

Technical Analysis Guideline for Final Design Report

This document aims to provide some guidelines on the level of detail required for technical analysis of various sub-systems of your design. It is important to remember that the focus is on the conceptual design as well as justifications on how you arrived at various design decisions. Full technical scrutiny of engineering systems is very time consuming, even for graduate engineers working in industry, so please be aware that this is not expected. Instead, consider the level of detail provided in lectures and workshops. If you are uncertain about the level of analysis needed, remember to ask your demonstrator or lecturer.

You are expected to provide technical analysis for any two of the technical topics listed below.

1. Material Selection
2. Fastener
3. Power Transmission
4. Sensors

Remember to always provide the following when writing technical analysis.

- Explanation – Describe what you have done clearly.
- Justification – Give a reason WHY you have made that particular decision. Why is it the best one?
- Validation – Prove that it meets the functional and safety requirements of the design brief. This is typically where the math happens.

IMPORTANT: You do not need to analyse a technical sub-system/component more than once. For example, if you have 5 bolted joints, you only need to provide the analysis for one of them. However, if your report is complete and you would like to do additional analysis feel free to do so.

You do not need to provide technical analysis for any other sub-systems in your design. Instead, you may “blackbox” the analysis for other sub-systems that would be required for your design. This means that you can assume everything that it needs to work, will work. A lot of the design will be beyond your expertise, e.g., electrical wiring, photovoltaics, battery design and so on.

For example, let’s say you were designing an air conditioner. Your calculations for each section might look like this and **should be included as an appendix to your final report:**

1. Fasteners – Provide analysis for joint in shear for one of the bolted joints holding the compressor in place. Ignore all other fasteners in the design in terms of calculations.
2. Power analysis – Provide power analysis of required power for compressor.
3. Sensors – Provide sample code for how a thermal sensor works. Ignore coding requirements for other sensors.

Remember, although you only need to provide a sample calculation, you should provide explanation and justification for AS MANY design decisions as possible.

Engineering Drawings

Engineering drawings are a fundamental requirement for design work. These are the only way to provide machinists with the mean to take our designs from the virtual world and into the real

world. A similar principle as per your technical analysis is to be applied to your engineering drawings.

1. You should provide component drawings of structures that you design.
2. You do not need to provide engineering drawings of things you did not design. E.g. motors, nuts, bolts, batteries and so on.
3. You can use GrabCAD to find models for common systems like motors, compressors, heat exchangers, solar panels, etc. Just remember to reference these to avoid plagiarism.
4. Assembly drawings must include all components within the sub-system. Structures that you did not design does not have to be completely accurate, but should be representative of the spatial requirements.
5. Don't forget to include assembly notes in your assembly drawing.
6. Lastly, remember the Drawing Checklist can be a lifesaver and should be used regularly during the drafting and proofing phases.