OPERABLE PARTITIONS
Strategies for Application in Schools

Alberta Infrastructure

DESIGN & TECHNOLOGY SERIES **8**

The flexibility, ease of operation, and acoustic performance of operable partitions are often promoted as benefits for facilities of many types, including schools. Alberta Infrastructure's Post Occupany Evaluation (POE)[1] program has gained significant insight into the real-world experience of operable partitions in school facilities, and offers direction on how to avoid common problems.

Spatial Functionality

One of the most common and unanticipated effects of operable partitions in school environments is the loss of wall and floor space for storage and display. The amount of storage for a facility is sometimes underestimated during the design phase, and once the building is operational and programming has been further developed, additional storage is often required. POE results reveal that wall space for display of student work and teaching materials is the most common functional deficiency in typical classrooms. Commonly, attachment of materials to wall panels is discouraged or impractical because the bending, sliding, or stacking of panels can interfere with or damage items fastened to them. In rooms requiring larger amounts of storage (such as music or art rooms) placement of materials, musical instruments, etc. adjacent to an operable wall is not viable, as movable panels require clear floor space to open and close. Relocation of these items is generally inconvenient if two rooms are frequently interconnected.

Consider the occassional benefits of an operable partition system against the day-to-day utility of a traditional fixed wall, or the provision of one larger space in lieu of two smaller, infrequently connected rooms. POEs of schools with operable walls showed that over half were used less than three times a year. Reasons given were a lack of programming requiring large spaces, infrequent use for special events, and the inconvenience of moving furniture whenever two rooms were interconnected.

Mechanical and Structural Design

Understand the type of rooms that will be joined when the operable partition is open, paying particular attention to their specific heating, cooling and ventilation needs. Dissimilar requirements may be difficult to satisfy. For example, in a school where an operable partition is to be installed between a music room and gymnasium, the mechanical system may be designed to meet the demand of the combined spaces rather than two individual zones. In reality, the spaces may remain separate from each other most of the time. When a class is using the gym, the mechanical system increases the air exchange and reduces the temperature, however, because the two rooms are treated as a single HVAC zone, the music room may become uncomfortably cool.

Structural input is necessary for optimum acoustic performance, as both the stiffness of the top track from which the wall is hung and the flatness of the floor below require above-average design and construction. If the top track is not sufficiently rigid, it will sag, resulting in gaps and sound transmission between spaces. The floor directly below the wall should be hard-surfaced (i.e. not carpeted) and exceptionally flat, to ensure a good seal is achieved. Wall/floor and wall/ceiling junctions must be perpendicular and smooth in order to avoid gaps and improve contact with the operable wall seal.

Acoustic Performance

Acoustic performance is one of the most misunderstood elements of operable partitions. Manufacturers use laboratory tests to measure the Sound Transmission

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Laboratory vs In-situ Testing

Standardized acoustic testing permits an accurate comparison of materials and assemblies used in operable partitions. However, the highly controlled lab conditions under which testing is performed are likely to produce better results than those found in real-world installations.

In-lab attention to the integrity of seals around operable partitions and the suppression of flanking transmission is typically of much greater quality than that of the built condition. Thus, the tested STC of an operable partition should be considered "best case scenario". While similar on-site diligence may improve the overall STC rating of the system, it is not likely to match that of the lab-tested assembly[4].

Good installation and the elimination of flanking paths and air gaps in surrounding assemblies will improve the performance of an operable partition, yet achieving lab STC ratings on-site is unlikely. Additionally, even a perfect installation can be undermined simply by an open door or a single-glazed sidelight. Users should be made aware that good acoustic separation requires the manipulation of many elements and cannot be achieved solely by installing an operable partition with a high lab-tested STC rating.

