MET 314: MACHINING TECHNOLOGY & INDUSTRIAL SAFETY

Fall Semester 2009

Machining Laboratory: The Engine Lathe
Exercise: Soft-Faced Hammer

The purpose of this lab is to acquaint you with the basic concepts associated with engine lathe operations involving precision outside diameters, steps, facing, knurling, and threading. You will work individually to complete this exercise (you may help each other with advice, suggestions, or setup, but not in the actual operation of the lathe).

You will be graded on the following criteria:

- Completed practical exercise 25%
- Tolerance of diameters to specified dimensions 25%
- Tolerance of lengths to specified dimensions 25%
- Completed lab report 25%

You should complete this lab as soon as possible and turn in the required product and associated lab report together to the lab instructor. The practical exercise should not take more than 16 lab hours to complete. The lab instructor will be present during the lab period to assist you and answer questions; however, this is intended to be an individual effort.

Using the accompanying shop drawings as your reference for this exercise, both 4140 steel and 6061 aluminum will be used to fabricate the soft-faced hammer. Since this is the first exercise using the engine lathe, take extra time to ensure your setup is safe and adequate before turning the machine on. You should use a combination of roughing and finishing cuts for this exercise. Roughing cuts should remove approximately 0.030 inches while finish cuts should remove 0.001 – 0.005 inches. Remember that you must determine if your particular lathe will reduce the diameter twice the indicated depth of cut or not when figuring your sequence of cuts. Power feeds will be used for this exercise, however, you are advised to use manual feeds for the first few steps to become familiar with the operation of the lathe before using power cross or longitudinal feeds.

Your primary equipment for this exercise will be the engine lathe, a three or six jaw universal chuck, quick change tool holder, live center (tailstock), cemented carbide lathe tools, cutting fluids, semi-precision and precision measuring/layout equipment, and various materials. Safety glasses are required for this exercise as well as appropriate personal attire (no sandals, shorts, etc.).

You should determine appropriate cutting speeds and feed rates for each specific material you will be machining. Spindle RPM will be calculated for each operation on all parts.

LABORATORY REPORT FORMAT

All written work submitted for grading must be completed professionally. Each lab write-up is to be considered a formal technical report, double-spaced, and must conform to acceptable standards of written communication, as well as the M&IE Departments Writing Outcomes. Spelling and grammar must be correct and are as important as technical content. Incorrect spelling, punctuation errors, and grammatical errors reflect a lack of proof reading and will be reflected in each lab grade. All assignments must be completed on one side of the paper only, must be neat and legible, and must be prepared in accordance with standard margin conventions.

Lab reports are to contain (at a minimum) the following:

Cover Sheet/Title Page • Name • Course and Section • Date • Submitted to	
Introduction • Purpose • Problem • Scope	What is the purpose of this report? What is the hypothesis or requirement? What are the limitations of this report?
Test and Evaluation • Apparatus • Procedure	What device(s) did you use? What procedure(s) did you use?
Findings • Data	What were the results of the test / experiment?
Interpretation	What was your interpretation of the results?
Conclusion and Recommendations	What can you conclude from the interpretation(s)? What is your recommendation based on this conclusion?
Attachments • Calculations • Data Sheets • Figures and Graphs	These should be attached as appendices. Each appendix should be titled and page numbered. Also, the report should include a reference to each appendix.

