

Format Requirements for Master's Thesis

The thesis format requirements documented here are required for all final copies of an MSME thesis. Any thesis not following these guidelines will be rejected and your graduation date may be jeopardized. Please save yourself and your advisor time and trouble by strictly following these format guidelines for all versions of your thesis.

General Thesis Format Requirements

Paper – Final version for binding - Paper must be 16- or 20-lb quality bond paper, with a minimum of 25% cotton content. Paper should be white, not off-white or ivory. When printing, make sure that the watermark is right side up. Copies printed out on the department copy machine are unacceptable. Copies must be produced on high-quality paper by graphic services or at Kinkos at student expense.

Margins – Minimum margins are required to ensure that your thesis is readable when bound, and that it may be photocopied or archived on microfilm. Minimum margins are 1.5 inches on the left side of the page and 1.0 inch on the other edges. You are encouraged to increase these minimum margin requirements by 0.1 inch to be on the safe side. Note that the page number should be no more than 0.5 inch from any edge.

Paragraph Format – Use double spacing. Justify all paragraphs to both left and right margins to create a clean look. Indent the first line of every paragraph.

Font – Use 12 point font for all text. Use a standard font such as Times New Roman.

Headings – Headings for chapters and subsections must be standard in format throughout the thesis. Use boldface, underlining, indentation, and capitalization for emphasis. Chapter titles should appear at the top center of the first page of the chapter.

Page Numbers – For the main text, number all pages beginning with the first page of the first chapter. The page number should be centered at the bottom of the page. All page numbers should be oriented the same, even for landscape pages. Appendices should also have page numbers, and should be numbered by continuation after that last chapter, or by using a separate set of page numbers for each appendix (A-1, A-2, A-3, etc. for Appendix A; B-1, B-2, B-3, etc. for Appendix B; etc.). All introductory material, except for the title and signature pages (and dedication page if included), should also be given a page number in lower case roman numerals at the bottom center of the page (for all pages). Begin with the Acknowledgements page, but include the other pages in the count (The Acknowledgements page should thus be either page iii or page iv).

Figures and Tables - Figures and tables are an integral part of your thesis. Be sure that formatting is neat and consistent. For figures, use only high-quality digital photographs and neat drawings (generally an AutoCAD or MS Office drawing). For tables, use bordering for emphasis as appropriate. Make sure that all text in tables and figures is legible. Work tables and figures into the text; do not group them at the end of a chapter. All figures and tables should be captioned and numbered using a chapter number-figure number format such as Table 4.6 or Figure 3-2. Table captions should be placed above the table, while figure captions should be placed below the table.

Organization of the Thesis

The thesis should generally consist of the following sections, arranged in the order listed. A sample of all elements appears at the end of this Appendix.

Title Page – The key elements of the title page include the title, department, degree, student name, and if desired, the copyright.

Signature Page – The signature page should include the title of your thesis, your name, and space at the bottom of the page for the signatures of your Thesis Advisor, the Mechanical Engineering Department Chair, and the Dean of the College of Engineering.

Dedication Page – This page is optional. If desired, you may dedicate your work to an individual who is important in your life, such as a spouse, child or parents.

Acknowledgements – This page is optional. If desired, you may acknowledge those who assisted and supported you in the completion of your thesis, such as your advisor, the faculty, your sponsoring agency if applicable, your fellow graduate students, the shop personnel and your family.

Abstract – The abstract should be a concise summary of the work presented in your thesis. It should summarize what you did and the major conclusions. Only key details which explain the constraints of the work should be included. This section is limited to one page.

Table of Contents – The table of contents should list chapter titles and subheadings, with page numbers right justified. A series of dots or blank space may be used between the listed heading and the page number corresponding to it. All introductory material (prior to the main body of the text) should also be listed in the table of contents using lower case roman numerals.

List of Tables – In a format similar to the table of contents, list all tables and corresponding page numbers.

