LD+A
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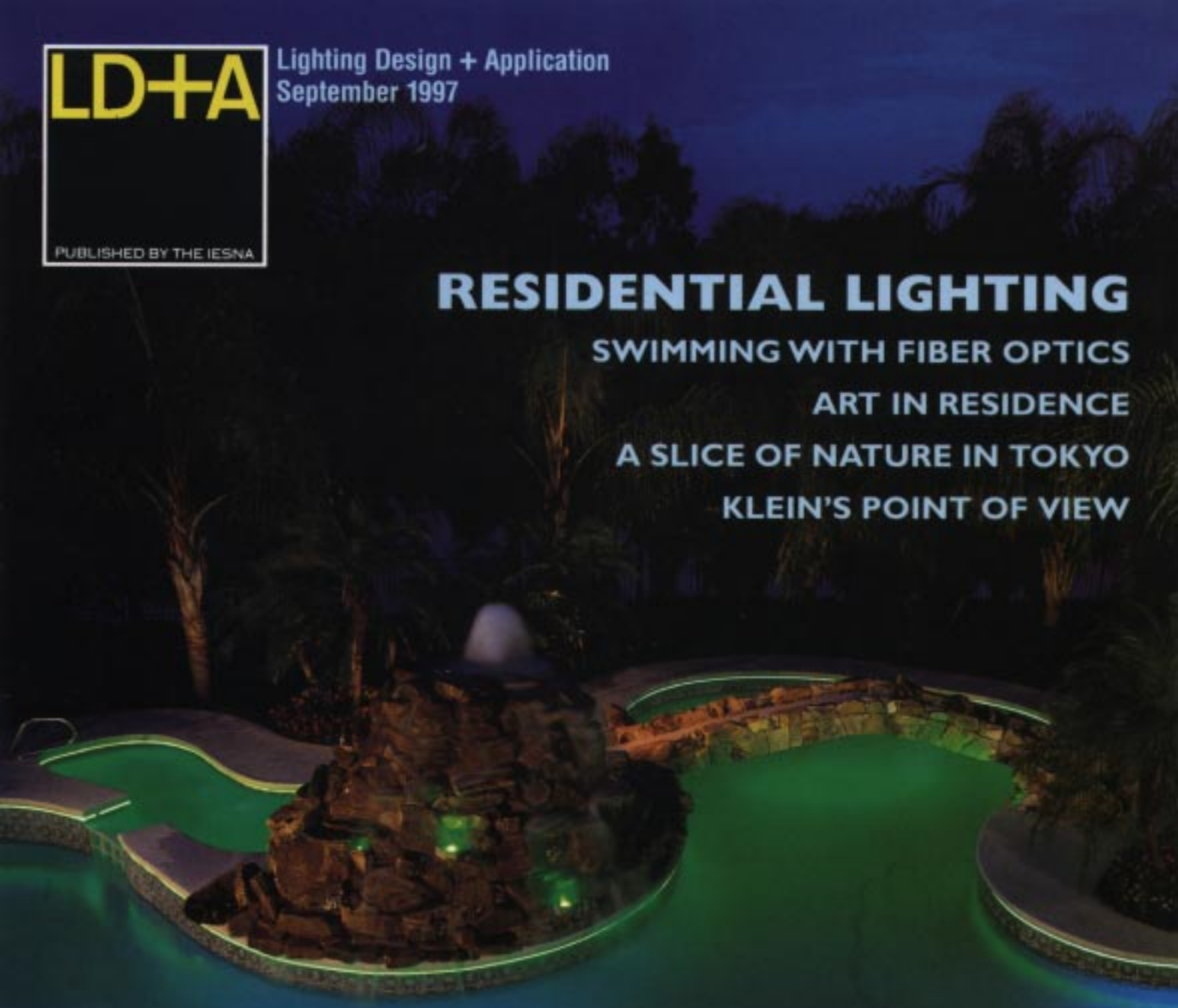
RESIDENTIAL LIGHTING

