WKEXP 905 TECHNICAL REPORT

Engineering Co-op Program
University of Alberta

PURPOSE

As a senior co-op student, you are required to complete a technical report, usually on a topic related to your work during your final work term. The following guidelines set out the report requirements: please read them carefully.

TECHNICAL REPORT REQUIREMENTS

This report must satisfy the general content criteria explained in the GUIDELINES FOR STUDENTS: TECHNICAL REPORTS. Supervisors are the best source of potential topics. You should explain your technical report requirement to your supervisor early in the work term. In most cases, the report will describe an actual project which you have been assigned.

If your work does not provide an obvious report topic, you will need to work at finding one. The EXAMPLES OF PREVIOUSLY SUBMITTED TECHNICAL REPORTS affords some insight into topics which previous co-op students have selected for their technical report.

FORMAT REQUIREMENTS

The report should follow a format similar to the description provided in the FORMAT REQUIREMENTS. You might also wish to refer to the report guidelines which are provided with some of your engineering design and/or laboratory courses. If your employer requests a specific format or you have any questions regarding the guidelines, please contact your coordinator as soon as possible.

All reports must include a letter of submittal as described in the guidelines.

SUBMISSION & EVALUATION

Technical reports may be submitted to the co-op office for grading by a faculty member from your discipline. Prior to submitting your report you must make your supervisor aware of its content and obtain clearance for its release.

If the report contains confidential information which the employer does not want released, the report may be graded by your work supervisor or an engineer within the employer's organization. In such cases, the evaluator should use the TECHNICAL REPORT EVALUATION FORM and return it to the Co-op Department.

DEADLINES

Your Technical Report or Report Evaluation from your supervisor/engineer is due in the co-op office on the last day of your work term. ***Late assignments will not be accepted and may result in a grade of FAIL.***

REMINDER: PERFORMANCE EVALUATIONS

Please remind your supervisor to complete and return your performance evaluation to us in order for you to be granted credit for the work term.

Evaluation forms are available on the co-op website at:
https://www.ualberta.ca/engineering/study-with-us/co-op/students/evaluation-forms

EXAMPLES OF PREVIOUSLY SUBMITTED TECHNICAL REPORTS

Chemical:

- Reformer Heater Efficiency
- VCM Refrigeration System Upgrade
- Pressure Compensated Temperature Control on Shellburn Splitter Columns
- Determining a Control Strategy for Controlling the Levels of the Devolatizer Tanks

Civil:

- Composting of the Organic Fraction in Municipal Solid Wastes
- Central Building Cable Tray Rack Design
- The Use of Geotextiles for Pipeline Right of Way Construction
- Behaviour of Steel/Concrete Sandwich Panels under Rated Load

Computer:

- Project Proposal for Workers Compensation Board
- Comparison of PC Operating Systems
- Displaying Conventional Radar Images on the 2397A Graphics Terminal

Electrical:

- User Control Interface Card High Level Design
- Use of High Speed Reclosing Circuit Breakers to Improve Reliability of an Overhead Distribution System
- 25KV Breaker Reclosing Scheme Using The Allen Bradley SLC 100, 150 Programmable Logic Controller
- Resistance Welding and the Need for a New Robotic Welder

Mechanical:

- Evaluation of the Judu Progressing Cavity Pump
- Pressure Rating Hydro-Test Caps
- Nipple Failures on Blowdown Risers
- Full Time Weld Quality Monitoring for an Automated MIG Welding Application

Mining:

- Dragline Planning Via a Personal Computer

Metallurgical:

- Copper Boil Retention Time
- Effect of the Proposed API Specification Changes on Drill Pipe Resistance to SSC
- Effect of Finishing and Coiling Temperature on Tensile Properties of Grade 414 #2 Steel
- Analysis of Pipe Quality and Yield for Fusion Bonded Coating

Petroleum:

- Smiley-Dewar Viking Pool Depletion Plan
- Plunger Lift Potential on Wet Gas Wells
- Expanded Waterflood Status Douglaston-Midale Beds Unit
- Numerical Modelling of a Cyclic Steam Injection Project

GUIDELINES FOR STUDENTS: TECHNICAL REPORTS

OVERALL REQUIREMENTS

Your report must not simply be an account of what you did on your work term. It must contain an identifiable analytic component, and should display some technical evaluation. Reports without critical analysis such as descriptions of processes, systems or existing mathematical models are unacceptable. Documents such as user guides are equally unacceptable.

Examples of acceptable technical reports include: feasibility studies; studies of the effectiveness of alternative solutions to an engineering problem; efficiency or cost effectiveness studies; or project studies in which a solution to an engineering problem is proposed and implemented. These types of reports contain the essential elements of problem definition and analysis. As well, they demand that you display some evaluative skills with respect to engineering solutions.

