

Guide to technical report writing

1. Introduction

A technical report is a formal report designed to convey technical information in a clear and easily accessible format. It is divided into sections which allow different readers to access different levels of information. This guide explains the commonly accepted format for a technical report; explains the purposes of the individual sections; and gives hints on how to go about drafting and refining a report in order to produce an accurate, professional document.

2. Structure

A technical report should contain the following sections;

Section	Details
Title Page	Must include the title of the report. Reports for assessment, where the word length has been specified, will often also require the summary word count and the main text word count
Summary	A short summary of the whole report including important features, results and conclusions
Contents	Numbers and lists all section and subsection headings with page numbers
Introduction	States the objectives of the report and comments on the way the topic of the report is to be treated. Leads straight into the report itself.
The sections which make up the body of the report	Divided into numbered and headed sections. These sections separate the different main ideas in a logical order
Conclusions	A short, logical summing up of the theme(s) developed in the main text
References	Details of published sources of material referred to or quoted in the text (including any lecture notes and URL addresses of any websites used)
Bibliography	Other published sources of material, including websites, not referred to in the text but useful for background or further reading.
Acknowledgements	List of people who helped you research or prepare the report, including your proofreaders
Appendices (if appropriate)	Any further material which is essential for full understanding of your report (e.g. large scale diagrams, computer code, raw data, specifications) but not required by a casual reader

3. Presentation

For technical reports required as part of an assessment, the following presentation guidelines are recommended;

Script	The report must be printed single sided on white A4 paper. Hand written or dot-matrix printed reports are not acceptable.
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Margins	All four margins must be at least 2.54 cm
Page numbers	Do not number the title, summary or contents pages. Number all other pages consecutively starting at 1
Binding	A single staple in the top left corner or 3 staples spaced down the left hand margin. For longer reports (e.g. year 3 project report) binders may be used.

4. Planning the report

There are some excellent textbooks contain advice about the writing process and how to begin (see section 16). Here is a checklist of the main stages;

- Collect your information. Sources include laboratory handouts and lecture notes, the University Library, the reference books and journals in the Department office. Keep an accurate record of all the published references which you intend to use in your report, by noting down the following information;

Journal Article	Book
author(s)	author(s)
title of article	title of book (italic or underlined)
name of journal (italic or underlined)	edition, if appropriate
year of publication	publisher
volume number (bold)	year of publication
issue number, if provided (in brackets)	
page numbers	

N.B. the listing of recommended textbooks in section 16 contains all this information in the correct format.

- Creative phase of planning. Write down topics and ideas from your researched material in random order. Next arrange them into logical groups. Keep note of topics that do not fit into groups in case they come in useful later. Put the groups into a logical sequence which covers the topic of your report.
- Structuring the report. Using your logical sequence of grouped ideas, write out a rough outline of the report with headings and subheadings.

5. Writing the first draft

Who is going to read the report? For coursework assignments, the readers might be fellow students and/or faculty markers. In professional contexts, the readers might be managers, clients, project team members. The answer will affect the content and technical level, and is a major consideration in the level of detail required in the introduction.

Begin writing with the main text, not the introduction. Follow your outline in terms of headings and subheadings. Let the ideas flow; do not worry at this stage about style, spelling or word processing. If you get stuck, go back to your outline plan and make more detailed preparatory notes to get the writing flowing again.

Make rough sketches of diagrams or graphs. Keep a numbered list of references as they are included in your writing and put any quoted material inside quotation marks (see section 11).

Write the Conclusion next, followed by the Introduction. Do not write the Summary at this stage.

6. Revising the first draft

This is the stage at which your report will start to take shape as a professional, technical document. In revising what you have drafted you must bear in mind the following, important principle;

- the essence of a successful technical report lies in how accurately and concisely it conveys the intended information to the intended readership.

During year 1, term 1 you will be learning how to write formal English for technical communication. This includes examples of the most common pitfalls in the use of English and how to avoid them. Use what you learn and the recommended books to guide you. Most importantly, when you read through what you have written, you must ask yourself these questions;

Does that sentence/paragraph/section say what I want and mean it to say? If not, write it in a different way.

Are there any words/sentences/paragraphs which could be removed without affecting the information which I am trying to convey? If so, remove them.

7. Diagrams, graphs, tables and mathematics

It is often the case that technical information is most concisely and clearly conveyed by means other than words. Imagine how you would describe an electrical circuit layout using words rather than a circuit diagram. Here are some simple guidelines;

Diagrams	Keep them simple. Draw them specifically for the report. Put small diagrams after the text reference and as close as possible to it. Think about where to place large diagrams.
Graphs	For detailed guidance on graph plotting, see the 'Guide to laboratory report writing'
Tables	Is a table the best way to present your information? Consider graphs, bar charts or pie charts. Dependent tables (small) can be placed within the text, even as part of a sentence Independent tables (larger) are separated from the text with table numbers and captions. Position them as close as possible to the text reference. Complicated tables should go in an appendix.
Mathematics	Only use mathematics where it is the most efficient way to convey the information. Longer mathematical arguments, if they are really necessary, should go into an appendix. You will be provided with lecture handouts on the correct layout for mathematics.