List of Figures – In a format similar to the table of contents, list all figures and corresponding page numbers.

Nomenclature – In table format list all variable and abbreviations used in the text. Provide three columns with the variable, its meaning, and its units. Place all variables in alphabetized order with English variables first from a - z, followed by Greek variables from alpha - omega. Following all variables you may provide a list of variable subscripts if necessary.

Text (Main Body) – This section should be broken down into as many subheadings as necessary. Common subheadings include:

Introduction: Lay out the premise of your topic and some general background.

Literature Review: Provide an overview of all prior work published on this topic and place your own work in context of the existing work. This section is commonly concluded with a concise statement of the work done for this thesis noting the uniqueness of the work in context of the existing work on the topic.

Experimental Equipment and Method (or Computational Methods, or Analytical Basis): Describes how the thesis work was completed with enough details for any

researcher to read this section and be able to duplicate the work for verification of your data and conclusions. This is commonly broken down into many subsections.

Discussion of Results: This section contains the presentation and discussion of your results. This commonly includes many tables and graphs, and presents the basis for all the conclusions drawn from your work. This is commonly broken down into many subsections.

Conclusions: This section concisely summarizes all the main conclusions presented in the Discussion of Results. No new data or new conclusions should be presented here. This is simply a summary section for the convenience of the reader.

Future Work: This section proposes new work based on your thesis. What new ideas have you developed and where would you take this work in the future if you could continue it?

References – List references in a standardized format. The format used by the American Society of Mechanical Engineers is encouraged since it will make it easier to adapt your thesis into a journal article at a later date. This standard is detailed below and is available at the ASME website.

(http://www.asme.org/Publications/ConfProceedings/Author/References_2.cfm)

Within the text, references should be cited in numerical order according to their order of appearance. The numbered reference citation should be enclosed in brackets. *Example: It was shown by Prusa [1] that the width of the plume decreases under these conditions.* In the case of two citations, the numbers should be separated by a comma [1,2]. In the case of more than two reference citations, the numbers should be separated by a dash [5-7]. References to cited material should be listed together at the end of the paper. References should be arranged in numerical order according to their order of appearance within the text.

Reference to journal articles and papers in serial publications should include:

- last name of each author followed by their initials
- year of publication
- full title of the cited article in quotes, title capitalization
- full name of the publication in which it appears
- volume number (if any) in boldface (Do not include the abbreviation, "Vol.")
- issue number (if any) in parentheses (Do not include the abbreviation, "No.")
- inclusive page numbers of the cited article (include "pp.")

Reference to textbooks and monographs should include:

- last name of each author followed by their initials
- year of publication
- full title of the publication in italics
- publisher
- city of publication
- inclusive page numbers of the work being cited (include "pp.")
- chapter number (if any) at the end of the citation following the abbreviation, "Chap."

Reference to individual conference papers, papers in compiled conference proceedings, or any other collection of works by numerous authors should include:

- last name of each author followed by their initials
- year of publication

- full title of the cited paper in quotes, title capitalization
- individual paper number (if any)
- full title of the publication in italics
- initials followed by last name of editors (if any), followed by the abbreviation, “eds.”
- publisher
- city of publication
- volume number (if any) in boldface if a single number, include, “Vol.” if part of larger identifier (e.g., “PVP-Vol. 254”)
- inclusive page numbers of the work being cited (include “pp.”)

