



University of South Australia

Division of Information Technology, Engineering and the Environment

School of Geoscience, Minerals and Civil Engineering

Report Writing Style Guide for Engineering Students

4th edition

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revised and updated by Monica Behrend and Bev Kokkinn

Prepared in association with Engineering staff and students,
and the Flexible Learning Centre, University of South Australia

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Major revisions in the fourth edition:

- renaming of Chapter 5 and inclusion of techniques for planning reports (sections 5.1 – 5.3)
- addition of Figures 14 and 15
- updating of Referencing in accordance with Style manual 6th ed (Revised by Snooks & Co. John Wiley & Sons Australia Ltd 2002)
- updating of University terminology (course, program, Division)

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- inclusion of examples of electronic referencing
- additions to Appendix D, *Punctuation in technical writing*
- inclusion of examples in Appendix G, *Purposes of paragraphs*

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- addition of an index
- variation to the headings for lists of *Figures, Tables and Symbols*
- addition of a table on the report writing process and related resources (Table 1)
- addition of a section on *Starting writing* (section 5.1)
- inclusion of all referencing examples in section 4 instead of the appendices
- addition of new diagrams (Figs 10–13) to illustrate the elements involved in a reference list

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Abstract

Students need to develop the skills associated with report writing to communicate appropriately at University and to fulfil the obligations of their future employment. The provision of this *Report Writing Style Guide for Engineering Students* is to assist students in developing these writing skills. The initial project was funded by the University of South Australia Foundation Inc, the Division of Engineering, Information Technology and the Environment (formerly the Faculty of Engineering) and the Flexible Learning Centre (formerly the Centre for University Teaching and Learning) at the University of South Australia. Learning Advisers, Engineering Staff and personnel from other units collaborated to produce this document which is written in the form of a model report. The *Style Guide* specifically deals with: formatting guidelines, components of a report, referencing of sources, planning and writing a quality report. Style is often a matter of personal preference. Report writing styles will sometimes differ according to the purpose of the report and the requirements of a particular school, employer or publisher. It is recommended that particular attention be given to visual impact and readability; referencing of sources; proofreading and editing; and that the selection of style be consistent and appropriate to both audience and purpose.

Disclaimer

We declare the following to be our own work, unless otherwise referenced, as defined by the University's policy on plagiarism.

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Contents

1	Introduction	1
1.1	Project reports	2
1.2	Other uses of the Style Guide	2
2	Formatting guidelines	3
2.1	Templates	3
2.2	Format of pages	3
2.2.1	Paper and margins	
2.2.2	Page numbering	
2.2.3	Headers and footers	
2.3	Format of type and headings	4
2.3.1	Font	
2.3.2	Size and style of type	
2.3.3	Headings	
2.3.4	Decimal numbering system	
2.4	Format of text	5
2.4.1	Justification	
2.4.2	Line spacing	
2.4.3	Indentation and centring	
2.4.4	Figures and tables	
2.4.5	Quotations	
2.4.6	Equations and formulae	
3	Components of a report	8
3.1	Preliminary pages	9
3.1.1	Title page	
3.1.2	Wording of the title of the report	
3.1.3	Disclaimer	
3.1.4	Abstract	
3.1.5	Acknowledgments	
3.1.6	Contents	
3.1.7	Figures	
3.1.8	Tables	
3.1.9	Symbols	
3.2	Text of report	12
3.2.1	Introduction	
3.2.2	Main sections	
3.2.3	Conclusion	
3.2.4	Recommendations	
3.2.5	References	
3.3	Appendices	15
4	Referencing of sources and originality	16
4.1	Two systems of referencing	16
4.1.1	Choosing between referencing systems	
4.1.2	Consistency in referencing	
4.2	Author-date referencing (Harvard system)	18
4.2.1	In-text author and date	
4.2.2	Alphabetical reference list	
4.3	Numerical referencing (endnote system)	26
4.3.1	In-text numbers	
4.3.2	Numbered reference list	

5	Planning and writing	30
5.1	The writing process	30
5.2	Starting the planning	30
5.2.1.	Planning techniques	
5.3	Starting the writing	32
5.4	Structuring writing	32
5.4.1	Cohesive paragraphs	
5.4.2	Clear sentences	
5.5	Structuring sentences	33
5.5.1	Proximity of detail and item	
5.5.2	Series of nouns	
5.5.3	Parallel construction	
5.6	Grammar	34
5.6.1	Active and passive voice	
5.6.2	Tense of verbs	
5.6.3	Agreement between noun and number	
5.6.4	Agreement between subject and verb	
5.7	Vocabulary	36
5.7.1	Personal language	
5.7.2	Gender inclusive language	
5.7.3	Jargon and slang	
5.7.4	Repetition of words	
6	Conclusion	38
7	Recommendations	39
8	References	40
Appendix A	National Competency Standards for Professional Engineers	41
Appendix B	Model title page	42
Appendix C	Plagiarism: Academic Misconduct Policy	43
Appendix D	Punctuation in technical writing	44
Appendix E	Summary of elements in reference lists	47
Appendix F	Library resources and report writing texts	48
Appendix G	Purposes of paragraphs	50
Appendix H	Report writing checklist	51
	Index	53

Figures and tables

Figures

Figure 1	Components of a report	8
Figure 2	Preliminary components of a report	9
Figure 3	Indentation of headings in a contents list	11
Figure 4	Components of the text of a report	12
Figure 5	Sample of 3D columns	14
Figure 6	Sample of 3D lines	14
Figure 7	Supplementary components of a report	15
Figure 8	Differences between referencing systems	16
Figure 9	Advantages and disadvantages of referencing systems	17
Figure 10	Book in author-date reference list	20
Figure 11	Journal article in author-date reference list	20
Figure 12	Electronic source in author-date reference list	21
Figure 13	Book in numerical reference list	28
Figure 14	Journal article in numerical reference list	28
Figure 15	Electronic source in author-date reference list	29

Tables

Table 1	Resources; for report writing process	1
Table 2	Size and style of headings	5
Table 3	Base SI units	11
Table 4	Sample table	13
Table 5	Connectors/linking words and phrases	33

1 Introduction

Report writing is an essential skill for engineering students. Engineering reports analyse data, present results and conclusions, and make recommendations in a logical, precise and accessible manner. Report writing is both a requirement for completing an engineering qualification at university and a central part of succeeding in future employment. The ability to prepare professional engineering reports is one of the competency standards specified by The Institution of Engineers, Australia (1993) (see Appendix A). Having recognised the need for students to write quality reports, the University of South Australia Foundation Inc, the Division of Engineering, Information Technology and the Environment and the Flexible Learning Centre initially provided funding to produce this *Report Writing Style Guide for Engineering Students* (now referred to as *Style Guide*). Learning Advisers developed the *Style Guide* in consultation with University of South Australia Engineering staff, staff from other units within the University and other personnel from various external organisations.

While this *Style Guide* has been prepared to assist engineering students with their report writing, it is not intended to be an inflexible set of rules. It is, rather, a set of guidelines. Style is often a personal choice, and report writing styles and content will differ according to the type of report, the purpose, and the audience. Engineering companies, for example, have their own ‘in-house’ style. For each report, students should consult their lecturer or school to determine if any specific requirements for particular schools apply.

This *Style Guide* is one of many resources that a student may use when writing a report (see Table 1). In the writing process the planning, writing and revising stages often need to be repeated to achieve a quality document.

Table 1 Resources; for report writing process

Report writing process		Possible resources	
Plan	Analyse requirements/topic	⇒	lecturers; topic guidelines and objectives
	Brainstorm/preliminary plan	⇒	prior knowledge
Study	Research/investigate	⇒	library; computer data; field work; experiments
Plan	Revise plan	⇒	newly informed knowledge; notes
	Outline sections and headings	⇒	Style Guide: structuring technical writing
Write	Draft report	⇒	Style Guide: formatting, components, referencing, planning and writing
Revise	Edit and proofread	⇒	Style Guide: recommendations, technical language, report writing checklist
Write	Revise draft report	⇒	Style Guide: formatting, components, referencing, and structuring writing
Publish	Publish final report	⇒	other students; staff

Where possible, this *Style Guide* models the format of an engineering report. At times, however, this document varies from report styles expected of students. (For instance, as this document is intended to provide information in an easily accessible format, there are numerous bullet points.) This *Style Guide* suggests guidelines for engineering reports in relation to formatting, components, referencing of sources, and planning and writing. It is essential that aspects of style are consistent throughout a report.

1.1 Project reports

Primarily this *Style Guide* will be useful to undergraduate engineering students who are writing project reports. Project reports must be presented in a well structured and visually attractive manner; the competent use of technical language and accurate referencing of all sources is also a requirement.

To logically structure a report, students should understand the purpose of each component. The preliminary pages of a report include an Abstract that summarises the purpose, methods, results and conclusions of the project. The Introduction provides the background, objective(s), approach, scope and limitations of the report. The main sections of the report include the work or research undertaken and the associated information. This must be arranged logically with headings to guide the reader. Visual aids such as figures and tables can assist with the clear communication of material. The Conclusion summarises and identifies the important findings, placing them in context. Recommendations may be included indicating future directions. A report ends with a list of references, and any required appendices.

1.2 Other uses of the Style Guide

Students will be required to write a variety of reports while at university, such as laboratory/practical reports, field reports, industrial experience and vacation reports. Postgraduate students will also have to produce a thesis. Not every aspect of style detailed in this document will be relevant to all of these reports. The planning and writing section however, may assist all students with their writing, while the referencing and formatting sections may also be of use to postgraduate students. An example of the requirements of a thesis are set out in the University of South Australia's publication, *Research Degree Student Information Guide* (1996).

Writers should strive to present their work with clear expression and within an organised structure. Such writing will lead to a professional result that communicates effectively.

2 Formatting guidelines

Appropriate formatting of reports improves the readability and accessibility of information. An important principle underlying all formatting choices is consistency. Each report should maintain the same internal style and structure. This *Style Guide* is formatted as a model and the guidelines assume that reports will be word processed on a computer. If you are unsure about how to apply the formatting guidelines, refer to the Help menu of the word processing software on the computer. If reports are to be hand-written, students should consult their lecturers.

2.1 Templates

One way in which consistency of a word processed report can be achieved is through the use of a template. The template forms the basis of a word processed document as it determines the basic structure and formatting for the entire document. You can use templates provided with a word processing program e.g. Microsoft Word or others provided by your lecturers.

When using a template, styles can be created and modified to suit your purposes. For example, you can create styles for the several levels of headings. Creating a style saves you the tedium of applying the same font size, appearance, numbering and white space every time you type a heading or sub-heading. The single most significant advantage is that using styles allows you to automatically create a Contents page. (Refer to the Help menu of the word processing software on the computer for further information on creating Contents pages.)

2.2 Format of pages

2.2.1 Paper and margins

- White A4 paper is appropriate, and printing on one side only is often preferred for assessment purposes.
- Each major section of the report begins on a new page; this may be inappropriate for very short sections or short reports.
- Wide margins are recommended; for example, allowing 2.5 cm on all sides.
- Bound reports have a left-hand margin of at least 3.5 cm, and 1.5 on the other three sides.

To change these features using MSWord 2000, go to the File menu and access Page Setup.

2.2.2 Page numbering

- The title page should not be numbered
- All other pages may be numbered either in the right-hand upper corner, or in the centre at the bottom of the page.
- Roman numerals — i, ii, iii, iv etc. — are usually used to number the preliminary pages (Abstract, Contents etc.).
- Arabic numerals — 1, 2, 3, 4 etc. — are used to number the text from the Introduction page to the end of the Appendices.
- Alternatively, pages in the Appendices can be numbered internally, according to the letter of the individual appendix and the number of pages within each appendix — A1, A2, B1, C1, C2, C3 etc. (where Appendix A has two pages; Appendix B has one page, and so on).

To change these features using MSWord 2000, go to the View menu and access Header and Footer.

2.2.3 Headers and footers

- Headers or footers position page numbers automatically.
- Two different headers or footers must be created so that the preliminary pages are numbered separately from the text of the report.
- Student name(s) and ID number(s) can appear in a footer placed against the right margin in 9 point size (see the bottom of this page).

2.3 Format of type and headings

2.3.1 Font

- A serif font (such as Times or Palatino) is usually chosen for the text of a report, as serif fonts tend to be easier to read.
- A different font (such as the sans serif fonts, Helvetica or Arial) may be used for headings and tables.
- The same font should be used throughout the whole report, unless a second font is chosen for headings and tables.

To change these features using MSWord 2000, go to the Format menu and access Font.

2.3.2 Size and style of type

- 11 or 12 point type are the normal sizes for the text of a report.
- For long, indented quotations, figures and tables, it is acceptable to use a point size one point smaller than the main font.
- Table 2 suggests a style of headings with specific sizes.
- Italics can be used to emphasise text where necessary (but it should not be overused, particularly as there may be confusion with italicised titles).
- Underlining or bold is avoided in emphasis of text as it is distracting.
- The use of precise words may be sufficient to create the required emphasis.

2.3.3 Headings

- Headings are numbered according to their importance, using the decimal numbering system.
- Some writers do not use numbering, but differentiate between levels of headings through size and style. (Readability and access to information are the key considerations.)
- Headings without text should never appear on the bottom line of a page.
- Size and style of headings should vary according to the importance of the heading; the suggested style in Table 2 may prove helpful. (To change the style of headings, go to the Format menu and access Style.)
- Headings can be differentiated using bold type, size and italics. (Overuse of underlining should be avoided as it makes reading more difficult.)
- Capital letters are for the first letter of the first word only in each heading; except for any acronyms (e.g. IEEE), trade names, or personal names and places, which may require more than one capital. Aim for minimal capitalization in headings as overuse of capital letters slows reading.

