

SECTION 36

SPECIAL REQUIREMENTS FOR VIDEOCONFERENCE FACILITIES

Table of Contents

36.0	SPECIAL REQUIREMENTS FOR VIDEOCONFERENCE FACILITIES	2
36.1	Design Issues.....	2
36.2	Acoustics.....	2
36.3	Lighting.....	3
36.4	Room Environment	3
36.5	Images	4
36.6	Services and Equipment.....	4
36.7	Equipment Standards.....	4
36.8	Furniture.....	5
36.9	Dedicated Videoconference Rooms.....	5
36.10	Videoconference Meeting Rooms	5
36.11	Lecture Theatres	6
36.12	Videoconferencing Definitions	7

Version	Date	Authors	Summary of Changes
1.01	3/6/2014	Derek Powell	Initial draft for VAVS approval
2	19/8/14		Issued to web

36.0 SPECIAL REQUIREMENTS FOR VIDEOCONFERENCE FACILITIES

36.1 Design Issues

Many of the design issues for Videoconference equipped spaces are similar to those for spaces where audio visual displays are used, but because communication is two-way, involving the use of microphones and cameras, matters of acoustics, space design and lighting are even more important.

Room Layout:

Backgrounds can add to the clutter or distract from the focus of a conference. To ensure a suitable background, consider the following:

- Avoid moving backgrounds such as curtains in a draft or people walking behind
- Locate doors either side or at the back of the room so that people can exit without crossing the camera's field of vision.
- Rectangular-shaped rooms are best for meetings with four or more people - all participants should be within the camera's view. Square rooms are suitable for smaller meetings with less than three people.
- Lighter shades of blue or grey are the best choice of background colours as white will reflect the light and make it difficult to see the participants face. Avoid shiny surfaces or bold colours.
- Wall finishes should be free from patterns that may create difficult working conditions for cameras. Patterns create more detail in the image making it difficult to compress resulting in jerky images.

The curtains and wall coverings in your room should be as simple as possible. Medium to pastel blue tones provide good skin tones on video cameras. If this is not possible, consider video conference specific backdrop blinds that can be lowered when required.

36.2 Acoustics

Refer to Section 18 – Acoustics.

Since videoconference spaces are often used for confidential meetings including student interviews and disciplinary hearings, care must be taken to ensure sufficient isolation so that conversations or “far-end” reproduced audio is not audible outside the room.

To this end, walls should extend to the slab above and be sealed with caulking on both the top and bottom of the walls. Wall partitions should have a low sound transmission rating. Entry and exit doors should be made of solid wood. Rubber door sweeps should be installed. Doors into the space should similarly have a minimum STC (Sound Transmission Class) rating of 45 to 55.

An acoustic engineer should be engaged to provide advice regarding the use of acoustical ceiling tiles, the use of suitable floor coverings to absorb and dissipate sound energy, and acoustic treatment to wall space in the room. Particular care needs to be taken if the room contains large windows or glass areas. Videoconference rooms should be designed to have appropriate reverberation times to aid intelligibility.

Noise Sources:

Mechanical devices such as heat exchangers and ventilation units should not be located in the ceiling above the immediate space or the surrounding areas. These devices will transfer mechanical vibrations into the space, adding to the overall noise floor.

HVAC diffusers, returns, and associated ducts should be designed to allow air to flow through them at minimal velocities and with minimal disruption of the airflow.

Microphones should be placed within the critical distance of the intended sound source. (Critical distance is the distance at which the direct and the reflected sound are equal.) This distance varies depending on the acoustical properties of the finished space. Aim for HVAC (NC 25-30 throughout room) SPL 35dbA or better – a lower number, and low sound ingress.

Locate Videoconference rooms away from “noise” sources like: exterior walls with windows; Elevators; Washrooms; Cafes; High Traffic areas; High speed photocopiers.

36.3 Lighting

Video conference venues are in effect small television studios and require additional care and consideration in lighting design. It is important to minimize shadows, eliminate glare, avoid reflective surfaces and to create an evenly lit environment. Specific advice for videoconference lighting may be found in the AETM Audio Visual Design Guidelines. Some key points are reproduced below.