Mechanical and Industrial Engineering Writing Outcomes

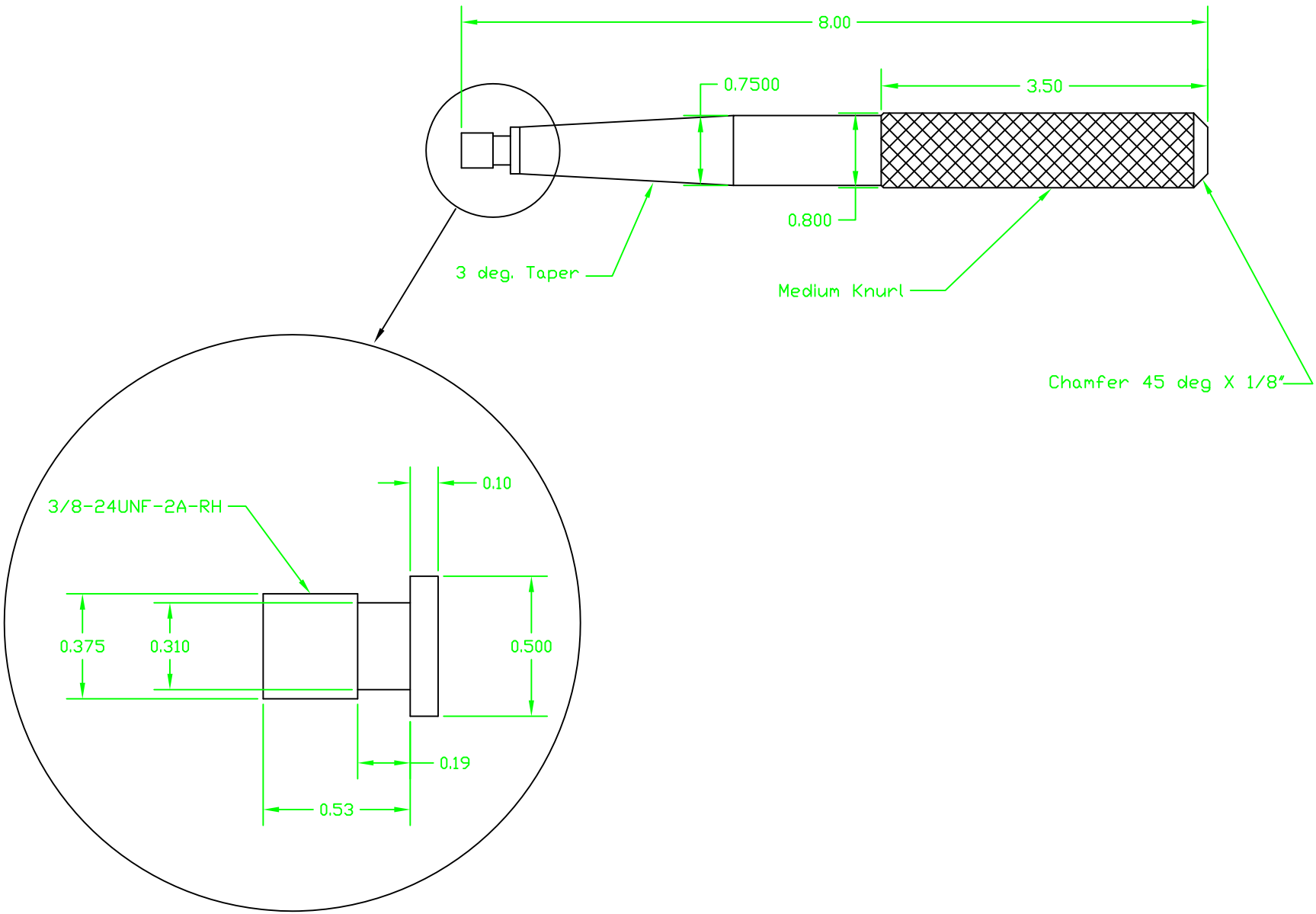
Undergraduate Programs in IME, ME, MET

General Writing Outcomes

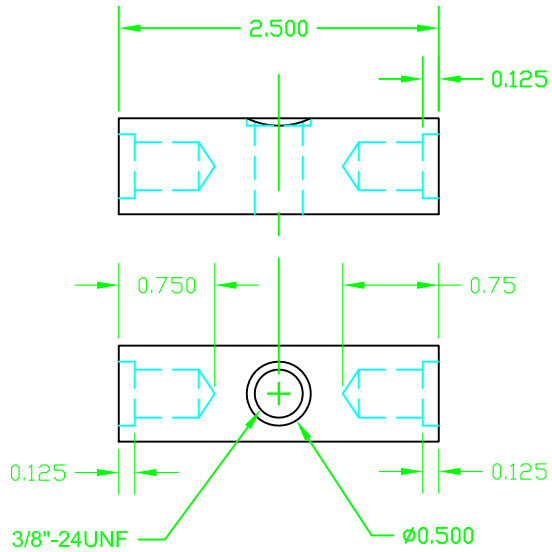
- Writing is an important part of an engineering and engineering technology education and career.
- Writing is a process that involves planning, drafting, and revising.
- Engineers and Engineering Technologists must be prepared to write to different audiences for different purposes.

