

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**DEVELOPMENT OF SAFETY PROCEDURES FOR
A MANUFACTURING INDUSTRY**

PROJECT NUMBER: M/912

STUDENT: ELEFThERIOU ELEFThERIOS (3M1)

JUNE 2001

HIGHER TECHNICAL INSTITUTE	PROJECT NO. 3276
----------------------------------	---------------------

DEVELOPMENT OF SAFETY PROCEDURES FOR A MANUFACTURING INDUSTRY

By

Eleftheriou Eleftherios

Project Report

Submitted to

The department of Mechanical Engineering

Of the Higher Technical Institute

Nicosia Cyprus

In Partial fulfillment of the requirements of

TECHNICIAN ENGINEER

In

MECHANICAL ENGINEERING

June 2001

HIGHER TECHNICAL INSTITUTE	PROJECT NO. 3276
----------------------------------	---------------------

ACKNOWLEDGMENTS

SUMMARY

INTRODUCTION

CHAPTER I

1. PRODUCTION

*Dedicated to my Parents
for everything
they have done for me!*

CHAPTER

2. PAGE

1-1

TABLE OF CONTENTS

	<u>Pages</u>
ACKNOWLEDGEMENTS	
SUMMARY	
INTRODUCTION	
CHAPTER 1	1-5
1. PRODUCTION DEPARTMENT	2
1.1. <u>Introduction</u>	2
1.2. <u>Description of the Plan</u>	2
1.3. <u>Safety Tips for proper use of machines and equipment</u>	2
1.3.1. <u>Washing machines</u>	3
1.3.2. <u>Spray machines</u>	3
1.3.3. <u>P40 and P40 Double machines</u>	3
1.4. <u>Plan Maintenance</u>	3
1.4.1. <u>Daily maintenance</u>	4
1.4.2. <u>Weekly maintenance</u>	4
1.4.3. <u>Monthly maintenance</u>	4
1.5. <u>Conclusion</u>	5
CHAPTER 2	6-21
2. PACKING & STORE DEPARTMENT	7
<u>Introduction</u>	7
2.1. <u>Back Injuries</u>	7
2.2. <u>Safety Rules when using methylene</u>	11
2.3. <u>Transportation by a means of a fork-lift</u>	11
2.3.1. <u>What factors of work organization can contribute to fork lift accidents?</u>	12
2.3.2. <u>What behavioral and operational factors can contribute to fork-lift accidents</u>	12
2.3.3. <u>How can workplace design contribute to fork-lift accidents?</u>	13

2.3.4. <u>What characteristics of the load create a hazard?</u>	13
	<u>Pages</u>
2.3.5. <u>What mechanical conditions or design features Increase the risk for Fork lift accidents?</u>	13
2.3.6. <u>Who can operate the Fork lift?</u>	14
2.3.7. <u>What should an operator do when operating the fork lift?</u>	14
2.3.8. <u>What should an operator avoid when operating the fork lift?</u>	15
2.3.9. <u>How should you load the fork-lift?</u>	15
2.3.10. <u>How should you insert the fork when loading the fork lift?</u>	16
2.3.11. <u>How should you raise the load?</u>	17
2.4. <u>Transportation by a means of conveyors</u>	18
2.4.1. <u>Belt Conveyors</u>	18
2.4.2. <u>Chain Conveyors</u>	18
2.4.3. <u>Safe operating rules</u>	19
2.5. <u>Transportation by a means of a hand lift pallet truck</u>	20
2.5.1. <u>Safety precautions for hand lift pallet trucks</u>	21

CHAPTER 3 **22-33**

3. MAINTENANCE DEPARTMENT **23**

3.1. <u>Introduction</u>	23
3.2. <u>Grinding Machine</u>	23
3.2.1. <u>Principal Hazards of Grinding</u>	23
3.2.2. <u>Safety Precaution</u>	24
3.3. <u>Arc Welding Machine</u>	25
3.3.1. <u>Principal Hazards of Arc Welding</u>	25
3.3.2. <u>Safety Precautions</u>	26
3.4. <u>Drilling Machine</u>	27
3.4.1. <u>Safety Precautions</u>	27
3.5. <u>Various Hand Tools</u>	28
3.5.1. <u>Rules for Tools</u>	28
3.5.2. <u>Hammers</u>	30

	<u>Pages</u>
3.5.3. <u>Screwdrivers</u>	30
3.5.4. <u>Wrenches</u>	30
3.5.5. <u>Saws</u>	31
3.5.6. <u>Files</u>	31
3.5.7. <u>Chisels and punches</u>	31
3.6. <u>Preventing maintenance</u>	32
3.6.1. <u>Works that must be carried out in Preventing maintenance</u>	32
CHAPTER 4	34-44
4. HEALTH AND HYGIENE	35
4.1. <u>Chemicals</u>	35
4.1.1. <u>Iso and Polio</u>	35
4.1.2. <u>Methylene</u>	36
4.1.3. <u>Don't get poisoned</u>	36
4.2. <u>Flammable liquid</u>	36
4.2.1. <u>Ignition sources</u>	36
4.2.2. <u>Storage of flammable liquid</u>	37
4.2.3. <u>Rules that must be followed in case of emergency</u>	38
4.3. <u>First Aid</u>	39
4.4. <u>Plant housekeeping</u>	40
4.5. <u>A Safety colour for industry</u>	42
4.5.1. <u>Where to apply the certain colours</u>	42
4.6. <u>Hygiene accommodations</u>	44
CHAPTER 5	45-51
5. ELECTRICAL HAZARDS	46
5.1. <u>Introduction</u>	46
5.2. <u>Safety Requirements</u>	46
5.2.1. <u>Switches and conduit</u>	46
5.2.2. <u>Sockets</u>	47
5.2.3. <u>Plugs</u>	48
5.2.4. <u>Damage</u>	48

