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Acoustical walls & ceilings

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Anutone is the only India-based building materials corporate with complete specialisation in acoustics.

Right from computer simulation to products or systems supply



Acoustic modelling

and site validation with objective measurements by spectrum analyser to ensure project outcomes meets design intent, Anutone straddles the acoustics value-chain.

Whether it's open-plan workstations in an office, banquet hall in a hotel, classroom in a college, operation theatre in a hospital or a pure-play auditorium, Anutone has them all soundscaped ... scientifically!



Spectrum analyser

Tried, tested, proven ... our projects are testimony. With Anutone you can be sure!

→ Ceiling tiles like Soundscape Shapes by Armstrong not just provide acoustics but also add to the aesthetics of a space

SOUNDING GOOD!

.....
An in-depth study on the industry unveils how acoustics can change the way one experiences spaces.



↑ **Tip**
Acoustics for the 1,450-seater Mount Carmel College auditorium in Bengaluru were designed by Acoustic Architect Sanjay Mudartha.

← **Left**
Soundscape Shapes by Armstrong provides sound absorption upto 0.95 NRC and humidity resistance upto 90 per cent RH.

→ **Right**
Ecophon tiles and wall panels by Saint Gobain Gyproc have an akutex surface coating that increases sound absorption.

Architectural acoustics, once reserved for auditoriums and performance spaces, is now being used across spaces – in apartment buildings, offices, and homes. With shrinking urban spaces and a corresponding increase in their population, the need to minimise external as well as internal noise is assuming paramount importance. "Whether it is noise reduction or sound enhancement, every construction project has a set of acoustical needs," says **Acoustic Architect, Sanjay Mudartha**. The **Founder and Director** of the 21-year old company **Acoustic Control**, he diversified six years ago into acoustic consultancy and design. He admits that bringing acoustic management to the design table was a battle initially, but architects are now beginning to understand the importance of this aspect. However, he says, accommodating reasonably good acoustics in a visually stunning design may often call for some compromises.

His views are echoed by **S Sankarshan, Associate Director (Technical), Soundesigns** – a company that has been designing acoustics for 14 years and has worked on projects in India, the Middle East and Africa. "There is now growing awareness that acoustics in any building plays a major role. It may be for reducing external noise break-in or excess reverberation time inside," he shares.



Starting point

Sound travels structurally via columns and beams in the very skeleton of a building. Which is why an acoustic architect prefers to be involved in the very early stages of project planning – even before the drawings leave the table. This, Mudartha explains, is because an acoustic architect can address any structural limitations and restrictions that may exist at the beginning, rather than having to repair defects later on. A case in point is the 1,450-seater Mount Carmel College auditorium in Bengaluru, where the upper viewing balcony slab had to be recast due to a

sightline fault that Mudartha had discovered through the computer application EASE.

However, there are both pros and cons to planning acoustics in the construction phase. Sankarshan explains: "In the pre-construction phase, we work on space geometry, which includes ratios (length:width:height), shapes, surface finishes, etc, and thus, we might be able to reduce the dependence on acoustical treatments, which is a big pro. However, in the absence of site measurements related to acoustics, there might also be a possibility that we end up with over or under designing the space, since then the acoustics are based purely on computer simulation studies."



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– S Sankarshan, Associate Director (Technical), Soundesigns

As of now, in most projects in India, the acoustics are planned only after construction – that is, in the interiors stage. This allows the designer to test the space objectively with measuring instruments and to tweak the design. However, Sankarshan points out, "It may be too late to implement the acoustical design, as the built space may not be able to accommodate the required treatment or might need excessive treatment due to wrong construction." As an acoustic consultant, Sankarshan prefers to start with noise mapping before ground breaking to study the effect of external noise on the building, keeping in mind the future increase in its density.

The construction of exterior walls and windows is the most important factor in determining the level of acoustical performance. At this stage, environmental measurements of external noise and temperature are taken. The greater the sound pollution, the more likely it is that



Soundesigns has used the Bruel&Kjaer's Odean software program for acoustic modeling at the Johnson & Johnson Research & Training Centre in Chennai.



the exterior walls will need to be constructed using materials with a heavier mass, and that windows will have combinations of heavier glass and double glazing with STC (sound transmission coefficient – for sound isolation). This principle is common for any type of venue, whether it is a performance hall or a block of flats.

