AUDIO
AES
138TH INTERNATIONAL CONVENTION
SOFITEL VICTORIA HOTEL, WARSAW, POLAND
• MAY 7–10, 2015 •
STUDIO SOUND SERVICE
DONATO MASCI - WWW.STUDIOSOUNDSERVICE.COM

# Project Studio Expo Session PS9
# **Implementing Practical Acoustics**

Donato Masci
donatomasci@gmail.com

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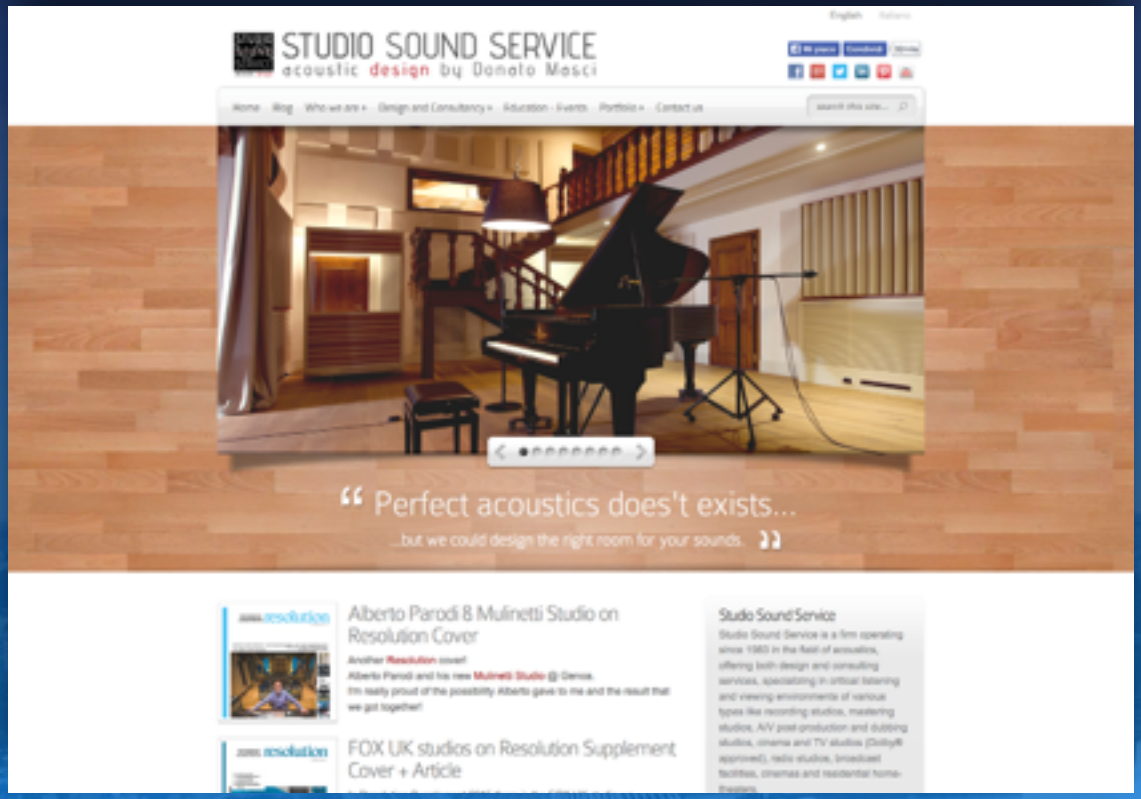
# Studio Sound Service s.a.s.

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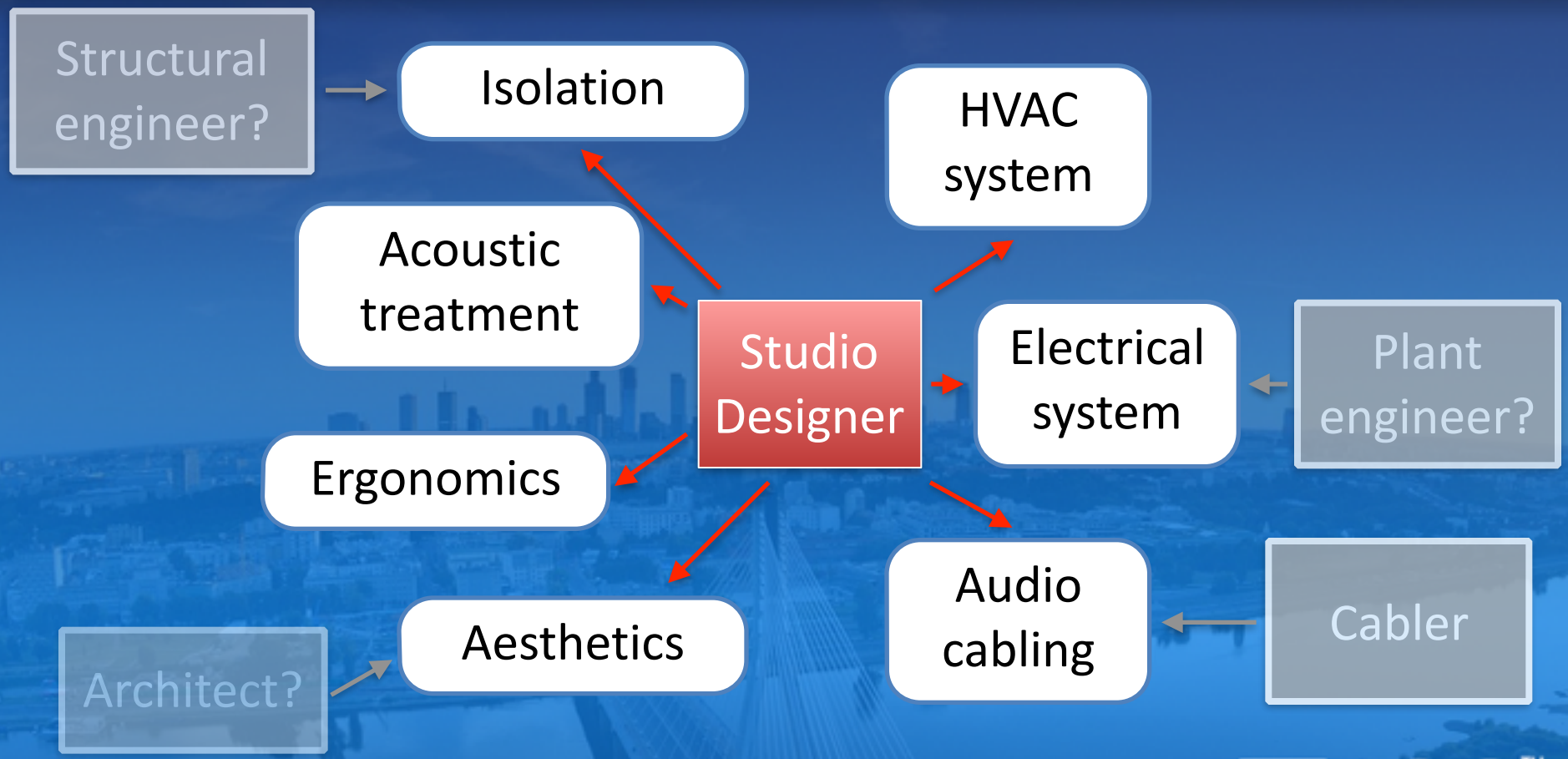
# Portfolio

70+ recording and audio-video (post)production studios
Acoustics for Churches, Theatres, Auditoriums, Conference Rooms, Home Theatre etc.

Among the most important projects:

- FOX International Channels @ Hammersmith, London (UK) – a/v post-production studios
- Mulinetti Studio (Alberto Parodi) @ Genova
- House of Glass @ Viareggio (LU) (**Resolution** Award 2013 – Best Audio Facility, Nomination)
- The Garage @ Civitella v.d.C. (AR) (**Resolution** Award 2014 – Best Audio Facility, Nomination)
- PPG Studios (Andrea Bocelli) @ Santo Pietro Belvedere (PI)
- **In House,** Mirko Perri @ Roma - Dolby® approved cinema mixing theatre, color correction (sound design for **"La Grande Bellezza" di Sorrentino, 2014 Oscar**)
- **George Lucas** Home Theater, Italy
- Santa Maria Nuova Church (Arch. **Mario Botta**) @ Terranuova Bracciolini (AR)
- **Prada** @ via Orobia, Milano - Auditorium and Conference Room
- **Ferrari** @ Maranello - Projection room of the Ferrari Museum

# Audio facility design



# Control room design

What cannot be a control room?

a. an anechoic chamber (too big and too difficult to work inside!!!)

b. a “typical” domestic room (in which country and how big?!)

What has a control room to be like?

**Like a place where listening is as neutral as possible.**

↓

Standards and guidelines!!!

EBU ITU AES

# Control room design

ACOUSTIC CAD simulators (EASE, CATT, ODEON) can not be so helpful (<100 Hz), they could not simulate the modal response of the room.
FEM simulators (COMSOL) can be helpful for low frequencies, but they are really not so used.

We just use **basic physics, geometry, experience** and typical design:

LEDE | RFZ | Non-environment

*… and a lot of measurements…*

# Standards and objectives

## Reverberation time

$$T_m[s] \approx 0.25\left(\frac{V}{V_0}\right)^{1/3}$$

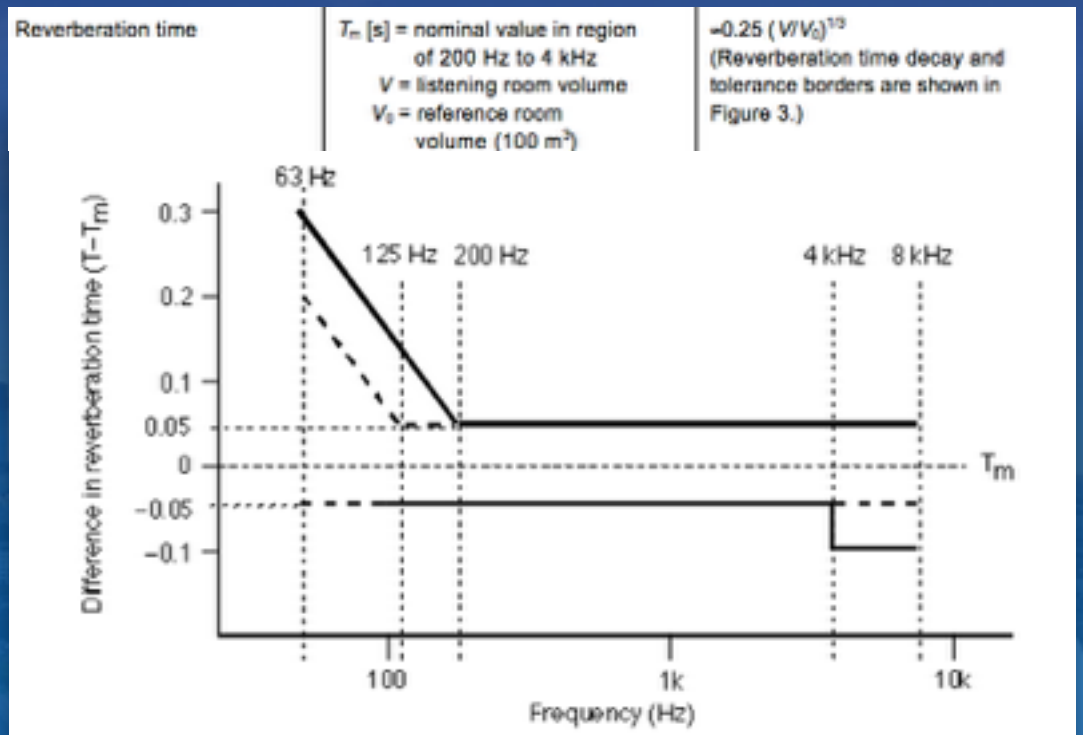



Figure 3. Tolerance mask for reverberation time, relative to arithmetic average value $T_m$. (Based on international recommendations, but extended to lower frequencies, with smaller tolerances in the range of 63–125/200 Hz.)

