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FACULTY OF ENGINEERING

DEPARTMENT OF MINING & WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT

UNDERGROUND MINING METHOD SELECTION(UMMS), MINE VENTILATION & ROCK SUPPORTING SOFTWARE

By

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Report submitted in partial fulfillment for the award of degree in Mining engineering

May/2016

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May God richly bless you according to his riches in glory (Ephesians 3:16)

DEDICATION

I take this opportunity to dedicate this work to my father ***KATABAZI JOHN*** (R.I.P) and my mother ***NAKKAZI ROY*** (R.I.P). I will dearly miss them for the good and lovely things they did in my life.

DECLARATION

I **BYAKATONDA MARVINE** do hereby declare that the information and the work in this report has been prepared by me out of my knowledge and it has never been presented to any University or Institution.

Signature ***Date***

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APPROVAL

This is to confirm that the work in this report has been prepared and presented by BYAKATONDA MARVINE giving the details of his final year project under my supervision.

Miss. Nangendo Jacqueline

Signature; ..... **Date; .....**

ABSTRACT

The usage of computer applications in the mining industry has become extensive though small scale mining companies have had challenges to access these softwares due to their high price and scarcity. This therefore called for the development of a software that can be used to select the best mining method, and determine rock supporting & ventilation requirements for underground mines since these are some of the key areas in mine design.

The mining method selection is based on Analytical Hierarchy Process (AHP) and University of British Colombia (UBC) methods for which the AHP method is preferred due to its versatility and flexibility. The rock supporting requirements are determined using Rock Mass Rating (RMR) and Q-system where RMR was preferred because it was giving detailed support requirements based on (Beiniawski, 1989) tables. The ventilation requirements are determined based on calculating the air flow requirements in the mine, this was based on air flow resistances in series and parallel circuits as well as depression and air quantity flow.

The software displayed excellent performance on windows 7, windows 8 & 8.1 and windows 10 both on 32 bit and 64 bit computers. Though there's need to include various tools and other factors that are desired in mine design to improve the scope and provide various fields to meet the users' needs. These including modelling rock failures, modelling air flows in underground mines and giving detailed analysis of the mining method selection process. There should also be an inclusion of a module that allows the user to print results to enable comprehensive record keeping.

