CADESIGN OF COMMON MACHINE ELEMENTS

PROJECT REPORT SUBMITTED

BY: IACOVOS SOLOMONIDES

in part satisfaction of the award of
Diploma of Technician Engineer in
Mechanical Engineering of the
Higher Technical Institute
CYPRUS

PROJECT SUPERVISOR: MR C. NEOCLEOUS
Lecturer in
Mechanical Eng. H.T.I.

EXTERNAL ASSESOR: Mr. Vasos Vasiliou

Type of Project: Individual

Project No: M/454

1566

ABSTRACT

This project deals with the aid of C.A.Design of common machine elements. It is arranged in four chapters, as follows.

In CHAPTER 1 a general introduction about CAD and its benefits is presented.

In CHAPTER 2 some notes on LOTUS 1-2-3 are given. Why especially LOTUS, what are its main functions, and the hardware required to operate it.

CHAPTER 3 is the main body of this project. The required theory and formulae for each subject are presented in each part of it.

In CHAPTER 4 the reader will be given the basic knowledge required to operate the program which is stored on the diskettes accompining this project.

In my opinion if anybody who will come across this project and has not enough time to spend on it, he/she must go straight away to the diskettes. All someone has to know in order to operate the program effecently is, to be able to load it on his/hers personal computer and press the "Return" ("Enter") key.

CONTENTS

INTRODUCTION		I
ABSTRACT		II
CHAPTER 1		
1.	What is CAD	1
1.1	Hardware and software	2
2	CAD and Productivity	3
2.1	Benefits of CAD	3
CHAPTER 2		
1	LOTUS 1-2-3	4
1.1	Why Lotus 1-2-3?	4
1.2	What is Lotus 1-2-3?	4
1.3	The operating System	5
1.4	System Hardware	5
1.4.1	Central Processor Unit	7
1.4.2	Keyboard	7
1.4.3	Disc drive	11
1.4.4	Monitor	13
1.4.5	Optional equipment	13
1.5	The border area	13
1.6	The worksheet	13
1.6.1	Formula entry	13
1.7	The control panel	13
1.8	Using the menus	14
1.9	Main Memory and disk strorage	15
CHAPTER 3		
1	Stress analysis	16
1.1	Combined Stresses	16
1.1.1	Stresses at any angle	16
1.1.2	Priicipal Stresses	17
1.1.3	Hertz Contact Stresses	20
1.1.3.1	Spheres	20
1.1.3.2	Cylinders	23
1.2	Deflection of beams due to bending	25
2	Screw Fasteners and connections	27

2.1	Thread definitions and standards	28
2.2	Power Screws	29
2.2.1	The mechanics of power screws	30
2.2.1.1	Square threads	32
2.2.1.1.1	Lifting the load	32
2.2.1.1.2	Lowering the load	34
2.2.1.2	ACME threads	35
2.2.1.2.1	Lifting the load	36
2.2.1.2.2	Lowering the load	36
2.2.1.3	Thrust collar	37
2.2.2	Thread stresses	38
2.3	Threaded Fasteners	38
2.3.1	Bolted joints	38
2.3.1.1	Torque requirments	39
2.4	Bolted and Riveted joints loaded in shear	40
2.4.1	Bending stress	40
2.4.2	Pure shear	41
2.4.3	Pure tension	41
2.4.4	Bearing stress	42
2.4.5	Shearing and Tearing of margin	42
2.5	Centroids of bolt or rivet groups	43
2.6	Shear of bolts and rivets due to eccentric loading.	44
2.7	Welded joints	46
2.7.1	Advantages and disadvantages of welded joints	49
2.7.2	Torsion in welded joints	51
2.7.3	Bending in welded joints	52
2.7.4	The strength of welded joints	54
3	Shafts	56
3.1	ASME Code	57
3.2	Soderberg Approach	58
3.3	Keys	61
4	Springs	64
4.1	Helical Springs	65
4.1.1	Stresses in helical springs	65
4.1.2	Deflection of helical springs	68
4.1.3	Springs materials	70

CHAPTER 4

1. How to load the diskette 74

2. Running the program 74

CONCLUSION 76

REFERENCES 77

APPENDICES