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SUMMER PRACTICE

BOOKLET

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# INTRODUCTION

This booklet is prepared to provide information for sophomore and junior Mechanical Engineering students on summer practices.

During undergraduate education, mechanical engineering students must complete two summer practices, namely ME 200 – Summer Practice I, and ME 300 – Summer Practice II. In each summer practice, training of at least 20 working days must be completed in a factory (or power plant or Research and Development office).

The following chapter of this booklet presents guidelines for application procedures, factory selection, practice reports and logs, evaluation and grading of practices. Chapter 3 presents the content of the analysis section of the summer practice reports. Chapter 4 concludes this booklet by summarizing the summer practice procedure in Çankaya University Mechanical Engineering Department.

# SUMMER PRACTICE GUIDELINES

According to Çankaya University Mechanical Engineering (ME) Department undergraduate curriculum, ME students must successfully complete two summer practices before graduation. These summer practices are performed in companies approved by the department. Normally, students are expected to perform the practice in summer. It is not permitted to perform the summer practice during academic semester. In accordance with this statement, the students, who are taking a course in summer school, are not permitted to perform the practice during summer school period.

## ME 200 – Summer Practice I

In ME 200 – Summer Practice I, the students are required to spend a training period of 20 days in a firm acting in manufacturing industry. During the practice, students will have the opportunity of observing manufacturing processes carried out and the relation between the manufacturing processes and the management functions.ME 200 – Summer Practice I aims to give students the opportunity to observe production environment in a firm.

The students who are willing to take the course must be successful from ME 210 – Manufacturing Processes course.

## ME 300 – Summer Practice II

In ME 300 – Summer Practice II, the students are required to do 20-working-days summer practice in a suitable factory, a thermal power plant or an R&D office. Students are expected to get acquainted with a real business environment by studying various managerial and engineering practices through active participation. ME 300 – Summer Practice II aims to give students the opportunity to observe various types of organizations in which they are likely to work after graduation.

The students who are willing to take the course must be successful from ME 200 – Summer Practice I.

## Company Selection

Students are encouraged to directly contact with the companies and propose the company for approval of the Mechanical Engineering Department. A company should satisfy following criteria to be approved for summer practices.

1. At least 3 engineers – at least one of which is a mechanical engineer must be employed in the company.
2. At least 7 white-collar personnel for ME 200 and consensus of the summer practice commission applies for ME300.
3. The company must be functioning actively (not on a break for any reason) during the practice period.

In addition to these criteria, the students are not allowed to perform the same summer practice (in case of unsatisfactory grade) or the following summer practice, in the same plant. However, different plants where activities of the plants are considerably different or R&D department of the same company may be proposed.

## Application for Summer Practices

The students who will perform the summer practice should follow an application procedure explained stepwise below.

Step 1: Students should fill in the ***Company Proposal and Statement of Permission Form*** in Appendix B (available in [the web site](http://me.cankaya.edu.tr/)). The form includes information about the name and address of the proposed company, employment data (number of engineers, number of mechanical engineers, number of blue- and white-collar personnel), and brief information about activities and main products. The form also includes information about eligibility of the student to perform the summer practice. After filling in the form, the student should hand the form in to his/her academic advisor for approval of eligibility and then submit the form to summer practice coordinator of the department. Upon arrival of the form, Mechanical Engineering Department evaluates the company proposal for approval. Approved companies are added to the acceptable companies list on [the web site](http://me.cankaya.edu.tr/). Whether or not the proposed company is listed on the web site, all of the students who are willing to take ME 200 or ME 300 must fill in this form.

Step 2: Upon approval of the company, students should apply to the company for the summer practice with the summer practice application form (Appendix G) Summer practice application procedures of the companies are usually different from each other. It is the students’ responsibility to provide the information requested by the companies. Moreover, it is again the students’ responsibility to ensure that he/she satisfies the prerequisites listed in Section 2.1 and Section 2.2. Otherwise, the summer practices – even completed in the company – will not be considered valid.

Step 3: As soon as the starting and finishing dates of their summer practice are determined, students should fill in the***“Health Premium Application Form”***in the web site and send it to summer practice coordinator via e-mail (stajme@cankaya.edu.tr) to start the process for their health insurance premiums which will be paid by the University. The procedures are explained in details in Appendix D (in Turkish).

