HOTER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING COURSE

DPLOMA PROJECT

PROCESS DESIGN AND CONTROL OF A MIXING SYSTEM IN A CYPRUS BUILDING MATERAL. INDUSTRY

VOLUME 1

M/1025

THEMISTOCLEOUS DEMETRIS

JUNE 2006

PROCESS DESIGN AND CONTROL OF A MIXING SYSTEM IN A CYPRUS BUILDING MATERIAL INDUSTRY

By Themistocleous Demetris

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

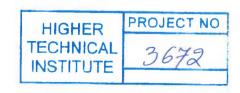
TECHNICIAN ENGINEER

In

MECHANICAL ENGINEERING

JUNE 2006

Project number: M/1025



ABSTRACT

Design and control of the mixing part of a plant producing building materials for Cyprus building industry, is the main subject of this project.

The company is **SAKRET ZEIPEKKIS LTD** and the main product of this industry is plaster.

The overall production process, the transporting methods between the main equipment used, the designing of the machinery of the mixing plant, the main controller and its controlling elements that have been used and all safety and environmental measures that have been taken are described.

Also calculations about production rates, specifications of each type of equipment are given to a specific following chapter.

Detail drawings are attached in the drawing volume that followed with this thesis.

ACKNOWLEDGEMENTS

I would like to express my thanks and appreciation to the following people:

- Dr. Andreas Stassis, lecturer in Mechanical Engineering Department of HTI for his assistance and guidance throughout this thesis.
- To the stuff of SAKRET ZEIPEKKIS LTD for their co-operation in dealing with this work, especially Mr. Christos Zeipekkis, the Managing Director of this Company.
- Mr. Christos Christou, Electronic Engineer and Computer programmer, for his help and useful information that he gave me.

CONTENTS

	<u>Page</u>
ABSTRACT	i
ACKNOWLEDGMENTS	ii
CONTENTS	iii
LIST OF FIGURES	vi
LIST OF DRAWINGS	vii
ABBREVIATIONS	viii
CHAPTER 1 – INTRODUCTION	1
1.1 About Plaster	2
1.2 Plaster production in Cyprus	2
CHAPTER 2 – THE PRODUCTION PROCESS	4
2.1 Main stages of the production process and main equipment	
used.	5
2.2 Secondary Equipment	7
2.2.1 Transporting media	7
2.2.2 Valves	10
2.2.3 Transducers	13
2.2.4 Actuators	14
2.2.5 Controller	16

CHAPTER 3 - DESIGN AND CONTROL OF

MIXING PLANT				
3.1	Layo	out of the Mixing Plant	19	
3.2	Des	ign/Selection of equipment	21	
3.	2.1	Storage silos	21	
3.	2.2	Mixer	22	
3.	2.3	Screw conveyors	23	
3	2.4	Weighing system	28	
3	2.5	Rotary valve	31	
3.	2.6	Belt conveyor	33	
3	2.7	Bucket elevator	34	
3.3	Con	trol of the Mixing plant	36	
3	3.1	Selection of controller	37	
3	.3.2	Safety and important requirements for a PLC system	37	
3	3.3	Sequencing	38	
3	3.4	Connections	38	
3	.3.5	The programming	39	
<u>CH</u>	\PTE	R 4 - INTEGRATION AND OPERATIONAL	DESCRIPTION	
OF THE PLANT 41				
4.1	Det	ail description of the different stages of the factory	42	
<u>CHAPTER 5 – SAFETY MEASURES</u> 48			48	
5.1	Des	cription of necessary safety measures	49	
5.2	Env	ironmental measures	51	

APPENDIX A	52
APPENDIX B	60
APPENDIX C	97
REFERENCES	185
ATTACHED MATERIAL A (Drawings)	
ATTACHED MATERIALS B (CD includes pictures, videos and catalogos)	oaues)

.