The best general lighting for videoconferencing is diffuse fluorescent. However even fluorescent lights will cause unattractive shadows around the eyes of participants if placed directly overhead. When carefully placed fluorescent asymmetrical wall washer light fittings can provide an even light at a 45 degree angle that reduces eye shadowing. Small spotlights carefully applied can provide pleasant shading and highlights to the participant’s faces. For consistency of colour and skin tone reproduction by the camera use lights of the same colour temperature (e. g. 4000 Kelvin) and ensure illumination of participants' faces at around 500 lux.

Ideally, the room should not have any exterior windows. If it does, they need to be fully covered with curtains or blinds. Even a small chink of sunlight in the background can cause problems for the camera. Backgrounds and table tops should not be too dark or too light as this can cause difficulty with camera auto-iris control. Mid tones and moderate lighting levels on background walls will give the best results. Avoid patterned or woven fabrics and finishes on walls as these can produce moiré patterns or strobing effects when the camera is moved.

36.4 Room Environment

Any artwork, wallpaper, or corporate logo that are to be in the field of view of the camera should not contain busy patterns or multiple closely spaced horizontal, vertical, or diagonal lines. Recreating these patterns requires additional codec processing resources and can sacrifice overall image quality.

Table surfaces can be a source of glare. Specify matte finishes to minimize reflectivity.

Ensure that air-conditioning vents are not located adjacent to fixed microphones. Mechanical noise from fans can be obtrusive and airflow directly on microphone capsules can cause significant “wind” noise.

Camera and projector mounts must be located away from potential sources of vibration which can cause jitter in the image.

36.5 Images

The reproduced image size must conform to AETM guidelines. Monitors and screens should be sized such that the furthest viewer is placed further from the screen than a distance equivalent to 5.3 times the picture height.

The horizontal viewing angle to the screen must not exceed 45 degrees and the vertical angle from any viewing position to the centre of the screen should not exceed 15 degrees.

For further guidance refer to the current AETM guidelines at www.AETM.org.

It is recommended that videoconference monitors be capable of reproducing images in High Definition at a resolution of 1920 x 1080.

36.6 Services and Equipment

Power and data must be available to equipment racks, monitors and projectors and to the meeting participants (see below regarding the use of table boxes).

No trailing cables are to be allowed between the table and the walls as these are an OH&S risk. Floor-boxes should be located below tables to obviate the need for exposed cable paths.

Power provided to the table and the audio visual equipment should be sourced from the same electrical circuit – or if this is not possible, from the same phase.

Wireless network services should be available in videoconference spaces and subnet configuration should be planned in advance in collaboration with VAVS.

One or more telephone lines, and telephones (preferably hands free) should be provided. Many VC rooms will have two separate numbered telephones, one support and one for an external caller using a cell phone or POTS to call into the conference on voice only.

36.7 Equipment Standards

Audio visual equipment specifications and brands will be determined by VAVS. Current standards will be documented on the VAVS website. (See also Section 27).

Allowable Equipment

To ensure compatibility with JCU systems and spares holding the following preferred manufacturer's equipment shall be specified:

Control systems	AMX
Touch Panels	ELO or AMX
Audio DSP	BIAMP
Audio systems	Bose, JBL, Crown, Australian Monitor
Radio Microphones	Shure, AKG
Hearing Augmentation	Williams Sound – IR systems
Data projectors	Panasonic (Lamp-less projectors wherever possible)
Flat panels	Panasonic, Sharp, Samsung or other leading brands
Videoconferencing codecs and infrastructure devices	Cisco
Presentation Interfaces	AMX, Extron

Document cameras	Elmo, Lumens
Lectern furniture	Team Mate

Interface with JCU Supplied PCs

Where PCs are specified in designs the interface to the AV system should typically provide for HDMI connection and line audio.

Laptop interfaces should support VGA with line audio and HDMI.

Designers should consult staff from JCU's IT Services and Support with regards to the make and model of computers that will be supplied, currently the latest model Dell and Apple computers.

36.8 Furniture

Tables should be equipped with boxes to give access to power and data, as well as inputs from user provided laptops and portable devices. Connectivity should allow for HDMI inputs as a minimum.

Triangular or trapezoidal shaped tables allow viewers farthest from the camera/monitor to see and be seen, without having to lean over the table. Chairs should not rock or roll and should be upholstered. Wheels squeak when they roll and the rocking motion provides a distracting activity for fidgety, camera-shy participants.

