

# SCULPTING THE LIGHT FANTASTIC

They call themselves wizards, pioneers, sculptors, inventors. Their creations transform laser light into three-dimensional sculptures. With advances in laser technology, these artists are beginning to push the limits of light and space.

In the past, combining art and lasers usually meant creating holograms. Holographers have perfected the technique of producing three-dimensional objects so they appear to float in space. Discovering new holographic techniques and better emulsion processes enables artists to create unusual forms. The Art, Science, and Technology Institute in Washington, D.C. recently opened Holography World, a permanent exhibit dedicated to displaying state-of-the-art holograms.

The power of the laser as an art form is catching. Other artists curious about the interplay between light and space are replacing their brushes and paints with light beams, in hot pursuit of a three-dimensional sculpture suspended in space.

One of the pioneers in the field of laser sculpture, Rockne Krebs, lives in a studio in Washington, D.C. His home is filled with glass sculpture and pieces of his art. In the late 1960s, using a 0.5 mW HeNe laser from University Labs in Berkeley, Krebs began his exploration of laser as art form. "I was studying space and I started exploring space with lasers and searchlights," he says.

## LASER SKYWRITING

While a research fellow at MIT's Center for Advance Visual Studies in 1973, Krebs built a digital laser scan-

ning device with the help of a graduate student. The scanner was the first step in realizing his dream to draw on clouds. Because the scanner lacked sufficient power, Krebs was only able to project a simple image—his name—a short distance. With the increased power of today's lasers, Krebs hopes to complete the project on a large scale in the skies over in California.

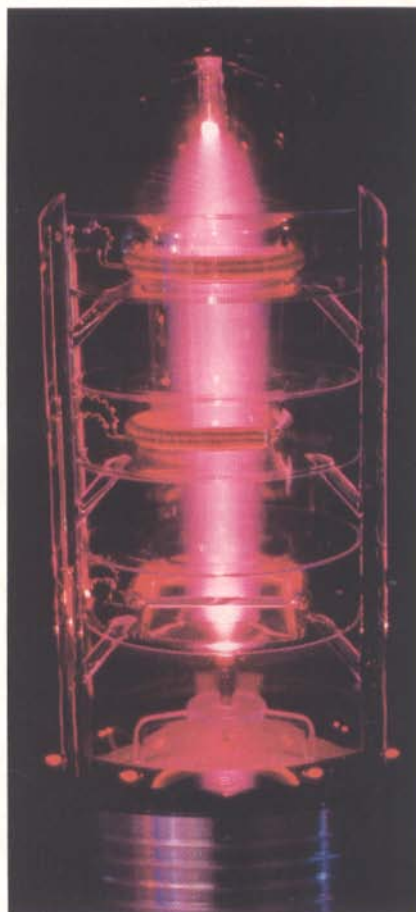
"All of the memory in the scanner was handwound. Today, I can use state-of-the-art equipment. Then it would have taken a year to produce enough memory for an image; today it only takes a few months," says Krebs.

He points out that laser technology has not arrived at its full potential for use as an art tool. "Until the cost is reduced and color selections increased, the laser won't be widely used," he notes.

During the 1970s and 1980s, Krebs worked on urban-scale laser sculptures that have appeared nationwide. These included the Kennedy Space Center, Baltimore's Inner Harbor, the Disneyland Hotel, and Johnstown, Pa.

For the Johnstown piece, which commemorated the great flood of 1889, Krebs collaborated with two other laser sculptors—Ron Alpert and Matthew Tanteri. Part of the piece entailed creating a 1000 ft. by 40 ft. undulating wave using two, 8-watt argon lasers. The combination of lasers and natural landscape often present new challenges to the artists.

The artists set up shop in a 100-year-old railroad building next to the Inclined Plane, a mountain on the outskirts of Johnstown. Minuscule vibrations knocked the beams off their mir-



"Shiva Lingam" created by Victor Sirwinski Davis.

BY SUSAN M. REISS

rors, causing oscillation. To combat the shake, they used cross lateral ties, pneumatics, and micrometer resolution position equipment.