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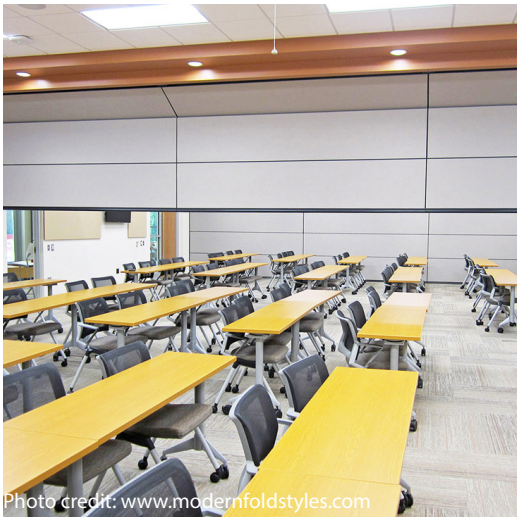

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Flanking

Flanking is the indirect transmission of sound from a source space to an adjacent space by paths other than the common partition. For example, impact sounds from footsteps or a dropped object may be transmitted from one room to another through a continuous floor assembly. Pipework, ductwork, and ceilings or walls that run through connected spaces are also common flanking paths.[2]

Flanking noise is problematic because it can be difficult to identify and mitigate, and it can undermine the acoustic performance of even the best partitions. Although poor acoustic separation is often blamed on operable partitions, they may not be entirely to blame, as the acoustical short-circuiting *around* the partition may be of greater consequence.[3]

Rooms intended to be divided by an operable partition should be designed to address flanking transmission as part of a holistic strategy to minimize noise transferrence. The careful detailing of architectural, structural, and mechanical components can significantly increase the effectiveness of sound separation between rooms, as well as the comfort of the occupants.

Class (STC) of their products in a manner that is standardized and replicable. Although this can provide consistent results, conditions vary greatly between the lab test and the installed environment, such as in a classroom. This variation significantly decreases the way an operable wall performs acoustically. Gaps between operable and fixed walls or floors allow sound to pass unimpeded between spaces. Where wall, ceiling or floor materials are continuous between rooms, flanking may also permit the transmission of unwanted noise. This may be of particular concern in a school setting where student attention and concentration may be adversely impacted by noise from an adjacent space. Consider an operable partition as being analogous to a window: the best quality window will not prevent heat loss from a space if there are gaps or thermal bridges around the frame. Similarly, an operable partition cannot protect an interior space from unwanted sound transmission if there are gaps or flanking paths around it.

Costs

The capital costs of operable wall systems are considerably higher than fixed-in-place walls. Their operable nature uses hinges, tracks, and other components that can wear out, become damaged, and require specialized expertise to install, repair, and maintain. Damage can easily occur in high impact areas such as gymnasiums where they are often used to connect the gym and adjacent music or gathering spaces. In two of the three schools studied in POEs in 2016, operable walls in the gymnasiums had been damaged to the point they were no longer operable; this had occurred within the first two years since the schools opened. One of the two had been repaired at a cost of $30,000.

Strategies for Application

Carefully analyze and understand the functional requirements of the end users, and anticipate how these needs may change over time. Strategic incorporation of operable partitions into a select few areas may be useful; installation throughout a facility will increase capital, maintenance and repair costs, and reduce storage opportunities as well as acoustic performance between spaces. Although these concerns may be tolerable in some locations, they are generally not appropriate for most spaces in a building.

Design interconnected spaces to have complimentary or similar uses or acoustic requirements. Two classrooms may have comparable noise levels and may be suitable for an operable partion, while a library/gym or music/CTS room are typically incompatible pairings. Ensure adjacent surfaces contribute to the reduction of sound transmission between rooms, as operable partitions are unlikely to provide adequate acoustic separation on their own. This is a particular problem when used to separate a noisy room such as a music room from quieter spaces, such as a library or classroom.

Operable partitions are part of a complex and interrelated system of building elements. Consider the impact of adjacent doors, windows, and other flanking paths on acoustic performance, and ensure that end users understand that the flexibility operable walls offer is not without cost and functional implications. If it is unclear how often a proposed operable partition will be used, it may be prudent to build a standard stud wall and revisit the decision once the space has been in service for a period of time.

Information Sourced From:

1. Technical Services Branch: *Post Occupancy Evaluations 2016*
2. http://www.acoustic-glossary.co.uk/sound-insulation.htm
3. https://www.tmsoundproofing.com/understanding-flanking-noise.html
4. http://www.adrianjamesacoustics.co.uk/papers/Movable%20Goalposts%20-%20Joe%20Bear%20111013.pdf

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