Reference to theses and technical reports should include:

- last name of each author followed by their initials
- year of publication
- full title in quotes, title capitalization
- report number (if any)
- publisher or institution name, city

Sample References:

- [1] Ning, X., and Lovell, M. R., 2002, “On the Sliding Friction Characteristics of Unidirectional Continuous FRP Composites,” *ASME J. Tribol.*, 124(1), pp. 5-13.
- [2] Barnes, M., 2001, “Stresses in Solenoids,” *J. Appl. Phys.*, 48(5), pp. 2000–2008.
- [3] Jones, J., 2000, *Contact Mechanics*, Cambridge University Press, Cambridge, UK, Chap. 6.
- [4] Lee, Y., Korpela, S. A., and Horne, R. N., 1982, “Structure of Multi-Cellular Natural Convection in a Tall Vertical Annulus,” *Proc. 7th International Heat Transfer Conference*, U. Grigul et al., eds., Hemisphere, Washington, DC, 2, pp. 221–226.
- [5] Watson, D. W., 1997, “Thermodynamic Analysis,” ASME Paper No. 97-GT-288.
- [6] Tung, C. Y., 1982, “Evaporative Heat Transfer in the Contact Line of a Mixture,” Ph.D. thesis, Rensselaer Polytechnic Institute, Troy, NY.
- [7] Smith, R., 2002, “Conformal Lubricated Contact of Cylindrical Surfaces Involved in a Non-Steady Motion,” Ph.D. thesis, <http://www.cas.phys.unm.edu/rsmith/homepage.html>

Appendices – Use as many appendices as are necessary and appropriate for your work (after consulting with your thesis advisor). Appendices commonly include such things as Sample Data Files, Computer Programs, Sample Data Reduction, Details of Error Analysis, etc. Label appendices by letter (Appendix A, Appendix B, etc.)

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Your thesis is a permanent archive of your work, and will be available for others to use in future study. A copy will be available in the reference section of Falvey Library. If you choose to copyright your thesis, you must fill out necessary forms with the Library of Congress. Placing the copyright on the first page gives you that option.

Sample Thesis Sections

The following pages include general samples of a properly formatted thesis.

**AN EXPERIMENTAL STUDY INTO THE EFFECT OF JET VELOCITY ON
IMPINGEMENT HEAT TRANSFER FROM POROUS ALUMINUM FOAM**

A Thesis

Presented to

The Faculty of the Department of Mechanical Engineering

Villanova University

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Science in Mechanical Engineering

by

Jane Smith

May 2009

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**AN EXPERIMENTAL STUDY INTO THE EFFECT OF JET VELOCITY ON
IMPINGEMENT HEAT TRANSFER FROM POROUS ALUMINUM FOAM**

by

Jane Smith

May 2009

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Date

Dedication

This thesis is dedicated to my parents, whose support helped to make this work possible.

Jane Smith

May 2009

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I graciously thank my advisor Dr. Katie Brown whose wisdom, guidance and faith in me saw me through the steps of graduation. I would also like to thank her for giving me the opportunity to work with her and also for her help and support during the past two years. I am grateful to Dr. Sam Jones for his valuable suggestions and his timely help. I would also like to thank Mr. Joshua Smith for his help in setting up the apparatus.

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Jane Smith

May, 2009

ABSTRACT

**AN EXPERIMENTAL STUDY INTO THE EFFECT OF JET VELOCITY ON
IMPINGEMENT HEAT TRANSFER FROM POROUS ALUMINUM FOAM**

by

Jane Smith

Villanova University, 2009

THESIS ADVISOR: Dr. Amy S. Fleischer

This study examined.....

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NOMENCLATURE

A	Area	m^2
d	Jet Diameter	m
h	Heat Transfer Coefficient	W/m-K
k	Thermal Conductivity	W/m ² -K
L	Tube Length	m
Nu	Nusselt Number ($Nu=hd/k$)	Dimensionless
Re	Reynolds Number ($Re=Ud/\nu$)	Dimensionless
T	Temperature	K
λ	Vortex Spacing	m

1.0 INTRODUCTION

1.1 JET BASICS

Air jets provide an effective means for cooling surfaces of different geometry by increasing convective heat transfer. Jet impingement is one of the oldest and most attractive techniques of intensification of convective processes where convective heating, cooling, or drying is applied.

Jambunathan [1] described turbulent flow of an air jet impinging orthogonally on a plane surface dividing the jet into four zones. Continue the body of the thesis here.....