

University of South Australia

Division of Information Technology, Engineering and the
Environment

School of Natural and Built Environments

Report Writing Style Guide for Engineering Students

4th edition

**by Anne Winckel and Bonnie Hart
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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- inclusion of a section of *Writing a section*
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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
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- 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 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, writing a section, referencing of sources, and the technical language appropriate to 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.

Anne Winckel

Bonnie Hart

Monica Behrend

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Symbols

G = amplitude of oscillation

t = time

x = displacement

X_{st} = static deflection of the system under the influence of the imposed force

β = frequency ratio

ϕ = phase angle

ω = natural circular frequency

ω_d = damped natural circular frequency

ζ = damping ratio

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 Faculty of Engineering, 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 but rather 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. For example, engineering companies have their own ‘in-house’ style. For each report, students should consult their lecturer or school to determine if any specific requirements apply — just as engineers who publish articles and technical reports must conform to the style required by their particular publisher or employer. (Staff may vary guidelines from this document according to school requirements.)

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

Table 1 Resources for report writing process

Report writing process		Possible resources
Plan	<ul style="list-style-type: none">Analyse requirements/topicBrainstorm/preliminary plan	<ul style="list-style-type: none">⇒ lecturers; topic guidelines and objectives⇒ prior knowledge
Study	<ul style="list-style-type: none">Research/investigate	<ul style="list-style-type: none">⇒ library; computer data; field work; experiments
Plan	<ul style="list-style-type: none">Revise planOutline sections and headings	<ul style="list-style-type: none">⇒ newly informed knowledge; notes⇒ <i>Style Guide</i>: structuring technical writing
Write	<ul style="list-style-type: none">Draft report	<ul style="list-style-type: none">⇒ <i>Style Guide</i>: formatting, components, referencing, and technical language
Revise	<ul style="list-style-type: none">Edit and proofread	<ul style="list-style-type: none">⇒ <i>Style Guide</i>: recommendations, technical language, report writing checklist
Write	<ul style="list-style-type: none">Revise draft report	<ul style="list-style-type: none">⇒ <i>Style Guide</i>: formatting, components, referencing, and technical language

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, writing a section, referencing of sources, and technical language. 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 which 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 other 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 *Technical language* 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 which communicates effectively.

2 Formatting guidelines

Appropriate formatting of reports improves the readability and accessibility of information. This section outlines essential formatting guidelines as required by your lecturers. An important principle underlying all formatting choices is consistency. Therefore each report should maintain the same internal style and structure, which can be achieved. 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 which follow, refer to the *Help* menu within the word processor. 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 your word processor or use the ones 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.

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

- 12 point type is the normal size for the text of a report
- 10 point may be used for long, indented quotations, figures and tables
- 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 in each heading only; 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

<i>Heading</i>	<i>Point Size</i>	<i>Style</i>	<i>Example</i>
First-level (includes Preliminaries)	18	bold	Acknowledgments 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 <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*.

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 of referencing, 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 parentheses () 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

An engineering report 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).

Also, 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.

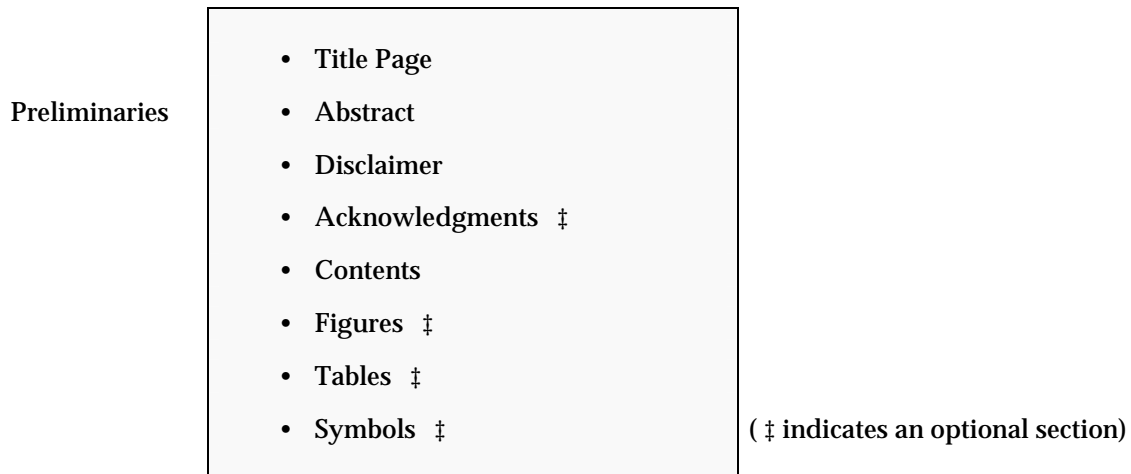


Figure 2 Preliminary components of a report

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 subject
- title of the report (which is precise and indicates the topic and scope)
- 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 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 ... followed by the author’s signature.