# Standards and objectives

## Frequency response

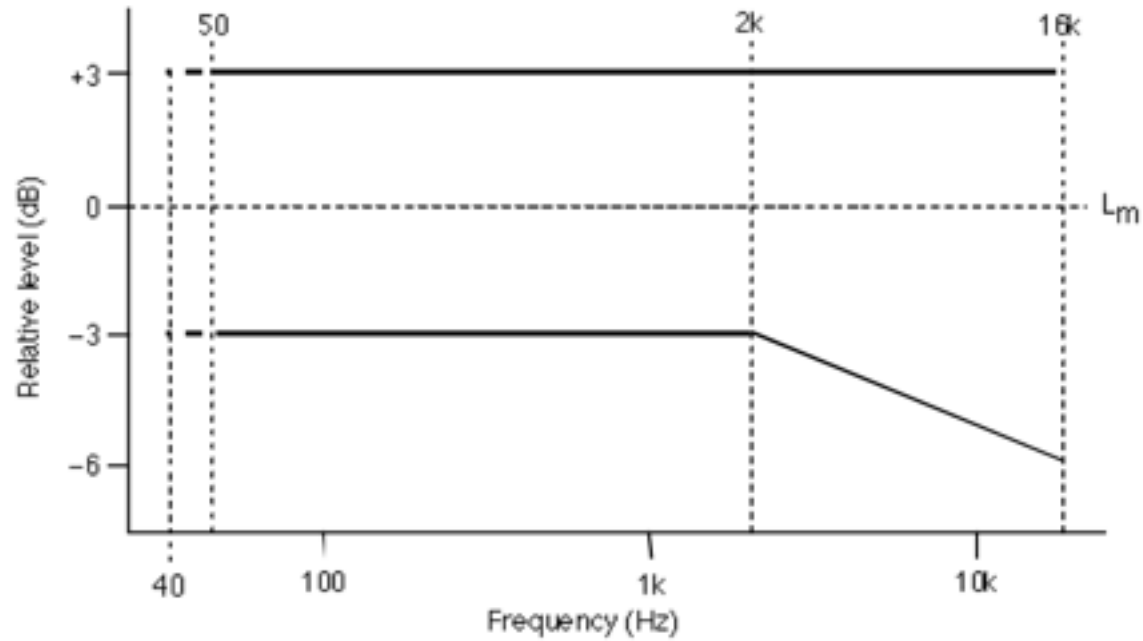
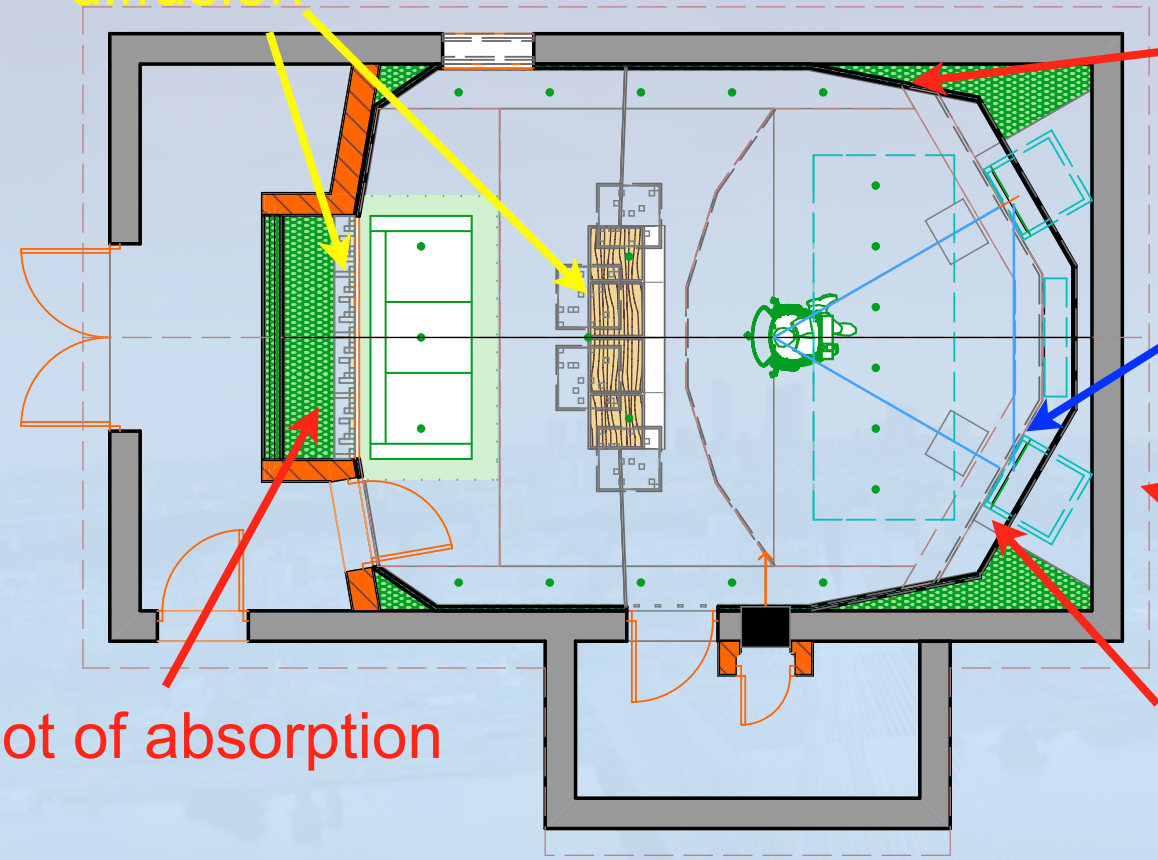



Figure 4. Tolerance limits of operational room response curve, relative level. (Based on international recommendations but extended to lower frequencies.)

# Starting from scratch



# Starting from scratch

The Garage Studio (Fabrizio Simoncioni)
@ Civitella val di Chiana (AR)
nominated for Best Audio Facility 2014
Resolution Awards

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# The Garage Studio (Fabrizio Simoncioni)

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REVIEWS: Drawmer MC 2.1 · Focusrite RedNet · McDSP 8020, AE400 & SPC2000 · Rosendahl Nanoclocks GL · Thermionic Culture Phoenix HG15 · Yamaha HS8

AUDIO FOR BROADCAST, POST, RECORDING AND MULTIMEDIA PRODUCTION

resolution

V15.1 JANUARY/FEBRUARY 2014 • £5

Manny Marroquin: music mixer · Live broadcasting The Voice of Germany · Sound through cinema screens

Birth of broadcaster BT Sport

The Fabrizio Simoncioni interview

Watkinson challenges 4k

# The Garage Studio (Fabrizio Simoncioni) nominated for Best Audio Facility 2014 Resolution Awards

# Starting from a "typical" ordinary room

1. Choosing the right room
   (dimensions, doors and windows, etc.)
2. Acoustic isolation
3. Listening point/area
   (room modes)
4. Studio monitor positioning
   (close to the wall, min. phase low frequency boost)
5. Acoustic absorption
   (a lot of space!)
6. Acoustic diffusion

# 1. Choosing the right room

## 1. Height

- a 3m room after insulation would be 2.7m without treatment;
- if you have a 2.4m room the listening point (1.2m) is in worst position;
- 40÷80 cm for acoustic treatment is needed for a professional result.

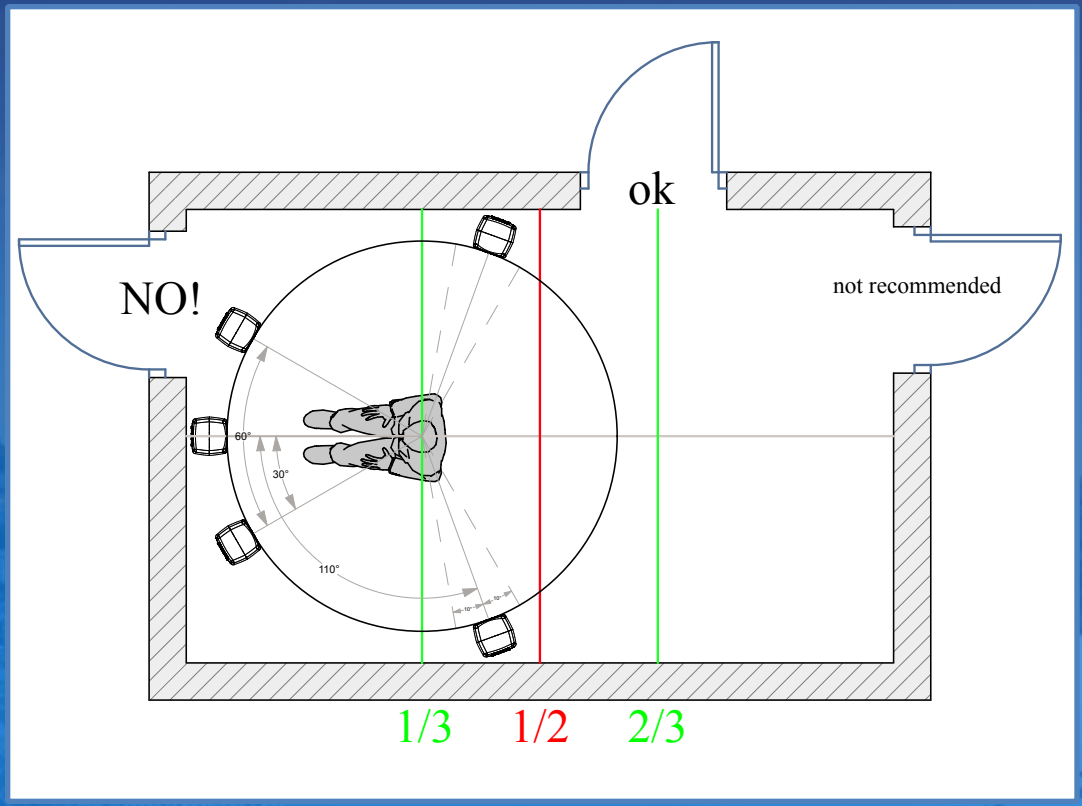
## 2. Dimensions

- you could prefer a “good sized room” (Bolt Area etc.) but after a proper treatment this is not so important, however…
- avoid square and cubic rooms!!!
- a longer room it's better than a wider one;
- for small rooms, please do not think that lowering the ceiling is better because room returns in the optimum dimensional relationships!

# 1. Choosing the right room

## 3. Doors

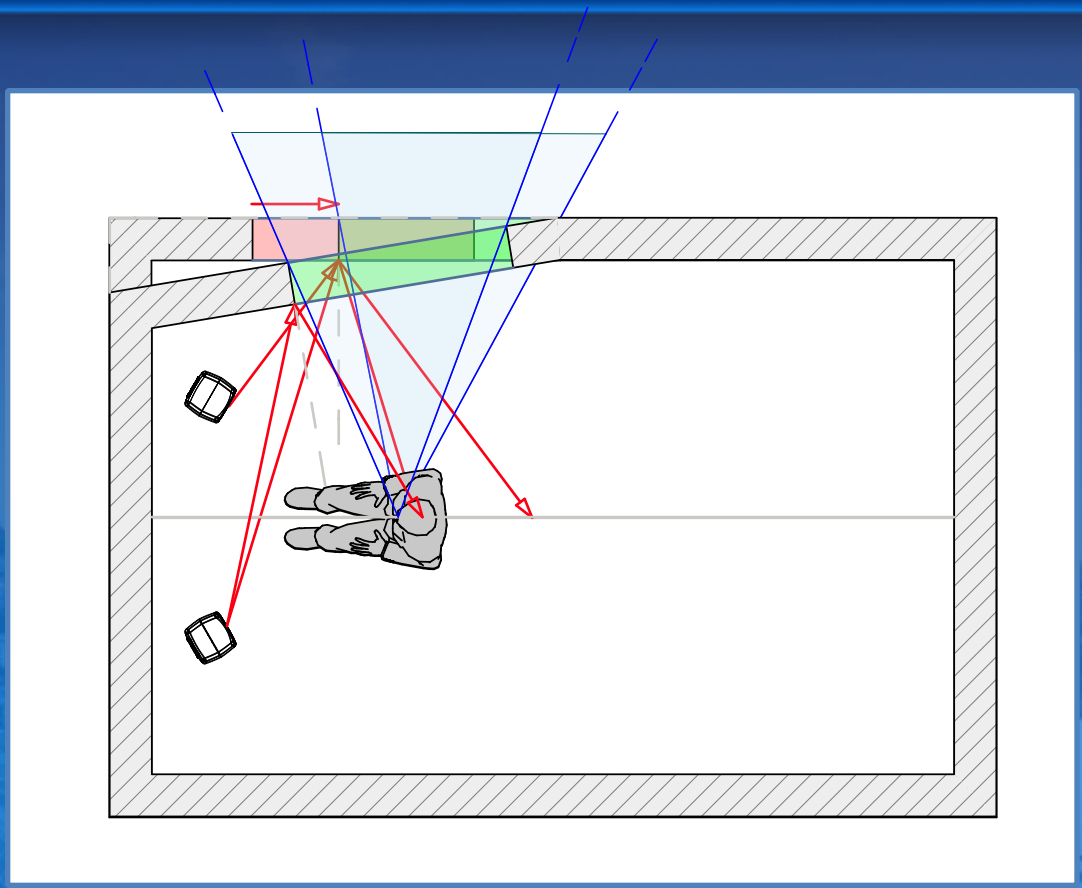
- avoid placing the door on the front wall (in particular if the door is not really massive);
- the best place to have the door is on the side, behind the sound engineer;
- you could have a door on the back of the room, this being not too small.



# 1. Choosing the right room

## 4. Windows

- if you use a 5.1 system or you work for cinema, avoid a front window;
- if you want a window on the side wall, close to the room's front, the only way is to tilt the side wall to address reflections behind the listening area;
- please do not abuse of glass, we could arrange a correct reflection but it has a lot of problems especially on low frequencies.



