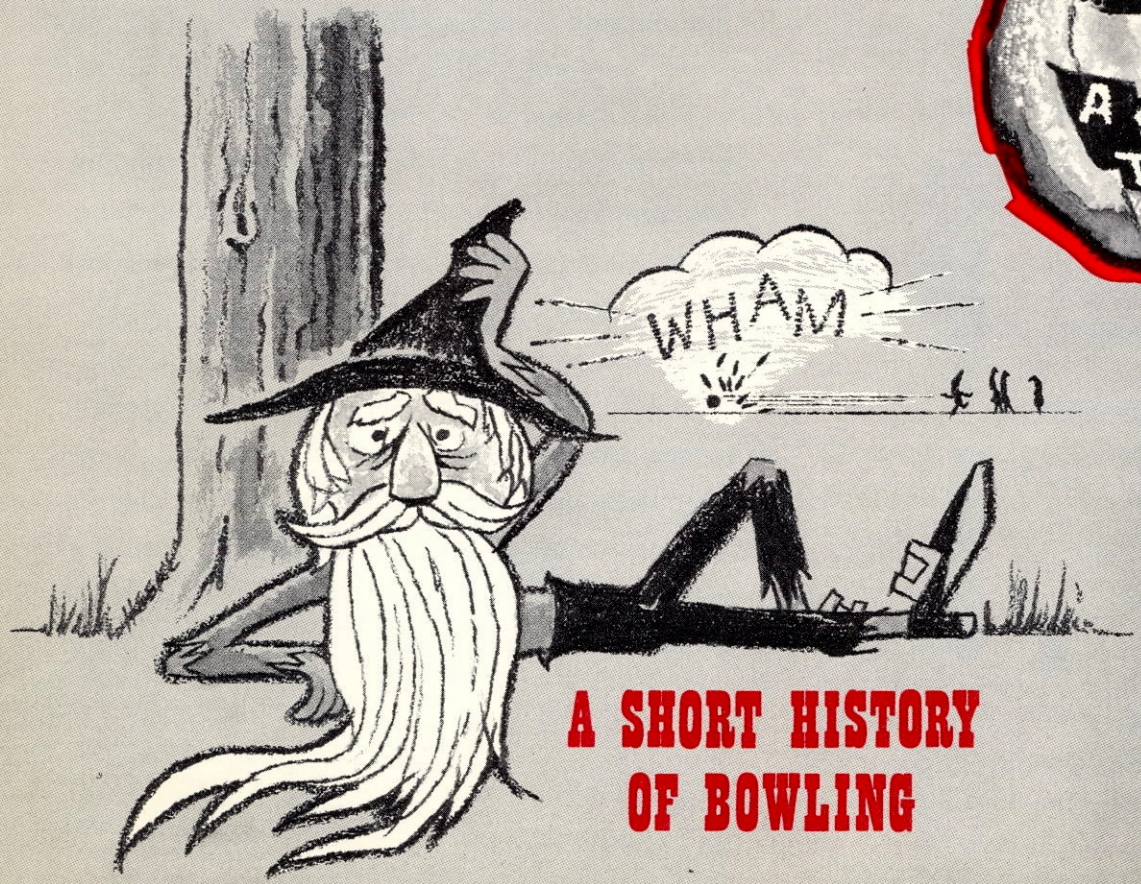
# AO NEWS

*For American Optical People*

## FIBER OPTICS ON THE . . . OUTSIDE LOOKING IN


## A SHORT HISTORY OF BOWLING

NUMBER 7/1967

# FIBER OPTICS

## ON THE OUTSIDE LOOKING IN

The fine strands of a spider's web are not as thin as the glass fibers in an American Optical Fiberscope! They aren't as durable either. A web made from AO glass fibers would probably be an improvement on even the most imaginative spider's handiwork. And AO's fibers would be capable of transmitting light, or an image, from one end of the web to the other, no matter how complex the design.

In the early sixties, LIFE magazine was calling Fiber Optics a "bright new science" and the WALL STREET JOURNAL was proposing all sorts of novel uses for the new image devices. Every thing from peering down a mole-burrow to locating previously inaccessible boiler leaks was featured in the lively articles. Even the "AO News" of October '61 mentioned an exciting new way to look into one of your own ears! There was a lot of excitement generated by the publicity, but the stories placed a strong emphasis on scientific tricks rather than the more practical potential of fiber optics. The public soon forgot about peering around corners and looking into gas tanks.

At American Optical, the science of fiber optics has really "come of age." Less than a year ago, a new AO fiber optics center was opened on the Southbridge grounds. It is part of AO space defense division headed by W. F. Peck, vice-president. This modern facility is literally a whole industry in miniature. Products utilizing the glass fiber principle go from drawing board to assembled units inside its 36,000 square feet. Security is a must within the structure because AO fibers constitute a major contribution to military defense. All activity takes place behind closed doors!

Fiber optics is relatively new as an industry. Most of the people involved have been working with the glass fibers since fiber optics moved from the laboratory to production at AO. They are all skilled artisans in their respective specialties.