Students are not guilty of plagiarism if they have correctly referenced the sources of all material which 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.

3.1.3 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.

3.1.4 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.

3.1.5 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	Only use fourth-level headings if essential	10

Figure 3 Indentation of headings in a contents list

3.1.6 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.

3.1.7 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.

3.1.8 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 into SI units.

Table 3 Base SI units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
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*).

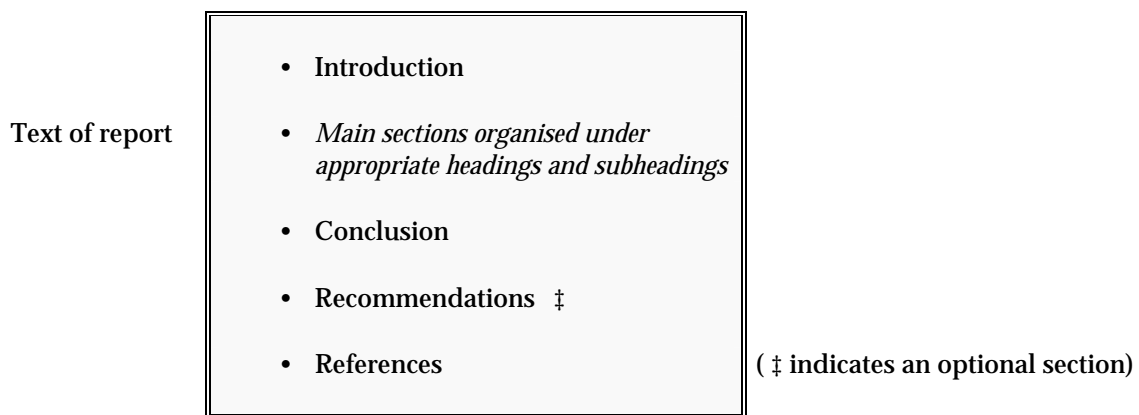


Figure 4 Components of the text of a report

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 comparison, analytical reports are based on a review of literature and other evidence. Therefore these reports involve a presentation of research and analysis of the literature. 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 which emerge from your thinking about what you have read. Therefore a key skill is to logically order information into sections by using headings and subheadings. In the sections information which came from your reading is explained, expanded on and supported with evidence by using references, figures and tables. How to construct and write a well organized section in a report is explained in detail in Chapter 3. Another key skill is referencing, where you indicate your source of information in the text and in a reference list at the end of the text (Windshuttle 1999, p.295). The skill of referencing is explained in detail in Chapter 4.

The headings and subheadings should divide the report into well defined sections. 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 2.3.4 *Figures and tables*.

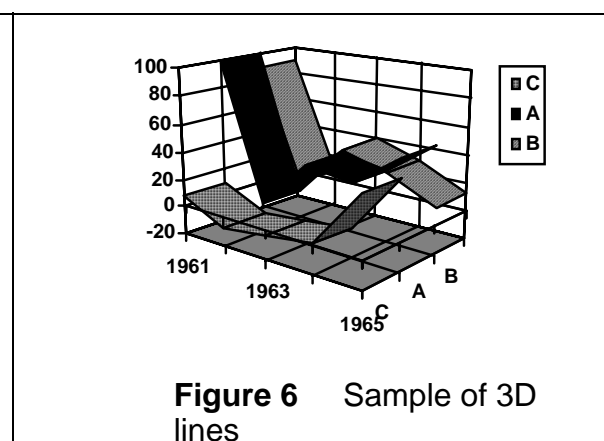
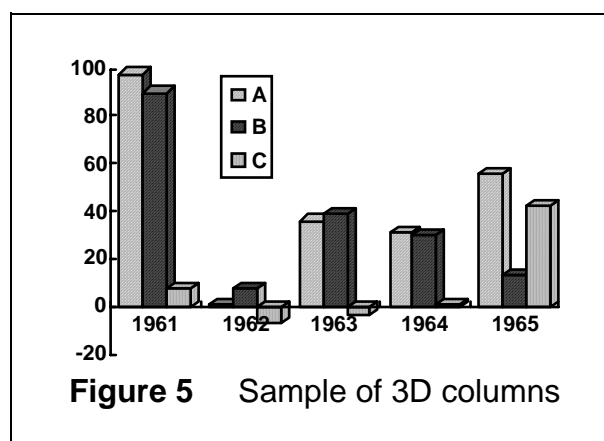
Consideration should be given as to whether the data is better communicated to the reader by a table or a figure. Using tables or dotpoint lists will focus the reader on relevant and needed information. This technique is easier for the reader than reading another paragraph. For example, write an introductory comment and then list advantages and disadvantages of two types of dwellings in a table. Also consider that sometimes a figure will demonstrate a numerical trend more effectively than a

table. In the following example, 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.