Table 2 Size and style of headings

Heading	Point Size	Style	Example
			Acknowledgments
First-level (includes Preliminaries)	16	bold	6 Environmental impact
Second-level	14	bold	6.1 Chemical waste
Third-level	12	bold	6.1.1 Cost analysis
Fourth-level	12	bold italics	6.1.1.1 Equipment costs or 6.1.1.1 <i>Equipment costs</i>

The best headings are:

- summary statements rather than questions
- not too brief (e.g. ‘Inspection of contaminated site’ is more explicit than ‘Results’)
- not judgmental (e.g. ‘Equipment for review’ is more neutral than ‘Poor equipment’)
- not too long (e.g. ‘The equipment on the Whyalla factory floor’ is unhelpfully long)

2.3.4 Decimal numbering system

- Decimal numbering of headings is normally used throughout the text up to and including the reference list (excluding the preliminaries).
- Introduction is numbered 1; References have the final number (e.g. 8).
- Too many levels of subheadings should be avoided: third-level headings are the preferred limit (e.g. 7.2.1).
- Fourth-level headings (e.g. 7.2.1.1) should only be used if necessary, but not if there is only one heading at that fourth-level.
- Decimal points are placed between numerals, but not after them (e.g. 7.2).
- Appendices are not numbered using the decimal system; they can be internally labelled with letters (Appendix A, Appendix B etc.).
- Omission of decimal numbering in shorter reports or where there are multiple subheadings, may increase readability.

2.4 Format of text

2.4.1 Justification

- All text and headings can be aligned against the left margin except for where indentation is appropriate (see 2.3.3 Indentation and centring).
- Text may also be justified on the right-hand margin, and full justification (right and left margins) is often preferred for formal documents and theses.

2.4.2 Line spacing

- 1.5 or double line spacing is generally used for work submitted for assessment; automatic line spacing (as provided with word processing) may be acceptable.
- Line spacing should be greater at the end of a section so it assists in separating sections.
- Line spacing may be decreased between headings and text so it assists in grouping information; the smallest line space (i.e. a four point space) may be appropriate before text such as a list of bullet points.
- Extra line spacing should be used in the following cases:
 - to separate paragraphs
 - to separate figures, tables, equations and long quotations from the text
 - to separate a main heading from the section of text which comes before.

To change line spacing using MSWord 2000, go to the Format menu and access Paragraph. Alternatively, place the cursor in the text to be changed, and press CTRL + 2 for double spacing, CTRL + 5 for 1.5 line spacing, and CTRL + 1 for single spacing.

2.4.3 Indentation and centring

- Indenting text at the beginning of a paragraph is unnecessary when an extra line space is being allowed between paragraphs.
- Indentation is appropriate for long quotations, complex mathematical expressions, lists with bullet points (dots •) and the list of headings on the contents page.
- Long quotations are usually indented from both the left and right margins.
- Figures and tables may be centred in the text.
- Students may choose to indent each subheading with its associated text, as shorter lines of text are easier to read; overall length is then affected.

To change indentation using MSWord 2000, go to the Format menu and access Paragraph.

2.4.4 Figures and tables

- Figures include diagrams, graphs, sketches, photographs and maps.
- Tables summarise data in rows and columns; a dash (—) indicates no data.
- All figures and tables may be centred.
- All should be labelled in bold with the appropriate consecutive number (figures are generally labelled at the bottom, and tables at the top)
- Another method of labelling figures and tables is to number them according to the major section where they appear. (As Table 4 is the second table in section 3 of this document, it would become Table 3.2.)
- Each should have a simple, descriptive caption which explains the figure or table; arrows, symbols, or abbreviations should be explained in the text.
- All figures and tables must be referred to in the text (e.g. 'see Figure 14'); avoid using words such as 'Figure above' or 'Table below'.
- All should be referenced (either author-date or numerical) if copied or adapted from another source.
- Figures and tables can be separated from the text with extra line spacing; labels and captions can be separated using four point spacing.

To design a table using MSWord 2000, go to the Table menu.

2.4.5 Quotations

- Quotes of less than two lines (or 30 words) in length should be inserted ‘within your text within single inverted commas’ (Hadgraft, Robertson & Eaves 1994, p. 23).
- Quotes of more than two lines (or 30 words) should be:
 - set off from the body of the text in a separate block, indented...and *single spaced*. Do *not* use inverted commas around block quotations. When using the block format, place the [author-date] citation on the line below the last line of the quote [or if using the numerical system, place the number directly after the quotation]. (Hadgraft, Robertson & Eaves 1994, p. 23)
- Changes or additions to a quote should be placed in square brackets.
 - e.g. ‘Ambiguity was caused by [financial] statistics being excluded from the report.’
- Words left out of a quote are indicated by the three points of ellipsis (...).
 - e.g. ‘Ambiguity was caused by...statistics being excluded...’

2.4.6 Equations and formulae

- Equations should be numbered consecutively as they appear, with Arabic numerals in round brackets () on the right margin, in order to distinguish them from any reference numbers which may appear in square brackets.
- Equations can begin on a new line and should be centred in the text, e.g.
$$x = G e^{-\omega t} \sin(\omega_d t + \phi) \quad (1)$$
- in a series of consecutive equations, the equal signs (=) should be vertically aligned, e.g.
$$0 = -C_1 \beta^2 + C_2(2\zeta\beta) + C_1 \quad (2)$$
$$X_{st} = -C_2 \beta^2 + C_1(2\zeta\beta) + C_2 \quad (3)$$
- Equations should then be referred to by either their number only, e.g. (2); or with the abbreviation Eq. and the number, e.g.
 - A combination of Eq.2 and Eq.3 allows the evaluation of constants C_1 and C_2 .

3 Components of a report

In the field of Engineering, a report can be a practical/scientific report or an analytical report. Practical or scientific reports give an account of events or steps in a research study or experiment. Analytical reports, on the other hand, focus on investigations into events, organisations, issues, processes or products and their purpose is often to provide information which can be used to make decisions and take further action. The components of both kinds of reports can be divided into three main sections:

- preliminary pages
- text of the report
- supplements if appropriate

The components of a report will be determined by the purpose and complexity of the report. The possible components and sequence of a report are illustrated in Figure 1, and the significance of the core of the report is highlighted by the double-lined box.

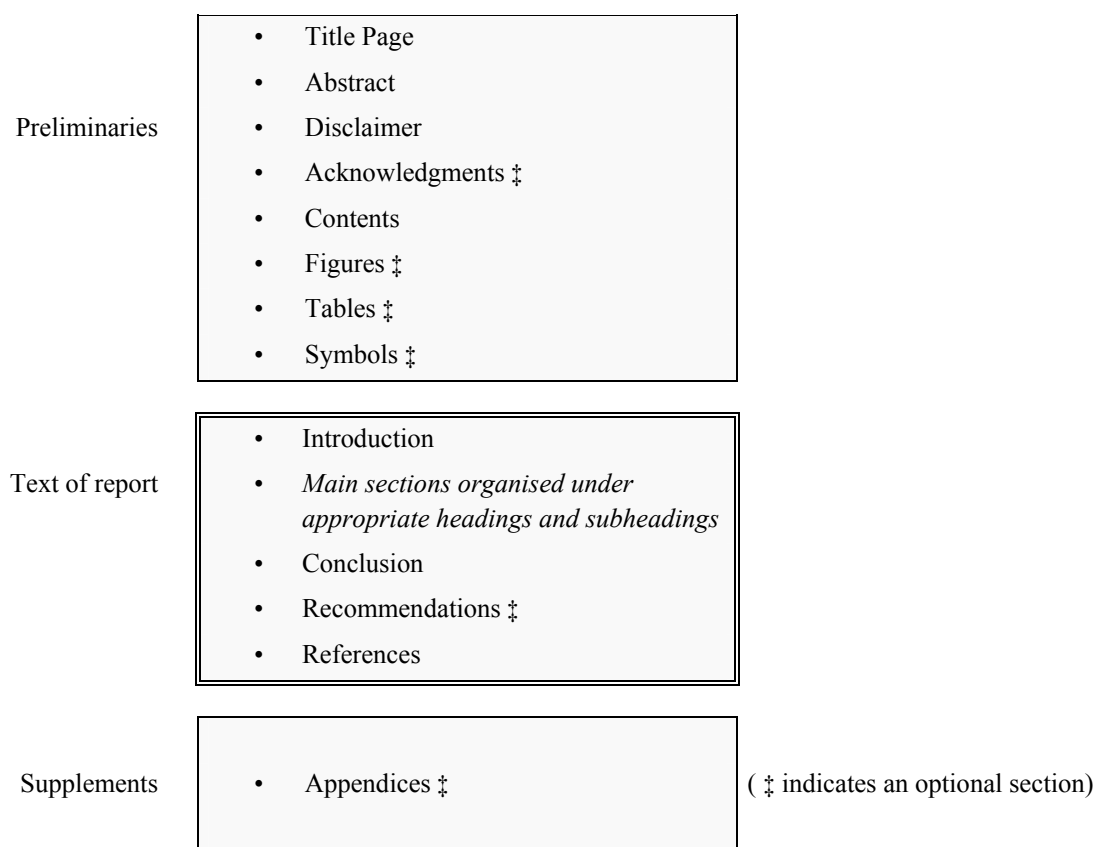


Figure 1 **Components of a report**

3.1 Preliminary pages

The preliminary pages are all numbered with Roman numerals (i, ii, iii, iv, v, vi etc.) except for the title page which is generally not numbered. Not all the components described below will be required in every report; for example, students may choose to omit a list of figures if only one or two diagrams appear in the report (for other optional preliminary components, see Figure 2). Additionally, a glossary of technical terms or acronyms might be added to a technical report, or an executive summary may be required in certain cases. Students can adapt the order of their preliminary pages to meet any specific instructions given by lecturers or particular schools. Postgraduate students should order the preliminary pages of a thesis according to the sequence required by their university.

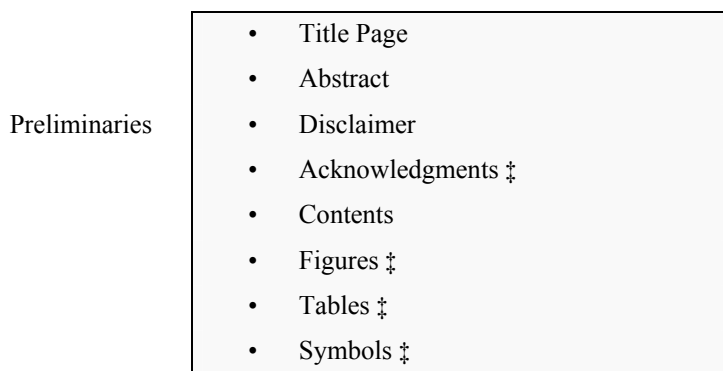


Figure 2 Preliminary components of a report

3.1.1 Title page

A model title page can be seen in Appendix B. A title should be brief but informative. A title page should be simple, attractive, and include the following information:

- name of the university
- name of the particular engineering school
- name and code of the course
- title of the report
- name of author(s) and ID number(s) (with the family name underlined)
- name of tutor/supervisor
- date of submission and/or date of experiment as applicable

3.1.2 Wording of the title of the report

In many cases the title of the report will be based on words from the information provided in assignment details. However, where an investigation or analysis has been undertaken, students will need to decide on a title. The wording of the title of a research report usually includes three elements of the investigation: the sample, the properties or property-linked process and the measurable effect of variables. For example, in the title *Laboratory studies of concrete expansion arising from delayed Ettringite Formation* (Lawrence 1993) the sample is *concrete*, the property-linked process is *expansion* and the variables are *delayed* and *Ettringite Formation*.

3.1.3 Disclaimer

A ‘disclaimer’ or declaration of authenticity is often required in major pieces of work such as large reports, projects and theses. It is a signed statement declaring that the report is the work of the stated author(s). The disclaimer should appear on a page following the abstract, and the acknowledgments may be on the same page. This is a possible disclaimer statement:

I declare the following to be my own work, unless otherwise referenced, as defined by the University’s policy on plagiarism. (This statement is followed by the author’s signature.

Students are not guilty of plagiarism if they have correctly referenced the sources of all material that is not their own work (see Appendix C for a university policy on plagiarism). Reference must be made both in the text of the report and in the reference list. A disclaimer may also be used to indicate that the report’s results, conclusions and recommendations are those of the author, and not necessarily a reflection of the opinions or policies of the university or sponsoring organisation.

3.1.4 Abstract

The abstract is also known as an overview, synopsis or summary. The abstract is often written last as its purpose is to provide a summary of the report’s essential information. All material in the abstract will also be in the report, particularly the Introduction. The abstract should appear on a separate page after the title page, and it is usually about 100–200 words in length. The abstract should include the following elements:

- why? *background* problem and *purpose* of the report
- how? brief details of the approach/procedure/*methods*
- what? important *results*/findings
- so what? major *conclusion(s)* and recommendation(s)

In professions such as engineering, the abstract may be the key part of the report that is read. A manager may use the abstract to decide whether or not the content of the report is relevant. For academic purposes, an abstract allows researchers to quickly review literature and significant findings on a particular topic. An executive summary can be required for a more complex report. It is a detailed overview of the essential content, and its length can be several pages or more.

3.1.5 Acknowledgments

The acknowledgments section is optional; however, it is essential that significant assistance, editing or work carried out by another person or organisation be acknowledged. Also, students may wish to thank colleagues or supervisors. In a group-writing situation where different sections of a report are written by various people, writers of separate sections must be clearly identified.

3.1.6 Contents

The heading for the list of contents is Contents. The list should clearly include:

- all major section/subdivision headings; numbered and worded exactly as in the text of the report (Minor headings are optional.)
- page numbers for each section/subsection

Some students choose to include the preliminary pages on the contents list; however, the title page should be excluded. The contents page may be set out with each level of subheading indented by a tab space. This allows the reader to understand at a glance the structure of the report, and to differentiate between important and less significant information. Figure 3 gives a possible format for a contents list.

5	Modelling of linear and non-linear network parts	8
5.1	Linear network	8
5.2	Non-linear network	9
5.2.1	The function of saturation	9
5.2.2	The function of hysteresis	9
5.2.2.1	<i>Only use fourth-level headings if essential</i>	10

Figure 3 Indentation of headings in a contents list

3.1.7 Figures

The heading for the list of figures is Figures. The list is only necessary if more than a few figures appear in the main text of the report. The list includes the figure number, caption, and page number, ordered as in the text. For a model of a list of figures, see preliminary page viii.

