GUIDELINE FOR PREPARATION OF B.Tech SEMINAR/PROJECT REPORT

(Formats prepared for MS Word document)

Size: A4, Soft binding, Double side printing

1. Cover page
2. Front page (see attached format/sample)
3. Certificate
4. Declaration (for originality) (see attached format) (no page numbers to be displayed till declaration page).
5. Acknowledgements (one page maximum). Start showing page numbers from thispage onwards starting from '*i*' (Roman numerals, italics)
6. Abstract: Abstract should give the outcome of the report, and highlight the insights and the new results and the implications. Provide four to five keywords related to the topic covered by the report towards the end of abstract. (Do not exceed 1 page.)
7. Contents (Chapter, Section and Sub-section headings and their page nos. are to be given). Before starting the chapters, show 'List of figures', 'List of tables', and 'List of abbreviations' as three first entries in the Contents. The last entry in the Table of contents (Contents) is 'References 'with its page number.

From acknowledgement to list of abbreviations (if present) use Roman numerals for page numbering (bottom centred and italicized).

8. List of Figures follows the table of contents.
9. List of Tables follows the List of Figures.
10. List of symbols and abbreviations follows the list of tables.
11. Start the first chapter with page numbering in to Indo-Arabic numerals (1, 2, 3,...etc), bottom centered. The page number in the first page in every chapter need not be shown.

Page Size: A4

Page numbering: Arabic numerals bottom centered.

Margin size: 25 mm on top and bottom, 30 mm on right and left.

Paragraph indentation 12.5mm (or ½ in)

Text: Font 12pt Times New Roman

Line spacing-1.5 lines

Paragraph: Begin paragraphs in the next line after headings. Leave a blank line before first paragraph in a chapter. Leave one blank line between paragraphs. Start paragraph without intend. No space to be left between section or sub-section headings.

Main Text in the report has to be classified into Chapters keeping the following points in mind:

I First Chapter should be titled '**Introduction**' which introduces the content of the report in a very short form, with chapter summaries towards the last paragraph. Preferably more than two pages. Introduction chapter states the importance of the subject. Last chapter should be titled '**Conclusions**'.

II Each chapter should be divided into **Sections, Sub-Sections, and Sub-sub-Sections** in the order of preference.

III **Figures, sketches, equations/expressions, and tables**, if any, are to be included at an appropriate place **immediately after** they have been referred in the text. (not before the they are introduced in the text).

IV **Conclusions**: Summarizes the learning acquired or insights obtained after reading the relevant literature, preparing the report, and presentation discussions during seminar.

V **References**: List of reference materials used or accessed for preparing the report alphabetically ordered with last name of first author and year.

Report content	Format
CHAPTER NAME	**14 Bold.** All capitals. No underline
1.1 SECTION HEADINGS	**12 Bold**. All capitals. No underline. Sections are to be numbered as 1.1, 1.2 ….. 2.1, 2.2 etc
1.1.1 Sub Section Headings	**12 Bold.** Running Capitals. Sub section headings are to be numbered as 1.1.1, 1.1.2… 1.2.1, 1.2.2 ….. 2.1.1, 2.1.2 …
1.1.1.1 Sub-sub Section Headings	**12 Bold.** Running Capitals. Sub-sub section headings are to be numbered as 1.1.1.1, 1.1.1.2…
Figures, sketches	Fig. no. and caption should be given **below** the fig. Serially numbered with chapter number prefix. (Eg.Figure 3.1, means first fig. in chapter 3)
Tables	Table no. and title are to be given **above** the table, horizontally centred. (Eg.Table 5.1, means first table in chapter 5)
Equations	Placed at **centre** of the line and numbered with chapter number prefix placed at the right end in the line. See the format given after this table
References	

$$A = \pi r^2 \qquad (4.1)$$

Reference formats

1. **Journal/conference/symposium papers:** Authors (Year (in bold)), Title of paper, Name of Journal/Conference/Symposium (in italics), Issue No. Pages.
2. **Books:** Author(s) (Year (Bold)), Book Title (in italics), Publisher, Edition.
3. **Websites:** Give complete web address for web references including date and time of access.
   Eg:.Author Name/ Organization 2012,
   http://www.tkmmech.net/research.aspx accessed on 31 July 2012 9.05 am

Citation to the referred articles, books and other resources have to be provided when and where theory, quotes or findings of theses references are used in the main text in the report. Citations have to be given in standard Harvard style (Author-year citation style).
For single author: Citation in running text by last name of the first author and year in braces.
For two authors: First author last name and second author last name and year in braces
For three or more authors: Last name of the first author et al. (year)

Eg: Two models/mechanisms explaining the effect of ultrasonic vibration on grain refinement have been proposed by Eskin (1998): cavitation-enhanced heterogeneous nucleation and dendrite fragmentation.
The efficiency of the grain refiner strongly depends on the Al alloy composition, namely the Si content, which determines the most suitable Ti/B ratio in the master alloy and the minimum Titanium concentration in the melt, as reported by Sritharan and Li (1997), which is often difficult to control.
Ultrasonic vibration can also be used to refine hypereutectic Al-Si alloys, as demonstrated by Feng et al. (2008), who obtained equiaxed α-Al crystals of around 40 μm and homogeneously distributed primary Si phase with average size of 180 μm in AlSi23 alloy.

