



CertainTeed
SAINT-GOBAIN
Ceilings

Maximum impact meets maximum comfort:

Designing dramatic spaces with targeted acoustics in mind

whitepaper



Photo © Jeffrey Totaro, 2015

The art of making an entrance

In a hotel, a corporate office, or a healthcare facility, the purpose of the lobby is to make an impression on the visitor. To convey in mere seconds the spirit and voice of the entire building. Of course, you don't want that voice to have a hollow echo – or to become a cacophony of background noise.

Successful lobbies and other prominent spaces (atria, executive conference rooms, etc.) need to demonstrate acoustic design and quality that matches their visual appeal, enhancing the overall effect and experience of the space.

Beyond the lobby

So what happens when you move past the reception area, into the heart of a facility? How do you meet the challenges of designing a beautiful and comfortable space for day-to-day work? Some would argue that the lobbies, atria and executive conference rooms are the “easy” part – the spaces where developers, owners, occupants are happy to use the budget to make an impression.

TABLE OF CONTENTS

The art of making an entrance	1
Beyond the lobby	1
Targeting acoustic performance where you need it most	2
Understanding NRC	3
Acoustic ceilings in disguise	3
Design is only one piece of the puzzle	4

How do you maintain design interest and acoustic performance in the thousands of feet of open office workstations, the ad hoc collaborative spaces, the phone and training rooms?

Aesthetics and acoustics don't have to be at odds in any space. The CertainTeed/Saint-Gobain North American headquarters provides numerous object lessons on using acoustic products to elevate visual impact and occupant comfort – no compromise necessary.

The key is to understand the basics of sound, and to plan ahead and address the acoustic needs of the space as much as possible during the design phase. Because integrating the proper acoustic treatments into the original design always results in a better aesthetic than trying to remediate noise problems after the fact.

Targeting acoustic performance where you need it most

For a variety of reasons, traditional lay-in acoustic ceiling tiles are simply the most effective solution for many spaces. This is especially true for retrofits like the CertainTeed headquarters, where existing HVAC systems must be accessible. It's also a favorite when budgets are tight and background noise is an issue. Of course, heavily fissured ceiling tile doesn't exactly rank high on the list of desirable finishes for most commercial designers (or occupants, for that matter). The trend is toward clean, bright panels with minimal texture and edge details that minimize the suspension grid as much as possible.

The designer's original plan for the 119,000 square feet of open office space called for Symphony® *f* fiberglass panels to be installed in a floating island configuration over the workspace areas. The contrast of the smooth, white panels

with their .90 light reflectance against the black-painted plenum and exposed ductwork in corridor and transition areas would be dramatic.

Rarely are designers dealing with a single source of sound or a single type, and the CertainTeed office was no exception. The realities of the low frequency mechanical system noise required the team to rethink the approach, finding a creative way to achieve the same overall aesthetic while ensuring the workstations remained quiet.

A solution was needed that would block the mechanical sound from reaching the work stations below, and while fiberglass provides excellent absorption, it is a poor sound blocker. In a situation like this, most would default to one of the following single-product solutions:

- Choose a panel based on the biggest concern: either a high absorbing fiberglass panel for the speech noise or a high blocking mineral fiber panel for the mechanical noise.
- Compromise with a mineral fiber panel that has moderate blocking and absorbing capabilities.
- Install a premium composite panel that excels at both blocking and absorbing throughout the entire space.

There is an alternative: a multi-product solution leveraging targeted acoustic characteristics, which is what the Jacobs team chose for the CertainTeed headquarters. Symphony *f* fiberglass makes up the majority of the ceiling. The NRC of 0.95 is ideal for absorbing background speech noise in the open office.



Photo © Jeffrey Totaro, 2015

Directly below the heat pumps, premium Adagio® composite ceilings perform a dual acoustic function. A fiberglass face absorbs sound, while a mineral fiber backer blocks the mechanical noise from above. Most importantly from an aesthetic perspective, the difference in tiles is invisible to the occupant, because Symphony and Adagio share the same clean, minimally textured surface and edge detail for a perfect match. The look also matches the Symphony *m* mineral fiber tiles chosen for the smaller conference and meeting rooms.

