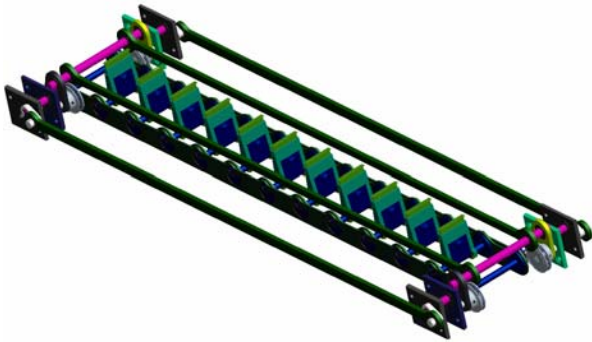


# MQP HANDBOOK

**MECHANICAL ENGINEERING  
DEPARTMENT**



## **THE STEPS TO A SUCCESSFUL MQP**

- What is expected from you
- Satisfying the Capstone Design Requirement
- Project Grading
- Sample Cover Pages and References

**FALL 2005**

# MAJOR QUALIFYING PROJECT HANDBOOK

## Introduction

The qualifying project in the major field of study should demonstrate application of the skills, methods, and knowledge of the discipline to the solution of a problem that would be representative of the type to be encountered in one's career. The project's content area should be carefully selected to complement the one's total educational program.

MQP activities encompass analysis, design, research and development, are experimental, numerical or theoretical, emphasize a particular sub-area of mechanical engineering, or combine aspects of several sub-areas. In many cases, MQP's involve capstone design activity.

# Mechanical Engineering Faculty Expectations for Major Qualifying Projects

The Faculty of the Mechanical Engineering Department endorses the following expectations for Major Qualifying Projects conducted under the auspices of the Department.

## **A. Students are expected to work in teams of at least 2 persons.**

In rare instances where logistics or extenuating circumstances result in the student working alone, the student will demonstrate that he/she has participated as a member of technical team within either a course format or other project based activities.

## **B. Students completing their MQP will have demonstrated the ability to communicate effectively.**

WPI requires that a project report be submitted through the Registrar's Office as part of meeting the MQP degree requirement. The Mechanical Engineering Faculty Advisor has responsibility for insuring the quality of that report. In addition the Faculty Advisor assumes the responsibility insuring that the project team orally presents the results of their project in an appropriate venue. Usually this venue is participation in the WPI Project Presentation Day in April. In other cases the students may give a formal oral presentation to a project sponsor

## **C. Students completing their MQP will have demonstrated an understanding of professional and ethical responsibility.**

The Project Advisor will insure that appropriate discussions of professional and ethical responsibility take place during the execution of the project.

## **D. Students completing their MQP will have demonstrated the ability to research and develop technical background that was not directly presented in their prior educational program.**

Students engaged in MQP activities are expected to demonstrate the skills that will enable them to engage in life-long learning.

**E. Students completing their MQP will have demonstrated a knowledge of contemporary issues.**

Student completing their MQP will demonstrated an understanding of the relationship between their project and contemporary engineering literature and issues.

**F. Students completing their MQP will have demonstrated the ability to use techniques, skills and modern engineering tools typical of current engineering practice.**

An appropriate MQP topic will require students to use techniques, skills and engineering tools that are typical of their first employment as a professional.

A few examples are computer aided design and manufacturing, finite element analysis, system simulation, modeling and experimental investigation.

**Use of the MQP to satisfy the Capstone Design Requirement**

In most cases the Major Qualifying Project may be used to satisfy the (1/3 unit) capstone design requirement. The Project Advisor may indicate that the student has met the capstone design requirement by checking the appropriate box on the MQP Completion of Degree Requirement form. If this box is checked, the Project Advisor certifies that the student has completed a major design project based upon knowledge and skills acquired in earlier course and project work and incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political. Furthermore the Project Advisor certifies that in the process of completing this project, the student has demonstrated the ability to design a system, component, or process to meet desired needs.

