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Furnaces sit at the core of all branches of manufacture and industry, so it is vital that these are designed and operated safely and efficiently. This reference provides all of the furnace theory needed to ensure that this can be executed successfully on an industrial scale. **Industrial and Process Furnaces: Principles, 2nd Edition** provides comprehensive coverage of all aspects of furnace operation and design, including topics essential for process engineers and operators to better understand furnaces. This includes: the combustion process and its control, furnace fuels, efficiency, burner design and selection, aerodynamics, heat release profiles, furnace atmosphere, safety and emissions. These elements and more are brought together to illustrate how to achieve optimum design and operation, with real-world case studies to showcase their application. Up-to-date and comprehensive reference encompassing not only best practice of operation but the essential elements of furnace theory and design, essential to anyone working with furnaces, ovens and combustion-based systems. More case studies, more worked examples. New material in this second edition includes further application of Computational Fluid Dynamics (CFD), with additional content on flames and burners, costs, efficiencies and future trends. Excerpt from **How to Build Up Furnace Efficiency: A Hand-Book of Fuel Economy, Including a Few Snorts About Industrial Efficiency and Other Things**, Written for the Men Who Pay for the Fuel and the Men Who Burn It In the early part of 1908 the author tendered a manuscript to the editor of an engineering magazine. It was returned with the following comment: "Your paper is too technical.

We get more technical articles than we can use. We want practical articles written in a popular way and we can't get them. Cut out the "high-brow" stuff and let us have something that the great mass of our readers can peruse with interest and profit." The result of this advice was the first edition of "How to Build Up Furnace Efficiency," published in 1908. It was brought out with many misgivings. Was it really possible to treat the rather technical subject of combustion in a really popular way - something that had never been attempted by anyone before? Would the public want such a treatment even if the treatment were successful? These questions were not long in being answered. The first edition was exhausted, almost as soon as the announcement of publication was made. Succeeding and larger editions followed the first one. The present edition, counting the foreign editions, is the fifteenth complete publication, and translations are now being made for other foreign editions. Counting all publications, the book has now reached its ninety-fifth thousand. Many things were omitted in the previous editions that should have been said and some things were said that might have been omitted. In the present edition, sufficient charts, diagrams and illustrations are used to make clear some of the things that it is hard to explain in the printed page. Certain instruments and apparatus designed by the author are illustrated. In showing these it is not intended to disparage other apparatus of like character. The illustrations are given for the sole purpose of showing the "tools" that the author has used in prosecuting combustion studies and in working out specific furnace efficiency problems in many plants. Cartoons have been used rather liberally in this edition and it is hoped that they will serve to emphasize some of the arguments that the author has tried to make. It is in no spirit of self-flattery that the author refers to the past success of his book. If credit is due anyone it belongs to the editor who offered the advice above quoted. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works. Presents previously unpublished formulas and charts to expedite calculations used when improving industrial furnace design, construction, and operation. Supports such studies for reasons of energy conservation. Includes case studies that illustrate the value of alternative methods. The shortcut solutions can be completed in a few hours compared to days of research when using other methods. Highlights some of the changes in industrial organization necessary to undertake effective programs for energy conservation. Excerpt from On Economy of Fuel, Particularly With Reference to Reverberatory Furnaces for the Manufacture of Iron, and to Steam Boilers 1. It would be difficult to exaggerate the importance of the part played by heat, both on a grand scale in the laboratory of nature, and on minor scale, in the domain of human art and science. In the former respect it is not only an essential condition to the existence of life on this planet, but also the prime agent in putting in motion most of the physical changes which take place at the earth's surface. In the latter, it must be regarded not only as furnishing man with the chief means he possesses of imitating in miniature the processes of nature, and moulding and modifying natural productions to his wants; but also as bestowing on him the ability to generate and apply at pleasure, a force equally stupendous and easy of control. 2. Yes, it is to heat we are indebted for the aliment which nourishes the sinews of that all-powerful giant, yet obedient slave, which the genius of a Watt subdued, and left as a legacy to all succeeding generations. That unwearied drudge of all work, which grinds our corn, weaves our clothing, forges our tools, drives our printing presses, twists a massive cable of iron, or spins a gossamer thread of cotton down, impels our steam ships on their

ocean routes, defying wind and wave, or whirls us through space when we journey on land, with thrice the speed of the race horse. A slave more patient than Caliban, fleetier than Ariel, such an one as it never entered into the imaginations of our forefathers in their most sanguine dreams, to hope for the possession of. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

