From Rule of Thumb to Real Results: Practical Ceiling Acoustics in the Field

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MD ACOUSTICS
Sound Solutions for Planning and Design

MDAcoustics.com

Agenda

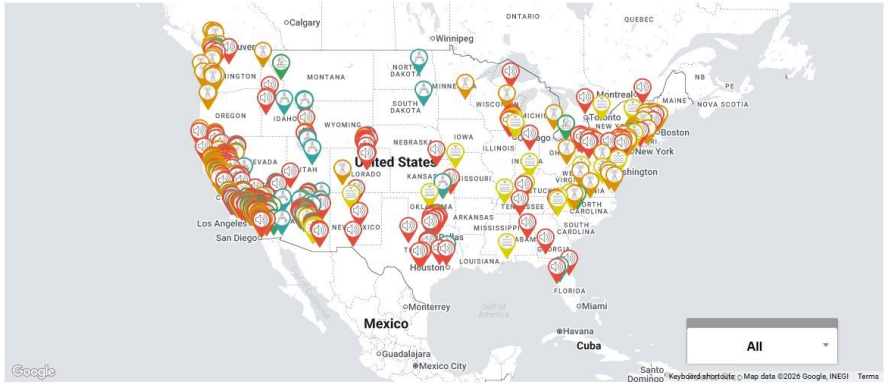
01	Who We Are
02	Room Behavior
03	Interiors & Sound
04	Consulting Value
05	Case Studies
06	Smarter Solutions

01

Who We Are

Who is MD Acoustics?

- Acoustical engineering firm specializing in noise and vibration control
- Experience across Hospitality, industrial, manufacturing, infrastructure, and commercial sectors
- Nationwide service supported by three offices and laboratory facilities
  - Field Technicians
  - Lab | Anechoic Chamber and Reverb Chamber



3,200+

Projects Completed

650+

Municipalities

249

Years of Combined Experience

01

Who We Are

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Responsive | Experienced | Tailored

- Direct access to senior technical experts
- Multidisciplinary team with expertise in acoustical physics, acoustical & mechanical engineering, industrial design and environmental science
- 250+ years combined professional experience with 130+ years of academic study
- Agile and responsive compared to large consulting firms

01

Who We Are

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Why Clients Partner With Us

- Empirical, measurement-driven engineering approach
- Advanced diagnostic and modeling capabilities
- Practical, implementable mitigation solutions
- Proven success resolving complex noise challenges
- Trusted partner to Installers, Manufacturers, Architects & Designers

01

Who We Are

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What We Do...

We help project teams:

- Understand how a room behaves
- Identify why acoustic issues exist
- Design mitigation strategies that work
- Verify performance after installation

The Scientific Approach to Acoustics

Measure → **Identify** → **Analyze** → **Mitigate**

Baseline RT-60 Field Testing | *Source & Surface Reflection Points* | *Frequency Analysis vs. Goal* | *Targeted Absorption & Diffusion*

Eliminating guesswork through data-driven measurement and analysis.

We connect **Design Intent - Products - Performance**

01

Who We Are

Why Consulting Matters...

Protecting the Design Intent

- Does the RCP and finish schedule design meet the acoustical criteria?
- During the value engineering process does the specified acoustic treatment products get replaced due to budget constraints or timeline issues?
- Does the GC understand the final acoustical design intent and the role that the acoustical contractor and the consultant play in the acoustical performance?
- We advocate for the contractor and vice versa.

02

Room

Behavior

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Rooms Are Systems

Dynamics of an Interior Space | RCP and Room Geometry

- Ceilings are the primary acoustic surface, remaining untouched, out of reach and can also be hidden.
- Acoustical performance depends on geometry, volume, and surfaces.
- Products operate within a larger acoustic system.
- Placement is as critical as material selection.

02

Room

Behavior

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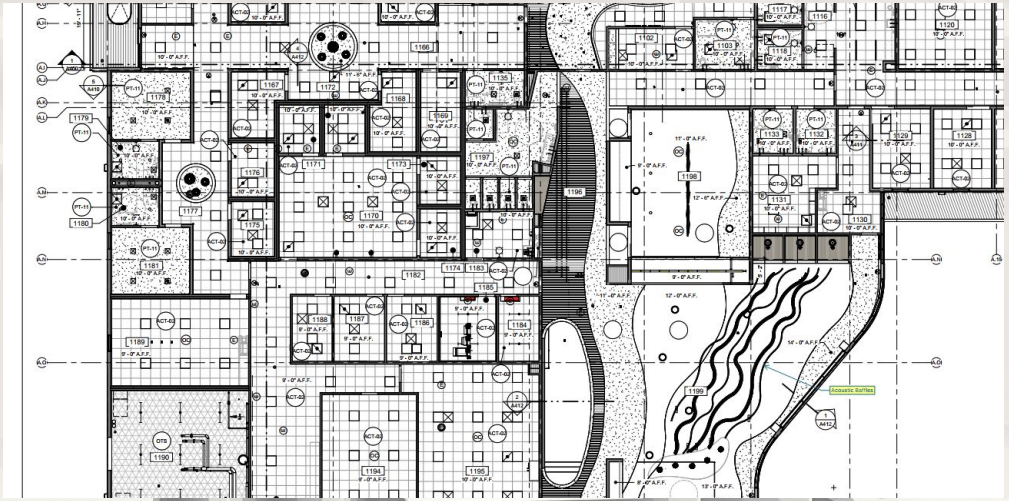
Reflected Ceilng Plans are Critical

