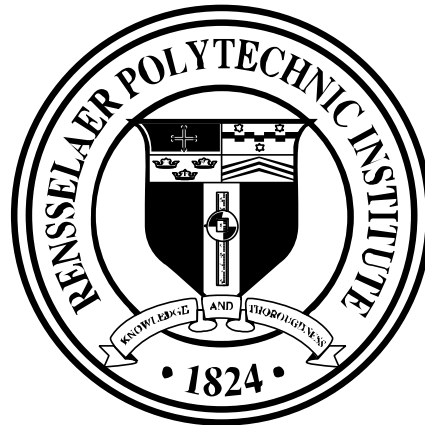


Technical Writing



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Materials based on lecture given by Jeff Morris, Ph.D., CORE Engineering

IED Grading

Major Element	Rubric	% Rubric Element	% Final Grade
Mini Project 25% of final grade	Competition	10%	2.5%
	Presentation	30%	7.5%
	Memo	60%	15.0%
		100%	25%
Team Project 50% of final grade * ICF	MS 1 - System Concept Presentation	20%	4.0%
	MS 2 - System Design Memo	40%	6.0%
	MS 2 - Design Presentation	100%	15.0%
	MS 3 - Design Review Presentation	40%	10.0%
	MS 3 - Design Review Report	60%	15.0%
	100%	50%	
Attendance 10% of final grade	Lectures		10.0%
	Classroom		
Quizzes 15% of final grade	On-line (LMS)		15.0%
			100%

36%

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I would rate my writing skills against my peers:

- A. Elite (Top 1%)
- B. Better Than Average (Top 30%)
- C. Average (Middle 30%)
- D. Lower 30%
- E. If it's over 160 characters, don't ask me to write

Outline

- 1. Purpose of Technical Writing**
- 2. Effective Technical Writing**
 - A. Context**
 - B. Organization**
 - C. Content**
 - D. Editing**

General Purposes

1. To provide the reader with **factual information**
 - Technical Reports, System Descriptions, Service Instructions
 - Remain as **concise** as possible, but explain ideas in **enough detail** to make it understandable to your reader.
 - For each new piece of information, tie it in to knowledge the reader already has.
2. To convince the reader to **draw the desired conclusions** from the provided information
 - Proposals, Recommendations
 - Remain **objective, logical** and provide **rational evidence** to back up assertions.
 - Answer the question “**Why?**” “Why is this important?” “Why is this beneficial?” “Why is this a problem?”

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In a technical report, it is okay to write the information so that the reader can interpret it based on their own perspective.

- A. True
- B. False

Context

Your goal: ensure that the ideas you have when writing are the same ideas that your **reader** has when reading.

Who will read your writing?

What do they **already know** about your subject?

What do they **need to know** about your subject?

What **relationship** exists between you and the reader?

Leave nothing open to interpretation!

This is not poetry.



Vagueness

- **Need specifics:** e.g., "*support load*" - what type of loading (point/distributed), how much force?
- How will you know what is too much or too little?
 - Is "*until it breaks or cracks*" acceptable?
 - "*very fast*" – 5 m/s or 100 mph?
- Which is it?
 - fast-sailing ship* (any ship) OR *fast sailing ship* (particular)

Organization

- One of the surest ways to confuse a reader is to have a poor organizational scheme
- Choose the organizational **method** based on the document being written and the information going into it

Chronological

- Usually used in describing processes or giving instructions.