In the beginning all of the fibers are "drawn" on machines designed especially for this purpose. This "drawing" process is a fusing or melting of solid optical glass to form a long hair-like fiber complete with a protective coating called cladding. The fibers are wound around large revolving drums in groups of 300 strands. The machines used for this process were conceived, designed and installed by American Optical Company engineers.

Immediately after drawing, the fibers are capable of transmitting light! If you were to pluck a small length from a drum and hold one end toward a source of light, a bright speck would be visible at the other end.

The principle of fiber optics is basically simple. It involves transmitting light or images around bends or along controlled paths. Light enters one end of a glass fiber, then travels down the fiber by bouncing from wall to wall until it shines out the opposite end.

After the fibers have been "drawn," they are transported to various areas of assembly. Sometimes large diameter fibers or "clad rods" are fused and drawn again to form multifibers. These perform an important function in the

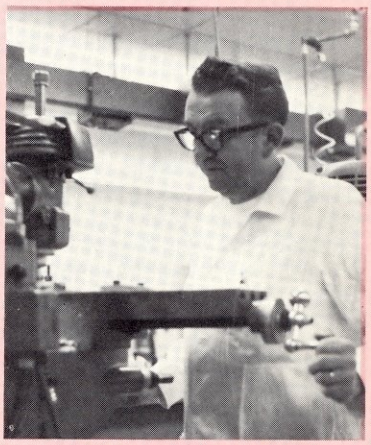
Doris Gobeille guides glass fibers in the drawing process.

Fiber Arrangement is checked by Rita Heroux.

Fiber Bundles are assembled by Annette Castrucci.

Terry Travinski and Claudia Monaco prepare fiber bundles for special products.

Quality Control is determined by Jeannette B. Baker.



Ed. Gregoire makes a delicate adjustment for the Fiber Optics Instrument Department.

The Human Anatomy is being probed.

familiar AO flexible fiberscopes. Thirty-six glass fibers fused together form a multifiber. Multifibers are actually the building blocks of a fiberscope.

When thousands of these fibers are arranged together in a uniform pattern, they can transmit an image.

Fibers are formed into either randomly or systematically arranged bundles. Random arrangement of fibers allows the transmission of light but not coherent images. Systematic arrangement produces fiber bundles capable of transmitting coherent images, even if the bundle is tied into a knot!

Fiber arrangement is often done by hand. It is a painstaking procedure and requires a great deal of dexterity. Women are especially adept at this type of work. AO's fiber optic assembly department employs mostly women for this delicate operation. Under the careful supervision of R. Duval, image conduits, fiberscopes and scanning devices take form.

An image conduit consists of thousands of clad fibers, all fused together to form a fiber bundle capable of transmitting an image. Image conduits can be bent into complex shapes by heating them over a gas flame. The individual fibers used are smaller in diameter than a human hair! Due to this factor, a conduit can be bent at sharp angles without significant loss of image transmission efficiency. Some image conduits contain up to 73,000 fiber elements!

Flexible fiberscopes contain uniformly aligned, "coherent" fiber bundles. They are fitted with suitable lenses at either end and are used to transmit images to and from hard-to-get-at places. AO has manufactured fiberscopes up to 12½ feet in length and 1¾ inches in diameter. Some fiberscopes contain more than 1,000,000 fiber elements. These instruments are designed by AO engineers like Bob Wayne and are built by AO instrument makers and technicians. Precision parts for them are made in the Fiber Optics Dept. Instrument Shop under the supervision of Chet Mackowiak.

Scanning devices utilize several incoherent bundles of fibers that are coupled to IBM sensors. In one application, the steady stream of light that each bundle transmits is broken when keypunched IBM cards are passed before them. Hence, a computer is able to "read" cards by means of fiber optics. AO know-how makes such design simplicity possible. Today, because of accumulated practical design and application experience, plus research and production capability, American Optical produces the most widely used sensing devices for sorters and collators, keypunch equipment, verifiers, printers and readers, or almost any other data processing equipment.

Quality Control is an important phase of the fiber optics operation. Hairsplitting is the quality controller's specialty. People like Doris Pinsonneault and Marie Bellerose seek out any minute flaws in a finished fiber optic product. Sometimes misalignment of a single fiber can mean a faulty instrument. However, fiber optics people are capable of a high degree of proficiency in their work. Seldom is a finished product scrapped.

Dr. Walter Siegmund, technical manager, William Nash, commercial manager, and Ken Wood, sales manager, are all aware that they are the leaders of a highly skilled, closely-knit team. They rely heavily upon the people of Fiber Optics. "Without them," says Bob Dowling, Jr., fiber optics engineer, "fiber optics would still be a laboratory phenomenon." Industry, defense, and especially medical science would suffer a great loss because the crucial question of "what goes on inside" would remain unanswered.

Lives have been saved through the use of Fiber Optics. The human anatomy is being probed in search of the causes of "killer diseases." Perhaps, someday, the glass fibers may reach into man's mind. It might be interesting to see a thought in a Fiberscope.