



# CONVERGENCE



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*Newsletter of the CENTER FOR OPTICS MANUFACTURING*



## *Harvey M. Pollicove – In Memoriam* 1944 - 2004

Harvey Pollicove, co-founder and Director of the Center for Optics Manufacturing (COM) at the University of Rochester (UR) passed away on Sunday, January 25, 2004 in Rochester, NY. He will be greatly missed by the Center staff and the optics industry community.

Dr. Robert McCrory, Director of the University's Laboratory for Laser Energetics, shared the sad news with the UR community: *"Harvey did an outstanding job for the University, and his energy, vitality and dedication will be missed. ... COM had been his focus and his life's work since he retired from Kodak, and the University has been a beneficiary of his dedication."*

Harvey's initiation in optics began at, and spanned, 28 years at Eastman Kodak Company in Rochester. He spent the majority of his career in optics manufacturing engineering. In the 1970's, Harvey led the Kodak manufacturing team that developed and implemented high-volume production processes for the first mass-market molded plastic aspheric camera lens. In the 1980's, he lead the first mass-produced molded glass aspheric camera lens system for Kodak's Disc camera. He held management positions in optics manufacturing, production engineering, and technical market sales. In 1990, Harvey retired from Kodak to join the University of Rochester and establish COM with Duncan Moore, then Director of The Institute of Optics.

*"Harvey was one of those people who made a difference. Through his leadership, an artisan-based industry that was struggling in the 1980's was transformed into a thriving high-tech industry,"* said Duncan Moore, co-founder of COM and current CEO of the Infotonics Technology Center in Canandaigua, NY.

*"I always think of Harvey as one of the first champions of research and development collaboration. He had a unique mind and ability to bring the government, industry and universities together. He was just a very special person,"* said Richard Jarman, Director of Technology Partnerships at Eastman Kodak.

Don Golini, President of QED Technologies in Rochester, said that Pollicove spent the last 15 years working for change in the optics industry. *"He had a vision that he stuck to of the way things ought to be done, and he saw that the industry needed to change the way it did business,"* Golini said. *"His fundamental ideas are now standard technologies. Harvey was a selfless guy who wanted to see bigger things happen than just his own success."*

Harvey chaired several national and international optics professional society conferences on manufacturing, the latest being the SPIE-APOMA sponsored *Optifab* conference that was held in Rochester in May 2003. He authored numerous papers, including several articles for *Photonics Spectra*, and contributed to several books on

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CENTER FOR OPTICS MANUFACTURING

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optical manufacturing technology. He served on the APOMA Executive Committee, and as an expert on the Ballistic Missile Defense Organization's Technical Applications Program. Harvey was an Honorary Member of both the Rochester Section of the Optical Society of America and the Hong Kong Photographic and Optics Manufacturers Association. He was active in U.S. and International optics standards, and both the OEOSC (Optics and Electro-Optics Standards Council) and the ASME (American Society of Mechanical Engineers) Y14.18 optical standards committees. He helped and advised numerous optics companies during his tenure at COM, and was recently appointed to the Edmund Industrial Optics Board of Directors. Harvey and COM technology developments won the 1992 and 2000 Department of Defense *Manufacturing Technology Achievement Awards*. The Center's industry partners won the *Photonics Spectra Circle of Excellence Award* in 1993 (Rank Pneumo) and 1999/2001 (QED Technologies). In 2001, the Center was a co-recipient of an *R&D 100 Award* with QED Technologies for the development of MRF technology.

Harvey was always a strong proponent of education. He was a proud member of the first Optics Technology class at Monroe Community College during his initial apprenticeship at Eastman Kodak, and subsequently continued his education and attained his degree at the University of Rochester (BS, 1973). During his tenure at the Center, he encouraged and supported both undergraduate and graduate students in various disciplines.

