

Case Study: Premium Acoustic Design for Regional Institute of Education Mysore Auditorium

 How Smart Auditorium Acoustic Treatment Achieved Exceptional Speech Clarity in a Large Hall



Sound Imagined. Experience Engineered.

About the Project – Regional Institute of Education Auditorium, Mysore

Volume: 4134 m³

Application: Lectures, conferences, cultural programs

Acoustic Design Partner: Himalyan Acoustics

Design Targets:

- Reverberation Time (RT60) ≤ 1.0 sec
- Speech Transmission Index (STI) ≥ 0.75
- C50 $\geq +6$ dB for speech clarity
- High-end aesthetic finish with acoustic functionality

Deep Dive:

The Regional Institute of Education Auditorium, located in the culturally rich city of Mysore, stands as a remarkable architectural achievement with a total volume of 4134 m³. This impressive space is designed to cater to a variety of functions, including lectures, conferences, and cultural programs, making it a versatile venue for educational and artistic gatherings. The auditorium is not merely a physical structure; it is a hub for intellectual exchange and cultural expression, where ideas are shared, and creativity flourishes.

To ensure that the auditory experience within the auditorium is nothing short of exceptional, the project partnered with the renowned acoustic design firm, Himalyan Acoustics. Their expertise in sound engineering was crucial in crafting an environment where every word spoken resonates with clarity and precision. The design targets set for this project were ambitious yet essential for achieving the desired acoustic quality. Specifically, the team aimed for a Reverberation Time (RT60) of less than or equal to 1.0 second, which is vital for maintaining intelligibility during spoken presentations.

In addition to RT60, the Speech Transmission Index (STI) was set with a target of 0.75 or higher. This index is a critical measure of how well speech can be understood in a given environment, and achieving a high STI score is indicative of a well-designed acoustic space. Furthermore, the design aimed for a C50 value greater than +6 dB, which is essential for ensuring speech clarity, particularly in mid-frequency ranges that are most relevant for human communication.

The project not only focused on achieving these technical specifications but also emphasized a high-end aesthetic finish. This dual approach ensured that the auditorium would not only function effectively as a space for lectures and performances but would also be visually appealing, creating an inspiring atmosphere for all who enter. The collaboration between functionality and aesthetic appeal is a testament to the thoughtful design philosophy behind the Regional Institute of Education Auditorium.

The results of these meticulous efforts speak for themselves. The auditorium has successfully achieved an

average RT60 of just 0.41 seconds, far exceeding the initial design target. This remarkable outcome ensures that sound travels efficiently throughout the space, minimizing echoes and reverberation that could detract from the auditory experience. Additionally, the STI score of 0.865 indicates a superb level of speech intelligibility, allowing audiences to engage fully with the speakers and performers. The C50 value has also surpassed expectations, measuring over +17 dB across mid-frequencies, which significantly enhances speech clarity and overall communication effectiveness within the auditorium.

In conclusion, the Regional Institute of Education Auditorium in Mysore is a shining example of how thoughtful design and expert acoustic engineering can come together to create a space that is not only functional but also enriching for its users. It stands ready to host a myriad of events, fostering learning, culture, and community engagement in a beautifully crafted environment.

Why Regional Institute of Education Mysore Auditorium Required Strategic Acoustic Treatment

Medium – Large Volume, Speech-Dominant Design

At nearly 4134 m³, the Regional Institute of Education Auditorium sits on the upper boundary of medium-large halls. Spaces of this scale tend to suffer from:

- Prolonged reverberation, which blurs speech
- Poor early reflection control, affecting clarity
- Low speech intelligibility at rear zones

Larger volume = greater need for broadband absorption and intelligent early reflection management.



Deep Dive:

The Regional Institute of Education Mysore Auditorium, with its impressive volume of nearly 4134 m³, stands at the upper boundary of what is classified as medium-large halls. This significant size, while offering a grand space for gatherings and events, also presents unique acoustic challenges that must be addressed to ensure optimal performance for speech-dominant activities. The design of such spaces, especially those intended for lectures, presentations, and performances, necessitates careful consideration of acoustic treatment to enhance the overall auditory experience.