Drawing the plan

For an effective acoustic plan, it is imperative that the acoustic architect examine the space layout and geometry. Working together with the architect, the

size and height of the space are determined to ensure optimal RT60 or reverberation time – the time it takes for sound to decay as it travels. Once this is done, a 3D model of the venue is created, and the acoustic model is fully developed, including the material to be used on various surfaces.

The design evolves until an acoustic model that suits the original plan is achieved. "We do acoustic modeling via computer simulation with Bruel&Kjaer's Odean software program wherein we can also hear how the finished space will sound even before it has been built. We undertake site measurements with Bruel&Kjaer's acoustic instrumentation," shares Sankarshan, who has used this software in several projects including the Cisco Bengaluru project with RSP Architects and Depuy Chennai (Johnson & Johnson Research & Training Centre) with CRN Architects with good results. Mudartha employs computer aids too, but prefers another software, EASE.

Selecting materials

As sound travels, it changes each time it hits a wall, floor or any other surface. How much it changes depends on the nature of the materials it encounters. Examining the shapes and surfaces of the walls, floors, doors, windows and ceilings, an acoustic architect recommends various products to achieve a desired effect by specifying either sound-absorbing or sound-reflecting materials. Where necessary, even AC



↑ Armstrong's SoundScapes Shapes are extremely versatile and can be installed individually or in cluster shapes on a predetermined arrangement using special frames for this purpose.



↑ This is a semi-permanent structure designed by Liam Hopkins of Lazerian within Bloomberg's London headquarters made from reclaimed cardboard and pallets that soften the office noise.



↑ Saint Gobain Gyproc's Ecophon Master Solo ceiling tiles are ideal for office spaces.

Smart tips on acoustic control

- External noise to be studied if residences face noisy road.
- External noise can only be controlled with acoustic windows.
- Hard and reflective surfaces to be minimised with fabrics, rugs.
- Install canvas painting without glass but with acoustic foam behind.

ducts are treated internally with sound absorbent materials.

Sound-absorbing materials such as carpet, mineral fibreboard and glass or rock wool are specified where sound absorption is desired. Sound-reflecting materials such as plaster, wood, vinyl, concrete, gypsum board and stone are specified where sound must be reflected back into the audience. Thus, the walls of the Mount Carmel College auditorium had blocks of carpet on top of wood and wool spaced with an air gap off the wall rather than on the wall. This, Mudartha believes, improves the efficiency of the material. The false ceiling here was treated with highly absorptive perforated gypsum.

Materials even differ based on the usage of the space. For commercial spaces, Sankarshan prefers dry construction for noise isolating partition walls and larger modules of absorptive panels of vinyl, texture, metal and plasters for ceilings and linings. For residential spaces, he recommends wet construction (brick masonry) for noise isolation and smaller modules of fabric or wood finishes for sound absorption. Thus, with proper planning and modern technology, it becomes possible to mitigate sound pollution, one of the pressing challenges of modern urban living.

“Whether it is noise reduction or sound enhancement, every construction project has a set of acoustical needs.”

– Sanjay Mudartha, Founder and Director, Acoustic Control

We examine some of the latest and most innovative products that are available in the industry...

...feature one

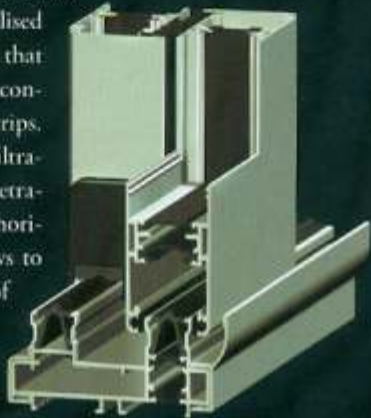


Ecophon tiles & wall panels

High density glass wool ceiling tiles and wall panels, Ecophon by Saint Gobain Gyproc has an akutex surface coating that increases sound absorption. Easy to clean, with NRC values of 0.9 to 1, Ecophon's anti sagging properties give it superior performance and a long life. Ecophon comes in thicknesses of 15 mm and 40 mm and is priced at ₹250-400 per sq ft, plus the cost of supporting framework and installation. Ecophon is ideal for auditoriums, offices (voice/non-voice based), school classrooms, hotel lobbies, hospitals, etc.

LS 45 sliding window system

For superior acoustic performance of windows, Yantra, with technical backup from Giesse (Italy), offers the LS45 system with specialised profiles and hardware that use gaskets instead of conventional weather-strips. This allows the air infiltration and water penetration performance of horizontal sliding windows to be raised to the level of casement windows.