"Fifteen years ago, the positioning equipment was not available to ensure a stable image over such a large area. The Johnstown sculpture wouldn't have been possible without construction of the mounts. Now they're off the shelf," says Ron Alpert, who lives

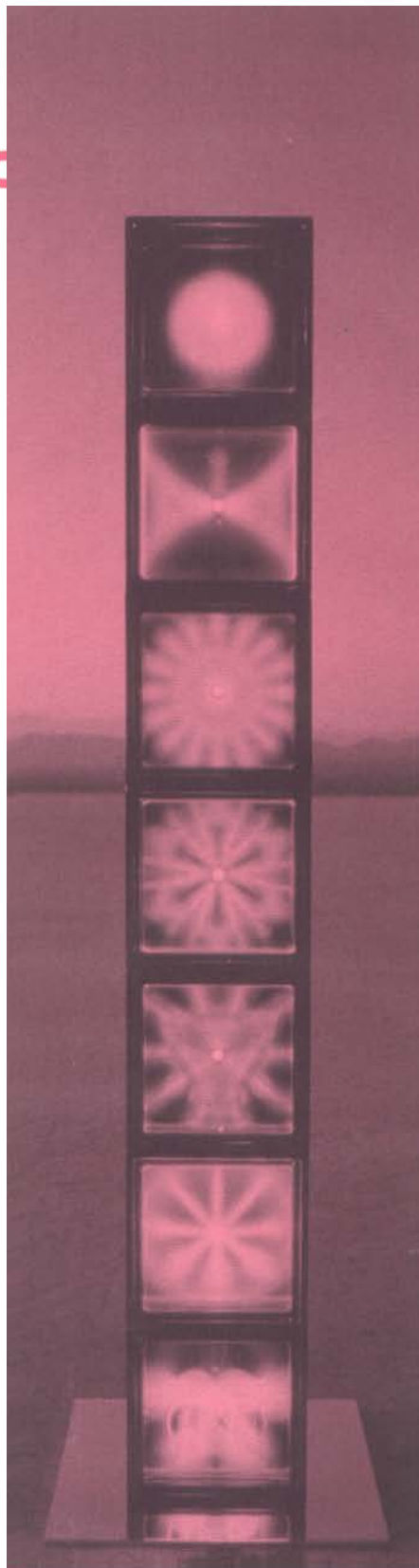
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in Temple Hills, Md. Alpert dabbled in injection coupling to produce a more coherent light at higher wattages early in his career. He now concentrates on sculptures created with metal vapors lasers ranging from a few milliwatts to 60 watts, and he is exploring fiber optics and simulated lasers for future use.

Alpert believes simulated lasers, which use the arc of a point source to create an image, are an excellent way to train people to use lasers. "You use an ultra-collimated arc light that has a longer life than a laser, while teaching safety and skills associated with a laser," he explains.

#### **SAFETY FIRST**

New York artist Matthew Tanteri knows well the importance of laser safety. In addition to light sculpting,



"Six Wheels and the Thousand Petaled Lotus" created by Victor Sirwinski Davis.

he operates lasers for rock concerts and other large scale events. After successfully completing the rigorous licensing procedures required by New York state, Tanteri has a special appreciation for laser use.

Most of Tanteri's art fills indoor spaces, in contrast to Krebs' large-scale creations. Because of the close proximity to viewers, the sculptures require exacting precision. In the future, Tanteri envisions skylines lit by laser sculptures that are the signatures of a particular city. He also believes lasers will be used more frequently in exterior lighting design of buildings.

"Artists are eager to translate new technological discoveries into art," Tanteri says. One area he is most enthusiastic about is optical phase conjugation. "With phase conjugation, a beam can retrace its path through an optical system, compensating for atmospheric changes, which is particularly useful on a large scale," he adds.

#### **THE LASER AS THEATER**

Not only have lasers found their way into fine art, they also have found their way to the theatre—business theatre. One company that has successfully capitalized on laser productions is Image Engineering in Somerville, Mass. President Walter Gundy emphasizes the need for first-rate laserists to produce a spectacular show: "Because of the complexity of our equipment and the military precision we use, we need people who have experience with a laser manufacturer or OEM laser user, an associate degree in laser technologies, and some experi-

ence in theater.”

