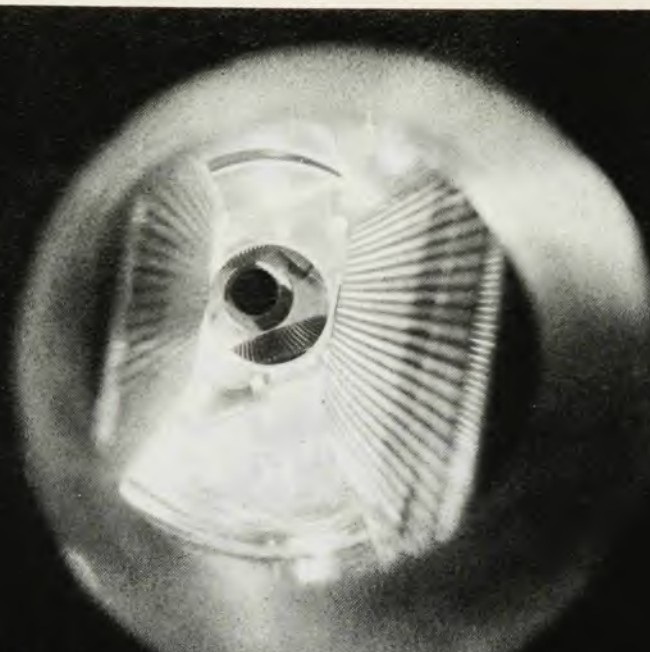




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misleading. With only a cursory reading, the unsophisticated reader could conclude that granulation is a chromospheric phenomenon. I think the author should have kept strictly to his layer-by-layer discussion.

The description of vertical oscillations in the chromosphere and the question of mechanical heating of the whole outer solar atmosphere is treated in considerable detail. Because of the extreme importance of these topics to the understanding of the structure of the chromosphere, I feel the emphasis is warranted. It is unfortunate that a lot of contributions to chromospheric research from studies of the uv and euv solar spectrum were a little too late to be included in the book.

The final chapter of the book is a thorough and well balanced discussion of the physics of the quiet corona.

The entire volume is profusely illustrated. However, to fit the many figures in the text, it was necessary to reduce them in size to a point where it is a strain to read some of the material. Furthermore, the illustrations taken from other sources contain information that is not discussed in the text or the captions. In comparing these figures with the original sources, I find that many were redrawn for this book. It is unfortunate that the extraneous matter was not removed in the process.

It is quite clear that most of the negative comments above are of a rather unimportant nature. In fact, I can recommend the book to the reader without hesitation. It is most pleasant to report that the book is well printed, well bound, and well proofread and inexpensive!

ROBERT D. CHAPMAN

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Optical Production Technology

D. F. Horne

567 pp. Crane, Russak; New York, 1972. \$42.50

Lens making is an ancient art, and many principles and even materials used centuries ago are still in use today. But the scope of application of optical surfaces is now extremely wide, as is the base of technology that is applied to their manufacture. In its broadest sense, the term "optical production technology" would cover the manufacture of lens elements from, say, the cheapest condenser lens to the largest telescope mirror—a range of cost, precision and manufacturing time of perhaps seven orders of magnitude.

Optical Production Technology suc-

ceeds admirably and I think uniquely in its attempt to describe the manufacturing methods for this entire field. The result is a most valuable contribution, which brings together in one place material that is not easily found in the general literature. The book will have its greatest use by students, opticians and engineers working in the field of optical fabrication. It will also be read and used by researchers with a problem to solve, and not least of all by those who simply have a general interest in the subject. This is a large book, nonmathematical, written in an easy conversational style, easy to skim, well illustrated and beautifully produced. It will be of value for many years.

D. F. Horne has skillfully blended his own writing with the contributions of other specialists and with interesting historical quotes. The book is published by the optical firm of Adam Hilger, Ltd, a part of Rank Precision Industries. Thus, in a sense, it is a sequel to the Frank Twyman classic, *Prism and Lens Making*, published by Hilger in 1942. The new book updates the material and enlarges the scope manyfold. Horne, currently at the Open University, has been involved with senior production engineering responsibilities at Rank Precision since 1948 and with the subsidiary firm from 1962 to 1969. The book not surprisingly is, therefore, at its best and most informative where it describes the technologies used by that firm for the making of a wide variety of high-quality optical components for a vast range of specialized optical instrumentation.