Step 4: Students should submit the printed copy of ***Practice Evaluation Form*** in Appendix C (available in [the web site](http://me.cankaya.edu.tr/)) to the summer practice supervisor in the company (Part I and Part V in the form should be filled by the student). After completion of the practice, appropriate parts of this form should be filled out by the practice supervisor and sent to the Department as instructed in the form. It is the students’ responsibility to ensure that the filled out form arrives in the Department.

Application procedure explained above is summarized in Appendix A.

## Summer Practice Period

Summer practice periods are determined/approved by the applied company. However, following criteria should be considered in determination of the practice period.

1. Summer practice periods should be at least 20 days each.
2. The practice period is uninterruptable, except for the weekends and official holidays. The period cannot be divided into sub-periods.
3. The practice period only includes weekdays. That is, it excludes weekends, even if the company is active on the weekends.

During the practice period, the students must obey all of the regulations set by the company. In addition, disciplinary regulations of the University are applicable during the practice period.

## Summer Practice Report

Students should submit summer practice reports upon completion of ME 200 – Summer Practice I, ME 300 – Summer Practice II. The reports must be written in English and free of spelling, typing or grammatical errors. The reports are graded considering style, format, organization of the report as well as the technical information provided. Therefore, the students must care about the style, format, and organization of the report.

* + 1. **Report Style**

The report can be prepared using any standard text editor (MS Word, OpenOffice etc.). The reports should be written using A4 size paper with 3 mm left, 2.5 mm top, 2.5 mm bottom, and 2.5 mm right side margins. For the body of the report, Times New Roman should be used with a font size of 12 and 1.5-line spacing. Any other basic font (Ariel, Verdana etc.) can also be used. Use of ornamental or script typefaces must be avoided. Each chapter should start on a new page, while the sections of the chapter should continue on the same page. For the chapter and section (also sub-section if required) headings, the format should be uniform throughout the report. For instance, if 14 fonts size-Times New Roman bold typeface is used for one of the chapter headings, other chapter headings should have the same style. Each figure or table presented in the report should be referred in the text, preferably just before the figure or the table. In addition, each figure and table should have a proper descriptive caption. For instance, this statement exemplifies how to refer a table in a text (Table 1). Similarly in this statement Figure 1 is used to refer a figure in the text. Captions of Table 1 and Figure 1 should also be noted. The caption styles should also be uniform throughout the report. It is common to present table caption above the table, while figure captions below the figure as illustrated in the captions of Table 1 and Figure 1. If a figure or a table is not of ultimate importance, or it is inconvenient to present the figure or table inside the text (for instance due to its physical size), it may be considered to place the entity in the appendix. If appendices are used, they should be referred as well in the text. (e.g. the last statement of Section 2.4).

In addition to these details unnecessarily large empty spaces in a page, unnecessarily long “filling” texts (it is non-sense to provide unnecessary information) should be avoided in the text. Similarly, use of active clauses with subject pronouns should be avoided, unless it is absolutely necessary.

Students may use this document as a style template for their summer practice reports.

Table 1: Some coarse metric threads

|  |  |  |  |
| --- | --- | --- | --- |
| Size - Nominal Diameter(mm) | Pitch(mm) | Clearance Drill(mm) | Tap Drill(mm) |
| M 1.60 | 0.35 | 1.80 | 1.25 |
| M 2.00 | 0.40 | 2.40 | 1.60 |
| M 2.50 | 0.45 | 2.90 | 2.00 |



Figure 1: Mechanical Engineering Department logo

### Referencing and Plagiarism

According to Encyclopedia Britannica, plagiarism is defined as “the act of taking the writings of another person and passing them off as one’s own”. However, it is not only limited to writings, but also the ideas and works of others.

Referencing is the way to credit previous ideas and work (Please refer your ESR 101 lecture notes). Meanwhile, by referencing one does not only credit other’s works, but also credit his/her own work, by proving the awareness of the work done so far on the subject.

