Guidelines for Undergraduate Students

Style Guide for Design Report Writing

2015 Edition

School of Mechanical, Industrial and Aeronautical Engineering

University of the Witwatersrand, Johannesburg
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1 INTRODUCTION

Report writing is subject both to personal preferences and the needs of the particular material. Nevertheless certain broad rules exist which should be adhered to. The purpose of this document is to provide brief and convenient guidelines regarding the written communication of technical information for undergraduate students. There is no unique ‘right’ way of constructing a report - however there are many ‘wrong’ ways and only one preferred format within the School of Mechanical, Industrial and Aeronautical Engineering.

Further details on report writing can be found in a postgraduate document “Guide for the Preparation of Theses, Dissertations and Project Reports” which may be obtained from the Faculty of Engineering offices.

1.1 Structure of a report

A report’s configuration should be tailored to the needs of the particular project. The essential elements of a research or a design technical report are shown below in the order in which they should appear. The general format should be followed as closely as possible, unless otherwise stated by the supervisor in charge of the course or the project. A detailed description of each component of a report is presented in later sections of these notes / guidelines. An example of a contents page is shown in section 4.3 in order to illustrate possible hierarchies and combinations of headings for both research and design reports.

i. Title and title page
ii. Candidate’s Declaration
iii. Executive Summary
iv. Acknowledgements (where appropriate)
v. Contents
vi. List of Figures
vii. List of Tables
viii. List of Symbols / Nomenclature
ix. Introductory Chapters
x. Central Chapters
xi. Concluding Chapters
xii. References
xiii. Bibliography (where appropriate)
xiv. Appendices

Note: Each main section of a report starts on a new page!

2 GENERAL GUIDELINES FOR THE PRESENTATION OF A REPORT

2.1 Title and Title Page

The contents of a title page must include the following:

- The course name and the course number.
- A short description of the contents of the report (i.e. Formal Report, Design Report, etc.)
- A title that indicates the contents in as few words as possible.
- Full name/s of the author(s) of the report.
- Student numbers of the author(s) of the report.
- Group number if one was assigned.
- The date when the report is submitted.
Penalties will be applied to reports that do not have all the above listed information. Figure 1 below gives an example of a title page.

![Title Page Example](image)

Figure 2.1: Example of title page

### 2.2 Binding

The project report must be bound to give the report a professional appearance. The best approach is to use ring binders together with a clear plastic front cover. Other forms of binding may also be accepted; the lecturer for a particular course may have special requirements and these should take preference.

### 2.3 Naming Convention

Many of the reports you submit will be submitted online. It is then a good idea to get into the practice of adopting a good naming convention for your digital documents. This is firstly to allow you to easily locate and sort through previous documents. Secondly it allows the lecturer receiving the document to not have to open your document to know who created it or what it relates too. Here are a few details that should be contained in your file name:

- Student number (this is a lot easier to locate or sort through than a persons name)
- Year created
- Type of report (design, research, assignment, etc.)
- Course code (this is far more convenient than the course name)

### 2.4 Paper

All reports are to be printed on a good quality white A4 size paper. The text must be printed on one side only! (The left hand must be left blank for examiners comments)

### 2.5 Page Setup and Layout

The suggested dimensions for margins are as follows. The left margin (binding margin) must be 35mm and the right margins must be 25mm wide. The top and bottom margins must be 20mm.
Page numbers must appear at the bottom right hand side of every page. All pages leading up to the introductory chapters must be numbered with roman numerals (i.e. i, ii, iii, iv, etc.). All pages thereafter are to be numbered with Arabic numbers (i.e. 1, 2, 3, etc.)

2.6 Font Size, Font Type and Alignment

The preferred font is “Times New Roman” with a font size of 11. The text must be fully justified across the page. The paragraph line spacing should be set to 1.5. Adjustment of the line spacing, font size or even margin sizes, to cheat the page limit imposed on the project is as good (if not worse) as going over the page limit!