Inductive

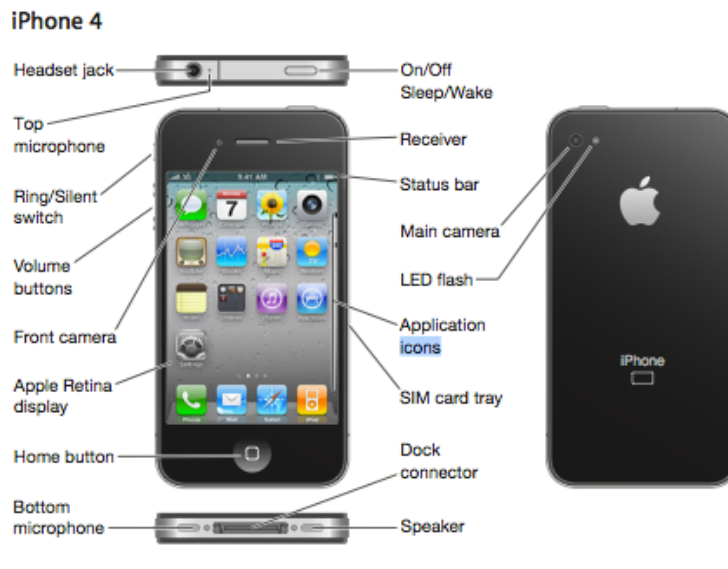
- Starts with the smaller ideas and build the larger ideas out of these smaller ones.



© CBS Productions, 2002

Deductive

- Starts with the larger ideas and break them down into smaller parts [4].



Organization

- Pattern 1
 - Motor A
 - Price
 - Performance
 - Lead-Time
 - Motor B
 - Price
 - Performance
 - Lead-Time
 - Motor C
 - Price
 - Performance
 - Lead-Time
- Pattern 2
 - Price
 - Motor A
 - Motor B
 - Motor C
 - Performance
 - Motor A
 - Motor B
 - Motor C
 - Lead-Time
 - Motor A
 - Motor B
 - Motor C

No Blogging/Diary

“The wheels were glued on to the PVC followed by a cut across the threaded rod, and then we searched for a drill...”



© Twentieth Century Fox Film Corporation, 2000

“The team stayed up all night and worked real hard...”

Give an “Introduction”

- Do not start describing the design
- Purpose
 - Why are you writing? Be concise. Be powerful.
- Background/**Problem**
 - Enough detail
 - Identify the **Problem**, Potential **Solutions**, and Expected **Benefits** from your Proposed Approach

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Which of these methods is preferred in IED?

- A. Deductive
- B. Inductive
- C. Chronological

Content

- **Back up assertions with facts & evidence, and use logical reasoning**

*“The types of blade designs considered for the wind turbine system were the PVC pipe and the airfoil design. The PVC pipe would cost less and be easier to construct, however **this material is heavy.**”*

- **Check your facts & evidence first!**
- **Use graphics, figures, and tables**



Signposts: Headings & Labels

- **Use Headings/Sections to break up paper.**
You do not write novels, and you're not Stephen King (see Fig. 1).



Fig. 1: Master of Horror Novels [5].

- **Labels & Caption**
 - Tables
 - Diagrams
 - Figures
 - **Cite** them in the body of text.

Diagrams

- Save words, save boredom
- Too much written detail in the wrong place can confuse the reader.

Two aluminum cylinders (0.8 inch diameter, 0.76 inch tall) are fastened at one end of the base *as shown in Fig. 2*. Four holes were drilled in the base to accommodate the flange bearing and cylinders. The cylinders account for the height of the compression system and the flange bearing so the two gears are on the same horizontal plane.

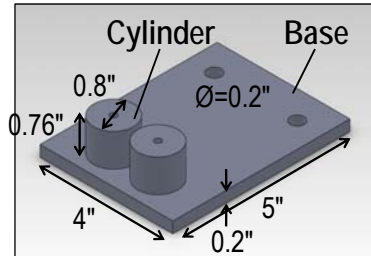


Fig. 2: Design of the base to accommodate the flange bearing and cylinders.


- Without referring to a diagram with **labels**, this description is useless to the reader!

Figures

- Should hold a couple of wires, shooting for at least three would be good as that would be the "normal" number of wires on a computer desk
- Should be relatively easy to wind and unwind the wires

Research


When looking for alternatives, I found one design that was very similar to mine, the [Razer, USA Ltd. "Cable Management System"](#) which has a lot of the same ideas¹. The basic idea is for one wire to be looped through a small assembly and then it can be wound up automatically.