One of the primary issues faced in auditoriums of this scale is prolonged reverberation, a phenomenon where sound waves bounce off hard surfaces and linger in the air longer than desired. This lingering sound can blur speech, making it difficult for audiences to discern individual words and phrases. The clarity of communication is paramount in any setting where information is being conveyed, and excessive reverberation can lead to misunderstandings and frustration among listeners.

In addition to reverberation, poor early reflection control can significantly impact clarity. Early reflections are the initial sound waves that reach the listener after bouncing off nearby surfaces. If these reflections are not managed effectively, they can interfere with the direct sound arriving from the speaker, creating a muddled auditory experience. This is particularly critical in larger venues where the distance between the speaker and

audience can exacerbate the problem, leading to a disjointed experience that detracts from the intended message.

Moreover, speech intelligibility tends to diminish in the rear zones of such expansive spaces. Attendees seated far from the speaker often struggle to hear and comprehend the content being delivered, which can lead to disengagement and a lack of participation. The larger the volume of the auditorium, the greater the need for strategic acoustic treatment, which includes the implementation of broadband absorption materials and intelligent early reflection management techniques. These strategies are essential to create a balanced acoustic environment where sound can be controlled effectively, allowing for clear communication regardless of where the audience is seated.

In conclusion, the Regional Institute of Education Mysore Auditorium requires a comprehensive approach to acoustic treatment to mitigate these challenges. By addressing issues of reverberation, early reflection control, and speech intelligibility, the auditorium can transform into a space that not only accommodates large gatherings but also ensures that every voice is heard clearly and distinctly. This strategic treatment will enhance the overall experience for both speakers and audiences, fostering an environment conducive to effective communication and engagement.

Acoustic Material Design Philosophy – Treating Sound by Zone

The Regional Institute of Education Auditorium applies the zonal approach to acoustic treatment, rooted in psychoacoustic principles:

- ◆ **Below 8 ft: Controlled Diffusion & Mid-Frequency Absorption**
 - **Material:** Wooden Slat Panels
 - **NRC:** 0.87
 - **Function:** Breaks up low-level reflections to prevent flutter echo and sustain natural room warmth
 - **Backed with:** 50mm acoustic absorb wool (1000 GSM) on G.I. studs

♦ *Above 8 ft: Full-Spectrum Absorption*

- *Material: Chroma Panels on Melody String*
- *NRC: 1.00*
- *Function: Absorbs late-arriving energy to shorten decay time and prevent echo build-up*
- *Construction: Chroma (9mm) + Melody String (20mm wood-fiber) + 50mm acoustic absorb wool backing*

♦ *Ceiling Zone – Wide-Band Control*

- *Material: Blaze Glass Fiber Panels*
- *NRC: 0.88*
- *Air Gap: 300 mm*
- *Function: Ceiling reflections are the most delayed and destructive for speech. These panels act as broadband absorbers especially effective above 500 Hz.*
- *Grid System: T24 grid for modular maintenance and performance stability*

♦ *Stage Zone – Noise Isolation*

- *Material: Muffle Board (STC 34)*
- *Purpose: Prevent intrusion of external noise from rear and ceiling onto the stage*
- *Technology: Compressed wood particle cement with anti-vibration mounting*



Deep Dive:

The Regional Institute of Education Auditorium embodies a sophisticated and innovative approach to acoustic treatment, utilizing a zonal methodology that is deeply rooted in psychoacoustic principles. This philosophy recognizes that sound behaves differently in various areas of a space, and it seeks to optimize auditory experiences by addressing these unique characteristics.

- ♦ **Below 8 ft: Controlled Diffusion & Mid-Frequency Absorption**

In the lower zones of the auditorium, specifically below 8 feet, the design focuses on achieving controlled diffusion and mid-frequency absorption. This is primarily achieved through the use of Wooden Slat Panels, which are not only aesthetically pleasing but also functionally effective. With a Noise Reduction Coefficient (NRC) of 0.87, these panels are adept at breaking up low-level reflections that can lead to flutter echo, a common issue in spaces where sound waves bounce off hard surfaces. By mitigating these reflections, the panels help to sustain the natural warmth of the room, creating an inviting atmosphere for both performers and audiences. Behind these slat panels lies a robust backing of 50mm acoustic absorb wool (1000 GSM) mounted on G.I. studs, which enhances their sound-absorbing capabilities, ensuring that the auditory environment remains rich and engaging.