FORMAT REQUIREMENTS

Your report must include the following sections:

- Preliminary pages
- Abstract (or summary)
- Report Body
- Conclusions and recommendations
- References

Additional, optional sections include:

- Glossary and nomenclature
- Appendix/Appendices

PRELIMINARY PAGES

The first pages of the report are called the "Preliminary Pages", and must be organized in the following sequence:

- Front cover
- Title page
- Letter of submittal
- Table of contents
- Lists of tables and figures
- Statement of confidentiality (where required)

Since the preliminary pages are at the beginning of the report, they should be of a quality that creates a good impression for the reader.

<u>Front Cover</u>

The front cover must list:

- the title of the report
- your name and department
- your current work term

Title Page

Select a title which provides the reader with some indication of the report topic and content. The title page must include the following information:

- University of Alberta
- Faculty of Engineering
- Title of Report
- Name and Location of your Employer
- Your name and current work term
- Completion date of the report

For spacing and layout, see the sample title page.

Letter of Submittal

The letter of submittal must follow the format of a standard business letter. Use either your employer's letterhead or use your home return address on plain paper. If your technical report is being graded in-house, address your letter to the individual marking your paper. If you are submitting your technical report to the Co-op Office for evaluation, address your letter to:

Dr. Don Raboud
Associate Dean, Student & Co-op Services
Engineering Co-op Department, Faculty of Engineering
2-300 Donadeo Innovation Centre for Engineering
University of Alberta

Your letter must contain the following information:

- Name of employer
- Report title
- Current work term
- Name(s) of supervisor(s)
- Department(s) in which you worked
- Main activity of employer and department
- Purpose of report (from the point of view of your work project)
- Acknowledgement of assistance and your role in the work described in the report. Did you do all of the reported work yourself? If you were a member of a project team how many people were on the team and what was your specific contribution?
- Your name, ID number, and signature

See the sample letter of submittal in the Appendix.

Table of Contents:

The table of contents lists all main sections of your report and any subsections which have headings. Use the same numbering system in the table of contents that you used in the main section of your report. See the sample table of contents in the Appendix.

List of Tables / List of Figures

These two lists are considered part of the table of contents but are listed separately and immediately after it. Each list identifies its components by number, title, and page number. Do not list any tables or figures that you include in your Appendices.

Abstract or Summary

The abstract is a short, self-contained paragraph usually about 200 words long at the beginning of your report. It is a synopsis of information contained in the report and should state the problem and give a summary of your main discoveries and conclusions. A sample abstract is shown in the Appendix.

REPORT BODY

Introduction

The introduction is always the first section in the body of your report. It sets the stage for the presentation of your work and specifically states what the problem or project was that you worked on. It should supply enough background information to help the reader understand why your report was written and how it relates to any similar work done previously. If you have written the report for your employer, mention this in the introduction. See the sample introduction in the Appendix.

The Rest of the Report Body

You have stated the problem (or project) in the introduction. The main section should explain how you studied this problem, what your findings were, and what these findings mean. Organize the report into sections using a clear and consistent system of headings. You may be able to follow the commonly used system of "Materials and Methods", "Results", "Discussion/Conclusions" with appropriate subheadings. A numbering system for sections and sub-sections similar to that shown in the sample table of contents is recommended.

The entire main section, including the introduction should be at least 2,000 words long.

Tables and Figures

Tables and figures in your report can save you unnecessary detail in the text while clarifying your work for the reader. Any table or figure, however, must serve a specific purpose. The same data should not occur in both a figure and a table.

Consider carefully whether the information is better presented graphically or in tabular form.

Tables

Use a table only when you need to present complex or voluminous data that contain several variables. If the data set is small or the variables few in number consider putting the information into the text rather than into a table. If you do use tables, check examples in journals or reference books in your discipline for layout and design.

Figures

Figures include line drawings (diagrams, histograms, graphs) and photographs. They should be used to illustrate aspects of your data that are too complex to portray in words.

Each table or figure should be clearly labelled and readable.

Conclusions and Recommendations

The conclusions provide a short summary of what you did and what it means. Make any statements here that you can derive from the investigation and that can be supported by the analyses described in the report. Do not go into detail about the methods you employed.

If recommendations come out of your work, emphasize them in the conclusions. Some of your recommendations may be speculative, but most should follow logically from the conclusions. See the sample conclusions and recommendations in the Appendix.

References

This section can also be named "Literature Cited" or "Bibliography" according to the preference in your discipline. List all publications referred to in the main test. Follow the standard for listing accepted by your Faculty or adopt a style used in journals in your research area. Reference formatting guidelines are also available at http://guides.library.ualberta.ca/citing.

Glossary

Add a glossary only if the text is necessarily heavy with specialized terms, mathematical symbols or technical jargon. If you have only the occasional term in your report, define it as part of the text:

> "...that pressure (P) is a function of temperature (T)..."
>
> "...the snout area contains a pair of nasolabial grooves (NLG: Fig. 4C)..."

Appendix

The appendix should contain any information that substantiates the report but that is not required for a convincing understanding of your work. The appendix may contain bulky data such as lengthy tables, computer print-outs, descriptions of processes or operations, maps, and so on. Assign consecutive letters or numbers to each, for example "Appendix A", "Appendix B", or "Appendix 1", "Appendix 2". Not all reports have or need an appendix.