2.7 Headings and Numbering

Numbered headings must be used throughout the report as this clarifies the sequence and interrelations of the sections of the report. Numbering also facilitates cross-referencing within the text of the report. Rules for headings and numbering of headings are as follows:

- Numerals must be Arabic, be numbered continuously and begin with 1.
- Each main section or first level heading of a report may be divided into any reasonable number of subdivisions or second level headings. This division can continue to third level headings.
- The numbers of designated headings of different levels are separated by full stops. No full stop appears after the last number.
- First level headings are written using uppercase letters.
- Each word of a second level heading is written using an uppercase letter as the first letter.
- Third level headings are written in lowercase letters except for the first letter of the first word.
- 2nd, 3rd and 4th level headings should not be indented and should all line up along the left margin.
- NO full stop appears at the end of a heading.
- Headings must be written using the bold font.

Example of a system of headings:

\begin{tabular}{|l|}
\hline
1 & FIRST LEVEL HEADING \\
1.1 & Second Level Heading \\
1.1.1 & Third Level Heading \\
\hline
\end{tabular}

Note: If possible try to avoid forth level headings!

All headings leading up to the introductory chapters (e.g. list of contents, figures, tables and nomenclature) are generally not numbered, with the introductory chapters onwards being numbered instead.

Appendices are also not numbered. Instead they are listed as Appendix A, Appendix B, etc. Each appendix should then have a heading explaining its contents (in this way the number format for the heading is Appendix A, instead of 1)
2.8 Figures

Graphs, photographs, illustrations, diagrams, schematics, sketches, etc. are all referred to as figures. Figures form a very important part of the document and as such should be carefully prepared. Each figure must have a caption which includes the figure number and a descriptive title which should be placed below it. In short reports it is convenient to number each figure in the sequence in which they occur, i.e. 1, 2, 3, etc. In long reports a more suitable convention would be to number the figures relative to the chapter number (never section numbers) in which the figures occur. Thus the first figure in chapter 2 would be Figure 2.1 and the second would be Figure 2.2. In the text of the report figures can be addressed in any of the following ways; Fig. 2.2 or Figure 2.2. Figure and table references should all have the “F” and “T” capitalised. The exception is equation references where it is always written with a lower case “e”. General references to figures and tables, and not specific examples can be done with lower case f’s and t’s. A similar principle holds for figures placed in lettered appendices, but the full stop is omitted. As an example the second figure in Appendix B is figure B2.

NOTE: Any figure must be referred to in the text preceding its first appearance.

A figure cannot appear in the body of a report without it being referred to. A short description of the contents of the figure must always be given (e.g. Fig. 9 illustrates the relationship between air density and altitude. From this relationship it is possible to …).

2.8.1 Graphs

Graphs form an important part of an engineering design or research report as they are used to show relationships between different variables. Graphs can take on a number of different forms, e.g. bar charts, pi-charts, pictographs, or line graphs. Line graphs appear most frequently in scientific and technical work. Line graphs are mainly used to show the relationship between a continuously varying independent variable and one or more of its dependent variables. In preparing graphs for inclusion in a formal report, the following should be borne in mind:

- The graphs should illustrate clearly the point that the writer wishes to make.
- The scale chosen should be such that only the relevant parts of the curve are presented. Typically a grid is not necessary however if used it should not be extended unnecessarily beyond the limits of the curve to be shown.
- If it is necessary to suppress the zero this should be clearly shown.
- The scale should be easy to read and be restricted to multiples and submultiples of 1, 2, 5, 10, 20, etc.
- Units should be clearly stated for each axis title and written in a way that they can be easily read.
- The caption should contain all the information pertinent to what is being plotted. Should the reader wish to locate some data shown in the graph they should be able to identify which graph they want by the list of figures (containing the caption description).
- To ensure clear reproduction graphs should not be overburdened with detail and should not rely on colour to distinguish result sets or curves. Reports are typically printed in black and white, so either use different shades of grey or rely on the use of distinctly different symbols.
- Never use shaded background in a graph.

