

HoloPro™, possibilities and features of a new projection medium

Application areas of HoloPro™

The holographic projection screens HoloPro™ open up completely new application possibilities for front projections and rear projections, even under very difficult light conditions in which conventional projections are not possible. HoloPro™ is used at trade fair stands, for events (for instance, brightly illuminated stages), at presentations, in shop windows and a number of other fixed installations (such as conference rooms, foyers, etc.). Another successful sales channel is the AV rental market. For the above mentioned applications the enormous brightness combined with excellent contrast is always decisive. Another important aspect is the transparency of the screen when the projector is switched off – a characteristic which no other projection screen possesses in this way. HoloPro™ has an enormous variability; the screens are available in sizes ranging from 20" diagonal to a maximum size of 100" diagonal as front projection variant and rear projection variant. Even the integration in the most varied of glass objects is possible (windows, doors, etc.).

The integration in unique, complete solutions is also very positively accepted by the market. As "stand-alone product" a so-called "HoloTerminal" – with the option of an integrated computer – was developed which offers a whole range of attractive utilization possibilities for POS / POI and has a designer keyboard which even makes Internet applications possible.

The second system we offer is the "HoloBox" which combines a 50" screen with a projector and an audio system in a mobile housing with rolls underneath, which means that this system is not only suitable for all types of PC applications but also for every type of video usage in indoor applications such as conference rooms, foyers, etc.

Systems

Free-Suspension system



The HoloPro™ screen is suspended in four acrylic corners with a wire cable system of 2mm diameter, thus preserving the transparency and lightness of the HoloPro™ system.

The screen is almost invisible if the projectors are switched off. A projected image appears to freely float in the air.

The system is particularly suitable for the screen sizes up to 67" (diagonal).

HoloBox



The HoloBox provides the use of HoloPro™ as an all-in-one solution, allowing daylight and unusual projections directly at the POS. The HoloBox is a compact moveable unit which integrates a 50" HoloPro™ screen, two surface mirrors, data source, projector and audio system as a complete package in one piece of furniture which is only 1.05 meters (approx. 40") deep.

HoloTerminal



The HoloTerminal makes it possible to display and present information at exposed places in daylight for interactive applications. This highly attractive design element with an integrated beamer, a mirror and a 30"-HoloPro™ screen is equipped with a stainless steel keyboard as standard. It can optionally be equipped with a PC or be controlled via a network.

The viewer gets an interesting and futuristic impression because the HoloTerminal features a special holographic display surface which seems to freely float in the air. You have a choice of appropriate presentations: Regardless of whether it is PowerPoint, Internet or DVD – the HoloTerminal is open to all ideas in the field of interactive presentation.

HoloTower



The HoloTower is a closed rear projection system offering projections which are very bright and rich in contrast in direct sunlight. With these characteristics the HoloTower is a perfect solution as a presentation and communication medium for outdoor applications.

A 67" HoloPro™ screen is integrated in a compact and closed unit having a height of app. 3 m (app. 10 feet). As the projector is fixedly installed in the tower, no additional settings are necessary. Thanks to the closed construction of the assembly that delivers the dark background, images that are most rich in contrast are possible.

The market launch of HoloPro™

The HoloPro™ screen has already been presented with great success at a great number of trade fairs since October 1999. The enormous interest of visitors on trade shows in Germany (Cologne, Düsseldorf, Hamburg, Wiesbaden, Stuttgart, etc.) and in other parts of the world (Los Angeles, LasVegas, Paris; Dubai, Singapore, Tokyo, Barcelona, Vienna) clearly illustrates the high acceptance of this innovative product in the market.

It is not without reason that companies such as AUDI, ABB, Aventis, Daimler Chrysler, Deutsche Telekom, Ericsson, IBM, Lufthansa Volkswagen, several television corporations, the BFG and a great number of other banks rely on HoloPro™ technology for their innovative company communication.

