

# Engineering Fundamentals

## ENG1101

### Writing Technical Reports

# Today's Agenda

- Example of a good report
- Report Writing
  - Sections
  - Format
  - Style
- Outline of design report

# As a Team...

- Go to the MTU Carbon Technology Center web page
  - [www.chem.mtu.edu/org/ctc](http://www.chem.mtu.edu/org/ctc)
- Click on the People link
- Open a Thesis/Dissertation from one of the past graduate students
- Identify the different parts of the report
- Each are excellent examples of a technical report

# Technical Report Sections

- Title Page
  - Name, Title, Organization (Class, Section # & Team #) & Date
  - Example in handout
- Table of Contents Page
  - Major Section Titles .....#
  - Appendix Letter & Title
- List of Tables & Figures Page
  - Figure #: Title .....#
  - Table #: Title .....#

# Examples

Table of Contents	Page
– Introduction .....	1
– Vehicle Design .....	2
– Vehicle Evaluation .....	4
– Conclusions .....	6
– Appendix A: Experimental Procedures for Spring Analysis	
– Appendix B: Preliminary Designs	

List of Tables & Figures	Page
– Figure 1: Force Data from Spring Analysis .....	3
– Table 1: Bill of Materials and Cost Analysis .....	4

# What did you find?

- Title Page and front matter
- Table of Contents
- List of Tables & Figures
- Executive Summary or Abstract
- Introduction
- Body of the Report
- Conclusions
- References
- Appendixes

# Technical Report Sections

(from Beer)

- Transmittal letter \*
- Covers and label \*
- Title Page
- Table of Contents
- List of Tables & Figures
- Executive Summary or Abstract
- Introduction
- Body of the Report
- Conclusions
- References
- Appendixes

\* Used for longer reports; not used in ENG1101

# Your Final Design Report

- **PURPOSE:** Document your design and describe its success or failure.
- **AUDIENCE:** ENG1101 instructors and next year's ENG1101 students.
- Refer to the design project handout.

# Technical Report Format

- Length: 4 pages or less (not including title page, table of contents, references, or appendices)
- Line spacing: space and a half
- Font: 12 pt, Times New Roman or equivalent
- Margins: 1" on each side
- Electronic Page Numbers in lower right-hand corner
- Minimum of one table and one figure within the main document (properly labeled and cited)

# Tables - REVIEW

XLF Experiments were conducted to see how car speed was affected by road grade and fuel rate. For these experiments, a tire pressure of 30 psig was used. The air temperature and air pressure were 70°F and 0.985 atm, respectively. For a full description of these experiments, see Appendix A.

The data show that speed increases with increasing fuel rate.

.....

*(insert table here)*

**Table 1:** Effect of Fuel Rate and Road Grade on Car Speed. (Car model = XLF, Tire pressure = 30 psig, Air Temp. = 70°F, Air pressure = 0.985 atm)

Road Grade (%)	Fuel Rate (gal/h)	Speed (mph)
0.00	1.00	38.2
	2.00	64.3
	3.00	81.0
	4.00	93.4
	5.00	99.2
5.00	1.00	32.2
	2.00	54.5
	3.00	68.4
	4.00	78.1
	5.00	84.8
10.00	1.00	25.8
	2.00	43.6
	3.00	54.7
	4.00	62.5
	5.00	67.8

# Figures - REVIEW

The data from these experiments can be found in Table 1. It can be seen that speed increases with increasing fuel rate....  
(insert table here)

Figure 1 is a graphical display of this data. It shows that the relationship between speed and fuel rate is non-linear. In addition, as road grade increases, the speed decreases. At a rate of 1 gal/h, there is approximately a 5 mph decrease in speed; while at 5 gal/h, there is approximately a 15 mph decrease in speed.

(insert Figure)