# Mulinetti Studio (Alberto Parodi) @ Genova
# Resolution Cover 04/2015

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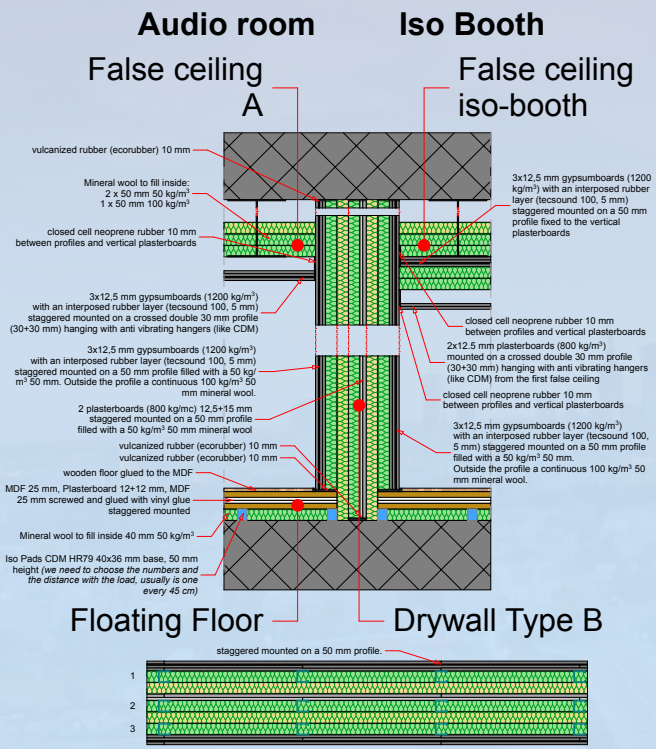
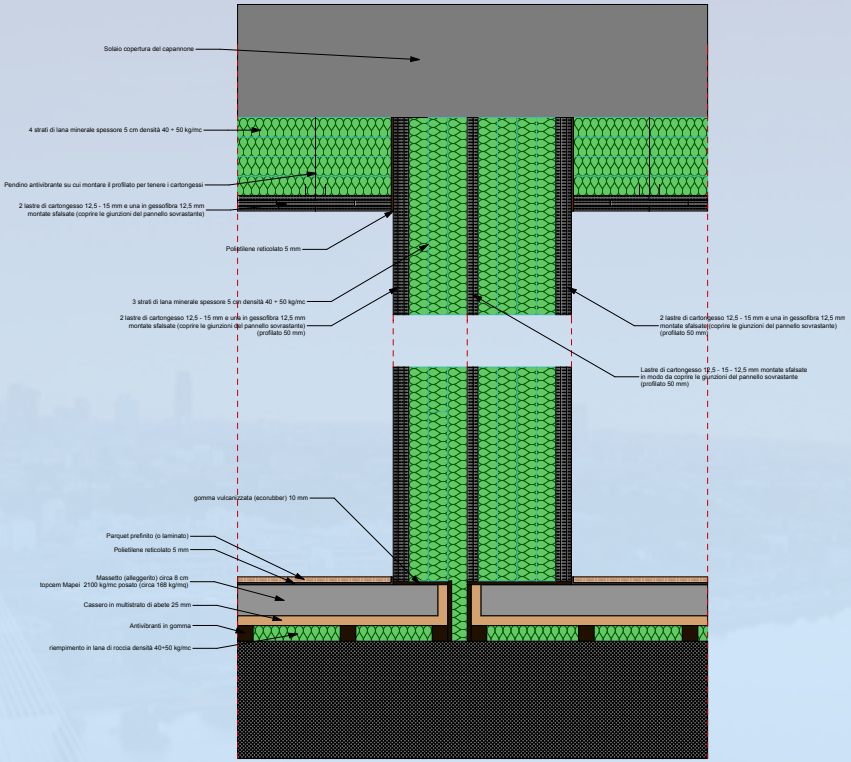
# 2. Acoustic isolation




Parete divisoria



# 2. Acoustic isolation

Floating Floor

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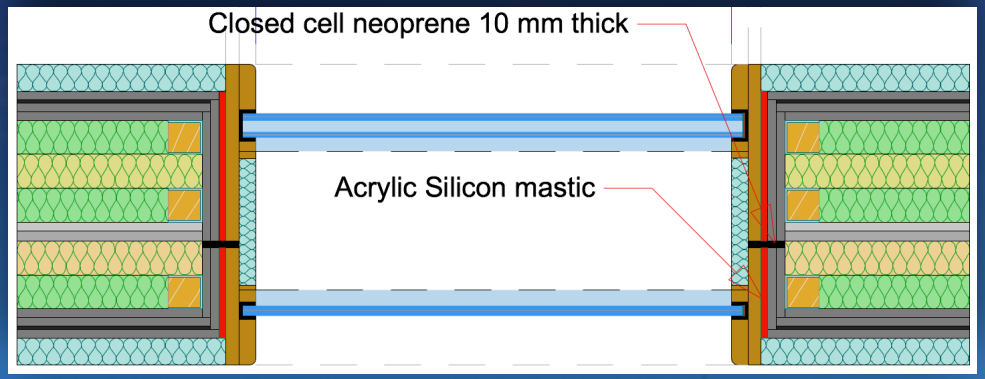
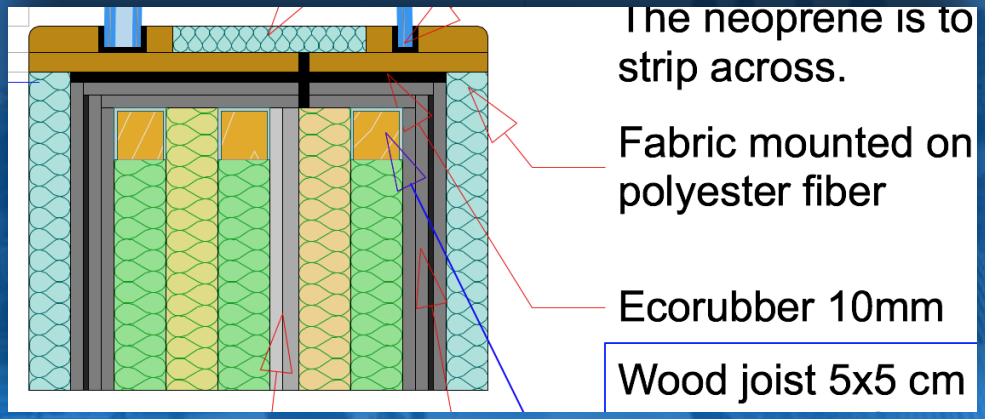
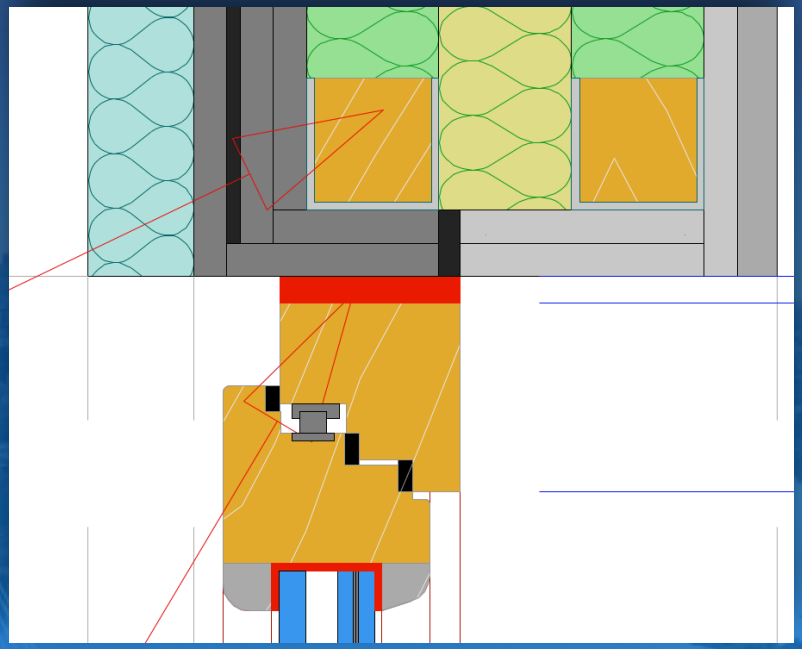


