



The Voyager Room at mbanx in Toronto, Ontario is designed as a teleconferencing room. A preset lighting control system allows for easy transitions between the various activities that occur in the space. Preset lighting scenes can be recalled at the touch of a button.

Interior design, Christine Weber/Marshall Cummings Associates;
Lighting design, Jerry Mobollo/Crossey Engineering;
Photography, Patrick Kennedy/East End Studios, with permission of mbanx.

Lighting for Teleconferencing Spaces

By James Robert Benya, PE, FIES, IALD, LC

© James Robert Benya 1997 All rights reserved.

Video teleconference rooms are among the most difficult spaces for which to design lighting. They combine the bright illumination requirements found in TV studios with the need for a darkened environment to allow viewing a video display screen. Making both possible at the same time is why special lighting systems and techniques must be used.

The secret to designing lighting for video teleconference rooms is to break the room in half. Taking the end in which the camera and screen are located, and then looking into the room, the room should be designed for relatively high illumination and proper balance of brightness on the ceiling, side and end walls, and the conference participants' faces and upper bodies. Taking the opposite end, the room should be designed for very low ceiling and side wall brightness, especially near the display end wall.



Scene 1: General Meeting – Lighting is brightest around the table. Window shades can be up or down.



Scene 2: Teleconferencing – the lighting is relatively high, with proper balance of brightness on the ceiling, side and end walls for video camera. Participants' faces and upper bodies are illuminated by ceiling fixtures that are angled for asymmetric distribution of light. Window shades are blacked out.

Lighting for the Camera

Modern teleconferencing video cameras are designed to operate without much attention or adjustment. The camera utilizes an automatic iris that adjusts the exposure to match the lighting conditions. As long as the illumination levels are adequate, the camera will produce an acceptable signal; however, as with any video camera, very dark areas will appear grainy or snowy, and very light areas will burn or streak. To eliminate these extreme conditions, all objects seen by the camera should be within a 100:1 range of luminance. Wall surfaces and furniture should be neutral in finish - grays, beiges, and other colors of around 30-40%. The floor usually isn't seen by the camera, but keep the floor relatively dark anyway.

To properly light the faces of the participants, called "key light", a relatively diffuse light source is recommended, preferably at an angle rather than straight down. Theoretically, indirect lighting would work very well for lighting the face, but there's a catch - the ceiling can't be bright. For this reason, indirect lighting systems generally aren't a good solution. Television studio lighting could also be considered, but the size and appearance of the equipment and the heat generated by it usually rule out its use.

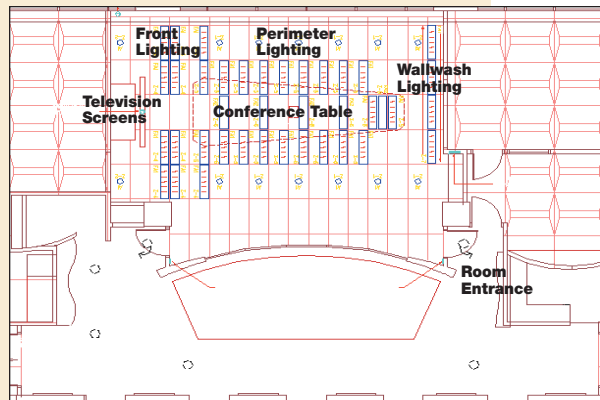
What appears to be the best solution for the primary lighting of this type of room is a special type of troffer having an angled lens and a black splayed baffle. Fluorescent lamps shine through a softening lens into the room at an angle, with peak candlepower at least 30 degrees above vertical. This creates a sawtooth ceiling which keeps the ceiling dark to the camera while providing abundant diffuse light onto the conference participants. Illumination levels of over 70 foot-candles in the vertical plane with excellent uniformity assures a good video picture.