(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. 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 (not to be confused with a bibliography) 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. 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 your 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 Writing a section of a report

An approach to writing a section of a report is explained in this chapter. This process involves planning, gathering information, reading and noting, further planning, writing the first draft, and finally revising and redrafting. This process is facilitated by the use of many resources, as summarised in Table 1 (page 1).

4.1 Planning

The first step of the writing process always involves clarifying the following expectations: message; purpose; audience, and scope of the report. This also applies when writing a section.

Message: Begin by clarifying the message of the section, i.e. write a precise heading or a summary sentence that summarises the section. This will enable you to focus on the information to communicate.

Purpose: The general purpose of the writing a section of a report is for you to gather information on a specific topic and the using this information to present a concise, organised, logical section. The specific purpose of writing a section relates to the message. For example, you might explain the concept of ‘Solar cells’ by providing a definition, detailing how they operate, providing an application and discussing research findings.

Audience: Each report is written for a specific person or group of people in mind. For example, often the audience is colleagues and professionals, such as engineers.

Scope: The scope of a section limits the information within the section. You can do this by stating exactly what you will or will not cover in the section. For example, in the section on ‘Solar cells’ you will not discuss solar energy in general.

Once you have clarified the expectations, you can now plan your section. Useful initial techniques are brainstorming, mindmapping and developing a Contents page.

4.1.1 Brainstorming

Literally allow your brain to storm or generate many ideas. One way to start doing this is by listing all the ideas or keywords that come into your mind, as shown in the example. Do not organise ideas at this stage as that is the next step of mindmapping.

Brainstorm example – Solar energy

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

4.1.2 Mindmapping

Now try to develop a logical organisation to the ideas. One way to achieve this is by developing a mindmap, a diagram that shows the linking of all the ideas listed.



Figure 8 An example of a section of a contents page

4.2 Developing a contents page

From the organisation from the mindmap you are now able to prioritise the ideas and generate a series of headings and subheadings. If you can achieve three levels of headings and subheadings, your section is starting 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 8 An example of a section of a contents page

Organising information into logical sections is challenging This process can be assisted by having read widely and having obtained more information about the topic.

5 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 the critical aspects of other research.

5.1 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

5.1.1 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

5.1.2 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 Australian Government Publishing Service (AGPS) *Style Manual for Authors, Editors and Printers* (1994). Other methods of each referencing system are used by individuals, faculties 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 AGPS *Style Manual* (1994).

5.2 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 ()
- at the end – an alphabetical reference list is included

5.2.1 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 parentheses, 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]

Author-date references in the text cont.

there are two or three authors

A recent study (Lim, Thompson & King 1993) found...

or

Lim, Thompson and King (1993) found the analysis...

[use an ampersand (&) when in the brackets; or 'and' outside]

more than three authors appear

A recent study (Boyd et al. 1994) has indicated...

or

Boyd et al. (1994) have indicated...

['et al.' means 'and the others']

there are different authors with the same surname

The theory was first put forward in 1970 (Jones, C. L. 1971), but since then many researchers, including A. G. Jones (1983), have rejected the idea.

[differentiate between authors by using initials]

you are referring to an author (primary reference) which you read about in another book or article (secondary reference)

Marini (Tan 1992) stated that...

[Marini is the primary reference]

or

Marini's study in 1975 (cited in Tan 1992) stated that...

or

Tan (1992), in reporting Marini's 1975 study, states that...

reference is made to more than one work by the same author

University research (Smith 1982, 1988) has indicated that...

or

University research conducted by Smith (1982, 1988) has indicated that...

the same author has published two or more things in the same year

In recent reports (James 1992, 1993a, 1993b), recommendations were made...

or

Recommendations by James (1993b) were implemented...

[add a, b, c etc. to distinguish between texts in the same year]

no author's name appears (but there is a sponsoring body, newspaper or title)

A recent study (CSIRO 1990) has suggested...

or

A recent survey (*Advertiser* 24 Jan. 1994, p. 5) indicated that...

or

A recent survey (*Population Projections* 1996) shows that...

the editor's name is the identifying feature

Current articles (ed. Harris 1994) on the industry suggest that...

or

Current publications edited by Harris (1994) suggest that...

no date can be established

Lewis (n.d.) continued the study...

or

The study was continued (Lewis n.d.)...