SWIMMING WITH FIBER OPTICS

ART IN RESIDENCE

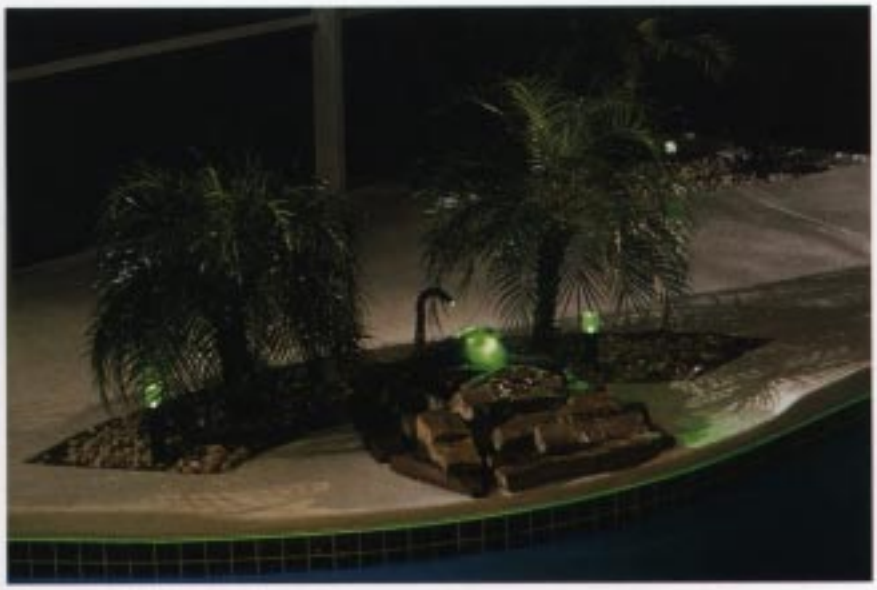
A SLICE OF NATURE IN TOKYO

KLEIN'S POINT OF VIEW



MIDNIGHT AT THE OASIS

When a small fortune is sunk in a swimming pool, the homeowner wants more than just a hole in the ground. ***Richard Heiner*** *uses fiber optics to bring extra flair to one client's personal paradise.*



(left) Complementing a large luxury home, this 20 by 70 ft pool provides the homeowner with a perfect place to relax or entertain guests. Fiber optics allowed for a variety of fixtures, special lighting effects, and design flexibility not normally available with other types of lighting. Additional lenses are placed in the stone waterfall and illuminate the bridge.
(above) Since the fiber optics do not transmit electricity, lenses, perimeter cable, landscape, and accent lights can be placed virtually anywhere. Code requirements were easily met since there were no electrical devices in or near the water.

The owner of this extravagant residential pool entertained frequently and wanted his pool and backyard environment to be a major focal point. The pool measures 70 ft long by 15 ft wide. The pool features a lagoon area spanned by a small stone bridge as well as a large spa fed with water by a "volcanic" waterfall/fountain. Don Bryant of Precise Pools in Ormond Beach, FL, was the designer and contractor for the pool, and he recommended fiber optics knowing it would provide the pizazz and variety of lighting that would satisfy the homeowner.