Due to the characteristics mentioned above, Mg and Mg-based alloys are increasingly used for aerospace, automotive and nuclear applications (Emley, 1966).

Sample Reference List

Eskin, G. I. (**1998**). *Ultrasonic Treatment of Light Alloy Melts*, 1 ed., Gordon and Breach Science Publishers, Amsterdam.

Feng, H. K., Yu, S. R., Li, Y. L. and Gong, L. Y. (**2008**). Effect of ultrasonic treatment on microstructures of hypereutectic Al-Si alloy, *Journal of Materials Processing Technology,* 208, 330-335.

Sritharan, T. and Li, H. (**1997**). Influence of titanium to boron ratio on the ability to grain refine aluminium-silicon alloys, *Journal of Materials Processing Technology,* 63, 585-589.

Format of Cover Page and Front page

TITLE

*(**16 Bold** all capitals . Times new Roman)*

SEMINAR REPORT

(14 Regular all capitals)

submitted by

(12pt Regular lower case letters)

NAME

(14 Bold all capitals)

University Registration Number

(12 Bold)

to

the University of Kerala

in partial fulfillment of the requirements for the award of B.Tech Degree in Mechanical Engineering. (12pt. italic)

(EMBLEM)

Department of Mechanical Engineering

(14 Bold, leading capitals)

T.K.M. College of Engineering, Kollam

Month & Year

(14 Regular)

Format of Certificate

DEPARTMENT OF MECHANICAL ENGINEERING
T.K.M COLLEGE OF ENGINEERING, KOLLAM
(14-Bold)

(EMBLEM)

CERTIFICATE (14 Bold)

Certified that this report entitled '*Title in Italics'* is the report of project/seminar presented by **Name, Roll No.** (in **Bold**) during **year-year** (in **Bold)** in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Mechanical Engineering of the University of Kerala.

(Name and Signature of Guide (s))
Designation
Dept. of Mechanical Engineering
TKM College of Engineering, Kollam

(Name and Signature of Project Coordinator)
Designation
Dept. of Mechanical Engineering
TKM College of Engineering, Kollam

(Name and Signature)
Head of the Department
Dept. of Mechanical Engg.
TKM College of Engg, Kollam.

Sample -Declaration

DECLARATION

I, …… (name of student) hereby declare that, this project report entitled……is the bonafide work of mine carried out under the supervision of ……..…….. (name, designation and official address of guide (s)). I declare that, to the best of my knowledge, the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion to any other candidate. The content of this report is not being presented by any other student to this or any other University for the award of a degree.

Signature:
Name of the Student.:
Uni. Register No:……..….. of year …….

Signature(s):
Name of Guide(s):

Countersigned with Name:
Head, Department of Mechanical Engineering
TKM College of Engineering, Kollam. Date:…../…../……

Sample -Acknowledgements

ACKNOWLEDGEMENTS

I take this opportunity to express my deep sense of gratitude and sincere thanks to all who helped me to complete the project successfully.

I am deeply indebted to my guide **Name**,..... Professor, Department of Mechanical Engineering for his excellent guidance, positive criticism and valuable comments. I am greatly thankful to **Name**, Head of Mechanical Engineering Department for his support and cooperation.

Finally I thank my parents and friends near and dear ones who directly and indirectly contributed to the successful completion of my project.

(Name of Student)

Place:

Date:

Sample -Abstract

ABSTRACT

As the lightest structural metal, Mg and Mg-based alloys have great potential applications in the aerospace, automotive and nuclear industries. However, such applications have been limited by low ductility and strength. Theoretically, small grain sized structure can synchronously improve its ductility and strength. Yet, universally reliable grain refinement techniques for the magnesium alloys are still under investigation and some are in strong debating. This paper presents a brief review of development of grain refinement methods for magnesium alloys, which would contribute to a better understanding of the factors controlling grain refinement and provide an outlook of future research in this field.

Key words: Magnesium alloy; grain refinement; microstructure

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CHAPTER 1

INTRODUCTION

Magnesium is the lightest structural metal with a density of only 1.738 g/cm3 at 20℃. For engineering applications, magnesium is usually strengthened by alloying mechanism; it can be alloyed with other alloying elements such as aluminum, zinc, manganese, zirconium and rare earth (Friedrich and Mordike, 2006). Besides the low density, Mg and Mg-based alloys also have other attractive properties, such as an excellent damping capacity and good electromagnetic shielding. Moreover they have good castability and machinability, and potential for availability because of its wide distribution in the Earth's crust and sea. Due to the characteristics mentioned above, Mg and Mg-based alloys are increasingly used for aerospace, automotive and nuclear applications (Emley, 1966). However, due to the hexagonal close packed crystal structure (a=0.32092 nm and c=0.52105 nm at room temperature), it has low (only two basal) independent slip systems (Dahle et al., 2001). At the room temperature, the low ductility and high degree of anisotropy in mechanical properties significantly limit their formability.