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, King revealed the site to be safe.

or

The site's safety is proved (King, B. T. 1994, pers. comm., 17 July).

[personal communications are not included in the reference list]

5.2.2 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 the ellipses in Figure 10. The shaded boxes indicate punctuation.

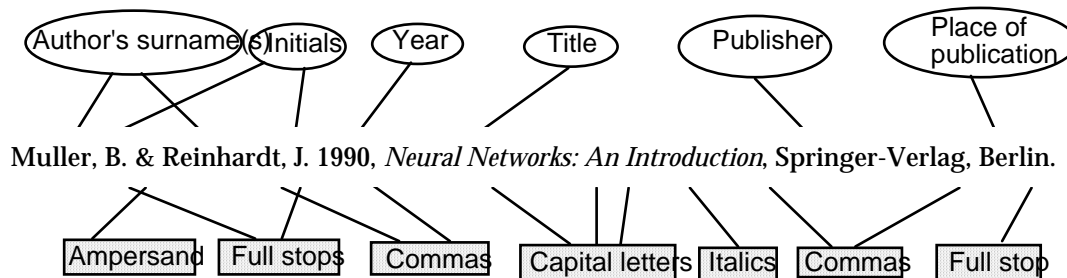
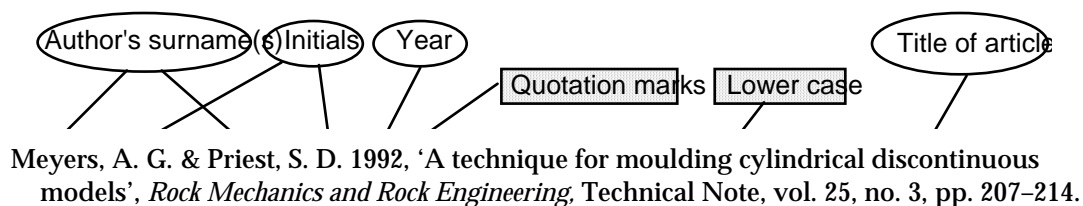


Figure 10 Book in author-date reference list

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. The correct order of these elements is indicated by the ellipses in Figure 11. The shaded boxes indicate punctuation.



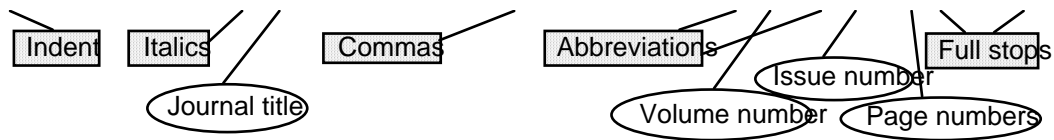


Figure 11 Journal article in author-date reference list

The following aspects of punctuation should be included (as indicated by the shaded boxes in Figures 10 and 11):

- 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 used for first letters of main words in titles of books and journals, and all other letters are lower case
- capital letters kept to a minimum in titles of articles and unpublished works
- short indentation of the second and subsequent lines of a reference is helpful 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, J. S. 1989, A solar airconditioning system, M Eng Thesis, South Australian Institute of Technology.

Browne, T. E. 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. R. F. 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, A. G. & Priest, S. D. 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. 1990, *Neural Networks: An Introduction*, Springer-Verlag, Berlin.

- Subramanian, C. 1992, 'Some considerations towards the design of a wear resistant aluminium alloy', *Wear*, vol. 155, pp. 193–205.
- Subramanian, C. 1993, 'On mechanical mixing during dry sliding of aluminium–12.3 wt. % silicon alloy against copper', *Wear*, vol. 161, pp. 53–60.
- Subramanian, C. & Strafford, K. N. 1993a, 'Review of multicomponent and multilayer coatings for tribological applications', *Wear*, vol. 165, pp. 85–95.
- Subramanian, C. & Strafford, K. N. 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, K. N., Wilks, T. P., Ward, L. P. & 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. Referencing of electronic sources is a relatively new activity, and the following examples are adapted from the style suggested by Li and Crane (1993).