Acoustical Contractors should have a general understanding of how the RCP will perform based on the design.

- Adequate coverage and distribution to meet RT-60 or reverb design intent
- Correctly specified STC, NRC or CAC values



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Room

Behavior

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Room Geometry Matters

Room Shaping Design Dispurses the Sound

- Is the room a cube, rectangular, triangular/A-frame (see below) or other?
- High Ceilings vs Low Ceilings (relative to wall length)

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Room

Behavior

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Are the Products Similar?

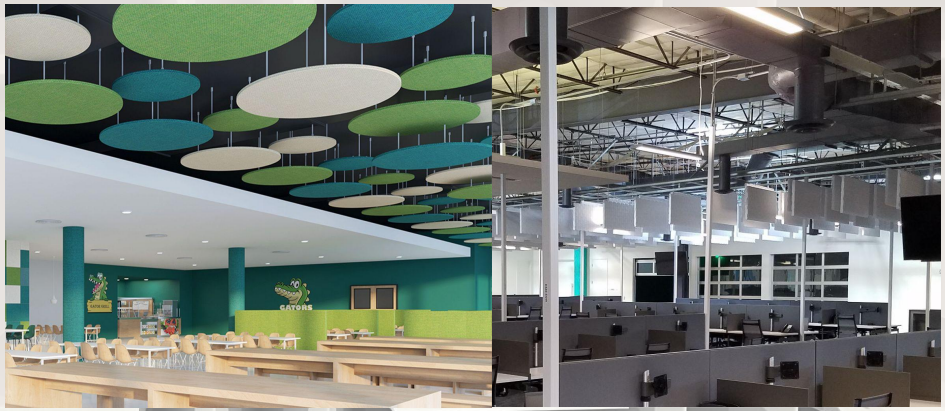
Not all Products are Created Equal

Felt vs Fiberglass

ACT vs Acoustical Plaster

Acoustically Rated Stretch Fabric Systems vs Acoustic Panels

Baffles vs Clouds



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Room

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Reverberation Time (RT-60) Rules of Thumb

Classrooms ~ 0.5 Seconds

Conference Rooms ~ 0.5 seconds or less

Multi-Purpose Rooms ~ 0.8 to 1.3 seconds

Typically to acoustically treat rooms we recommend a treatment coverage of 40% to 60% to make an audible impact.

Zone Category	Sound Masking (dBA)	Background Noise (NC)	Reverberation (s)	Ceiling Finish (NRC)	Wall Finish (NRC)
Bustling	48	40	0.80	0.75	-
Open	48	40	0.80	0.75	-
Collaborative	48	40	0.80	0.75	0.70
Focused	45	35	-	0.80	-
Private	Case-by-Case	35	0.50	0.80	0.70
Connected	None	35	0.50	0.80	0.80
Confidential	None	35	0.50	0.80 - 0.90	0.80

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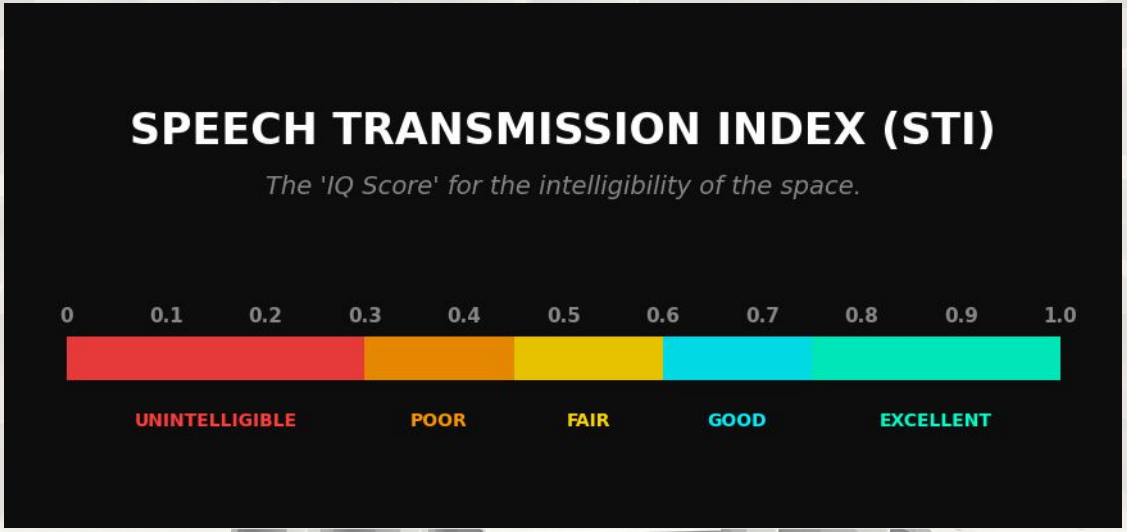
Speech Intelligibility (STI)

