

Lasers at American Optical and Laser Incorporated

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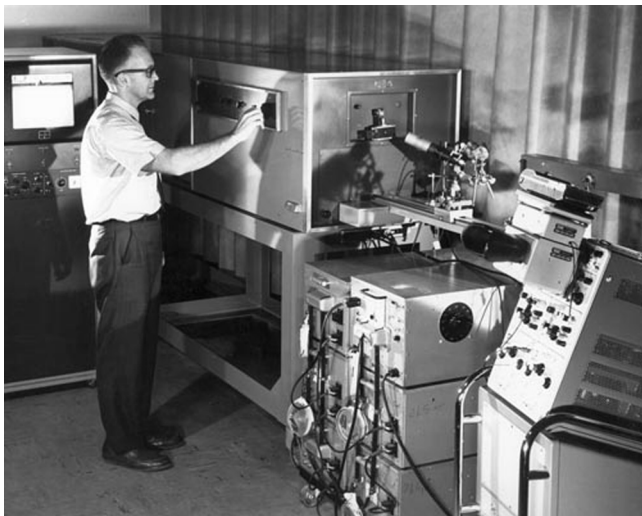
American Optical (AO) entered the laser business early through its interests in optical glass and optical fibers. Elias Snitzer, whom AO had hired to work on fiber optics, made the first glass laser in 1961 by doping glass with neodymium, drawing it into a long, thin rod and cladding the rod with lower-index glass to guide light along the rod by total internal reflection, just as in an optical fiber.

The author started at AO in 1962 as a technician working for the company's chief metallurgist, George Granitsis, who was investigating potential use of lasers for welding. They were in the same building in Southbridge, Massachusetts, as Eli Snitzer, so the author also was assigned the task of testing new laser glasses for Eli. Everyone was excited about lasers, and the author remembers AO putting out a press release touting that the company would become the IBM of the laser industry.

Those were fun days. Glass was easier to make in large rods than other solid-state lasers, so larger and larger powered lasers were made, such as the one Eli is working on in Fig. 1. When Shiner worked in Eli's laser lab, they had two big metal wastebaskets. One said "Eli" and one said "Bill." The flashlamps that pumped the glass lasers sometimes blew up, so when they charged the power supplies for them, they put the wastebaskets over their heads in case the lamp failed. When the lamps exploded, the glass would hit the metal wastebasket. These wastebaskets were also the first form of laser eye protection.

AO made the first Sun-powered laser, using a huge mirror to focus sunlight onto a neodymium-glass rod. AO produced the first laser capable of ranging off the Moon with a group from Harvard University, using a glass laser and an amplifier. The company also had a lot of early military contracts and for a time held the world's record for producing the most energy in a single laser pulse, 5000 J, which was classified at the time. The author's lab had glass lasers that put out 1500 to 3000 J per pulse, and they had to pump the rod with many times that energy, as the efficiency was about 2% wall plug. The resulting heat caused thermal expansion that sometimes blew up the glass rods. They also built the first large glass oscillator-amplifier systems for KMS Fusion and the Lawrence Livermore National Laboratory to use in the first laser fusion experiments back in the late 1960s.

The author also did some early medical laser applications work with Dr. Charles Koester, some of which in retrospect was rather weird. He worked with a doctor at the Delaware Veteran's Hospital who was working on a new procedure to stop ringing in the ear that was plaguing Vietnam veterans. The standard procedure was to drill a hole to the brain with the patient alert and knock out brain audio receivers until the ringing stopped. Many times more brain tissue was destroyed than required. The laser application was to map the cochlea of the inner ear with a fiber laser to knock out the receptors rather than to knock out the receivers in the brain. Monkeys were trained to respond to sound by pulling on a lever when they heard a sound at a certain frequency to avoid receiving a slight shock. This technique thus established a map of the threshold of sound as a function of frequency for the monkey. The side of the monkey's face was shaved, the diaphragm was folded back, and the fiber laser was inserted in the inner ear of the monkey. The procedure was to locate the fiber laser at a precise location and fire it to eliminate a receptor. In the cochlea the receptors are at a precise location as a function of



▲ Fig. 1. Elias Snitzer with glass laser. (Courtesy of the Snitzer family.)

enhance and protect the physical senses: animal groups from all over the country were calling, complaining about the photos showing the author with the poor monkey with a shaved head and distorted face.

AO later bought a small company called Laser Incorporated in Briarcliff Manor, New York, headed by Tom Polanyi, which had developed an industrial carbon dioxide laser. They moved the personnel to Framingham, Massachusetts, and consolidated it with AO's laser group. However, like most other large companies, AO found it hard to make enough money from lasers to generate a profit and decided to close the laser division. At that time in June of 1973 the author was application manager and Albert Battista was engineering manager in the AO Laser Division. The two of them teamed up and purchased the business from AO and renamed it Laser Inc. They did quite well and grew sales to several million dollars, making the company quite profitable. In 1980 they sold Laser Inc. to Coherent, and it became the most profitable division of Coherent for the next three years.

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frequency. After the procedure the monkey was tested to determine which receptor was eliminated. Many times as the diaphragm was removed to reach the inner ear, the seventh cranial nerve would be damaged, creating distortion of the monkey's face. The experiments went very well and the Veterans hospital called in the press. Photos were taken of the doctor, the monkey, the laser, and the author.

The author was very proud of his contribution to the project; the photos went out over the Associated Press wire. When he came back to AO he was called into the president's office, and the author thought he was going to be congratulated for his contribution. Instead, he almost got fired. The company made eyeglasses, and the company slogan was about products to