



# **Cement Manufacturer's Handbook**

by

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## PREFACE

With this book, the author has intended to fill the need for a handy reference guide for cement plant engineers, supervisors, and managers.

This work contains the necessary engineering formulas which represent the basic tools for gaining a better understanding of cement manufacturing technology. Mathematical formulas have been purposely kept simple with a minimum of written text to conserve an engineers time and to make this book available for use to the widest possible readership.

Little or no mention is made about the result one can expect from any of the multitude of formulas presented. To do so would not serve a useful purpose and would defeat the objectives set forth for this book. None of the results obtained are universally applicable as is true for all manufacturing facilities. The process of manufacturing cement is one of the most difficult and dynamic processes known. Therefore, it would be a fallacy to assume that because a certain equipment, design, or method has proven itself in some plants that it would be equally successful in another. Nowhere is this situation more pronounced than in the rotary kiln operation.

There is no substitute for experience. But, experience combined with a sound mathematical understanding and knowledge of the process is a goal every cement plant engineer should strive for. If this book generates interest and gives the reader more satisfaction on his or her job, its writing will have been justified. But it is hoped, that it will do more than that.

\* \* \*

Special appreciation is extended to my family for their sacrifices without which this book would not have become a reality. For their understanding and patience I'm dedicating this book to

SONJA, DANIELA, AND MARCEL

\* \* \*

## INTRODUCTION

The process of manufacturing cement requires a knowledge of many sciences such as chemistry, physics, thermodynamics, and physical chemistry. It takes years to acquire a fundamental knowledge of the cement manufacturing process and this learning process tends to be never ending. There is always something new in this industry: new types of equipment, new operating techniques, and conditions that require great effort to bring about change. Failure to accept this as a requirement of the job could lead to stagnancy instead of progress.

Unfortunately, for anyone that has chosen a career in the cement industry, this knowledge cannot be acquired in a classroom or behind a desk. Instead, to become familiar with the process, one must acquire experience out in the field. For a manager or engineer this means he periodically has to don his overalls and spend time on the firing floor, the grinding department, the packhouse, and the quality control laboratory. By doing this, he must not shy away from the possibility that he might return to the office in a state more fitting for a chimney cleaner than a member of the plants management staff.

In the course of 23 years, the author has been working in almost all departments of a cement plant and has been fortunate to gather experience as an hourly employee as well as a member of the plants management staff. During these times, a sore back from loading cement sacks on trucks, clinker dust in nostrils and ears from operating a kiln, inflamed eyes from cement and kiln dust, a few minor burns from hot clinker, a lot of sleepless nights, call-outs, and 16-hour work days were common occurrences.

It is all part of the learning process.

It is hoped that these remarks do not give the newcomer to the industry the false impression that all cement plants are terribly dirty places to work in. They really aren't, they are just slightly different from other industrial processes and some time is required to get used to them. There is however a much more positive aspect to embarking on a career in the cement industry. Making a living in the cement industry, as a manager, engineer, supervisor, or hourly worker, is a job that seldom becomes monotonous or boring. This is an interesting technical field to work in and is always full of the unexpected. It takes a special kind of individual who can tackle new problems head-on. It is a credit to the cement industry that it has so many individuals that can salvage an apparently hopeless situation and keep, figuratively speaking, the train on the track. The author himself has observed specialists in their own right making a production facility continue to produce cement when others had given up years ago saying that the particular equipment was long overdue for the scrap pile. And at other times, workers and supervisors, almost beyond their call of duty, have proven they can repair a piece of equipment and get it back on line within a time frame other industries would consider impossible. These are the unsung heroes in the cement industry, those who are just doing their job and whose names usually never appear in the trade literature. In part, the author dedicates this book to these individuals.

There really is no way for a book to teach the uninitiated this kind of a work experience. There are just too many unknowns and variables that enter into the decision making process about how to handle a given situation. It is therefore a fallacy to assume that this book provides an individual with everything he has to know about the cement manufacturing process. The aim of this book, however, is to provide the foundation upon which an individual can build his experience and technical know-how. The author has attempted to compile the technical information that is considered necessary to give the reader a good background of the process.

It is not uncommon to observe an engineer spending four hours in preparation of a test, one hour for the actual test in the field, two hours for calculations, and two days in compiling the results and writing the report. In many chapters of this book, work sheets are provided which an engineer can copy thus saving him valuable time in this overall endeavor.

Since the majority of the formulas in this book are presented both in the English and metric systems, the engineer has a tool available that makes the transition to the new system easier for him. The only caution the



author must give is that the reader should make a habit of ascertaining the appropriate formula in the correct system of units for his work or project. Included at the end of this book are extensive conversion tables that allow the reader to become familiar with all three systems: the English, the metric, and the International System of Units.

The author would like to see a college or university that would establish a school of "Cement Manufacturing Technology" here in the United States. Such an institution would enable our industry to develop the required pool of new engineers needed to maintain a progressive technological growth in the North American industry. It is the authors opinion that such a school could contribute a great deal toward making the U.S. cement industry less dependent upon foreign technology. There are many unique processes that were invented and developed by the U.S. cement industry. Perhaps in the future we can again take a leading role in improving and advancing the technology of making cement. But to do so requires a financial commitment and a great deal of effort from all of us.

Kurt E. Peray  
Dallas, Texas

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