Theory and Calculation of Heat Transfer in Furnaces covers the heat transfer process in furnaces, how it is related to energy exchange, the characteristics of efficiency, and the cleaning of combustion, providing readers with a comprehensive understanding of the simultaneous physical and chemical processes that occur in boiler combustion, flow, heat transfer, and mass transfer. Covers all the typical boilers with most fuels, as well as the effects of ash deposition and slagging on heat transfer Combines mature and advanced technologies that are easy to understand and apply Describes basic theory with real design that is based on meaningful experimental data The Future of Fuel Technology documents the proceedings of a Conference held in the Netherlands, Amsterdam in May 1963. This book consists of four main topics relating to the future of fuel technology— combustion and heat transfer, generation of steam and power, furnaces, and domestic utilization. In these topics, this compilation specifically discusses the broad strategy of research and development in industrial fuel utilization, flame research at IJmuiden, and fuel utilization in water-tube boilers. The fuel requirements for fuel cells, high-intensity combustor for liquid fuels, and gaseous fuels in industrial furnaces are also discussed. This text likewise covers the manufactured domestic fuels for closed appliances and domestic gas utilization research and development. This publication is recommended for fuel technologists, engineers, and scientists concerned with advances in fuel technology. Fuels, Furnaces and Refractories focuses on the sources and efficient use of energy available to modern industry. This book begins with the classification, properties, tests, and different kinds of fuels, as well as trends in fuel utilization. This text also tackles the generation and distribution of electricity from both chemical and nuclear energy sources. Subsequent chapters focus on the thermodynamics, physics, chemistry, and kinetics of combustion of fuels; the burner design; the heat transfer and flow of gases through furnaces and flues; and ways of controlling energy supply rates and temperatures. The refractory materials, which are heat-resisting substances, are also described. Written in a student-friendly manner, the book begins with the introduction to fuels, furnaces and refractories. It further exposes the reader to the different types of fuels with their testing methods. Besides covering the recent developments in the field of non-recovery coke ovens, dry coke cooling, use of coal in DRI and blast furnace, and new energy recovery system, the book also covers all the aspects of refractory systems. For better understanding of the text, the book includes a large number of illustrations. The book also facilitates a thorough understanding of different environmental issues associated with the use of fuel. Finally, the reader is made familiar with the Indian industrial scenario regarding fuels, furnaces and refractories. This historic book may have numerous typos and missing text. Purchasers can usually download a free scanned copy of the original book (without typos) from the publisher. Not indexed. Not illustrated. 1920 edition. Excerpt: ... BLUE BOOK OF Oil Burning and Burners HEAT AND COMBUSTION When we speak of fuel oil we generally mean the oil which is burned in the furnaces of steam boilers. The best engineer is the one who can make the most steam with the least fuel. Heat may be produced in many ways, but for the

purpose of the marine engineer it is only necessary to consider the heat generated in the furnace by burning fuel oil and coal. The degree or intensity of heat can be measured by a thermometer or pyrometer. The quantity of heat necessary to produce a certain temperature is measured in heat units. The British Thermal Unit (B.T.U.) is 1/180 of the amount of heat necessary to raise one pound of water from a temperature of 320 F to 2120 F. Roughly one B.T.U. will raise the temperature of one pound of water one degree. Above 2120, water is changed into steam, by the addition of heat and the above definition is not true of steam. The best fuels contain the most B.T.U.'s per 1 pound. The average good steaming coals contain between 11,000 and 14500 B.T.U.'s per pound, while fuel oils contain as high as 20,000 B.T.U.'s per pound. Unfortunately, there is no quick practical method by which the engineer can judge of the quality of his fuel. The number of heat units per pound must be determined in a laboratory with an instrument called a calorimeter, and to be of any value the test must be very carefully and accurately made. Consequently the engineer must judge of the quality of his fuel by its actual performance in his furnace. But a knowledge of the fundamental principles of heat and combustion cannot fail to help in saving at the fuel pile. Heat is generated by combustion, or the burning of coal or oil in the furnace. Coal and fuel oil consist principally of carbon, .. This book contains detailed description of solid, liquid, gaseous fuels, combustion and furnaces. Beside short questions and answers and multiple choice questions & answers and multiple choice questions; answers drawn from the examination papers of various engineering Colleges and professional bodies examinations are also included. The book will be useful for degree & diploma curriculum of various branches of Engineering and for various associate membership examinations conducted by professional bodies like Institution of Engineers (AMIE), indian Institute of Metals(AMIIM), Indian Institute of Chemical Engineers(AMIChE), Institute of Chemicals etc. Present day technology is vibrant and changing rapidly. But the essential characteristics remain the same; when a fuel is burnt, the aim will always be to completely burn it and derive maximum heat out of it. A furnace and its refractory linings are must to utilize the fuel. When the fuel is burnt and some process(s) are performed in the furnace, it becomes a consequential necessity to measure the temperature in the furnace, to have a proper control over the operations. An effort is made to give the students a deep insight into the utilization of fuels, with some fundamentals, essential to have a grasp of the subject. This book thus tries to encompass the fuel utilization to a satisfactory level. Salient features - Units are converted to S.I. Units from CGS or FPS systems - More material is added in Nuclear and Solar Energy topics The Efficient Use of Energy, Second Edition is a compendium of papers discussing the efficiency with which energy is used in industry. The collection covers relevant topics in energy handling and describes the more important features of plant and equipment. The book is organized into six parts. Part I presents the various methods of heat production. The second part discusses the use of heat in industry and includes topics in furnace design, industrial heating, boiler plants, and water treatment. Part III deals with the production of mechanical and electrical energy. It tackles the principles of internal combustion engines, generators, and the use of nuclear energy. Total energy systems and heat salvage are covered in Part IV. Part V elucidates on the use of refractory and insulating materials and the importance of instrumentation and control in the regulation of energy consumption. The final section focuses on the environmental aspect of energy production such as the control of pollutants emanating from plants during production. The book will be of use to engineers and plant production managers. This work has been selected by scholars as being culturally important, and is part of the knowledge base of civilization as we know it. This work was reproduced from the original artifact, and remains as true to the original work as possible. Therefore, you will see the original copyright references, library stamps (as most of these works have been housed in our most important libraries around the world), and other notations in the

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