- ♦ **Above 8 ft: Full-Spectrum Absorption**

Transitioning to the upper zones, above 8 feet, the auditorium employs a strategy of full-spectrum absorption. This is accomplished with the integration of Chroma Panels on Melody String, which are designed to absorb a wide range of sound frequencies effectively. With an impressive NRC of 1.00, these panels excel at capturing late-arriving energy, which is crucial for shortening decay times and preventing the build-up of echo that can muddle clarity during performances. The construction of these panels includes a combination of 9mm Chroma and 20mm wood-fiber Melody String, complemented by a substantial 50mm acoustic absorb wool backing. This layered approach not only enhances sound absorption but also contributes to the overall aesthetic of the auditorium, creating a visually striking environment that complements its acoustic functionality.

♦ Ceiling Zone – Wide-Band Control

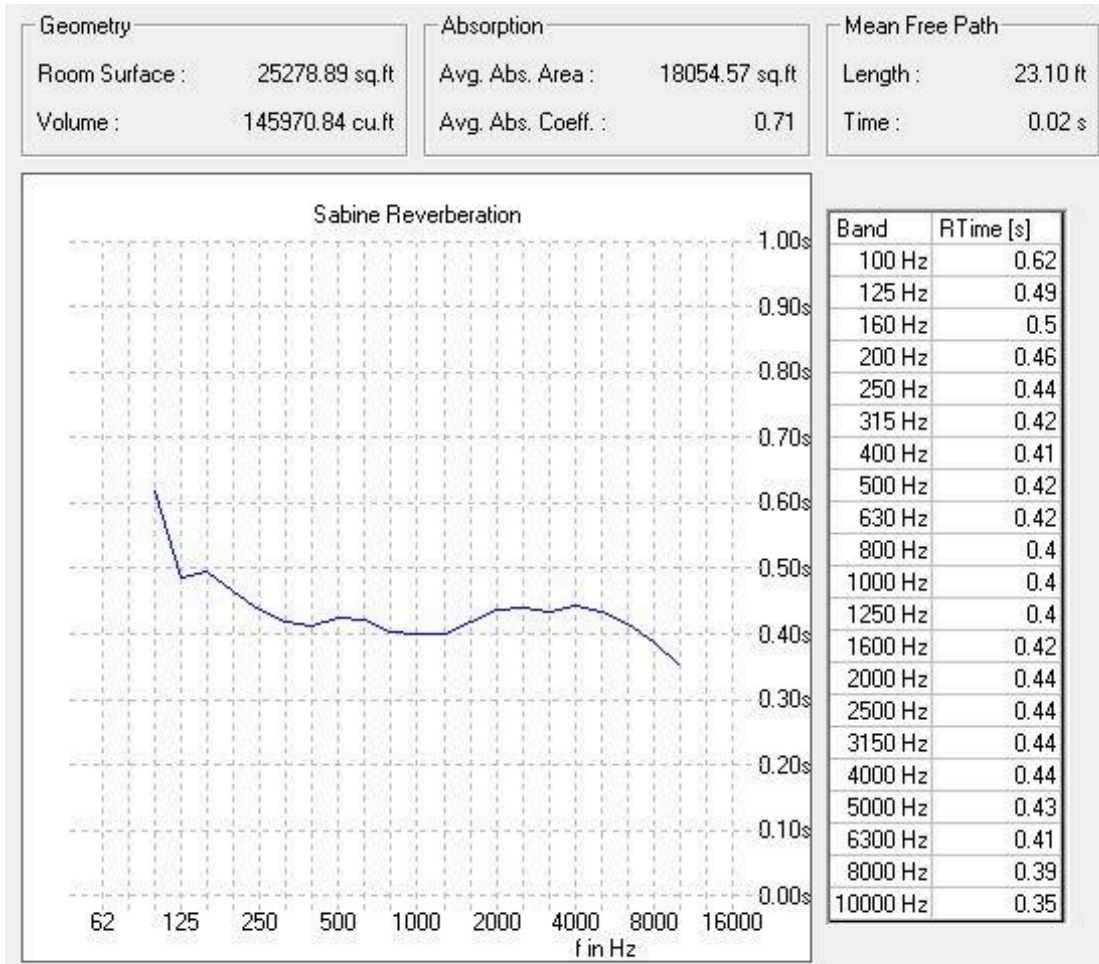
The ceiling zone is particularly critical in the overall acoustic treatment of the auditorium, as ceiling reflections are often the most delayed and can be especially destructive for speech intelligibility. To address this, the design incorporates Blaze Glass Fiber Panels, which have an NRC of 0.88. These panels are strategically placed to act as broadband absorbers, particularly effective at frequencies above 500 Hz, ensuring that sound waves are managed before they can disrupt the auditory experience. An air gap of 300 mm is maintained to optimize the performance of these panels, allowing them to absorb sound more effectively. The installation utilizes a T24 grid system, which not only facilitates modular maintenance but also ensures the stability and performance consistency of the acoustic treatment over time.

