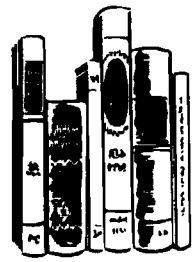

books reviewed

Filmprojektoren Filmprojektion (Film Projectors and Projection)

By Kurt Enz. Published (1965) by VEB Fotokinoverlag, Leipzig, Germany. 520 pp. incl. bibliography and index. Illus. 5¾ by 8½ in. Price MDN 32.

This is an excellent reference book for the serious student of motion-picture projection, as well as for the experienced engineer.

All basic optical and mechanical physics used in motion-picture projection design and operation is described in a thoroughly technical manner.

The author is an acknowledged expert in the field of film projection technology; he has included film formats, drive systems, optics and light sources in addition to an excellent description of the construction of major projector mechanisms.

His explanation of the geometry of various film transports is particularly thorough and includes various Maltese-cross or Geneva-type movements, as well as cam-driven claw types, beater types and various continuous film transports optically rectified for motion-picture projection.

Sprocket design, framing devices, pad rollers and other mechanical parts are described in detail. An elaborate section relates to projection light sources together with associated optics for incandescent, carbon-arc and xenon projection lamps.

The book is replete with drawings, figures and charts. Mathematical computation is such that the work could easily be used as a teaching manual.

Final chapters are devoted to complete projection systems. Most 70mm, 35mm, 16mm and 8mm projectors are described in detail—Review and translation by *Don V. Kloepfel and Tom Rothe*, General Film Laboratories, 1546 North Argyle Ave., Hollywood, Calif. 90028.

Generation of Optical Surfaces

Ed., Karl Kumanin. Published (1967) by Pitman Publishing Corp., 20 E. 46 St., New York, N.Y. 10017. 476 pp. Illus. Diagrams. 7 by 9¾ in. Price $45.00.

The underlying physics of the processes employed in the grinding and polishing of optical surfaces has not been the subject of a large mass of technical literature in English. In particular there is no comprehensive coverage of this subject in a single reference text. It would appear that a similar lack has existed in the Russian language. As a result, a collection has been made, under the editorship of Professor K. G. Kumanin, of fifteen papers prepared by eleven different authors. The collection is referred to as a symposium and its original publication is dated Moscow, 1962. The translation is by D. Finch with E. H. Murch, J. W. Gates, and E. A. Sutherns doing the editing of the English publication.

The translator and editors are to be congratulated on the excellent quality of the English translation for there are very few instances where the language poses any problem for the reader. I suspect that for the American reader the differences between English technical usage and that of American workers in this field will be more obvious than any problems arising from word selection by the translator.

The papers are divided into three groups. The first group is concerned with the mechanisms of grinding and polishing, with the details of the interaction of abrasive grains and the surface of the work, with rates of material removal, energy relations and forces. While some theoretical and analytical work is reported, the real value of this section rests in the large amount of observational data presented. Not only is this data well coordinated with the analysis, but it appears in a form which will allow it to be applied directly to practical cases. A discussion of ultrasonic grinding and surface generation is included as part of material of this section.

There would not seem to be any new concepts, different from those developed and reported in the literature familiar to Americans working in this field, but I do not know of any other compilation of this material in as useful or complete a form.

The second section treats the problems of generating and polishing the variety of geometrical surface shapes required in modern optical devices. The first paper of this section is, like those of the first section, an excellent combination of analytical discussion and experimental results of studies of the thermal problems, mechanical distortions, distribution of abrasives, rates of removal and the control of surface shape in the classical surface generation process.

The second paper of this section deals with the specific problem of the generation of spherical surfaces with cup-shaped tools. This method is in widespread use in the American optical industry and its capabilities and limitations are well understood by those employing curve generators of this type. While there does not appear to be any new information not known to those using this method, the gathering together of all the major considerations into one text will be very valuable to those seeking a thorough coverage of the subject.

The next two papers cover specialized methods. In 1927, Preston discussed the theory and design of machines for the rapid polishing of plate glass. This concept has been extended and analyzed for the generation and figuring of precision optical surfaces. Some work along these general lines is underway in the United States and in England and these papers will be of great interest to these particular workers not only because of the completeness of the analysis but also because these papers shed considerable light on the direction of Russian activity.

A detailed paper in this section describes and analyzes the great variety of machines previously reported for the generation of specific aspheric surfaces. Again, no new facts or ideas are disclosed but having all the information in one place will be a great convenience. Some of the aspheric shapes and

the machines adapted to their generation, described in this paper, should provide a basis for interesting speculation on the part of lens system designers as to the use of these surfaces.

These two papers contrast with the first section in that they do not contain any significant information on the accuracy of the resulting surfaces generated by the methods described. The reader is left with the feeling that he has learned the principles and the details of the geometry, but has no basis for estimating the practical difficulties and limitations of these methods. In fact in some cases in which this reader has had some direct experience, the omission of some of these real limitations in real machines makes him wonder just how far any of these specialized methods have been reduced to practice by the authors.

A paper dealing with the subject of the measurement of the shape of aspheric surfaces describes many interesting instruments, some of which are well known and others appear new in concept. In nearly all cases, however, the instruments measure some geometric property of the surface. There is almost no exploitation of interferometry for surface shape measurement. It is to be kept in mind that these papers were written in 1962 or before and that lasers were not as common at that time as they are today. Thus, the great opportunity for interferometry with lasers did not exist then as it does today.

Two papers, one covering the angling and errors of prisms, and one on the mechanical location of flat and spherical surfaces add to the completeness of the book in these areas, but these subjects are covered in many other readily available publications, manuals and texts in English. The material is accurate and complete, but no more so than in these other sources.

Part III of the book is the most difficult to read and to review. It is entitled "General Problems of the Theory of Surface Generation" and it is just that. Many rather fundamental problems are defined and discussed, but in most cases the theory or the analysis has not progressed sufficiently to lead to any great improvements of methods. The author tries by mathematical analysis, based on a few fundamental assumptions, to draw some general conclusions and to guide the reader's thinking so he may have a better understanding of the physical processes inherent in surface generation. The material seems incomplete, however, for there is no description of actual production or even experimental results based on or illuminating the analysis.

One important result which this book may have is the influence which it may well exert on the many individuals working in these same fields in America and Western Europe to publish their analyses and results. There has been an inhibition to publication because of the proprietary concern of the optical manufacturing companies where the bulk of the work is carried out. Perhaps the appearance of such a book, particularly one translated from the Russian, will make more of us realize that our reluctance to publish can only impede the advance of the technology necessary to generate the optical surfaces required by modern optical devices.—*Roderic M. Scott*, Vice President and Chief Scientist, Perkin-Elmer Corp., Norwalk, Conn. 06852.