1.1 GRAIN SIZE DEPENDENCE OF THE YIELD STRESS

Although Mg-based alloys have outstanding strength/weight ratio, the important disadvantages of Mg alloys are low strength and low ductility compared with the other competitive structural materials such as Al and steel. It is well known that a finer grain size may contribute synchronously to the
strength and ductility. The grain size dependence of the yield stress (and tensile strength) can be expressed through the classical Hall-Petch relationship:

$$\sigma_{yd} = \sigma_0 + K_y d^{-\frac{1}{2}} \tag{1.1}$$

Where d is the average grain diameter, σ_0 is a constant and K_y is the stress intensity factor for plastic yielding. For Mg and Mg-based alloys, the value of K_y is about 210 $MPa \cdot \mu m^{1/2}$ and depends on temperature, structure, composition and preparation (Friedrich and Mordike, 2006). Therefore, grain refinement is an effective method for improving the mechanical properties of Mg-based alloy and can significantly extend the applications of Mg-based alloys. As a result, the grain refinement of Mg-Al based alloys has been an active research topic over several decades

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2.2.1 Grain Refiners

Information on commercially available grain refiners is summarized in Table 2.1. The most commonly used alloy is Al-5Ti-1B but recent studies show that some of the dilute alloys can be equally effective.

Table 2.1 Commercially Available Grain Refining Alloys

Alloy type	Composition
Al-Ti	Al-10Ti, Al-6Ti
Al-Ti-B	Al-3Ti-1B, Al-5Ti-1B, Al-5Ti-0.6B, Al-3Ti-0.2B, Al-5Ti-1B, Al-5Ti-0.2B, Al-10Ti-0.4B, Al-1.6Ti-1.4B (TiBloy for hypoeutectic Al-Si alloys), Al-1.2Ti-0.5B (Hydloy), Al-3Ti-3B, Al-1Ti-3B
Al-B	Al-10B, Al-5B, Al-3B, Al-10Sr-2B, Strobloyä, (Al-10Sr-1.6Ti-1.4B)
Al-Ti-C	Al-6Ti-0.02C, Al-3Ti-0.15C
Al-Sc	Al-1Sc, Al-2Sc
Mg-Zr	AM cast (Mg-25Zr), Zirmax (Mg-33.3Zr)

Moreover, Lee et al. (2000) proposed that the significant grain refinement of Zr addition for pure magnesium is mainly caused by its high growth restriction effect during solidification. But the fact is that at least one Zr-rich core was found in almost each grain of alloy with high Zr addition (0.40% and 0.51%) (shown in Fig. 2.1) and no such cores were found in the alloy with a low Zr addition (0.21%) in Mg-9Gd-4Y alloy (Peng et al., 2005)

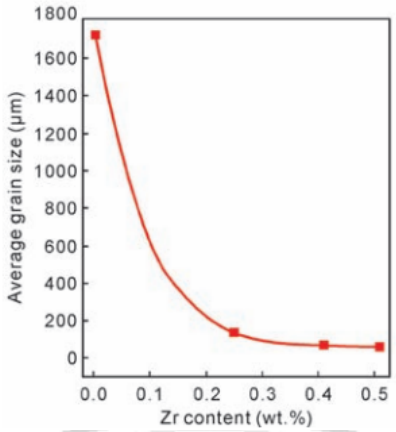

Fig.2.1 Grain size of Mg-9Gd-4Y alloys as function of zirconium (Peng et al., 2005)

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REFERENCES

Dahle, A. K., Lee, Y. C. and Nave, M. D. (**2001**). Development of the ascast microstructure in magnesium-aluminum alloys, *Journal of Light Metals*, 1(1), 61-72.

Emley, E. F. (**1966**) *Principles of Magnesium Technology*. Oxford: Pergamon Press Ltd. U.K.

Friedrich, H. E. and Mordike, B. L. (**2006**). *Magnesium Technology (Metallurgy, Design Data, Applications)*. Springer –Verlag, Berlin Heidelberg.

Lee, Y, C., Dahle, A. K. and St.John, D. H. (**2000**). The role of solute in grain refinement of magnesium, *Metallurgical and Materials Transactions, A (Physical Metallurgy and Materials Science)*, 31(11), 2895-2906.

Peng, Z. K., Zhang, X. M., Chen, J. M., Xiao, Y. and Jiang, H. (**2005**). Grain refining mechanism in Mg-9Gd-4Y alloys by zirconium, *Materials Science and Technology*, 21(6), 722-726.