

HIGHER TECHNICAL INSTITUTE
MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN OF A WATER-JET CUTTING RIG

M / 874

BY: MICHAEL ARODITIS

JUNE 2000

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING COURSE

DIPLOMA PROJECT

DESIGN OF A WATER-JET
CUTTING RIG

M/874

BY: MICHAEL ARODITIS

JUNE 2000

HIGHER TECHNICAL INSTITUTE	PROJECT NO. 3162
----------------------------------	---------------------

DESIGN OF A WATER-JET
CUTTING RIG

By
ARODITIS MICHAEL

Project Report
Submitted to

The Department of Mechanical Engineering
of the Higher Technical Institute
Nicosia Cyprus

In partial fulfillment of the requirements
For the diploma of

TECHNICIAN ENGINEERING

In

MECHANICAL ENGINEERING

JUNE 2000

Project Supervisor: Dr. A. Lazari

HIGHER TECHNICAL INSTITUTE	PROJECT NO. 3162
----------------------------------	---------------------

CONTENTS

PAGE

ACKNOWLEDGMENTS

CHAPTER 1- INTRODUCTION	1
CHAPTER 2- WATER JET CUTTING	
2.1 General Application	2
2.1.1 What is Water Jet cutting	2
2.1.2 What is Abrasive Water Jet cutting	5
2.1.3 Limitations	9
2.1.4 Advantages of Abrasive Water Jet machining	11
2.2.1 Obtainable tolerances	16
2.2.2 Comparison with other methods	22
CHAPTER 3- MEASUREMENT OF SURFACE PRESSURE DISTRIBUTION RESULTING FROM WATER JET IMPACT	
3.1 Introduction and theoretical	29
CHAPTER 4- OBLIQUE IMPACT OF HIGH SPEED LIQUID ON JETS ON PLASTIC SOLIDS	
4.1 Introduction and theoretical considerations	33
4.2 Penetration by jets on constant velocity	34
4.3 Penetration by jets on varying velocity	38

4.4 Crater diameter resulting from normal jet of a constant velocity	39
4.5 Jet velocity distribution	41
4.6 Craters examination	44
CHAPTER 5- DESIGN ANALYSIS	46
FINAL DRAWINGS	

ACKNOWLEDGEMENTS

I wish to express my sincere thanks and appreciation to Dr. L. Lazari for his assistance during the course of the present work. Special thanks to Photos for his help during this project and also to Mr Tekkis George.

This project is dedicated to my parents.

CHAPTER 1

CHAPTER 1

INTRODUCTION

The purpose of this project was to design a water jet-cutting rig.

This system will manage to make horizontal cutting in order to connect two wells. Our objective was to manage to cut in the well by thinking of a way to work automatically from the surface at any depth.

We have managed to find the water jet-cutting machine and also all the necessary parts needed to finish the project.