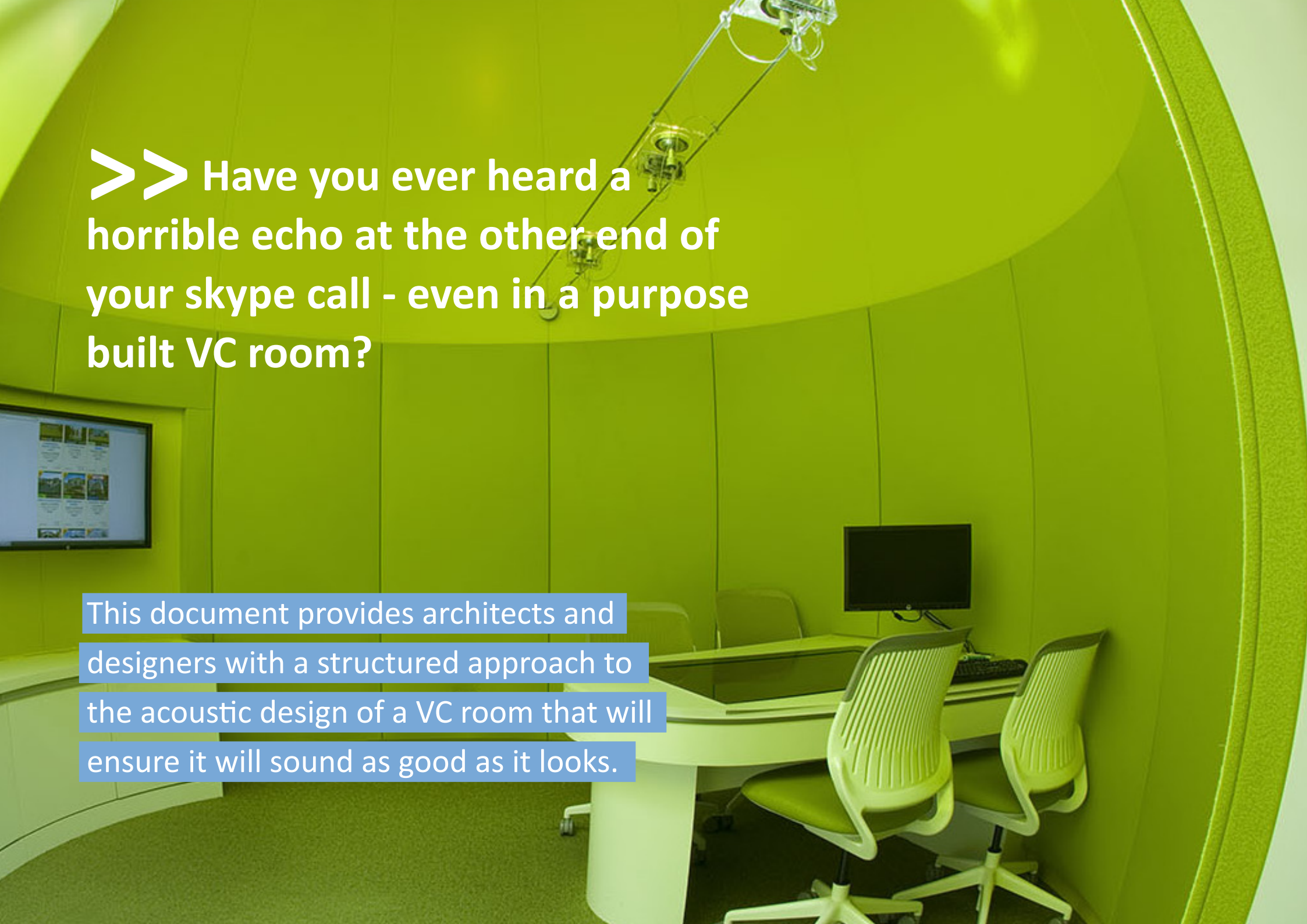


ACOUSTIC  
DESIGN  
GUIDE

# ROOMS FOR VIDEO CONFERENCES

MARSHALL DAY  
Acoustics 





**>> Have you ever heard a horrible echo at the other end of your skype call - even in a purpose built VC room?**

This document provides architects and designers with a structured approach to the acoustic design of a VC room that will ensure it will sound as good as it looks.