	<u>Pages</u>
5.3. <u>Portable Tools</u>	49
5.4. <u>Fire Hazards</u>	50
5.4.1. <u>Wire Fires</u>	50
5.4.2. <u>Arcs and Sparks</u>	51
CHAPTER 6	52-65
6. ERGONOMICS	53
6.1. <u>Anthropometry</u>	53
6.2. <u>Biomechanics</u>	55
6.3. <u>Ergonomics applied to machines and controls</u>	56
6.4. <u>Lighting</u>	58
6.4.1. <u>Daylight and technical light</u>	59
6.5. <u>Temperature</u>	61
6.6. <u>Noise</u>	62
6.6.1. <u>Noise measurement</u>	62
6.6.2. <u>Noise reduction</u>	64
CHAPTER 7	66-87
7. THE ROLE OF THE SAFETY OFFICER	67
7.1. <u>Introduction</u>	67
7.2. <u>Duties and responsibilities of the safety officer</u>	70
7.3. <u>Procedures for a safety officer</u>	72
7.3.1. <u>Safety Inspections</u>	72
7.3.2. <u>Safety Audits</u>	73
7.3.3. <u>Safety Sampling</u>	81
7.3.4. <u>Control Procedures</u>	83
7.4. <u>Posters and Displays</u>	84
7.4.1. <u>Purposes of posters</u>	84
7.5. <u>Courses and Demonstrations</u>	85
7.6. <u>Newsletters</u>	86
7.7. <u>Conclusions</u>	87

	<u>Pages</u>
CHAPTER 8	88-99
8. THE MANAGEMENT OF RISK	
8.1. <u>Introduction</u>	89
8.2. <u>Definition of Accident hazard and risk</u>	89
8.3. <u>Principles of actions necessary to prevent accidents</u>	90
8.4. <u>Risk management</u>	90
8.4.1. <u>Risk management-role and techniques</u>	91
8.4.2. <u>Risk Identification</u>	91
8.4.3. <u>Risk assessment</u>	91
8.4.4. <u>Risk control</u>	94
8.5. <u>Job Safety analysis</u>	97

CONCLUSIONS

REFERENCES

APPENDIX

ACKNOWLEDGMENTS

During the completion of this project several people gave me their valuable contribution, support and guidance.

Firstly I would like to thank my project supervisor Mr. **Rousha Damiano** for his constant guidance and support. Also if it were not his knowledge and experiences this project would not have been completed.

Secondly, I would like to thank the Laboratory Assistant Mr. Constantino Christodoulou, the safety inspector of the Ministry of Labour Mrs. Anastasia Kanari, the H.T.I graduate Mr. Kyriako Panayi and the management and personnel of “Astrasol” industry for their valuable help.

Special thanks I would like to give to my family for their understanding during the creation and completion of this project.

Lastly, thanks should be given to all my friends for their help and support and especially in times that I seemed to have lost all my stamina.

Created by: Eleftheriou Eleftherios

Title: Development of safety procedures for a manufacturing industry.

SUMMARY

This project deals with the design of health and safety procedures for the “Astrasol Industry” in Nicosia, Cyprus.

The project covers the following departments of the factory:

- ◆ Production department
- ◆ Packing and store department
- ◆ Maintenance department

An attempt was also made to raise the important factor that affects health conditions in factories, that is, ergonomics.

Since the management of risk plays an essential role in accident prevention this book denotes a chapter about it.

Finally, the role of the Safety Officer is of high importance so procedures and responsibilities were described to be followed by such an officer.

INTRODUCTION

From the ancient time accidents have been with us and mostly have been caused by unsafe conditions and acts in the working environment.

The results of those accidents are the suffering of the workers and their families, but also and the cost that the business called to pay, which in some times is huge.

So everyone wants a safe and healthful workplace, but what each person is willing to do to achieve this worthwhile objective can vary a great deal.

In most of the big industries a person usually designated as a safety officer or industrial hygienist, sets the tone of the safety and health program within the firm.

When the workers follow the directions that the safety officers give to them the industrial accidents are less.

So it is obvious that training in safety matters is needed, not only in the workers category but and in the other categories such as the managers.

When employers realize that by ensuring safety in every activity of their factory, prevents accidents and so they increase the production rate, the quality of their products and thus their profit, and when employees have in mind the hazards of their job and pay attention to it then it is sure that the industrial accidents will be minimize.

Finally the role of the government is essential in safety issues; so more restricted laws about safety can be applied.

The purpose of this book is to study and provide tools and guidelines for safety and health for “astrasol” industry.

Astrasol industry produces plastic soles for shoes and it is located in Latsia industrial estate. It is separated into three main departments:

- ◆ The production department, where the soles are produced.
- ◆ The packing and store department.
- ◆ The maintenance department which is used for preventing maintenance, work-repairing or cleaning the machines of the industry.

As a conclusion it must be said that like everything else in business, safety does not just happen—you have to **make it** happen.