

**System Design Profile –
Clinical Assessment Labs - Health Science Learning Center – UW Madison**

The Clinical Assessment Center at the newly constructed Health Science Learning Center at UW Madison consists of 24 exam rooms in an Exam Area, a Control Area, an Orientation Room, and a Conference Room.

Each of the 24 exam rooms in the Exam Area is outfitted with two in-ceiling domed cameras. The cameras are remote controllable and programmable pan tilt zoom focus type and are placed on either side of the room for full room coverage. One camera primarily views the exam table and one camera primarily views the interview table. Each exam room is also outfitted with two in-ceiling microphones. The microphones are placed one over the exam table and one over the interview table for best overall coverage. The audio, video and control signals are sent to the racks in the Control Area.

The Control Area consists of six full height electronic equipment racks. The racks house all the audio, video and control equipment. The equipment for each exam room consists of a streaming encoder, a microphone mixer, and three LCD monitors. Two of the three LCD monitors display each of the cameras in the exam room. The third monitor displays the view that is being recorded or played back on the video encoder. The racks also house a large 48-input to 48-output audio video matrix router, an audio and video monitoring system, and a control system.



Equipment racks for the Clinical Assessment Center. Each assessment room has its own bank of monitors.

All functions of all processors can be controlled and setup via a single touch-screen mounted at the control station near the rack. The system can also be controlled from the Orientation and Conference rooms with a portable touch-screen. The streaming encoder records and plays back the pictures and sound from the exam room. All streaming

encoder transport functions can be controlled by the control system via the touch-screens. The microphone mixer mixes the audio from the two microphones in the exam rooms for recording and monitoring capability.

The 48x48 router is able to send the audio and video signals from any of the 24 exam rooms to any of the streaming encoders and the Orientation and Conference Rooms. The router is controlled by the control system via any of the touch-screens. The audio and video monitoring system allows the system administrator to view the activity of any exam rooms or evaluation stations as well as setup, trouble shoot and reroute system problems. The control system controls all exam room cameras, processors, video recorders, routing, and audio levels.

A 12” touch screen provides the instructor a user friendly graphical interface to select one of the 24 exam rooms. Once the room is selected, the instructor can select the view of the room to be seen on the touch screen and the view to be encoded. The instructor is also able to control the camera’s pan tilt zoom focus functions and presets, the stop start record and playback functions of the video encoder and adjust the audio levels.

The 24 encoding PC’s record the room activity. They start recording when a card is swiped through a card reader in the exam room. Periodically the files are uploaded from the encoding PC’s to the Storage server. From the storage server the files can be streamed or accessed over the web.

The Orientation Room has a ceiling mounted 32” monitor and control port. A control system touch screen can be plugged into the control port. The touch screen has all the same functionality that the evaluation stations have.

The Conference Room has a wall plate that allows for a roll-about monitor and control system touch screen.

When designing a system of this type it is very important to coordinate many factors of the room construction in addition to the basic system design.

Lighting

Lighting in the exam rooms is key to delivery of a good quality image. We consider elements such as lighting level, lighting angle, and overall color temperature. For lighting levels we must take care to provide good balance for the best camera performance. For angle, the key is to equalize the available light on the participants and eliminate shadows,

dark backgrounds, and bright spots in the center of the exam table. Diffused light versus direct light can help with glare or excessive whitewash. Furthermore, we must coordinate the lighting with the camera positions. Bright lights in the background of the camera image are very distracting. As for color temperature (expressed in Kelvin), we consider that optimum color temperature of light varies across each video input and streaming encoder. Then we coordinate the color temperature of the room lighting with your equipment selection.

Background Color

Another often overlooked design issue is background color. We recommend specific colors for backgrounds and wall coverings to enable better recognition of participants without straining the capture capabilities of the video camera. When considering furniture and walls we can advise as to how their color and physical characteristics may make the video or audio system have to work harder.

Audio and Acoustics

Audio setup is another important component of exam room. If the audio is good, minor glitches in the video can be tolerated without concern. The acoustics of the room should offer fair sound absorption and sound insulation. A room that is excessively “live” will sound dull and confusing and degrade intelligibility on the recording. Sound leakage between the rooms will become a distraction. Air handling noise must be minimized and the microphones must be appropriately selected with the correct pickup patterns to optimize the signal to noise ratio. We can create a computer simulation of the acoustics of the space to aid in material selection. Our expertise in applying signal processing to the microphone signals is key to optimizing their performance.

HVAC and Electrical Requirements

We also work with the electrical and HVAC consultants to make sure there is appropriate thermal management to accommodate the heat loads generated by the equipment racks as well as appropriate clean power to the appropriate system components.