Gyptone

A product by Saint Gobain Gyproc, this is an acoustical perforated plasterboard, which is used in walls and ceilings for sound absorption. Its USP is its unique monolithic finish and perforations, which are available in line, square and hexagonal patterns. Installation of Gyptone is quick and less labour oriented. It comes in a thickness of 12.5 mm with a size of 8 ft x 4ft and can be painted. Ideal for high traffic areas like common areas, malls, auditoriums, libraries, discotheques, banquets halls, etc, Gyptone is priced at ₹70-80 per sq ft.



Savana

A new ceiling tile with mineral fibre core and sand-finished, white-painted surface, Savana by Anutone is a great option for open-plan offices and similar large areas. The clatter of office equipment and chatter at workstations is quickly absorbed by this material.



ACT KLH Lite

ACT KLH Lite is a unique wall panel from Anutone available in unperforated vinyl – an economical option to micro-perforated vinyl. Unperforated means less sound absorption of higher frequencies but better surface integrity to pedestrian abuse. It is ideal for high-density public areas or classrooms.



Roctex

A ceiling tile with rock fibre core and white-texture finish, Roctex by Anutone is very rugged and high-performance. It is best for large areas like reception lobbies, corridors, banquet halls, as Roctex absorbs footfall noise and loud conversations found in such areas.



Pixel Smery

A sound absorbing, paintable surface, Pixel Smery by Anutone can provide invisible acoustics to the space. It can be used in all kinds of spaces, be it guestrooms or office cabins and is a great alternative to acoustic panels with soft fabrics or perforated surfaces that attract dust.



Slats Serate

A variation of Slats, Anutone's best selling fibreboard, Serate aids sound diffusion and hence preserves the natural sound, enriching the built environment. Slats Serate is ideal for studios, music rooms, home theatres, auditorium and similar speciality venues.



Strand Plus

Anutone's flagship product Strand, a woolwood board that has been in the market for five decades, has a new variant, Strand Plus. Made from superfine fibres (0.6-0.8mm), Strand Plus has a single layer (Strand is dual-layer) that results in many more air-cells for superior sound absorption.



Sonaspray FC

Sonaspray FC & FCX by Asona are spray-applied acoustical textures that provide an attractive, high performance solution to acoustical and lighting design objectives in both new construction and renovation projects. Typical installations include schools, churches, passenger terminals, libraries, cafeterias, offices, hotels, condominiums and many more. Besides acoustical properties, this spray is odourless, easy to clean, removable, anti-static (does not attract dust), covers cracks and does not peel.



Float 25T3

Float 25T3 by Anutone is a floor panel that is just 25 mm high but controls impact noise due to stillets, trolleys, dropping objects or bouncing balls in multi-level apartments, hotels, hospitals and all other buildings where inter-floor noise control is important.



Sonaspray K13

K-13 by Asona is a rough, textured spray-applied insulation tailored to specific project requirements for insulation, noise reduction, colour, durability, condensation control, texture and aesthetics. It's a more cost effective alternative to rigid board and batt insulations, sprayed plasters, and acoustical ceilings. It can be applied to virtually any even surface and can be sprayed up to five inches thick overhead in one application without mechanical support. Besides acoustical performance, K-13 also provides thermal insulation and condensation control.



Sway

Sway by Anutone is a unique accessory that offers resilient mounting to ceiling or wall channels. It prevents structure-borne vibrations and in effect isolates the ceiling or drywalls from vibration transmission and is used in home theatres, studios, discotheques where bass dominates.



Tufbloc

Tufbloc by Anutone is for sound blocking, not absorption. It can be used for both ceilings and drywalls to prevent noise break-in or break-out. It is used in office cabins, banquet halls, classrooms, hospital rooms, nightclubs, auditoriums and operating centres.



Anutone's 2011 project list is replete with architectural gems that have used innovative solutions in acoustics to ensure that the interiors look stunning, sound great and feel good! Here is a selection of some diverse projects from around the country, showcasing segments, applications, products. Anutone is the only corporate in the private sector to use acoustic modelling by computer simulation at design stage and onsite measurements with spectrum analyser on project completion to validate results with original intent.

Case 1: Network Operating Centre (NOC) of a handset major in Bengaluru.

Project type: Office project, private sector

Challenge: The client's brief was for the NOC to be very quiet, given that it was located below a carpark in a building in the eastern suburbs of Bengaluru. Apart from airborne noise, structure-borne vibration was the concern.