Defining Clarity

- Measures how understandable speech is to a listener
- Negatively impacted by excessive reflections and noise
- Poor STI leads to user complaints and unusable spaces



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Room

Behavior

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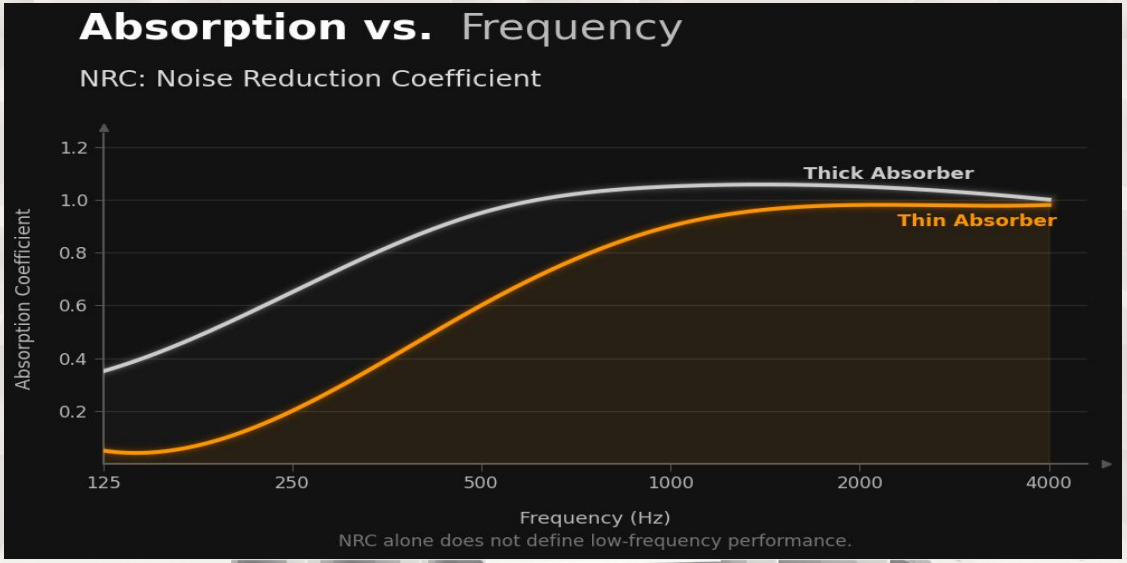
The NRC Limitation

NRC is Only Part of the Story

- NRC Describes material absorption at specific frequencies
- Ignores placement and geometry
- Relying solely on NRC leads to over-treatment or failure



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Interiors &
Sound

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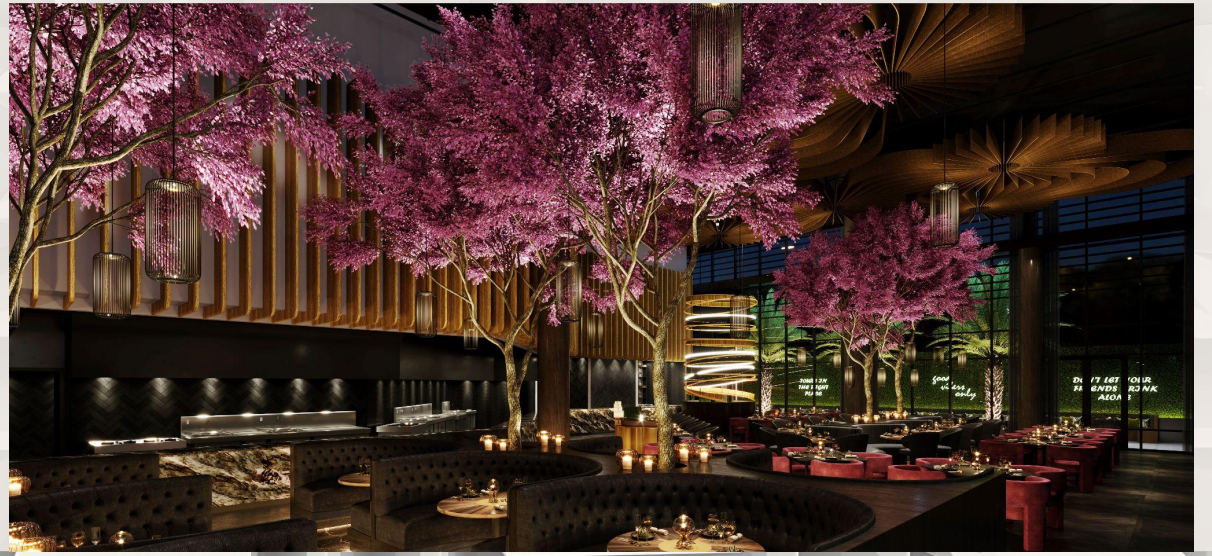
Interiors Shape Sound