While this is nice, there are some downsides. It can only store one wire, and also the price point is rather high. The whole assembly is \$19.99, which is a somewhat high price to only store and organize one wire. With this in mind, the importance of how many wires can be stored and also how overall cheap the assembly is recognized.

Concepts

The first concept for this project involved using a motor to power a cylinder in the middle. In this way, it's somewhat similar to the [Razer, CMS](#), except that it would be taller and could hold more wires. However, the problem with this design is that each of the wires would have to be individually powered, because you obviously would not want all of the wires to wind up at the same time since not all wires would have the same length. Doing something like that could not be done mechanically, so if I wanted to do so it would significantly ramp up the cost of the assembly.



The second concept was somewhat of an evolution of the first concept. Realizing that individually winding the wires would probably be too complicated, the next idea was to instead make one long column that could be wound up with a motor, similar to the image on the right. A drill motor would be hooked up to the

Figure 6.24: Display Microcontroller Pseudo-code Diagram.

The base microcontroller pseudo-code diagram is shown above in Figure 6.24, while a full set of code can be found in Appendix I. The above loop is executed **ten times per second**. With each iteration of the loop, the microcontroller checks if it has received an RPM value from the base microcontroller. **If a new value has been received, the microcontroller clears the LCD display and prints out the new RPM value.**

6.3.5 Liquid Crystal Display

The liquid crystal display (LCD) is responsible for displaying the current RPM reading of the turbine to the user. The specific LCD display utilized in the monitoring subsystem is the NHD-0216K1Z display by Newhaven Display. The display can display a **maximum of 32 characters** in a 2 x 16 character array. A picture of the display is shown below in **Figure 6.25**.

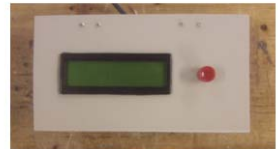


Figure 6.25: LCD Display in Housing.

Be Clear & Concise

How many words can you trim from the following sentence?

The following report outlines the different aspects relating to the current feasibility of constructing rotationally stressed reinforcement bar in Northern Maine. (21 words)

~~*The following*~~ **This report outlines** ~~*the different aspects relating to the current*~~ **feasibility of constructing rotationally stressed reinforcement bar in Northern Maine.** (14)

Editing

~~*“An important conclusion extracted from the result is that there is a correlation between shaft length and mass.”*~~ (18 words)

“The result is a correlation between shaft length and mass.” (10 words)

- **Typos, poor grammar & wordiness** are distractions from otherwise good **content** that may be well **organized** and **in context**.
- The Editor should NOT be the Writer!

iClicker Matching

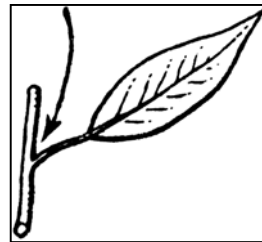
	AXLE	AXEL	AXIL	AXL
A	2	3	1	4
B	3	2	4	1
C	2	4	1	3
D	2	4	3	1
E	4	2	1	3



1



2



3



4

Grammar & Style

- Double space – Instructor Preference
- Comma usage
- Keep margins approximately 1" – 1.5"

- **AVOID** First Person "**We**" or "**I**"
- **AVOID** Contractions, e.g., "**doesn't**" or "**isn't**"
- **AVOID** Starting a sentence with "**So**" or "**But**"

Voicing

Third Person, Active Voice:

- Four repetitions of the test revealed structural failure occurring at or above 160°.

Third Person, Passive Voice:

- Structural failures occurring at or above 160° were revealed in each of four repetitions of the test.

Structural failure occurs at or above 160° as revealed in each of four repetitions of the test.

