MAE STUDENT SHOP DETAILED CHECKLIST

DETAIL DRAWINGS. Does each drawing have the following information?

□ YES □ NO Enough views of the part for clarity
□ YES □ NO Dimensions to properly locate EVERY part feature
□ YES □ NO Appropriate tolerances for EVERY dimension
□ YES □ NO Proper surface finish notes for ANY important surface
□ YES □ NO Proper hole and thread notes based on the tap chart
□ YES □ NO Drawing units, material type, quantity of parts to be manufactured
□ YES □ NO Unique part name / number
□ YES □ NO Deburring instructions
□ YES □ NO Legible drawing size and print quality
□ YES □ NO Clearly visible dimensions and tolerances

HOLES AND THREADS.

□ YES □ NO Are the proper type of threads (coarse or fine) used in the proper type of material?
□ YES □ NO Are hole notes, thread notes, and tap drill sizes correct based on the tap chart standards?
□ YES □ NO Are clearance holes properly sized using close and free fit standards off the tap chart?
□ YES □ NO Are threaded holes designed with AT LEAST FIVE threads of engagement?
□ YES □ NO Are threaded holes designed for the largest feasible fastener size? (Taps smaller than #6 or M4 are much easier to break, even in weaker materials.)
□ YES □ NO If blind holes are required, does the bottom of the hole reflect the conical drill bit geometry? (Flat bottomed holes require special drills.)

DESIGN FOR MANUFACTURING (DFM) TIPS.

□ YES □ NO Is the part as small as possible without affecting its function?
□ YES □ NO Is each feature tolerance as large as possible while still meeting desired design intent? (Mfg. time increases exponentially with feature tolerance.)
□ YES □ NO Is each finished surface necessary for part function? Are the coarsest surface finish specifications used wherever possible? (Mfg. time increases exponentially with surface finish.)
□ YES □ NO Is the number of dimension datums minimized? (Less edge findings = quicker part production.)
□ YES □ NO When possible are thru bolted holes used instead of threaded holes to reduce mfg. time?
□ YES □ NO Are nominal (versus arbitrary) part dimensions used where possible? (i.e. 3.00" vs. 3.04")
□ YES □ NO Are parts designed for minimum raw-stock removal? (Less material removed = cheaper part.)
□ YES □ NO Have alternative designs been investigated which may lower manufacturing and assembly times? (i.e. designs which combine parts, or split parts; or designs which use sheetmetal vs. billet)?
□ YES □ NO Have unnecessary features that increase manufacturing time been eliminated? (fillets, etc.)

MATERIAL AND TOOLING CONSIDERATIONS.

□ YES □ NO Is the material near net shape? (Students with materials requiring 30+ minutes of material preparation will be asked to return with appropriately sized stock.)
□ YES □ NO Has a file test been conducted to ensure the material is not hardened?
□ YES □ NO Are material choices justified? Are lower strength materials that are easier to machine used everywhere possible? (Steel for example requires 3 times as long to machine as aluminum.)
□ YES □ NO If the part material is specified as ferrous, have the appropriate tools been purchased / provided? (Tools provided in the student shop are for use in non-ferrous materials only. Additional tooling resources are McMaster-Carr or MSC. If you have questions, please see Mike or a TA.)
□ YES □ NO Is each part feature designed around nominal, standard (commonly produced, imperial) cutter sizes? (If you require metric tooling, it must be purchased. If purchasing metric endmills, order them with imperial (inch-sized) shanks to fit in the imperial collets on the milling machines.)
□ YES □ NO If machining with small tools have you purchased multiple tools due to the increased risk of tool damage and breakage? (If break your tools then it will most likely end your day in the shop unless you have purchased multiple or understand the delicacy of small tools.)