

BOOK REVIEW

J. CHEDAILLE and Y. BRAUD, **Industrial Flames; Volume 1, Measurements in Flames.** Published by Edward Arnold (1972). £6. 228 pages.

THIS is the first of three volumes devoted to the subject of Industrial Flames and deals specifically with measurement techniques and instruments used in large industrial-type flames. The three volumes have, as a basis, the research carried out by the International Flame Research Foundation over the past twenty-four years. The authors, and the translator of two of the four parts of the present book have all contributed to the work of the Foundation in past years.

The four parts of the book are entitled Temperature Measurement, Measurement of Heat Transfer, Measurement of Gas and Solid Concentration and Velocity Measurement. The first and fourth parts were originally published as IFRM documents in 1966 and 1967 respectively; it is these parts which have been translated from the French by Dr. N. Chigier. The sequence of chapters is immediately striking in that the velocity-measurement techniques are relegated to fourth position; thus, although the aerodynamic mixing largely controls the temperature distribution within a furnace and, therefore, the heat transfer and much of the pollution formation, the comparative simplicity of the instrumentation available to the authors, coupled with an understandable desire to measure the property which dictates the survival of the furnace, requires that temperature be considered first. In all cases, the measurement techniques are concerned with time-average properties and this again reflects the difficulty of obtaining satisfactory measurements in industrial flames.

The 49 pages dealing with Temperature Measurements state the necessary fundamental principles as well as presenting instrumentation developed and used at the IFRF and the resulting sources of error. The diagrams of instrumentation are interesting and it is regrettable that more time was not spent explaining the reasons for various aspects of the detailed design. The quoted uncertainties reflect the difficulty of the temperature measuring problem, for example 5 per cent for a venturi pyrometer. This reader would like to have been informed of the significance of an error of this magnitude. Indeed, the introductory statement

that "It is therefore important that measurements of temperature are made with a high degree of accuracy" is not expanded upon, for example, by stating the purpose of such measurements or the meaning of "high degree of accuracy". The material presented in the chapter is easy to comprehend but the presentation does not render it convenient for reference purposes.

Approximately 40 pages are devoted to Measurement of Heat Transfer. These forty pages are divided into two chapters. One concerned with the Measurement of Heat Transfer to a Load and the second with Flame Radiation. The description in both chapters are clear and useful, but not exhaustive.

The third part of the book is also the longest. It deals with the measurement of gas and solids concentration and occupies some 80 pages. These 80 pages are divided into three chapters concerned with sampling, gas analysis and the analysis of solids. With the present awareness of pollution, this part of the book makes particularly interesting reading. The techniques, in common with almost all experimental methods described in this book, will be familiar to most readers of the Journal. It is the discussion, specific to the application of these standard techniques to large scale furnaces, which makes them interesting and in which the value of the book lies.

The discussion of velocity-measuring devices is restricted to total- and static-pressure devices. There is nothing new in the principles employed but the discussion of practical problems such as the influence of solid particles is of interest.

The book has few merits for undergraduates or graduate students and permanent research staff are unlikely to require it for their personal libraries. The price is high and the applicability of the text slight. In spite of the interest with which this reviewer read the sections dealing with the application of standard techniques to large scale furnace flames, there is no section of the engineering community to which the book can be strongly recommended.

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