♦ Stage Zone – Noise Isolation

Finally, the stage zone is a vital area where the focus shifts to noise isolation. Here, the auditorium employs a Muffle Board with a Sound Transmission Class (STC) rating of 34, specifically designed to prevent the intrusion of external noise from the rear and ceiling onto the stage. This is essential for maintaining the integrity of performances, as any unwanted noise can detract from the experience for both the performers and the audience. The technology behind this material involves a unique composition of compressed wood particle cement, which is further enhanced by an anti-vibration mounting system. This combination not only isolates sound effectively but also contributes to a more focused and immersive auditory environment, allowing performances to resonate without interference.

In summary, the Regional Institute of Education Auditorium's acoustic material design philosophy exemplifies a meticulous and thoughtful approach to sound treatment, treating the auditory landscape by zone. By employing specialized materials and techniques tailored to the specific needs of each area, the auditorium creates a harmonious environment where sound can flourish, providing an optimal experience for all who enter.

Acoustic Performance Analysis – Verified with Modeling & Measurement



Reverberation Time (RT60)

Frequency (Hz) RT (sec)

100 0.62

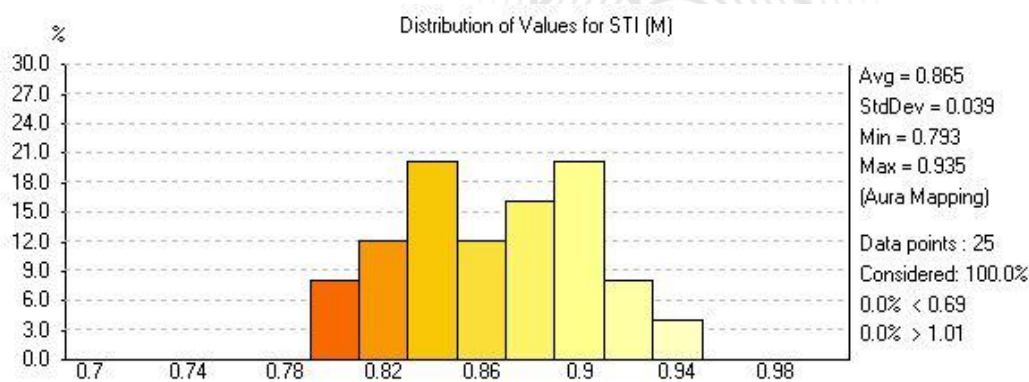
125–250 0.49–0.4
4

500–2000 0.40–0.44

8000–10000 0.39–0.35

 Consistent decay in mid/high frequencies ensures high speech clarity and reduced smearing. Average RT60 stays around 0.41 seconds – ideal for lecture and conference settings.

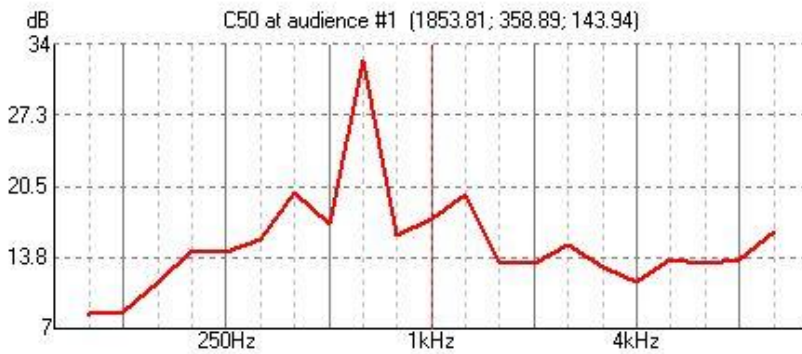
Speech Intelligibility – STI (Speech Transmission Index)



- STI Range: 0.793 – 0.935
- Average STI: 0.865

These values fall in the "Excellent" zone, indicating speech is intelligible at every seat.