If provided, Lecterns should be fixed and have room for electronics equipment – in a ventilated environment.

Consider placing a logo behind the users as long as it does not reflect light or detract from the participants. This can provide easy identification of the venue to “far-end” participants. Hang additional wall clocks in the room to display alternate time zones, particularly if contact is routinely made to overseas or interstate destinations.

The furniture should have a matt (or at worst satin) surface and should not be lighter than oak or darker than medium teak. Particularly, the furniture should not have any chrome or bright metal finishes which could reflect light into the camera lens.

36.9 Dedicated Videoconference Rooms

JCU policy is that meeting rooms must always be multi-purpose. To this end, all videoconference rooms must be capable of displaying content from connected equipment (such as laptops) even when no videoconference connection is active. VAVS staff are available to provide advice on standard design types already in use at JCU.

36.10 Videoconference Meeting Rooms

Meeting rooms that are equipped for videoconference typically have one camera only, mounted immediately adjacent to the monitor as close as possible to the centre of the image area. The camera must have a clear view of all participants, but should not be mounted too high as this provides an unnatural viewing angle at the far end.

The acoustics should be well controlled (see above) so that auto-tracking camera systems that rely on directional microphones to track the current speaker may be deployed. Plain backgrounds will also assist where facial recognition technology is employed in camera systems to provide auto focus.

Where possible, microphones should be positioned as a ceiling array, rather than mounted in (or on) the table.

36.11 Lecture Theatres

In larger teaching spaces two or more cameras are to be installed to cover both the teaching area (where the session originates from the “near-end”) and also the student (or audience) area for situations where the teaching is undertaken from the “far end”.

The lecturer’s camera must be capable of covering both the lectern area and the general teaching “stage” including the area of any whiteboards. Care should be taken so that the cameras are out of the reach of students, but not so high as to provide an unacceptably steep angle on the lecturer. Audience cameras must be situated such that a clear view can be obtained of every section of the audience.

One or more monitors should be provided for the lecturer to be able to view the far-end audience without turning away from the local audience.

These spaces must be fitted with sufficient ceiling mounted microphones to enable questions to be audible from students located anywhere in the audience area. Automatic echo cancellation must be provided at the microphone mixer to enable effective two-way communication without the distraction of echoes.

36.12 Videoconferencing Definitions

Word	Short-form Definition
Classroom	General purpose teaching space with a flat floor and loose furniture
Lecture Theatre	A general purpose teaching space which has fixed seating and a tiered or sloping floor. It is typically more intensively equipped for visual presentations
Bandwidth	Bandwidth defines the amount of information that can be sent and received in a certain time frame. In Videoconferencing, the higher the bandwidth, the higher the quality of the picture and sound during the Videoconference. Lower bandwidths result in more choppy pictures and sound.
Bridge	In videoconferencing vernacular, a bridge connects three or more conference sites so they can simultaneously communicate
Camera Presets	Allows predefined camera angles to be programmed into a videoconferencing system
Codec	Coder-Decoder. A codec is the core (or "engine") of a videoconference system and is responsible for all of the encoding and decoding of information (audio, video). Before the transmission, the codec converts analog signals to digital signals and compresses the digital signals. Incoming audio and video must be decompressed and converted from digital back to analog
Compressed Video	The codec compresses the information into smaller pieces for easier and faster transmission. This allows the information to be transmitted faster over smaller capacity lines. Due to the compression and decompression of information some of the original quality of the video and sound are lost which results in diminished picture and sound quality.
Desktop Videoconferencing	Videoconferencing on a personal computer. This is the most economical type of Videoconferencing systems. It is most useful for individuals and smaller groups
Document Camera	A camera used during a videoconference for taking pictures of still images, pictures, graphics, pages of text, and 3-D objects. All images can be sent to a monitor or as part of a videoconference.
Document Sharing	Allows users on both sides of the videoconference to view and edit the same computer document.
Echo-cancellation	(also Automatic Echo Cancellation (AEC)) Process of eliminating echo in a videoconference system.
Far End	The remote equipment and venue connected as part of a video conference
Frame Rate	Frequency that the video frames are displayed on a monitor, typically described in frames-per-second (fps). The higher the frame rate the better the quality of the video.
Full Duplex	Sending audio data in both directions at the same time. Usually higher quality, but requires more bandwidth. Provides much more natural and useable audio to a videoconference because people on either end of the conference can speak at the same time.
Gateway	The interface between two opposing protocols, such as H.320 and H.323. By means of software and hardware, a gateway allows connection between otherwise incompatible networks.
H.239	ITU Standard for sending data long as a dual stream in a videoconference.
H.264	ITU Standard for video compression sometimes referred to as MPEG 4 part 10.
H.320 Standard	A commonly used video compression standard for videoconferencing over networks that provide fixed communication paths (such as the ISDN phone network). By defining standardized ways of performing all of the processing that has to be done by a videoconference system, systems from different vendors can communicate with each other as long as they all comply with the standards. H.320 references many other standards for specific tasks (such as audio coding or video coding).
H.323	This is also a top-level standard, like H.320, for videoconference systems. The difference is that H.323 defines methods to be used on what are called packet-based networks (which are also called IP (Internet Protocol) networks) like a typical business, school LAN or the Internet.
H.324	The standards used to specify voice and video transmission over traditional analogue phone lines.

