

FIBER-OPTIC FIXTURES—RECENT DEVELOPMENTS

BY RUSSELL L. DEVEAU, CONTRIBUTING EDITOR

Fiber-optic systems have advanced in the last few years. Some of the most notable advancements have occurred in the area of components and accessories, such as fixtures.

Early fixtures were generic. Often in limited finishes, they were typically marked as "spot" lights with the same fixture used in downlighting, underwater and museum applications. These fixtures generally served only as decorative surface devices that provided performance impressions. Unless a lens was incorporated, light coming from the fiber at a particular angle simply passed through the device without modification. Although in many cases this concept hasn't changed, today's fixtures are made of diverse materials, allow for a selection of exterior finishes and often provide a high degree of optical control.

TYPES OF FIXTURES

Most fixtures currently produced are marketed as being application-specific and include downlights, decorative downlights, adjustable fixtures, display and showcase fixtures, exterior fixtures and fixtures specifically designed to be used underwater. Although promoted for particular applications, many fixtures can be utilized in a variety of interior and exterior lighting projects.

Downlights. The majority of companies that offer fixtures market at least one that is promoted as a downlight. These fixtures are generally made of molded plastic or cast aluminum and are available in a wide range of colors and finishes. A non-adjustable lens is usually incorporated into their housing. Their small size and flexibility pertaining to mounting positions allow for these fixtures to be used in a wide range of task and accent lighting applications.

The newest fixtures tend to add decorative elements to downlights and are growing in popularity because they are designed to provide a lighting element that combines with or complements the interior or exterior design.

Decorative downlights usually incorporate an element that light

passes through in order to provide reflections or glowing effects. These elements may include acrylic molds, high-quality crystals, or shaped clear, frosted or colored glass.

Wall Wash and Accent. Several companies offer fixtures that are adjustable for use in wall-washing and accent lighting. Often referred to as "eyeballs," they are adjustable by means of a socket and can be easily aimed. Many of these fixtures include an adjustable lens that allows for light to be focused from small to wide beams.

Although almost any fiber-optic fixture can be used for display illumination, there are many fixtures developed specifically for this purpose. Directional systems are mounted in showcases or in ceilings to illuminate many individual objects or entire gallery walls. These fixtures can contain numerous light outlets that are positioned in mounting bars or rails. Fewer outlets can be used depending on the illumination requirements. The outlets usually swivel in a socket to direct light to almost any area in the display while also offering the ability to focus or diffuse light.

Landscape and Exterior. Numerous fixture options are available for illuminating landscapes, sidewalks and gardens. These fixtures can often be mounted flush to the ground for uplighting or resemble traditional bollards that can diffuse or reflect light. Some manufacturers offer outdoor fixtures that are extremely flexible and can be aimed at specific areas in the landscape. Decorative elements that glow are often incorporated into these fixtures.

In addition to fixtures designed to illuminate landscapes, wall-mounted fixtures for exterior wallwashing, stair lighting and patio and sidewalk lighting are also available. Many of these fixtures come in a variety of shapes and allow for controllable light output. Some of these fixtures can be buried in the ground or mounted in concrete, and numerous decorative options are available.

Underwater Applications. Although many fixtures are waterproof, there are fixtures designed specifically for underwater locations. These fixtures usually include only a lens, but custom decorative options are also available. They are used to illuminate swimming pools, whirlpools, fountains and a variety of underwater locations.

Specialty. An assortment of small fixtures designed to provide tiny points of light are available from certain manufacturers. Although generally used for decorative purposes, some of these fixtures may offer some degree of light control.



ADJUSTABLE
DOWNLIGHT,
SCHOTT CML FIBRE OPTICS
CIRCLE NO. 50



DECORATIVE FIXTURES,
STARFIRE LIGHTING, INC.,
CIRCLE NO. 51

These fixtures include "bullets" and Christmas tree lights (such as "icicles") and are usually made of shaped clear, colored or frosted glass.

Custom Fixtures. As is the case with any custom lighting design, standard fixtures are not always appropriate in particular environments. Many fiber-optic applications make use of custom-designed fixtures that the designer develops based on the lighting effects desired and the overall decor of the environment. Given the lack of electrical restrictions associated with a fiber-optic fixture, designers have few limitations to consider when designing a fixture to be used with fiber. Even with an extensive selection of standard fixtures readily available combined with unlimited custom options, designers have more fiber-optic fixture choices at their disposal. Fibers are generally extremely flexible and function well in a variety of temperatures. This often means that, depending on the fiber utilized, they can be mounted in almost any material. Many ordinary objects, such as furniture, handrails, works of art, floor and a variety of other architectural and decorative elements have been transformed into fiber-optic "fixtures" by incorporating fibers into their construction.

FIXTURE SELECTION

One of the first questions designers tend to ask about fiber-optic fixtures usually pertains to how many can be obtained from one illuminator. Although there are definite limits, there is no standard answer. The exact system components selected to obtain the desired lighting results will be the determining factor and many variables will apply. Component selection depends on the specific application and will include issues related to the illumination or brightness levels desired from each fixture used in the design. Ambient light levels will always need to be considered and mock-ups are often suggested.

The necessary illumination levels will generally determine the type of light source that will be used in the illuminator and the size of the individual fibers that will attach to each fixture.

Generally, in decorative applications, where light levels are based strictly on brightness, the designer can expect to supply anywhere from a handful up to several hundred fixtures with light from an illuminator. The maximum numbers become significantly less as applications require increased amounts of light.