Hint: If you use Microsoft EXEL to generate your graph and you want to copy this graph into a Microsoft WORD document then the method to follow is the following: With your mouse select the graph in EXEL by left-clicking on it. While holding down the shift key on your keyboard, use your
mouse and click on “Edit” which is positioned right above the toolbar. With your mouse select “Copy Picture” to copy the graph as a picture into the computer’s memory. The computer will request you to select the size and the appearance. Once the graph is copied into the memory as a picture you can paste it in your WORD document. If you just copy and paste the graph from EXEL into WORD and not paste it as a picture, your WORD file size might become very large as the graph will be copied as a data object.

Figure 2.2 gives an example of a graph together with some additional notes. Note: Gridlines are thinner than the plot, no borders, no fill, uncertainty bonds are shown, predictions and measurements are plotted on the same axes.

Figure 2.2: Example of a properly formatted graph displaying variation of drag coefficient with lift coefficient for a NACA0012 aerofoil, V=8m/s.

2.8.2 Engineering drawings

All technical designs must be accompanied by sufficient, correctly executed engineering drawings. This makes the essential features of your design clearly understood. They must, as far as possible, be kept simple and uncluttered. The standard, quality and conventions should be according to the SABS ‘Code of Practice for Engineering Drawing’ – SABS 0111-1969. (Some assignments will only require NEAT sketches or un-scaled drawings. This will be communicated by the coordinator of the project.)

Should you wish to have your engineering drawing printed on an A3 page then the page should be folded as shown in Figure 2.3. In this way the title block, containing all the relevant information is still visible and full readable, the binding has not stopped the drawings from being unfolded and there are no pages sticking out of the closed report.
2.8.3 Photographs

Photographs are usually not inserted into reports, but may occasionally prove useful and sometimes even necessary. As a rule photographs should not be used unless they include features which cannot easily be expressed in words or by means of line drawings. If photographs are used, they must be clearly described in the text of the report. Sections of the photograph should be labelled with text boxes in order to make them easier to understand. Photographs should also include some sort of scaling so that the size of the object shown may be easily identified. Photographs alone should not be used to illustrate the experimental apparatus in research report. If they are used they must be accompanied by a sketch depicting the layout of the apparatus.

2.9 Tables

In one sense a table is a form of graphical presentation and as such it should be kept simple and clear. Tables are best used when a number of numerical values are to be listed. Tables can be arranged either vertically or horizontally. They should be arranged to fit into a single page of the document. Horizontal tables are used where their size is such that they cannot be fitted into the width of the printed page.

Each table should have a caption above the table and be numbered with Arabic numerals. The numbering scheme follows the same format as is used for figures. The columns in a table should be arranged for easy comparison with related information being brought together. Each column should carry a brief heading and include consistent units. In column headings try to avoid using expressions like \( \times 10^{-3} \) as these are ambiguous. It is not clear whether the figures in the column have already been multiplied by 10\(^{-3} \) or not. Rather use the recognized metric prefixes, e.g. ‘\( \text{mm} \)’ instead of ‘\( \times 10^{-3} \text{ m} \)’. Where this is not possible, make sure the heading is unambiguous even if it appears clumsy. Table 2.1 is an example of a table.
Table 2.1: Observed variation of temperature with distance from a furnace wall

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Temperature (°C)</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

2.10 Numbers and Equations

The rules for using numbers are the following:

- In the text of the report use words rather than numerals for integers below ten. Exceptions to this rule occur for figures and tables, or when integers are associated with unit symbols. For numerals above ten, use whatever provides optimum clarity and good appearance.
- Where it is necessary to have decimal fractions these should be expressed as numerals, e.g. ‘2.7’ and not “two point seven” or even $2 \frac{7}{10}$.
- Do not begin a sentence with a numeral as this can lead to confusion.
- Avoid writing out large and small numbers by using either accepted prefixes or exponential notation, e.g. $253 \times 10^3$ or $0.253 \times 10^6$. Where large numbers must be written out these should be separated by a small spaces into groups of three counting from the left or right of the decimal sign, e.g. 5 241.2 or 0.524 65.