CONTENTS

Acknowledgements i

Dedication ii

Declaration iii

Approval iv

Abstract v

List of Acronyms xi

List of Figures xii

List of Tables xiii

List of Appendices xiv

1 Chapter 1: Introduction 1

1.0 Background 1

1.1 Problem statement 1

1.2 Objectives 2

1.2.0 Main objective 2

1.2.1 Specific objectives 2

1.3 Justification 2

1.4 Scope 3

1.4.0 Underground mining method selection (UMMS) 3

1.4.1 Rock supporting 4

1.4.2 Mine ventilation 4

1.5 Limitations 4

2 Chapter 2: Literature review 5

2.0 Underground mining method selection 5

2.1 Rock supporting 7

2.2 Mine ventilation 8

3 Chapter 3: Methodology 12

3.0 Introduction 12

3.1 Underground mining method selection 12

3.1.0 Selection Parameters 12

3.1.1 The UBC method 13

3.1.2 Analytical Hierarchy Process (AHP) 15

3.2 Rock supporting parameters determination 18

3.2.0 The Q-classification method 18

3.2.1 The Geomechanics Classification/ Rock Mass Rating (RMR) 20

3.2.2 Rock Load Classification 21

3.2.3 Rock Structure Rating (RSR) 22

3.2.4 Geological Strength Index (GSI) 22

3.3 Mine Ventilation 23

3.3.0 Series Flow 23

3.3.1 Parallel Flow 24

3.4 Testing and validating the software 24

3.4.0 Operating systems 24

3.4.1 RAM and memory usage 25

3.4.2 Processor type and Speed 25

3.5 System design 25

3.5.0 System conceptual framework 26

4 Chapter 4:Results and Discussions 28

4.0 Underground Mining Method Selection 28

4.0.0 UBC Method 28

4.0.1 AHP Method 29

4.1 Rock Supporting Parameters Determination 31

4.1.0 Based on Q-System 31

4.1.1 Based on RMR 33

4.2 Mine Ventilation 34

4.2.0 Ventilation equations 34

4.2.1 Resistance circuits 35

4.3 Software testing and validation results 36

4.3.0 Operating system & processor type test results 36

4.3.1 RAM, memory usage and Clock speed 36

4.4 Economic analysis 38

5 Chapter 5: Conclusions and Recommendations 39

5.0 Conclusions 39

5.0.0 Mine ventilation 39

5.0.1 Underground mining method selection 39

5.0.2 Rock supporting 39

5.1 Recommendations 39

5.1.0 Mine ventilation 39

5.1.1 Underground mining methods selection 40

5.1.2 Rock supporting parameters determination 40

References 41

Appendices 46

Appendix A 46

Appendix B 48

Appendix C 49

Appendix D 52

Appendix E 56

Appendix F 59

Appendix G 62

List of Acronyms

AHP – Analytical Hierarchy Process

FAHP – Fuzzy Analytical Hierarchy Process

MMS – Mining Method Selection

UMMS – Underground Mining Method Selection

UBC – University of British Colombia

RMR – Rock Mass Rating

UCS – Ultimate Compressive Strength

RQD – Rock Quality Designation

RSS – Rock Substance Strength

PROMTHEE – Preference Ranking Organization Method for Enrichment Evaluation

LIST OF FIGURES

Figure 1 AHP Decision Process 16

Figure 2 Airflow in Series Air ways 23

Figure 3Underground Mining method selection process flow chart 26

Figure 4Mine Ventilation Data Processing 26

Figure 5Rock Supporting Data Analysis 27

Figure 6 UBC method software output for the best mining method 28

Figure 7 Matrix generated to compare mining methods in relation to Health and Safety 29

Figure 8 Matrix generated to compare the factors considered in the mining method selection ... 30

Figure 9 Generated combination matrix for mining methods and factors considered 30

Figure 10 Output for the mining method selected and the overall results analysis 31

Figure 11 One of the error messages displayed by the software in case of invalid user input 32

Figure 12 Part of the GUI for Q-value calculation by the software 33

Figure 13 Software output for RMR based support requirements determination 34

Figure 14 Ventilation equation software output 35

Figure 15 Airways effective resistance calculation 35

Figure 16 Task Manger output for the software run test results 36

Figure 17 Detailed output for software run tests performance analysis 37

LIST OF TABLES

Table 1 Various Softwares available on market and their prices 3

Table 2 Geological & Geotechnical Characteristics 12

Table 3 Saaty's Fundamental scale for absolute numbers 16

Table 4 Q-System classification groups 19

Table 5: ESR rating for different excavation categories 20

LIST OF APPENDICES

Appendix a Project Budget and Time frame 46

Appendix b Mining Method Selection Parameters 48

Appendix c Beiniawski's Tables for Rock Mass Rating 49

Appendix d Q-System classification tables 52

Appendix e Mining Methods Selection Criteria Assistance Tables Based geological, geotechnical and technical factors 56

Appendix f UBC Ratings for mining method selection 59

Appendix g Sample Code from Visual Studio 62

1 CHAPTER 1: INTRODUCTION

1.0 BACKGROUND

From the days past, man's major aim has been to improve life and reduce manual labour. This called for the industrial revolution leading to development of various kinds of innovative and state of the art technology which has been implemented in the various fields of life ranging from daily, academic, scientific, industrial, business and other related kinds of activities including mining engineering. There has been incremental use of computers in the field of mining in the last three decades due to the continuous research and desire to exploit low grade deposits economically. (Erarslan, 2005)

Also the desire to improve mine safety and optimization of mine processes and activities has called for accurate, reliable and fast data processing systems. These systems have helped in simulating real world situations, solving difficult problems and analysis of mine data.

There are very many softwares that have been developed to deal with mine planning, designing, modelling, mine data storage etc., which big companies use in their mines to process data right from exploration to mine closure. (Wade, 1987) But these softwares have not been readily available to be used by the small scale miners due to their scarcity and price of purchasing them as well as technical support for the software usage in case they have bought them. This therefore calls for the design of a software, simple to use and cheap for small scale mining companies. (Erarslan, 2005)

1.1 PROBLEM STATEMENT

Due to scarcity & high costs of computer applications used in the mining industry, there is need to come up with a software that is cheap, reliable, accurate and user friendly to be used in selecting underground mining methods (Goldman, et al., 2014), determining rock supporting requirements and calculating ventilation requirements (parameters) for any given mine.

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