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Mark A. Kahan

Professional Experience

2010-Present	Chief Engineer of Electro-Optical Systems, Synopsys
1998-2010	Director of Electro-Optical Systems Engineering & East Coast Office; Chief Electro-Optical System Engineer, Optical Research Associates
1985-1998	Director of Electro-Optical Systems Engineering & Director of East Coast Office, Optical Research Associates; Facility Security Officer
1984-1985	Manager, Optical Systems Engineering, Itek Optical Systems, Litton Industries
1976-1983	Manager, Environmental Effects, Itek Corporation
1972-1976	Manager, Thermo-Optical Engineering Section, Itek Corporation
1968-1972	Manager, Thermo-Optical Engineering Group, Itek Corporation
1965-1968	Senior Engineer, Itek Corporation

Education

1970-1991	Graduate Courses at Northeastern University in Advanced Optics and Management. Certificate-Optical Design/UCLA
1966	M.S. Degree in Structural Mechanics, Northeastern University
1966	Certificate, Institute of Optics, University of Rochester, Summer Session
1964	B.A. Degree in Experimental Psychology, Tufts University
1964	B.S. Degree in Structural Analysis, Tufts University

Mr. Kahan is expert in optical systems engineering, error budgeting, the interdisciplinary modeling of environmental effects on and the cost of optical systems, materials/stability, radiative loads/shielding and aircraft windows/boundary layers. This has included detailed opto-mechanical and thermo-optical engineering of both very small and very large optical systems where tolerances down to pico-meters has been critical, and in environments from cryo to HEL. Mr. Kahan has served in roles that have included full performance accountability, research, computer code development, and technology assessments from the UV to the IR in environments from underwater to outer space.

He has served as the Lead Optical/Systems Engineer or as Chief Engineer from design through manufacture for nearly a dozen multi-million dollar programs of high optical engineering content. This has included contracted consulting to various companies and countries. As part of the Strategic Defense Initiative (SDI) he has helped configure architectures and designs of survivable sensors from the boost phase through terminal defense. This work has included successful roles as Program Manager/Chief Engineer including responsibility for layout, optical engineering, lens design, and coating, through to contamination control & off-axis rejection. Beyond oversight & overall responsibility, Mr. Kahan personally ran-the-numbers for a great many critical thermal and structural analyses, and he directly worked issues tying to the fielding of stable, tightly packaged, optical hardware where real-world material factors were key. Solar outage, laser threats, scanning methods, spectral agility, ensquared energy/resolution, false alarm rate, signal/noise ratio and cross talk were just some of the issues or performance trade-off criteria. He was Chief Engineer of the cryogenic IR TEAL RUBY optical system. He was Lead Systems Engineer for a large classified multi-mode system and on adaptive optics-wavefront sensors. His functional responsibilities on optics extend from conceptual design through flight hardware and include technical

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support to new business development, the setting of optical/design requirements, contract end item specifications, interface control drawings, design reviews, and support to test plans and procedures and selected breadboards. His project commitments have been extensive and include successful lead engineering roles on wide angle lenses, star sensors, long range oblique reconnaissance cameras, various tracking/zoom/x-ray telescopes, submarine periscopes, environmental effects on UAV Optics, retroreflector arrays such as ALSEP/LAGEOS, Apollo, Skylab, Viking, HEL systems, E-O/image processing, remote sensing, LIDAR's, laser diagnostics, and laser communication. He also generated algorithms for preliminary estimates of weight, power, and cost of optical hardware.

Mr. Kahan has served as an Advisor to the Hubble Space Telescope Board of Investigation, functioning as Optics Lead for the IRT Code-Q activity on HST Redesign Effort, and has continued his IRT support of large optical systems in several arenas. For NASA this has included Lead Optical IRT Roles on Chandra/AXAF (including special work on Optical-Bench bakeout and Door/Dust-Cover stiction/creep), through Spitzer/SIRTF (with special Tiger Team roles in coating delamination studies and particulate impacts), and on through selected JWST Independent Cost/Schedule assessments/PIT-PVT-Reviews, through TRIP Assessments for CON-X & LISA, as well as IRT Assessments for KI, LBTI, SIM, and TPF as part of the Navigator Mission (including an assessment of the stability of the optical hardware). He was also a Member of the WISE Telescope's Integrated Independent Assessment Review Board (which become the WISE Standing Review Board) and the Independent Optical Systems Engineering Lead on the WISE Image Quality Assessment Team, and he recently completed a Table-Top Review of the Opto-Mechanics under development for the Orbiting Carbon Observatory (OCO), is on the SRB for IRIS, and is a Lead Optical Advisor on ATLAS, OSIRIS-Rex, and Ascends. Most of these later NASA activities currently continue, as do Mr. Kahan's classified efforts. In this work he has helped, and is helping, direct the efforts of numerous Companies and Departments while providing a high degree of added value. As Itek's Manager of Optical Systems Engineering he directed an interdisciplinary department of chief optical engineers and systems engineers with full technical and managerial cognizance. He structured IR&D efforts, recruited/developed personnel and was involved in software development (including preliminary plans for an artificial intelligence system).

