

MAK112E – Computer Aided Technical Drawing

Spring Semester 2009

(1+3) 2.5 credits

Lecturer

Dr. Serpil KURT, Assoc. Prof., Mech. Eng. Building (ITU) Room: 222,
Tel: 293 1300 – 2690, e-mail: kurtserp@itu.edu.tr

Assistants

Özlem SALMAN, Eren KAYAO LU, Research Ass., Mech. Eng. Building (ITU) Room: 221,
Tel: 293 1300 – 2449, e-mail: ozlemsalman@itu.edu.tr, kayaoglu@itu.edu.tr (www.mkn.itu.edu.tr/~kayaoglu)

Office Hours

Tue 09-16; Wed 09-18; Thu 14-16; Fri 9-13

Course Hours

Thursday 8³⁰-12³⁰ (406); Fridays 13³⁰-17³⁰ (406);

Prerequisite

RES 105

The text book

[1]Giesecke, F.E., *et al*, **Engineering Graphics**, MacMillan Pub, New York, 2004. T.353.E54.2004
www.mkn.itu.edu.tr/~mkimrak/MAK112E.htm

Recommended

[2]Goetsch, D., Chalk, W., Nelson, J.A., **Technical Drawing** Delmar Pub, 2000. T.353.G64.2000

Texts

[3]Shih, R.H., Zecher, J., **AutoCAD 2000 MultiMedia Tutorial**, SDC Publ., 1999. T.385.S55.1999

[4]Madsen, D, et.al **Fundamentals of Drafting Technology**, Delmar Pub, 1994. T.353.M33.1994

[5]Jensen, C.H. **Engineering Drawing and Design**, McGraw-Hill, 2002, 2008. T.353.J46.2002, T.353.J46.2008

[6]Horenstein, M.N., **Design Concepts for Engineers**, Prentice Hall, 2002. TA.174.H67.2002

(for design project)

[7]Earle, J., **Engineering Design Graphics: AutoCAD 2000**, Prentice-Hall Publ, 2001. TA.174.E37.2001

[8]Earle, J., **Engineering Design Graphics: AutoCAD 2007**, Prentice-Hall Publ, 2008. TA.174.E27.2008

Course description

Introduction to computer aided technical drawing. Geometric construction. Orthographic projection and multi-view drawings. Hidden details and Scales. Pictorial drawings. Sections and sectional views. Half section, local section, revolved section and removed section. Auxiliary views and intersections. Dimensioning fundamentals and surface texture indication. Tolerances, limits and fits. Screw threads and engineering fasteners. Assembly modeling and assembling drawing. Three dimensional design and solid modeling.

Objectives

This course of study aims to teach students: learning the standard techniques of preparing engineering drawings, reading and interpreting drawings, and solving three-dimensional technical problems that require the application of descriptive geometry and graphical analysis, computer aided drafting and modeling, how to print and present standard 2D blueprint and solid models.

Caution

Students are reminded not to treat this course instruction manual as a comprehensive and solely sufficient material for their studies since the purpose of this course manual is not meant to be a substitute for regularly attending classes, reading relevant textbooks, recommended books. The course instruction manual is aimed at providing a quick reference and a brief guidance for the students.

Content of The Course

Graphical interpretation of orthographic projection to include auxiliary views, section views, dimensioning, translation of design instructions into detail and assembly drawings, drawing conventions including referencing and surface finish notation, election of tolerances based on design requirements.

Learning Outcomes

In successfully completing this course students will a) draw 2D drawings in standard 2D blueprint forms b) apply dimensioning in 2D drawings, c) design and align given parts in an assembly, d) print out and present 2D drawing, e) create solid model of a part.

General Skills

The course is designed to give undergraduate engineering student ability to read and write the language of Engineering Graphics. It provides the undergraduate engineering student with a background in descriptive geometry, orthographic projection, basic dimensioning, auxiliary and section views, and computer-aided engineering graphics. Students are to learn to use a commercial CAD package.

Learning Experiences

Students will construct orthographic views of various components, exercises selected from the textbook. Students will practice construction of orthographic drawings from given pictorial views using traditional drafting instruments. Students will construct assembly views and add a simple part list. Students will select appropriate fits for these assemblies and add tolerances to their detail drawings. Suitable surface textures will be selected and the symbol added to the detail drawings. Students will gain knowledge and experience of an up to date version of AutoCAD, Pro/E and SolidWorks.

Learning Methods

A variety of teaching and learning methods are used including formal lectures, cooperative learning, individual project, laboratory practice, and homework, question and answer sessions. Lectures and practice will be in 406 Comp. Lab. Students use many online sources, referring to online public domain references and reference books that are found at local public libraries. Field trips are suggested and are accomplished within students' local areas. Students will respect each other's personal beliefs and be committed to helping each other learn about the course objectives and themselves. Students also are expected to help other students in improving their CAD/drafting abilities through one-on-one and group activities. If you miss a class for any reason, you are responsible for obtaining any material and announcement from other students. Instructor's notes will not be given out. Also, students are required to read the appropriate chapter before attending the class.