Geometry and Surface Interaction

- Ceiling height and surface continuity dictate reflection paths
- Interior designers and architects determine the “acoustic canvas”
- Installers inherit the conditions created by the architecture



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Sound

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First Impressions

The Sound of Comfort

- Acoustic comfort is noticed within seconds of entry
- It influences the perception of luxury, productivity and safety
- Sound is often the “invisible” element of a brand

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Interiors &
Sound

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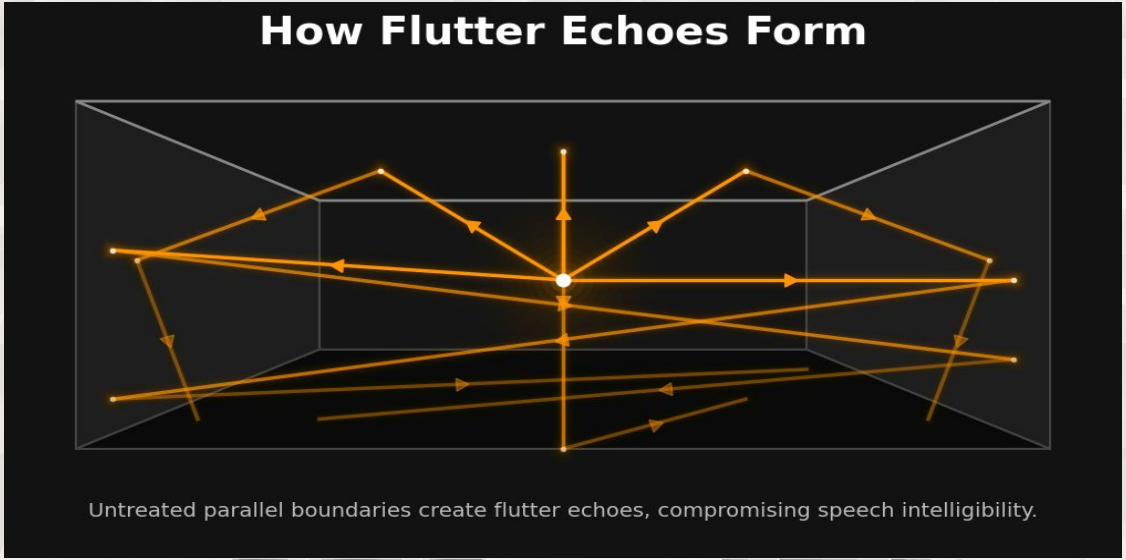
Geometry Effects

The Parallel Surface Trap

- Parallel walls create flutter echoes and standing waves
- Geometry overrides product performance
- Energy buildup occurs in corners and hard-surfaced “canyons”



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Consulting

Value

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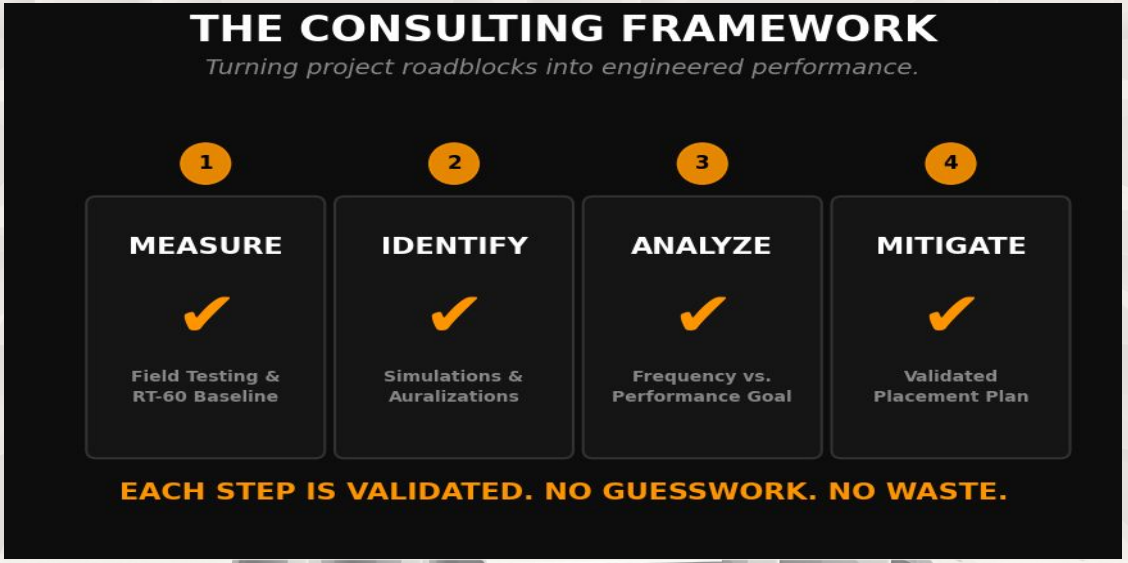
Why Strategy Matters

