

BUSITEMA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF MINING ENGINEERING
DESIGN AND SIMULATION OF A CONE SHAPED ALIGNMENT
FISHING TOOL.

BY

NJOKA ROGERS

BU/UG/2017/1236

Email: njokarogers8@gmail.com

Tel: 0783123321/0700837631

SUPERVISORS: Mr. NASASIRA BAKAMA MICHAEL

Mr. TUGUME WECLIFE

*A final year project proposal submitted in partial fulfillment of the
requirement for the award of a Bachelor of Science in Mining Engineering.*

March, 2022.

DECLARATION

I **NJOKA ROGERS** declare to the best of my knowledge that the work presented in this proposal report is my own and has never been presented to any University or higher institute of learning for any academic award.

Signature.....

Date..... 20th / 01 / 2023

APPROVAL

This proposal report has been submitted to the Department of Water Resources and Mining Engineering for examination with approval from the following supervisors:

Mr. NASASIRA BAKAMA MICHAEL

Signature.....

Date..... 20/1/2023

Mr. TUGUME WECLIFE

Signature.....

Date.....

DEDICATION

I dedicate this report to my beloved parents in appreciation for their unconditional love and care, in supporting me since childhood, and for the spirit of hard work, courage and determination they taught me and made me able through the Lord to fight to become a complete mining engineer.

I also dedicate it to my beloved friends Ssekweyama Isaac, Mwanyi Ian, Sam, Ouma Denis, Stella, Kwikiriza Mathias among others for the motivation and courage they have always given me to focus on education.

ACKNOWLEDGEMENT

I give great thanks to the almighty God who has given me the strength, courage, protection and good health during my studies and also to enable me to come up with this idea as well as the write up.

Appreciation goes to all my dear supervisors; Mr. Nasasira Bakama Michael, Mr. Tugume Wycliffe for their selfless guidance, knowledge and encouragement given to me throughout the writing of this report as well as the Mining department and Busitema University lecturers.

Finally, I thank all my friends and fellow Mining Engineers for all the support and advice they have given me during my proposal report writing.

May the Almighty God reward you abundantly.

Contents

APPROVAL.....	Error! Bookmark not defined.
DEDICATION	iv
ACKNOWLEDGEMENT	v
1.0 CHAPTER ONE	1
1.1 BACKGROUND	1
1.2 PROBLEM STATEMENT	2
1.3 Objectives.....	3
1.3.1 Main objective	3
1.3.2 Specific objectives	3
1.4 Justification	3
1.5 Scope of the study	3
1.5.1 Conceptual scope	3
1.5.2 Geographical scope.....	3
2.0 CHAPTER TWO LITERATURE REVIEW	5
2.1 Introduction.....	5
2.2 Types of fish	5
2.3 Drilling assemblies.....	5
2.3.1 Test tools packers and plugs	6
2.4 Wire lines and wire line tools	6
2.5 Fishing tools.....	7
2.5.1 Tubular fishing tools.....	7
2.5.2 Tubular or wire line fishing tools	8
2.6 Milling, drilling and walling off	9

2.6.1 Working stuck down hole assemblies	9
2.6.2 Releasing fluids	10
2.7 Catching the fish	11
2.7.1 Cleaning inside the fish	11
2.7.2 Washing over the fish	11
3.0 CHAPTER THREE: METHODOLOGY	15
3.1 INTRODUCTION	15
3.2.1 Thread Strength.....	20
3.1.2 Assumption for the design of a hollow cylindrical shaft.....	26
3.3 Design of the spear taper tap.....	27
3. 4 Design of the conical guider	28
4.0 CHAPTER FOUR: RESULTS AND DISCUSSION.....	33
2 Comparison between a spear tap taper fishing tool and a cone shaped alignment fishing tool.	43
Spear tap taper fishing tool.	43
Cost benefit analysis	45
5.0 CHAPTER FIVE: CONCLUSION CHALLENGES AND RECOMMENDATIONS.....	45
5.1 CONCLUSION.....	45
5.2 RECOMMENDATIONS.....	47

List of tables

Table 1 shows the computed values of axial loading	23
Table 2 showing the material selection criteria	29
Table 3 showing the hole diameter of different drill bits	33
Table 4 showing the maximum axial loading with variation to pipe length	34
Table 5 showing the computed values for coefficient of friction	35
Table 6 showing the minimum and maximum share stress obtained from solid work results	35
Table 7 showing the material property of the model that where generated in solid work report	36
Table 8 showing the applied normal force on the threads and on the fish generated using solid works	40
Table 9 showing the generation of the initial investment	42
Table 10 showing the net present value calculation	44