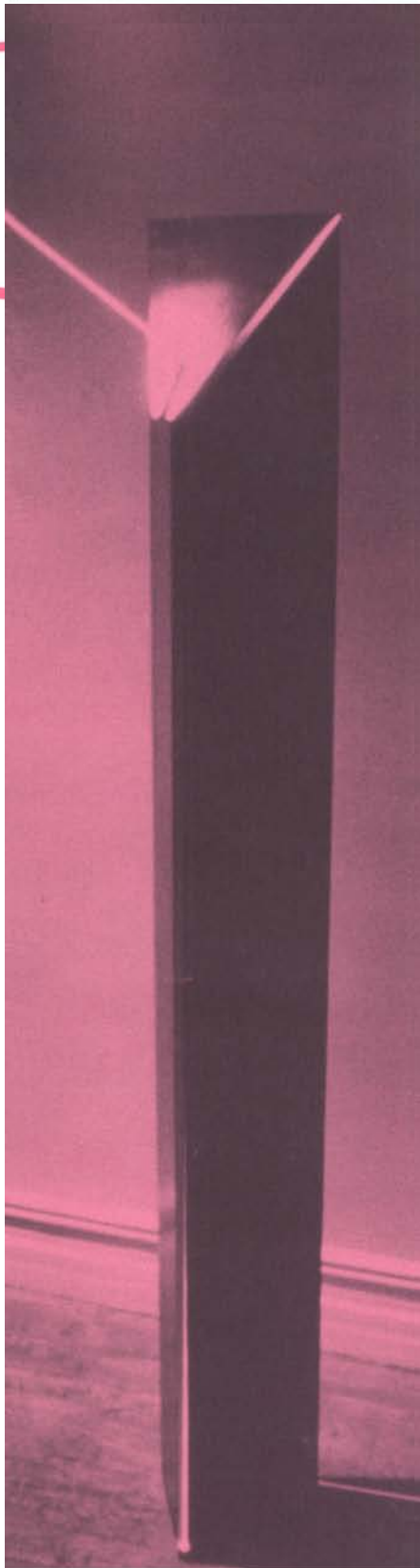
Image Engineering has produced such shows as the Seoul Olympics, Singapore's 25th anniversary, and the rededication of the Statue of Liberty. Using argon and krypton lasers, the company uses a variety of techniques to create their effects, including mass balanced mirror mounts that allow faster movement of light and high-powered scanners.

“Laser scanning creates more convincing 3-D illusions than other projection media because the vector trace does not shed light on the overall screen surface the way video or film does,” explains Gundy. “Only XY laser scanning provides a ‘floating in space’ phenomenon for the viewer.”

Trapping light in space comes naturally for Victor Sirwinski Davis, a Hollywood-based artist. To date, Davis has created sculptures that combine lacquered woods, glass, acrylic, and most of the noble gases. Strongly grounded in Hinduism, Davis infuses all of his works with his love for the Indian philosophy.

In “Shiva Lingam,” Davis suspends three electromagnets inside a glass bell jar to deflect a direct current plasma channel. A 5,000 V, 120 ma neon supply transformer is rectified to pulsating DC and applied to the chamber across two electrodes. All facets of the plasma and magnetic effects are controlled by a logic box. Each time a magnet is energized, the plasma is deflected.

“Shiva Lingam is filled with numerical and symbolic representation of the story of Shiva, the god of destruction and regeneration,” Davis relates.



“Axiform” created by Matthew Tanteri using wood, lacquer, laser, and optics.

Davis learned the science of his craft from his father, who helped develop nuclear firing mechanisms at Sandia Laboratory during the 1950s and 1960s. To realize his ideas, Davis has had to construct new devices. Early on, he developed chambers that allow current to pass through without use of electrodes in the vacuum. “This improves the longevity of the chamber because there are fewer contami-

... Tanteri envisions skylines lit by laser sculptures that are the signatures of a particular city.

nants,” Davis says.

Because high frequency, high voltage drivers cannot be added in parallel for large projects, Davis uses one oscillator to drive as many as six transistors, which in turn drive six custom wound high voltage transformers. “This allows a much higher current delivery to the plasma chamber, resulting in brighter displays,” he continues.

As lasers improve and more artists become interested in the medium, the artists interviewed suggest that more public galleries will accommodate laser works. “The potential of lasers is so great. This is our time,” says Tanteri.

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