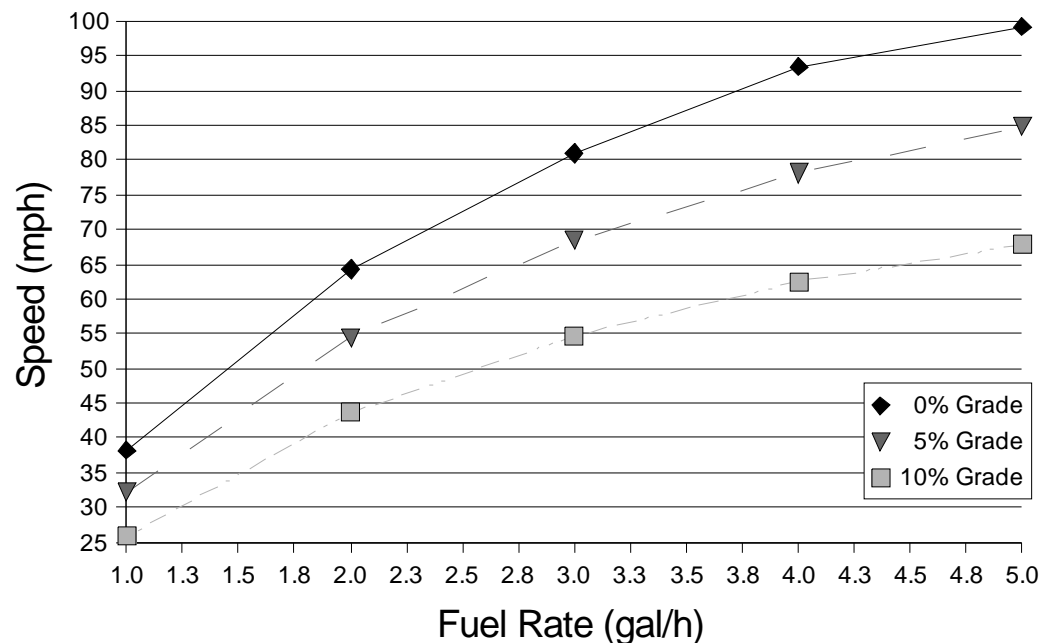


Figure 1: Effect of Fuel Rate and Road Grade.  
(Car model = XLF, Tire pressure = 30 psig, Air Temperature = 70°F, Air pressure = 0.985 atm)

# Technical Report Sections

- Introduction and Background
  - Final Design Description
  - Mathematical Model of Design
  - Pre-test and Competition Results
  - Recommendations
  - Conclusions
- 
- These sections no MORE than 4 pages total!

# References - REVIEW

(Beer, pg 234-241 or [www.ece.uiuc.edu/pubs/ref\\_guides/ieee.html](http://www.ece.uiuc.edu/pubs/ref_guides/ieee.html))

Fuel consumption was the major .... [1]. Other studies have shown that ..... [1,2]. In addition, as road grade increased, fuel consumption .... [3:112-120].

## References

[1] L.J. Fritz, "Fuel consumption of a Ford Escort," *Science News*, vol. 183 pp. 38-42, Feb. 25, 1995.

[2] M. Brass, .....

[3] "Road Grade," *Encyclopedia Britannica*, 1976, ed.

[4] .....

# Technical Report Sections

- References
  - Properly cited within text
  - Cite library and internet sources you used
  - Personal communication references (who you interviewed about previous designs)
- Appendices
  - Revised management plan/gantt chart
  - Concept sketches
  - Revised mathematical model of YOUR design

# Appendix

- Label using letter and title at TOP of page
  - **APPENDIX A:** Experimental Procedure for Determining Speed of Vehicle
  - **APPENDIX B:** Raw Data from Speed Testing
- First appendix cited in text is always Appendix A
- New documents should be in the next appendix
- Figures, Tables, etc. in Appendix should be numbered
  - Many times figures in appendix are labeled with letter
    - i.e. Figures in Appendix A are labeled Figure 1A: *Title*
- See Beer, pg. 139

# Example Appendix and Discussion

For these experiments, a tire pressure of 30 psig was used. The air temperature and air pressure were 70°F and 0.985 atm, respectively. For a full description of these experiments, see Appendix A. The data from these experiments is found in Table 1. The results show that speed increases with increasing fuel rate. Appendix B contains the raw data collected from these experiments.

**APPENDIX A:** Experimental procedure for determining vehicle speed while changing road grade and fuel rate.

Test Site: [REDACTED]

Equipment: [REDACTED]  
[REDACTED]

Procedure: [REDACTED]  
[REDACTED]

Data Collection: [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

# As a Team...

- Answer the following questions:
  - What specific topics should be discussed in each section?
  - Which sections will you need to cite references?
  - What is a meaningful figure to include? Where will it go?
  - What is a meaningful table to include? Where will it go?
  - In which sections will you be referencing your appendices (three are required)?
- Use your answers to develop a detailed outline of your report.

# Style and Audience

- Clear & Concise wording
  - Do not tell a story, "What I did for my design project."
- Write to a technical audience (instructor & other students)
- **Proof read your work more than once**
- See Beer, Chapter 3 for more on Style
- Review Active vs. Passive voice *Beer pg. 52-53*

# Are the following sentences written in active or passive voice?

- 1) The report was written by the engineer.
- 2) Figure 5 shows a mouse trap vehicle.
- 3) We determined the length of the string by using the laws of circular motion and our vehicle measurements.

# Are the following sentences written in active or passive voice?

1) The report was written by the engineer.

- Passive

2) Figure 5 shows a mouse trap vehicle.

- Active

3) We determined the length of the string by using the laws of circular motion and our vehicle measurements.

- Active

# Active vs. Passive

- **Active:** The engineer wrote the report.
- **Passive:** The report was written by the engineer.
- **Active:** Figure 5 shows a mouse trap vehicle.
- **Passive:** The mouse trap vehicle is found in Figure 5.
- **Active:** We determined the length of the string by using the laws of circular motion and our vehicle measurements.
- **Passive:** The laws of circular motion and vehicle measurement were used to determine the string length.

# Active vs. Passive Voice

- Some instructors want Passive voice
  - Active voice directly states that someone does something.  
*Our ENG1101 instructor gave us a design project.*
  - Passive voice emphasizes the recipient of the action.  
*A mouse trap vehicle design project was assigned.*