

Home Movie Projectors on the Rise

Projectors that convert data to pixels and cast the resulting images onto a screen or wall are widespread in professional life. The next conquest of these **digital projectors** is the home cinema. SCHOTT is a major supplier of optical components for such projectors.



As flat as it gets: digital projectors transmit motion pictures onto a projection screen, thus bringing cinema film quality to the home.

► Nowadays, digital projectors are the standard devices for presentations in professional circles. Unlike slide or overhead projectors, which merely cast a light beam through a finished slide or transparency to project the picture, they select individual units or pixels to project the image.

This digital projection technology has far more areas of application than just Power Point presentations. In general, all graphical information can be made visible with its help: the possibilities range from television programs, DVD movies, videos and vacation photos to computer screen presentations with text documents or pages from the Internet and computer games. Some day image-transmitting telephones will be able to beam a life-size image of the person on the other end of the line onto the wall with the help of such multimedia projectors.

Enormous potential

Digital projectors are definitely gaining ground in home applications. Experts already see the onset of the age of digital home cinema systems. In light of the large picture formats that can now be projected in a high quality, the once slightly exaggerated terms "home cinema" or "home movie theater" now seem perfectly appropriate.

Lower prices would obviously accelerate the trend to digital projectors. The fact that practically every household is a possible buyer shows the enormous potential of this technology. People who are not enthusiastic about a front projector fitted to the ceiling can always choose a rear-projection television that looks like a TV set. The rear-projection television transmits the digitally produced images onto the back of a luminous television screen. They also offer much larger picture formats than ordinary televisions.

In anticipation of this boom, SCHOTT founded its own Digital Projection Business Segment at the end of 2001. The company's existing know-how in optical components was concentrated in this business segment, which specifically targets the producers and subsystem assemblers of projectors. From light management and optical engine systems to projection lenses, SCHOTT has something to offer for all phases of light and image generation in digital projectors. "This includes all three major digital projection technologies that are currently available on the market: LCD, LCOS and DLP," says Dr. Jürgen Weichert, Vice President of SCHOTT Digital Projection.

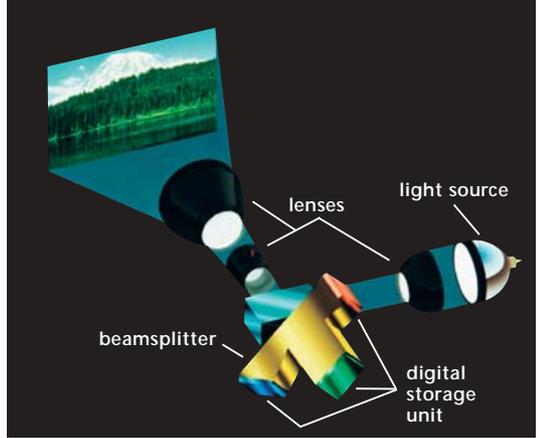
These three technologies use a light source that produces white light. And all three separate this light into blue, red and green partial radiation that is ultimately reunited when it leaves the projector as a single beam through a lens system, thus produc-

ing the projected image. The differences in the technologies have to do with the way in which the separated partial radiation is processed in the so-called optical engine.

A clearly defined color combination is attributed to each point of the image to be produced. Just how much blue, red or green reaches the projection lens at this point is controlled differently by each of these three technologies. In projectors based on the transmissive Liquid Crystal Display (LCD) technology, each partial beam (blue, red or green) is directed through a liquid crystal that is comparable to the slide of a conventional slide projector. Each image point in such a liquid crystal is individually selected, then transmitted or absorbed. For a pixel that is ultimately supposed to appear black, all three colors are absorbed, while to achieve white all three colors are transmitted. Liquid Crystal on Silicon (LCOS) technology functions in a similar way, but with a critical difference: the light that is able to pass through the liquid crystal is reflected by a coating on the reverse side of the liquid crystal layer.

Several hundred thousand micromirrors

"Digital Light Processing" (DLP) technology, developed by Texas Instruments, is based on a different principle. The heart of "DLP" technology is the digital micromirror device. Each light beam strikes a thumbnail-sized chip with several hundred thousand tiny reflectors – one for every pixel. A small hinge attached to each of these mirrors controls its direction and thus also whether the reflected light beam reaches the lens or



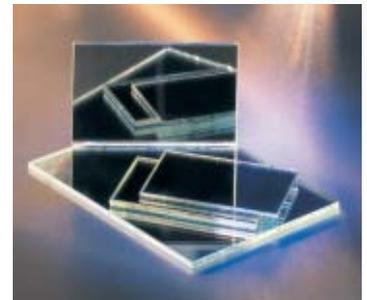
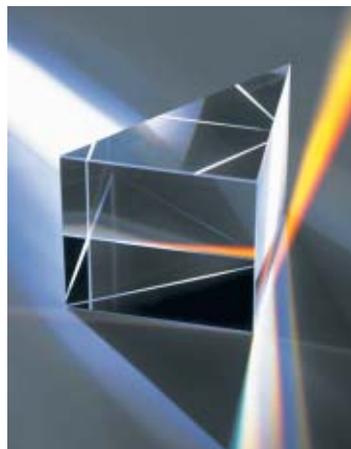
In combination with electronics, a miniaturized optical system can make impressive film projections from digital data.

The main engineering material for most of these components is glass. SCHOTT thus has a very important advantage, says Torsten Holdmann, Manager of Business Development at SCHOTT Digital Projection. "We have the in-house know-how and access to hundreds of special glass types, in addition to the necessary expertise for each process and refinement step." Holdmann refers in particular to the various coating technologies and explains, "Every glass component has to be coated in some way for its application in a digital projector."

not. This demonstrates the extremely small dimensions in which digital projection works. Each mirror is just a few micrometers (millionths of a meter) wide. Some 500,000 image points are individually worked over an area of about one square centimeter. And the end of miniaturization is still not in sight.

Several optical components are necessary in situations in which light has to be worked with such extreme precision. Nearly all these components are supplied by SCHOTT's Digital Projection Business Segment. For the light management systems there are, for example, coated cold-light reflectors, cover glasses and IR-cut filters. As part of optical engine systems, SCHOTT provides dichroic filters, which reflect the light of selected wavelengths and transmit the rest. These filters are the components of choice when it comes to separating white light into blue, red and green. Depending on the technology, various mirrors, prisms and lenses are used in the course of the process.

In 2002 over 1.9 million digital projection devices were sold worldwide – nearly half of these in North America. The share of these projectors in private use is calculated at eleven percent. Experts estimate that this figure will reach 50 percent in 2004. Branch insiders predict that the selling price will sink to 1,000 euros by the end of 2003 – on average about one quarter of the price paid in mid-2002. In this connection it is interesting to note that according to a survey in the United States, 78 percent of those polled would buy a projection TV if the price dropped below 1,000 dollars. ◀



SCHOTT produces a wide range of optical components for projection applications, including glass-ceramic reflectors, optical filters, heat protection glass, interference filters and pressed blanks for TIR prisms, X-cubes and PBS cubes.

High-performance lamps made of special anti-reflective glass from SCHOTT: a heat protection filter prevents excessive heat build-up in the light path of the projection system.



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