3.1.8 Tables

The heading for the list of tables is Tables. The list is only necessary if more than a few tables appear in the main text of the report. The list includes the table number, caption, and page number, ordered as in the text. For a model of a list of tables, see preliminary page viii.

3.1.9 Symbols

Where symbols are used extensively, a list of definitions should appear at the beginning of the report. If there is no list, symbols should be defined in the text when first used. The heading for the list is Symbols. The list of symbols should include appropriate information such as the symbol, definition, quantity to which the symbol refers, and the unit of measurement. Use an appropriate number of significant figures or level of accuracy when presenting measurements.

All units of measurement should be in the metric form given by the International System of Units (SI: *Système International d'Unités*). Appendix D covers punctuating numerals and abbreviations, and care should be taken to include the space between the numeral and the unit (e.g. 55 cm). Table 3 indicates SI base units. If you are using another system of units, convert these to SI units.

Table 3 Base SI units

Quantity	Unit	Symbol
length	metre	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K

(from *Style manual for authors, editors and printers* 2002, p. 178)

3.2 Text of report

The pages of the text of the report (beginning with the Introduction) are numbered with Arabic numerals (1, 2, 3 etc.).

An effective report has clear objectives and presents information in a logical sequence (see section 5.2 Structuring writing). A structured approach assists the reader by providing a framework for reading the report. An effective structure includes an introduction, followed by material organised under appropriate headings, and ends with a conclusion and possibly recommendations (see Figure 4).

Care should be taken to refer to the sources of all information both in the text and in the reference list at the end (see section 4 Referencing of sources and originality).

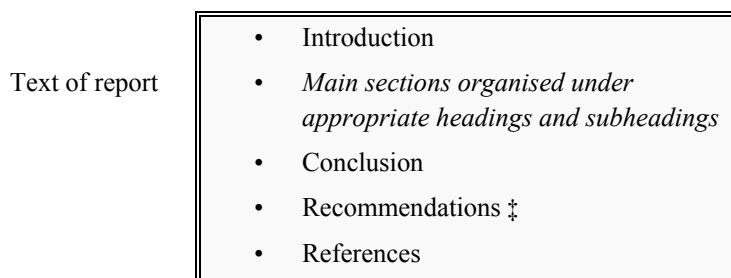


Figure 4 Components of the text of a report

3.2.1 Introduction

The Introduction gives the reader the necessary background information. It can include:

- a description of purpose(s) and objective(s)/topic(s)
- a statement of the problem(s)
- a survey of background information
- a review of previous work/research and the relationship to the current project
- the method(s) of approach
- an indication of the scope and limitations of study
- an outline of material presented in the rest of the report

(adapted from Michaelson 1990, p. 38)

3.2.2 Main sections

The main sections of the report expand and develop the material in a logical and coherent manner, reflecting the structure outlined in the Introduction. Information in the report should be placed in context, and well supported with evidence and documentation by using references. In Engineering you will be asked to write two types of reports, scientific and analytical.

In scientific reports based on experiments, the following areas, with appropriate headings, may be included:

- methods/procedures and materials used
- data collected/information presented
- findings or results/comparisons with previous work
- discussion or analysis of the material

In contrast, analytical reports are based on a review and analysis of literature and other evidence. The structure of these analytical reports is determined by the type and purpose of the report (e.g. a feasibility study identifies a problem and evaluates alternative solutions). The structure is also determined by the key ideas or themes that emerge from what has been read. A key skill in this process is to order information logically into sections.

Headings and subheadings should divide the report into well defined sections. Under each heading or sub-heading students explain, expand on and support the main ideas and claims that are made, referencing appropriately. A careful division of the report and choice of headings creates an outline or framework for the report which allows the reader to progress logically through the material. Lengthy reports are improved by introductions and summaries in each major section. For information about the format of headings, see section 2.3.3 Headings. While words such as ‘Introduction’ and ‘Conclusion’ may be appropriate headings, students should *never use* ‘Main body’ or ‘Main sections’ as headings.

Figures (including diagrams, graphs, sketches, photographs and maps) and tables (involving summarised data in rows and columns) can be incorporated into the text to give clear and concise information. Such visual aids support the content of the report and can communicate information more effectively. They must be located in the text as close as possible after the first reference to them. A sentence referring to the figure or table is necessary in the report. For example, ‘Over a five year period the performance of groups A, B and C have varied markedly, with no group indicating constant improvement (refer to Table 4)’. For formatting and labelling requirements, see section 2.4.4 Figures and tables.

Consideration should be given as to whether the data is better communicated to the reader by a table or a figure. Tables are particularly useful to represent comparisons or components. For example, you could write an introductory comment and provide a table listing advantages and disadvantages of two types of dwellings. Figures, on the other hand, are more commonly used to represent numerical trends like graphs. The significance of the data in Table 4 may be more clearly presented in the form of a graph, as can be seen in Figures 5 and 6.

Table 4 Sample table (from Hadgraft et al. 1994, p. 6) *

Year	A	B	C
1961	97.70	89.93	7.77
1962	1.20	7.74	-6.54
1963	36.10	39.24	-3.14
1964	31.00	30.11	0.89
1965	55.90	13.64	42.26

* Asterisks or other note identifiers (e.g. double daggers ‡) can be used in a footnote to add detail, e.g. to a table.

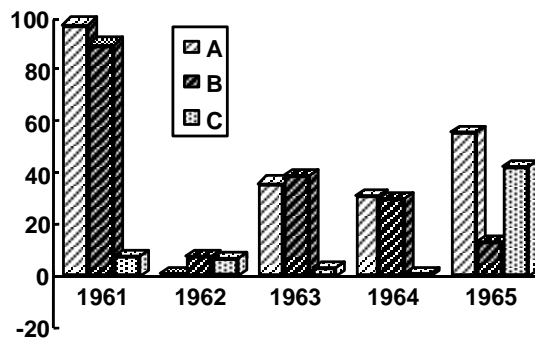


Figure 5 **Sample of 3D columns**
(from Hadgraft et al. 1994, p. 7)

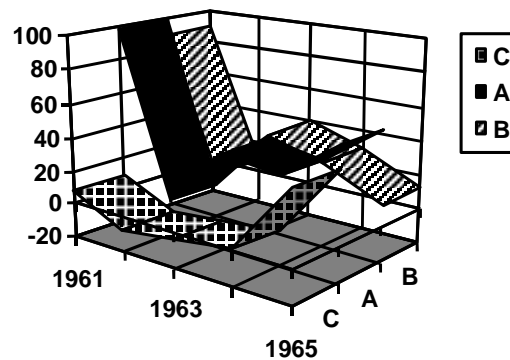


Figure 6 **Sample of 3D lines**
(from Hadgraft et al. 1994, p. 7)

3.2.3 Conclusion

The conclusion(s) of a report must be related to, and resulting from, the material which appears in the report. The content of the Conclusion will be linked to the Introduction. The Conclusion places findings in perspective without introducing any new material, and it may include:

- a clear and concise summary of the main points
- the context and significance of the information
- a reference to the original aim(s)/purpose(s) of the report
- the application(s) of the results
- the limitations and advantages of the findings
- the writer's judgment/evaluation

3.2.4 Recommendations

Not all reports include recommendations, but if they are required recommendations should emerge from the conclusions of the report. This section is important to those who must act on the findings. The writer may include a brief, persuasive statement before presenting the recommendations clearly listed in numbered or bullet points.

A series of recommendations may be worded in instructional language; for example, each beginning with a verb (e.g. *complete* testing). There are styles of reports where the Recommendations follow the Introduction. Recommendations may involve:

- strategies, procedures or techniques for solving the problem(s)
- an indication of further work which needs to be completed

3.2.5 References

A reference list must appear at the end of a report, listing all sources that have been referred to in the text. The heading for this list will be References. Students should ensure that all sources are referenced in the text as well as in the reference list at the end of the report.

The format of the reference list will depend on the system of referencing chosen for the report. There are two different types of reference lists used in engineering:

- alphabetical reference list according to author – used with the author-date (Harvard) system (see section 4.2.2 Alphabetical reference list)
- numbered reference list in order of their appearance in the text – used with the numerical (endnote) system (see section 4.3.2 Numbered reference list)

The reference list *only* includes the sources referred to in the report (the in-text references). A bibliography is a wider list of all texts that have been read in preparation for writing. A bibliography is not usually included in an engineering report (check with the lecturer).

3.3 Appendices

Not all engineering reports will need appendices, which are supplements to the text of the report (see Figure 7). The Appendices may include material which is incidental to the report, supportive of the report, or too long or technical to include in the text; for example, maps, folded diagrams, tables of results, letters, questionnaires, statistics, and computer program information. Large maps or figures should be reduced to A3 size where possible, and multiple folding is discouraged.

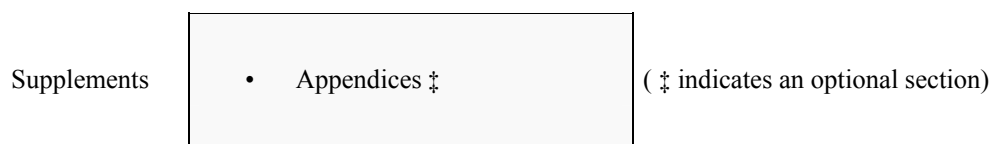


Figure 7 **Supplementary components of a report**

Each separate appendix should be lettered (Appendix A, Appendix B, Appendix C etc.). The text page numbering can continue into the Appendices, or alternatively, the Appendices can be numbered internally using the letter of the individual appendix and the number of pages within each appendix (A1, B1, B2, B3, C1, C2 etc. where Appendix A has one page, Appendix B has three pages, and so on).

4 Referencing of sources and originality

References must be provided in your report if you use someone else's opinions, theories, data or organisation of material, and this includes all occasions when you:

- paraphrase (use their same idea in your own words)
- summarise (use their main points)
- quote (use their exact words)
- copy (use their figures, tables or structure)

It is expected at university that students will present original work for assessment. Where any ideas or written work from other sources/authors appear in your report, you must acknowledge the sources by making reference to them. These references must be *in the text* as well as *in the reference list*. Failure to indicate the sources of your ideas may suggest that you are wrongfully claiming their ideas or words to be your own, which is known as 'plagiarism'. Universities impose heavy penalties on students who plagiarise (see Appendix C for an example of a plagiarism policy). Referencing of sources is also encouraged because it strengthens a writer's argument. Referencing shows wide reading and identifies important aspects of other research.

4.1 Two systems of referencing

There are two main ways of referencing sources in engineering reports:

- author-date referencing (Harvard system). See section 4.2.
- numerical referencing (endnote system). See section 4.3.

In a report, students must use *either* the author-date *or* the numerical system, not both. The main differences between the two systems are described in Figure 8.

Author-date referencing	Numerical referencing
In the text of report: <ul style="list-style-type: none">• author and date in parentheses e.g. ...validation of results (Smith 1992).• page number included if needed	In the text of report: <ul style="list-style-type: none">• consecutive numbers in square brackets e.g. ...validation of results [4].
Reference list at the end of report: <ul style="list-style-type: none">• alphabetical list of references<ul style="list-style-type: none">– author's surname first– date follows author– no page numbers of quotations– where more than one line in length, the second line is indented	Reference list at the end of report: <ul style="list-style-type: none">• numbered list of references<ul style="list-style-type: none">– author's initials or name can be before the surname– title follows author, with date appearing later– page numbers are last if needed

Figure 8 Differences between referencing systems

4.1.1 Choosing between referencing systems

When deciding on which referencing system to use, students should consider:

- the audience of the report
- the purpose of the report

An author's referencing style may be determined by the *audience* of the report — as specific referencing styles are often required by different lecturers, employers and publishers of journals and conference papers. For example, many international journals in Electrical Engineering use the numerical system, while academic journals in Mechanical Engineering often use the author-date system.

The selection of an appropriate system of referencing will also depend on the *purpose* of the report. Numerical referencing may be used where the purpose of a report is to communicate technical information and the conclusions are of more interest to the reader than the names of cited sources. The author-date system is useful where the purpose is to present scholarly research, such as in a research or project report, or in an academic article or thesis. The names of those who have completed previous work in the area will be of interest to the reader, and direct textual references to sources will therefore be useful, rather than having the reader turn to a list at the end.

Possible advantages and disadvantages of the two referencing systems are summarised in Figure 9.

Author-date referencing	Numerical referencing
Advantages <ul style="list-style-type: none">• allows author and date to be seen in context within the text of report• saves turning to a list at the end to find the name of a cited source• provides an alphabetical reference list at the end• means that inserting extra references into the text is easy	Advantages <ul style="list-style-type: none">• prevents the text of the report from being interrupted by wordy references• prevents constant repetition of the same references as only a number needs repeating
Disadvantages <ul style="list-style-type: none">• creates very long author-date entries if there are multiple authors and sources• creates repetition and disruption to the text when the same source is used repeatedly	Disadvantages <ul style="list-style-type: none">• creates a non-alphabetical reference list at the end• means turning to reference list to match a numerical reference to its source• may create complications if an extra reference needs inserting later

Figure 9 Advantages and disadvantages of referencing systems

4.1.2 Consistency in referencing

The numerical system and author-date system outlined below are based on the style that is common for engineering report writing, and the *Style manual for authors, editors and printers* (2002). Other methods of each referencing system are used by individuals, Divisions and publishers. It is therefore important for internal consistency that only one version of a referencing system is used within any report. When referencing sources, writers should also take particular care to maintain consistency with punctuation.

For further guidelines, students can refer to a librarian or the *Style manual for authors, editors and printers* (2002).

4.2 Author-date referencing (Harvard system)

There are two major elements involved in the author-date system of referencing:

- in the text – the author's surname and date appear in parentheses or round brackets ()
- at the end – an alphabetical reference list is included.

