

MET 314: MACHINING TECHNOLOGY & INDUSTRIAL SAFETY

Fall Semester 2009

Machining Laboratory: The Vertical Milling Machine **Exercise: Hand Vise**

The purpose of this lab is to acquaint you with the basic operations associated with a standard manual vertical milling machine. This exercise will include bandsawing, drilling, tapping, precision measurement, face milling, and shoulder/step milling operations. These are common operations associated with vertical mill work.

You will work individually for this lab exercise in the manual milling operations portion of the course. The six (6) vertical milling machines located inside of the student machining area will be used for this exercise. You must coordinate with the lab instructor for specific operation instructions for each machine before beginning.

You will be graded on the following criteria:

- Completed practical exercise 25%
- Tolerances of lengths to specified dimensions 40%
- Completed lab report 35%

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 lab instructor will be present during the lab period to assist you and answer questions; however, this is intended to be an individual effort.

In this exercise you will be required to produce a precision hand vise (a common tool for clamping small or delicate work). You will have to fabricate multiple mating components as specified on the accompanying shop drawings. You will be required to machine the aluminum workpiece using face milling operations down to a rectangular shape with the following dimensions: 5.250" x 2.500" x 2.625". Once the exterior machining operations are completed then you will drill and bandsaw or machine out the inside of the hand vise. Next you will machine down the interior surfaces to finish dimensions. After the base has been completed then machine the remaining components and assemble for use. The finished products are intended to become an actual shop clamping tools; so care must be taken in all steps of this exercise.

Your primary equipment for this exercise is the horizontal bandsaw, the vertical bandsaw, gear-driven drill press, and vertical milling machine. Safety glasses are required for this exercise. See the instructor for directions and materials/supplies.

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 <ul style="list-style-type: none"> • Name • Course and Section • Date • Submitted to 	
Introduction <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Apparatus • Procedure 	What device(s) did you use? What procedure(s) did you use?
Findings <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 context**
 - 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:

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.x	± .030
.xx	± .010
.xxx	± .005
.xxxx	± .0005

