



Fluid Mixing

This small volume (A5 format, hard covers, approximately 210 pages) is a record of the papers presented at a symposium organised by the Yorkshire Branch and the Fluid Mixing Processes Group of the Institution of Chemical Engineers and held in Bradford in March 1981. The individual contributions vary greatly in length: from 8 to 33 pages. The papers are reproduced from the original typescripts submitted by the authors and are nevertheless very legible. The papers would be easier to follow if the figures were included in the text rather than placed at the end of each paper and I would have thought that the high price* of the volume could have been reduced by using paper binding.

Thirteen papers are included: one (in spite of the symposium title) is primarily concerned with the mixing of solids, the rest are all concerned with liquid mixing in agitated tanks. Most of the papers report primarily experimental work, although there is one entirely theoretical treatment and two more with considerable theoretical or modelling components. In all cases except one the tanks were agitated mechanically, the remaining study was concerned with jet agitation. The diameter of the tanks studied ranged from 0.2 m to over 3 m, although only three papers were concerned with diameters greater than 1 m. These relatively small scale studies are presumably a reflection of the fact that a large majority of the work reported was carried out in university laboratories. It is disappointing that such a symposium concerned with a very practical subject

should attract only a relatively small industrial participation.

The liquids studied were both Newtonian (for example water and dilute electrolyte solutions) and non-Newtonian (for example molten chocolate and Carbopol solutions), and a wide range of impeller geometries are represented. The variables measured were (in descending order of popularity) power requirement, flow pattern, heat transfer coefficient, and time to achieve mixing. These facts make objective comparison of the work difficult; mixing is a highly empirical subject and the work reported here illustrates this well. The most interesting paper to me was that by Mann, Mavros and Middleton who measured the gas disengagement rate after a gas feed below the impeller was switched off. The resulting fall in liquid height in the tank was then used to infer the type of mixing and the flow patterns present in the stirred liquid.

This book, as can be seen, will be primarily of interest to those engaged on research in liquid mixing, and of comparatively little interest to industrial designers.

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Process Level Instrumentation and Control: Vol 2

Engineering measurements and instrumentation.

N. P. Cheremisinoff

The book is aimed at practising engineers in the process industry and at senior-to-graduate students of engineering. It will be useful to those engineers who do not specialise in control or instrument engineering but who need a technical reference when assessing the merits of a given level measurement system.

Most of the types of level instrument in commercial use are included. The first two chapters are devoted to a brief review of the mathematical principles of automatic control, with emphasis on level control, and of design practices including references to vessel dynamics and to the importance of safety considerations. The operating principles of each type of level instrument are described in the ensuing chapters, each case backed-up by a general

description of a discreetly-named commercial example and by typical industrial applications. A chapter on control valve characteristics and an Appendix on Laplace Transformations conclude the book.

The theoretical treatment should be well within the grasp of the intended readership and there is a wealth of detail devoted to practical aspects. It is therefore almost surprising that there is no explicit reminder of the discrepancy between the true level in a boiler and that 'seen' in a gauge glass connected to it. This topic could also be complemented by a mention, in the chapter on newer devices, of the 'Hydrastep' system developed by the CEGB for accurate indication of the level in a high pressure boiler.

Suggested examples are added to each chapter for further study, but the student reader may need the guidance of a tutor as solutions to the problems are not given. The units used throughout the book are Imperial/North American.

The text appears at first sight to be congested. This is due in part to the extensive descriptive material and to the fact that the print, and the sketches, are relatively small. However, this keeps the book to a reasonable size (250 pages, Octavo)

and once one has adjusted to the format, the text is eminently readable and the overall presentation is clear. The method used for emphasising certain words or phrases by underlining them is visually unattractive. The binding, in hard back, is sound.

D. L. Smith
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Centrifugal pump clinic

I. J. Karassik

Compared to a conventional text, this is a somewhat unusual book; its basis was some queries the author received on problems in centrifugal pumps, which later appeared as a series of articles. The questions and answers were mainly to allow the readers to improve the operation and installation of their plant.

This book, then, is a selection of these articles and in consequence appears as a series of questions and answers, roughly gathered together in chapters on applications, pump construction, installation, maintenance and field troubles. Thus, the readers who would benefit are plant engineers and design engineers, rather than those with academic or theoretical leanings. The author also includes recent graduates in those that could benefit from its use.

Nearly 200 problems are detailed, ranging from an explanation of suction specific speed to installation questions such as how to arrange suction piping. Equal balance is given to hydraulic problems such as cavitation, pump selection and mechanical matters and plant installation.

Personally I don't like the format as the author has had to include a lot of text book material in his problems to offer a satisfactory explanation. This I feel, would be better written as a section of text with the problems following as examples. Likewise, the layout adopted means the facts are mixed up with the authors opinion and advice, with some of which, for instance the conditions for cavitation damage, I would not agree. He also reiterates old definitions

of cavitation inception, which is perhaps because he quotes references of 1937 vintage. The format also leads to great difficulty in tracing specific topics without reading the whole book each time. This is not helped by an incomplete index at the back.

Despite these criticisms, there is an enormous amount of most useful information given that is rarely found in other books. Although the items such as trimming impeller dimensions to get a specific head or flow is very useful, the reviewer especially appreciated the information not easily found elsewhere. This clearly includes much of the authors advice and opinions on design and installation, but also such things as the effect of altitude on NPSH, information on wear ring clearances and the effect of wear on the performance characteristics. Another useful topic was the operation of two pumps in series or parallel, and the differences involved as to whether the pumps had steep or flat characteristics, an important aspect which is usually ignored.

Whether looking for data on specification, technical factors or mechanical aspects, engineers involved in the practical side of centrifugal pumps will find this a valuable addition to their bookshelves.

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