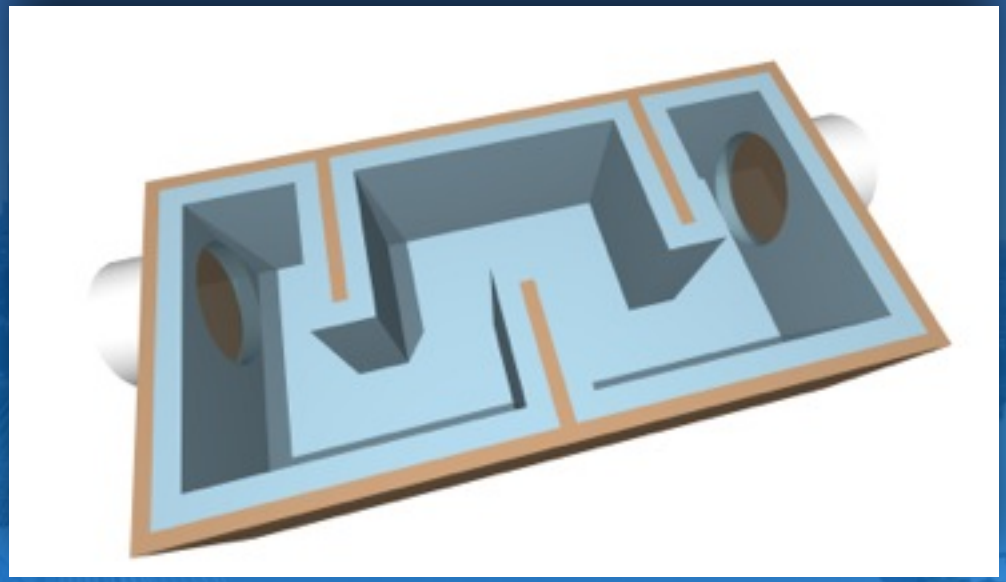




## Doors and windows

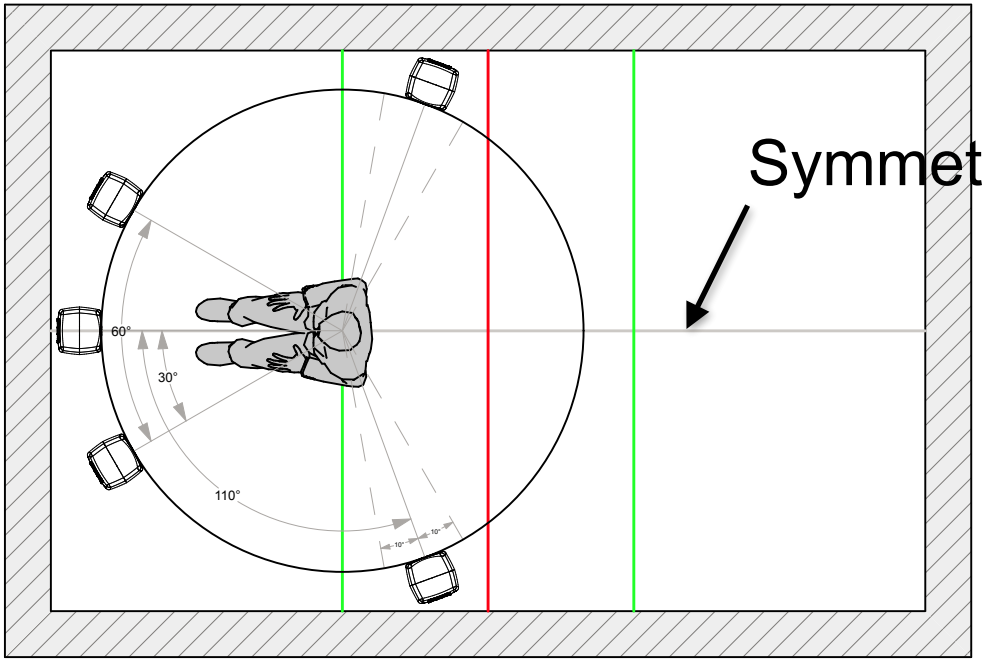


# 2. Acoustic isolation

HVAC silencers



# 3. Listening point/area

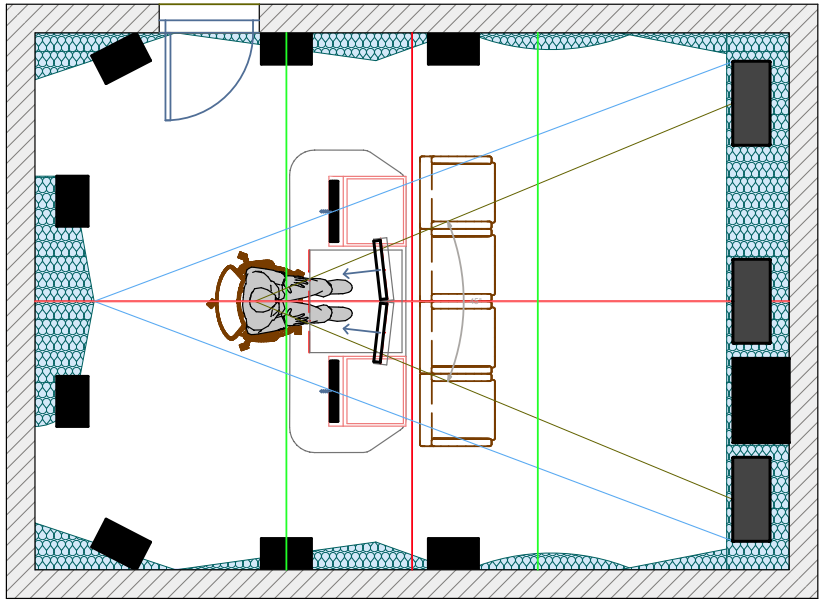



Symmetrical axis L/R

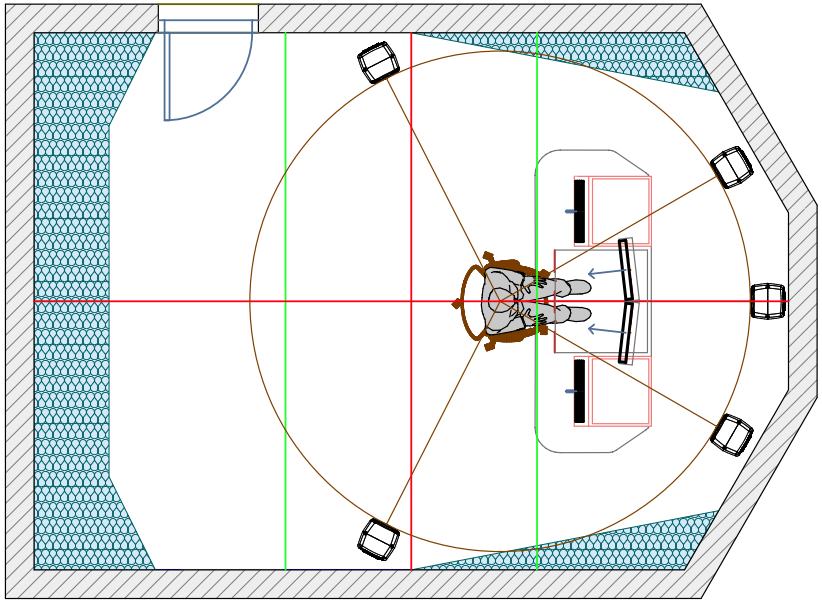
1/3 1/2 2/3

# 3. Listening point/area

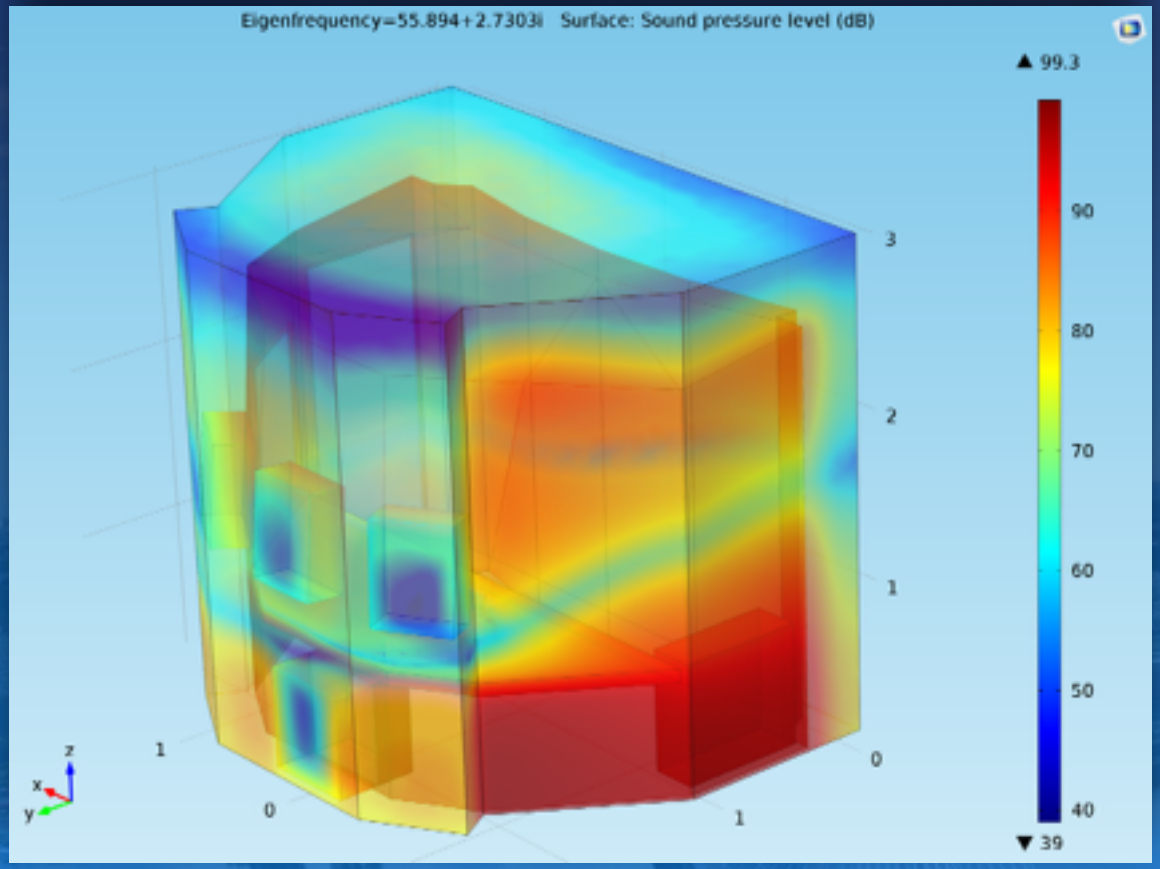
Diffuse Field (Dolby) (2/3)



ITU (1/3)



# 3. Listening point/area




FEM simulation (COMSOL)

FOX intl. ch. UK

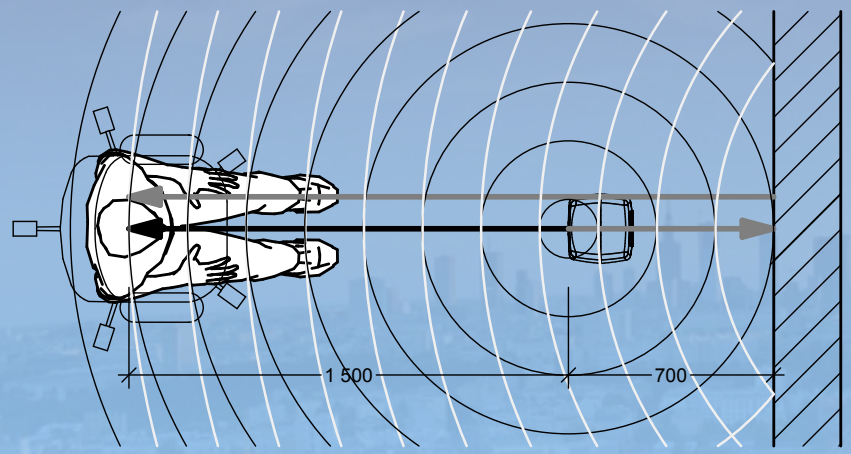
Thanks to B&C Speakers for the image

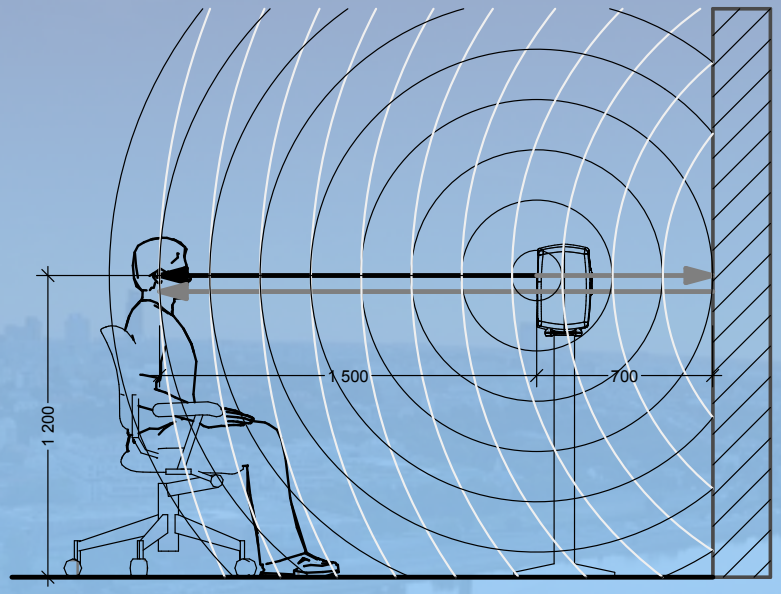
# 4. Studio monitor positioning

1. Flush mount: big monitors are really nice…!
   - concrete
   - multilayered baffle (MDF, Plaster, Lead, etc.);
2. No flush mount: close to the front wall (solid back!);
3. With sub-woofer: place the sub-woofer close to the front wall, then you can move the monitors from the front wall.

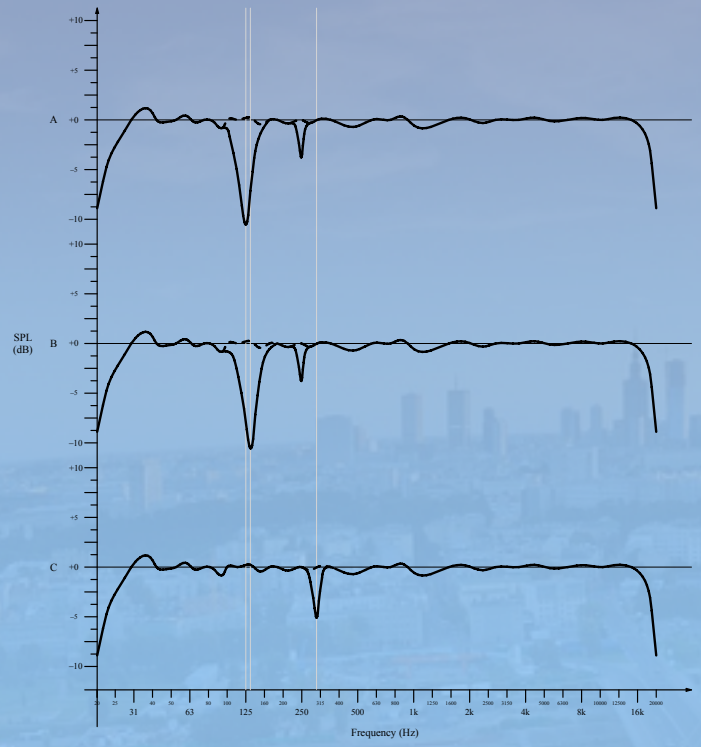
Look at the GENELEC guidelines.