Lighting for the Rest of the Room

Next, it's important to provide wallwashing specifically for the rear wall and side walls beginning around the first participant table. (Remember, the camera probably won't ever "see" the front part of the walls.) As with the light on the participant's faces, the wallwash lights must be shielded so that the camera isn't exposed to a bright lamp or reflector.

For the wallwash lighting, consider recessed or semi-recessed luminaires utilizing continuous T-8 luminaires or periodic luminaires with T5 twin tubes. Design the lighting system to achieve an average of 30 foot-candles, vertical, in the upper half of the wall and not exceeding 90 foot-candles anywhere on the wall. Dimming will be important here – see below.

Finally, consider adding work lights for the electronics and other tasks within the room. Even if the room only serves as a video teleconference space, providing separate lighting for the work areas is always a good idea.



Voyager Room – Reflected Ceiling Plan



Scene 3: A/V Presentation – Screen is lowered for audio/visual materials, and lighting is generally dark except for a layer of lighting on the table for note taking. Window shades are blacked out.



Scene 4: Unoccupied/Nightlight – Accent lighting washes the back wall and walk area of the room. Window shades can be up or down.

Lamp and Ballast Specifications

Traditionally, video scenes have been illuminated by incandescent and halogen lights. Even in modern news studios, this technology prevails. But that does not mean that incandescent lighting must be used for video teleconferences.

In fact, for many practical reasons, fluorescent lighting is the preferred source. If operated on high frequency electronic ballasts, there will be no flicker to interact with a video camera. Dimmable high frequency electronic ballasts are needed for balancing light levels.

Lamp color is the subject of some debate. While workable results can occur with just about any fluorescent lamps (including cool white), video professionals recommend high color quality, halophosphor 3200K lamps for the very best color rendition. These specialty high tech lamps, which are sold T-8 and T5 twin tubes, are designed to almost perfectly achieve the color of tungsten halogen lamps. However, the differences are subtle and satisfactory results can often be achieved with standard T-8 lamps. It really depends on the desired quality of the transmitted picture.

Keep in mind that cameras can be adjusted for different scene color temperatures quite easily. A high color quality 5000K fluorescent system can produce an equal video image to a high color quality 3200K system if the proper adjustments are made. However, don't mix light sources even though they are supposedly of the same color temperature, such as 3000K fluorescent and incandescent or halogen lamps. These lamps will create different color effects. Stick to one lamp and color type for the best results.

About the Screen

The hardest part of creating a video teleconference room is usually making the room dark enough to see the screen wall. This problem is related to the problems of computer screens in office space. In this case, the problem is caused by the bright lighting needed for the camera.

Small video conference rooms usually employ a TV-style monitor. A 35" monitor works fairly well for a room up to about 20' long, so an expensive video or computer projector isn't really needed for many video conference rooms. That's good news, because direct screen monitors are brighter and offer a sharper picture than low cost video projection systems.

Here's where we need to be reminded of the design methods used in motion picture theaters. To improve screen contrast and image sharpness, the room surfaces around the screen should be dark and shaped to shield the screen from ambient light. The dark finish on adjacent surfaces prevents the screen's own light from being diffusely reflected onto itself. In other words, proper architectural design is essential in achieving good screen image quality. Lighting should not be blamed for errors in fundamental room design.

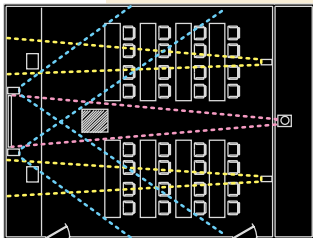
Bringing It All Together

Video conference rooms share one thing in common with TV and film studios – they need some form of lighting control including dimming. As a minimum, dimming is needed to balance the “key light” with the lights used to illuminate the walls. In more complex multi-use rooms, a dimming system is essential for dimming and managing the multiple lighting “zones” -- the “key light”, wallwashers, note-taking downlights, and work lights.