John Schoen of COM remarked: *"I am fortunate to have worked with and known Harvey for many years, first at Kodak and most recently at COM. Many of us in the optics industry have stories and experiences to share about this man. You may have been a younger associate feeling his determination for your continuing education; an observer of his ability and fortitude in leveraging support; survived the days, nights and weekends of J-218 and J-149 camera lenses; read the original APOMA newsletters published from his home; saw his dream, vision and evolution of COM (especially MRF); or experienced his personal side on such topics as dinner menu protocols, air travel techniques or the best pig roast in town. I know I speak for many of us when I say that we have lost a friend, a colleague and a mentor. All of us at COM will miss Harvey's presence, impact, determination and leadership."*

Harvey was posthumously awarded the *Distinction in Photonics Award* from *Photonics Spectra* on January 26, 2004 at Photonics West in San Jose, CA. The award is given to an individual whose service to the industry over the years has contributed to its growth and prosperity. His acceptance speech was read at the award ceremony by publisher Wendy Laurin (*Photonics Spectra*) and accepted by long-time friend Walter Czajkowski (Edmund Industrial Optics); and later that week by Don Golini at Harvey's memorial service at the UR's Interfaith Chapel. A portion of it read:

*"Over my 40 years in optics, two of the most important things that I have learned are: no matter what the circumstance – there is always something you can learn. Even more important was: always work with people smarter than you are.*

*In 1964, I started at Kodak as a grinder. I was told that if I did well, I might get to be a polisher, a coveted position in the shop, and from there maybe I could be a "master optician" someday.*

*But within a year, I learned that I was never going to make it into the "optics artisan" hall of fame. This reality became apparent as I sat next to a very experienced artisan in the grinding pits. One day, as we were both grinding away, my optic caught a dry spot on the wheel and went crashing into the grinding tub wall. With that, Jack (Driscoll) looked over toward me and said, "Harvey, you'd better go back to school, because you ain't never going to be a worker."*

*Like I said, it doesn't matter the circumstance, there is always something you can learn. The second thesis was also proved true, Jack was smarter than I was in judging my ability to become an optics artisan.*

*So, one of the many things that I am indebted to Kodak for - I applied for the Kodak Optics Tech program, was accepted, and went back to school at Kodak's expense. I eventually became an engineer at Kodak. Another reason that I am very thankful, I was given incredible leeway and opportunity, was exposed to an astonishing array of opportunities, and was fortunate enough to meet my wife.*

*I stayed on the manufacturing side and eventually led the manufacturing teams that created the first hi-volume manufacturing processes for both plastic aspheric optics and the first glass molded aspheric optics. We molded over 200 million optics in both plastic and glass – in 3 years. From there, I went into management.*

*Suffice it to say that in the 28 years I spent at Kodak I was very lucky and learned a lot from a lot of very smart people. I was also given the opportunity to become very familiar with the industry, especially the Far East, and I was given a lot of leeway in dealing with the outside – that was the beginning of the idea of COM.*

*I have a lot of thank you's to dole out as a result of all the great things that I got to do during my career. I'll save them for personal conversations, except for two.*

*One especially significant event in my Kodak career was the time that I worked with Walt Czajkowski – he was working on computer controlled optics manufacturing. It was an extremist concept at the time, and I used to call his lab “Wally World” - out of it came all of the initial COM concepts for deterministic grinding.*

*It wasn't too long after I retired from Kodak, to go to UR and start the Center for Optics Manufacturing, that I met another incredible talent – the guy that would eventually take one of the most far fetched ideas ever conceived in optics polishing and make it a shop floor reality. That, of course, is Don Golini.*

*So, as promised, I will save most of my thank you's for later personal conversations – with the exception of thanking all of you in the optics industry for making this a great place to work and enjoy.”*

Harvey is survived by his wife Catherine (Kit) and daughters Carolyn (Edmund) Russell and Sarah. Contributions in his memory may be directed to: The Harvey M. Pollicove Memorial Fund in c/o The Rochester Area Community Foundation, 500 East Ave., 14607 or to St. John's Home Foundation, 150 Highland Ave., Rochester, NY 14620.