UNIVERSITY OF ALBERTA
FACULTY OF ENGINEERING

OPERATING STATISTICS OF THE ROLLS ROYCE AVON GAS GENERATOR

TRANS CANADA PIPELINES LIMITED
ENGINEERING OPERATIONS DEPARTMENT

CALGARY, ALBERTA

PREPARED BY:
I. M. COMPETENT
Mechanical Engineering

April 4, 2018

1404 - 8th Avenue S.W.
Calgary, Alberta
M1H 2X3

April 4, 2018

Dr. Don Raboud
Associate Dean, Co-op & Student Services
Engineering Co-op Department, Faculty of Engineering
2-300 Donadeo Innovation Centre for Engineering
University of Alberta

Dear Dr. Raboud:

This report, entitled "Operating Statistics of the Rolls-Royce Avon Gas Generator", was prepared as my senior work term report for the Engineering/Operations Department - Operations Analysis Section of Trans Canada Pipelines Limited. The Trans Canada Pipeline System pumps natural gas from the Saskatchewan Border into Ontario and Quebec.

The Operations Analysis Section is headed by Mr. J. N. Scott and is primarily involved with the performance analysis of turbine and reciprocating compressor units. This report is a historical study of the Rolls-Royce Avon Jet Engines used by Trans Canada Pipelines.

This report has been prepared and written by me and has not received any previous academic credit. In carrying out this work, I was a member of a project team consisting of Mr. C. Capobianco, Mr. I. J. Langham, and Mr. J. N. Scott and I would like to thank them for their assistance in preparing this document. My specific role in the project was reviewing the historical data, understanding the context of specific data sets, developing an analytical framework and carrying out the analysis.

Sincerely,

I. M. COMPETENT (Signature)

I.D. 786655

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ABSTRACT

This report has attempted to solve the major problems involved in the plotting of networks. The minor problems have been documented for possible future resolution. Using the algorithms developed here, a computerized network plotter can be implemented and will be a useful tool for the design of interexchange (IX) Networks. The two distortion algorithms have been implemented independent of any routines including input routines and plotting routines. These algorithms are ready to be used for plotting any network, although caution should be used when plotting many nodes with the same co-ordinates. The plotting of IX Networks requires some thought in the representation of off-net facilities, but otherwise is straightforward.

INTRODUCTION

Over the past few years, computer applications in the business world have become more and more extensive and complex. Inventory, order entry and production control systems, payroll and banking systems, tools for sales and marketing have been influenced by the increasing use of the computer. For any computer system, however, there is a need to store data. Program logic (source data), documentation and reports (text data), and the actual numbers and figures the system processes all need to be stored in computer memory files for use each time the system is run.

With the trend toward smaller computer systems and the ever increasing amount of data to be processed, there is a developing awareness of the need for "data compression". Data compression is the process of reducing the storage size of the data. Many different techniques have been developed for compression of the various types of data described above. Most of these techniques apply to source and text data compression. The need also exists, however, for the compression of numeric data.

In this report, four different compression techniques for numeric data will be tested and compared in the following areas:

1) Compression, where the measure of compression used will be a percentage based on the size of the compressed data as compared to the original size of the uncompressed data. Therefore, a compression of 20% is much better than a compression of 80%.
2) Compress/Write Time, which is the time it takes to compress the data and write it into storage.
3) Read/Expand Time, which is the time it takes to read the data from storage and expand it again.
4) Security, which is the rating of the difficulty of unauthorized reading of the compressed data.

****** For the purposes of this sample report, the bulk of the report body has been excluded. ******

CONCLUSIONS AND RECOMMENDATIONS

After thorough investigation of the various departments in contact with cements and sealers and their basic responsibilities and procedures, the following conclusions can be presented:

The lack of control over the material entering or leaving the cement and sealer crib, especially during the night shift when there is no supervision, has resulted in:

- improper stock rotation

- unnecessary material shortages

- incorrect usage figures on the Cement and Sealer Report

- accumulation of damaged drums and defective material in the storage crib

Excessive amounts of material and money have been wasted due to the lack of cost emphasis. These losses can be attributed to:

- material exceeding shelf life

- damaged drums

- defective material

- material ordered but never used

- residual material and container disposal

At present, there is no position of "Material Utilization Engineer" to watch over, solve, and prevent the many specific problems encountered with the use of this type of material. A material utilization responsibility should be established to control the use and most cements and sealers in the plant.

To control present material problems, the storage crib should be locked during the night shift. The Production Department and the Receiving Dock should order and handle material only during the day shift. Any night emergencies should be handled by the Material Handling Supervisor.

When more emphasis on proper material management, present material waste can be reduced. Material that has passed its recommended shelf life should first be tested for usability. Attempts should be made to salvage material in damaged drums by redrumming them or by repairing the dents and punctures.