Light and Color

Fluorescent Technology

How Fluorescent Lamps Work
A fluorescent lamp is a "gaseous discharge" light source. Light is produced by passing an electric arc between tungsten cathodes in a tube filled with a low pressure mercury vapor and other gases. The arc excites the mercury vapor which generates radiant energy, primarily in the ultraviolet range. This energy causes the phosphor coating on the inside of the tube to "fluoresce," converting the ultraviolet into visible light. Fluorescent lamps have two electrical requirements. To start the lamp, a high voltage surge is needed to establish an arc in the mercury vapor. Once the lamp is started, the gas offers a decreasing amount of resistance, which means that current must be regulated to match this drop. Otherwise, the lamp would draw more and more power and rapidly burn itself out. This is why fluorescent lamps—and other discharge light sources—must be operated by a ballast, which provides the required starting voltage and then controls the subsequent flow of current to the lamp.

The Importance of Phosphor Coatings
Fluorescent lamps offer more color options than any other lamp type. This is because of sophisticated refinements in the composition of the phosphor coating on the inside of the tube. Early fluorescent lamps used a single halophosphor coating and could offer improved color quality only with an accompanying decrease in efficacy (LPW). It is now possible to add "rare earth" or "triphosphor" coatings that allow precise control over the generation of red, green and blue, the three primary colors of light. This has enabled the development of high LPW lamps in a variety of color temperatures that feature excellent color quality and provide vibrant and outstanding rendition of virtually all colors. Today's SYLVANIA fluorescent lamps employ more than twenty different phosphor formulations to offer designers and specifiers extensive control over the quality of light in any installation.

A Systems Approach
It is always important to bear in mind that fluorescent is a system involving both ballasts and lamps. A properly balanced fluorescent lamp/ballast system enhances luminous efficacy, improves color characteristics, extends lamp life and increases energy efficiency.

T8 Lamps Improve Efficiency
Another important advance in fluorescent technology is the development of the T8 lamp. Featuring a tube of only one inch in diameter—compared with one and a half inches for the traditional T12 lamps—these lamps dramatically improve system efficiency. A 32-watt OCTRON® T8 lamp, for example, uses 20 percent less energy to provide the same light output as a 40- watt T12 lamp. T8 lamps employ special triphosphor coatings to achieve precise control over color temperature and CRI. The smaller diameter of the T8 tube means that less of these costly materials are needed. In addition, T8 lamps provide optimum system efficiency when used with electronic ballasts. This combination provides such dramatic savings in energy costs that billions of dollars are being spent each year to retrofit existing T12 installations with more efficient T8 technology.

T5 Lamps Extend Options
Fluorescent lamps are getting thinner. Although T8 OCTRON lamps are still the choice for retrofitting most T12 installations and for new commercial construction, the new T5 PENTRON® lamp are inspiring the work of specifiers everywhere. PENTRON® SYSTEM PS and SYSTEM PHO are lamp/ballast innovations that are designed to maximize the system performance of T5 lamps. The narrow PENTRON® lamps and slim, lightweight QUICKTRONIC® ballasts allow fixture manufacturers to design T5 luminaires that are both small and stylish.

Compact Fluorescent Lamps Save Energy
The fastest growing application for fluorescent technology today is compact fluorescent lamps. These lamps feature a narrow tube (1/2 to 5/8 inches in diameter) that is doubled back on itself and terminated in a plastic base. Compact fluorescent lamps are small enough to replace incandescent lamps in diffuse source applications and therefore bring the increased efficiency of fluorescent technology to a much larger variety of fixtures. DULUX® EL compact fluorescent lamps, for example, feature an integral electronic ballast and a standard screw-in medium base. These innovative lamps can be used to directly replace incandescent lamps in many of the most common wattages. Other DULUX lamps are available in a variety of sizes, wattages and color temperatures for use with external magnetic or electronic ballasts.