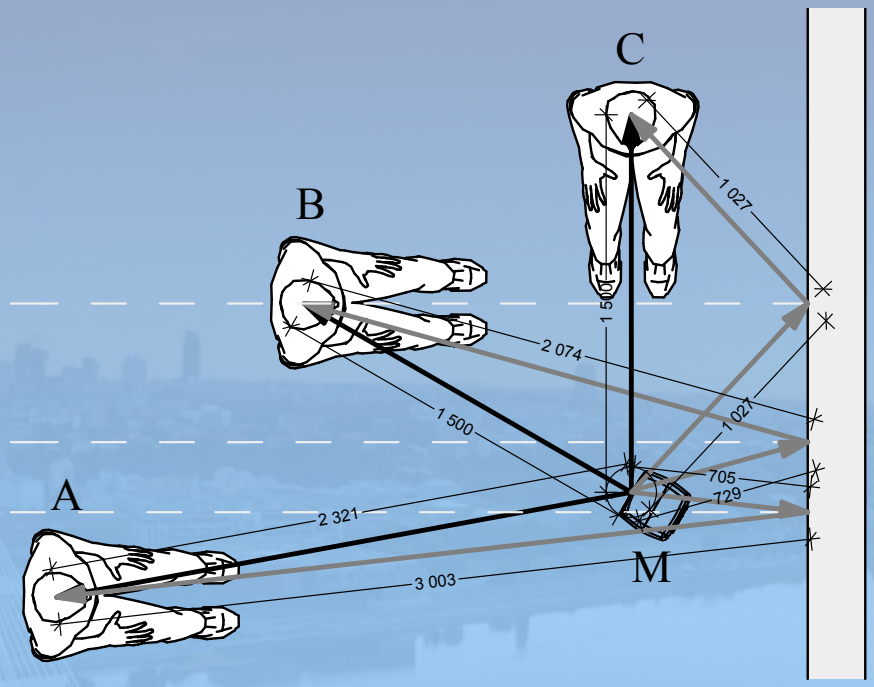
# Minimum and non-minimum phase effects



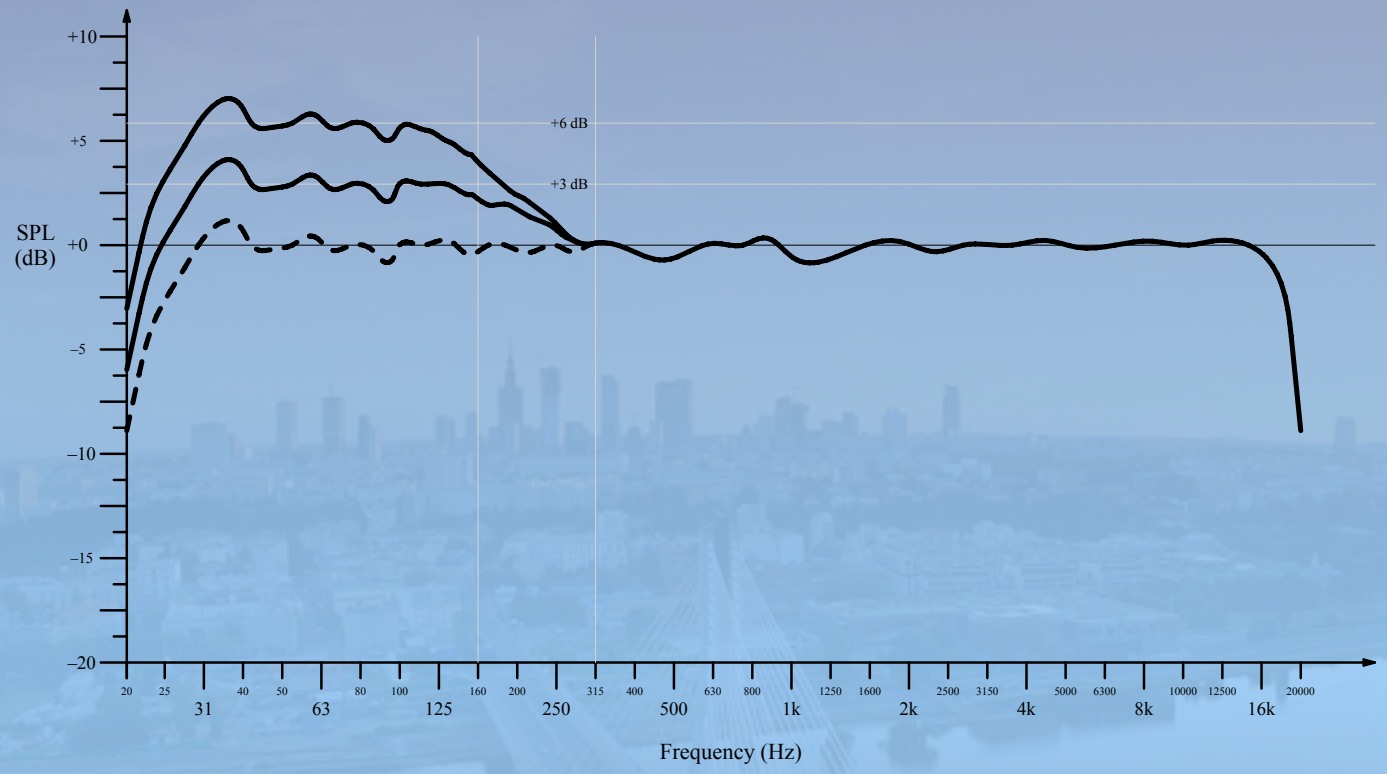



# Non-minimum phase effects



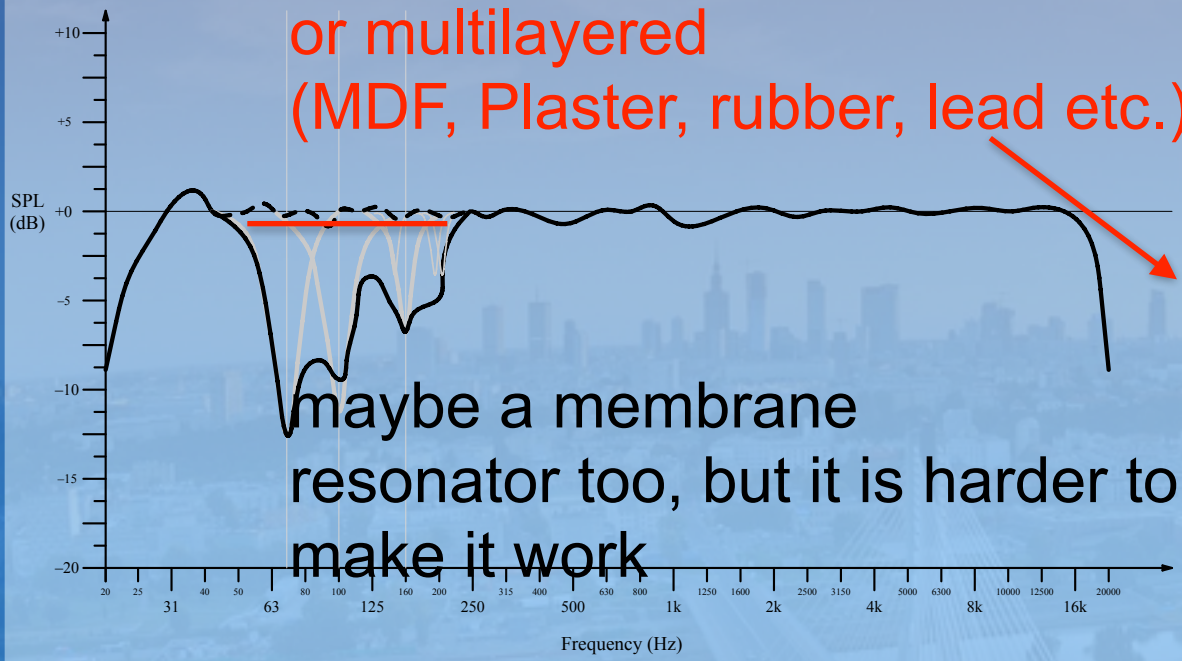



# Minimum phase low frequency boost

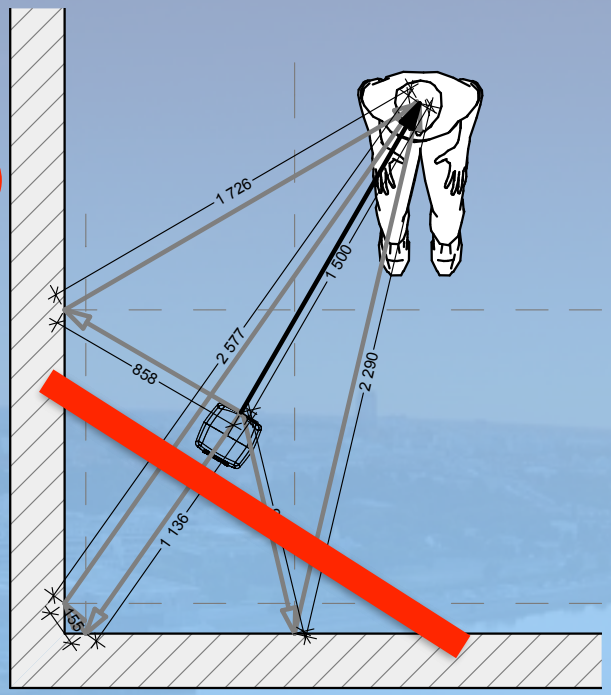


# Corners

Solid (concrete, masonry)
or multilayered
(MDF, Plaster, rubber, lead etc.)

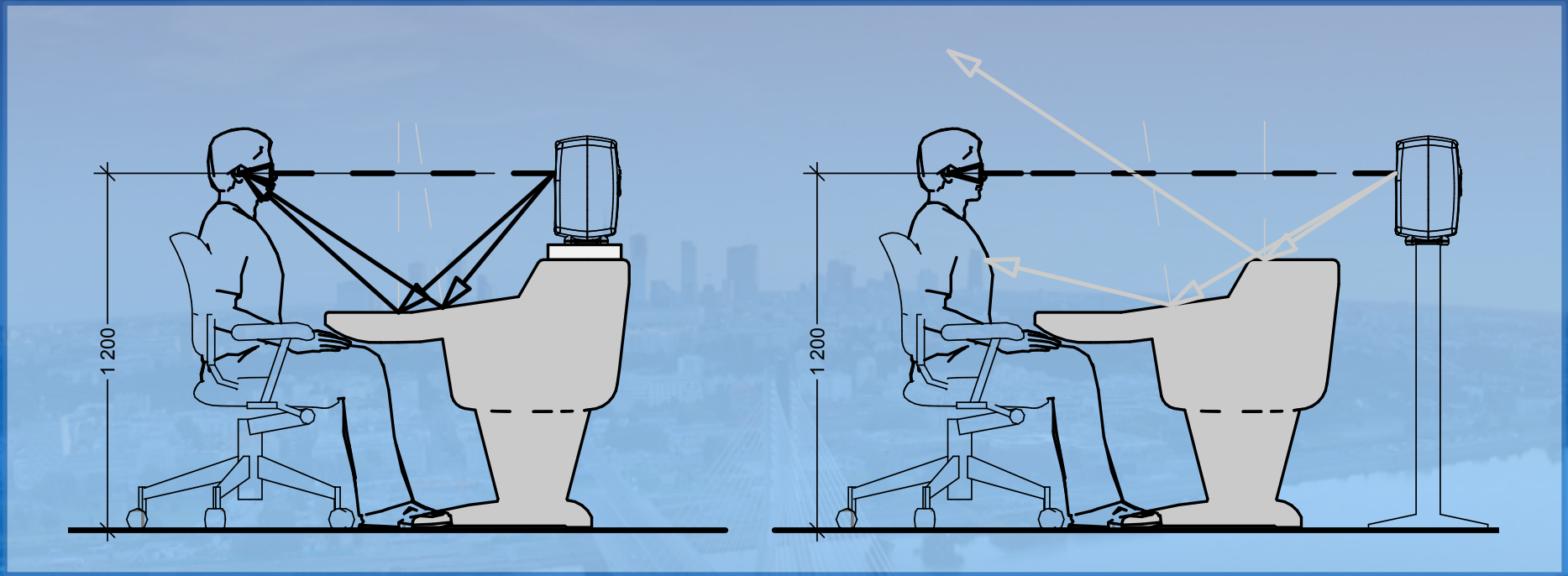



maybe a membrane resonator too, but it is harder to make it work



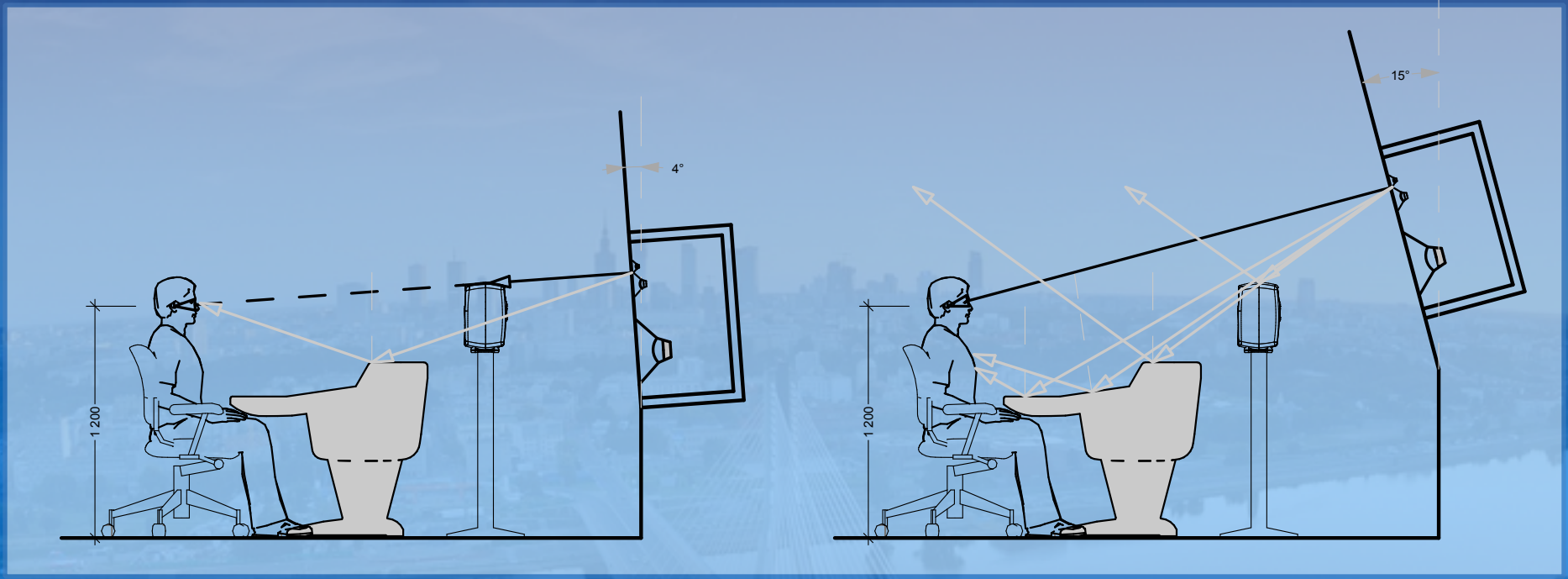
# Controlling the reflections from the console

Do not place the speaker on the meter bridge!