Academic Dishonesty Cheating and plagiarism are serious academic matters and they will be handled by the following policy and by the University policy. A grade of zero is assigned for the entire assignment or exam. The case will be reported to the Dean of Students for disciplinary action.

Assessment This course is very time consuming. This is a three credit hour course, so expect to work at least three hours outside of class for every one hour in class. The student should spend at least six hours per week on the computer outside of class. To successfully progress through the course, students must understand each of the topics in the order it is presented. Students missing class are still responsible for the material covered in class. Students are expected to comply with all requirements for the class. Drawing assignments and projects will be graded based on content and neatness. Grades are not given, they are earned. You are expected to accept all responsibility for your performance in the class.

| | |
|---|------|
| Midterm Exams..... | 20 % |
| Homework's..... | 10 % |
| Design Project (Week 14) | 10 % |
| Assignments < Average of the assignments > | 20 % |
| Final Exam (Exam Week) | 40 % |

Exams (20%) There will be two midterm exams and one comprehensive final exam. No make-up exam will be given (a grade of zero will be assigned) except for a verified and written excuse. The instructor should be informed in advance or no later than 48 hours after the exam in case of an emergency. It is the instructor's discretion to give the make-up exam.

Homework (10%) Submit your homework both in hard copy form (print out) and upload to **Ninova e-Learning System**. Late homework is not evaluated. Homework should be submitted in due time with complete form. You must use engineering paper for all handwritten problems and projects.
http://www.mkn.itu.edu.tr/~mkimrak/MAK112E_homework.htm

Design Project (10%) Design Project is designed as a comprehensive problem, (the instruction from "Engineering Design Graphics" [7] by Earle page 102. It is selected from the p.111, problem 78. ref.7) During the 2nd course week : The design team will be formed by 4 or 5 members; One of the team members will be selected as a team leader; The team activity schedule will be prepared ; The course instructor will be informed about your team, the leader, and the team activity schedule ; Otherwise, the design teams will be organized by the course instructor; Progress report will be submitted and presented during the 6th course week.

Assignments (20%) It is compulsory to ATTEND at least 80% of the practice. Draw all assignments using a CAD package as a tool in Comp. lab. You are to stay in lab and work on your PC until they are completed and handed in or the class ends. It is up to each student to complete the work. No credit will be given for late work. Assignments will be collected within the last five minutes of class. Repeating the assignments is not possible. All computer assignments must be turned in on disk and hard copy. The student should print their name clearly on the disk. The hard copy must contain an appropriate title block as discussed in class.

Course Plan

- Week 1 - Introduction to computer aided drawing*
- Week 2 - Parametric design & basic drawing functions*
- Week 3 - Orthographic projection and multi-view drawings*
- Week 4 - Principles of dimensioning*
- Week 5 - Creating sectional views*
- Week 6 - MIDTERM EXAM #1*
- Week 7 - Three dimensional design and creating parts in 3D drafting*
- Week 8 - Applying constraints and dimensioning in solid modeling*
- Week 9 - Extruding modifying and redefining feature construction*
- Week 10 - Transferring 3D parts to drafting detailing*
- Week 11 - MIDTERM EXAM #2*
- Week 12 - Assembly modeling and assembling drawing*
- Week 13 - Surface modeling*
- Week 14 - Design Project Presentations*

Evaluation and overall grading scale Final grade will be awarded as following. However, the instructor may adjust the scale according to the class performance. The following grading scale is the suggested grading scale.

| Marking System | | | |
|----------------|----------|-----------|---------|
| AA | 93 – 100 | CC | 51 – 60 |
| BA | 92 - 85 | DC | 45 – 50 |
| BB | 71 – 84 | DD | 40 – 44 |
| CB | 61 – 70 | FF | < 40 |

Coordinator Dr. C. Erdem MRAK, Prof.

Date January 2009

MAK 112E Computer-aided Technical Drawing

2008/09 Spring Semester

Homework # 1 /mutli- view

A pictorial drawing of a cast iron component (Gripper Rode Center) is given in (*page 192 Fig.6.10A*) [7]. Using layout A3 (adjusted) draw in 1st angle projection, the following views:

- a) a front elevation (view)
- b) a plan (top) view
- c) an end elevation (right side view)
- d) give all necessary dimensions.

Homework # 2 /sectional view

Two views of a cast iron component (Bracket) are given in (*page 440 Fig. 14.57*) [1]. Using layout A2 (adjusted) draw half-size in 1st angle projection, the following views:

- a) a front elevation (view)
- b) a plan (top) view
- c) an end elevation (right side view)
- d) remove sections A-A and B-B
- e) give all necessary dimensions.