The product – innovation HoloPro™, technical background

HoloPro™ is a transparent projection surface which enables daylight video/data projection on a transparent display (glass, polycarbonate). This means that for the first time projection is possible in daylight environment, and even outdoors in the sun. A shop window application can be arranged e.g. as follows: An advertising film is projected from the inside of the building onto the shop window. People on the walk side can see a bright and brilliant information, while at the same time the customers in the shop have a clear view to the outside.

HoloPro™ consists of holographic optical elements (HOE) which are exposed on a high-resolution film. The angle selectivity of the HOEs ensures that only the light emitted from the projector is directed towards the observer. Consequently the ambient light coming from other directions goes straight through the screen and does not interfere with the projection. The result is a bright, high-contrast picture. The exposed and developed film is embedded between two panes of anti-reflection glass and is hence protected against weather influences. It is further UV-stable. In future it will also be possible to embed the film in polycarbonate (Macrolon, a new brand launched by Bayer AG). Appropriate tests are currently being carried out in cooperation with Bayer AG.

In 1998 the Institut für Licht- und Bautechnik – ILB (Institute for light and building technology) at the University for Applied Sciences of Cologne in Germany applied for a patent for HoloPro™. After the patent has been granted, pronova acquired it in July 1999, with the aim of setting up a series production and worldwide distribution of HoloPro™. Within the framework of a cooperation agreement the know-how was transferred from the ILB to pronova. In October 1999 pronova made its first official appearance at the Infocomm Europe, where it presented HoloPro™ HR with considerably improved features. At the beginning of 2000 the first roll exposure machine was manufactured for series production.



Since 1999 four leading employees have been taken over from the ILB in order to build up the profound know-how for HoloPro™ at pronova. Hence, the production of this innovative product is completely in the hands of pronova. In June 2001 pronova established its subsidiary pronova USA, Inc. in Hoboken, New Jersey.

Holography film

Negotiations with AGFA led to the development of a new appropriate holography film. The necessary development costs were taken over by pronova. The first 2,500 square meters of Skypro film were produced in August 2000. The cooperation with AGFA is regulated by a supply agreement which guarantees the exclusive supplying of pronova with Skypro.

Innovative communication technologies

Apart from the pure projection surface with special characteristics, HoloPro™ is being further developed into an interactive display through the use of touchscreen technologies. In addition there are plans for HoloPro™ to also be able to generate sounds through special measures (transparent loudspeakers).

Cooperation

In its function as a research institution, the ILB secures the continuous further development and promotion of HoloPro™ and hence the unique standing of the product in the market. Apart from the improvement of quality, further application possibilities are also being sought.

At the same time pronova is supported by the affiliated company Exact Planwerk, a firm of consulting engineers who look after all products associated with the screen and foster the development of new products.

Projectors

Although during the time HoloPro™ was introduced only a few video/data projectors were able to project at an angle of 36.4° and to compensate the arising keystone effect, nowadays nearly all manufacturers produce projectors which are capable of doing so. Hence, the projection is now possible almost independent of specific projector manufacturers.

Projection technology

1. Projection

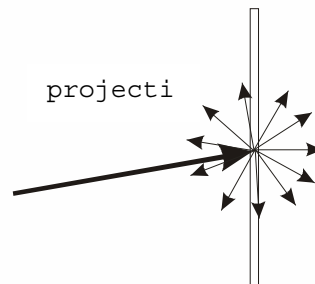
A small LCD chip is penetrated by rays of light emitted by a light source. A projection lens images this chip on the projection surface. The beam from the projector is invisible; a picture only becomes visible when projection light reaches the eye of the viewer.

In order to make the projected image visible the light of the entire projection surface has to be directed in such a way that it meets the eye of the viewer.

2. Projection media

One possibility of re-directing is diffraction. A diffracting medium, such as a frosted pane of glass or a rear projection screen, distributes the arriving light evenly throughout the room. As the projection can be seen from all directions the feared hotspot occurs in the case of straight projection: in the center of the image excessive lighting by the projection source becomes visible. Towards the peripheral edges there is a continuous drop in brightness.