Mathematics included in the text should form an integral part of the argument and should be intelligible to the intended reader. Detailed derivations and mathematics beyond the interest of the majority of readers should be put in an appendix. Equations must be numbered. The numbering scheme follows the same format as is used for figures; however the number is placed to the right of the equation, next to the margin. The equation may be left or centre justified and should be numbered in the right margin. If the equation is a part of a derivation, only number equations that are referred to in the text. An example of the form of mathematical expression would be as follows:

$$\omega = \sqrt{\frac{k}{m}} \tag{1}$$

Where $k$, spring constant, N/m; $m$, body mass, kg; $\omega_n$, frequency of vibration, rad/s

Note: Units are very important so do not leave them out.

NOTE: If a nomenclature is used in the report it is still necessary to redefine the symbols below the equation the first time they appear in the text. Once a symbol has been defined below an equation, it does not have to be redefined later.

2.11 Referencing and Bibliography

While conducting a research or a design project it is common to use sources such as books and journals for additional information. These sources must be referenced in order to:

- indicate the source of the writer’s statements
- acknowledge another person’s work
- provide a source of additional information
- comply with the law of copyright.
There are a number of different referencing systems. The two most commonly used in scientific literature are the Harvard system and the Numerical (or the Vancouver) system. Both methods are accepted.

2.11.1 Harvard system

The references are referred to in the text by the author’s surname followed by the year of publication (in brackets) and are listed in alphabetical order by year of publication in the list of references. If the same author is cited more than once for a given year the letters a, b, c are used to distinguish the articles. If their citation is only to a particular page then this is shown by the use of a colon followed by page numbers (after the date).

If there are more than three authors, only the first (senior) author’s name is given in the text followed by ‘et al.’.

Example

- Specimen text
  A succinct account of the basics of interactive television programming has recently been given (Bolton, 1981). Nyhan and Johansen (1980 : 399) have summarised the economic implications. Robertson (1979) has reviewed some of the technical aspects. Veith (1981a, 1981b) has provided the best all-round accounts of teletext and videotext.

- References


2.11.2 Numerical system

The references are numbered in ascending order in the text, and are listed in that order in the list of references. In the text itself, the numerals are given in square brackets as show in the example below.
Example

- Specimen text


- References
2. Nyhan, M.J. and Johansen, R. Videotex and teletex in the United States,

2.11.3 Citations

The order in which items in the references are listed is as follows:

- Authors’ names.
- Year (if Harvard system is used).
- Edition numbers of book or report number of report.
- Name of journal, publisher, conference, sponsor or report or the word Transactions or Proceedings followed by name of report.
- Location of journal, conference, sponsor or society if not well known.
- Volume number, issue number, month (abbreviated) and year.
- Inclusive page numbers of books or journal articles.

Examples of citation for different types of publication

- Journal article:


- Book:


- Standard:
2.11.4 Bibliography

Any supplementary literature not referred to in the text, but considered to be relevant and of interest, may be put after the references in a Bibliography and formatted in the same manner as references.

2.11.5 Referencing the internet and the CD-ROM

Internet references must be accompanied by the name of the author, the date when the article was written and the internet website where the article originated from. The date when the article was accessed must also be included.


NOTE: http://www.google.com is NOT an acceptable reference!

A reference to a CD-ROM follows similar procedure.


2.12 Appendices

Appendices are convenient places for recording complicated mathematical or other formulae or any other specialised or lengthy material such as computer programme listings, copies of spectra or other instrumental outputs that would otherwise detract from the readability of the text. The reader should be able to study or refer to these later, and only if he/she wishes to do so, after he/she has read the main work. Appendices must be numbered or lettered consecutively in large print at the top left-hand corner of the page to facilitate their location in the text. Each appendix must start on a new page. The appendices should be placed immediately after the list of references.

2.13 Some Specific Issues

2.13.1 Plagiarism

Students are guilty of plagiarism when they try to pass off the work of another author as their own. Plagiarism is a serious offence. An example of plagiarism is when students copy parts of books or articles or previous year’s student submissions in their assignments. It is also illegal to copy sentences, paragraphs, or specific information without acknowledging the source or providing a reference. A quote may not exceed 150 words and may not be a complete paragraph. Students may not write assignments by combining quotations, even if source citations are provided. Assignments and reports must be students’ own work, written in their own words and providing considerable interpretations of the sources.