DRAWN BY: KLA

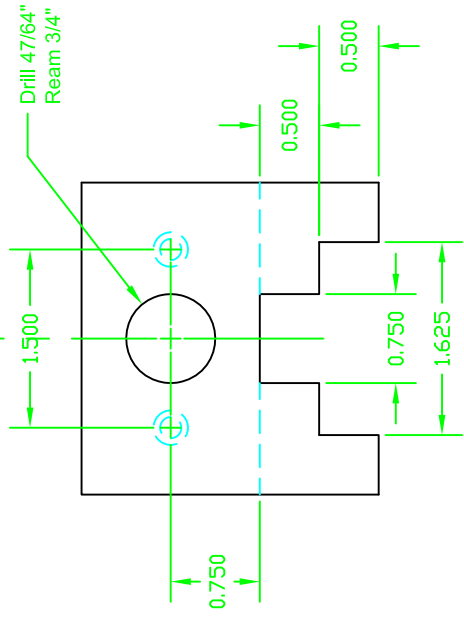
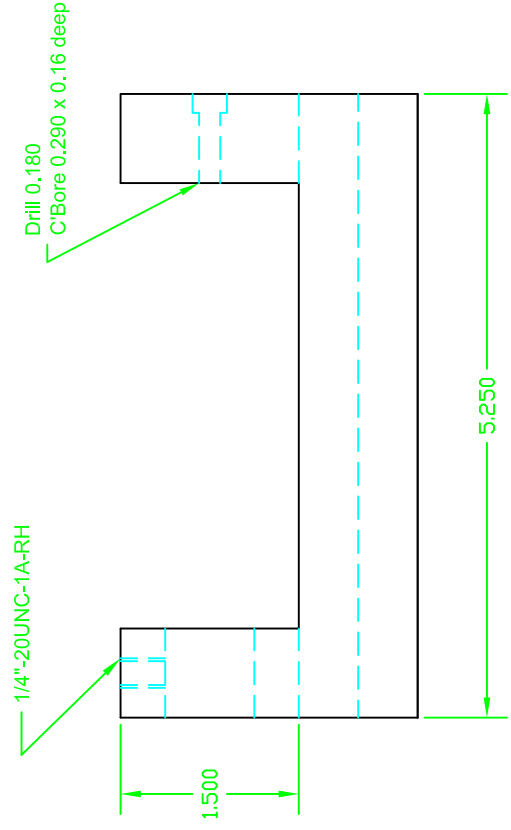
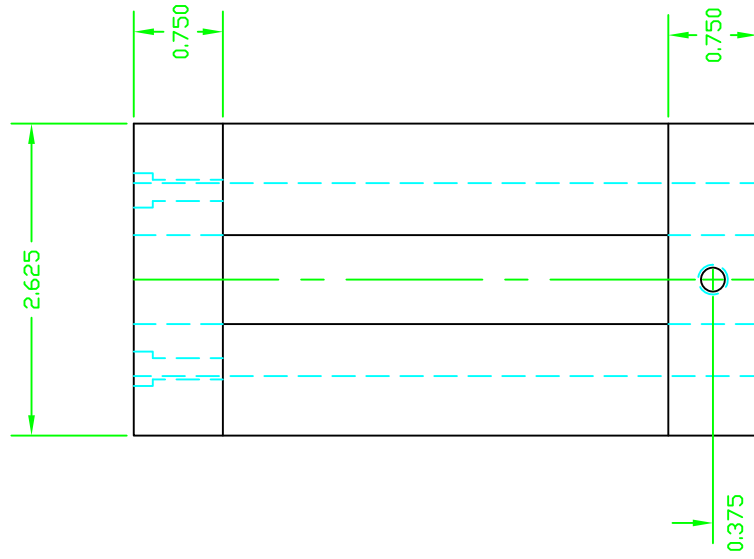
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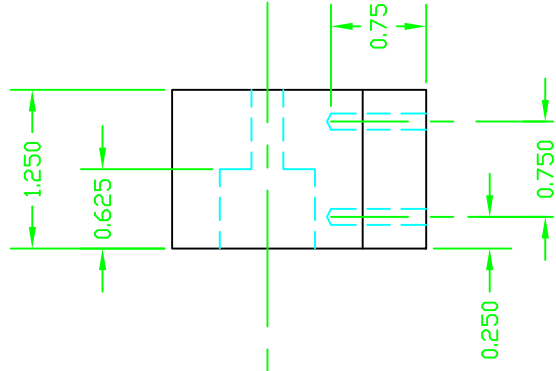
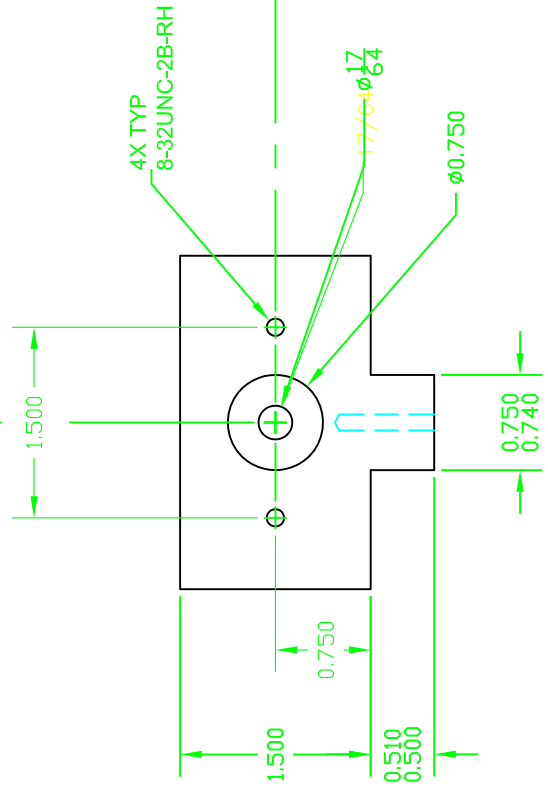
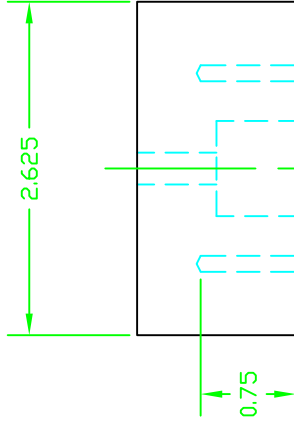
SHEET #1