8. The report layout

The appearance of a report is no less important than its content. An attractive, clearly organised report stands a better chance of being read. Use a standard, 12pt, font, such as Times New Roman, for the main text. Use different font sizes, bold, italic and underline where appropriate but not to excess. Too many changes of type style can look very fussy.

9. Headings

Use heading and sub-headings to break up the text and to guide the reader. They should be based on the logical sequence which you identified at the planning stage but

with enough sub-headings to break up the material into manageable chunks. The use of numbering and type size and style can clarify the structure as follows;

3. METHODS OF HARNESSING WAVE ENERGY
3.1 Shore-Based Systems
3.2 Deep-Water Systems
3.2.1 'Duck' Devices
3.2.2 Rafts

10. References to diagrams, graphs, tables and equations

- In the main text you must always refer to any diagram, graph or table which you use.

- Label diagrams and graphs as follows;

Figure 1.2 Graph of energy output as a function of wave height.

In this example, the second diagram in section 1 would be referred to by "...see figure 1.2..."

- Label tables in a similar fashion;

Table 3.1 Performance specifications of a range of commercially available GaAsFET devices

In this example, the first table in section 3 might be referred to by "...with reference to the performance specifications provided in Table 3.1..."

- Number equations as follows

$$F(\text{dB}) = 10\log_{10}F \quad (3.6)$$

In this example, the sixth equation in section 3 might be referred to by "...noise figure in decibels as given by eqn (3.6)..."

11. Originality and plagiarism

Whenever you make use of other people's facts or ideas, you must indicate this in the text with a number which refers to an item in the list of references. Any phrases, sentences or paragraphs which are copied unaltered must be enclosed in quotation marks and referenced by a number. Material which is not reproduced unaltered should not be in quotation marks but must still be referenced. It is not sufficient to list the sources of information at the end of the report; you must indicate the sources of information individually within the report using the reference numbering system.

Information that is not referenced is assumed to be either common knowledge or your own work or ideas; if it is not, then it is assumed to be *plagiarised* i.e. you have knowingly copied someone else's words, facts or ideas without reference, passing them off as your own. This is a **serious offence**. If the person copied from is a fellow student, then this offence is known as collusion and is equally serious. Examination boards can, and do, impose penalties for these offences ranging from loss of marks to disqualification from the award of a degree.

This warning applies equally to information obtained from the Internet. It is very easy for markers to identify words and images that have been copied directly from web sites. If you do this without acknowledging the source of your information and putting the words in quotation marks then your report will be sent to the Investigating Officer and you may be called before a disciplinary panel.

12. Finalising the report and proofreading

Your report should now be nearly complete with an introduction, main text in sections, conclusions, properly formatted references and bibliography and any appendices. Now you must add the page numbers, contents and title pages and write the summary.

13. The Summary

The summary, with the title, should indicate the scope of the report and give the main results and conclusions. It must be intelligible without the rest of the report. Many people may read, and refer to, a report summary but only a few may read the full report, as often happens in a professional organisation.

- Purpose - a short version of the report and a guide to the report.
- Length – short, typically not more than 100 - 300 words
- Content - provide information, not just a description of the report.

14. Proofreading

This refers to the checking of every aspect of a piece of written work from the content to the layout and is an absolutely necessary part of the writing process. You should acquire the habit of never sending or submitting any piece of written work, from email to course work, without at least one and preferably several processes of proofreading. In addition, it is not possible for you, as the author of a long piece of writing, to proofread accurately yourself; you are too familiar with what you have written and will not spot all the mistakes.

When you have finished your report, and before you staple it, you must check it very carefully yourself. You should then give it to someone else, e.g. one of your fellow students, to read carefully and check for any errors in content, style, structure and layout. You should record the name of this person in your acknowledgements.

15. Word processing/ desktop publishing

Advantages	Disadvantages
Word processing and desktop publishing packages offer great scope for endless revision of a document. This includes words, word order, style and layout.	Word processing and desktop publishing packages never make up for poor or inaccurate content
They allow for the incremental production of a long document in portions which are stored and combined later	They can waste a lot of time by slowing down writing and distracting the writer with the mechanics of text and graphics manipulation.
They can be used to make a document look stylish and professional.	Excessive use of 'cut and paste' leads to tedious repetition and sloppy writing.
They make the process of proofreading and revision extremely straightforward	If the first draft is word processed, it can look so stylish that the writer is fooled into thinking that it does not need proofreading and revision!

Two useful tips;

- Do not bother with style and formatting of a document until the penultimate or final draft.
- Do not try to get graphics finalised until the text content is complete.

16. Recommended reading

1. Davies J.W. *Communication for Engineering Students* (Longman 1996)
2. van Emden J. *Effective communication for Science and Technology* (Palgrave 2001)
3. van Emden J. *A Handbook of Writing for Engineers* 2nd ed. (Macmillan 1998)
4. van Emden J. and Easteal J. *Technical Writing and Speaking, an Introduction* (McGraw-Hill 1996)
5. Pfeiffer W.S. *Pocket Guide to Technical Writing* (Prentice Hall 1998)
6. Eisenberg A. *Effective Technical Communication* (McGraw-Hill 1992)

Dr H Prance
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