John Schoen, COM's Engineering Manager, has been appointed Acting Director while the University conducts a search for a new director. John can be reached at: Tel: 585-275-8296 Email: schoen@lle.rochester.edu



### **School Career Awareness Presentations Grow with the *Optics Suitcase***

*(Written by Annette Sansone and Steve Jacobs)*



*Optics Suitcase presentation by UR Graduate student, Matt Bolcar on February 27, 2004*

Educational outreach in the optical sciences has definitely taken off! There have been several conferences on how to reach the young children of today to become the engineers and scientists of tomorrow. In October we presented a paper on the *Optics Suitcase* at the international conference on Education and Training in Optics and Photonics in Tucson. It was very well received and resulted in many inquiries.

The *Optics Suitcase* has become a hit as an aid for teaching students the importance of the sciences. Thanks to multiple educational grants from the Optical Society of America (OSA) and annual funding from the OSA Rochester Section, the *Suitcase* has been delivered to 54 organizations within the United States and around the world. [Just this week a Suitcase request came in from the OSA Student Chapter at Universidad del Valle, Colombia.] In February, we received an additional \$1,000 from the Rochester Section and a \$1,000 activity grant from OSA to cover supplies and shipping costs.

We thank Wendy Gilpin of the Electro-Optics Center at Penn State University, who provided \$1000 to the Progressive Workshop in Kittanning, PA, for their labor in manufacturing all of our “color in white light” theme packets.

Locally, we have had many requests for the theme packets and *Optics Suitcase* demonstrations. The Undergraduate Student Chapter of OSA, in collaboration with The Institute of Optics graduate students, have given and are sched-

uled to give 6 presentations coming up in March. Employees at the University of Rochester, Kodak, and other local industries have asked to do demonstrations for their local schools. It will be a busy spring.

Due to the high demand for the *Optics Suitcase* in Southern California, we were asked by Donn Silberman from The Optics Institute of Southern California for permission to manufacture and distribute the *Suitcase* and theme packets in his region. Donn is a dynamic advocate for educational outreach in his community and has done a great job teaching students the importance of optics through the *Optics Suitcase*.

For further information on the *Optics Suitcase*, please check out our website <http://www.opticsexcellence.org/Programs/EduOutreach/ORoverview.htm> or contact Annette Sansone at the Center for Optics Manufacturing at (585) 275-1093 or e-mail [acom@lle.rochester.edu](mailto:acom@lle.rochester.edu).



### Extended Depth of Field with Logarithmic Aspheres

Wanli Chi and Nicholas George  
ngeorge@troi.cc.rochester.edu  
University of Rochester, Institute of Optics

The depth of field and resolution are two important characteristics of an imaging system. It is known that the depth of field of an imaging lens is inversely proportional to the aperture of the lens for pixel size limited imaging and inversely proportional to the square of the aperture size for diffraction-limited imaging. So decreasing the aperture is often not a good solution to increase the depth of field because this will sacrifice both resolution and light collecting capability of the lens. In this communication we describe a new imaging system that combines a lens design and image processing to extend the depth of field without closing down the aperture. The setup of the system is shown in Fig. 1. The imaging lens in the system includes the idealized perfect lens and a phase plate called a logarithmic asphere [1-3]. The combined lens and phase plate form a multi-focal lens system, i.e., the focal length of this combination is different for different portions of the lens. So at any distance, there exists a portion of lens that will form a sharp picture on the CCD detector; also the remaining portion of lens contributes to blur. The careful design of the controlled aberration of the phase plate will make the total impulse response or blur function similar over a substantial object range. The digital processing of the image formed on CCD has the capability to correct blurs by both phase plate and defocus using a single impulse response, thus a sharp picture is obtained over an extended object range. The fabrication and testing of these exotic lenses has been carried out successfully at the Center for Optics Manufacturing of the University of Rochester and the Institute of Optics.

