

CONTENTS

<i>Foreword</i>	(vii)
<i>Preface</i>	(ix)
<i>Acknowledgements</i>	(xi)

CHAPTER - 1

Suitable Site Selection for Installation of a Cement Plant

1.1 Introduction.....	1
1.2 Two Distinct Production Units	2
1.3 Clinkerization Unit	2
1.4 Cement Grinding and Packing Unit	2
1.5 Site Selection - Influencing Factors	3

CHAPTER - 2

Civil Engineering Considerations in Design of Plant Structures

2.1 Introduction.....	9
2.2 Civil Structures are Essential to:	9
2.3 Quantum of Civil Works	9
2.4 Types of Structures and Buildings	10
2.5 Civil Engineering Considerations	11
2.6 Site Investigations	26
2.7 Cost Influencing Factors	28
2.8 Civil Design and Drawings	29
2.9 Site Execution	30
2.10 Maintenance of the Buildings	32

(xiv) *Contents*

CHAPTER - 3

Optimization of Structures and Structural Elements

3.1 Introduction	33
3.2 Governing Factors	34
3.3 Suggestions for Economical Structural Design	38

CHAPTER - 4

Loads and Effects

4.1 Introduction	45
4.2 Live Loads Acting on Various Structures	45
4.3 Wind Loads	48
4.4 Earthquake Loads	50
4.5 Blast Loads	52
4.6 Impact of Surge Forces due to Moving Loads	56

CHAPTER - 5

Dynamic Loads Considerations

5.1 Introduction	57
5.2 Dynamic Loads	58
5.3 Sources of Dynamic Loadings and Vibrations	60
5.4 Acceptable Limits of Vibration	61
5.5 Simple Dynamic Analysis	65
5.6 Simple Calculations for:	82
5.7 Mitigation of Vibrations	86
5.8 Suggestions	86

CHAPTER - 6

Design of Machine Foundations

6.1 Introduction	87
6.2 General Guidelines for Preliminary Sizing of Foundation	87
6.3 Dynamic Parameters of Founding Strata	88
6.4 Design Inputs Required from the Equipment Manufacturer	90
6.5 Dynamic Analysis of Foundations	94
6.6 Permissible Amplitudes	95
6.7 Elastic Half –Space Method.	98
6.8 Construction Details	102
6.9 Design Example – Vertical Roller Mill (VRM) Foundation	102

CHAPTER - 7

Material Storages

7.1 Introduction	111
7.2 Basic Factors for Choosing Storage System	111
7.3 Types of Storage Systems	111
7.4 Crane Halls	111
7.5 Stock Piles and Reclaim System	113

CHAPTER - 8

Primary Crusher House

8.1 Structural Components	121
8.2 General	121
8.3 Components of the Structure	122

CHAPTER - 9

Crusher Foundations

9.1 Introduction	127
9.2 Types of Crushers	127
9.3 Jaw Crusher Foundations	127
9.4 Hammer Crusher (Mill) Foundations	131
9.5 Impact Crusher Foundations	132
9.6 Cone / Gyratory Crusher Foundations	133
9.7 Roll Crushers	135

CHAPTER - 10

Structural Systems and Design basis of Preheater Towers

10.1 Introduction	137
10.2 Process Considerations	137
10.3 Approximate Sizes of Preheater Towers	144
10.4 Development of Different Structural Systems	145
10.5 An Unconventional Structural System for A Preheater Tower	148
10.6 Inference	149

CHAPTER - 11

Rotary Kiln Foundations

11.1 Introduction	151
11.2 Characteristics of Equipment and Process	152
11.3 Generation of Different Types of Loads	153

(xvi) Contents

11.4	Sensitivity of Calculated Loads (Ref: KT Andersen – ZKG Journal)	154
11.5	Supplier’s Load Data	155
11.6	Types of Supporting Foundations	155
11.7	Allowable Foundation Displacements	155
11.8	Structural Design	156
11.9	Roofing	157
11.10	Possible Sources of Vibrations	157
11.11	Typical Foundation Design	157
11.12	Typical Structural Design of Pier II of a 6000 TPD kiln – 3 Tyre kiln	162

CHAPTER - 12

Cement Clinker Cooler House

12.1	Introduction	165
12.2	Structure	166
12.3	Equipment	168
12.4	Structural Arrangement and Location of the Columns	170
12.5	Medium of Construction	170
12.6	Analysis and Design	170
12.7	Performance Criterion	170

CHAPTER - 13

Mill feed Houses and Mill Hoppers / Silos

13.1	Introduction	173
13.2	Functional Requirements	174
13.3	Mill Feed Hoppers / Silos	175
13.4	Types of Hoppers	175
13.5	Feed Structure	176
13.6	Structural Arrangement, Location of Columns and Construction Medium	177
13.7	Analysis and Design	180
13.8	Performance Criteria	180

CHAPTER - 14

Grinding Mill Houses

14.1	Introduction	181
14.2	Grinding Mills	181
14.3	Mill Houses	183
14.4	Structural Design Considerations	187
14.5	Side Cladding	188

CHAPTER - 15

Foundations of Tube/Ball Mills and Vertical Roller Mills

15.1 Introduction.....	189
15.2 Equipment in Vogue in Industry for Grinding	189
15.3 Tube/Ball Mills	189
15.4 Vertical Roller Mills (VRM).....	196

CHAPTER - 16

Roller-Press Foundations

16.1 Introduction.....	205
16.2 Equipment	205
16.3 Foundations.....	207

CHAPTER - 17

Packing Plant

17.1 Introduction.....	209
17.2 Equipment	210
17.3 General Description of Structure	210

CHAPTER - 18

Belt Conveyor Bridges and Trestles

18.1 Introduction.....	213
18.2 General Structural Geometry and Ranges	213
18.3 Trestles/Bents	219
18.4 Structural Design.....	222
18.5 Structural System and Assumptions	222
18.6 Loads Computation	222
18.7 Site Parameters Required	224
18.8 Materials to be Considered	224

CHAPTER - 19

Monorail Track Beams – Design of Bottom Flange

19.1 Introduction.....	225
19.2 Basic Actions	225
19.3 Spacing of Supports and Permissible Deflection	226

(xviii) *Contents*

CHAPTER - 20

Common Errors in Design of Steel Structures

20.1 Introduction	227
20.2 Influence of the Medium of the Construction of the Main Structure	227
20.3 Common Errors	229
20.4 Explanations and Importance of the Common Errors	230
20.5 Summary	240

CHAPTER - 21

Suggestions for Safe Structural Engineering

21.1 Introduction	241
21.2 Understanding of the Manufacturing Process	241
21.3 General and Miscellaneous	242
21.4 Major Issues to Consider	243

ANNEXURE - 1

Proactive Failure Analysis as a Structural Engineering Design Tool	247
---	------------

ANNEXURE - 2

Transformation of Fresh Engineer into Expert Engineer – An Exciting Path	257
---	------------

REFERENCES	261
-------------------------	------------

INDEX	265
--------------------	------------