Author-date reference lists:

Books:

- | | |
|---|---|
| <i>One or two authors</i> | Muller, B. & Reinhardt, J. 1990, <i>Neural Networks: An Introduction</i> , Springer-Verlag, Berlin. |
| <i>3 or more authors</i> | Arrillaga, J., Arnold, C. P. & Harker, B. J. 1983, <i>Computer Modelling of Electrical Power Systems</i> , Wiley, Chichester. |
| <i>No author, 2nd or later edition</i> | <i>Computer Integrated Manufacturing 1990</i> , 2nd edn, Architecture Technology Corporation, Minneapolis. |
| <i>Books sponsored by an institution, corporation or other organisation</i> | 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. |
| <i>Edited work (role of editor not paramount)</i> | <i>The Electrical Engineering Handbook 1993</i> , ed. Richard C. Dorf, CRC Press, Boca Raton. |
| <i>Edited work (role of editor paramount)</i> | Browne, T. E. Jr (ed.) 1984, <i>Circuit Interruption: Theory and Techniques</i> , M. Dekker, New York. |
| <i>One volume of multi-volume work</i> | Gopel, W., Hesse, J. & Zemel, J. N. (eds) 1989, <i>Sensors: A Comprehensive Survey</i> , vol. 1, <i>Fundamentals and General Aspects</i> , eds T. Grandke & W. H. Ko, VCH, Weinheim, Germany. |
| <i>Chapter in edited book</i> | Stead, J. P. & Strutt, J. E. 1987, 'Marine corrosion on offshore pipelines: predicting the problem using computer-aided risk evaluation', in <i>Plant Corrosion: Prediction of Materials Performance</i> , eds J. E. Strutt & J. R. Nicholls, Ellis Horwood, Chichester. |

Journals:

- | | |
|--|--|
| <i>One or two authors</i> | 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. |
| <i>Issue number included (if each issue is paginated separately)</i> | Meyers, A. G. & Priest, S. D. 1992, 'A micro-processor controlled pump for triaxial cell pressure control', <i>International Journal of Rock Mechanics and Mining Sciences & Geomechanics Abstracts</i> , Technical Note, vol. 29, no. 2, pp. 187–191. |

No author

'Efficient low cost solar cell developed' 1994, *Search*, vol. 25, p. 309.

Specialised sources:

Conference papers

Hunt, F. L. 1990, 'Ballarat East — from Eureka to the 80's', *Proceedings of the Pacific Rim Congress 90, Gold Coast, Australia*, Vol. III, Australasian Institute of Mining and Metallurgy, Parkville, Victoria, pp. 473–480.

Maps

Mullineaux, D. R. 1976, *Preliminary Overview Map of Volcanic Hazards in the 48 Conterminous United States*, U. S. Geological Survey Miscellaneous Field Studies Map MF-786, scale 1:7 500 000.

Standards

American Society for the Testing of Materials 1988, *Standard Specification for Cast Steel Wheels for Railway Service*, (A 583 – 88), ASTM, Philadelphia.

Standards Association of Australia 1991, *Australian Standard: Electrical Installations — Buildings, Structures and Premises, known as the SAA Wiring Rules*, (AS 3000 – 1991), Standards Australia, North Sydney.

Patents

Tan, I. S. & Arnold, F. F. (US Air Force) 1993, *In situ Molecular Composites Based on Rigid-rod Polyamides*, US patent 5 247 057.

Author-date reference lists cont.

Government publications

Bureau of Transport Economics 1986, *Demand for Australian Domestic Aviation Services*, Occasional Paper no. 79, AGPS, Canberra.

Australian Bureau of Statistics 1994, *Building Approvals Australia*, Cat. no. 8731.0, ABS, Canberra.

Ergas, H. 1986, *Telecommunications and the Australian Economy*, Report to the Department of Communications, AGPS, Canberra.

Government reports

Commission of Inquiry into Poverty 1975, *Poverty in Australia*, First Main Report (Prof. R. F. Henderson, Chairman), AGPS, Canberra.

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<i>Document via FTP or Telnet</i>	King, M. L. 1963 August, <i>I Have a Dream</i> [Online]. Available FTP: mrcnext.cso.uiuc.edu Directory: gutenberg/freenet File: i-have-a-dream
<i>Document via email</i>	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
<i>Journal article on CD Rom</i>	Girotti, T. B., Tweed, N. B. & Houser, N. R. 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
<i>Journal article via FTP</i>	Drew, J. R. 1989 October, So that's why they call it the Big Apple, <i>Qyabta</i> [Online] vol. 1, no. 1. Available FTP: export.acs.cmu.edu Directory: pub/quanta File: quanta-oct.ps.Z
<i>Online databases</i>	<i>The Educational Directory</i> [Online] 1992. Available: Knowledge Index File: The Educational Directory (EDUC6)
<i>Lists or bulletin boards</i>	<i>Alcohol and Drug Studies</i> [Online]. Available email: ALCOHOL@LMUACAU.BITNET
<i>Computer programs</i>	Wu, A. H. & Jenkins, B. 1990 May1, <i>Diagnostic Ordering in Clinical Medicine</i> (DOS version 1.0) [Computer program]. Available Distributor: Health Sciences Consortium, Chapel Hill, NC (Address: 201 Silver Cedar Court, Zip: 27514)

5.3 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

5.3.1 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].

or

Smith [1] has argued that 'the relative seriousness of the two kinds of errors differs from situation to situation'.