# Controlling the reflections from the console

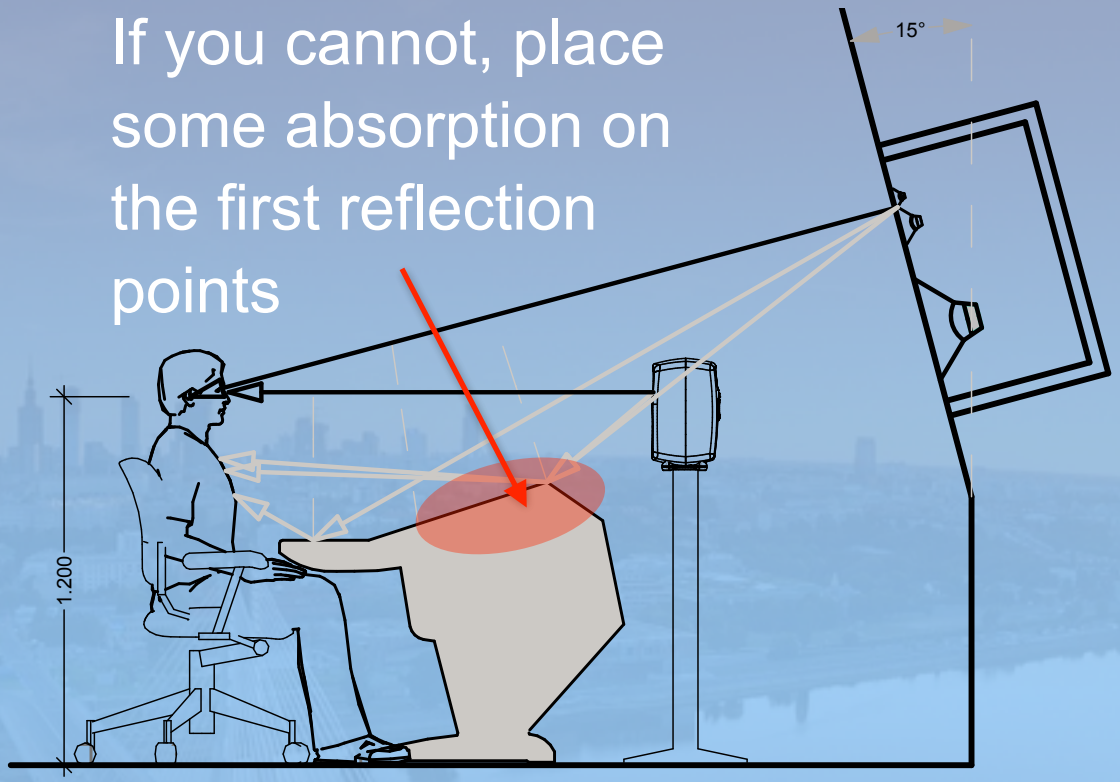
## Big Monitors and nearfields



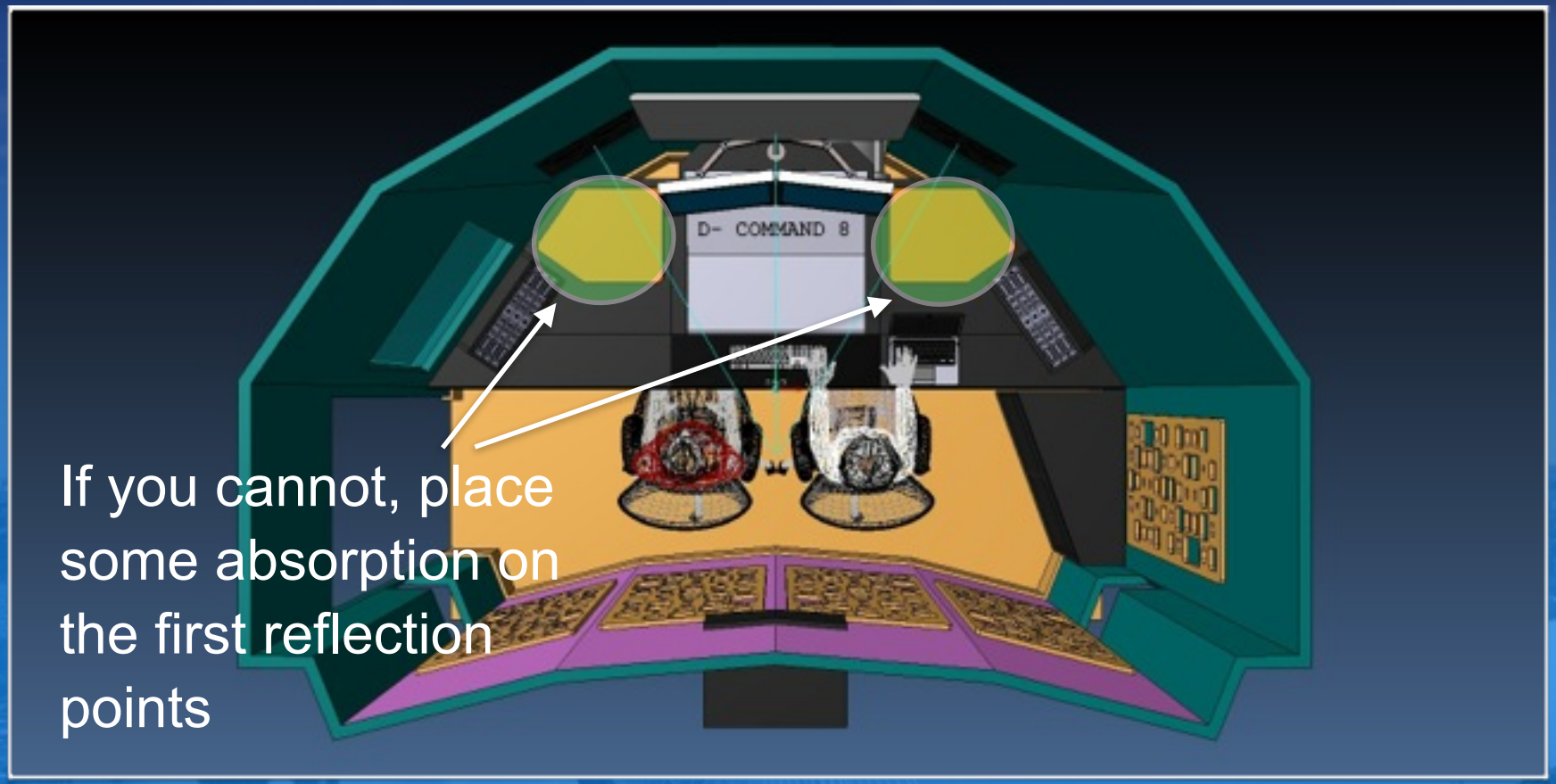
# Controlling the reflections from the console

Tilting the angle of the console, it would be better for the ergonomics and the acoustics too

If you cannot, place some absorption on the first reflection points

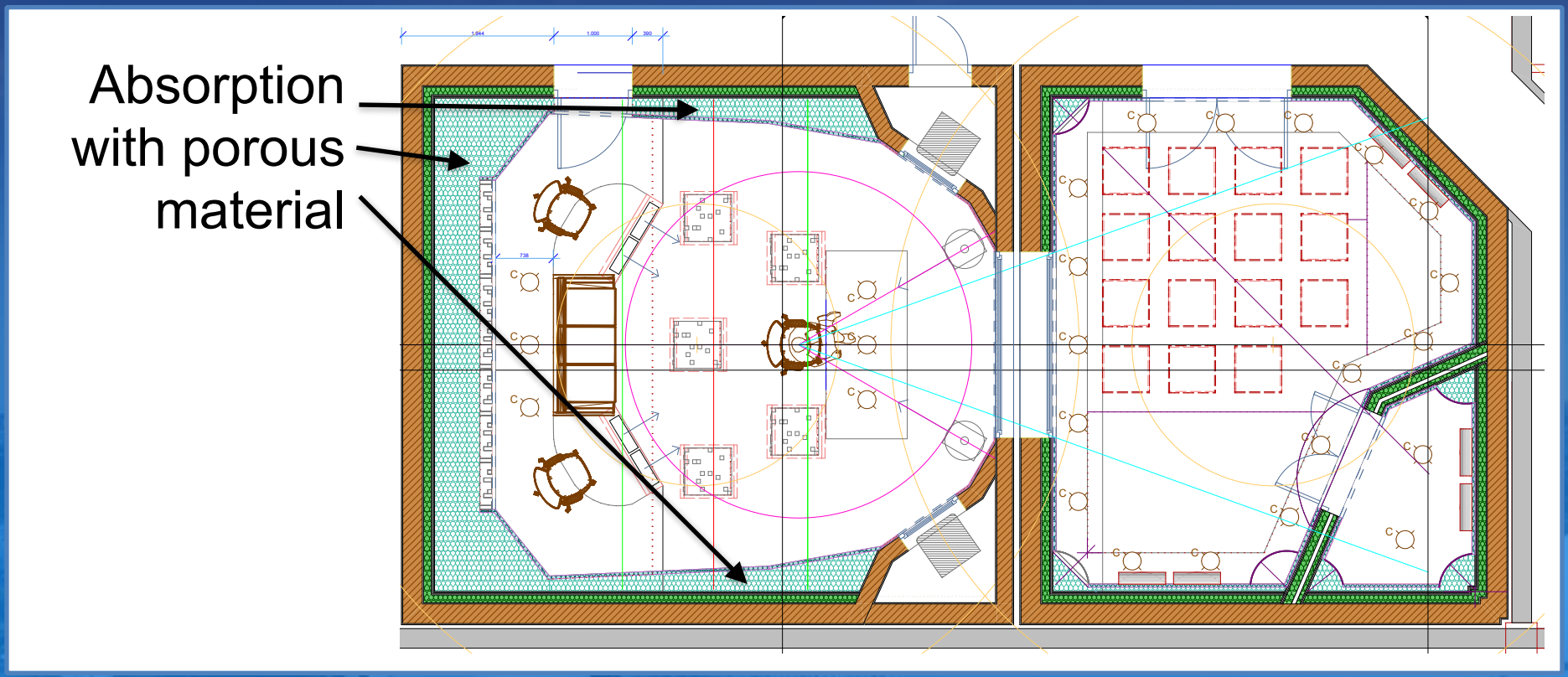


# Controlling the reflections from the console




If you cannot, place some absorption on the first reflection points

# 5. Acoustic absorption

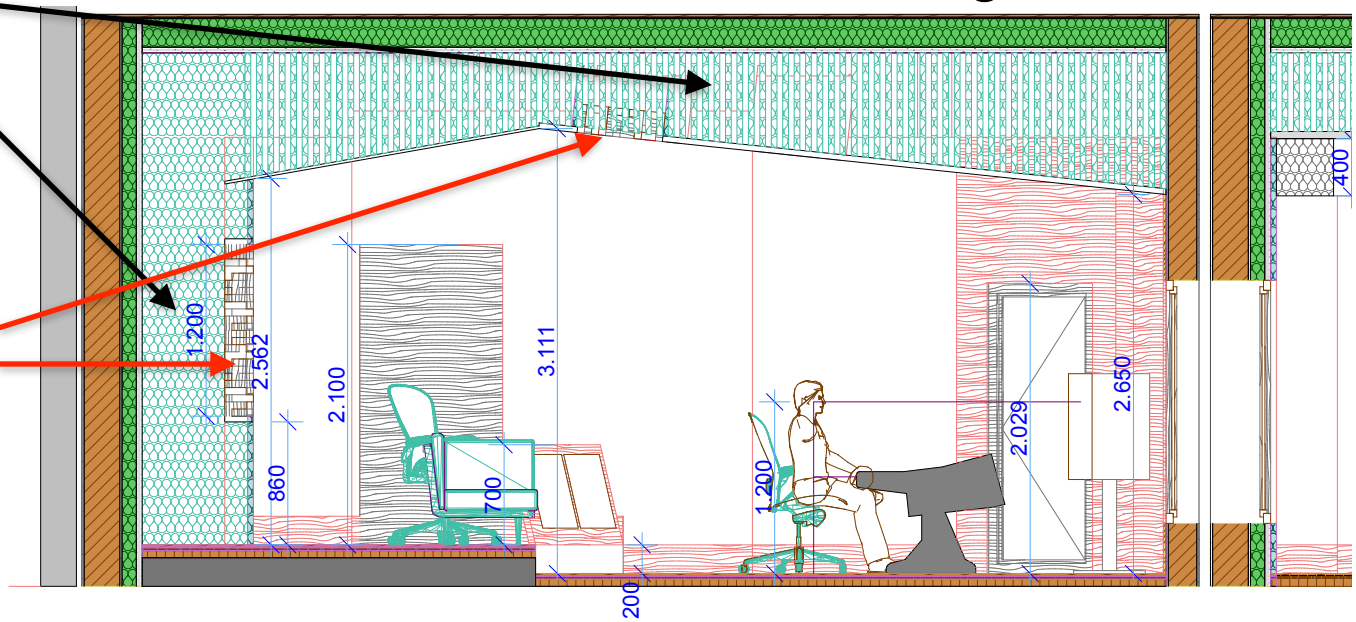


# 5. Acoustic absorption

Absorption with porous material

baffles on the ceiling

diffusion too for mid-hi freq.