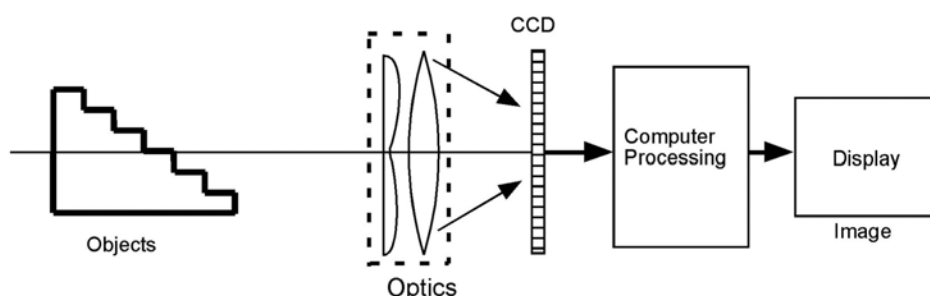


Fig. 1. The setup of the computational imaging system to extend the depth of field.

There are three types of logarithmic aspheres or phase plates described in the literature [2, 3], all are circularly symmetric. Without going into the details of logarithmic phase plate theory and design, we plot here one example of a logarithmic phase plate surface in Fig. 2. The phase plate is made of BK7 glass. It is circularly symmetric with a radius of 8mm and a maximum deviation of about from the flat surface. The other side of the phase plate is flat. The center thickness of the plate is 2.8mm.

The phase plate was fabricated at COM using Deterministic Microgrinding on the Optipro SX50, and the Magneto-Rheological Finishing machine Q22Y [4, 5]. Starting with a flat plate of BK-7 glass that is pitch polished, we found that it took only about 30 minutes to generate a surface that is accurate to maximum surface error. Further reduction of this fabrication error is quite possible for the machine capability, although it is not necessary for this application.

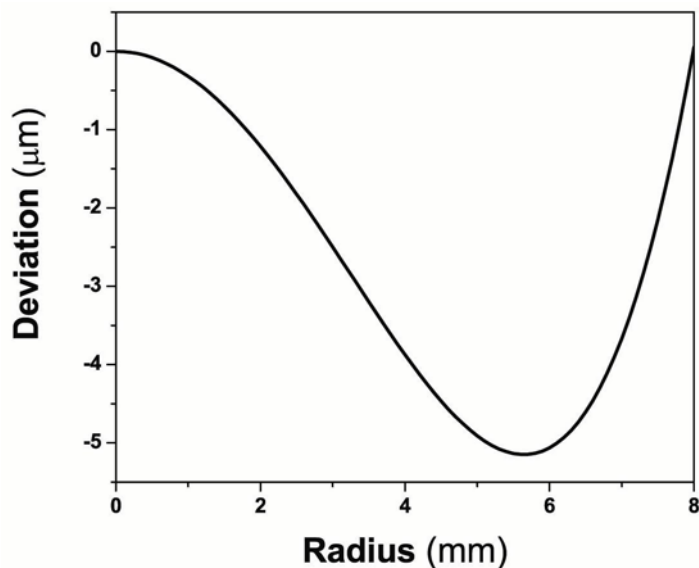


Fig. 2. The surface shape of the logarithmic asphere.

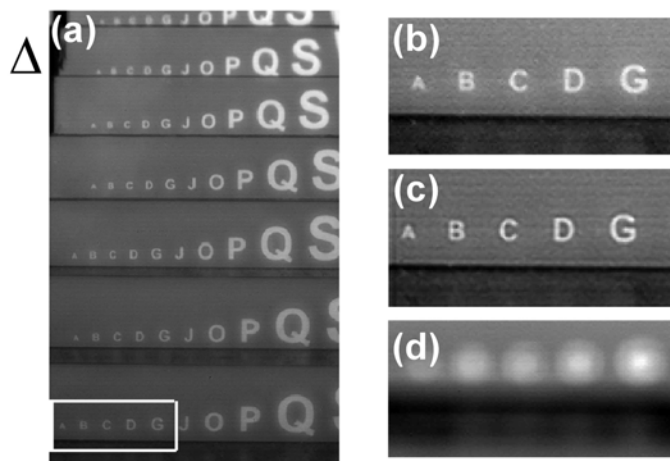



Fig. 3. The experimental results using stair object (See text for explanation).