## >> KEY DESIGN CONSIDERATIONS

### PLANNING FOR ACOUSTICS TO CREATE IMMERSIVE VIDEO-CONFERENCE SYSTEMS

When designing a room for speech it is important to give consideration at the early design stage to how the room will sound. Video Conferencing (VC) is becoming an increasingly standard and essential feature in a commercial office fitout and the acoustic requirements for such facilities must be considered early.

As VC display and network standards improve, most VC systems now have the technical potential to offer genuine, natural and immersive face to face meetings; where beyond just speech and video reproducibility, the nuances of the speech and movements can be inferred. Practically however the VC experience is often compromised by the acoustics within the space.

The following outlines key aspects that should be considered early in design and incorporated into design briefs. Without appropriate room acoustic design the overall VC experience is compromised. Therefore the budget for the VC technology expenditure should be balanced with the budget for room acoustic treatment to ensure that the money spent on a high quality VC system provides the best possible return on investment.

Key goals for acoustics in VC spaces are:

- 1. High speech intelligibility**
- 2. Speech privacy**

The most successful environments  
consider the acoustics  
early in the design process

# 1. SPEECH INTELLIGIBILITY

The ultimate goal for a VC system is for speech to be effortlessly understood and that the speaker can use their natural voice range, with added inflections and nuances, as used in a normal face to face conversation.

The key aspects for speech to be clearly heard and understood are:

- Low ambient noise level, ensuring the intended speech is clearly prominent above all other noise
- Control of late echoes, standing waves and reverberation, limiting the noise build-up in the room that interrupts and muddles the discussion

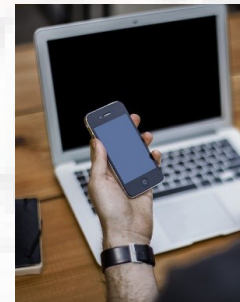


## THE BEST DESIGNS

1. Select room locations that require the least remedial treatments
2. Target a balanced room response that is not too subdued (dead) or lively
3. Have low ambient noise level, providing the least disruption to speech
4. Mitigate external distractions, through either layout or construction

Planning and early design considerations to achieve the above include:

- Internal finishes
- Room shape
- Ambient noise levels



**Fig. 1: Types of rooms used for VC**

*Top left clockwise - Dedicated immersive VC; Use of speakerphones in breakout rooms; Use of laptops (e.g. Skype) in breakout rooms; Meeting rooms with VC*

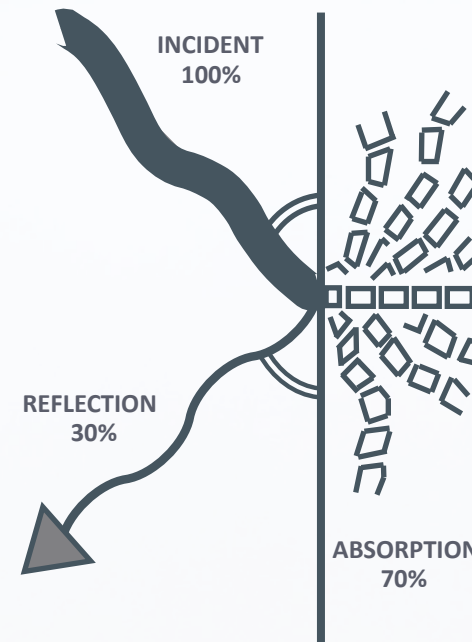
## INTERNAL FINISHES

Typically suppliers of VC systems recommend a reverberation time (RT60 ) in the range of 0.3 to 0.5s. This is typically more subdued or dead than a standard meeting room. The recently released Australian Standard AS/NZS 2107:2016 goes further, recommending a range of 0.2-0.4s for dedicated VC / audio conference rooms.

Internal finishes should be carefully selected to provide the right balance of absorption and reflection.