Clarity Index – C50 (Early-to-Late Energy Ratio)



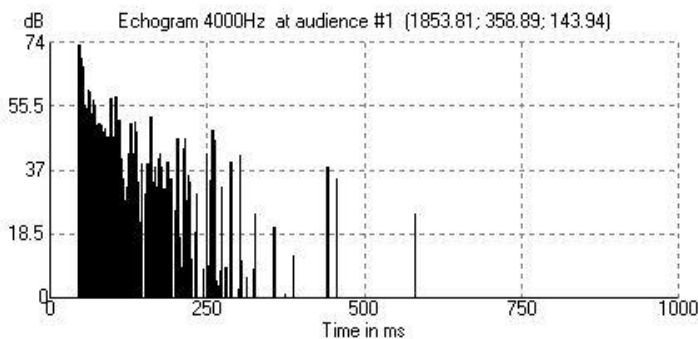
Frequency (Hz) C50 (dB)

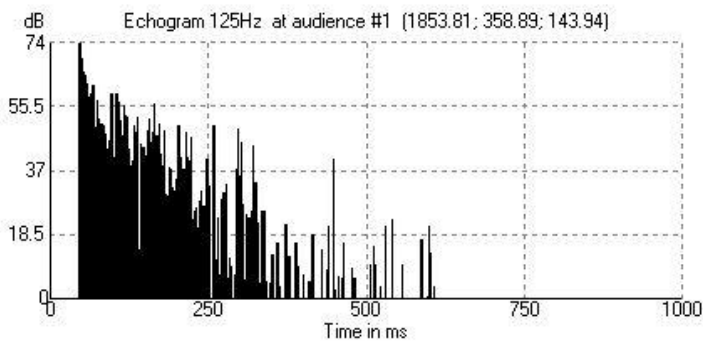
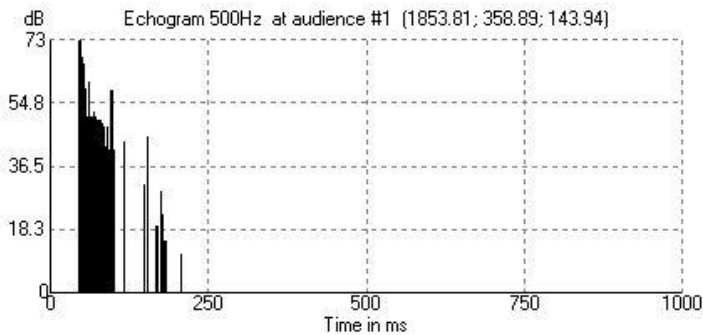
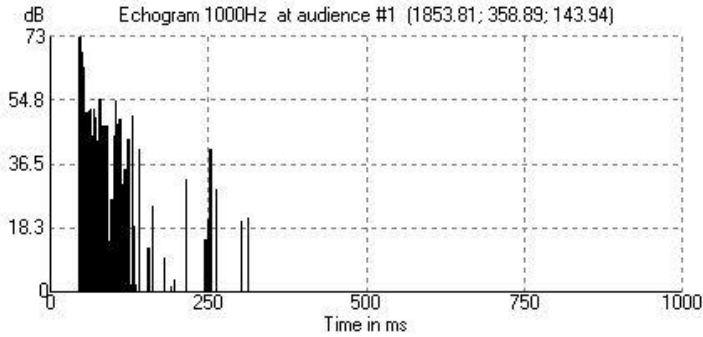
500	+17
700–800	+30+
1000–2000	>+15

C50 well above +6 dB across all voice-relevant bands. This indicates dominance of early reflections, a strong predictor of natural, unforced speech intelligibility.