Precision v. Guesswork

- Prevents Costly late-stage fixes
- Avoids over-treating areas that don’t contribute to performance
- Validates that the solution meets the target RT-60



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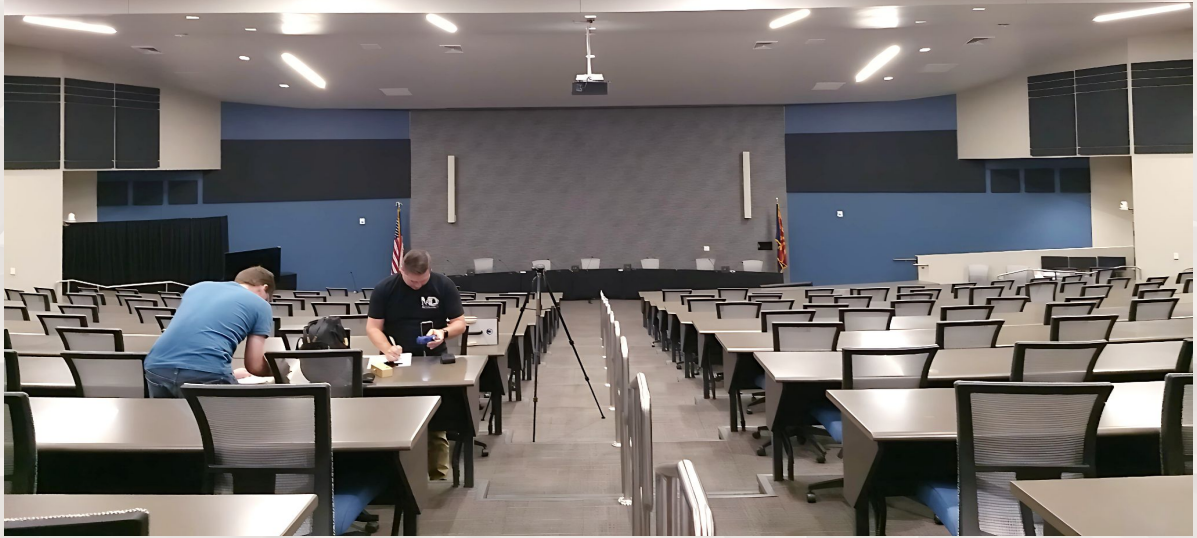
Case

Studies

Case Study: Gilbert Training Facility

Public Safety Training Auditorium

- 1,200 sq. ft. space with hard interior finishes
- Primary challenge: Excessive reverberation and flutter echo
- Objective: Clear unamplified speech for training



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Case

Studies

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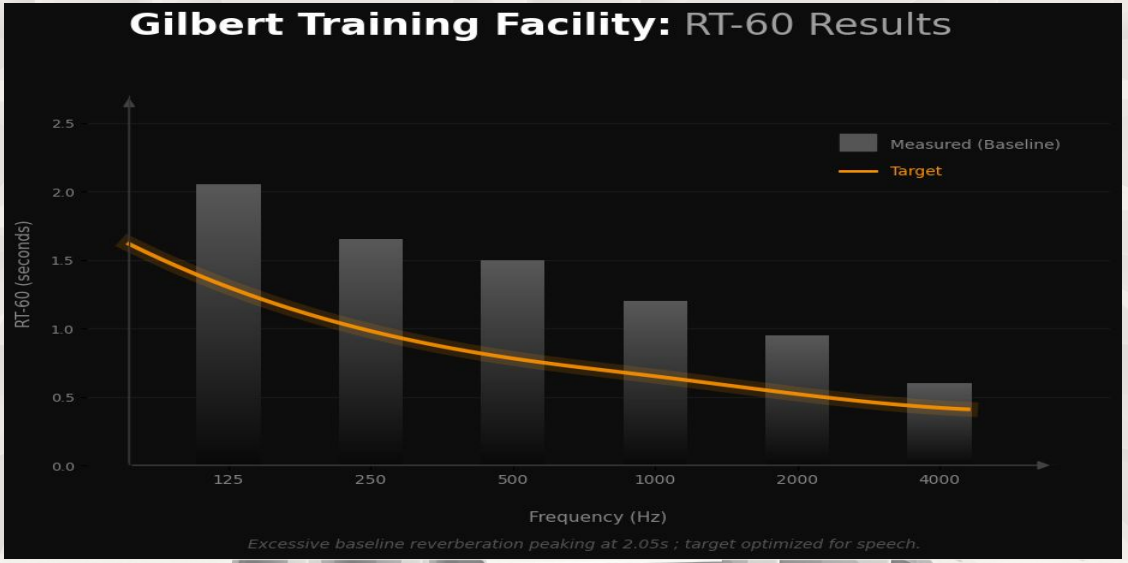
The Problem

