DESIGN OF A SEMI AUTOMATIC NAIL EXTRACTION DEVICE

by

Polis Papadopoulos

Project Report

Submitted to

M-626

the Department of Mechanical Engineering

of the Higher Technical institute

Nicosia Cyprus

in partial fulfilment of the requirements

for the diploma of

TECHNICIAN ENGINEER

in

MECHANICAL ENGINEERING

June 1992

PROJECT NO HIGHER INSTITUTE 2056

ACKNOWLEDGEMENTS

I would like to thank my supervisor G.Katodritis for his help and also i would like to thank,

S.Kalogirou, P.Ioannou for there help.

I am dedicating this project to my family. Especially to my parents which helped me a lot and provided me everything i needed in order to complied my project.

SUMMARY

Nail Extraction Device by Polis Papadopoulos

The purpose of this project is to design a semiautomatic nail extractor device.

The design sequence used is as followed. First an identification of the problem is made. Then creativity phase take place where several ideas are worked out in order to find the best solution of the problem. After the selection of the most appropriate solution optimisation design phase takes place. Appropriate components are selected from catalogues in order to respond the design requirements. All items not found from catalogues are presented with detailed specifications.

The design is based on a mass production of the device. So the hole construction is not complicated but as simple as it can be done.

-6-

LIST OF CONTENTS:

ACKNOWLEDGEMENTS:

SUMMARY.

INTRODUCTION.

CHAPTER 1

Needs Analysis Phase:
 1.1 Recognition of need.
 1.1.1 Need statement.
 1.1.2 Goals , aims end objectives.
 1.1.3 Constrains and trade-offs.

1.2 Information Search: 1.2.1 Critical Questioning Technique. 1.2.2 Answers to Critical Questions. 1.2.3 Questionnaires. 1.2.4 Answers to the Questionnaires.

1.3 Conclusions

CHAPTER 2

2. Creativity: 2.1.1 Powering motion. 2.1.2 Transmission of motion. 2.1.3 Control. 2.1.4 Overall shape. 2.1.5 Type of gripping mechanisms for nails. 2.1.6 Mechanisms for extracting the nail off the wood.

CHAPTER 3

| 3. | Decision | Making: | | |
|-----|----------|---------|-------|-------------------------|
| | | | | powering motion. |
| 3.2 | Decision | making | about | transmission mechanism. |
| | | | | control system. |
| 3.4 | Decision | making | about | overall shape. |
| 3.5 | Decision | making | about | gripping mechanism. |
| 3.6 | Decision | making | about | extracting mechanism. |

CHAPTER 4

4. Calculations:
4.1 Calculations for the lever bar.
4.2 Calculations for fixing system of the lever.
4.2.1 Calculations for the pin.
4.2.2 Calculations for tensile stress in the fork.

4.2.3 Calculations for tensile strength on the rod and in the net area of eye.
4.3 Calculations for mounting on the piston rod.
4.3.1 Calculations for the pin.
4.3.2 Calculations for fork tear out.
4.4 Calculation for the supporting base of the piston.
4.5 Calculations for the gripping mechanism
4.5.1 Force needed to shear the wood.
4.5.2 Calculations for the two pins securing the jaws.
4.5.3 Calculations for tear out for the jaws touching the extraction lever during the down stroke.

CHAPTER 5

5. Control system: 5.1 design of the control system.

CHAPTER 6

6. Aesthetics and Ergonomics:

6.1 Aesthetics

6.2 Ergonomics

REFERENCES

APPENDICES