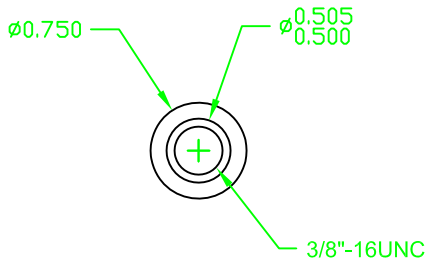
Specific Learning Outcomes

- **Generate reports with clear and complete engineering content**
  - Content tailored to context (audience, purpose, use)
  - Clear statement of purpose
  - Complete analysis
  - Correct and thorough conclusions
  - Appropriate backup content in appendices
  - Synthesis and clear presentation of information from various sources (web, library, course content)
- **Generate reports with logical flow**
  - Clear connections between sections and within sections
  - Use of paragraphs for change of thoughts
  - Headings and subheadings where appropriate
- **Design and integrate effective graphic elements (tables, figures, and other non-textual elements)**
  - Appropriate graphic elements when needed
  - Graphic elements integrated with text or placed in an appendix if appropriate
  - Clear and complete labels for and references to graphic elements (figures, tables, etc.) and appendices
- **Generate grammatically and mechanically correct reports**
  - Subject/verb agreement
  - Tense
  - Sentence Structure (complete sentences, no run-on sentences, relatively simple sentence structure)
  - Spelling
  - Punctuation
  - Word usage (e.g., affect vs. effect)
  - Citation of references
- **Write in an appropriate style and tone for the contex**t
  - Voice, Person
  - Word choice
  - Definitions for and correct use of technical terms
  - Conciseness (minimal repetitions, no unnecessary content)
  - Professional tone: written to inform, not to impress; appropriate level of formality
  - Clarity
  - Consistency (two inches, 2”, 2 in.)



TOLERANCE:	HAMMER HANDLE			
x/x ± 1/64 .x ± .030 .xx ± .010 .xxx ± .005 .xxxx ± .0010	MSU - M&IE Department Mechanical Engineering Technology			
	SIZE A	CLASS NO. MET 314	MAT'L. AL 6061-T6	REV 4
DRAWN BY: KLA	SCALE: NOT TO SCALE		SHEET 1 OF 2	





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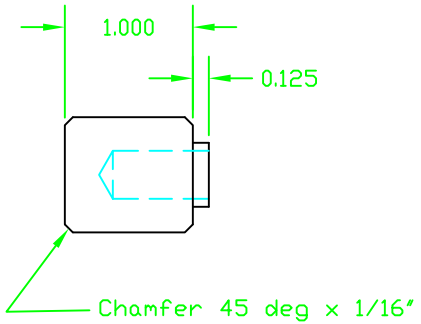

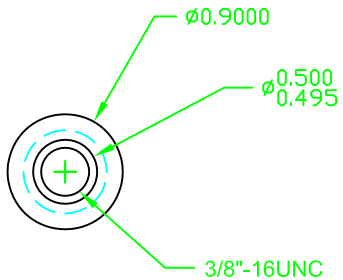

MAT'L: 1 BRASS HEAD & 1 ACETAL HEAD

TOLERANCE:			HEAD & FACES			
x/x	±	1/64	MSU - M&IE Department Mechanical Engineering Technology			
.x	±	.030				
.xx	±	.010				
.xxx	±	.005				
.xxxx	±	.0010	SIZE A	DWG NO. MET 314	MAT'L. SEE PART SPEC.	REV 3
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