4.2.1 In-text author and date

To acknowledge a source *within the text* of your report using the author-date system of referencing, you should state the following items:

- author's surname
- date of the publication
- page numbers, if necessary (e.g. when material is quoted or copied).

This information should appear in parentheses or round brackets () directly after the material quoted (see the first example below). If the author's name has already been used in the text of the report then it does not need to be placed in the brackets, as seen in the alternative example below.

Author-date references in the text

a quotation is used	It has been argued that 'the relative seriousness of the two kinds of errors differs from situation to situation' (Smith 1982, p. 47). or Smith (1982, p. 47) has argued that 'the relative seriousness of the two kinds of errors differs from situation to situation'.
the author's words are paraphrased	A recent study (Jones & Chan 1991) has shown that testing procedures are inadequate.
the same author is cited again	Another argument raised by Smith (1982) relates to the error evident in the conclusion.
several different sources need to be cited at the same time	Jones and Chan (1991), Kuwlesky (1988) and Tan (1992), all agree that testing procedures are inadequate. or Recent studies (Jones & Chan 1991; Kuwlesky 1988; Tan 1992) all agree... [names of first authors are alphabetical; and separated by semicolons]

there are two or three authors	<p>A recent study (Lim, Thompson & King 1993) found...</p> <p>or</p> <p>Lim, Thompson and King (1993) found the analysis...</p> <p>[use an ampersand (&) when in the brackets; or 'and' outside]</p>
more than three authors appear	<p>A recent study (Boyd et al. 1994) has indicated...</p> <p>or</p> <p>Boyd et al. (1994) have indicated...</p> <p>['et al.' means 'and the others']</p>
there are different authors with the same surname	<p>The theory was first put forward in 1970 (Jones, CL 1971), but since then many researchers, including AG Jones (1983), have rejected the idea.</p> <p>[differentiate between authors by using initials]</p>
you are referring to an author (primary reference) which you read about in another book or article (secondary reference)	<p>Marini (Tan 1992) stated that...</p> <p>[Marini is the primary reference]</p> <p>or</p> <p>Marini's study in 1975 (cited in Tan 1992) stated that...</p> <p>or</p> <p>Tan (1992), in reporting Marini's 1975 study, states that...</p>
reference is made to more than one work by the same author	<p>University research (Smith 1982, 1988) has indicated that...</p> <p>or</p> <p>University research conducted by Smith (1982, 1988) has indicated that...</p>
the same author has published two or more things in the same year	<p>In recent reports (James 1992, 1993a, 1993b), recommendations were made...</p> <p>or</p> <p>Recommendations by James (1993b) were implemented...</p> <p>[add a, b, c etc. to distinguish between texts in the same year]</p>
no author's name appears (but there is a sponsoring body, newspaper or title)	<p>A recent study (CSIRO 1990) has suggested...</p> <p>or</p> <p>A recent survey (Advertiser 24 Jan. 1994, p. 5) indicated that...</p> <p>or</p> <p>A recent survey (Population Projections 1996) shows that...</p>
the editor's name is the identifying feature	<p>Current articles (ed. Harris 1994) on the industry suggest that...</p> <p>or</p> <p>Current publications edited by Harris (1994) suggest that...</p>
no date can be established	<p>Lewis (n.d.) continued the study...</p> <p>or</p> <p>The study was continued (Lewis n.d.)...</p>

the source is unpublished	Nguyen (unpub.) argues for... or An argument (Nguyen, unpub.) has been made for...
reference is made to a personal communication	In a telephone conversation on 17 July 1994, BT King revealed the site to be safe. or The site's safety is proved (King, BT 1994, pers. comm., 17 July). [personal communications are not included in the reference list]

4.2.2 Alphabetical reference list

When using the author-date system of referencing, you must include an alphabetical reference list *at the end* of the report (before the Appendices) listing all sources cited. Personal communications such as conversations or personal email messages need not be included in the reference list, as they cannot be checked. When writing the reference list you must take care to include the *correct elements*, and to use the *correct punctuation*.

The elements required for a *book* are: the author's surname(s) and initials, year of publication, title, publisher, and place of publication (other elements may also be relevant — see Appendix E). The correct order of these elements is indicated by this example:

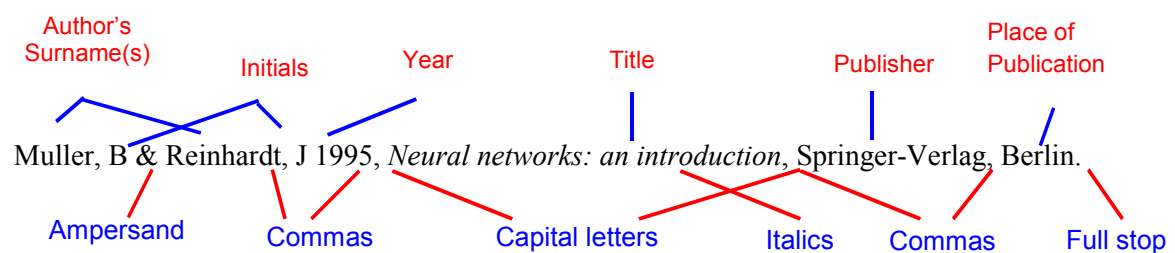


Figure 10 **Book in author-date reference list**

The elements required for a *journal article* are: the author's surname(s) and initials, year of publication, title of the article, title of the journal, volume number, issue number, and page numbers. Some elements will not always apply, and sometimes others will be relevant — see Appendix E.

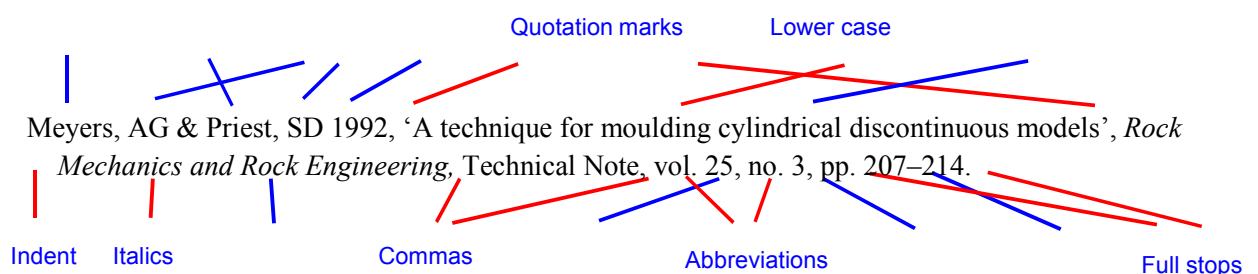


Figure 11 **Journal article in author-date reference list**

The elements for *electronic sources* are the author's surname(s) and initials or organisation responsible for the source, date of publication, title, type of medium (e.g.[online] or [CD-ROM], except for Internet source), edition, place of update/revision, date of viewing, location (may include: a host document; availability and access number), notes

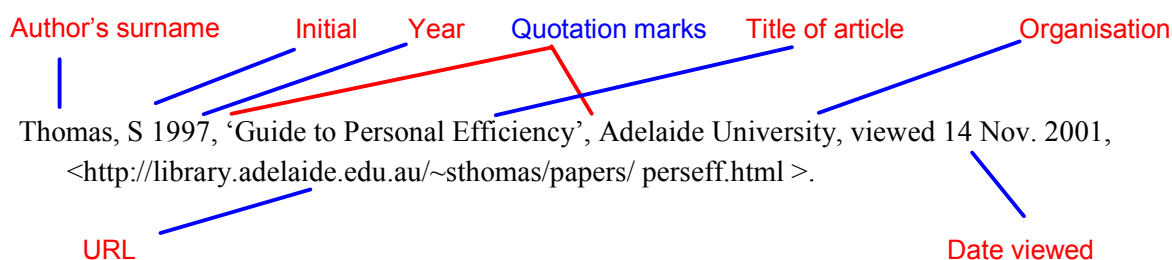


Figure 12 **Electronic source in author-date reference list**

The following aspects of punctuation should be included.

- Commas used to separate all elements.
- Full stops used for the abbreviation of words, and the end of the reference.
- Ampersand (&) used to separate last two authors — instead of 'and'.
- *Italics* or underlining used to indicate the title of a book or journal.
- Single quotation marks used to indicate the title of an article.
- Titles of unpublished works — such as theses — are not differentiated (by italics, underlining or quotation marks).
- Capital letters should be kept to a minimum in titles of books, articles and unpublished works except for titles of journals which require capital letters for all main words.
- Short indentation of the second and subsequent lines of a reference helps to show the alphabetical order.

A reference list is arranged in alphabetical order according to the authors' surnames.

- If there is no author, then they are listed alphabetically using the first word of the title, excluding 'a' or 'the'.
- If there are two or more references by the same author(s), they are listed in order of publication date, with the oldest work first.
- If works by the same author(s) are published in the same year, they are arranged alphabetically by title of the work; lower-case letters are added to the publication dates to distinguish each work (e.g. 1992a).
- Works where the author is the sole author are listed before works where the author is the senior author with co-authors, regardless of date of publication.

For example, this is the **correct alphabetical order for an author-date reference list**:

- Aukland, JS 1989, *A solar airconditioning system*, M Eng Thesis, South Australian Institute of Technology.
- Browne, TE Jr (ed.) 1984, *Circuit interruption: theory and techniques*, M Dekker, New York.
- Commission of Inquiry into Poverty 1975, *Poverty in Australia*, First Main Report (Prof. RF Henderson, Chairman), AGPS, Canberra.
- Dictionary of scientific and technical terms* 1994, 5th edn, McGraw-Hill, New York.
- Henderson Report. *See* Commission of Inquiry into Poverty 1975.
- Meyers, AG & Priest, SD 1992, 'A technique for moulding cylindrical discontinuous models', *Rock Mechanics and Rock Engineering*, Technical Note, vol. 25, no. 3, pp. 207–214.
- Muller, B & Reinhardt, J 1995, *Neural networks: an introduction*, Springer-Verlag, Berlin.
- Oss, ME & Mackie, JJ 2001, 'Technology for Market Survival', *Behavioural Health Management*, vol. 21, no. 1, pp. 20-5, viewed 26 Nov. 2001, *Academic Search Elite*: EBSCOhost. AN 4158374.
- Sharma, S, Rafailovich, MH, Peiffer, D & Sokolov, J 2001, 'Control of Dewetting Dynamics by Adding Nanoparticle Fillers', *Nano Letters*, vol 1, no. 10, pp. 511-514, viewed 14 Nov. 2001, American Chemical Society, Available from Internet <<http://pubs.acs.org/journals/nalefd/index.html>>.
- Subramanian, C 1992, 'Some considerations towards the design of a wear resistant aluminium alloy', *Wear*, vol. 155, pp. 193–205.
- Subramanian, C & Strafford, KN 1993a, 'Review of multicomponent and multilayer coatings for tribological applications', *Wear*, vol. 165, pp. 85–95.
- Subramanian, C & Strafford, KN 1993b, 'Towards optimization in the selection of surface coatings and treatments to control wear in metal-forming dies and tools', *Materials & Design*, vol. 14, pp. 291–298.
- Subramanian, C, Strafford, KN, Wilks, TP, Ward, LP & McMillan, W 1993, 'Influence of substrate roughness on the scratch adhesion of titanium nitride coatings', *Surface & Coatings Technology*, vol. 62, pp. 529–535.

The sources referred to in a reference list may be books, articles, reports, journals, conference papers, newspapers, audiovisuals, electronic and other non-print material. The reference list includes all sources in alphabetical order.

Author-date reference lists

Examples of books

One or two authors	Muller, B & Reinhardt, J 1995, <i>Neural networks: an introduction</i> , Springer-Verlag, Berlin.
3 or more authors	Arrillaga, J, Arnold, CP & Harker, BJ 1983, <i>Computer modelling of electrical power systems</i> , Wiley, Chichester.
No author, 2nd or later edition	<i>Computer integrated manufacturing</i> 1990, 2nd edn, Architecture Technology Corporation, Minneapolis.
Books sponsored by an institution, corporation or other organisation	McKinsey & Company & the Australian Manufacturing Council Secretariat to the Australian Manufacturing Council 1993, <i>Emerging exporters: Australia's high value-added manufacturing exporters: final report of the study</i> , Australian Manufacturing Council, Melbourne.
Edited work (role of editor not paramount)	<i>The electrical engineering handbook</i> 1997, ed. Richard C Dorf, CRC Press, Boca Raton.
Edited work (role of editor paramount)	Browne, TE Jr (ed.) 1984, <i>Circuit interruption: theory and techniques</i> , M. Dekker, New York.
One volume of multi-volume work	Gopel, W, Hesse, J & Zemel, JN (eds) 1989, <i>Sensors: a comprehensive survey</i> , vol. 1, <i>Fundamentals and general aspects</i> , eds T Grandke & WH Ko, VCH, Weinheim, Germany.
Chapter in edited book	Stead, JP & Strutt, JE 1987, 'Marine corrosion on offshore pipelines: predicting the problem using computer-aided risk evaluation', in <i>Plant corrosion: prediction of materials performance</i> , eds JE Strutt & JR Nicholls, Ellis Horwood, Chichester.

Examples of journals

One or two authors	Albrecht, P & Shabshab, C 1994, 'Fatigue strength of weathered rolled beam made of A588 steel', <i>Journal of Materials in Civil Engineering</i> , vol. 6, pp. 407–428.
Issue number included (if each issue is paginated separately)	Meyers, AG & Priest, SD 1992, 'A micro-processor controlled pump for triaxial cell pressure control', <i>International Journal of Rock Mechanics and Mining Sciences & Geomechanics Abstracts, Technical Note</i> , vol. 29, no. 2, pp. 187–191.
No author	'Efficient low cost solar cell developed' 1994, <i>Search</i> , vol. 25, p. 309.

