it will deflect significantly less during heavy cutting. T / F
9. Roughing tools have serrated edges that break chips into smaller pieces for improved evacuation and less chance of re-cutting. T / F
10. WC tools can always be ground/honed sharper than HSS tools. T / F
11. Which coating(s) should be used for cutting aluminum:

    a. ZrN b. TiB2 c. TiN d. TiAlN e. TiCN

12. Which coating(s) should be used for cutting ferrous materials:

    a. ZrN b. TiB2 c. TiN d. TiAlN e. TiCN

13. A higher helix angle is less likely to cause tool pull-out due to the decreased axial forces. T / F
14. Endmills are available with ball ends and convex radii in place of the normally sharp corners. T / F
15. Typically only one long tool is necessary to cut deep features (i.e. > 2×D). T / F
16. All endmills are center cutting and therefore can plunge-cut without issue. T / F
17. It is always better to predrill a hole before plunging or ramping into a part. T / F

18. Always use the newest, sharpest endmill you can find for each part you make when cutting forgiving materials like aluminum or low carbon, easy-to-machine steels. T / F
19. You can never feed an endmill too slowly, as the only downside is doing so takes longer. T / F
20. Cutting twice as deep results in cutting forces that are twice as large. T / F

Now let's put it all together and see how you do ☺:

21. Which endmill would be best for creating a feature requiring a maximum corner radius of 1/8" (±0.020"), 3/16" deep in mild steel using a manual milling machine:
    a. Ø 3/16", HSS, uncoated, 2 flute, 3/16" length of cut (LOC)
    b. Ø 3/16", WC, uncoated, 4 flute, 3/16" LOC
    c. Ø 1/4", HSS, ZrN coated, 2 flute, 1/4" LOC
    d. Ø 1/4", WC, TiN coated, 4 flute, 1/4" LOC
22. Which endmill would be best for creating a ¾" (±0.005") wide slot, ½" deep in aluminum using a manual milling machine:
    a. Ø ¾", HSS, uncoated, 2 flute, 1.5" LOC
    b. Ø ¾", WC, TiAlN coated, 4 flute, 1" LOC
    c. Ø ½", HSS, ZrN coated, 3 flute, ¾" LOC
    d. Ø ½", WC, ZrN coated, 4 flute, ¾" LOC
23. Which endmills would be best for creating a ¼" wide slot in 16 gage steel sheetmetal for a course student:
    a. Ø 1/8", HSS, uncoated, 2 flute, ¼" LOC
    b. Ø 1/8", WC, TiAlN coated, 4 flute, ¼" LOC
    c. Ø ¼", HSS, uncoated, 2 flute, ¼" LOC with slightly worn/damaged corners
    d. Ø ¼", WC, TiN coated, 4 flute, ¼" LOC with slightly worn/damaged corners