

Acoustical Design: Issues, Understandings, and Solutions in Control Centers

There's always one loud-talker in a control room. That one Operator who's voice just seems to invade every corner of the room. Other Operators are doing the same job, but also hear that background noise.

It's a tough call- so many people potentially in a room who need speech privacy and the ability to collaborate quickly with adjacent consoles.

How can room acoustics be addressed so persons in the Center can hear what they need to (alarms, radio traffic, and even entertainment radio) without disturbing those key adjacencies, yet enable a conversation with an Operator with whom a shared workflow is also necessary?

Room acoustics are dependent upon the room itself: volume of air in the room, geometry of the room, and materials/finishes in the room. People and chairs, furniture, and other accessories can be helpful to controlling sound paths, or harmful, causing more problems. Additionally, sound occurs in many different frequencies, further complicating the design of the space for sound.

Generally, sound *absorption* is measured in sabins, while loudness is measured in *decibels*. A Unit (S_a) of sound absorption is equal to the absorption of one square foot of a perfectly absorbing surface. For example, sound traveling towards a 12" x 12" open window is a perfect absorber; the sound just leaves the space with no reflection. In reality, most materials in a room both absorb the energy from the sound pressure by converting it to heat, and reflect some back into the room as reverberation- the material/finish determines what's absorbed or reflected, so we need to consider that when we design those spaces. Another concern is

transmission of sound through walls- whether exterior or interior- is also important to understand and be able to design walls that mitigate transmitted sound; idling trucks to trains, or server rooms, glass walls or even kitchen-break rooms for example.

Within the various control rooms and suites we've encountered, we've seen everything from no apparent solution to addressing sound, often resulting in a very noisy and stressful environments, to well done rooms that address sound by absorption effectively. Actively, we've seen clear acrylic sound domes placed above consoles that try

to address the 'active' sound control issue, and while they do contain sound in one focused location, they produce a lot of visible reflections that we feel will lead to glare on displays and as a result,



control room lighting problems to reduce the glare developed; we do not recommend these domes.

To address these issues, SLA has developed an approach to control room acoustics for those that employs both passive (absorptive) and electronic (active) solutions to help put those necessary alarm signals and conversations with field personnel into a more personalized and isolated 'bubble' around each console so voices don't need to be raised, radio volumes don't need to be raised and the electronic monotones of radio traffic is contained at each console position. A second benefit of this approach is that conversations and collaborations may be conducted without disturbing others; only a deliberate raised voice is needed to project one's voice into the room, but for the most part, the room remains much quieter than control rooms without the combined active/passive solution we recommend.

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