Specialised sources

Conference papers	Hunt, FL 1990, 'Ballarat East — from Eureka to the 80's', <i>Proceedings of the Pacific Rim Congress 90, Gold Coast, Australia</i> , Vol. III, Australasian Institute of Mining and Metallurgy, Parkville, Victoria, pp. 473–480.
Maps	Mullineaux, DR 1976, <i>Preliminary overview map of volcanic hazards in the 48 conterminous United States</i> , U. S. Geological Survey Miscellaneous Field Studies Map MF–786, scale 1:7 500 000.
Standards	American Society for the Testing of Materials 1988, <i>Standard specification for cast steel wheels for railway service</i> , (A 583 – 88), ASTM, Philadelphia. Standards Association of Australia 1991, <i>Australian Standard: electrical installations — buildings, structures and premises, known as the saa wiring rules</i> , (AS 3000 – 1991), Standards Australia, North Sydney.
Patents	Tan, IS & Arnold, FF (US Air Force) 1993, <i>In situ molecular composites based on rigid-rod polyamides</i> , US patent 5 247 057.
Government publications	Bureau of Transport Economics 1986, <i>Demand for Australian domestic aviation services</i> , Occasional Paper no. 79, AGPS, Canberra. Australian Bureau of Statistics 1994, <i>Building approvals Australia</i> , Cat. no. 8731.0, ABS, Canberra. Ergas, H 1986, <i>Telecommunications and the Australian economy</i> , Report to the Department of Communications, AGPS, Canberra.
Government reports	Commission of Inquiry into Poverty 1975, <i>Poverty in Australia</i> , First Main Report (Prof. RF Henderson, Chairman), AGPS, Canberra. Henderson Report. <i>See</i> Commission of Inquiry into Poverty 1975.
Newspaper articles	Fist, S 1994, 'The call to disconnect analogue phones', <i>Australian</i> , 2 Aug., p. 25.
Pamphlet	<i>Quit: give smoking away in 5 days</i> 1987, Victorian Smoking and Health Program booklet, Health Department Victoria, Anti-Cancer Council and National Heart Foundation, May.
Microfiche	Herbert, WG 1987, <i>The Australian beef industry: an overview</i> , Australian Livestock Council, Canberra, microfiche.
Video	<i>What are we going to do with the money?</i> (video recording) 8 August 1982, ABC Television.

Examples of unpublished material (Note: No quotation marks are used for the title.)

Thesis	Son, M 2000, 'Design and fabrication of a miniaturised flow injection analysis system - and its application to the analysis of glucose and other analytes', PhD thesis, University of South Australia.
Unpublished report	Janz, JK 1993, Orroroo bedrock drilling 1993, South Australian Department of Mines & Energy, Unpublished Report RB 93/042.

Examples of electronic media

Document on World Wide Web (Internet)	desJardins, M 1998, 'How to Succeed in Postgraduate Study', Applied Ecology Research Group, University of Canberra, viewed 26 April 2001, http://aerg.canberra.edu.au/jardins/t.htm .
Document via email	Harnad, S 1992, Post-Gutenberg galaxy: The fourth revolution in the means of production of knowledge, in <i>Directory of electronic journals, newsletters and academic discussion lists</i> , 2nd edn [Online]. Available email: LISTSERV@UOTTAWA Message: Get EJOURNL1 DIRECTORY
Journal article on CD Rom	Girotti, TB, Tweed, NB & Houser, NR 1990 February, 'Realtime var control by SCADA', <i>IEEE Transactions on power systems</i> [CD Rom] vol. 5, no. 1, pp. 61–64. Available: UMI File: IPO (IEEE/IEE Publications Ondisc) Item: 3631953
Journal article from an electronic journal	Sharma, S, Rafailovich, MH, Peiffer, D & Sokolov, J 2001, 'Control of Dewetting Dynamics by Adding Nanoparticle Fillers', <i>Nano Letters</i> , vol 1, no. 10, pp. 511-514, viewed 14 Nov. 2001, American Chemical Society, Available from Internet < http://pubs.acs.org/journals/nalefd/index.html >.
Online databases	<i>The educational directory</i> [Online] 1992. Available: Knowledge Index File: The Educational Directory (EDUC6)
Discussion lists, newsgroups	<i>Alcohol and Drug Studies</i> , 1998, [online], viewed 15 Sept. 1999, Available email: ALCO-L@LMUACAU.BITNET . Harnad, S 1992, 'Post-Gutenberg galaxy: The fourth revolution in the means of production of knowledge', in <i>Directory of Electronic Journals, Newsletters and Academic Discussion Lists</i> , 2nd edn. [online], viewed 27 Dec. 1995, Available email: LISTSERV@UOTTAWA Message: Get EJOURNL1 DIRECTORY.

Electronic book (ebook)	Trochim, WM 2000, <i>The Research Methods Knowledge Base</i> , 2 nd edn., updated 2 Aug. 2000, viewed 14 Nov. 2001, Available from Internet < http://trochim.human.cornell.edu/kb/index.htm >.
Computer programs	MathWorks, 2001, <i>MATLAB</i> [CD-ROM], ver. 6, rel 12, [Computer program]. Available Distributor: The MathWorks Inc., 24 Prime Park Way, Natick, MA, 01760-1500, USA.

4.3 Numerical referencing (endnote system)

There are two major elements involved in the numerical system of referencing:

- in the text – consecutive numbers appear in square brackets []
- at the end – a numbered reference list is included

4.3.1 In-text numbers

To acknowledge a source *within the text* of your report using the numerical referencing system, you should place an Arabic number in square brackets after the quotation, relevant material, or author's name. This number will then be repeated in the reference list with the corresponding details of the source (e.g. the reference list will include elements such as the author, title, and page numbers).

Consecutive numbers should be used for each new reference. However, where you cite the same source or reference more than once in the report, you can use the same number again each time. However, if a second citing of a source involves a different page number, then a new numerical reference is used — and a corresponding new entry will be included in the reference list.

Numerical references in the text

a quotation is used	It has been argued that 'the relative seriousness of the two kinds of errors differs from situation to situation' [1]. <i>or</i> Smith [1] has argued that 'the relative seriousness of the two kinds of errors differs from situation to situation'.
the author's words are paraphrased	A recent study [2] has shown that testing procedures are inadequate.
the same author is cited again	Another argument raised by Smith [1] relates to the error evident in the conclusion.
several different sources need to be cited at the same time	Recent studies [2][7][9] all agree that testing procedures are... <i>or</i> Jones and Chan [2], Kuwlesky [9] and Tan [7], all agree...

there are two or three authors	A recent study [3] found the analysis... <i>or</i> Lim, Thompson and King [3] found the analysis...
more than three authors appear	A recent study [4] has indicated... <i>or</i> Boyd et al. [4] have indicated...
there are different authors with the same surname	The theory was first put forward in 1970 [5], but since then many researchers, including AG Jones [6], have rejected the idea.
you are referring to an author (primary reference) which you read about in another book or article (secondary reference)	Marini [7] stated that... <i>or</i> Marini's study in 1975 [7] stated that... <i>or</i> Tan [7], in reporting Marini's 1975 study, states that...
reference is made to more than one work by the same author	University research [1][8] has indicated that... <i>or</i> University research conducted by Smith [1][8] has indicated...
the same author has published two or more things in the same year	In recent reports [10][11][12], recommendations were made... <i>or</i> Recommendations by James [12] were implemented...
no author's name appears (but there is a sponsoring body, newspaper or title)	A recent CSIRO study [13] has suggested... <i>or</i> A recent survey [14] indicated that... <i>or</i> A recent survey, <i>Population Projections</i> , [15] shows that...
the editor's name is the identifying feature	Current articles [16] on the industry suggest that... <i>or</i> Current publications edited by Harris [16] suggest that...
no date can be established	Lewis [17] continued the study... <i>or</i> The study was continued [17]...
the source is unpublished	Nguyen [18] argues for... <i>or</i> An argument [18] has been made for...
reference is made to a personal communication	In a telephone conversation on 17 July 1994, BT King revealed the site to be safe. <i>or</i> The site has since proven to be safe (King, BT 1994, pers. comm., 17 July). <i>[personal communications are not included in the reference list]</i>

4.3.2 Numbered reference list

When using the numerical system of referencing, a *numbered* reference list appears *at the end* of the report (before the Appendices) listing all sources cited. Personal communications such as conversations or personal email messages need not be included in the reference list, as they cannot be checked.

The reference list is arranged in numerical order according to the sequence in which the authors were cited in the report. When writing the reference list you must take care to include the *correct elements*, and to use the *correct punctuation*.

Appendix E summarises the various elements which may be required in a reference list, and highlights the differences between the alphabetical and numerical reference lists. For a numerical reference list, the main differences include the following.

- The reference number appears first.
- The initials or given name come before the surname.
- The date appears at the end of the reference before any page numbers.

In a numbered reference list, the elements required for a *book* are: the author's initials and surname(s), title, publisher, place of publication, and year of publication. The correct order of these elements is indicated in this example. Note the use of appropriate punctuation.

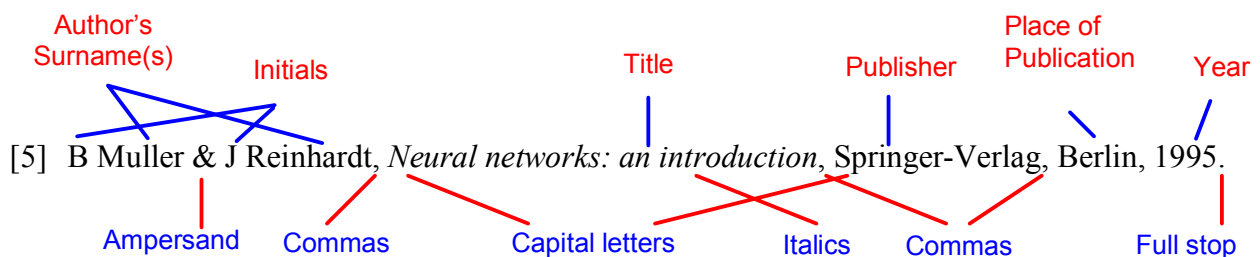


Figure 13 **Book in numerical reference list**

The elements required for a *journal article* are: the author's initials and surname(s), title of the article, title of the journal, volume number, issue number, year of publication, and page numbers. Some elements will not always apply, and sometimes others will be relevant — see Appendix E. The correct order of these elements is indicated in this example:

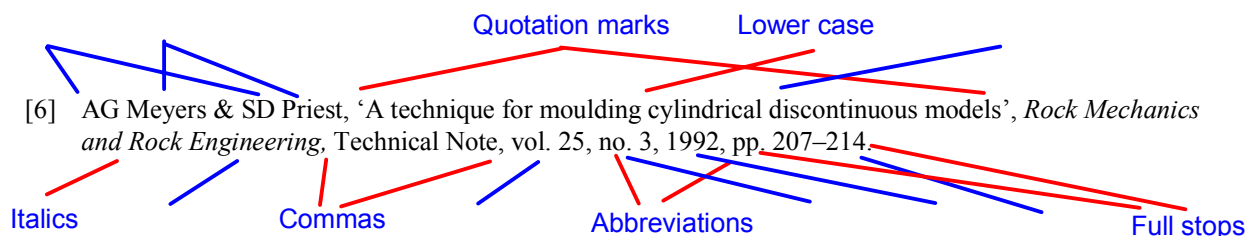


Figure 14 **Journal article in numerical reference list**

The elements for *electronic sources* are: the author's initials and surname(s) or organisation responsible for the source, date of publication, title, type of medium (e.g.[online] or [CD-ROM], except for Internet source), edition, place of update/revision, date of viewing, location (may include: a host document; availability and access number), notes

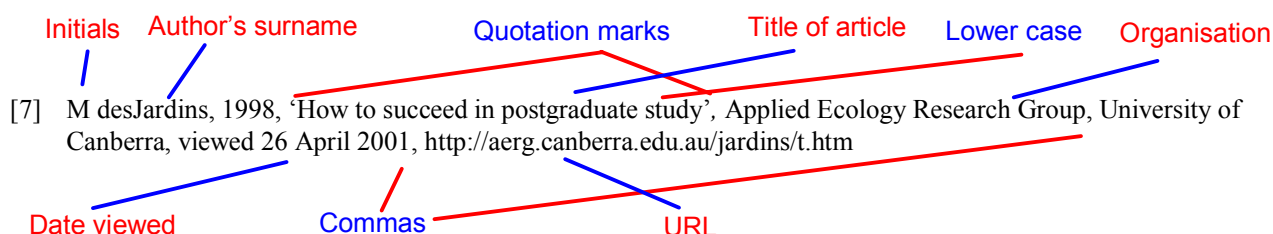


Figure 15 **Electronic source in author-date reference list**

The following aspects of punctuation should be remembered and used.

- Commas should be used to separate all elements.
- Full stops should be used for the abbreviation of words, and the end of the reference.
- Ampersand (&) used to separate last two authors — instead of 'and'.
- *Italics* or underlining should be used to indicate the title of a book or journal.
- Single quotation marks should be used to indicate the title of an article.
- Titles of unpublished works are not differentiated (by italics, underlining or quotation marks).
- Capital letters should be kept to a minimum in titles of books, articles and unpublished works except for titles of journals which require capital letters for all main words.
- Initial numerical reference can be with or without square brackets [].

The sources referred to in a reference list may be books, articles, reports, journals, conference papers, newspapers, audiovisuals, electronic and other non-print material. For a detailed list of examples, see section 4.2.2 Alphabetical reference list — but note that numerical references are not presented alphabetically, and the sequence of the elements needs to be adapted to the appropriate style.

Examples of numbered reference lists

1. *Dictionary of scientific and technical terms*, 5th edn, McGraw-Hill, New York, 1994.
2. JS Aukland, 'A solar airconditioning system', M Eng Thesis, South Australian Institute of Technology, 1989.
3. B Muller, & J Reinhardt, *Neural networks: an introduction*, Springer-Verlag, Berlin, 1990.
4. AG Meyers, & SD Priest, 'A technique for moulding cylindrical discontinuous models', *Rock Mechanics and Rock Engineering*, Technical Note, vol. 25, no. 3, 1992, pp. 207–214.
5. TE Browne, Jr (ed.) *Circuit interruption: theory and techniques*, M Dekker, New York, 1984.

or alternatively, using square brackets, for example:

- [1] *Dictionary of scientific and technical terms*, 5th edn, McGraw-Hill, New York, 1994.
- [2] JS Aukland, 'A solar airconditioning system', M Eng Thesis, South Australian Institute of Technology, 1989.