Vernacular, Idioms, & Colloquialisms



- My idea “*came into light*”
- This product will “*tackle the problem*”
- That idea was “*thrown out*”
- “*taken out of the picture*”
- This idea “*leaves many doors open*”
- to “*be able to*”
- “*somewhere around*” 5 pounds – use “approximately”
- “*essentially*”, “*basically*”, “*actually*”, “*in essence*”

Appendix: Data/Code

- Raw Data, e.g.,
spreadsheet, charts, scaled drawing with dimensions, pictures, screenshots
- Construction/Assembly Process
- Analysis, e.g.,
 - Test Descriptions/Surveys
 - Projectile Motion Diagrams
 - Spring Force Calculations

References

- MS Word Reference Tool
- **Consistency** with YOUR Formatting Style
- **Use IEEE Style [1] (or APA Style [2]):**
 - Full list of author names, “Title of the article”, *Title of Journal using italic font*, vol. xx, pp. page number-page number, Abbrev. Month, year.
 - For example [3]
- More Information on reference styles:
 - <http://www.bibme.org/citation-guide>

[1] *IEEE Citation Reference*, September 2009. Retrieved on August 31, 2015, from <http://www.ieee.org/documents/ieeecitationref.pdf>

[2] *APA Citation Style*. Retrieved on August 31, 2015, from <https://www.library.cornell.edu/research/citation/apa>

[3] J.-Q. Lu, “3-D hyper-integration and packaging technologies for micro-nano systems,” *Proc. IEEE*, vol. 97, no. 1, pp. 18–30, Jan. 2009.

References: Wrong

- <http://www.mdpub.com/SolarPanel/>
- http://en.wikipedia.org/wiki/Peltier_device
- http://en.wikipedia.org/wiki/ABS_plastic

If a URL has to be cited, use the following formats:

Author(s), (Month Year). *Title of document*. Retrieved on Month day, year, from URL
OR

Title of document, Month Year. (Date Last Accessed, Month day, year). URL

E.g.,

Office of Graduate Education at Rensselaer, (May 2013). "*Preparation Guide for Dissertation and Thesis*". Retrieved on August 31, 2015, from <http://www.rpi.edu/dept/grad/docs/ThesisManual.pdf>

Use Our Templates

- **LMS > Technical Writing Resources**
 - **IED-PD1 Mini-Project Final Technical Memo Template**
 - **IED-PD1 Concept Memo Template (Milestone I)**
 - **IED-PD1 Final Report Template (Milestone III)**

- ***Write to EXPRESS, not IMPRESS.***

- ***Write to COMMUNICATE, not CONFUSE.***

Checklist for Effective Technical Writing

A. Context

1. Understand the goals of your readers
2. Use knowledge of readers' goals to choose appropriate media, language, and content

B. Organization

3. Provide a clear organizational structure
4. Identify the main point and put work in context (i.e., provide a beginning and an end)

C. Content

5. Display a clear ethical sensibility
6. Use evidence and logical reasoning to back up assertions and claims
7. Address expected reader's questions and/or topics
8. Apply effective principles of visual communication

D. Editing: Observe the conventions of

9. Standard English
10. a particular discipline or workplace

E. Proof Reading for style, consistency, logic/accuracy, professional and format

Citations

1. **David Adams**, (August 2001). *Writing Better Reports: A Handbook for Civil & Environmental Engineers*. Retrieved on August 31, 2015, from <http://www.egr.msu.edu/cee/techcom/handbook.pdf>.
2. **David A. McMurrey**, Instructions. *Internet Technical Writing Course Guide*. Austin Community College. Retrieved on August 31, 2015, from <http://w3.gel.ulaval.ca/~poussart/gel64324/McMurrey/texte/instrux.htm>.
3. **Rensselaer Polytechnic Institute**. Resources for Writers. *Center for Communication Practices*. Retrieved on August 31, 2015, from <http://www.ccp.rpi.edu/resources/>.
4. **Jordan Kahn**, (June 25, 2010). Apple Posts iPhone 4 User Manual/Guide for iOS 4. Retrieved on August 31, 2015, from <http://www.blogsdna.com/11132/apple-posts-iphone-4-user-manualguide-for-ios-4.htm>.
5. Stephen King. Retrieved on August 31, 2015, from <http://sporelections.files.wordpress.com/2008/12/627887871.jpg>.

Thank You!

Questions?