Plagiarism is a matter of honesty and commonly perceived as fraud. Therefore, great care should be taken to cite previous works and ideas by using a suitable referencing style. The style used in the report, should not cause any ambiguity. There are various referencing style published. Citations should be very clear and meticulously selected.

In ME summer practice reports, do not use footnotes for referencing. Instead, present the references as a separate list at the end of the main body. Use IEEE citation style throughout the report (Please refer IEEE citation guide for referencing style available in <http://www.ieee.org/documents/ieeecitationref.pdf>). For the documents posted on a web site, note the last access date in the citation. For instance:

[1] Multiphysics Modeling and Simulation Software COMSOL, Last access date: 20 May 2012. Available from: <http://www.comsol.com>.

Also for the web sites, be sure that you write down the full URL of the document (e.g. <http://me.cankaya.edu.tr/Underg_Courses.htm#Mechanical_Engineering_Department_offers_4-year_undergraduate_program> instead of [http://me.cankaya.edu.tr](http://me.cankaya.edu.tr/)).

### Content of the Reports

Summer practice report is a technical report. Therefore a technical language should be preferred instead of a literary language. In addition, great care must be given for referencing of others’ works as stated in the previous section. The report should be organized as follows.

1. Title Page (Use the title page in Appendix E as the template)
2. Table of Contents (with the page numbers included)
3. Table of Figures (with the page numbers included)
4. Statement of Plagiarism
5. Introduction
6. Analysis (details of this item are presented in the next chapter of this document)
7. Conclusion
8. References
9. Appendices (if required)

Excluding the title page, the pages up to “Introduction” should be numbered in Roman numerals as i, ii, iii etc. Starting from the “Introduction” all remaining pages should be numbered in Arabic numerals starting from 1. All page numbers should be centered at the footer of the page.

### Submission and Evaluation of the Reports

After completion of the report, electronic copy of the report should be uploaded first to relevant directories in ME 200/300 page on webonline.cankaya.edu.tr as pdf and MS Word files. The files should not be zipped or password protected. File names should include information about the student and the code of the summer practice such as 201115001\_ME200.pdf and 201115001\_ME200.docx. Also electronic copies should be given in a CD with the report. In addition to the electronic copies, printed and filed copies of the reports should be submitted to summer practice coordinator before the deadlines announced by the Department.

After electronic copies are uploaded, the reports are checked against plagiarism using plagiarism checking tools. If an unreferenced or incorrectly referenced match is detected, the report will not be evaluated and the student will directly get U – Unsatisfactory from the summer practice. In addition, disciplinary action will be taken. Otherwise, the report is directed to the evaluator by the summer practice coordinator. The evaluator evaluates and grades the summer practice by filling in the *Grading Form* (Appendix F). Here, the evaluator considers the format and content of the report, and evaluation of the practice supervisor. If the student satisfies the minimum requirements noted in the Grading Form, he/she will get S – Satisfactory. Otherwise, he/she will get U – Unsatisfactory. However, the evaluator may consider to return and unsatisfactory report back to the student for revision. After the revision, the evaluator evaluates the report once more and decides on the final grade as S or U. If the report is still unsatisfactory, it will not be returned back to the students for a second revision. Final grades decided by the evaluators are sent to the summer practice coordinator. Grades are announced by the coordinator on [the web site of the department](http://me.cankaya.edu.tr/).

Details about the analysis section of the summer practice reports are explained in the following chapter.

# ANALYSIS SECTION OF SUMMER PRACTICE REPORTS

Although style, format, and organization of the summer practice reports are crucial for presenting the technical content, the content itself has the highest weight in grading. In this chapter, technical contents of summer practice reports are explained.

## Analysis Section of ME 200 Report

ME 200 – Summer Practice I aims to make the students observe the applications of the knowledge gained in first four semesters in a company or plant. Therefore, the practice should focus on the production in the company, manufacturing processes and manufacturing support systems in the company. Accordingly, “Analysis” chapter of the report (please refer Section 2.6.3) should include the following.