Awards/Honors

- 2010 NASA Commendation for Work on the Wide-field Infrared Survey Explorer (WISE)
- 2010 Receipt of the Steve Benton Memorial Award from the New England Section of the Optical Society of America for Sustained and Substantial Contribution to the Optics Community in New England
- 2006 New England Board of Higher Education Commendation for Work with Educators (Project Photon)
- 2005 NASA Commendation for Work on Spitzer
- 2003 NASA Commendations for Work on Both LISA and CON-X
- 1995 NASA Commendations for Work on Both HST and Chandra
- 1995 NASA Public Service JPL Group Achievement Award
- 1987 Fellow, SPIE - The International Society for Optical Engineering
- 1978 Itek Engineer of the Year Award
- 1977 NASA Commendation for Viking
- 1976 NASA Commendation for LAGEOS
- 1976 Commendations for Outstanding Public Service, Town Of Arlington, MA

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Clearances

TS, SBI (Polygraphed, Also prior-Q), and others

Patents

Three pending: HEL Optics Athermalization, Novel Focus Control Method, Image Processing Concept

Publications

"An Optical Believe It Or Not: Key Lessons Learned," SPIE International Symposium on Optical Engineering + Applications, 2008.

"From the Navy to the three little pigs: universal optical systems engineering take-aways to help us all," SPIE Optics + Photonics Conference, 2008.

"Design Strength of Optical Glass," M. Kahan, K.B. Doyle *SPIE*, Vol. 5178, August 2003.

"Automated Multidisciplinary Optimization of a Space-Based Telescope," ICES , (with Cullimore, et. Al, (2002).

"Budgeting, or How to Win at Stellafane," Amateur Telescope Makers Tent Talk, Stellafane Vt., (1966).

"Chandra's ACIS Door-Failure Investigation: Technical Aspects and Mitigation Procedures," Proc. SPIE 4198, 8, (November 2000).

"Cost Modeling of Large Spaceborne Optical Systems," Proc. SPIE 3356, 1204, (1998).

"Demo the Optics of a Swimming Mask," OE Magazine, Education Beat, 35, (March 2002).

"Design Strength of Optical Glass," Proc. SPIE 5178, (with K. Doyle) (August 2003).

"First-order Thermo-optical and Optomechanical Wavefront Error Analysis," (with N. W. Wallace) Presented at SPIE Lens and Optomechanical Modeling and Design Conference, (1997).

"Integrated Analysis of Thermal/Structural/Optical Systems," ICES (with Cullimore, et. Al), (2002).

"Introduction to Electro-Optical Systems Engineering," Proc. SPIE, Tufts Course U7, (1986).

"Optical Athermalization," OSA, (1970).

"Optical Materials," E-O/Laser, (1978).

"Optical Modeling and Performance Predictions I, " Chair, Proc. SPIE 5178 (August 2003).

"Optical Modeling and Performance Predictions II, "Chair, Proc. SPIE 6675, (August 2007).

"Optical Modeling and Performance Predictions III," Chair, Proc. SPIE, (August 2009).

"An Optical Believe It Or Not: Key Lessons Learned I," Chair Proc. SPIE 7071, (August 2008).

"An Optical Believe It Or Not: Key Lessons Learned II," Chair, Proc. SPIE, (August 2010).

"Optical Testing and Verification on HST," Optics & Photonics News, p 28, (November 1993).

"Optics and Photonics for Non-Optical Engineers," SPIE Short Course, SPIE Photonics East (October 2003).

"Optics in Adverse Environments," Editor, Proc. SPIE Vol. 216, (1980).

"Optics in a Hostile Environment," E-O/Laser, (1977).

"Opto-Mechanical Northeast," Chair, Proc. SPIE 4198, (November 2000).

"Structural and Environmental Effects on Aerospace Optics," Masters Thesis, Northeastern University, Boston, Mass., (1966).

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“Teal Ruby-Design, Manufacture, and Test,” (with W. Barnes, J. Pepi, and R. Zielinski), Proc. SPIE 216, p 160, (1980).

“Thermo-Optical Engineering, Methods and Applications,” JOSA A 2, 13, p. 94, (1985).

“Introduction to Optics and Photonics for the Non-Optical Engineer,” Video Series and Lecturer for SPIE: 2000 and on.

Professional Societies:

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| Fellow, SPIE | The International Society for Optical Engineering (& Most Sub-Groups) |
| Member, OSA | Optical Society of America |
| Member | Executive Council of New England Section, OSA; Developer/Chair of Lecture Kit/Modules |
| Life Member | American/Boston Society of Civil Engineers, Structural and Engineering |