<i>the author's words are paraphrased</i>	A recent study [2] has shown that testing procedures are inadequate.
<i>the same author is cited again</i>	Another argument raised by Smith [1] relates to the error evident in the conclusion.
<i>several different sources need to be cited at the same time</i>	Recent studies [2][7][9] all agree that testing procedures are... or Jones and Chan [2], Kuwlesky [9] and Tan [7], all agree...
<i>there are two or three authors</i>	A recent study [3] found the analysis... or Lim, Thompson and King [3] found the analysis...
<i>more than three authors appear</i>	A recent study [4] has indicated... or Boyd et al. [4] have indicated...
<i>there are different authors with the same surname</i>	The theory was first put forward in 1970 [5], but since then many researchers, including A. G. Jones [6], have rejected the idea.
<i>you are referring to an author (primary reference) which you read about in another book or article (secondary reference)</i>	Marini [7] stated that... or Marini's study in 1975 [7] stated that... or Tan [7], in reporting Marini's 1975 study, states that...

Numerical references in the text cont.

<i>reference is made to more than one work by the same author</i>	University research [1][8] has indicated that... or University research conducted by Smith [1][8] has indicated...
<i>the same author has published two or more things in the same year</i>	In recent reports [10][11][12], recommendations were made... or Recommendations by James [12] were implemented...
<i>no author's name appears (but there is a sponsoring body, newspaper or title)</i>	A recent CSIRO study [13] has suggested... or A recent survey [14] indicated that... or A recent survey, <i>Population Projections</i> , [15] shows that...
<i>the editor's name is the identifying feature</i>	Current articles [16] on the industry suggest that... or Current publications edited by Harris [16] suggest that...
<i>no date can be established</i>	Lewis [17] continued the study... or The study was continued [17]...
<i>the source is unpublished</i>	Nguyen [18] argues for... or An argument [18] has been made for...

reference is made to a personal communication

In a telephone conversation on 17 July 1994, King revealed the site to be safe.

or

The site has since proven to be safe (King, B. T. 1994, pers. comm., 17 July).

[personal communications are not included in the reference list]

5.3.2 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 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 by the ellipses in Figure 12. The shaded boxes indicate punctuation.

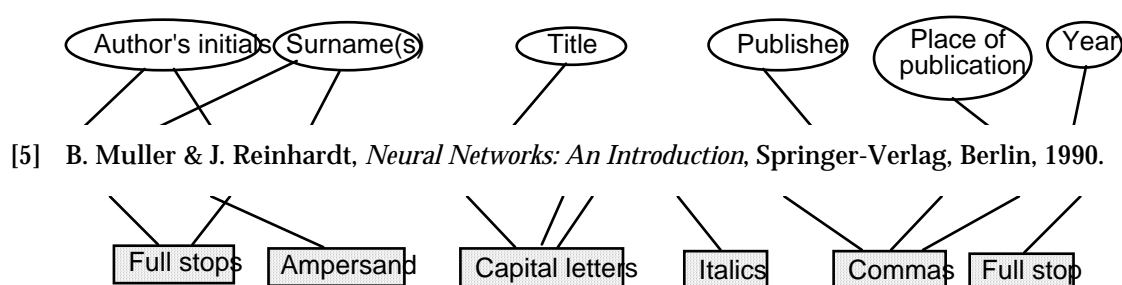


Figure 12 Book in numerical reference list

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 by the ellipses in Figure 13. The shaded boxes indicate punctuation.

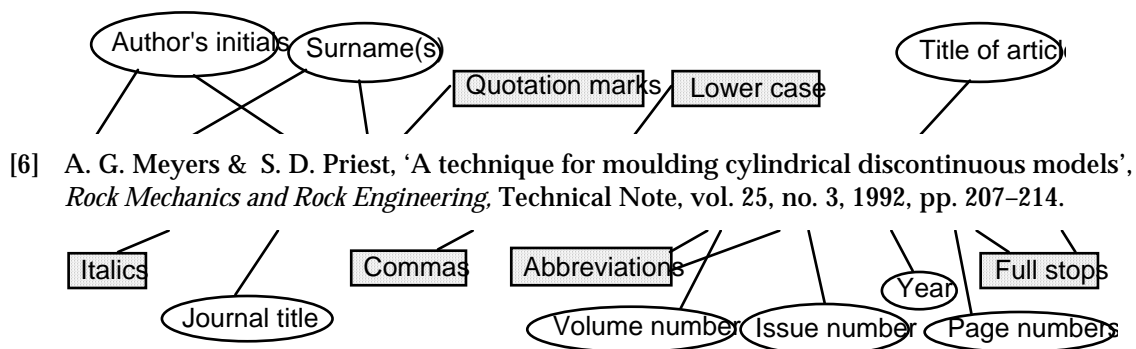


Figure 13 Journal article in numerical reference list

The following aspects of punctuation should be included (as indicated by the shaded boxes in Figures 12 and 13):