5 Planning and writing

Writing a quality report requires careful planning, drafting and several revisions. It also requires effective use of appropriate technical language. Planning techniques are suggested and technical language is considered in terms of sentence structure, grammar, vocabulary and punctuation. (The use of punctuation in technical writing is detailed in Appendix D.)

A quality engineering report exhibits the following characteristics:

- *clear* statement of aim or purpose
- *concise* and accurate presentation of detail
- *cohesive*, logically organised development of data and ideas
- *considered* objective separation of fact and opinion
- *categorised* layout of well-spaced headings, paragraphs and visuals.

5.1 The writing process

The process of writing a report involves planning and gathering information, reading, noting, and sorting that information into logically sequenced sections. The planning and noting leads to the writing of the first draft which is revised several times to meet the required standard. There is no prescribed order for these activities, for example locating information might need to reoccur after the completion of the first draft. This process of development is facilitated by using many resources, as summarised in Table 1 (page 1). Students may also find it useful to refer to report writing resources available from their university library (see Appendix F).

5.2 Starting the planning

The planning stage of a report should include clarifying expectations about the purpose of the report and who will read it. The *purpose* of a report or a section of a report may be to:

- analyse data/literature is investigated; gaps are identified
- inform information or research is outlined; results are presented
- instruct procedures are explained; strategies are provided
- persuade conclusions are discussed; recommendations are made
- document written record is created and filed.

For example, the purpose of a report might be to analyse ‘Solar cells’, document their operation, and recommend one application. The report must also be written appropriately for its intended readers or *audience* who, for engineers, are often other engineers. Once it is clear *why* a report is being written and *for whom*, then *how* to write will become more evident.

5.2.1. Planning techniques

Once the expectations of purpose and audience have been clarified, each section can be planned. Useful initial techniques are asking questions, brainstorming, mindmapping and developing a Contents page.

5.2.1.1 Asking questions and brainstorming

One technique to start is to ask yourself questions. These may be: What? Where? When? Why? and How? For example, the planning of an engineering report on solar energy may be assisted by asking such questions as:

- What is solar energy?
- Where and when is solar energy predominantly used?
- Why is usage of solar energy currently limited?
- How is solar energy utilised in engineering contexts?

Asking questions helps to generate ideas and key words for the structure of sections and paragraphs, and for the associated headings.

Another technique for planning is to “storm” or generate ideas in a random way. List all the ideas or keywords that come to mind, as shown in the example below. *Do not attempt to organize these ideas at this stage.*

Brainstorm example – Solar energy

Solar cells	Why?	Suitability of location
Weather	Financial	Amount of sunshine
Advantages	Businesses	Infrastructure
Disadvantages	Location

5.2.1.2 Mindmapping

The lists of questions and key words must be logically organized. One way is to make logical lists or keep logically sorted information on different cards. Another way is to develop a mindmap or diagram that links all the ideas. The shape of a mindmap will depend on how you see the connections between items of the information – it may be a flow chart, a spider’s web, a cycle or some other figure. The use of colour helps to link the information visually and suggests possible sizes of headings and sub-headings to be used.

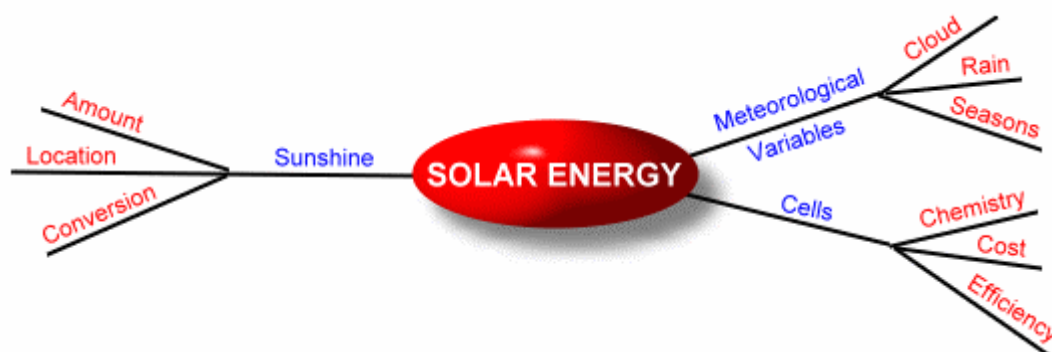


Figure 16 Mindmap showing logical organisation of ideas relating to solar energy.

5.2.1.3 Developing a Contents page

The organisation of a logical list, sets of notes on cards or a mindmap will suggest ways to prioritise different sections of the information and generate a series of headings and subheadings. Once three levels of headings and subheadings have been developed, the sections start to develop a logical argument.

Contents
1 Solar energy
1.1 Sunshine
1.1.1 Amount
1.1.2 Location
1.1.3 Conversion
1.2 Meteorological variables
1.2.1 Cloud cover
1.2.2 Wind
1.2.3 Rain
1.2.4 Seasons

Figure 17 An example of a section of a Contents page

There are several ways of using computers to facilitate the development of a Contents page. Refer to the Help menu of the word processing software on your computer for further information on creating Contents pages.

5.3 Starting the writing

When beginning to write a report, students may find it easier to write the main sections first. It can be useful to write the introduction later as it usually includes an outline of the structure of the whole report. The conclusion and abstract or summary are also written more easily after completing the main sections.

5.4 Structuring writing

Information in a technical report is systematically developed at several levels: *sections*, *paragraphs* and *sentences*. The organisation of this information can be controlled using various techniques including:

- different levels of headings
- summary, overview or key statements indicating purpose
- visual aids such as tables and figures
- bullet points (dots •), dashes and lists
- linking sentences between sections and paragraphs

5.4.1 Cohesive paragraphs

Paragraphs are groups of sentences which organise information into the essential units of the report. Before writing a paragraph, the writer should be clear about the purpose(s) of the paragraph. A useful technique is to decide what the reader needs to know.

The broad and specific purposes of paragraphs in technical writing (see Appendix G) involve:

- describing facts (e.g. paragraphs which define, classify, and describe)
- describing the relationship between facts (e.g. paragraphs which describe, analyse, compare and contrast)

A paragraph should begin with a general overview or summary statement before the specific or exemplifying information is given. Exemplifying information may include examples, illustrations, descriptions, explanations and evidence which expand the ideas. A paragraph is often structured with:

- a key sentence (introducing main idea and/or giving context)
- concept development (expanding main idea/giving specifications etc.)
- a summary statement (concluding with main idea/linking to what follows)

Connectors or linking words help create cohesion within the paragraph and between paragraphs. Information should be organised systematically and one way of achieving this is to use connectors or linking expressions (see Table 5).

Table 5 Connectors/linking words and phrases

Purpose for link	Connecting word or phrase
show time/sequence	first, second, finally, shortly, immediately, soon, subsequently
show importance	first, next, most significant, least
add ideas	again, furthermore, additionally, indeed, moreover, another
show cause and effect	thus, since, so, therefore, as a result, hence, consequently, then
indicate a summary	in brief, finally, to conclude, in fact, indeed, on the whole
show comparison/contrast	on the other hand, though, similarly, however, nevertheless
give illustration	for example, in illustration, specifically, for instance
show concession	granted, despite, while, notwithstanding, of course
show position	next to, beside, in, out, below, juxtaposed

(Adapted from Marshall & Rowland 1993, p. 174)

5.4.2 Clear sentences

Complex sentences are more difficult to read and often contain more grammatical errors. Reading the report aloud is one technique for locating errors. Students should aim to keep sentences as short as possible, although it is effective to vary sentence length. Shorter sentences are useful as summary statements and for emphasis.

5.5 Structuring sentences

5.5.1 Proximity of detail and item

Reading information is easier and the meaning is less confused if the sentence components are kept close together. Care should be given to the proximity of:

- the subject and verb (person and action), e.g.

The test results were confirmed as accurate after a review.	✓
(subject) (verb)	
not	
The test results after a review were confirmed as accurate.	✗
(subject) (verb)	
- an item, and its detail or description, e.g.

Arrangements were made for a meeting to be held on 19 June.	✓
not	
On 19 June, arrangements were made for a meeting.	✗

5.5.2 Series of nouns

Reading is improved and less ambiguous when a long series of nouns is avoided. Also, when verbs or processes are written as nouns (by adding ‘ment’, ‘ance’, and ‘tion’ etc.) the sentence becomes complicated.

e.g.	The first test to check the circulating water flow of the cooling tower...	✓
not	The initial performance flow test of the cooling tower circulating water...	✗
e.g.	The fault occurred causing difficulties.	✓
not	The occurrence of the fault caused difficulties.	✗

5.5.3 Parallel construction

Items which are listed or grouped should be presented in a parallel form. ‘Parallel’ means the same grammatical structure, sentence length, capitalisation and layout.

e.g.	Reading is easier than writing.	✓
not	Reading is easier than to write.	✗

Parallel construction is critical with the use of bullet points or lists (as in instructions, procedures or recommendations).

e.g.	Some aspects of concern are:	✓	not:	✗
	• the security of the data;		• the need to protect security;	
	• the protection of confidentiality; and		• without doubt, confidentiality;	
	• the costs of such measures.		• often these are expensive.	

(adapted from Hadgraft et al. 1994, p. 21)

5.6 Grammar

5.6.1 Active and passive voice

The passive voice is usually used in engineering reports where the writing is intended to be impersonal and objective. A passive sentence uses a form of the verb ‘to be’ (e.g. ‘is’, ‘was’, ‘has been’, ‘will be’), plus the past participle of the verb often made by adding ‘ed’ to the verb (e.g. ‘tested’, ‘identified’, ‘monitored’). The passive voice is preferred when the human subject or agent is less relevant than the activity. In a passive sentence, the human subject is placed last or can be removed from the sentence.

e.g.	The situation has been monitored by a researcher.	(passive)
	(human subject at end)	
e.g.	The situation has been monitored .	(passive)
	(no human subject)	

The active voice emphasises the human subject or agent by placing it first in the sentence. If no human is directly involved in the action of the sentence (e.g. the subject is a piece of equipment), then it is appropriate to use the active voice.

- e.g. A researcher **has monitored** the situation. (active)
(human subject emphasised)
- e.g. Temperature gauges **monitored** the air inside the cylinder. (active)
(non-human subject emphasised)

The important issue in the choice between active and passive sentences is placing the *key aspect* — whether the activity (passive) or the agent (active) — at the beginning of the sentence.

5.6.2 Tense of verbs

Verb tense changes according to the section in the report, the purpose of the section or sentence and the type of information included. The following suggestions are a general guide only:

- Use *present tense* to explain or discuss
 - continuing objectives e.g. The aim of this report **is** to...
 - general principles or laws e.g. Ohm's law **states**...
 - data or results e.g. These results **show**...
 - procedures or instructions e.g. **Identify** each item by code...
- Use *past tense* or the past perfect) to state or describe
 - what the objectives were e.g. The main purpose **was**...
 - what equipment was used e.g. The cylinders **were** reused...
 - what procedure was followed e.g. After careful cleaning, the test tubes **were**...
 - what happened e.g. The damage to the component **had been**...

The review of literature including other research may be written in either the present, past or the present perfect tense. Using the present tense is often less complicated.

- e.g. The research by Elberg (1993) **shows**... (present tense)
- e.g. The research by Elberg (1993) **showed**... (past tense)
- e.g. The research by Elberg (1993) **has shown**... (present perfect tense)

5.6.3 Agreement between noun and number

Nouns need to agree with the number before them. In other words the names of things need to be singular (without an 's') or plural (with an 's') according to whether there is only one or more than one.

- | | | |
|-----------------------|----------------------------------|---|
| e.g. the first check_ | ... several checks_ | ✓ |
| (singular) | (plural) | |
| e.g. a pilot program_ | ... three pilot programs_ | ✓ |
| (singular) | (plural) | |

Some nouns do not use an 's' to indicate whether they are singular or plural.

- e.g. three pieces of equipment_ ; much information_ ✓

5.6.4 Agreement between subject and verb

In a sentence, the subject and verb must agree in relation to *number* and to *person*:

e.g. The results (plural subject)	... are available (plural verb)	✓
e.g. The organisation (single subject)	... is progressing (single verb)	✓
e.g. I (first person subject)*	... am responsible (matching verb)	✓
e.g. They (third person subject)	... are responsible (matching verb)	✓

Mistakes with regard to agreement are common when a single subject is separated from its verb by other plural words, causing the subject to appear to be plural when it is not.

e.g. A list of results (single subject)	... is available. (single verb)	✓
not A list of results are available.	(A list <i>are</i> available??)	✗

The following rule helps students to check if they are using the correct verb (it applies when the present tense is used):

- If the subject is plural (ends in an 's'), then there is no 's' on the verb.
e.g. The tests ...demonstrate_
(subject + 's') (verb with **no** 's')
- If the subject is single (does not end in an 's'), then the verb does end in an 's'.
e.g. The test_ ...demonstrates
(subject with **no** 's') (verb + 's')

5.7 Vocabulary

5.7.1 Personal language

Currently in engineering reports, personal language ('I' or 'we' is avoided in preference to impersonal constructions which emphasise scientific objectivity.

e.g. The mining site was investigated.	✓
not I investigated the mining site.	✗

Personal language is occasionally used to distinguish between the views or findings of other authors and your own.

e.g. Nguyen (1993) determined...whereas my conclusions are...	(personal language)
e.g. Nguyen (1993) determined...whereas the conclusion of this study is...	(objective language)

5.7.2 Gender inclusive language

Gender neutral language is language which includes women and men equally. Technical reports should avoid using male-only terminology such as ‘he’. This can be achieved by:

- using both pronouns
e.g. he/she; s/he; his/her ✓
- using gender non specific terms
e.g. The drafter was responsible for the plans ✓
not The draftsman was responsible for the plans ✗
- restructuring the sentence to avoid personal pronouns
e.g. A report can be completed by the engineer ✓
not The engineer can complete his report ✗

Another method of being inclusive is to use the plural pronoun ‘their’ with a single subject when it would not be ambiguous. In the past, this was considered to be grammatically incorrect, but the University of South Australia’s current Policy on Gender Neutral Language (1991) explains that this is now an option.

e.g. The operator is to check their machine for safety... ✓

5.7.3 Jargon and slang

Clear and simple English should be used rather than jargon (specialised or pretentious language). New terms should be defined for the reader. A glossary of terms or abbreviations may be useful for long, complex reports.

e.g. The **use** of testing procedures was recommended. ✓
not The **utilisation** of testing procedures was recommended. ✗

Informal language or slang like “cool” or “really” should also be avoided. The words which are used should be precise to give an accurate meaning.

e.g. The diode was **soldered** into the circuit. ✓
not The diode was **put** into the circuit. ✗
e.g. Artificial intelligence **aims to imitate** a brain in a machine. ✓
not Artificial intelligence **is like** a brain in a machine. ✗

5.7.4 Repetition of words

Often writers have favourite words or expressions. Reports should avoid overuse of particular words, groups of words, or sentence structures.

not Then... Then... Then... ✗
not The test demonstrated... The result demonstrated ✗
not It is a requirement that... It is essential that... This signifies that... ✗

In technical writing, clear expression and attention to detail are essential.