Baseline Failure (2.05s RT-60)

- Speech was unintelligible
- Massive energy spikes in the 100Hz-650Hz range
- The room geometry was amplifying the noise floor



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Case

Studies

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The Engineered Solution

Targeted Frequency Mitigation

- We created openings at the stepped areas of the ceiling to allow sound to enter the voids which were also packed with insulation.
- Added stretch fabric covering over the openings to mimic drywall.
- Introduced acoustical panels at the back of the venue to absorb direct and reflected sound.

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Case

Studies

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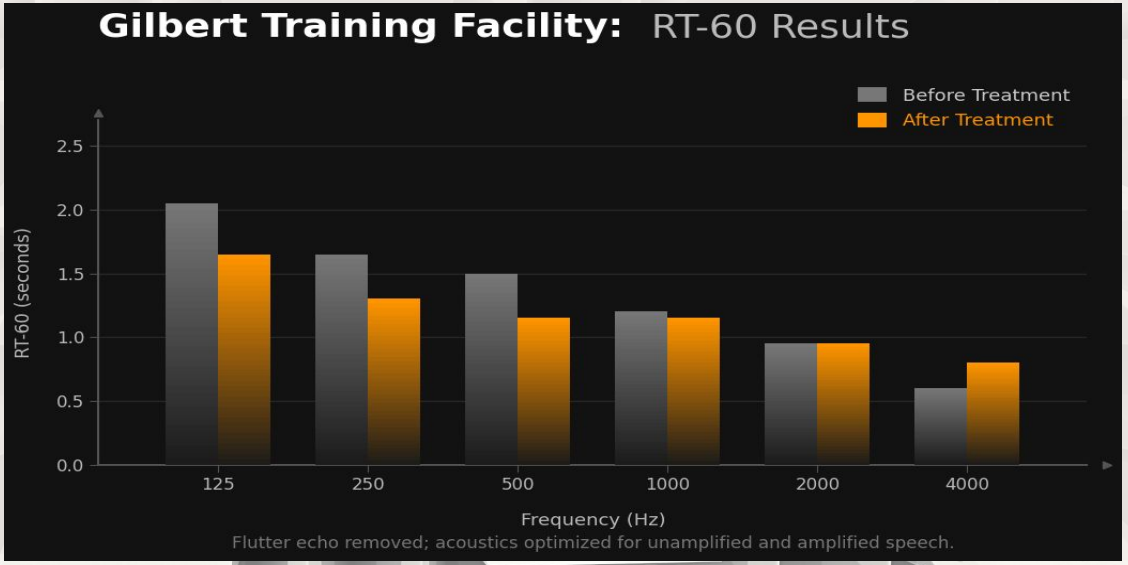
Measured Results

Performance Validated (0.95s RT-60)

- Post-mitigation field measurements and confirmed targets were met
- Echo eliminated and speech clarity restored
- Successful unamplified speech throughout the room



