EML2322L – Design & Manufacturing Laboratory

Common HW Mistakes / Weaknesses

1. **Center drills do NOT "mark" the starting hole location;** center drills start (or center) the hole using a special short, stiff drill geometry that improves positional accuracy over a regular drill bit.

2. **Tap drills do NOT create threads;** tap drills create properly sized holes in preparation for threading. In addition, tap drills and regular drills are related like squares and rectangles: tap drills are simply particular sized regular drills, but all regular drills are not tap drills.

3. **Hole and thread notes:**

hole note specifications:	***5/8″ threads thru aluminum:***	***10mm threads 20mm deep in steel:***
Ø tap drill diameter	Ø 17/32″ THRU	Ø 9.20, 30mm DP
thread specification + depth	5/8-11 UNC THRU	M10x1.25, 20mm DP
quantity of holes desired	2 PLACES	3 PLACES

4. **Fine thread bolts have a larger cross sectional (tensile) area and coarse female threads have a larger cross sectional (shear) area;** this means female threads in weak materials should be specified as coarse threads and the strongest male threads (i.e. bolted joints) will have fine threads.

5. **Bolt holes are ALWAYS clearance holes;** by definition, bolts freely pass through the parts to be connected and to do so requires clearance between the hole and the bolt shank.

6. **Limiting factor for how deep an endmill can cut per pass in a particular workpiece is STIFFNESS:** the stiffness of the tool, the workpiece, and the machine. **Limiting factor for how fast an endmill can rotate when cutting a particular workpiece is HEAT:** the heat produced by the tangential velocity of each cutting flute moving across the workpiece. **Limiting factor for how fast a drill or endmill can feed (or advance) in any material is the size/STRENGH** of its cutting edges/lips: the larger the drill / endmill, the stronger it is.

7. **Four lathe operations used to produce the assigned wheel hubs in lab:**
   facing, turning, drilling/reaming, chamfering (formally, "profiling")

8. **Three controllable cutting conditions that affect the productivity of the turning process:**
   surface (or spindle) speed, depth of cut, feedrate

9. **Purpose of tap guide** is to guide the tap perpendicular to the surface of the part to be threaded.

10. **Avoid features that require small tools** whenever possible; small tools are weaker and less stiff, so they break more easily and are less accurate because they deflect more than larger tools.

11. **Difference between accuracy & precision:** *accuracy* refers to how closely a measurement comes to measuring the true value (since measurements are always subject to error); *precision* refers to how closely repeated measurements come to duplicating measured values (so it is quite possible to be very precise and totally inaccurate).