

DESIGN OF SWEET-POTATOE SCRAPER

by

Savas Christofides

Project Report

Submitted to

the Department of Mechanical Engineering

of the Higher Technical Institute

Nicosia Cyprus

in partial fulfillment of the requirements

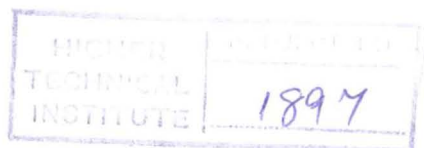
for the diploma of

TECHNICIAN ENGINEER

in

MECHANICAL ENGINEERING

June 1991



ACKNOWLEDGEMENTS

I would like to express my thanks to Mr. L.G. Lazari lecturer at the H.T.I. who was my project supervisor and helped me with his professional guidance.

Also I would like to thank Mr. M. Carlettides for reading and making useful comments on the project and Mrs E. Kyriacou who typed this project.

Finally I would like to dedicate this project to all my beloved persons and especially to my parents.

Christofides Savas
Student in Mechanical
Engineering of H.T.I.

I N T R O D U C T I O N

"Kolokassi" in Cyprus, is served very often and is one of the most tasteful foods. For this reason in England it is named "sweet potatoe". In Cyprus "Kolokassi" is grown in southern areas successfully due to the favourable climate.

The scraper used in the past and nowadays is the knife which is an inefficient and dangerous method. For these reasons alternative designs are suggested and examined in this project.

CONTENTS

	<u>Page</u>
Introduction	1
Abstract	2
 <u>Chapter 1: Historical Aspects</u>	
"Kolokassi"	4
 <u>Chapter 2: Existing methods</u>	
Existing methods of scraping	
"Kolokassi" and their major problems	6-7
 <u>Chapter 3: First alternative design</u>	
3.1 Introduction	9
3.2 Components	9
3.3 Operation	9
3.4 Operating power	9
3.5 Mass mechanism	10
3.6 Selection of motor	11
3.7 Design of shaft	11
3.7.1 Introduction	11
3.7.2 Check for static failure	11
3.8 Design of key	12
3.8.1 Forces acting on key	12
3.8.2 Shear failure of key	12
3.8.3 Bearing stress failure	13
3.9 Selection of bearing	13
3.10 Other necessary components	14
3.10.1 Cylinders	14
3.10.2 Nails	14
3.10.3 Springs	14
3.10.4 Casing of bearing	14
3.10.5 Coupling	14
3.10.6 Iron casing of motor	14
 <u>Chapter 4: Second alternative design</u>	
4.1 Introduction	16
4.2 Components	16
4.3 Operation	16
4.4 Operating power	16
4.5 Selection of motor	17
4.6 Design of shaft	17
4.6.1 Introduction	17
4.6.2 Check of static failure	17
4.7 Design of key	18
4.7.1 Forces acting on key	18
4.7.2 Shear failure of key	18
4.7.3 Bearing stress failure	19

4.8	Selection of bearing	19
4.9	Other necessary components of system	19
4.9.1	Centrifugal casing	19
4.9.2	Scraper	20
4.9.3	Coupling	20
4.9.4	Iron casing of motor	20

Chapter 5: Third alternative design

5.1	Introduction	22
5.2	Components	22
5.3	Operation	22
5.4	Operating power	22
5.5	Selection of motor	23
5.6	Design of shaft	23
5.6.1	Introduction	23
5.6.2	Identification of forces	23-24
5.6.3	Shear force and bending moment diagrams based on X-Y plane	25
5.6.4	Shear force and bending moment diagrams based on X-Z plane	27
5.6.5	Check for static failure	28
5.6.6	Reverse bending steady torsion	29
5.7	Selection of Bearings	29
5.8	Design of Keys	29
5.8.1	Forces acting on key	29
5.8.2	Shear failure of key T	30
5.8.3	Bearing stress failure	30
5.9	Selection of belt	31
5.10	Design of spring	31
5.11	Other necessary components of system	32
5.11.1	Base having the shape of Kolokassi	32
5.11.2	Scrapers	32
5.11.3	Coupling	32
5.11.4	Casing of bearings	32

Chapter 6: Other alternative proposals

6.1	Introduction	34
6.2	First alternative solution	34
6.3	Second alternative solution	35

Chapter 7: Discussion and conclusions

7.1	Advantages of designs	37
7.2	Disadvantages of designs	37

Appendices

Drawings
Tables
References