Students caught plagiarising will receive a mark of zero for the entire report and the report will be referred to the plagiarism committee. Second offending and more serious transgression can be referred to the university disciplinary committee for future prosecution.

2.13.2 Language

A good report should be comprehensive and precise. It should also be concise. The writer should read through his/her draft critically and eliminate unnecessary material. Where the writer’s home language
is not English, it is most important that he/she should seek help in this draft reading process. A report should be written in the past tense and the passive voice (i.e. never use; I, we, etc…). Present tense can be used when referring to the content of the report (i.e. Fig 1 shows that…)

- The following are some of the techniques that will help:
- Break down complex statements into lists.
- Use the active voice where appropriate.
- Do not use pompous words or jargon where simpler words are often more effective.
- Avoid empty phrases such as ‘it is interesting to note that…’
- Avoid unnecessary words, e.g. ‘the precipitate was found to be in a wet condition’ which simply means that ‘the precipitate was wet’.
- Reports of work done are usually written in the past tense. Where universal truths such as natural laws are stated, the present tense is generally used.
- Do not change tenses in a sentence unless there is a good reason for it.
- Avoid long sentences as they are difficult to follow.
- Use only generally accepted abbreviations and symbols.
- Check spelling and punctuation.

2.13.3 Paragraph use

Paragraphs are there to help the reader by breaking up the text into manageable sections, as long unbroken sections of text are discouraging to the reader. A paragraph should consist of a central statement supported by a group of details. The transition between paragraphs should be smooth, with some form of connecting link in the text.
3 NOTES ON DESIGN REPORTS

Design reports are intended to convey all pertinent information concerning a particular design or solution to the appropriate audience. In general, this audience will be the staff member assessing the report. However it should be born in mind that in future the readers of design reports could be any person within the organization. As with all writing, it is important that students bear their prospective audience in mind.

Reports are not assessed on length – generally succinct brevity is preferred to long winded explanations. Students are encouraged to use appropriate sketches and diagrams. Hand drawn sketches are always acceptable in the report body, for clarity. Presentation of reports should be neat and orderly. If not typed, the hand writing must be clear and legible. Pages of the report should be numbered.

The following general format should be followed, where appropriate, in presenting a design report:

- Title Page
- Declaration sheet
- Executive Summary
- List of Contents
- List of Figures
- List of Tables
- Nomenclature (as appropriate)
- Introduction
- Market survey/needs analysis/literature survey (as appropriate)
- Product Requirement Specification (PRS)
- Design justification
- Design Specification (the formal description of your final solution)
- Conclusions and Recommendations
- List of References, and/or Bibliography
- Appendices

All pages from the declaration up to and including the nomenclature must have page numbers with roman numerals. All pages thereafter, including appendices must be numbered with Arabic numerals.

3.1 Declaration sheet

A declaration is a signed statement identifying the work which was shared and that which was performed individually. An example of the group declaration sheet is shown in Figure 3.1. A declaration is a legal document and as such it must be signed and placed in the report. If you wish to retype the declaration into your own document rather than copying or scanning it in, then ensure that it is copied verbatim and no points are left out.

All details must be completed in the form. Any unfilled information can be taken as an admission of failing to meet the obligations of the declaration sheet and will be interpreted as a potential plagiarism.
3.2 Executive Summary

This should be a paragraph briefly summarizing the task, the work that was undertaken and the final outcome. It should be written in the past tense. i.e. what has been done (not just a list of what will be found in the report). The purpose is to summarize, for an outside reader, what the report is all about. It is sometimes called an ‘executive summary’ and may be the only part read by a top manager, who may not be an engineer, who just wants to know the overall recommendation and can trust his engineers to have done the job properly.