Homework # 3 /solid model

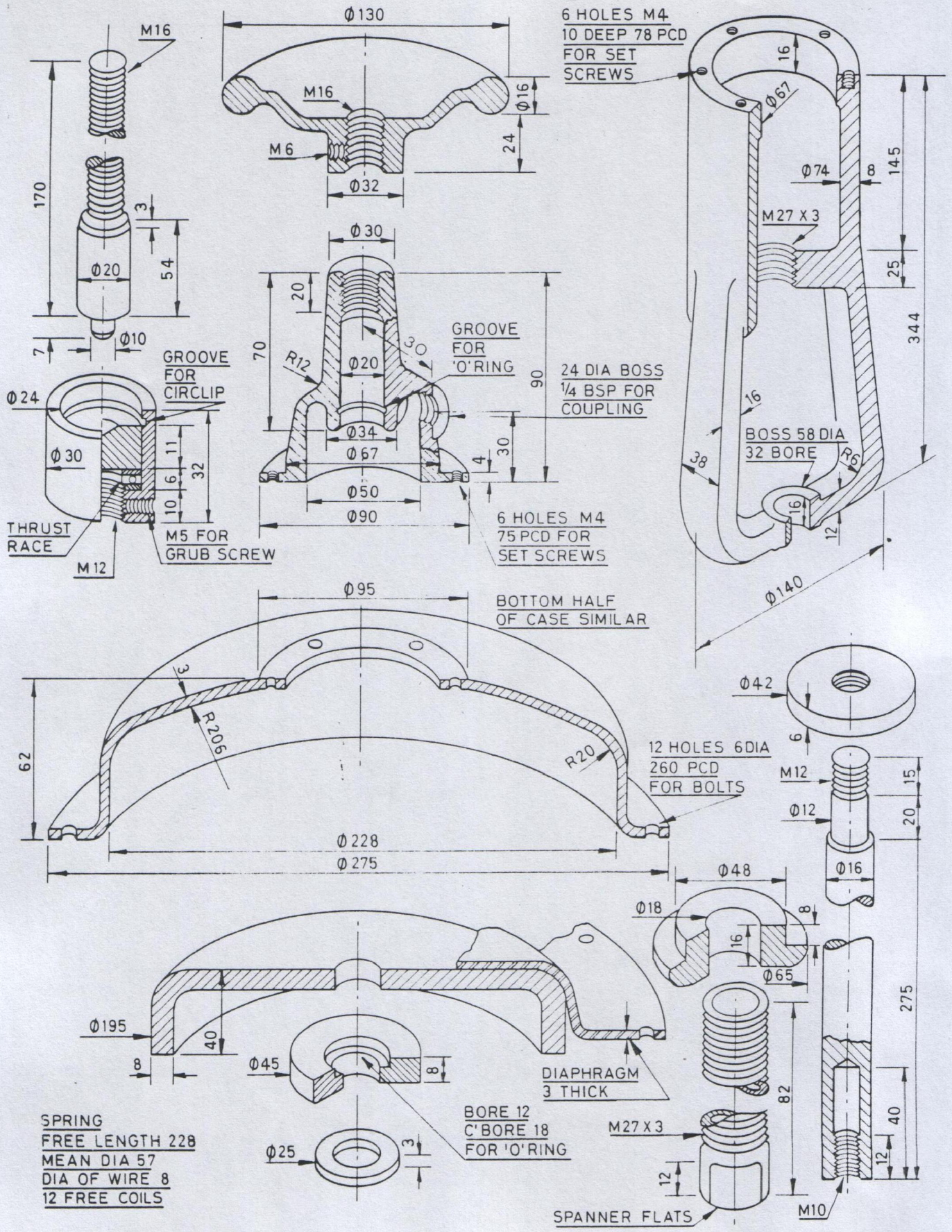
The views of a cast iron component (Support Base for Planer) are given in (*page 439, Fig. 14.54*) [1]. Using layout A2 (adjusted) create a solid model of the component using SolidWorks then, create necessary views with orthographic projections (*front view, top view, left side view in full section on A-A as indicated and removed section B-B*) and give all necessary dimensions with surface finishing symbols (*with the exception of the surface of the holes, all the surfaces are to have a maximum surface roughness value of 6.3 μm . the surface roughness of the holes is to lie between 0.4 and 1.0 μm*). Make sure that all rounds, fillets and runouts are properly created.

Homework # 4 /assembly

The details of a Valve Actuator assembly are given. Assemble all the components and draw full-size the following views

- a) a sectional front elevation (view) of the assembly
- b) a plan (top) view
- c) an end elevation (left side view)
- d) insert a title block and add a part list

use your judgment where dimensions have been omitted.



SPRING
 FREE LENGTH 228
 MEAN DIA 57
 DIA OF WIRE 8
 12 FREE COILS

VALVE ACTUATOR