6 Conclusion

While this document was not developed to be an inflexible set of rules, it is however intended to assist university engineering students in producing professional, well organised reports. Student report writing skills can be enhanced by the application of these guidelines in relation to formatting of documents, components, referencing, planning and writing reports.

Students are encouraged to write with attention to the contents of this *Style Guide*, but where instructed students should follow the directions given by their lecturers or school. Many resources, such as the library, are available to assist students in their report writing. The use of a specific format or style must be followed consistently throughout a report.

With careful initial planning of the presentation of their material, students can concentrate on the content being presented in the report. During the writing and editing process students may find it useful to refer to the Report writing checklist (Appendix H). A well written and logically structured report will result in a quality document which effectively conveys precise information to the reader.

7 Recommendations

With regard to the conclusions detailed above, the following recommendations have been formulated. Students are recommended to:

- identify and follow instructions from particular Schools or employers — particularly where such instructions vary from common practice
- read and use the information in this *Style Guide*
- ensure internal consistency in formatting (particularly of numbering and headings)
- give attention to visual impact and readability
- acknowledge sources by referencing both in the text and in a list at the end
- proofread and edit thoroughly all written work.

Students should remember that excellent content in a report needs to be supported by high quality presentation, and an accurate use of technical language.

8 References

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* This is an example of an alphabetical reference list — used with the author-date (Harvard) system. (For students who use the numerical referencing system, see section 4.3.2 for an example of a numerical reference list.)

A bibliography (a wider list of all texts that have been read in preparation for writing this document) has not been included in this *Style Guide*, as it is generally not required for engineering reports.

Appendix A National Competency Standards for Professional Engineers

Engineering students should take particular note of competencies 5.1.1 and 5.3.1, (our italics) which are expected of graduate students or Stage 1 Professional Engineers.

Graduates are expected to be able to demonstrate competency in these areas with limited guidance.

For more information see the Institution of Engineers Australia website at:

<http://www.ieaust.org.au/membership/res/downloads/NGCS.pdf>

5. Communication

5.1 Communicate effectively in the English language

- 5.1.1 *Communicates fluently in written and oral expression at a professional standard*
- 5.1.2 Contributes to the preparation, interpretation and presentation of information
- 5.1.3 Liaises with colleagues and experts within the organisation
- 5.1.4 Correctly interprets engineering instructions received
- 5.1.5 Issues clear and accurate instructions to subordinates as appropriate
- 5.1.6 Selects appropriate methods of communication

5.2 Present, report on and advocate engineering ideas

- 5.2.1 Contributes to the preparation and presentation of lectures at a professional level
- 5.2.2 Prepares papers for publication in Professional Engineering journals
- 5.2.3 Communicates engineering information effectively within the engineering work-force, and to others
- 5.2.4 Conveys engineering information effectively to higher engineering and non-engineering levels in the enterprise
- 5.2.5 Undertakes professional development in negotiation, conflict resolution, counselling, exchanging ideas and conveying convictions and attitudes

5.3 Prepare and comprehend engineering documents

- 5.3.1 *Prepares Professional Engineering reports*
- 5.3.2 Contributes to specifications, standards and graphical representations
- 5.3.3 Participates in the preparation of more complex documents such as environmental impact statements
- 5.3.4 Correctly interprets applicable engineering drawings and other graphics, specifications, standards, regulations, codes of practice and environmental impact statements

from National Competency Standards for Professional Engineers (Stages 1 and 2)
1993, 1st edn, The Institution of Engineers, Australia, ACT.

University of South Australia

Division of Information Technology, Engineering and the Environment

School of Electrical and Information Engineering

02478 Communication Systems 2

Computer Simulation Assignment

Student: Kim Citizen

ID Number: 9599999K

Tutor: Dr. T. Ferris

Due date: 15/10/2002

Appendix C Plagiarism: Academic Misconduct Policy

Students should be aware of their University's policy on plagiarism. The following definition and policy regarding penalties are taken from the University of South Australia's policy on academic misconduct (from *University of South Australia Policy no. A-11.2* 1994).

Preamble

With respect to academic misconduct, a distinction will be made between a deliberate act and an inadvertent act occurring through unfamiliarity with academic conventions.

A specific form of academic misconduct is plagiarism. Deliberate plagiarism is regarded as a serious act of academic misconduct.

Definition

- 1 Academic misconduct, whether inadvertent or deliberate, shall include the following:
 - 1.1 Presentation of data with respect to laboratory work, field trips or other work which has been copied, falsified or in other ways obtained improperly;
 - 1.2 Inclusion of material in individual work which includes significant assistance from another person in a manner unacceptable according to the assessment guidelines for the course;
 - 1.3 Providing assistance to a student in the presentation of individual work in a manner unacceptable according to the assessment guidelines for the course;
 - 1.4 **Plagiarism**, whether inadvertent or deliberate, which includes the following:
 - 1.4.1 Word-for-word copying of sentences or whole paragraphs from one or more sources (the work or data of other persons), or presenting of substantial extracts from books, articles, theses, other unpublished work such as working papers, seminar and conference papers, internal reports, lecture notes or tapes, without clearly indicating their origin. This should be referenced appropriately.
 - 1.4.2 Using very close paraphrasing of sentences or whole paragraphs without due acknowledgment in the form of reference to the original work;
 - 1.4.3 Submitting another student's work in whole or in part;
 - 1.4.4 Use of another person's ideas, work or research data without acknowledgment;
 - 1.4.5 Submitting work which has been written by someone else on the student's behalf;
 - 1.4.6 Copying computer files without clearly indicating their origin;
 - 1.4.7 Submitting work which has been derived, in whole or in part, from another student's work by a process of mechanical transformation (eg changing variable names in computer programs);
 - 1.5 Other actions not covered by the above clauses may be judged by a Dean or the Registrar to be acts of academic misconduct and be dealt with under the provisions of this policy.

Policy on penalties

- 2 A student found guilty of academic misconduct shall be subject to any of the following penalties:
 - 2.1 failure, that is zero score, in the component of the course, a note in the student's file and a reprimand from the Head of School;
 - 2.1 failure in the course, a note in the student's file and a reprimand from the Head of School;
 - 2.3 suspension from the university for a period not exceeding three years;
 - 2.4 expulsion from the university.

Appendix D Punctuation in technical writing

The purpose of punctuation is to convey ideas clearly and without ambiguity. Current publishing styles often use minimal or no punctuation, such as in lists.

1 Full stops

- end a complete idea or sentence
e.g. The machine was operated by a technician for 24 hours a day.
- end an abbreviation where the final letter of the abbreviation is not the last letter of the word (other than discipline-specific abbreviations or units of measurement — check SI units)
e.g. p. for page and ch. for chapter
- show that a word(s) has been omitted using the three points of ellipsis (...)
e.g. Several causes...have been rectified.

2 Colons

- introduce a list or quotation
e.g. The following factors are critical: cost recovery, priority of tasks and competitiveness.
e.g. Farre (1990, p. 51) stated: 'Education and training are central to the development of industry.'

3 Semicolons

- connect two sentences or main clauses which are closely connected, and often not joined with a linking word
e.g. The initial survey revealed a high interest; results showed that further development is valid.
- separate complex or wordy items in a list
e.g. The following factors are critical: the environmental impact statement; the government and union policies; the approval of business and council; and public opinion.

4 Commas

- show a pause or natural separation of ideas
e.g. After the recommendations were implemented, further evaluations were conducted.
- bracket or separate information in a sentence
e.g. The additional results, which were withheld, raised doubts about the initial hypothesis.
- precede linking words, such as 'but', 'so', 'hence', and 'whereas'
e.g. The aim was to test strength and density, but the measurements taken were not accurate.
- separate information in a list
e.g. The items included: circuit boards, several meters, wires and a power supply.

5 Parentheses

- provide information additional to a sentence
e.g. Engineering and Technology courses (as well as Applied Science) are studied at Mawson Lakes campus.
- enclose author-date references in the text
e.g. A number of experiments (Smith 1987; Tan 1990; Wong 1991)...
- enclose the number for an equation, and bracket parts of the equation
e.g. $x = G e^{-\omega t} \sin(\omega_d t + \phi)$ (1)

6 Quotation marks

‘ ’ or “ ”

Single quotation marks are more common.

- indicate a shorter quotation as part of a sentence
e.g. ‘In information technology, speed is of great importance,’ as highlighted by Schwarz and Oldham (1984, p. 2) in their introduction to the scope of Electrical Engineering.
- show the titles of journal articles
e.g. ‘Efficient low cost solar cell developed’ (1994) is an example of an article without an author.

7 Hyphens and dashes

- hyphen – en rule — dash

- join words with a hyphen only when the meaning is changed without them
e.g. liquid-solid separation
- use an en rule (length of the dash equals ‘n’) to indicate a range e.g. 1939–1945
- use two dashes (em rules) when adding parenthetical information to a sentence
e.g. Understand the uses of the hyphen and the dash — the dash is longer — to avoid confusion.

8 Apostrophes for ownership

‘s

- place the apostrophe at the end of the owner-word, then add a possessive s
e.g. The researcher’s results. (one researcher owns the results)
add apostrophe + s
- if the original word ends in an s, place the apostrophe at the end of the owner-word without adding a possessive s
e.g. The researchers’ results. (more than one researcher owns the results)
add apostrophe only (possessive s is invisible)

9 Capital letters

XYZ

- use minimally, especially in titles and headings where small words such as ‘and’, ‘in’, ‘the’, and ‘by’ should not be capitalised
- use only for a specific and formally named item (e.g. ‘Ohm’s law’), not for a general reference to an item (such as ‘a law’)

10 Punctuating numerals and abbreviations

- write numbers of ten or less in words, except when followed by units
e.g. nine experiments e.g. 9 mm
- place a space between the numeral and the unit of measurement or operator sign, and do not use full stops with units of measurement
e.g. 17 cm e.g. $y = v + 2$
- use SI units (Système International d’Unités)
- do not abbreviate or shorten forms of words in formal reports
e.g. it is a difficult situation so the company does not...
not it’s a difficult situation so the company doesn’t...
- use the standard or recognised abbreviations of your discipline
e.g. the current was 225 amps when measured...

11 Punctuating bullet point lists

- introduce lists with a colon (:) and either have no punctuation after each item, or punctuate as a normal sentence (with a full stop at the end)

e.g. The *Style Guide* includes:

or

The *Style Guide* includes:

- | | |
|----------------------|-----------------------|
| ▪ formatting | ▪ formatting, |
| ▪ report components | ▪ report components, |
| ▪ referencing | ▪ referencing, and |
| ▪ technical language | ▪ technical language. |

Note

Bullet points may not always be list like those above, but **may be a series of whole sentences**. In this case, each point is punctuated like a sentence with a capital letter at the beginning and a full stop at the end.

e.g.

- Indenting text at the beginning of a paragraph is unnecessary when an extra line space is being allowed between paragraphs.
- Indentation is appropriate for long quotations, complex mathematical expressions, lists with bullet points (dots •) and the list of headings on the contents page.
- Long quotations are usually indented from both the left and right margins.
- Figures and tables may be centred in the text.
- Students may choose to indent each subheading with its associated text, as shorter lines of text are easier to read; overall length is then affected.

Appendix E Summary of elements in reference lists

This table outlines the elements needed for a reference list, and the order in which those elements appear in both the alphabetical (author-date) reference list, and the numbered reference list. These details are based on the *Style manual for authors, editors and printers* (2002). The type of reference list used must be consistent with the system of referencing selected for the particular report.

Alphabetical reference list (Author-date system)	Numbered reference list (Numerical system)
BOOKS – order the information as follows:	
<ul style="list-style-type: none"> • author's surname • author's initials or given name • year of publication • title of publication (italics or underlined) • title of series ‡ • volume number, or number of volumes ‡ • edition ‡ • editor, reviser, compiler or translator ‡ (if other than the author) • elements of a book ‡ • publisher • place of publication 	<ul style="list-style-type: none"> • author's initials or given name • author's surname • title of publication (italics or underlined) • title of series ‡ • volume number, or number of volumes ‡ • edition ‡ • editor, reviser, compiler or translator ‡ (if other than the author) • elements of a book ‡ • publisher • place of publication • year of publication • page numbers or numbers ‡
ARTICLES – order the information as follows:	
<ul style="list-style-type: none"> • author's surname • author's initials or given name • year of publication • title of article • title of journal or periodical (italics or underlined) • title of series ‡ • place of publication ‡ • volume number ‡ • issue number or other identifier ‡ • page numbers or numbers 	<ul style="list-style-type: none"> • author's initials or given name • author's surname • title of article • title of journal or periodical (italics or underlined) • title of series ‡ • place of publication ‡ • volume number ‡ • issue number or other identifier ‡ • year of publication • page numbers or numbers

Note: ‡ indicates an optional element

Personal communications — such as letters, conversations and email messages — need not be included in a reference list as they cannot be checked, and are usually incorporated into the text.