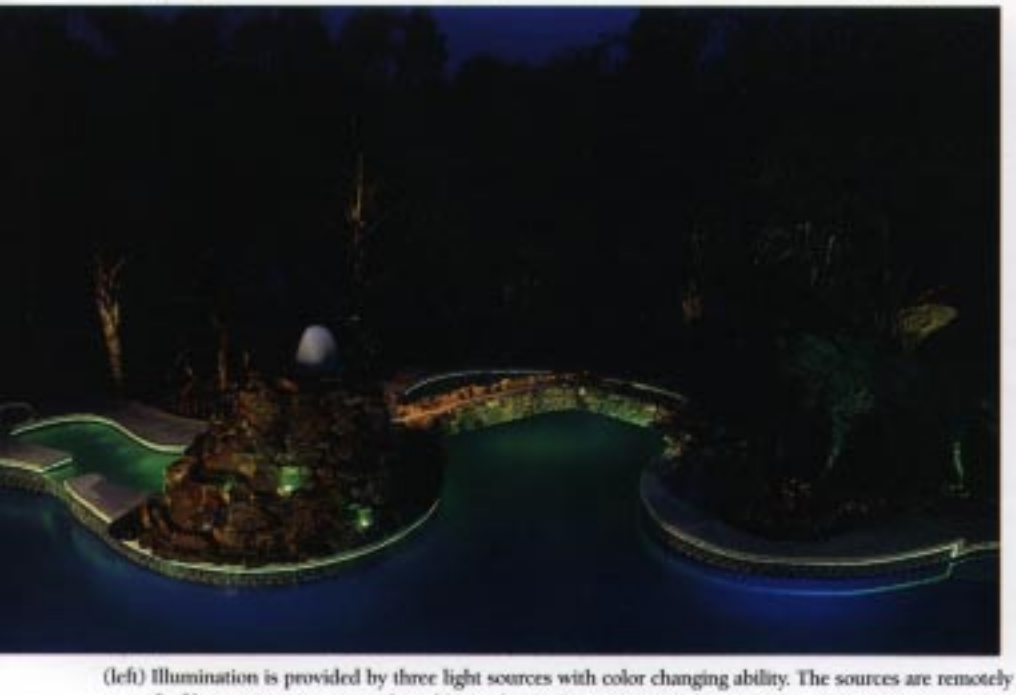
Fiber Optic Lighting - Background

Fiber optics have been on the market for over 15 years and are a widely accepted solution for swimming pool applications. Its most obvious benefits over conventional lighting is the lack of electricity near the water. A light source that houses a 250 W halogen lamp transmits light through plastic optical fiber and terminates at a clear plastic lens about a foot below the water line. For underwater lens type lights this means that there is no risk of electrical shock for a service person changing a lamp. This also prevents having to drain the water to access the lamp.

Standard electrical lamps have glass lenses that could break during pool servicing while fiber optic lenses are plastic and adapt to standard pool industry fittings.

While these examples may excite a pool service company, the real excitement of fiber optic lighting is the color-changing ability and the effects created with side-emitting fiber. While light follows the path of least resistance, even in a fiber strand light will find its way out of the side. This product has created a whole new revolution for neon-type lighting without the risk of glass breakage or high voltage transformers. The effects around the perimeter of a pool can be awe inspiring. We frequently receive calls for the "two bands of light around the pool." Actually there is only one band of light—the second band is a reflection. Primarily for decorative purposes, sideglow fiber can also be used as safety lighting under stair risers (as on this project) or for around the outside perimeter of a raised spa.

This project expanded the typical applications of underwater lighting to include the lighting of external features like the stone archway bridge, the waterfall/fountain, landscape lighting, and step lighting. Several light sources were used that can be controlled from the interior of the house with standard light switches. Underwater lighting is on one system, landscape lighting is on a second system, and perimeter lighting is on a third. The color-changing ability of the optics can be independently stopped or started for each system. This allows the homeowner to choose synchronized colors or a variety of colors between each system, as well as the option of illuminating one or more systems at a time.



(left) Illumination is provided by three light sources with color changing ability. The sources are remotely switched from the house. (right) The primary cost of a fiber optic system is in the cable. In this project, extremely long cable runs were required, using nearly 300 ft of cable.

Design and Installation Challenges

Paul Koren, Super Vision product development manager, and I met with Precise Pools on-site to discuss the lighting design. The main considerations for underwater lenses is that they are placed shining away from the primary viewing angle, in this case the house which ran parallel to the pool. When we met Don Bryant on-site, the pool had been dug, reinforcing wire was in place, and the shell was ready to be shot-creted. Paul and I had already reviewed a drawing of the pool so we were familiar with the design and knew the approximate locations for the proposed lenses.

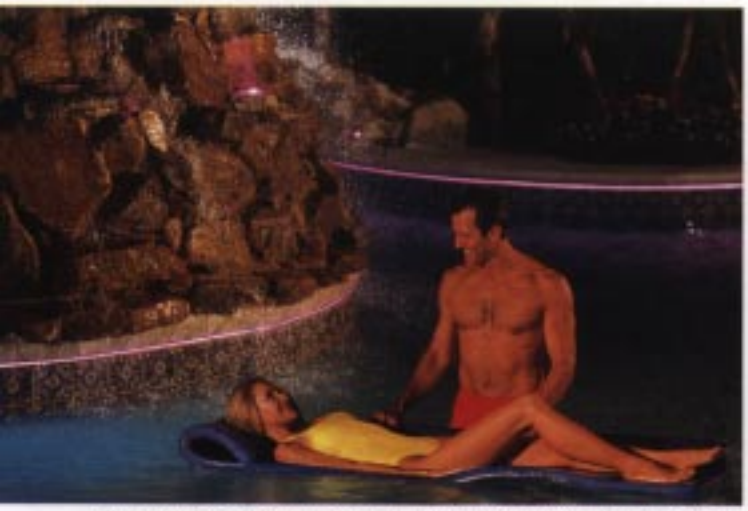
As often happens in construction projects, changes are made until the very last minute. The overall dimensions of this pool had grown slightly and it was necessary to a add a few more lenses. The lenses are spaced approximately 12 ft apart and 9–12 inches below the waterline. We hopped inside the shell and sprayed the underwater lens locations onto the side walls so the plumber knew where to run the PVC conduit for the fiber optic cable.