- 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 are not differentiated (by italics, underlining or quotation marks)
- capital letters used for first letters of main words in titles of books and journals, and all other letters are lower case
- capital letters kept to a minimum in titles of articles and unpublished works
- initial numerical reference 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.

Numbered reference lists:

1. *Dictionary of Scientific and Technical Terms*, 5th edn, McGraw-Hill, New York, 1994.
2. J. S. 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. A. G. Meyers, & S. D. Priest, 'A technique for moulding cylindrical discontinuous models', *Rock Mechanics and Rock Engineering*, Technical Note, vol. 25, no. 3, 1992, pp. 207–214.
5. T. E. Browne, Jr (ed.) *Circuit Interruption: Theory and Techniques*, M. Dekker, New York, 1984.

or alternatively, using square brackets:

- [1] *Dictionary of Scientific and Technical Terms* , 5th edn, McGraw-Hill, New York, 1994.
- [2] J. S. 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] A. G. Meyers, & S. D. Priest, 'A technique for moulding cylindrical discontinuous models', *Rock Mechanics and Rock Engineering*, Technical Note, vol. 25, no. 3, 1992, pp. 207–214.
- [5] T. E. Browne, Jr (ed.) *Circuit Interruption: Theory and Techniques*, M. Dekker, New York, 1984.

6 Technical language

Effective use of technical language is a critical part of report writing. The important aspects of technical language to be considered are structure, grammar, vocabulary and punctuation. (The use of punctuation in technical writing is detailed in Appendix D.) A report must be written appropriately for its *audience*. The *purpose* of a report must be decided before the writing begins. Once it is clear *why* a report is being written, then *how* to write will become more evident. A quality engineering report exhibits these characteristics:

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

6.1 Starting writing

When beginning a report, students may find it useful to plan and write the main sections first. The abstract or summary should be written last as should the conclusion. It can also be useful to write the Introduction later as it includes an outline of the structure of the whole report.

A useful technique for developing a structure is to ask questions. These questions 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?

It is useful to ask as many questions as possible because such questions help to generate ideas and key words for the structure of sections and paragraphs, and for the associated headings. Students may find it useful to refer to report writing resources available from their university library (see Appendix F).

6.2 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

6.2.1 Logical sections

Students should consider the overall purpose of the report, and be aware of the specific purpose of individual sections. Using a flow chart or visual representation can assist with planning and structuring the report. (For further information see section 3.2.2 *Main sections*.) Some possible purposes are 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

6.2.2 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 paragraph's purpose(s). 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)

6.2.3 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.

6.3 Structuring sentences

6.3.1 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.	✗

6.3.2 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. | ✗ |

6.3.3 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:	✗
	<ul style="list-style-type: none"> • the security of the data; • the protection of confidentiality; and • the costs of such measures. 			<ul style="list-style-type: none"> • the need to protect security; • Without doubt, confidentiality; • often these are expensive.

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

6.4 Grammar

6.4.1 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.

6.4.2 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) |

6.4.3 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_ | ✓ |
|------|--|---|

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

6.5 Vocabulary

6.5.1 Personal language

Currently in engineering reports, personal language is avoided in preference to impersonal constructions which emphasise scientific objectivity.

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

* Check with your lecturer before using personal language such as 'I' or 'we'.

Personal language is occasionally used to distinguish between the views or findings of other authors and your own. Alternatively, personal language can be avoided by using objective language.

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)

6.5.2 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...	✓
------	--	---

6.5.3 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 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.	✗

6.5.4 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.

7 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 and technical language.

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.

By initially planning the presentation of their material, students can concentrate on the content being presented in a 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.

8 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.

9 References *

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- Style Manual for Authors, Editors and Printers* 1994, 5th edn, Australian Government Publishing Service, Canberra.
- Schwarz, S. E. & Oldham, W. G. 1984, *Electrical Engineering: An Introduction*, Holt, Rinehart and Winston, New York.

* 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.