The treatment of optical tools and abrasives is especially comprehensive and will be of great value. The discussion of synthetic diamonds, their value in optical surfacing, and the major impact this has had on the diamond tool industry will be new to many optical workers. American workers will be disappointed to find that references to sources of supply of materials are mostly British. The descriptions of the function and capability of specific types of optical machinery are excellent. In this case, the discussion does include machinery from western Europe and the US that will be familiar to workers on both sides of the Atlantic.

The discussion of the history and fundamental technology of astronomical-telescope mirrors is informative and well balanced, but the discussion of modern methods is highly abbreviated. This chapter will widen the horizons of the optician working in other fields, but will not help him in the direct way of the earlier chapters, with respect to general optical production. The discussion of the testing of such systems is quite limited.

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There are other chapters that similarly will serve mostly as interesting reading rather than as an important reference source. The chapter on glass making, for example, describes the making of window glass in some detail (including the exciting float process), but does not give a really full picture of modern methods for producing optical glass. It would have been better in the discussion of glass properties to have played down the optical characteristics of interest to the lens designer and to have emphasized the mechanical, thermal and chemical properties of glasses and other optical materials that actually affect (and often seriously) the working behavior in the shop.

I hope that this book will be commercially successful to the degree that revisions and new editions will be possible. Expansion of the index will make the book easier to use as a reference. Extension of the sections on optical glass, nonspherical surfaces, optical crystals and metals, testing and lens mounting could convert these from interesting commentaries to definitive reference sources. The addition of a chapter with expanded information on plastic-lens manufacture would also be of real value.

A short chapter on production planning gives useful insight into some of the practical problems of cost estimation and work-flow organization. Short chapters on optical fibers and projection screens are interesting, but hardly seem central to the major topic.

This important book should be in the library of anyone with a serious interest in the making of optical surfaces.

F. DOW SMITH

Itek Corporation

Lexington, Massachusetts

Magnetic Interactions in Solids

H. J. Zeiger, G. W. Pratt

660 pp. Oxford U.P., New York, 1973. \$62.50

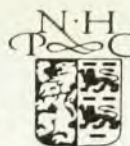
Over forty-two years have passed since J. H. van Vleck, in the preface to his celebrated *Theory of Electric and Magnetic Susceptibilities* wrote that the successes in the theory of susceptibilities may be regarded as among the greatest achievements of quantum mechanics and devoted his book to that topic. In the intervening years so much progress has been made in understanding quantum mechanics and statistical mechanics of solids in general, and magnetic solids in particular, that this statement of van Vleck now sounds quaintly dated. Yet here we have a new and learned volume, *Magnetic Interactions in Solids*, by two

able researchers at MIT's Lincoln Laboratories, Herbert J. Zeiger and George W. Pratt, reading for all the world like an update of the earlier book. It is in fact a new classic, impeccably written, delving in areas that are well known now and perhaps even beyond controversy, but doing so with method and clarity. It is a shame that so little of it deals in the cooperative aspects of magnetism, the quantum mechanics and statistical mechanics of the interacting spins, the nature of spin waves, or of phase transitions, or quantum dynamics of strongly interacting electrons.

Yet it is in the nature of such a "classic" to remain on safe ground, to skip areas of recent discovery and controversy, and the authors have consciously exercised their option to avoid this rocky terrain. Their preface is addressed precisely to this point: "Our original intent was the preparation of a book on the physics of ordered magnetic systems. In the course of collecting material for this, we found that the presentation of background material alone was a formidable project. We therefore chose to present a more basic treatment of magnetism, tracing the origins of magnetic interactions in insulators and metals, and leaving to others the task of discussing ordered magnetic systems."

The contents of the Zeiger-Pratt book are as follows: after introductory chapters in which the origins of electronic magnetism are sought in the Dirac equation, in which the hyperfine interaction, spin-orbit coupling, the g -factor and the Zeeman effect are all obtained, the many-electron atoms are studied by means of the Hartree-Fock approximation, followed by an explanation of the L-S and J-J coupling schemes, a derivation of Hund's rule and quadrupole moment operators. Similar material is also found in countless quantum-chemistry texts (also known as atomic or molecular physics), but it is necessarily repetitive, because a consistent notation and terminology is introduced.

One of the main chapters follows, more than 150 pages on magnetic properties of ions in the fields of a crystalline solid. This well presented survey of the influences that a solid-state environment can have on an incomplete-shell ion is enhanced by the use of tables, figures and computational examples. A good example of the presentation is the Jahn-Teller effect; a word picture is first drawn, distinguishing between the static and dynamic effects. This is followed by examples, calculations and figures of constant-energy contours. This chapter also includes some 30 pages on the exchange forces in insulators: The Goodenough-



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