HAND VISE BASE

MSU - M&IE Department
Mechanical Engineering Technology

CLASS NO.	MATL	REV
A MET 314	6061-T6 AL	3





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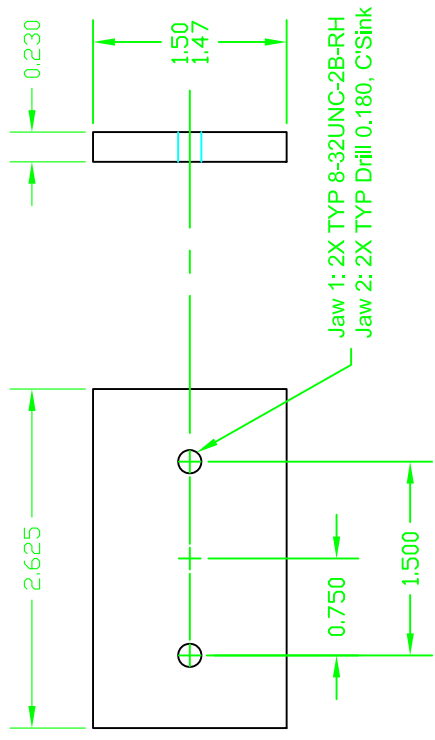
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x	+ .030
.xx	± .010
.xxx	± .005
.xxxx	± .0005

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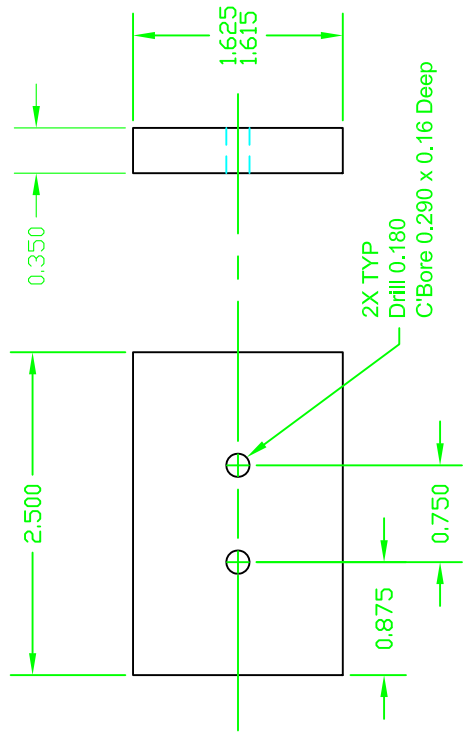
MOVABLE JAW

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Mechanical Engineering Technology

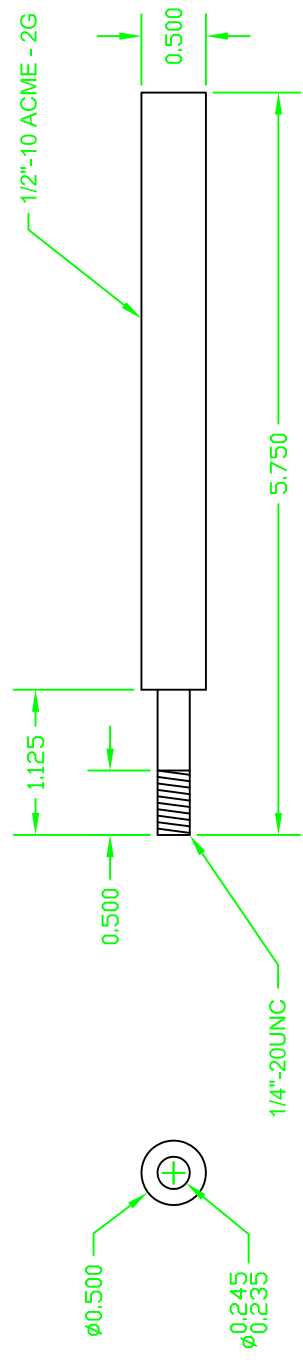
SIZE	CLASS NO.	MATL.	REV
A	MET 314	AL 6061-T6	4
SCALE-NOT TO SCALE			SHEET #2



WISE JAW



GUIDE PLATE



LEAD SCREW

NOTE: MAKE THE FOLLOWING QUANTITIES OF EACH PART:

- 2 - VISE JAWS (MAT'L. CR1080)
- 1 - GUIDE PLATE (MAT'L. ACETAL)
- 1 - LEAD SCREW (ZINC PLATED STEEL)

TOLERANCE:

x/x	+ 1/64
.x	+ .030
.xx	+ .010
.xxx	+ .005
.xxxx	+ .0005

DRAWN BY: KLA

HAND VISE PARTS

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SIZE	CLASS NO.	MAT'L.	REV
A	MET 314	SEE PART SPEC.	3
SCALE NOT TO SCALE			SHEET #3