Solution: We used MAT BSB ISO boards as noise/vibration isolating ceilings suspended on KSCH and AF100 resilient mounts with a grid ceiling below for sound absorption. For the walls, we used noise/vibration isolated with Tufbloc boards on Sway resilient mounts and ACT GLD as panel absorbers. These were backed with SynthPF as an acoustic infill.



Result 1: Impact Noise Isolation (structure-borne) of the floor. Design Criteria: 55 dB. Pre-Install: 44 dB. Post Install: 60~63 dB. The higher the better; the result meets the requirement.

Result 2: Airborne Noise Isolation of the partition wall. Design Criteria: 40 dB. Post Install: 40 dB. Meets the requirement.

The NOC operators are delighted to work in a quiet environment with good speech intelligibility.

Case 2: Johnson & Johnson, Depuy Training Centre, Chennai.

Project type: Classroom project, private sector

Challenge: The client wanted an acoustical ceiling and wall panelling that does not impart a grid look: a smooth, seam-



less finish that absorbs sound, yet is quick and clean to install so that they can upset the sequence and bring in the wall and ceiling after the furniture.

Solution: Stretch SLS as an acoustic membrane for ceilings and Stretch Cara for fabric walls with SynthPF backing was used. For the seamless, non-grid look, we customised it to onsite conditions with a wet-free/dust-free install. Nothing can beat the Stretch systems from Anutone!

Result: The client is delighted with the results of an echo-free training environment. The teachers and students have better interaction due to greater speech clarity.

Case 3: RG Kar Medical College, Kolkata.



Project type: Auditorium project, public sector

Challenge: The client demanded state-of-the-art acoustics for multipurpose performing arts that include seminars, music, dances and theatre. However, the aesthetics were not to be compromised upon.

Solution: A combination of Pixel Taper perforated gypsum board and Slats grooved wooden panels were used for the ceiling. A combination of ACT KLH perforated-vinyl panels and Slats were used for the walls. Thus, Slats is the common element between the ceiling and walls. All these were backed with SynthPF. Everything was installed in a manner that excites the senses – the eye, the ear and the mind!

Result 1: Design Criteria: Reverberation Time: $1.1 \pm 0.25s$. Pre Install: 2.2s. Post Install: 1.1s. Thus, it meets the requirement.

Result 2: Design Criteria: Background Noise: 38 dBA. Pre Install: 56 dBA. Post Install: 38.2 dBA. Meets the requirement. The perfect acoustics for multipurpose performances.

Case 4: DMRC, New Delhi

Project type: Transport project, government sector.

Challenge: Troubleshooting for an existing Operation Control Centre (OCC) of DMRC without disrupting the 24/7 work in terms of reducing reverberations and thereby improving speech intelligibility.

Solution: Sconz foam panels were stuck to the existing gypsum ceiling and ACT GLD fabric-finished panels were impaled on the existing walls. A wet-free/dust-free quick and easy install was conducted without any disruption to the occupants.



Result 1: Design Criteria: Reverberation Time: $0.6 \pm 0.25s$. Fourth floor: Pre Install: 1.25s. Sixth floor: Pre Install: 3.15s.

Result 2: Design Criteria: Background Noise: NC(30)38 dBA. Sixth floor: Pre Install: 39 dBA. Although post install measurements are pending, the client is already delighted with the outcome. Operators are now relieved with the resulting speech clarity.

Case 5: Indian Space Research Organisation (ISRO), Ahmedabad.

Project type: Auditorium project, public sector.

Challenge: The client demanded the latest in acoustics to match the hi-tech audio-video and for multipurpose use including seminars, music, dance and drama. Aesthetics too had to be top-notch.

Solution: Pixel perforated gypsum board for the ceiling and a combination of Stretch Cara fabric with Slats grooved wooden panels for walls, all backed with SynthPF.



Result: Design Criteria: Reverberation Time: $1.25 \pm 0.25s$. Pre Install: 7.27s (simulated). Post Install: 0.56~1.29s. The solution meets the requirements. Perfect acoustics for the performing arts.

Case 6: Park Hotel, Hyderabad

Project: Nightclub project, private sector

Challenge: The nightclub is a high pulsating, high energy space and no noise or vibration should permeate into the lobby or guestrooms above.

Solution: To create a noise/vibration isolation shell, Anutone floated the floor, walls and ceilings for a room within a room with MAT BSB boards resiliently mounted with Anutone Float (15 mm smooth + 6 mm NBR), KSCH & sway springs. SynthPF was used as an acoustic infill.

Result: Post-install measurements are pending, but the client and guests are satisfied with the outcome.

(Communication by the management of the company)