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 Electronic and Information Engineering

02478 Communication Systems 2

Computer Simulation Assignment

Student: Kim Citizen

ID Number: 9599999K

Tutor: Mr T. Ferris

Due date: 15/10/95

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 SA Policy no. A-11.2 1994*). The full policy is located in the *Student Diary*.

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 subject;
 - 1.3 Providing assistance to a student in the presentation of individual work in a manner unacceptable according to the assessment guidelines for the subject;
 - 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 subject, a note in the student's file and a reprimand from the Head of School;
 - 2.1 failure in the subject, 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 The Levels.
- 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.
$$x = G e^{-\omega t} \sin(\omega_d t + \phi) \quad (1)$$

6 Quotation marks ‘ ’ or Ò Ó (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:

- formatting
- report components
- referencing
- technical language

or

The *Style Guide* includes:

- formatting;
- report components;
- referencing; and
- technical language.

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 *AGPS Style Manual* (1994). 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: (differences highlighted in bold)	
<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: (differences highlighted in bold)	
<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.

Finding information

In most libraries, materials are arranged in 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 subjects:

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 — usually a computerised 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.

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

CD-ROM databases are ‘electronic indexes’ which help you to identify relevant periodical articles, conference papers, product catalogues and standards. Useful engineering CD-ROMs may include: Applied Science and Technology Index; Compendex (known as Engineering Index in the print version); Engineering and Applied Science (collection of Australian engineering databases); and INSPEC (for electrical and electronic engineering, computing, and manufacturing).

Reference materials such as encyclopedias, 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 help desk. Standards available may include Australian Standards and standards from international organisations such as British Standards, ASTM, ISO and IEEE.

Periodicals or **journals** provide up-to-date and often very detailed information. The Serials List or the catalogue shows which periodicals are held by the library.

Information desk

At the information desk a member of staff is available to assist you to locate information in your course. Staff can also help you with questions about how to use

the catalogue, the CD-ROMS and other resources. 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, M. R. & Wyatt, P. 1990, *Presenting an Assignment*, Nelson, South Melbourne.
- Michaelson, H. B. 1990, *How to Write and Publish Engineering Papers and Reports*, 3rd edn, Oryx Press, Phoenix.
- Neufeld, J. K. 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. & F. N. 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, F. W. 1993, *Writing a Thesis: A Guide to its Nature and Organisation*, 4th edn, Bibliotech, ANUTECH, Canberra.
- Rudestam, K. E. & Newton, R. R. 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. & F. N. Spon, London.
- Li, X. & Crane, N. B. 1993, *Electronic Style: A Guide to Citing Electronic Information*, Meckler, Westport.
- Style Manual for Authors, Editors and Printers* 1994, 5th edn, Australian Government Publishing Service, 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 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.

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

- ☐ headings & subheadings
- ☐ decimal numbering system
Tables and figures
- ☐ key tables/figures
- ☐ zeros and rounded numbers
- ☐ captions of tables/figures
- ☐ caption information
- ☐ data in tables/figures
- ☐ symbols/labels/signs
- ☐ asterisks (*)

improving layout and presentation

developed logically and consistently at each level
(e.g. size and style of headings)
used accurately and consistently; fourth-level avoided

used in the text (others, if required, in Appendix)
used for clarity sometimes
selected for specific differences between tables/figures
consistent with text information
consistent with data in report
explained clearly
added explanatory notes of further information, abbreviations, sources etc. that do not fit into rows or columns

Components

- Preliminaries*
- ☐ names/titles of people etc.
- ☐ abstract
- ☐ disclaimer
- ☐ acknowledgments
- ☐ contents pages
- ☐ figures & tables lists
- ☐ symbols list
Text of report
- ☐ sections
- ☐ abbreviations & acronyms
- ☐ definitions of new terms
- ☐ *Appendices*

enhancing logic and readability

spelt correctly & acknowledged fully
written to highlight and summarise significant information
signed and authorship declared
identified all who assisted with material and with editing
matched exactly to text (e.g. titles of headings with decimal and page numbering)
matched exactly to labels and captions
included all symbols from the text

divided clearly and developed logically
written in full when first used
expressed accurately and clearly
(each) referred to in the text of the report

Referencing

- ☐ all sources of information, other than your own
- ☐ only one reference system
- ☐ punctuation and elements

ensuring correct academic standards

referenced correctly twice, both in text and in reference list

used either author-date or numerical system – not both
standardised exactly (e.g. order of elements, punctuation, capitalisation and publishing details)

Technical language

- ☐ repetition of words
- ☐ sentences
- ☐ longer sections or paragraphs

editing for style and grammatical accuracy

avoided
tightened, focused and varied in length
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 |
| <input type="checkbox"/> gender inclusive language | used correctly |

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