BIG PICTURE, TURBINE PROJECT and ENGINEERING DOCUMENTS IN GENERAL:

This project was to be INDIVIDUAL work, not photocopy or cut-paste of teamwork.
On other projects which are team work – include all team members names.
The purpose of this sort of engineering work is to ***concisely*** and ***clearly communicate*** something ***important***.

Consider who the memo/letter/documentation is written for. Although this work was to be written specifically for your lead engineer, assume all of your engineering work will be shared with managers, clients, lawyers/judges/juries, peers/colleagues/lead engineers, and your future self.

Lead engineers need to be able to quickly understand what you did and the justification/reasons for doing it. They need to know your conclusion (answer). BOTTOM LINE: **they need to be comfortable passing your work on to someone else *as if it were their own*. You are asking them to *put their professional reputation on the line* for your work, but they don't have the time to work the details (that's why you have a job). Characteristics to help achieve this:**

- Clear what the memo is addressing (concise but descriptive SUBJECT line in memo header)
- Clear what the problem is that you are directly answering in the memo (INTRODUCTION)
- Clear that you understand the overall problem and how your work fits in (BACKGROUND)
- Analyses is clear and self-evident. Validated as much as possible (DISCUSSION and ATTACHMENTS)
- Clear what the answers to the questions are (CONCLUSION)
- Clear where data came from and be able to judge its validity (EVERYWHERE, plus REF SECTION)
- Concise clear writing in memo itself – refer the reader to the details in attachments.

For the turbine project reports, some common problems were associated with the following:

- In concise writing, avoid too many details (specific data, equations, etc.). Put the details in the attachments.
- Avoid unclear/non-defined/"fluffy" terms. Examples:
    - Does not change significantly…
    - Results were precise…
    - The results were accurate…
    - There was good agreement…
    - The engine runs efficiently…
- Cite references for general info, details, data, photographs…everything obtained from some other source including interviews (meeting with lead engineer). It needs to be clear to the reader where the info came from.
- Use tables, figures, photographs judiciously – CITE SOURCES for data, photos, etc.
- Use standard problem-solving format "on steroids" (it must be very clear to the reader what you are doing and why). Include citing sources of data and equations (if the equations are not commonly known – if you have to look it up, assume the reader will too)

How to make sure you achieve this?

- Read your own work with ***empathetic*** *powers.* View it through the reader's eyes.

- Have a someone technically knowledgeable but not familiar with this project review it.
- The writing center is here to help you write.
- Double check the rubrics or grading sheet for both DETAILS and INTENT
- For specific questions, ask the instructor

Some miscellaneous comments from the turbine reports:

- Sign (or initial) all technical letters and memo's. This is your way of saying "this is my work and I am proud of it – it is a reflection of who I am". It is!
- RPM is a unit of measure, just like millimeters is a unit of measure. It is **not** proper to say "*the millimeters are 23*" so it is **not** proper to say "*the RPM's are 1000*." It **would** be appropriate to say "*the speed is 1000 RPM*."
- Data presentation: you decide to include data in either tables (specific quantities) or graphs (trends and relationships) – but **not both**. For the convergence plots – you decide between graph **or** table.
- 1 photograph = 1000 words. 1 table = 1000 words. 1 graph = 1000 words. These are hints about how to create clear and concise work. Make life easy for the reader.
- While we studied using matrices to solve systems of equations in this class, this is not necessarily the best approach for this project – in fact, it probably is not the simplest approach for either hand calculations or Excel.
- If the Excel spreadsheet uses the same algorithm as the hand calculations, it is easier for the reader to understand the Excel work (assuming the hand calculations are clear – which should be a good assumption). If it doesn't, then you need a clear description of what the Excel spreadsheet is doing (a good flow diagram is one way to achieve that).
- Microsoft wrote a program titled "Excel" – which is capitalized.
- If you don't know what "IEEE" referencing format is, google it. It was a requirement for this project.
- Read the project requirements before beginning and make sure you achieve all details and their intent.
- If you are confused or if something is unclear, ask.

BEFORE BEGINNING ANY REPORT, LAY OUT A GAME PLAN – AN OUTLINE OF WHAT IS IMPORTANT. For the turbine project, this may look like:

My writing goals for this report is to have a colleague be able to:*

- **Quickly and easily** understand the "big picture" (eg. what an HP compressor blade is. What a RR Trent 1000 engine is and where it is used)
- **Quickly and easily** understand what I did specifically and how it fits into the big picture (eg. develop methodology to calculate tip extension due to thermal expansion and centripetal force. This is an important design detail to help improve fuel efficiency on the turbine engines).
- **Quickly and easily** verify the data used.
- **Quickly and easily** understand and follow the analysis at every step (requires good sketches, explanations, etc.)

- **Quickly and easily** understand the Excel algorithm (what is actually going on in the Excel spreadsheet)
- **Quickly and easily** understand the convergence study – its purpose and results
- **Quickly and easily** know that Excel work was independently verified by hand (and the answers agree).
- **Quickly and easily** know my answers.

*this goal can and should be checked before submitting the work.