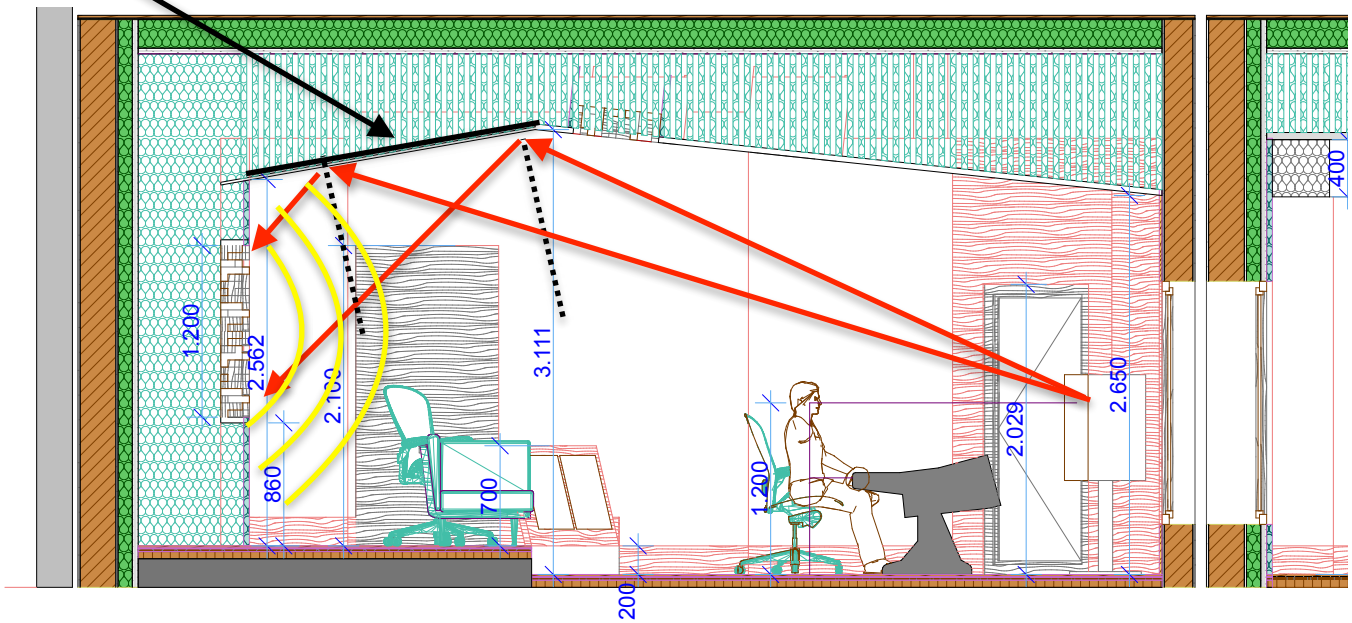


# 6. Acoustic diffusion

1. Place the diffuser on the back wall, over acoustic absorption;
2. a few diffusers on the ceiling could be useful to enlarge the image and to give more presence (brilliance);
3. it is also useful to place other reflective/diffusive surfaces to reach the right RT values, but you have to control the first reflection for reflective panels;
4. it's a good idea to place a reflective panel near the diffuser on the back, it helps it to work properly.

# 5. Acoustic absorption

Reflective panel



# Bagnoli Bros Studio @ Castelnovo ne' monti (RE)

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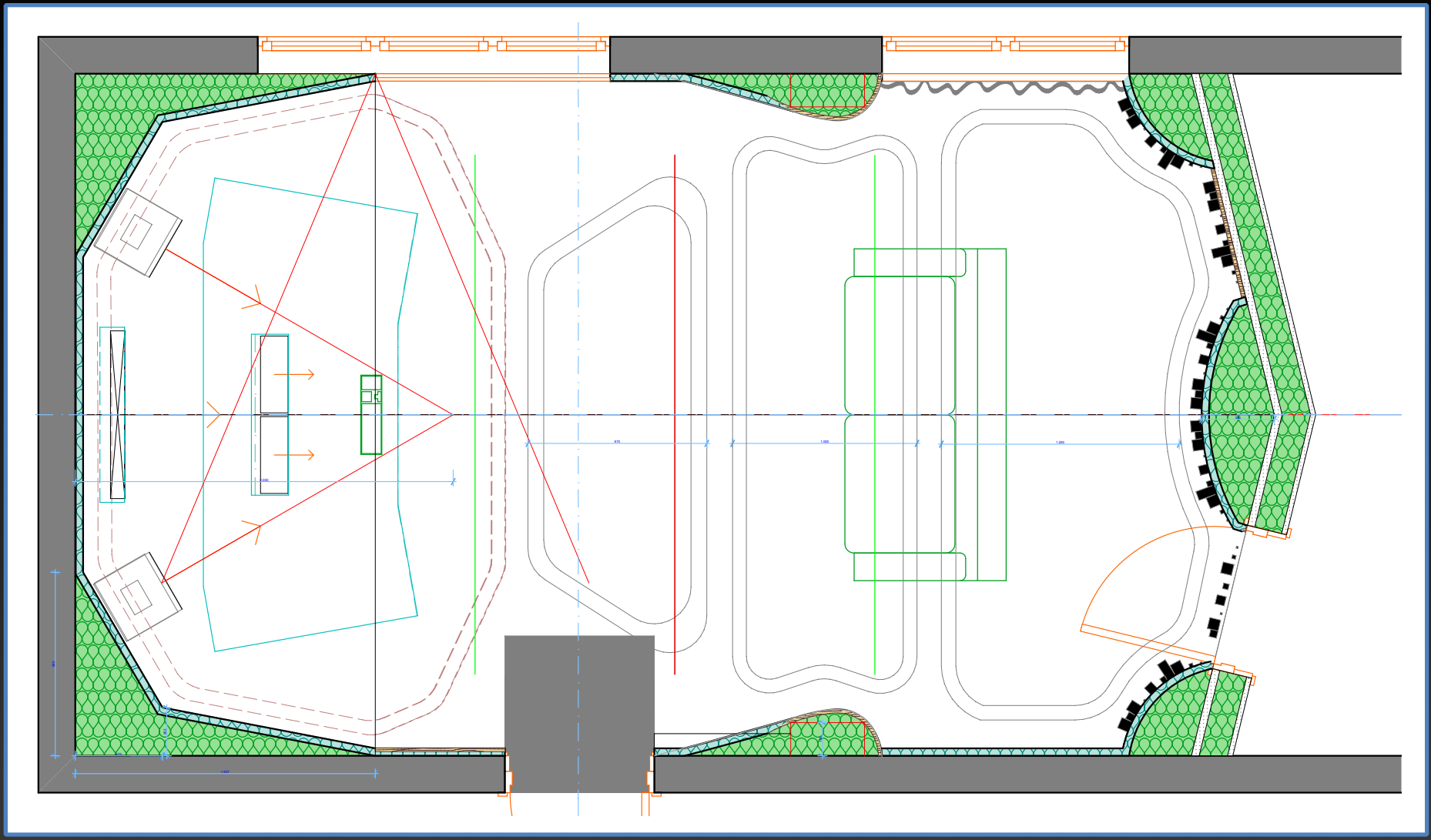

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# Bagnoli Bros Studio @ Castelnovo ne' monti (RE)

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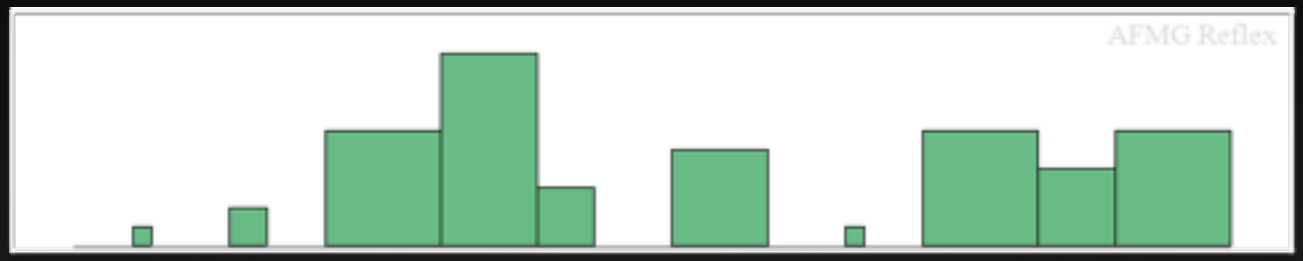
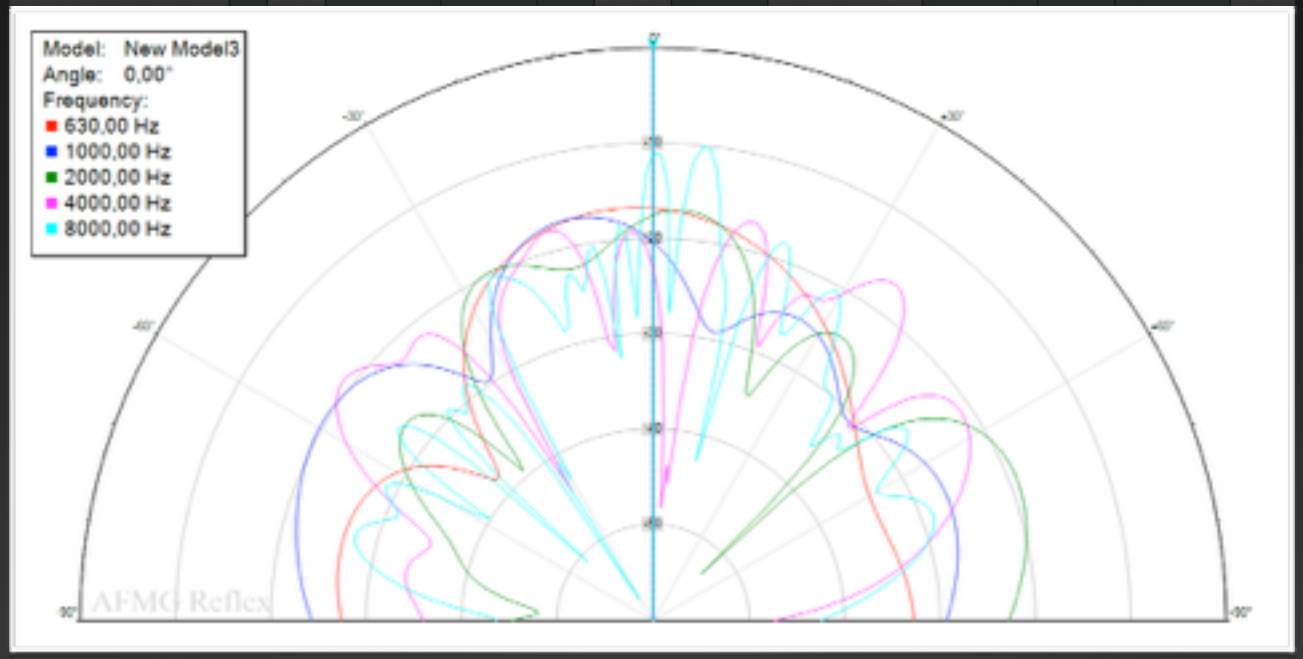
# Slat Absorber/diffuser
# SlatSSS

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Ronny Aglietti Studio @ Monte San Savino (AR)

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# Typical Acoustic Problems

These guidelines are really helpful to build a good control room, because they are based on the physics of sound. However the biggest issues show up with the right analysis of the room environment before treatment:

- rooms with masonry walls have a longer RT @ LFs, they need more absorption but the final result is better @ LF;
- plasterboards could sometimes help to control the RT @ LFs, but you never know at which frequency they resonate and above which frequency they are a rigid wall (reflect the sound).

# Ergonomics

# House of Glass (Gianni Bini) @ Viareggio (LU)

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# Mulinetti Studio (Alberto Parodi) @ Genova
# Resolution Cover 04/2015

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# Aesthetics

Recording studios are sites that are privileged to the most intimate moments of music creativity and emotive performance; insulated spaces that give musicians the required conditions in which to experiment and create music.
*(A. Watson, 2015)*

They are not only room with a good acoustics but also:
- a performative space;
- a relational space (in which the intimate, emotional quality of human relations is laid bare).

**The atmosphere and ambience in the studio influences the emotions of individuals and the "mood" of the music.**

# Aesthetics

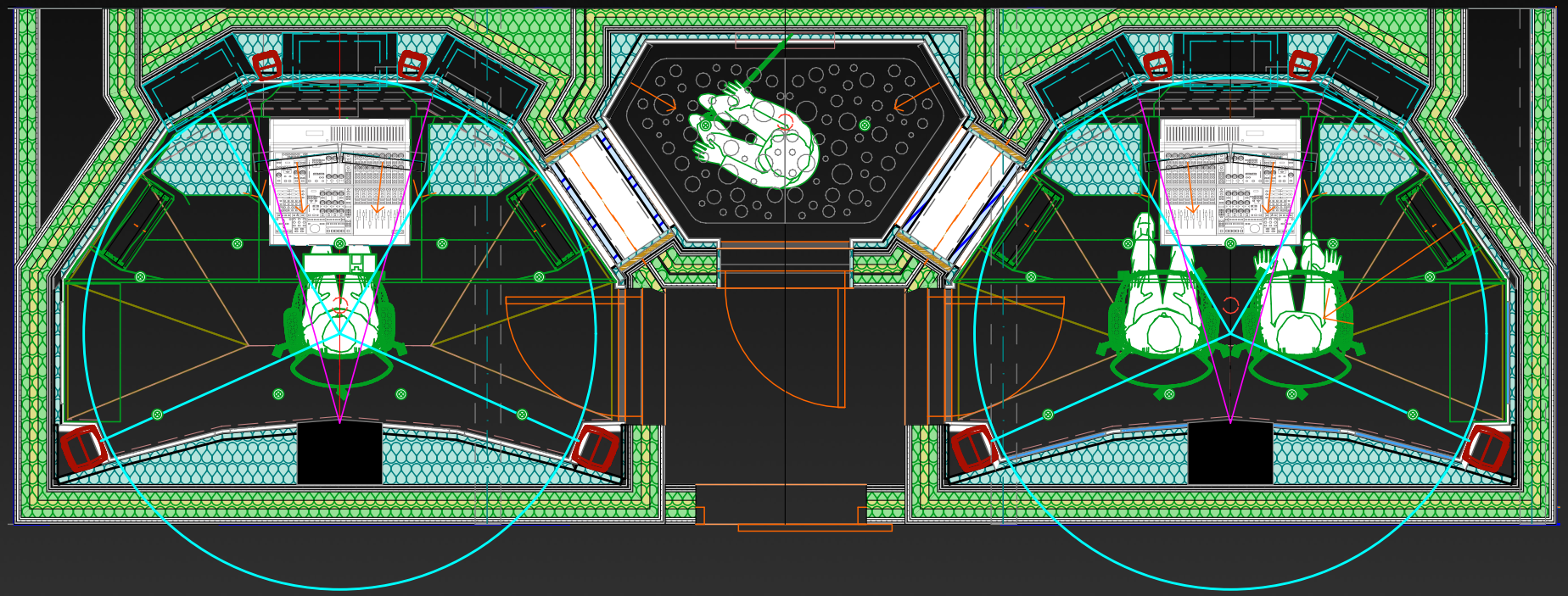
So the Aesthetics of the studio is not a trivial matter, but a real requirement. We do not talk only of making a “beautiful” studio, but to create a:

- **creative space;**
- **inspiring space;**
- **comfortable space.**

and this can change depending on the music or audio content that will be produced in it.