This will be the last part of the report that is written as the design needs to be complete.
The 5 points that must be covered are:

- What - what is the purpose of the design or task statement
- Where – where is the design to operate
- Why – what is the purpose behind the design (this can usually be combined with the “what” unless there is a clear motivation to the project
- How – how was the design developed. This will include a brief summary of the type of concepts evaluated and how they were evaluated and the analysis performed
- The result – what the final design is. This should contain some quantifiable data from dimensions to performance specifications.

3.3 List of Contents, Figures, and Tables

These are not all required in short reports provided that each figure, table and drawing is clearly titled and referred to appropriately in the text. However a list of contents, with page numbers, is always desirable. In long reports it is essential to include all these lists (with a page number against each item). Each list should be contained on a separate page.

3.4 Nomenclature

With large reports there are generally a large set of symbols used in equations and calculations throughout the report. It is therefore sometimes helpful to have them all listed in a single table, giving the symbol, the description of the symbol and the units used. These are not always necessary in reports and it’s a judgement call of the report writer as to whether they are necessary or not. If it is included in the report then it must contain every symbol used.

3.5 Introduction

This sections will contain the following information:

- Background (if relevant or appropriate)
- Motivation (if relevant or appropriate)
- Task statement

The background is used as a lead in to statement of what the problem that the design needs to address. It should feature the history of the design and or previous attempts at addressing the problem. It should not be a lengthy section.

The motivation is the reasoning behind why the design is needed. In many cases the projects you are presented with in undergrad are created by the lecturer to test your design skills and do not have any real world application and there is therefore no need for a motivation. Do not dream up reasons why your design is needed!!

The task statement is presented as given and as understood. The task as understood can be shown here or after the next section as prior research may be required in order to gain a proper understanding of the task.

3.6 Market Survey/Needs Analysis/Literature Survey

This section should be included if it has been necessary to carry out any of these activities in order to fully clarify the task and its scope, in preparation for writing the PRS. Generally it is only one of the three and most reports should not contain a market survey, needs analysis and literature survey.
Only relevant information should be contained here. If there is something in the report that has relied upon previous research into a matter, than that information can be included. Needlessly padding the report with information is pointless.

Information should also not be simply copy and pasted. The idea is that you should summarise the information you have found, relating it to the design at hand (it is unlikely you will find information that is directly aimed at your design needs) and present only what is relevant. Values or claims should be referenced as necessary to back up what you are saying. You should not need to be referencing every sentence because you have just copied it from a book or website.

Depending on the length of this section it is helpful to have subsections within it. This helps split up the information making it easier for the reader to refer back to specific points you discussed in the literature survey.

Any and all information sourced must be properly referenced otherwise you are claiming it as your own work. That includes figures!

### 3.7 Product Requirement Specification

A Product Requirement Specification (PRS) shall be set out including:

- Requirements
- Constraints
- Criteria

This section should really not be longer than a page.

### 3.8 Design Justification

In an industrial context, this section would include all assumptions, decisions and analyses relevant to the design exercise so that the reader could scrutinize the work in detail, if necessary. In the university context, this is the section in which you will outline your:

- Concept formation
- Concept evaluation
- Analysis (including assumptions made)
- Detail development

**Note:**

Concept figures should be clearly visible and should not be made too small to allow for more text. Conversely they should not be overly large, provided the figure sizes allows for a clear distinction of what the concept is, it’s okay. As with all Figures, the concept figure should be centred on the page. For easier reference by the reader is helps to name the concept with an easily recognisable format. Good names to use are, for example, Wishbone suspension concept, Trailing arm suspension concept or Macpherson suspension concept; these names allow the reader to easily recognise which concept you are referring to. Names such as concept 1, concept 2 or The Rectractor5000 are examples of bad names as it will generally require the reader to refer back to the concepts section to know what you are talking about. This ideally should not have to happen as it breaks the flow of the report.

