award winner profile

part of a grand design

George Hunter, the 2003 A.E. Conrady Award recipient, set new standards in interferometry with the Model GH Interferometer.

By Erin M. Schadt

From a childhood interest in an Erector set to an industry-altering interferometer, George C. Hunter has always been fascinated by the way things work. This fascination has paid off throughout his career with innovative interferometer designs and most recently with an A.E. Conrady Award.

The Conrady Award recognizes exceptional contributions in design, construction, and testing of optical systems and instrumentation. Hunter was specifically honored for his contribution to the development of the Model GH Interferometer—an instrument that fundamentally changed how the interferometer is used. So how did this interest in engineering begin?

George Hunter (right) and Jeff Soule, Zygo's assistant production manager (left), along with two special systems built for their customers.

"My father, who worked in a steel mill, provided the stimulus from an early age to encourage me to study engineering," says Hunter. "I still remember my first Erector set, which I spent many hours with. In my preteen years I became interested in designing and building things myself, including model airplanes and boats. I had the good fortune to have some excellent teachers in high school who nurtured this interest in the technical fields. However, I never lost interest in doing things with my hands."

Hunter earned a BS in mechanical engineering at the Carnegie Institute of Technology (Pittsburgh, PA), and in just his second job after graduating, he was hired as an optomechanical engineer at Perkin-Elmer (Wilton, CT), where he first became involved with interferometry.

the birth of a machine

Hunter started with the fledgling Zygo Corp. (Middlefield, CT) in 1970. "When Zygo was started in 1970, the development of a commercial interferometer was not part of the business plan," says Hunter. "However, one of the three major programs in the initial plan was to design and build an advanced machine for polishing very accurate flat optical surfaces, which required an interferometer to measure the surface quality of the optics being made."

At that time, optical shops in need of an interferometer usually built their own. There were a few commercial systems available, but they were restrictive in aperture size and difficult to align, says Hunter, therefore making it difficult to obtain accurate results. "So, like most others, we built our own, which I designed, with the shortcomings mentioned," says Hunter.

In 1972, Zygo was contracted by a fused-silica manufacturer to build an instrument to measure the homogeneity of its material. The interferometer Zygo used for the job was a more compact version of the one it used in its own optical shop.

"Paul Forman, a founder and the president of Zygo, recognized that if we could make this interferometer easy to align and use, there was a significant market for the instrument," Hunter says. "I was tasked with designing a means to quickly, reliably, and accurately align the interferometer and acquire fringes from the optical surface being tested."

Forman credits Hunter for his significant contribution to the industry. "His design resulted in an instrument that met and exceeded all the criteria that were established for it at the outset," he says. "This instrument, shown for the first time at the OSA [Optical Society of America] annual meeting in San Francisco in 1972, changed forever the way optics were going to be tested."

The chief merit of this new interferometer was its ease of use,

Hunter profile *continued on page 36*

Aciu profile *continued from page 34*

an experienced team of real pros," says Aciu. "Our team members specialize in hardware, software, image processing, communications, and related fields. Without them such a complex and challenging design would not be possible."

Aciu is married and has two sons and two grandchildren. He likes to travel with his wife, and enjoys boating and skiing with his grandchildren, ages six and eight, and his sons. He's also an avid reader of history and philosophy, and acknowledges that he works even when he's relaxing.

As he accumulates awards, it's clear he could rest on his laurels, but "high-speed" might be a good description for the man as well as his work.

Hunter profile *continued from page 35*

making it possible for technicians to accurately measure optics in the fabrication shop instead of requiring engineers and a quality-control lab. This greatly improved productivity and quality.

"The GH Interferometer provided an affordable tool to the optical industry that was very easy, and foolproof, to use," says Hunter. "It made reliable interferometry available to the small optical shop. Instead of a curiosity, which was affordable only to larger companies, the interferometer became a production tool as common as the test plate."

To recognize Hunter's key role in the development of the company's new interferometer, Zygo decided to call it the Model GH Interferometer.

"The GH had a major impact on the optics industry—it was the manifestation of a new vision in interferometers," says Forman. "In addition, this was the right product at the right time; because of the increased use of lasers in that time frame, the need for more and higher quality optics was just emerging."

no one-hit wonder

The GH Interferometer isn't Hunter's only accomplishment, though. With six patents under his belt, he has kept busy at Zygo designing most of the accessories to Zygo's interferometer line.

He also "had the mechanical engineering responsibility for a novel aspheric generator that produced specular aspheric surfaces on glass substrates with a contour accuracy of 0.1 µm," says Hunter. "This machine remained the world's foremost generator of glass aspheres for nearly 20 years." In addition, Hunter designed Zygo's line of large-aperture interferometers, which have been crucial to large-aperture testing worldwide.

"In 1978 I invented a novel way to measure the radius of curvature of very long radius concave optical surfaces. This method is much more accurate than conventional sagittal techniques and can be performed in 1/50 the length of the radius being measured," he explains. As for interferometers, Hunter was key to the development of Zygo's Mark II series of interferometers, which incorporate his signature functionality, ease of use, and flexibility. This series was the basis for subsequent Zygo phase-measuring systems, which are still widely used. Hunter also designed Zygo's large plano polishing machines, known as continuous polishers. This innovation helped make Zygo a major manufacturer of large, high-accuracy flat optics.

"More recently, I have worked closely with major glass manufacturing companies to provide them with the interferometric metrology required to meet increasingly challenging homogeneity requirements," Hunter says. "My greatest satisfaction comes from devising new and unique solutions to the optical fabrication and metrology problems that are faced by Zygo and our customers."

Married with three children and three grandchildren, Hunter stays busy. And he certainly hasn't lost that love of working with his hands. "I enjoy playing golf," he says, "and my current avocation is building golf clubs."

ICO NEWS

ICO newsletter
July 2003, No. 56

- ICTP Winter College on Biophotonics, 10–21 February 2003: report
- Announcing ICO/ICTP Award 2003 to Róbert Szipöcs
- Report on the ICTP Meeting (Trieste, Italy, 20 February 2003): A new TSOSA, Advisory Group for Optics activities in developing regions
- Obituary: In memoriam Walter Lewis Hyde, 1919–2003
- Forthcoming events with ICO participation

Please visit **www.ico-optics.org** for a full version of the newsletter.

SPIE international headquarters

phone (1) 360-676-3290

fax (1) 360-647-1445

e-mail spie@spie.org
customer_service@spie.org

website www.spie.org

postal service
P.O. Box 10
Bellingham, WA 98227-0010, USA

shipping
SPIE International Headquarters, 1000 20th St.
Bellingham, WA 98225, USA

SPIE Europe
Karin Burger, Manager
karin@spieeurope.org
Phone: 44 7974 214542
Fax: 44 29 2040 4873

SPIE Russia
Edmund Akopov, Executive Director
12, Mokhovaja str. 119019 Moscow, Russia
Phone/fax: (095) 202-1079
e-mail: edmund.spierus@relcom.ru