

O P T I C A L

R E S E A R C H

A S S O C I A T E S

Professional Experience

2005 – Present	Principal Engineer, Optical Research Associates
2001-2005	Director, Photonic and Imaging Engineering Services, Optical Research Associates
1997-2001	Assistant Director of Optical Engineering Services, Optical Research Associates
1991-1997	Optical Engineer, Leica AG
1989-1991	Head, Optical Design and Metrology, Leica Aarau (formerly Kern and Co. AG)
1988-1989	Optical Designer, Leica AG (formerly Wild Leitz AG)
1984-1988	Assistant Professor, Institute of Optics, University of Rochester
1983-1984	Instrument Designer, Kern Co., AG
1978-1983	Research Assistant, University of Arizona
1977-1978	Mathematician, Computer Sciences Corporation
1976-1977	Programmer, David Taylor Naval Ship R & D Center

Education

1983	Ph.D. Degree in Optics, University of Arizona
1981	M.S. Degree in Optics, University of Arizona
1976	B.S. Degree in Mathematics, Virginia Polytechnic Institute

In the area of optical design, His experience ranges from conceptual design through assembly and alignment. He has designed and toleranced such diverse systems as photogrammetry for clinical dental use, ophthalmic surgical systems, biocular and binocular systems, FLIR systems, helmet-mounted displays, zoom lenses, and systems using Gradient Index (GRIN) lenses. He has designed and toleranced diffractive optical systems for both imaging and pattern-generating applications. Working closely with micro-optics fabricators, he has generated mask patterns for lithographic production of diffractive optical elements, and has hands-on experience in the alignment and testing of such systems.

He is experienced in the analysis and tolerancing of optical systems for photonics. He has used ORA-proprietary techniques for propagation of general (non-Gaussian or aberrated) optical beams to calculate insertion loss characteristics of optical systems, and examined the sensitivity of insertion loss to fabrication and alignment errors of the systems.

In the area of non-imaging optics, he has designed and analyzed systems for illumination and fluorescence detection for a spaceborne application, as well as a collection system for an airborne LIDAR application.

In addition to optical design, he has substantial experience in interferometry and optical testing. He has worked on tilt sensors, interferometers from the deep UV to the thermal IR as well as differential interference microscopes, as well as MTF and distortion test equipment. He has designed software for phase shifting interferometers, and has designed systems for optical alignment using whight light interferometry (optical coherence tomography).

He actively researched design techniques for tilted component optical systems, and has taught optical testing, geometrical optics, and lens design at the university level. Recent publications include papers on slope tolerances for optical surfaces and techniques for creating designs that are insensitive to tolerances.

Patents

U.S. 7,230,766B2	Optical Combiner Designs and Head Mounted Displays
U.S. 7,196,849	Apparatus and methods for illuminating optical surfaces (co-inventor)
U.S. 6,612,693	Panoramic reverse Galilean telescope optics for an underwater diving mask (co-inventor.)
U.S. 5,953,114	Method of determining measurement-point position data and device for measuring the magnification of an optical beam path. (co-inventor)
U.S. 5, 867,309	Stereomicroscope (co-inventor)
U.S. 5, 841,149	Method of Determining the Distance of a Feature of an Object from a Microscope, and a Device for Carrying Out the Method. (co-inventor)
DE 196 21 195.6	Verfahren und Vorrichtung zur Richtungsbestimmung zu einem Object. (co-inventor)
DE 196 21 196.4	Optischer Sensor zum Verfolgen einer Zielmarke. (co-inventor)
EP 0 801 760 B1	Method of Determining the Distance between a Feature on an Object and a Surgical Microscope and a Device for Carrying out the Method. (co-inventor)
U.S. 6,043,890	Arrangement for Determining the Position of a Surgical Microscope.

Publications

"Slope error tolerances for optical surfaces," SPIE Technical Digest TD04-04, (Invited paper).

"Using Global Synthesis to Find Tolerance-Insensitive Design Forms," Proc. SPIE 6432, 63420M1-63420M11 (2006).

"Design of an advanced helmet mounted display (AHMD)," Proc. SPIE 5801, 304-315, (2005).

"Using Nodal Aberration Theory for Optical Design," Invited paper, SPIE Annual Meeting PM148 (2004).

"How to Talk to an Optical Design Consultant," OSA Annual Meeting, Long Beach, CA, (2001).

"Design of a wide-field, unity magnification dive mask," Proc. SPIE 5962, (2005).

"Neue Entwicklungen und zukunfftige Trends in der Optikdesignsoftware," German Optical Society meeting, Gottingen, (June 2001).

"Techniques and Tools for Obtaining Symmetrical Performance from Tilted-Component Systems," Optical Engineering 39,7, 1776-1787 (2000).

"Integrated Micro-Optical Systems Fabricated by Replication Technology," (with M. Gale, M. Rossi, M. Scheidt, and L. Stauffer), Presented at IO DC Conference, Proc. SPIE 3482, (1998).

"Interferometric Measurement of Group and Phase Refractive Index," (with M. Hopler), Applied Optics 30, 7, 735, (1991).

"Optical Lenses," The Handbook of Microwave and Optical Components, Ch. 3, (1989).

"Optical Performance of Holographic Kinoforms," (with D. Buralli and G. Morris), Applied Optics 28, 5, 976, (1989).

“Some Fundamental Limitations of Achromatic Holographic Systems,” (with D. Buralli), Journal of the Optical Society of America 6, 1863, (1989).

“The Y-Y Diagram for Radial Gradient Systems,” (with M. Harrigan and R. Loce), Applied Optics 27, 3, 452, (1988).

“Application of the Y-Y Diagram to GRIN Rod Design,” (with M. Harrigan and R. Loce), Applied Optics 27, 3, 459, (1988).

“Conversion of Group Refractive Index to Phase Refractive Index,” (with M. Hopler), Journal of the Optical Society of America 5, 10, 1595, (1988).

“Practical Tilted Mirror Systems,” Proc. SPIE 679, 12, (1986).

“Vector Aberration Theory and the Design of Off-Axis Systems,” Proc. SPIE 554, 76, (1985).

“Aberrations of Optical Systems with Large Tilts and Decentrations,” Proc. SPIE 399, 272, (1983).

“Fringe Shifts in Multiple Beam Fizeau Interferometry,” Journal of the Optical Society of America, 72, 638, (1982).

Professional Societies

- Member Optical Society of America
- Member Society of Photo-Optical Instrumentation Engineers
- Member German Society for Applied Optics
- Member American Society for Refractive and Cataract Surgery