## WPI Faculty Motion on Project Grading

The Faculty of WPI have endorsed the following grading guidelines for project activity: (approved by Faculty on May 5, 1994)

1. Each term a student is registered for a project, the student receives a grade reflecting judgment of accomplishments for that term.
2. Upon completion of the project, students will receive an overall project grade. It is important to note that this grade reflects not only the final products of the project (e.g., results, reports, etc.), but also the **process** by which they were attained. No amount of last-minute effort should turn a mediocre project effort into an A.
3. The available grades and their interpretations are as follows:
  - **A:** a grade denoting a consistently excellent effort, and attaining the stated project goals.
  - **B:** a grade denoting a consistently good effort, and attaining the stated project goals.
  - **C:** a grade denoting an acceptable effort, and partially attaining the stated project goals.
  - **SP:** a grade denoting an effort sufficient for the granting of the credit for which the student is registered. This grade provides students with no feedback, and its use is discouraged except for circumstances in which the faculty member is unable to judge the quality of the work (yet can still determine that the granting of credit is appropriate).
  - **NAC:** a grade denoting an effort unacceptable for the credit for which the student is registered. Note that this grade is entered into the student's transcript.
  - **NR:** a grade denoting an effort insufficient for the credit for which the student is registered. This grade is appropriate when the project has not proceeded due to circumstances beyond the control of the student, or for project extensions which do not represent the full amount of credit for which the student is registered.

4. The results of a project should be such that an outside reviewer would reasonably deem the project as being worthy of the credit and grade given, based on evidence such as the project report.
  
5. In light of the above grading criteria, it is strongly suggested that a formal project proposal or contract be developed early in the project activity, so that all participants in the activity have a clear understanding of the project goals, and advisor and student expectations.

# Sample Cover Page

Each MQP report should have a Title Page that includes the project title, the name(s) of the author(s), the date of final approval (month and year), and the name(s) of the project advisor(s). The Project Office requires that you list three keywords pertaining to the project on the left side of the page, opposite the advisors' signatures. Careful thought should be given to the selection of an appropriate project title. A sample Title Page is included on the next page.

Text that appears in < > is specific to your project.

## Sample MQP Title Page

Project Number: <ME-XXX-0000>

<DESIGN AND ANALYSIS OF A MECHANICAL SYSTEM FOR XYZ>

A Major Qualifying Project Report

Submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

in Mechanical Engineering

by

<students names>

<student(s) signatures>

Date: <enter date of submission>

Approved:

< signature of major advisor >

Prof. <A. B. Jones>, Major Advisor

< signature of co-advisor >

Prof. <A. B. Smith>, Co-Advisor

Keywords:

1. cam design
2. tool chatter
3. torque sensor

# References

There are two common referencing formats. The major difference is how references are sited in the text material. The first uses numbers to identify the reference, the second uses author (year). The form of the reference in the list of references is similar for both formats.

**Format 1.** This format is taken from the ASME journals. There are other formats that may be used instead. Within the text, references should be cited in numerical order according to their order of appearance. The numbered reference citation within text should be enclosed in brackets.

*Example:* It was shown by Prusa [1] that the ...

In the case of two citations, the numbers should be separated by a comma [1,2]. In the case of more than two references, the numbers should be separated by a dash [5-7].

**Format 2.** This format is used by many journals including the Journal of Biomechanics.

*Example:* It was shown by Prusa (2000) that the ....

In the case of two citations the references should be separated by a “;” such as (Jones, 2000; Lee et al., 1982). Use “et al. in the text for more than 2 authors. All authors are cited in the list of references. In the list of references the order is similar to the ASME format shown on the last page of this document, however, usually a period follows the date and there are some differences in punctuation and capitalization. Refer to the Journal of Biomechanics or other similar journal for the details.

Web references always contain the date when they were cited. Further information on citations can be obtained from the library’s web page. <http://www.wpi.edu/Academics/Library/> Look under “Style Guidelines for Citations”.



**List of References.** References to original sources for cited material should be listed together at the end of the paper; footnotes should not be used for this purpose. References should be arranged in numerical order according to the sequence of citations within the text. Each reference should include the last name of each author followed by his initials.

(1) 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.")

(2) 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."

(3) 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.”)

(4) 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.
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- [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] Hashish, M., 2000, "600 MPa Waterjet Technology Development," *High Pressure Technology*, PVP-Vol. 406, pp. 135-140.
- [6] Watson, D. W., 1997, "Thermodynamic Analysis," ASME Paper No. 97-GT-288.
- [7] Tung, C. Y., 1982, "Evaporative Heat Transfer in the Contact Line of a Mixture," Ph.D. thesis, Rensselaer Polytechnic Institute, Troy, NY.
- [8] Kwon, O. K., and Pletcher, R. H., 1981, "Prediction of the Incompressible Flow Over A Rearward-Facing Step," Technical Report No. HTL-26, CFD-4, Iowa State Univ., Ames, IA.
- [9] 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>