1988 was reduced by 38% in the present subscription year. Each month, the number of pages ready for publication is published so that individual issues may vary widely in size. Thus a 250 page issue may be followed by a 1000 page issue in the next month, and so on. Any single issue which Dr. Levenspiel uses in his comparison is therefore likely to distort the results.

4. [*sic*] Furthermore, the comparison with *CES* is further distorted by other erroneous information. I cannot directly comment on the difference in subscriber bases and cannot comment on the differences in publication methods, except to say that unless a complete analysis of the subscriber bases and international markets are [*sic*] made, no cost comparison can be made. For example, a society publication, say, may have other sources of editorial funding such as page charges or distribution methods such as bulk society purchase would no doubt have other ways of generating revenue which would supplement the subscription price. Some publications accept advertising and are distributed on a controlled circulation basis, while others are not. In any event the scopes of the publication are quite different. *Chemical Engineering Communications* provides "a forum for the rapid publication of papers in all areas of chemical engineering." A recent issue of *CES* states in its scope "The object of the journal is to publish papers dealing with the application to chemical engineering of the basic sciences and mathematics...."

The other areas of distortion in a valid comparison can include such factors as complexity of typesetting and quality of materials. For example, *CEC* offers free publication of color photographs as well as other special services. In addition libraries subscribing to *CEC* can, for an additional nominal $5 per volume receive a photocopy licence [*sic*] allowing them unlimited photocopying thus providing a very low cost of dissemination.

The true current cost to subscribers of *CEC* is about half of that quoted in Dr. Levenspiel's letter and compares favorably with other commercial, international journals. In a major pricing study recently prepared by a major university library system our company was ranked 18th.

In fact, we are quite concerned about the current library budget crisis. We have been trying for some time now to find a way to defer or lessen the effect of inflation and currency problems on our regular subscribers. We are enclosing a press release of a program which we are announcing to further reduce the costs to existing subscribers. Our prices, after adjustment for changes in numbers of pages, have increased only 10% in the last three years despite a higher inflation rate and a falling dollar. Unfortunately, damaging false analyses like Dr. Levenspiel's serve only to raise prices by reducing units, not to lower them.

We work in an intellectual area with intellectual product and try to orient our services to the needs of the community. Libelous attacks made without fact or knowledge and without verification like those of Dr. Levenspiel serve no useful purpose in this enterprise.

Martin B. Gordon
Gordon and Breach, Science Publishers, Inc.

Editor's Note: *The Press Releases enclosed with the above letter describe a "Subscriber Incentive Plan" (SIP) that would result in 10-20% discounts when certain conditions are satisfied. A basic membership earns a 10% discount which will be automatically granted for the 1988-89 period, with future discounts dependent on membership in SIP; a 5% discount voucher "credit memo" good on future renewals will be extended with enrollment in the SIP; and an additional 5% discount is offered to the subscriber if the order is placed through their preferred agent, STBS. The offer will initially be restricted to North American libraries.*

ChE book reviews

DIRECT CONTACT HEAT TRANSFER

by Frank Kreith and R. F. Boehm
Hemisphere Publishing Corp., 1988

Reviewed by
Joseph J. Perona
The University of Tennessee: Knoxville

The term "direct-contact heat transfer" denotes the physical contacting of media for heat exchange purposes in the absence of a separating barrier, such as a tube wall. Some applications are quite old, *e.g.*, cooling towers and barometric condensers. The concept is not mentioned by such modern textbooks on heat transfer as those by Lienhard and by Incropera and DeWitt. A chapter is devoted to it in Kern's book, published in 1950.

Direct contact operations are fundamental to chemical engineering. Nearly all mass transfer processes are direct contact operations. From an analysis or modeling standpoint, direct-contact heat transfer is not significantly different from nonisothermal mass transfer, unless radiation is important. The state-of-the-art is the same. For transfer between fluid phases, interfacial areas are usually not known and experiments produce volumetric coefficients, in which the transfer coefficient and interfacial area are lumped together. Similar contacting devices are used. Since mass transfer inevitably accompanies direct-contacting, its extent must be evaluated in any heat transfer application. It may or may not be desirable for the objectives of the operation.

The primary advantages of direct-contact heat transfer over surface exchangers are the elimination of

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per week for twenty-six weeks is scheduled (78 hours). It is estimated that the total time that the students spent is closer to double this figure. However, the nature of these projects is such that much of the time must be spent at the end of the final term, which is, of course, when it is the most scarce. We were concerned that the students would be unable to complete the projects in the available time. This is probably the largest risk in such a venture. A high degree of success was achieved, however, with most students meeting the objectives of the work and producing a piece of laboratory equipment which worked. Shortfalls in the program occurred in testing and preparing detailed laboratory procedures. In most cases, additional work is needed in these areas so that the experiments can be used routinely in the undergraduate laboratory.

Scheduling

The time for equipment which was slated for upgrading and which was also part of a current laboratory course required careful scheduling. Fortunately, only one project (packed column gas absorption) fell into this category. We found that it was necessary to run all the laboratory course experiments on packed column gas absorption in one time block at the beginning of the first term. Once this was accomplished, the equipment was turned over to the thesis student and the upgrading proceeded without interruption.

Type of Student

The laboratory projects require that a student have a certain degree of mechanical know-how and dexterity. Since technologist time is limited, a major amount of actual construction is necessarily performed by the student. There were a few students who lacked basic skills in this area and who had no interest in learning them. The result of this situation was that the faculty member had to put in a fair amount of time doing the actual construction.

Research Aspect

One disadvantage of this type of project is that students wishing to pursue a post-graduate degree will not be exposed to some of the concepts or techniques of research. There is no doubt that development of skills in the areas of literature searches, experimental design and general research philosophy suffered. However, development of other skills relating to equipment construction, communications and general project management is also important in research.

SUGGESTIONS

In contemplating this type of project, the following important points should be considered:

- **Only do as many projects for which there is adequate funding.**
- **The larger projects would probably be more successful with two students working together instead of only one.**
- **Do not have only laboratory-type projects available; research or theoretical projects should be provided for those students who have no interest in a laboratory project.**
- **Ensure that enough technical help is available. Machinists, plumbers, and electricians are necessary resource people.**

CONCLUSIONS

An alternate approach to the undergraduate thesis has been described. This approach lies somewhere between the traditional research-oriented thesis and the work normally done in a process and plant design course. The size of our senior class has made it possible for us to offer this experience to all members of the group. In a large institution it would still be possible to adopt this scheme, but with a smaller percentage of the seniors. While a strategy of this sort is neither desirable nor feasible to implement on a continuous basis, our one attempt has brought numerous benefits to both the department and the students involved. □

REVIEW: Direct Contact

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any wall resistance and low capital cost. In specialized situations these advantages certainly will lead to further commercial use of direct contact exchangers.

The book is the product of an NSF-supported workshop held at the Solar Energy Research Institute in 1985. In contains fourteen chapters written by the organizers and principal speakers. Five chapters deal with two-phase fluid systems. Three chapters treat heat transfer between particulate solids and gases. A chapter each concerns evaporation and condensation processes.

Several valuable functions are fulfilled by this book. At the most basic level it should serve to re-emphasize to the heat transfer specialists that this kind of heat exchanger is an option with certain strong advantages. The book is a good source of ideas and configurations for possible applications. A valuable feature of the book is a set of design examples included as six appendices. In the final chapter the editors present a summary of research needs. ❐