# Small multichannel control rooms for broadcast

# FOX International Channels @ Hammersmith, London UK



# FOX International Channels @ Hammersmith, London UK

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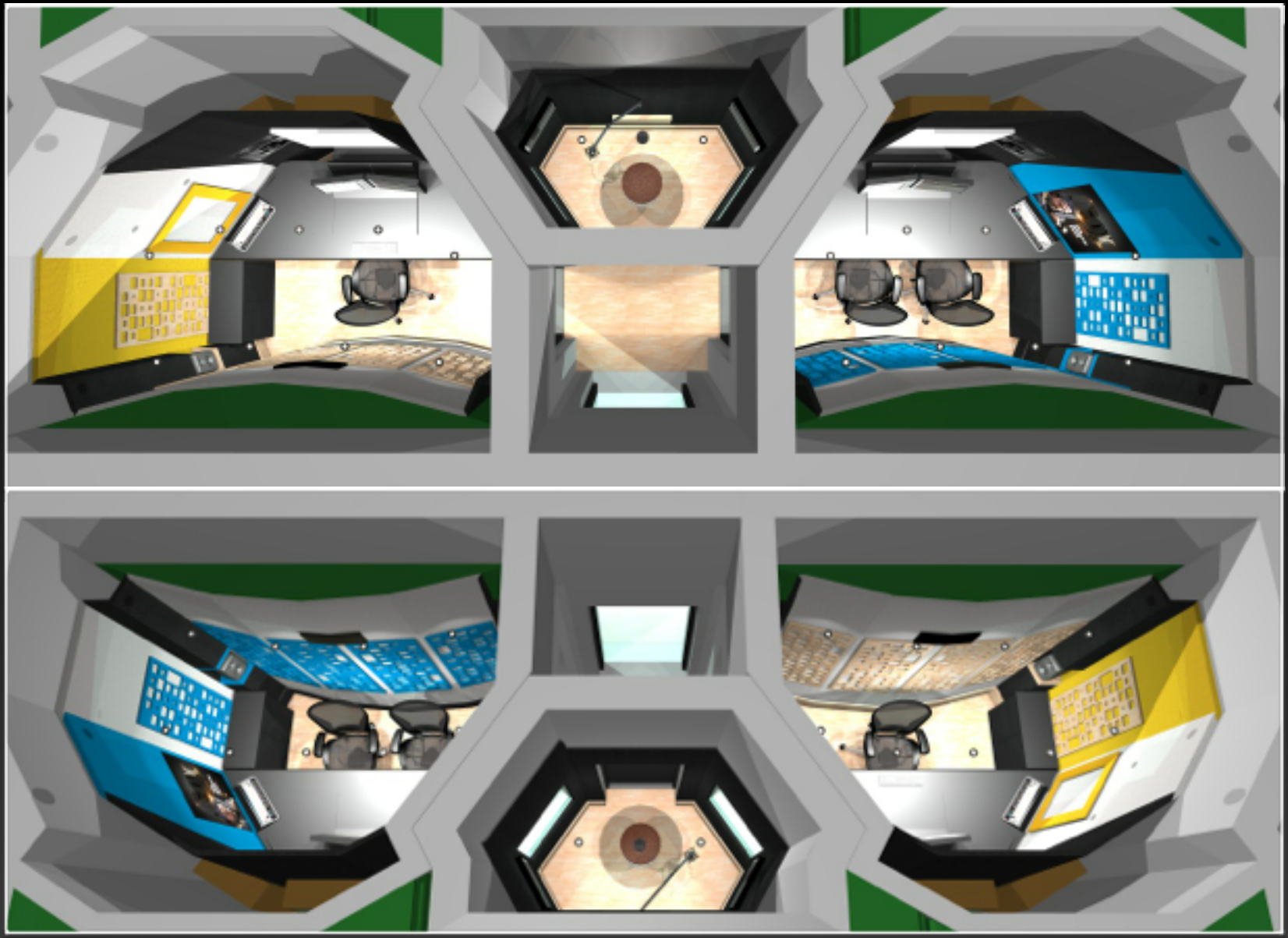

# FOX International Channels @ Hammersmith, London UK

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# beep! Studios - sala Garage @ Roma

# beep! Studios - sala Gorilla @ Roma

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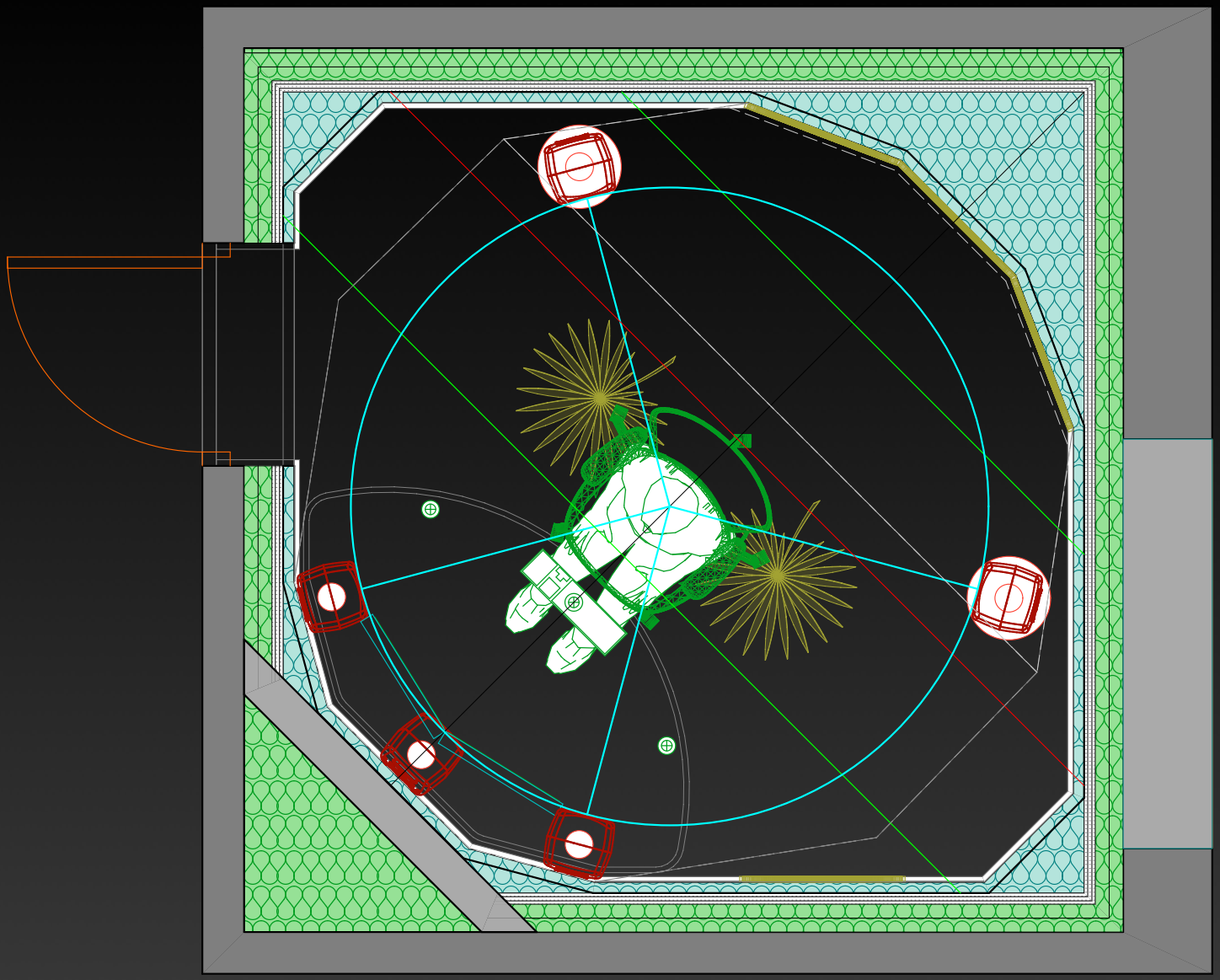

# beep! Studios - sala Gorilla @ Roma

# beep! Studios - sala Gorilla @ Roma

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# Jinglebell Communications @ Milano

ACOUSTIC DESIGN BY DONATO MASCI – WWW.STUDIOSOUNDSERVICE.COM

# Dolby® Theatre for Cinema

# In House @ Roma

# In House @ Roma

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# Recording studios

# Officina Sonora del Bigallo @ Bagno a Ripoli (FI)

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House of Glass (Gianni Bini) @ Viareggio (LU)
nominated for Best Audio Facility 2013 Resolution

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# Sudestudio @ Guagnano (LE)

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# PPG Studios (Guerrini - Bocelli) @ S. Pietro Belvedere (PI)

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# Cambusa Wave @ Reggio Emilia

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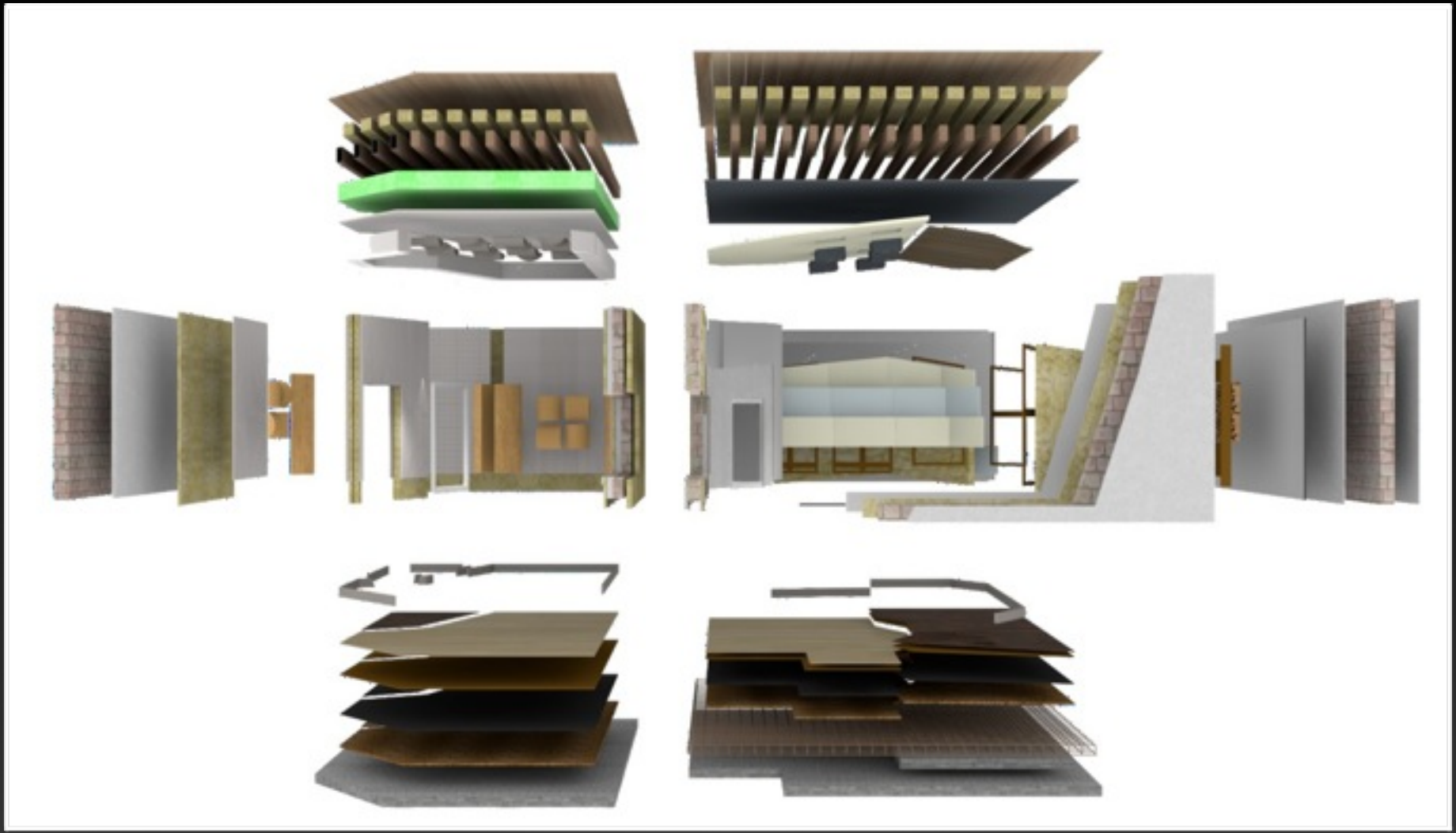

# Cambusa Wave @ Reggio Emilia

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# Dunastudio @ Russi (RA)

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# International Sound @ Conversano (BA)

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# Thank you.



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