Appendix F Library resources and report writing texts

These notes should be read in conjunction with relevant library publications or see the Library's website at www.library.unisa.edu.au

Finding information

In most libraries, materials are arranged by Dewey decimal classification (i.e. resources on the same subject are shelved together). Below is a brief guide to the location of the main engineering courses:

004-006	Computing		
621	Mechanical Engineering	624	Civil Engineering
621.3	Electrical Engineering	660	Chemical Engineering
621.38	Electronic Engineering	669	Metallurgy
622	Mining	670	Manufacturing

Use the library catalogue to identify all possible sources of information in the library. Relevant engineering material can often be found by looking on the shelves in different areas of the collection. There are also pathfinders near the Mawson Lakes library information desk which provide some suggestions of useful engineering materials to use.

Books written by subject experts may provide you with some of the required information.

Reference materials such as encyclopaedias, dictionaries and handbooks will help you to find brief, factual information such as definitions, constants and equations. Reference books can be found in the Reference Collection, and can only be used in the library.

Standards are very useful sources of practical information for design work. Check which standards are held in your library by using the catalogue or by asking at the information desk. Standards available may include Australian Standards and standards from international organisations such as British Standards, ASTM, ISO and IEEE. The Library provides access to Standards Australian Online. This database can also be accessed from computer barns and computer pools around the university.

Journals provide up-to-date and often very detailed information. The catalogue shows which journals are held by the library.

Databases are 'electronic indexes' which help you to identify relevant journal articles, conference papers, product catalogues and standards. Useful engineering databases may include: *Applied Science and Technology Abstracts*; *Compendex* (covering all engineering multidisciplines); *Engineering and Applied Science* (collection of Australian engineering databases); *IEEE Xplore* and *INSPEC* (for electrical and electronic engineering, computing, and manufacturing), and *SciFinder Scholar* (a chemistry database which covers chemical engineering).

Information desk

At the information desk a member of staff is available to assist you to locate information in your subject area. Staff can also help you with questions about how to use the catalogue, databases and other resources. The Liaison Librarians are available to assist with your course related and subject specific questions and requests in more detail. Library staff are happy to help you with any problems — you only need to ask.

Books on technical writing for engineers

Report and assignment writing

- Baylis, P 1991, *Report Writing for Engineers*, Engineering Education Australia, Milson's Point.
- Blicq, R 1995, *Writing Reports to Get Results: Quick Effective Results using the Pyramid Method*, 2nd edn, IEEE Press, New York.
- Elton Mayo School of Management 1995, *Guidelines for Essay and Report Writing*, 13th edn, ed. A. Kay, EMSM Publications, Adelaide.
- McEvedy, MR & Wyatt, P 1990, *Presenting an Assignment*, Nelson, South Melbourne.
- Michaelson, HB 1990, *How to Write and Publish Engineering Papers and Reports*, 3rd edn, Oryx Press, Phoenix.
- Neufeld, JK 1987, *A Handbook for Technical Communication*, Prentice Hall, Englewood Cliffs, New Jersey.
- Roze, M 1994, *Technical Communication: The Practical Craft*, 2nd edn, Merrill, New York.
- Turk, C & Kirkman, J 1989, *Effective Writing: Improving Scientific, Technical, and Business Communication*, 2nd edn, E & FN Spon, London.
- Weissberg, R & Buker, S 1990, *Writing Up Research: Experimental Research Report Writing for Students of English*, Prentice Hall Regents, New Jersey.

Thesis writing

- Anderson, J & Poole, M 1994, *Thesis and Assignment Writing*, 2nd edn, John Wiley & Sons, Brisbane.
- Lewins, FW 1993, *Writing a Thesis: A Guide to its Nature and Organisation*, 4th edn, Bibliotech, ANUTECH, Canberra.
- Rudestam, KE & Newton, RR 1992, *Surviving your Dissertation: A Comprehensive Guide to Content and Process*, SAGE, Newbury Park, California.

Style guides and referencing

- Kirkman, J 1992, *Good style: writing for science and technology*, E & FN Spon, London.
- Li, X & Crane, NB 1993, *Electronic style: a guide to citing electronic information*, Meckler, Westport.
- Style manual for authors, editors and printers* 2002, 6th edn, revised by Snooks & Co. John Wiley & Sons Australia Ltd. Canberra.
- Young, M 1989, *The technical writer's handbook: writing with style and clarity*, University Science Books, California.

Appendix G Purposes of paragraphs

A paragraph will be written well if the writer is certain of its *purpose(s)*. Both the broad and specific purposes of technical paragraphs are shown in the following table:

Broad purpose	Specific purpose (Type of paragraph)	Identifying features of the paragraph
Describing facts	Defining	<ul style="list-style-type: none"> term or name group/category/device/type/concept distinguishing characteristics or elements
	Complex defining	<ul style="list-style-type: none"> additional specifications explanation of operation additional classification further examples
	Classifying	<ul style="list-style-type: none"> ordered members or items class or principles of arrangement definition/basis of classification (size, shape, type, category etc.)
Describing the relationship between facts	Describing - Physical - Process - Function - Special relationships	<ul style="list-style-type: none"> item/place developmental stages and connections series of instructions relating to a procedure use or purpose of an item elements involved in a procedure connection of two or more items
	Analysing cause and effect	<ul style="list-style-type: none"> statement of cause list of effects - short and long term statement of relationship statement of reasons for effects
	Exemplifying (Explaining)	<ul style="list-style-type: none"> example(s) or illustration(s) evidence (often used with models, charts, tables etc.)
	Comparing/Contrasting	<ul style="list-style-type: none"> statement of main idea development of idea statement of two or more comparative/contrasted items of information

Adapted from Baylis, P. 1991, *Report Writing for Engineers*, Engineering Education Australia, Milson's Point.

Appendix H Report writing checklist

For effective report writing it is essential to thoroughly edit your work. This checklist may be useful for the editing and redrafting process. Check each of the following:

Formatting	improving layout and presentation
<input type="checkbox"/> headings & subheadings	developed logically and consistently at each level (e.g. size and style of headings)
<input type="checkbox"/> decimal numbering system	used accurately and consistently; fourth-level avoided
Tables and figures	
<input type="checkbox"/> key tables/figures	used in the text (others, if required, in Appendix)
<input type="checkbox"/> zeros and rounded numbers	used for clarity sometimes
<input type="checkbox"/> captions of tables/figures	selected for specific differences between tables/figures
<input type="checkbox"/> caption information	consistent with text information
<input type="checkbox"/> data in tables/figures	consistent with data in report
<input type="checkbox"/> symbols/labels/signs	explained clearly
<input type="checkbox"/> asterisks (*)	added explanatory notes of further information, abbreviations, sources etc. that do not fit into rows or columns
Components	enhancing logic and readability
<i>Preliminaries</i>	
<input type="checkbox"/> names/titles of people etc.	spelt correctly & acknowledged fully
<input type="checkbox"/> abstract	written to highlight and summarise significant information
<input type="checkbox"/> disclaimer	signed and authorship declared
<input type="checkbox"/> acknowledgments	identified all who assisted with material and with editing
<input type="checkbox"/> contents pages	matched exactly to text (e.g. titles of headings with decimal and page numbering)
<input type="checkbox"/> figures & tables lists	matched exactly to labels and captions
<input type="checkbox"/> symbols list	included all symbols from the text
<i>Text of report</i>	
<input type="checkbox"/> sections	divided clearly and developed logically
<input type="checkbox"/> abbreviations & acronyms	written in full when first used
<input type="checkbox"/> definitions of new terms	expressed accurately and clearly
<i>Appendices</i>	(each) referred to in the text of the report
<i>Referencing</i>	ensuring correct academic standards
<input type="checkbox"/> all sources of information, other than your own	referenced correctly twice, both in text and in reference list
<input type="checkbox"/> only one reference system	used either author-date or numerical system – not both
<input type="checkbox"/> punctuation and elements	standardised exactly (e.g. order of elements, punctuation, capitalisation and publishing details)
Technical language	editing for style and grammatical accuracy

<input type="checkbox"/> repetition of words	avoided
<input type="checkbox"/> sentences	tightened, focused and varied in length
<input type="checkbox"/> longer sections or paragraphs	introduced and/or summarised to provide an overview of the information given
<input type="checkbox"/> passive voice	used to emphasise the object of action rather than the agent
<input type="checkbox"/> parallel construction	applied accurately in lists of information or sentences
<input type="checkbox"/> subject and verb agreement	related in number and person
Gender inclusive language	used correctly

Index

- abbreviations, 6,7,11,21,29,37,44,45,51
- abstract, 2,3,8-10,32
- academic misconduct (see plagiarism)
- acknowledgments, 5,6,9,10
- active voice, 34
- agreement
 - noun and number, 35
 - subject and verb, 33,36
- apostrophes, 45
- appendices, 2,3,5,8,20,28,51
- Arabic numerals, 3,7,12
- asterisks, 13,51
- authenticity statement (see disclaimer)
- author-date referencing
 - alphabetical reference list, 14,17,18,20,
 - in-text author and date, 29,40,47
- bibliography, 15,40
- body of report (see main sections)
- brackets, 7,16,18,19,26,29
- bullet points, 1,6,14,32,34,36
- capital letters, 4,21,29,45
- centring, 5,6
- checklist, report writing, 51
- colons, 44,46
- commas, 7,21,29,44
- competency standards, 1,40,41
- components of a report
 - preliminary pages, 2-4,8,11
 - text of report, 4,12
- conclusion, 2,8,10-13,18,26,32
- connectors, 33
- consistency, 3,18,39
- contents, list of, 3,6,8-11,31,32,46,51
- dashes, 32,45
- decimal numbering system, 4,5,51
- diagrams, 6,9,13,15
- disclaimer, ii, 8-10,51
- editing, 10,38,51
- electronic media, 25
- ellipsis, 7, 44
- endnote referencing (see numerical referencing)
- equations, 6,7,48
- et al., 19, 25
- executive summary, 9,10
- figures, 1,2,4,6,8-11,13,15,16,32,46,51
- font, 4
- footers, 4
- footnote referencing (see numerical referencing)
- footnotes, 13
- formatting, 1-3,13,38,39,46,51
- formulae, 7
- full stops, 21, 29, 45,46
- gender inclusive language, 37,52
- glossary, 9,37
- grammar, 30,34
 - active and passive voice, 34
 - agreement between noun and number, 35
 - agreement between subject and verb, 33,36
 - tense of verbs, 35
- Harvard referencing system (see author-date referencing)
- headers, 4
- headings, 1-13
- hyphens, 45
- indentation, 5,6,11,21,46
- Institution of Engineers, Australia, 1, 40
- introduction, 2,3,5,8,10,12-14,32
- italics, 4,5,21,29,41,47
- jargon, 37
- justification, 5
- library resources, 48
- line spacing, 6
- linking words and phrases, 33
- main sections, 2,8,12,13,32
- margins, 3,5,6,46
- numerals, 3,5,7,9,11,12,45
- numerical referencing
 - in-text numbers, 26
 - numbered reference list, 15,26,28,29,47
- originality, 12,16
- page numbering, 3,15,51
- paragraphs, 6,30-33,43,46,50,52
- parallel construction, 34
- paraphrasing, 16,18,26,43
- passive voice, 33
- past tense, 35
- personal communications, 20,27,28,47
- personal language, 36
- plagiarism, 10,16
- planning and writing, 1,30,31,38
- preliminary pages
 - acknowledgments, 5,6,9,10
 - contents, 3,6,8-11,31,32,46,51
 - disclaimer, ii, 8-10,51
 - figures, 1,2,4,6,8-11,13,15,16,32,46,51
 - symbols, 11
 - tables, 6,11,51
 - title page, 9-11,38,42
- present tense, 35,36

quotations/quotation marks, 4,6,7,16,18,25,29,45
 recommendations, 1,2,8,10,12,19,27,30,34,39,44
 references, list of, 14, 38
 two systems, 16
 choosing between, 17
 author-date (alphabetical), 14,17,18,20,
 numerical, 15,26,28,29,47
 repetition, 17,37,52
 report writing
 getting started, 31
 project reports, 2
 resources, 1,30,38,48
 Roman numerals, 3, 9
 sections, 1-3,6,8,10,13-16,29-32,35,40,51,52
 semicolons, 18,44
 sentences, 13,30-37,43-46,52
 parallel construction, 34
 proximity of detail and item, 34
 series of nouns, 34
 sexist language (see gender inclusive language)
 SI units, 11,44,45
 size of type, 4
 slang, 37
 starting planning, 30
 starting writing, 32
 structure, 2,3,11-13,16,30-34
 style of type, 4
 summarising, 16,18,26,43
 supplements, 8,15
 symbols, list of, 11
 synopsis, 10
 Système International d'Unités, 11
 table of contents (see contents, list of)
 tables, 6,11,51
 technical language, 1,2,32-37
 grammar, 30,34
 sentences, 13,30-37,43-46,52
 structure, 2,3,11-13,16,30-34
 vocabulary, 30,36
 templates, 3
 text of report, 8,12-16,51
 conclusion, 2,8,10-13,18,26,32
 introduction, 2,3,5,8,10,12-14,32
 recommendations, 1,2,8,10,12,19,27,30,34,39,44
 thesis, 47
 title page, 9-11,38,42
 type, 4
 underlining, 4,21,29
 units of measurement, 11
 visual aids, 2,13,32
 vocabulary, 30,36
 gender inclusive language, 37,52
 jargon, 37
 personal language, 36
 repetition, 17,37,52
 slang, 37
 writing and planning, 1,30,31,38