🌀 Echogram Insights – A Psychoacoustic “Pulse Check”

Echograms show:





- Strong direct sound spike
- Dense cluster of early reflections within 0–50 ms
- Rapid decay within 200–250 ms
- No late echo spikes, even at 125 Hz or 4 kHz

This indicates ideal conditions for aural intimacy and vocal articulation – matching both the room's purpose and psychoacoustic models for speech intelligibility.

Deep Dive:

Reverberation Time (RT60)

The reverberation time, commonly referred to as RT60, is a critical metric in understanding the acoustic behavior of a space. It measures the time it takes for sound to decay by 60 decibels after the source has stopped. This analysis reveals a detailed breakdown of RT60 across various frequency ranges, providing insights into how sound propagates within the environment.

| Frequency (Hz) | RT (sec) |

| 100 Hz | 0.62 sec |

| 125–250 Hz | 0.49–0.44 sec |

| 500–2000 Hz | 0.40–0.44 sec |

| 8000–10000 Hz | 0.39–0.35 sec |

The data indicates a consistent decay in mid to high frequencies, which is essential for ensuring high speech clarity and minimizing sound smearing. The average RT60 remains around 0.41 seconds, a figure that is particularly ideal for settings such as lectures and conferences where clear communication is paramount. This optimal reverberation time allows for a balance between liveliness and clarity, enabling speakers to be heard distinctly without excessive echo that could muddle their message.

Speech Intelligibility – STI (Speech Transmission Index)

The Speech Transmission Index (STI) is another vital indicator of acoustic quality, reflecting how well speech can be understood in a given environment. The STI values obtained from the analysis range from 0.793 to 0.935, with an average STI of 0.865.

These values fall comfortably within the "Excellent" zone of the STI scale, suggesting that speech is intelligible at every seat in the room. Such high levels of intelligibility are crucial for effective communication, ensuring that all attendees, regardless of their position in the space, can engage fully with the spoken word. This is particularly beneficial in educational and professional settings, where the clarity of information can significantly impact learning outcomes and decision-making processes.

Clarity Index – C50 (Early-to-Late Energy Ratio)

The Clarity Index, known as C50, is a measure that assesses the ratio of early sound reflections to late sound energy, providing insight into the perceived clarity of speech. The following data outlines the C50 values across various frequency bands:

| Frequency (Hz) | C50 (dB) |

| 500 Hz | +17 db |

| 700–800 Hz | +30+ db |

| 1000–2000 Hz | >+15 db |

The C50 values are well above the +6 dB threshold across all voice-relevant bands, indicating a strong predominance of early reflections. This dominance is a strong predictor of natural and unforced speech intelligibility, allowing listeners to comprehend spoken words with ease and comfort. Such favorable conditions contribute to a more engaging and effective communication experience, enhancing overall interaction within the space.

Echogram Insights – A Psychoacoustic “Pulse Check”

Echograms provide a visual representation of the acoustic characteristics of a space, acting as a psychoacoustic "pulse check." The insights gleaned from the echograms reveal several key features:

A strong direct sound spike indicates that the primary sound source is clear and prominent.

A dense cluster of early reflections within the first 0–50 milliseconds suggests that sound waves are bouncing off surfaces in a way that enhances clarity and engagement.

A rapid decay within 200–250 milliseconds indicates that sound does not linger excessively, which is crucial for preventing muddiness in communication.

Notably, there are no late echo spikes, even at lower frequencies such as 125 Hz or higher frequencies like 4 kHz.

These echogram characteristics indicate ideal conditions for aural intimacy and vocal articulation, aligning perfectly with both the room's intended purpose and established psychoacoustic models for speech intelligibility. The absence of disruptive echoes, coupled with the strong presence of early reflections, creates an environment that fosters effective communication and enhances the overall auditory experience for all individuals present.