1. Information about the company (Full name and address of the company, history, main activities, main products, organizational structure and duties of each section/department, duties of the mechanical engineers, employment data including number of white- and blue-collar personnel)
2. Description of the products
3. Machine and machine tools used in manufacturing (number and technical properties). Technical details will be given only for main machine groups (At least 5 groups). Machine tool representing the group will be explained in detail. Structure, layout, working principles, and technical specifications should be explained. Copy of the information from the website is not acceptable
4. Production type (job shop, flow line, cellular etc.) and production quantity
5. Describe Computer Aided Drawing / Design/ Engineering /Manufacturing software used in the company with brief explanations and related hardware (workstations, CNC machines, etc). Describe Computer usage in Assembly and Management (production, inventory, cost, personal, configuration, revision).
6. Automation in the company (if not existing, possible ways of automation should be discussed)
7. Supporting facilities in the company (air conditioning, waste treatment etc.)
8. Material handling and storage (material handling devices such as forklifts, cranes, conveyors, shelves, racks, automated vehicles etc.) in the company. Objectives and operational principles of the handling devices and their contributions in the facility.
9. Quality management plan, quality assurance and quality control system, and standards and certificates of the company. Explanation of the quality management system for a selected part, product.
10. Maintenance of the machines/systems in the company (Periodical maintenance and repair principles, basics and schedules of the company for the whole systems available in the company).
11. Occupational health and safety practices in the company
12. General assessment of the summer practice, benefits, special situations, observed problems, identified and proposed solutions, and recommendations for the future, the major occupational benefits obtained.
13. Engineering drawings of two selected major parts/products manufactured in the company. All the technical drawings (detailed/working) will be drawn in 3D and 2D by the student using Inventor or Autocad. The drawing printout must be given in appendix and also the source file (idw or .dwg) shall be given with the CD.
14. Detailed description of the manufacturing processes involved in manufacturing of these selected parts. Draw manufacturing flow chart for both parts.

## Analysis Section of ME 300 Report

In ME 300 Summer Practice II, students are expected to gather information about management of the production system, and observe the approaches to real-life problems. Support systems in the production environment, including managerial and design functions should also be analyzed. In addition, the students are expected to identify a mechanical engineering problem in the company, analyze the problem and propose a solution for the problem as a part of the summer practice. Depending on the type of practice facility, namely factory and power plant, “Analysis” chapter of the report (please refer Section 2.6.3) will be different in content, as explained below.

**3.2.1. Analysis Section for Practice in a Factory:**

1. Information about the company (Full name and address of the company, history, main activities, main products, organizational structure and duties of each section/department, duties of the mechanical engineers, employment data including number of white- and blue-collar personnel).
2. Description of the products.
3. Production type (job shop, flow line, cellular etc.) and production quantity.
4. Machine and machine tools used in manufacturing (number and technical properties). Technical details will be given only for main machine groups (At least 5 groups). Machine tool representing the group will be explained in detail. Structure, layout, working principles, and technical specifications should be explained. Copy of the information from the website is not acceptable
5. Product design/development, process planning, research and development (R&D) activities in the company (if not applicable, discuss the reasons and effects).
6. Computer usage in manufacturing and manufacturing support systems (software).
7. Automation in the company (if not existing, possible ways of automation should be discussed).
8. Supporting facilities in the company (air conditioning, waste treatment etc.).
9. Location and layout of the company (reasons affecting the selection of the current location, block layout of the plant and detail layout of a section/department, reasons affecting the layout).
10. Quality assurance and control systems in the company.
11. Maintenance of the machines/systems in the company (calibration tools, maintenance periods, policies in maintenance should be discussed in detail).
12. Occupational health and safety practices in the company.
13. Detailed engineering analyses of two products (assemblies or subassemblies) manufactured in the company.
    1. 3D Engineering drawings of the two products. The drawing printouts must be given in appendix and also the source file (.idw Inventor or .dwg-Autocad) shall be given with the CD.
    2. Process flow of the two products, from raw material to finished good (process flow diagram), and any possible improvements in the processes or the flow.
    3. Cost analysis of the two products.
14. Identification and analysis of a mechanical engineering problem in the company, proposal of a solution. There should be a special focus on this issue. The problem and the proposed solution must be reported in detail.