The setup of experiment is shown in Fig. 1. The lens in the setup is a Nikon 60mm lens. The CCD has a pixel size of square. The object is a staircase made of wood. A series of alphabet letters of varying size are placed on each step riser. Figure 3 shows imaging results [6]. The step denoted with  $\Delta$  has a distance of 950mm to the lens. This distance is set as the best focus position of the Nikon lens. The steps are 50mm each and so the closest step is at 700mm. Figure 3(a) shows the recovery of blurred image on CCD by linear Wiener-Helstrom inverse filter. A small section of Fig. 3(a) is magnified and shown in Fig. 3(b). We see that excellent recovery is obtained using an image-plane form of the Wiener-Helstrom filter. Even better contrast and less ringing are obtained using maximum entropy processing shown in Fig. 3(c)[3]. For comparison purposes to conventional imaging, in Fig. 3(d), we show the image that was obtained using the high quality 60mm Nikon lens for the same inset portion of the object. The depth-of-field is increased about tenfold. Impressively, too, the impulse response is theoretically diffraction limited.

This research was supported by the Army Research Office.

**References:**

1. W Chi and N George, "Electronic imaging using a logarithmic asphere," *Opt. Lett.* **26**, 875-877 (2001).
2. N George and W Chi, "Extended depth of field using the logarithmic asphere," *J. Opt. A* **5**, S157-163 (2003).
3. W Chi and N George, "Computational imaging with the logarithmic asphere: theory," *J. Opt. Soc. Am. A* **20**, 2260-2273 (2003).
4. QED Technology LLC, <http://qedmrf.com/>
5. E Fess, "MRF polishing of microground surfaces, part II - Magnetorheological finishing," *Newsletter of the Center for Optics Manufacturing* **10**, no.3 (2002).
6. W Chi and N George, "Extended depth of field with the logarithmic asphere," *OPN optics* in 2002, 46 (2002).



**Welcome New APOMA Members!!**

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*Oliver Meissner*  
 Dublin, CA 94568  
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 FX: (925) 833-1759

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 San Jose, CA 95134  
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**...JOB POSTINGS...JOB POSTINGS...JOB POSTINGS...**



Director  
Center for Optics Manufacturing  
Laboratory for Laser Energetics  
University of Rochester

The University of Rochester invites applications for the position of Director of the Center for Optics Manufacturing (COM). The mission of the COM is to develop advanced manufacturing technology, implement technology transfer, and promote and establish training and education to benefit the domestic optics industry. The principal objective is to research and introduce innovative technology and novel techniques that increase the competitiveness of the optics manufacturing base. COM is designed to promote collaborative university-industry research in areas of unique potential for translation and commercialization to industry. Research programs are carried out in a close association among industry, the faculty and students, utilizing unique university facilities and instrumentation.

The Director is responsible for all aspects of the Center's operation, including management of staff and facilities, contractual reporting, industry participation and establishment of industrial collaboration. The Director is expected to foster optics industry support through organizations such as the American Precision Optics Manufacturers Association (APOMA) and to develop a continuing portfolio of sponsored program research that is well coupled to the academic mission of the University and its faculty. The Director of COM will report directly to the Director of the Laboratory of Laser Energetics.

A critical aspect of the position is the continued creation, addition and strengthening of linkages to DoD program offices and industry prime contractors, and the establishment of collaborative programs that satisfy DoD needs and provide for innovative research opportunities for faculty and students.

We are particularly interested in candidates with a proven track record and relevant experience in optics manufacturing technologies, industry partner connections, management of sponsored research and knowledge of DoD optical systems. Candidates will need to have the ability to establish positive relationships with industrial corporations, University faculty and scientists, and members of DoD programs involving both civilian and military leaders. **US citizenship is required.**

Further details on the University of Rochester can be found at [www.rochester.edu](http://www.rochester.edu), and the Center for Optics Manufacturing at [www.opticsexcellence.org](http://www.opticsexcellence.org)

Candidates are requested to send resumes with all relevant information regarding experience, professional interests, salary expectations and a list of references to: Personnel Services Manager, LLE, 250 E. River Rd., Rochester, NY 14623; Fax: 585-275-5960; e-mail: [jobs@lle.rochester.edu](mailto:jobs@lle.rochester.edu). University of Rochester is an Equal Opportunity Employer.