A critical factor is the direction the lens shines. The objective is to illuminate the opposite wall as evenly as possible. The pool's interior surface color and texture—plastered with small bits of glass in this case—can greatly affect light reflectiveness and color rendition. Smooth white finishes are best; dark- and black-bottom pools are not good candidates for colorful fiber optic lighting. However, white light can only be used with dark finishes, but will require more fiber and lenses. For perimeter sideglow, pool finishes and color are not a factor. When we finished spray painting the dirt and climbed out of the wire and dirt pit, we had nine lenses in the pool and three in the spa.

The light sources are available with the option for automatic or manual color synchronizing. The owner chose manual so he could have the lagoon and the pool on separate colors simultaneously. The owner also has the option to stop or hold one system on a color while the other changes.

One design challenge we faced was the length of cable from the light source to the fixture. In most cases the primary cost

of a fiber optic system is in the cable. Also, light intensity was a confounding factor. Normal distances are up to 30 ft for the lens lights, also referred to as endglow or end lighting. At about 40 ft a slight drop-off in light intensity occurs and there is a steady drop-off to a maximum of about 100 ft. With dimensions of 70 by 22 ft, and only about 10 ft of deck right



All the comforts of a luxury resort in your own backyard. Achieving artistic lighting ambience that reflected the natural feel of the pool environment was the homeowner's foremost priority. Colorful side-emitting fiber optics outline the pool's perimeter adding an exciting dimension to this waterscape.

up to the face of the house with no inconspicuous location to mount the sources, the light sources had to be mounted on the opposite side of the pool. Very long cable runs were required. The light sources were placed in a heavily planted landscape bed near the spa.

Cable Ready

Over about six to eight weeks, several site visits were made to check the installation's progress. Although fiber optics are generally very simple to work with, mistakes in calculating or cutting fiber distances can be costly. For this particular job the risks where high. The pool's perimeter was approximately 265 ft. Add that to the distance to and from the light sources (perimeter cable begins and terminates at the light source) and you have nearly 300 ft! 200 ft is the maximum recommended distance for perimeter cable; beyond that, the light drop-off is significantly noticeable. A second light source was added for the perimeter and it was configured in a "daisy chain." The two light sources were synchronized for consistent color changes. A single band of the perimeter fiber was installed under a step riser where it enters and exits the pool; this added safety and a bit of flair.

The light source for the spa light also accommodated the stone waterfall's illumination. Three standard fiber optic pool lenses were mounted vertically in the structure so the light would play off the splashing water. The adjacent stone bridge was washed with light from two lenses mounted in the stone at each side of the base of the bridge.

In the pool industry there are several design competitions published annually in the trade journals and magazines. I have noticed an increase in nighttime photographs for these awards over the past few years. Even though most of these designs are for general design (not lighting specific), from my perspective as a lighting manufacturer it indicates the emphasis homeowners, landscape designers, and other professionals are placing on lighting to enhance and improve a project.

My experience in the pool and spa industry over the last few years has led me first to believe in and understand the element of basic lighting principles and design which has mostly come from on-the-job-training. When I give a talk or a training session on pool lighting it usually begins with examples of architectural lighting and the layer concept. This lighting model is then transferred to the backyard environment once the comparisons of architectural examples have been established. A balanced lighting approach for underwater lenses is what I prescribe as opposed to the single "headlight" design. Of course either of these designs can be achieved with standard lighting, low voltage, or fiber optics. The primary goal is better lighting, and after that has been established all the wonderful attributes and benefits of fiber optics can then be discussed. After all, pool owners spend the majority of daylight hours during the week at work. During the evening they would like to enjoy the environment that they have invested thousands of dollars creating. Lighting then becomes a central issue and a crucial aspect of the pool's ability to transform the homeowner to his own private oasis.

The author: Richard Heiner is marketing director with Super Vision International, Inc., in Orlando, FL. While working on a neon project for sidelit etched glass in March 1994, he investigated Super Vision's fiber optic cable and four days later ended up working for them. Shortly thereafter the company began developing and designing products for pool and landscape lighting. He studied design and fine arts at the University of Maryland and has worked in the graphic art and architectural/engineering field for over 15 years.