Instead of an open plenum painted black, Theatre® Black f fiberglass panels were installed around the perimeter to create the visual effect of free-floating islands while providing additional sound absorption.

Acoustic ceilings in disguise

Somewhere between the all-out wow factor of a lobby and the “back of house” work station areas are spaces that require a little something extra in both form and function. The clean, monolithic look of a solid ceiling is always in demand. But there are considerations: intolerable reverberation from a drywall ceiling and lack of access to mechanicals, plumbing and ductwork remain two of the most common. In those cases, even the smoothest, brightest 2 x 2 or 2 x 4 panel isn't going to achieve the look the space demands.

Within the CertainTeed headquarters, this was the case in some conference rooms, as well as social, dining and gathering areas: the cafeteria that doubles as a town hall and impromptu meeting space,

Understanding NRC

The most common piece of data used to evaluate acoustic panels is the Noise Reduction Coefficient or NRC. To appreciate the value – and limits – of NRC ratings, a little more background is needed – specifically, a basic understanding of frequency.

Frequency is the measurement of how often a wave passes a fixed point in one second. Measured in hertz (Hz), it dictates the pitch of the sound and its audibility to the human ear. High frequency sounds are high pitched. Low frequency sounds are low pitched. The human voice has a general range between 80 Hz to 240 Hz for men and 140 Hz to 500 Hz for women. For comparison, a piano produces sounds between 27.5 Hz and 4186 Hz. The human ear can distinguish sounds between 20 Hz and 20,000 Hz.

The NRC of a product is determined by averaging how much sound it absorbs at four frequencies: 250, 500, 1000 and 2000 Hz. This average is represented as a decimal between 0.00 (no absorption at all) and 1.00 (complete absorption), rounded to the nearest .05. For general purpose interior acoustic decisions, this average is an acceptable measurement. But for more precise acoustic control – especially in spaces where speech perception is important, architects are advised to look at more granular data: specifically ASTM C423, which shows a complete absorption profile from 100 to 5000 Hz.

Fiberglass ceiling panels have the highest NRC, ranging from 0.80 to 1.00. Mineral fiber panels have an NRC of 0.50 to 0.80.

and the pantries in each work area. As social hubs, they obviously had the potential for plenty of background noise. But as gathering areas, they would have a high level of visibility to outside visitors.

For these spaces, large format panels and fully concealed grid solutions that create the illusion of a solid ceiling were selected. Ecophon® Focus™ Ds panels give the overall impression of a drywall ceiling with recessed lighting fixtures. But where drywall ceilings are highly reflective, the fiberglass used in Focus Ds is highly absorptive.

One of the most unusual and acoustically sophisticated CertainTeed Ceiling products also camouflages its acoustic properties. Gyptone® BIG™ Quattro 46 is actually full-size gypsum sheets that install and finish just like standard drywall. The gypsum surface does reflect sound, which is appropriate to the large classroom-style training spaces located on each floor of the headquarters. Some degree of reflection is important in a classroom setting, allowing speech to carry and remain live within the space, from the front podium to the back corner. But the unique pattern of perforations



in the board allow enough sound absorption to keep the reverberation low enough that it doesn't interfere with speech intelligibility and cause too much background noise.

Design is only one piece of the puzzle

A successful project is a collaborative effort. Architect, designer, acoustician, contractor, manufacturer, installer – everyone must do their part to make sure that a beautiful design results in a beautiful finished product.

The more elaborate and specialized the acoustic products in a space, the more important it is to have the proper technical consultation and support along the way. The more detail you can get into your design plans, the better chance you have of success.

Bill Humlhanz is the veteran installer who served as ceiling foreman on the CertainTeed headquarters, which he called “the most intense project

I've done in 18 years.” He emphasizes the importance of knowing and accommodating the unique qualities of your materials and encourages specifiers to bring in that technical expertise as early as possible in the design process, whether it is support from an acoustician, manufacturer or experienced installer. To figure out how to make your design happen, it helps to consult with people who live and breathe these products every day.

Whether it's a soaring atrium, an executive boardroom, or a span of open office workstations, creative ceiling solutions can add an element of design impact and acoustic comfort that take the occupant experience to an unexpected level.

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