Acoustic Material Strategy – How Each Component Adds Value

Treatment Zone	Material	Acoustic Purpose	NRC / STC
Stage	Muffle Board	Exterior noise isolation & vibration control	STC 34
Ceiling	Blaze Panel	Broadband absorption above listener heads	NRC 0.88
Upper Walls	Chroma + Melody String	Late reflection suppression for RT control	NRC 1.00
Lower Walls	Wooden Slats + Wool	Diffusion + mid-freq absorption for clarity	NRC 0.87



Deep Dive:

In the realm of sound design and acoustic engineering, the careful selection and application of materials is paramount to achieving an ideal auditory environment. Each component within an acoustic treatment zone plays a distinct role, contributing to the overall sound quality and experience. Below, we delve into the specific materials used, their acoustic purposes, and their performance metrics, highlighting how they work in harmony to create an optimal soundscape.

Muffle Board

Material: Muffle Board

Acoustic Purpose: The Muffle Board serves a critical function in isolating exterior noise and controlling vibrations that can disrupt the listening experience. By effectively blocking unwanted sounds from entering the space, it creates a sanctuary for pure audio enjoyment. This is particularly beneficial in environments like recording studios or performance venues, where clarity is essential.

NRC / STC: With a Sound Transmission Class (STC) rating of 34, the Muffle Board significantly reduces the transmission of sound through walls and ceilings, ensuring that external disturbances are kept at bay.

Blaze Panel

Material: Blaze Panel

Acoustic Purpose: Positioned above the listeners' heads, the Blaze Panel is designed for broadband absorption, capturing a wide range of frequencies to enhance the acoustic quality of the space. This material is especially effective in reducing echoes and reverberations, allowing for clearer sound reproduction. It is an essential element in spaces where vocal clarity is paramount, such as theaters or lecture halls.

NRC / STC: With a Noise Reduction Coefficient (NRC) of 0.88, the Blaze Panel demonstrates its ability to absorb sound effectively, contributing to a more controlled acoustic environment.

Chroma + Melody String

Material: Chroma + Melody String

Acoustic Purpose: This innovative combination is specifically engineered for late reflection suppression, which is crucial for controlling reverberation time (RT). By minimizing reflections that can muddle sound clarity,

Chroma + Melody String ensures that every note and word is delivered with precision. This is particularly important in spaces where music and speech are integral, as it enhances the overall auditory experience.

NRC / STC: Achieving an NRC of 1.00, this material exemplifies superior sound absorption, making it an invaluable asset in any acoustic treatment strategy.

Wooden Slats + Wool

Material: Wooden Slats + Absorb Wool

Acoustic Purpose: The combination of wooden slats and Absorb wool introduces both diffusion and mid-frequency absorption into the acoustic environment. The wooden slats serve to scatter sound waves, preventing the buildup of standing waves and enhancing spatial clarity. Meanwhile, the absorb wool absorbs mid-frequency sounds, which can often be problematic in terms of clarity. Together, they create a balanced sound profile that enhances the listening experience.

NRC / STC: With an NRC of 0.87, this combination effectively contributes to a rich, clear auditory experience, making it suitable for a variety of applications, from concert halls to intimate recording studios.

In conclusion, the thoughtful integration of these materials within an acoustic treatment zone not only enhances the quality of sound but also creates a more enjoyable and immersive experience for listeners. Each component plays a vital role, ensuring that the space is not only functional but also conducive to the art of sound itself. By understanding the unique contributions of each material, designers and engineers can craft environments that resonate with clarity, depth, and richness.

Acoustic Summary of Regional Institute of Education Mysore Auditorium

-  **RT60 in auditorium – reduced to 0.41 s for speech clarity**
-  **NRC-rated acoustic panels used for ceiling, walls, and stage**
-  **STI optimization for auditoriums – achieved 0.865 score**

-  Early reflection and C50 tuning – clarity index over +17 dB
-  Architectural acoustics for large spaces – well - executed for volume > 4000 m³
-  Auditorium ceiling soundproofing – with Blaze absorbers and 300 mm air gap

Final Thoughts – Benchmarking Smart Acoustic Design for Educational Spaces

The Regional Institute of Education Mysore Auditorium is now an acoustically optimized space - engineered not just for compliance but for listener experience. It embodies a holistic acoustic design strategy that combines:

- Zonal treatment philosophies (diffusion vs absorption)
- Material performance profiling across frequency bands
- Psychoacoustic timing of reflections
- Data-driven verification of speech metrics

 A true model of modern auditorium acoustic treatment done right - backed by real-world acoustic data and advanced material application.

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