**APOMA members please send your job postings to Annette Sansone  
at [acom@lle.rochester.edu](mailto:acom@lle.rochester.edu) or fax 585-275-7225**

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**...JOB POSTINGS...JOB POSTINGS...JOB POSTINGS...**

**Company:** FISBA OPTIK LLC  
Attention: John Nemechek  
3495 Winton Place, Bldg E-120  
Rochester, New York 14623  
Email: [jjn@fisbaoptik.com](mailto:jjn@fisbaoptik.com)

**Sales Engineer**

**Description**

Experienced sales engineer sought to help expand sales and support of Swiss made interferometers in North America. Candidate will travel to existing and prospective customers to demonstrate, install and support Fisba's phase-shifting interferometers in manufacturing and laboratory environments.

**Experience**

Applicants should have minimum of 8 years experience in the optics industry, with at least 4 years in sales. Strong communication, organizational and computer skills are required. AAS/BS in Optics or Physics or equivalent work experience.

**Send resume to address above.**

**Company:** ONYX Optics, Inc.  
Attention: Oliver Meissner  
6551 Sierra Lane  
Dublin, CA 94568  
Fax: 925-833-1759  
E-mail: [omeissner@onyxoptics.com](mailto:omeissner@onyxoptics.com)

**Polishing Specialist**

ONYX Optics, Inc., a growing and innovative crystal and glass component company, is adding to its optical manufacturing division. ONYX is the world leader in Adhesive-Free Bonding (AFB) and provides all types of bonded laser components, assemblies and other precision optical components. ONYX Optics, Inc. is looking for master opticians and polishing technicians for laser optics precision polishing. Familiarity and experience with both hard and soft crystalline materials as well as glass helpful. Work is primarily for flat optics with some cylindrical work. ONYX offers competitive salary, 401K and health benefits.

**Send resume to address above**

**Company:** PPGI  
Attn: Bill Brucker, Director, Human Resources  
181 Legrand Avenue  
Northvale, NJ 07647  
[bbrucker@ppgrpinc.com](mailto:bbrucker@ppgrpinc.com)  
Fax: 201-767-9644

**Optics Sales Manager**

Photonic Products Group, Inc. (PPGI), a leading producer of OEM Custom Optics, Systems and crystals has an immediate opening for an Optics Sales Manager with a unique combination of technical competence and professional sales skills. Ideal candidate will have experience in OEM customer development/qualification strategy, account management and ability to interact at all levels.

**Description:** This position, located and based in our corporate headquarters, will promote, sell and support optical components and subassemblies services, manage relationships with existing accounts, identify and bring in new custom optics business from new accounts, maximize face-to-face customer contact and assist in implementing marketing communication plans. The incumbent will also provide multi-level customer support including applications engineering, quotations, product presentations and on-site visits. Up to 50% travel required.

**Education:** Technical degrees, BS or higher in Optics, Physics with current knowledge of photonics, optics and optical coatings.

**Experience:** Minimum 5 years of high level sales and technical/engineering in custom optics or photonics industry. Proven ability to cultivate and develop new markets. Strong consultative customer sales and technical support skills essential. Must be proactive and possess strong account management, presentation and negotiation skills.

This is a challenging position with a unique opportunity for rewarding professional growth. We have a modern facility located in an attractive suburban environment. Our competitive benefits package includes health, dental, vision, life insurance, Company matched 401K and PPGI incentive plan. **Come join our team and grow.**

**Send resume to above address**

## 2004 INDUSTRY EVENTS

**CLEO 2004**, San Francisco, CA  
April 18-21, 2004

**Frontiers in Optics/Laser Science Conference**,  
Rochester, NY  
October 10-14, 2004

**Optifab 2005**, Rochester, NY  
May 2-5, 2005

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Our newsletter is also on the COM website!! Go to  
[www.opticsexcellence.org](http://www.opticsexcellence.org) and click on 'Newsletter'

## NEWSLETTER MAILING LIST UPDATE

*Please let us know of any address corrections,  
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fax 585-275-7225.*

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