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Case

Studies

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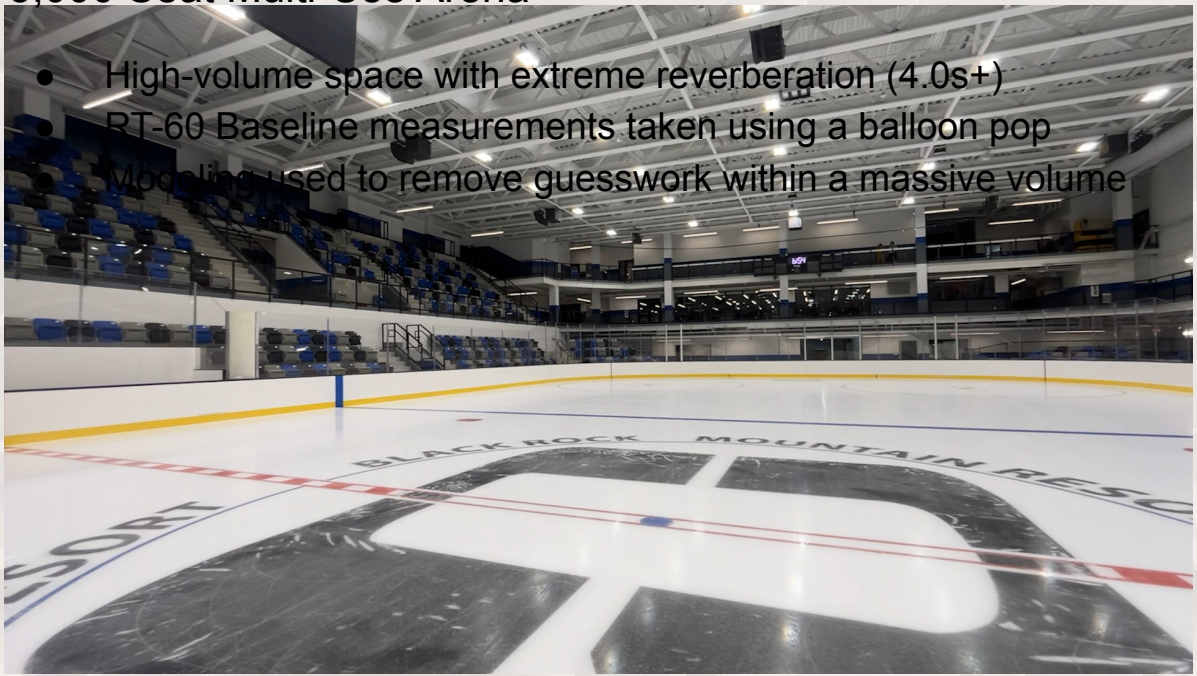
Case Study: Black Rock Event Center

3,000 Seat Multi-Use Arena



- High-volume space with extreme reverberation (4.0s+)
- RT-60 Baseline measurements taken using a balloon pop
- Modeling used to remove guesswork within a massive volume

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Case

Studies

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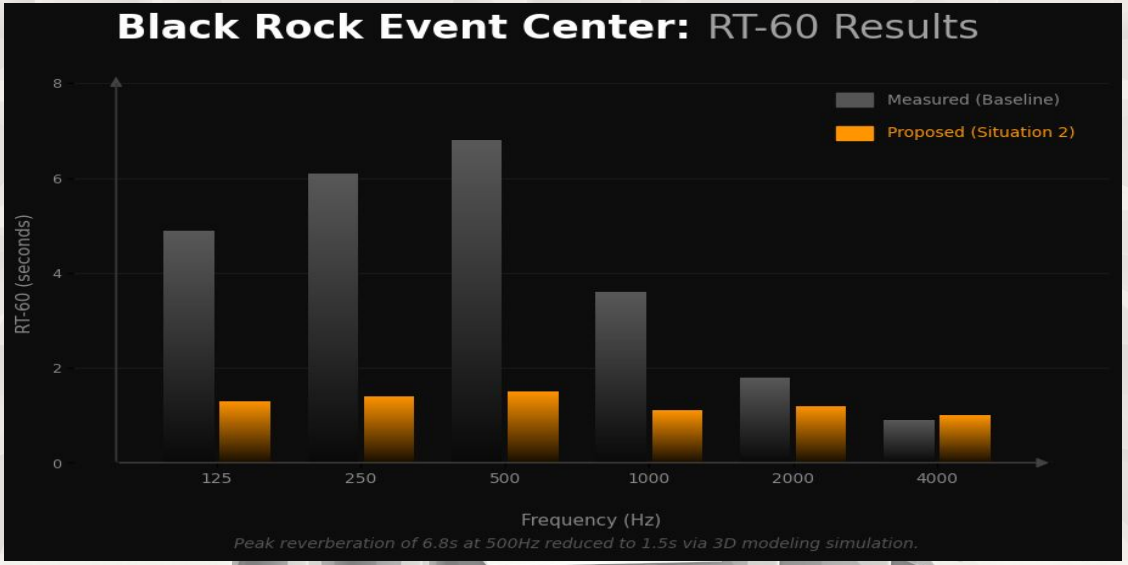
Modeled Results

Predicted Impact of Mitigation

- Target range RT-60 of 1.2 to 1.6 seconds achieved
- Extreme low-frequency energy significantly reduced
- Auralizations provided for client confidence