**3.2.2. Analysis Section for Practice in a Power Plant:**

1. Information about the power plant (Full name and address of the plant, history, main activities, main products, organizational structure and duties of each section/department, duties of the mechanical engineers, employment data including number of white- and blue-collar personnel).
2. An assessment of the site plan.
3. Description of the energy production systems.
   1. Source of energy (e.g. hydraulic, thermal, nuclear, etc., a complete analysis of the source in terms of its quality, capacity, efficiency and availability).
   2. Power, annual energy production.
   3. Description and assessment of each unit (e.g. turbines, boilers, control units, generators, electric distribution units, etc.).
   4. Assessment of raw material storage facilities (e.g. storage and transportation of coal, fuel- oil and water, flow rate etc.).
   5. Assessment of safety rules and practices.
   6. Production planning.
4. Usage of software in management and production. Software used should be described.
5. Assessment of automation level in the plant (if not existed possible ways of automation should be discussed).
6. Assessment of safety and control systems used in the plant.
7. Cost analysis (unit cost of produced energy).
8. An assessment of the future development plans of the plant.
9. A study of the plants share in environmental pollution and of preventive measures taken.
10. Research and development (R&D) activities in the company (if not applicable, discuss the reasons and effects).
11. Supporting facilities in the company (air conditioning, waste treatment etc.).
12. Maintenance of the machines/systems in the company (maintenance periods, policies in maintenance should be discussed in detail).
13. Detailed engineering analyses of the plant in terms of efficiency and power, and comparison with other types of power plants.
    1. Power cycle should be analyzed using theoretical and measured temperature, pressure, etc. data.
    2. Power and efficiency of the power plant should be calculated and compared with the measured values.
    3. Power and efficiency of the plant should be compared with similar or other types of power plants type of other plants.
14. Identification and analysis of a mechanical engineering problem in the power plant, proposal of a solution. There should be a special focus on this issue. The problem and the proposed solution must be reported in detail.

**3.2.3. Analysis Section for Practice in Design, R/D and Consulting Offices:**

1. Information about the company (Full name and address of the company, history, main activities, main products, organizational structure and duties of each section/department, duties of the mechanical engineers, employment data including number of white- and blue-collar personnel).
2. An overview of the projects and the company structure, in conjunction with the position of the firm in the domestic and foreign markets, and the overall of the firm with the world markets.
3. Machine and machine tools used in prototyping (number and technical properties). Structure, layout, working principles, and technical specifications should be explained. (Copy of the information from the website is not acceptable).
4. Product design/development, process planning, research and development (R&D) activities in the company.
5. Usage of software by the company. Explain each software about where and for what purpose it is used.
6. Level of automation in the firm should be described.
7. Quality assurance and control systems in the company. Explain quality management system and the quality certificates of the company.
8. Maintenance of the equipment/systems in the company (calibration tools, maintenance periods, policies in maintenance should be discussed in detail).
9. Occupational health and safety practices in the company.
10. Process flow of the projects in the firm, from customer requirements, through all design steps (literature survey, conceptual design, embodiment design, detailed design), till end of design verification through testing of prototype systems. Implementation for each step should be explained in detail.
11. Analyses of two projects applied in the company.
12. Description and analysis of two research, development or technology projects completed by the firm.
13. Cost analysis of the two projects.
14. A detailed explanation of the contribution of the student to a project during the summer practice including customer requirements, analysis and/or design. (Detailed calculations and 3D engineering drawings\* should be included in the appendix).
15. If there was no drawing in step 12 create 3D engineering drawings\* of two subassemblies from the two projects described in step 11.

\*The drawing printouts must be given in appendix and also the source file (.idw or .dwg) shall be given with the CD).

# CONCLUSION

This document is prepared to provide a guideline for ME students who will perform ME 200 and ME 300 summer practices. Brief descriptions of each summer practice are presented. Prerequisites and periods of each summer practice are stated. In addition to these, application procedure, report format and content and evaluation-grading procedure are explained in details. Any other information about the summer practices are announced on [the web site of the department](http://me.cankaya.edu.tr/). Students who are performing their summer practices or who are willing to perform the practices should regularly follow the web site of the department for up-to-date information. In addition, the students may contact summer practice coordinator of the department for further details.