Because fluorescent lamps are used for virtually all lighting in more video conference room, the dimming system should be based around good high frequency electronic dimming ballasts. While most of the dimming needed in video conferencing rooms can be handled by generic 10% minimum level ballasts, the full range dimming ballast is preferable, especially if the room is to be used for other, non-video conference activities.

There are many fluorescent lighting controls that can be used to properly set the lighting levels. In modest rooms, dimming using a handheld “personal” dimmer or wallbox device may be adequate. For larger rooms, and especially the multipurpose rooms, a preset dimming system with at least one scene set for “video teleconference” is the proper professional solution.

ADDENDUM — AN ELECTRONIC CLASSROOM



Classroom optimized for video teleconferencing and distance learning.

An electronic classroom combines a video teleconferencing room with a “distance learning” classroom, taking maximum advantage of the infrastructure costs of high speed telecommunications and video projection. Given present technology and limited number of sites, this makes sense for a lot of schools, corporate training centers and other facilities seeking to maximize the use of the room.

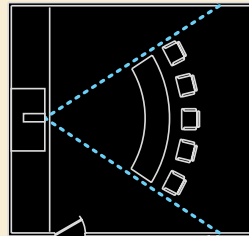
To the basic layout of the teleconferencing room, the electronic classroom needs lighting for the front or screen end of the room. Specific lectern locations are required and highly controlled key light, generated by tungsten halogen architectural or theatrical luminaires, are added for each lectern location. This permits the very difficult situation of simultaneous lighting of the lecturer and the display of video material on the adjacent screen.

Grazing wallwash luminaires can be added to illuminate the panels behind the lecturer and on either side of the screen. In addition, these lights can also serve to illuminate marker boards. Note that marker boards should be gray or have removable covers finished in a suitably neutral color. The ceiling in this area can be shaped and should be dark colored near the screen to prevent image-light reflections.

It will also be necessary to add low level “note taking” narrow beam downlights over the audience area so that students can take notes during a video presentation. These rooms also are quite capable of serving other educational and entertainment uses, such as 35 mm slide, film, and other forms of presentation media.

These more complex rooms often require trained operators and an equipment and control room is generally part of the design. Control for the lighting, which is still primarily fluorescent, will need to be managed by a preset dimming system. At minimum, a preset dimming system is required because of the various activities that occur in such spaces. Complex rooms also usually include various lighting zones, such as lectern lighting and wallwashes, that need to be managed by a preset lighting system. To make operating these rooms easier, touch-screen systems controlling video, audio, slide projectors, screen motors, drapery motors, and virtually anything else in the room are often used.

ADDENDUM — VIDEO CAPABLE MEETING OR BOARD ROOM



Basic video teleconferencing board room.

Generally the most expensive room in an office building is the board room or main meeting room. It is typically equipped with the best systems and has the best finishes and furniture. In the current market, the designers should also consider video conferencing.

The room is usually equipped for audio/video presentations, making the problem of video conferencing a bit easier. A large monitor, front screen projector or rear screen projection system can be used depending on the budget and room size. With the dramatically improved light output and quality of portable single lens projectors, creating a large screen image from a tabletop projector is quite viable.

As with the classroom, a layer of “note taking” lighting is added to the lighting for the participant faces and background walls needed for video conferencing. In this example, the video conferencing luminaire has been replaced by small cell louvers (“paracubes”) specially designed to have an asymmetric or angled distribution. A black or dark anodized finish is preferred over the standard silver metalized color. While not as efficient nor effective as the video conferencing luminaire, it will perform fairly well in many situation.

This type of room will be very common in the future as funds for highly-equipped spaces will be limited to a few rooms. Remember to make use of the room easier by using a preset dimming system that is clearly labeled.

LUTRON®

Lutron Electronics Co., Inc.

7200 Suter Road Coopersburg, PA 18036-1299

610-282-3800

www.lutron.com

©1998 Printed in U.S.A. 3/98 P/N 366-657