Each concept should have the following information
- Concept figure
- Short paragraph describing concept
- List of advantages and disadvantages (if necessary)

Design calculations should wherever possible be presented according to the following format:

- purpose of calculation
- sketch to illustrate the model to be analysed (possibly in the form of a FBD)
- theory or formula to be used; specify assumptions or approximations, cite references used unless the formula is well known (e.g. Newton II).
- calculations – NOTE that symbols must always be defined and units must be stated!
- results
- check (dimensions, order of magnitude, etc)

In the industrial situation the reader will only refer to this section if he is not satisfied with any aspect of the solution specification, or to reassure himself that the assumptions made or the method of analysis used is applicable or valid. In the university situation this section will frequently be read critically as a check on your method of approach. It is therefore important that any decision or choice made is properly explained and that any solution obtained is reasoned to show that you understand what it is you are doing.

3.9 Design Specification

In the above sections (Statement of task as given and task as understood, Market survey/needs analysis/literature survey and Product Requirement Specification (PRS)) you set out the objectives of the task in hand. In this section you set out your proposed solution to achieve these objectives.

This section will include (as appropriate):

- an overall description of the final proposed device or system and its principles of operation
- one or more fold-out assembly or pictorial drawings showing sufficient detail so that the reader can quickly grasp the essence of the proposed solution (with accompanying explanations where needed)
- a statement of the performance capability of the device including, for example, capacities, speeds, power, manpower requirements, etc.
- comments on any critical area that could impact on the success of the design
- a capital and operating cost analysis if appropriate

Note: where appropriate the elements in the design specification should be related to the PRS.

This section should not contain any explanations, reasoning or calculations. It is simply there to state what your final design is! Similarly if you have not analysed a particular aspect (such as top speed of the design) you cannot specify it here. The design justification acts as the justification for your final product shown in the design specification.

3.9.1 Engineering Drawings

Unless otherwise stated in the problem assignment, all designs must be accompanied by sufficient, correctly executed engineering drawings to make all essential features of your design clearly understood. The standard, quality and conventions should be according to the SABS ‘Code of Practice for Engineering Drawing’ – SABS 0111-1969. (Some assignments will require NEAT sketches or unscaled drawings only).
All drawings must include a title block, which should contain the following information:

- The title of the drawing or name of the part shown
- A sequential number for the drawing, to allow easy references to the drawing
- A revision number, to distinguish between versions of the same drawing
- The name and student number of the draftsperson responsible for making the drawing
- The name / number of the course for which the drawing is submitted
- The date the drawing was created

The engineering drawings are part of the design specification and should be contained under that section.

3.10 Conclusions and Recommendations

The conclusions are a critical evaluation of your design. It should be closely related to the points in the PRS and the task statement. Points to discuss are how well the design meets the task statement and possible deficiencies. This is not a place to discuss how much you have learnt or not learnt, it is not the place to complain about the difficulty of the design. Conclusions are typically presented in point form.

The recommendations are a list of further work that needs to be done. As an undergrad time constraints will typically mean that you will not complete your design in its entirety and there will still be more work to be done, in the form of analysis, testing, further considerations, etc. This shows your awareness of the scope of the design. It is not an excuse to not complete the design and list everything you should have done in the first place!

3.11 List of References, and/or Bibliography

References are publications actually cited in the text as sources of specific information used. Any supplementary literature not specifically referred to in the text but considered to be relevant background reading is listed separately under ‘Bibliography’. For more information refer to section 2.4 of this report.

3.12 Appendices

Appendices may contain additional support information, brochures, computer simulations, minor or lengthy detailed calculations, etc. (these must be cross-referred to in the body of the report to justify inclusion).

The appendices are not an excuse to cheat the page limit imposed on your report. Any information contained in the appendices should not need to be reviewed, in fact in many cases they will not be reviewed. Placing important information, such as your engineering drawings or your concepts in the appendices is as good as not having them in the report at all.

The exceptions are your calculations, where their placement in the main body will disrupt the flow of the report. As such they should be accurately summarised in the main body and then listed in full in the appendices, with references in the main body to that particular appendix.
In conclusion please remember that the main purpose of writing a report is the quick and accurate transmission of information: hence it should be easily read and understood. BEAR THE READER IN MIND. Reports must be typed; ensure that it folds out flat and that the drawings fold out for easy reference when reading the corresponding text. Finally, be brief and precise. Report quality is not proportional to its length.