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Smarter
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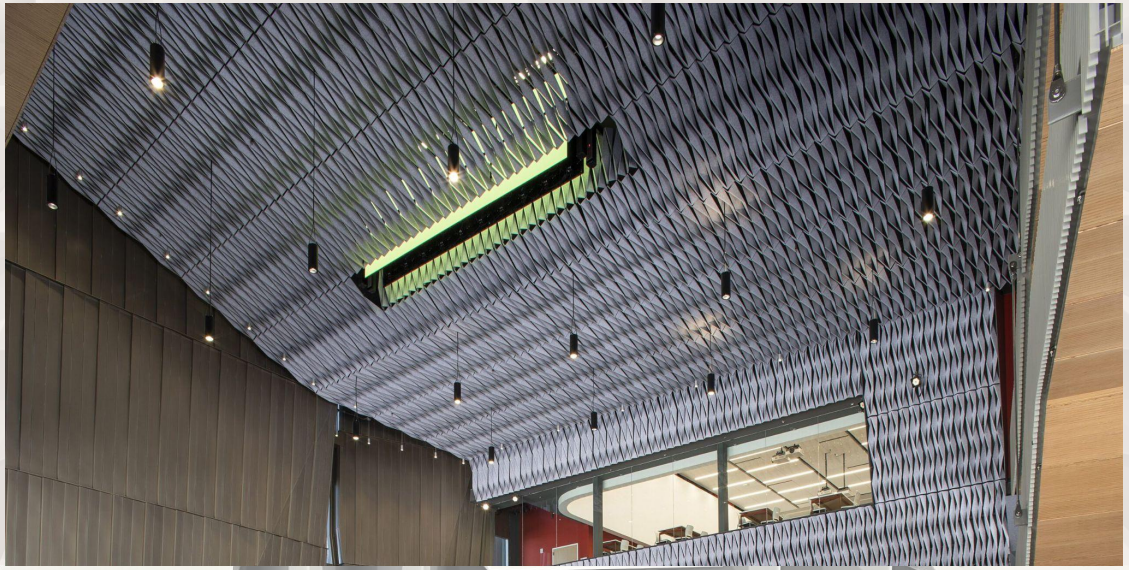
Protecting the Bottom Line

The High Cost of Remediation

- Late-stage fixes cost 3x-5x more than upfront design
- Field rework disrupts occupancy and labor schedules
- Products get returned and installers often inherit the blame



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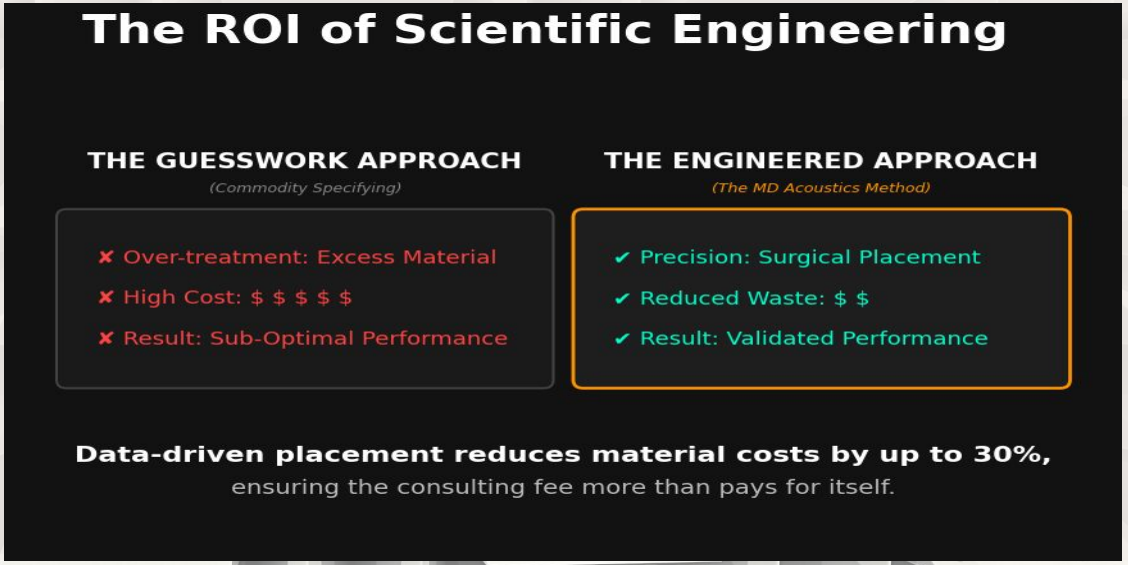
Smarter Acoustic ROI

Better Performance with Fewer Resources

- Strategic placement reduces material waste
- Predictable outcomes ensure project success on day one
- Consulting fee is offset by material savings



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Final Thoughts

General Rules of Thumb for Acoustical Treatment

- RCP should provide at least 40% - 60% acoustical coverage when absorption is needed.
- Acoustical treatment should be installed uniformily across the ceiling or walls.
- The products selected must adaquately address the frequencies of concern (bass, mid and treble).
- The room shape matters and has the potential to increase or minimize standing sound waves.
- Is there a substitute product that can be used for value engineering purposes that is more cost effiective and is within the clients budget?

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Questions, Comments

Discussion

Questions or comments?

Thank you for your time today!

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