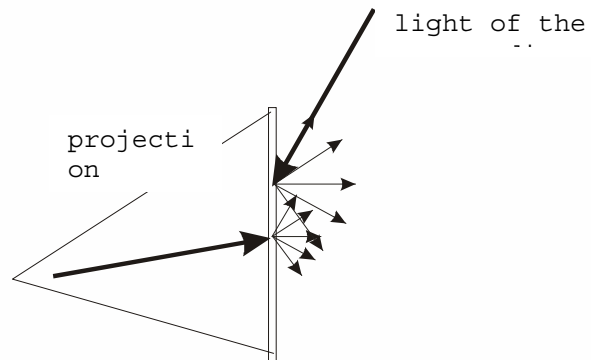
The wider the angle of the projection lens and the worse the light distribution by the projection surface, the more pronounced this drop in brightness.



As in this case the light is distributed vertically and horizontally to areas beyond the projection surface, the luminance efficiency is reduced: with an ideally diffracting screen the so-called gain¹ would be a maximum of 1.

However, since all materials absorb light and reflect it, this value generally is considerably lower for diffracting surfaces. The brightness of the image would be very limited and light generated at great expense would be wasted. In addition, not only the light of the projector but also the whole light of the surroundings is diffracted and the picture loses contrast.

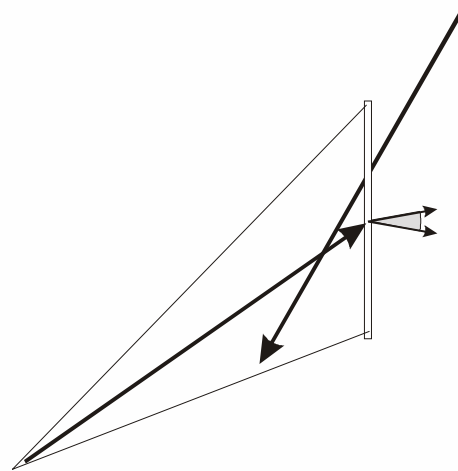
¹ Gain is the ratio between the light projected onto the projection area and the share projected in a specific direction. The maximum value is called peak gain.



For this reason, such types of projection surfaces should only be operated in darkened rooms.

3. HoloPro™

HoloPro™ successfully utilizes the direction selectivity of holograms in order to achieve a bright projection which is independent of ambient light. Only the light which comes from a calculated distance and from a calculated angle is optimally re-directed to the viewer by holographic optical elements (HOE) and contributes to the brightness of the projected image. Light from other directions passes unhindered through the hologram. As it is not diffracted it does not influence the contrast of the image. The peak gain is 3.8 in accordance with DIN 19045-4. No hotspot occurs because the light is horizontally redirected by 36.4° and the HOE is highly efficient.



The extremely high resolution of HoloPro™ prevents the Moirée effect. Another advantage is the high transparency: the projection image appears on a clear pane of glass, which remains transparent during projection. Since the image is only visible in the illuminated areas, the projected image appears to be floating.

Please observe that a bright background (lamps, bright walls or similar such items) is visible through the screen and can outshine the projected image. As long as the background is dark, it is even possible to project in sunlight. The light of the projector, which hits HoloPro™ from the correct angle, is directed into an angle range of approximately $\pm 30^\circ$ horizontally and $\pm 10^\circ$ vertically. A very bright projection image of high contrast which is not disturbed by ambient light is created within this “visible range”.

Awards

Since pronova assumed responsibility for the marketing of HoloPro™ we (together with our dealers who supported us) have been able to win the following design awards. Please do not hesitate to contact us in case you need the logos/awards for your own PR work:

Design prize of the state of North-Rhine/Westphalia, Germany, 2001
Prize of Honor for Product Design

Design prize reddot Award 2001, Product Design category, Europe

The Golden Mouse 2001, Eastern Europe

Japanese Innovation Award for Display Technology 2000

Corporate Media Award of Master 2000, Europe