## ROOM SHAPE

An often overlooked early consideration is the room shape. Avoiding square rooms and parallel walls (particularly glazing) can eliminate flutter echoes and the need for remedial wall panel treatments.



### Absorptive materials

- Fabric acoustic panels
- Ceiling tiles
- Carpet
- Perforated plasterboard
- Slotted timber

### Reflective materials

- Glass
- Concrete
- Timber
- Plasterboard

Fig. 2: Acoustic reflection vs absorption

Internal finishes should be carefully selected to provide the right balance of absorption and reflection

## AMBIENT NOISE LEVELS

In selecting the VC room, it is important to consider a location that is not exposed to excessive noise ingress, noting that rooms that may be suitable for non-VC internal meetings may be unsuitable for VC. For example, road traffic noise impacts are often more prominent in a quiet VC room compared to an open office space.

Break-in from adjacent spaces also needs to be considered particularly where the room is adjacent to open office or informal meeting areas.

Setting building services design targets early is paramount as these may inform fundamental choices about the types of mechanical systems required.

Typically VC system suppliers recommend ambient noise levels 30-35dBA to have a good buffer between speech and

the background noise level. This is generally much lower than a base-building provision of 40-45dBA, suitable for open office areas.

Often to accommodate the cooling load, large meeting rooms will require dedicated mechanical plant (e.g. a fan-coil unit or water-cooled package unit). Ideally this should be located outside the room with air ducted into and out of the room. Otherwise substantial (i.e. physically large) upgrades may be required to control noise from the unit itself as well as the supply and return air ducts. Such treatments may impact ceiling heights, which is another reason they should be considered early.

Setting building service design targets early is paramount as these may inform fundamental choices about the types of mechanical systems required

## 2. SPEECH PRIVACY

Acoustic privacy can be important for a range of reasons. These include speech confidentiality of sensitive information, limiting distracting noise break-in and the perception of privacy (which can be particularly important for external client meeting spaces). Some early planning considerations for meeting room locations are as follows.

### WALL HEIGHT

Unless there are substantial mass layer ceiling controls, full height walls are generally required, which may impact the mechanical services design requirements that should be considered in budgeting.

### FLANKING

Where meeting rooms adjoin the façade, flanking via the connection to the window mullion can be critical. Similarly, modifications may be required to base-building perimeter diffusers where they cross over partitions.

Immediately outside the VC room consideration needs to be of the closest listener, and whether they are near acoustically weak points in the partition (e.g. glazing / doors). It should be noted that where there is no visual connection between spaces that there is a subconscious presumption that acoustic privacy is also provided. Where no visual connection exists, a high level of acoustic privacy should also be provided.

Acoustic privacy can be important for a range of reasons, including speech confidentiality of sensitive information limiting distracting noise break-in and the perception of privacy



## DOORS

Finally, it must be recognised the weakest point of any partition will be the door. High rated acoustic doors may be required to match the speech privacy intent. Systems are available that are not substantially more expensive than a standard door, however they do require more co-ordination with regards to seal location, frame upgrades, threshold requirements and the catch / handle mechanism.



# >> SUMMARY

This design guide is intended to give architects and designers an overview of the approach we recommend to achieving the best possible acoustic environment in rooms designed for video conferencing.

In summary, consider the following:

## 1. Speech Intelligibility

- Internal Finishes
- Room Shape
- Ambient Noise Levels

## 2. Speech Privacy

- Impacts to mechanical services
- Visual connection to external spaces
- Acoustically weak points in the partition

## 3. Involving an acoustic engineer early in the design process

With these requirements in mind, and early consideration in planning, a high performance VC room can be economically achieved. A suitable acoustic design can unleash the potential of VC technology and help to realise the full advantages of remote meetings.

## CONTACT US

Marshall Day Acoustics works across all areas of acoustic, sound system and theatre design, with offices across Australia, New Zealand, China, Hong Kong and France. We are industry leaders in the development of room acoustics modelling software and as one of the largest independent acoustic design consultancies globally, we have access to a wealth of technical expertise.

Call your local office to discuss how we can assist you with your project.

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