List of figures

Figure 1 Shows stuck point determination	14
Figure 2 force diagram of thread A	17
Figure 3 shows Connection diagram of the cylindrical hollow shaft and the fishing tool	18
Figure 4 shows the alignment designs	22
Figure 5 shows a force diagram axial loading	23
Figure 6 shows the drill bit pipe ratio	25
Figure 7 showing a cylindrical hollow shaft	26
Figure 8 showing thread per taper for a fishing tool	27
Figure 9 showing different parts of the thread of the fishing tool	28
Figure 10 showing the simulation procedures	31
Figure 11 showing a force diagram for axial loading	34

Figure 12 showing the drill bit, drill pipe diameter ratio.....37
Figure 13 showing the conical guide40
Figure 14 showing the spear tap taper50
Figure 15 the dimensions of the cone shaped alignment fishing tool51
Figure 16 the dimensions of the fish.....51
Figure 17 showing the dimensions of the cylindrical hollow shaft.....52
Figure 18 showing dimensions of the spear taper tap.....53
Figure 19 showing the dimensions of the conical guide.....53

1.0 CHAPTER ONE

1.1 BACKGROUND

Fishing is the process of removal of equipment that has become stuck or lost in the wellbore.

Globally, in geological survey drilling is one of the main activities carried out for exploration, appraisal and later for production in a fully developed field. Drilling constitutes of 35-50% of the total project cost. It is therefore vital to manage drilling costs and keep them low. Stuck pipe and fishing are considered non-productive and increase drilling costs by more than 15% on average, hence, should be avoided where possible (Atwa, 2018). For every stuck pipe, there is a mechanism that leads to the incidence and a corresponding procedure to free the string. The success of stuck pipe management and fishing is evaluated by the time it takes to complete the whole process. Unsuccessful fishing operations end up in loss of equipment and resources including time and sometimes lead to well abandonment.

In Uganda industry wide, 25% of drilling costs may be attributed to fishing. Operator error, equipment declines, and failure to clean the hole are the cause of many fishing jobs. Running more mud weight than necessary can cause differential (wall) sticking. When hole conditions permit, differentially stuck pipe may be freed by spotting nitrogen (Douglas & Technology, 2017). Improperly shopped tool joints may part while tripping or drilling ahead. Interior corrosion in the body of drill pipe may cause torsion failure. Fishing equipment for tubular goods includes overshot, baskets, spears taper taps, die collars, mills, wash pipe, jar-bumper subassemblies, surface bumpers, safety joints, bent joints, wall hooks, circulating subs, and cutters. Additional tools for fishing junk are the magnet and the junk shot. The cardinal rule of fishing is “Know when to quit.” Close cooperation between geology, engineering, and

References

- Atwa, V. O. (2018). *ANALYSIS OF STUCK PIPE AND FISHING OPERATIONS : CASE STUDY OF OLKA..... RIA GEOTHERMAL FIELD IN KENYA*. 8, 1–32.
- Cao, X., Kozhevnykov, A., Dreus, A., & Liu, B. C. (2019). Diamond core drilling process using intermittent flushing mode. *Arabian Journal of Geosciences*, 12(137), 1–7. <https://doi.org/10.1007/s12517-019-4287-2>
- Design, E., & Series, T. (1995). *An Introduction to Stress Analysis Applications with SolidWorks Simulation*. 1–44.
- Douglas, J., & Technology, C. (2017). *Fishing Techniques for Drilling Operations*. 1–14.
- Drilling, B., & Conditions, U. F. (2010). *TECHNICAL REVIEW*. 2–130.
- Fasteners, T. M., Fastener, A. A., Dimension, H., Recommended, A. B., Torques, F., Bolt, A. C., Markings, G., Chart, S., Letter, A. D., & Equivalents, N. D. (2017). *Fastener Handout*. 1–32.
- JICA, & DDCA. (2013). *Technical Manual for Drilling Works for Technical Support Plan for the Drillers in DDCA. March*, 1–433.
- Longyear, B. (2017). *Coring rods and casing catalog* ©. 1–84.

ME 323 Mechanics of Materials. (2019). *1*, 1–11.

Tjondro, Bambang, I. (2003). Fishing Tools. *Training Book, Bandung*, 1–52.

Wang, Y., Xia, B., Wang, Z., & Chai, C. (2016). Model of a new joint thread for a drilling tool and its stress analysis used in a slim borehole. *Mechanical Sciences*, *7*(2), 1–12. <https://doi.org/10.5194/ms-7-189-2016>

reference

appendix