More variables, many of which are not directly associated with the fixture, come into play when consistent light output from fixture to fixture is required. Proper system design is imperative in order to ensure that each fiber receives an even distribution of light to the illuminator. Light inconsistencies at the input end of the fiber will show up at the fixture to illuminated surfaces as well. Fiber type and length will also play a role in how much and what quality of light reached the fixture. Different fibers possess varying light transmitting characteristics and light will diminish as lengths increase. Special care should be taken during installation to ensure that fibers are not bent beyond the manufacturers' recommendations as excessive bending will also affect light output.

FIXTURE INSTALLATION

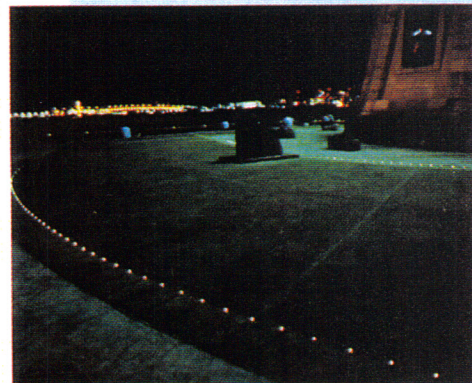
Installing a fiber-optic fixture is generally easy when compared to the procedures needed to install a traditional lighting fixture. No special tools are required and, in many cases, electricians are not involved. Ceiling-, wall- or surface-mounted fixtures require a hole of the appropriate size be prepared so that the fixture can be inserted. Dimensioning is important for proper fit and straight holes are necessary to ensure that the fixture isn't mounted at an unwanted angle. Some fixtures utilize a mounting sleeve for the fixture to slide through in order to assist in the securing process, but many fixtures are simply held in place by spring clips, screws or adhesives. Fixtures used in display or showcase applications are just as easy to install, if mounting rails are used, they are cut to the correct length (either by the manufacturer or at the job site) and individual fixtures either click into or slide into the desired locations onto the rail. It often takes very little time to install a fiber-optic fixture and once installed, maintenance is usually limited to occasional dusting.

Most manufacturers provide detailed instructions that explain how fiber should attach to fixtures. Although the exact methods will vary depending on the fiber and fixture utilized, dust and impurities are usually addressed. The installer should make sure that both the fixture and optical areas of the fiber are kept clean and dust-free

Selected list of fiber-optic fixture manufacturers and representatives:

- Conservation Lighting International Ltd., (215) 568-4572
- Drama Lighting Inc., (716) 626-9300
- Fiberstars, Inc., (800) 327-7877
- Lightly Expressed Ltd., (714) 556-6655
- Lumenyte International Corp., (714) 556-6655
- Pinpoint Fibreoptics Ltd., (310) 276-3437
- Schott CML Fibreoptics LLC, (508) 229-8312
- Starfire Lighting, Inc., (800) 443-8823
- Supervision International, (407) 857-0050

LANDSCAPE FIXTURES,
FIBERSTARS, INC.
CIRCLE NO. 52



throughout the connection process. Any debris on these areas will effect the quality of light coming from the fixture.

Some fibers attach to the fixture by means of a ferrule (see Figure 1). Ferrules are devices that attach to the end of the fiber and assist in providing efficient coupling to the fixture. Ferrules are usually factory-designed to work with particular fibers and are therefore ideally sized to attach to certain fixtures. When ferrules are used, the attachment process is often completed by simply inserting the ferrule into the fixture's connection sleeve. In other cases, custom ferrules or compression systems may be used to hold the fibers in place. The goal in connecting the fibers to the fixture should be to ensure that the fibers are properly secured and correctly positioned so that the necessary light output is achieved. Varying fiber locations within like fixtures will allow for varying light output characteristics.

COST CONSIDERATIONS

Fixtures are generally sold as part of an entire fiber-optic system, but they are also available as individual units for designers who are interested inputting their own systems together. Prices vary greatly. Generally, simple decorative fixtures are priced much lower than fixtures that are designed for task or accent lighting. Fixtures that offer a high degree of optical control or are made of expensive or unique materials will be priced even higher. Specifiers should check quality and performance characteristics in order to ensure that particular fixtures meet the lighting design requirements.

Developments related to fixtures are allowing fiber optics to be installed in more diverse environments at a rapid rate. But advancements related to fiber-optic technology are not limited only to new fixtures. Technological improvements are occurring in the unseen components as well. Illuminators are becoming more efficient and fibers are carrying light further. Of course there are limitations, but the industry's commitment to overcoming them by means of new product development and system-wide improvements will continue to allow for increased applications. Keeping informed of developments isn't easy. But maintaining updated catalogs and paying special attention to new products are good ways to ensure that the designer stays updated in the latest in fiber-optic lighting design possibilities. ■

Russell L. DeVea is the author of *Fiber Optics: A Guide for Lighting Specifiers*, published by Architectural Lighting.

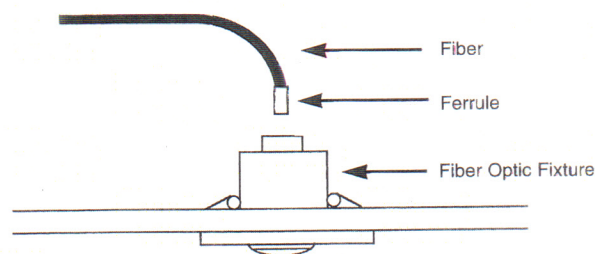


FIGURE 1: FIBER OFTEN CONNECTS TO A FIXTURE BY MEANS OF A FERRULE

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CIRCLE NO. 53