Half Duplex	A telecommunication system where data can only flow in one direction at a time. For example, a half duplex speakerphone only allows one person to speak at a time.
High Definition 1080i/1080p	1080i is the designated name for one of the HDTV video modes. 1080 stands for 1080 lines of vertical resolution, while the letter "i" stands for interlaced or non-progressive scan. The horizontal resolution of 1920 dots across and a frame resolution of 1920 × 1080 or over two million pixels with an aspect ratio of 16:9. In addition a field resolution of 1920 × 1080/2 (interlaced) or about 1.04 million pixels.
ISDN	"Integrated Services Digital Network". A type of telephone network that uses digital service right up to the end user's equipment. This type of telephone network also uses separate paths or channels for signalling so that the signalling information does not interfere with the data being sent by the user. It provides communications of voice, video, and text between videoconferencing systems at a faster data transfer rates than analogue telephone lines. Used for videoconferencing to remote areas or certain secure networks.
Kbps	kilobits per second
LAN (Local Area Network)	A computer network linking workstations, file servers, printers and other devices within a local area, such as an office. LANs allow the sharing of resources and the exchange of both video and data.
Multipoint Videoconference (via MCU)	Videoconference with more than two sites. The sites connect via a video bridge, which is also called a Multipoint Control Unit (MCU).
Point-to-point Videoconference	Videoconference between two sites.
POTS (Plain Old Telephone System)	This is the traditional analogue system for voice.
PTZ (Pan, Tilt, and Zoom)	Remote control features that typically come with high-quality cameras that are used in room-sized videoconferencing systems.
Room-based Videoconferencing	Videoconferencing using a larger and more sophisticated system. These systems can be mobile stand-alone systems or customized for the needs of the user. These systems are more appropriate for large groups and more sophisticated techniques.
Video Bridge	Computerized switching system (also known as MCU - Multipoint Control Unit), which allows more than two sites to communicate using videoconferencing. Many companies now offer bridging services for a set fee.
Videoconferencing	Interactive communication using video and audio to communicate over long distances. It combines the interactivity of the telephone with the visual stimulation of the television. Videoconferencing may also include graphics and data exchange.
WAN (Wide Area Network)	A communications network that services a geographic area larger than that served by a local area network or metropolitan area network. WANs include commercial or educational networks such as AARNet, Janet, and others.
AETM	Association of Educational Technology Managers (www.aetm.org) – an Australian Tertiary Education organization responsible for AV standards and guidelines
ANSI	The American National Standards Institute-a standards organisation.
Data Projector	An electronic device capable of projecting an image from a computer or video source onto a large display screen. (the terms 'data projector' and 'video projector' are normally interchangeable
AMX	A control system used by most universities which is manufactured by AMX Corp
VAVS	Videoconferencing & Audio Visual Services. This section is a unit within JCU's Information Technology and Resources Directorate and are responsible for design installation, maintenance and support in centrally bookable teaching and meeting spaces.
Sources:	Some definitions above derived from http://picturephone.com/learn/glossary.html Some text is reproduced from the AETM Audio Visual Design Guidelines – Tertiary Teaching Spaces (2 nd Ed.)