

Using Modular Buildings For Maintenance Workspace

Written by Eric McDonald, O'Brien Partition Co.
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Any work goes smoother in the right environment, and maintenance and reliability office operations are no exception. Flexible modular buildings can provide the ideal solution for a maintenance office or lab. Here are some issues to be considered.

Building maintenance office space, equipment enclosures, or process enclosures out of modular in-plant buildings and wall systems can help a company create flexible plant space. Modular in-plant buildings allow you to quickly install a project with less mess than would be associated with fixed drywall or block construction. You can typically build the same space in half the time it would take to build it using fixed construction and without the need to have separate trades for the messy functions of taping, mudding, sanding, and painting.

Modular buildings are relocatable and the material is reuseable. You can typically reuse 90 percent of the material during the relocation or renovation of a modular in-plant building. Modular in-plant buildings also qualify for accelerated depreciation because they are considered equipment. They can be depreciated over 7 years vs. 39 years for fixed construction. The key to a successful modular in-plant building project is planning.

Initial planning considerations

Understanding what can be accomplished in a standard, cost-effective manner and planning for it from the beginning is very important. The following points are important in initial planning:

- Some designs are more cost efficient, from a material standpoint, than others. For example, a 16 ft. x 30 ft. building and a 20 ft. x 24 ft. have the same square footage, but the 16 ft. x 30 ft. does not require supporting joists for the dustcover, reducing material and installation costs.
- Using interior walls as load-bearing walls could eliminate the need for dustcover support joists, again reducing material and labor costs.
- A two-story building requires less floor space but could cost up to 50 percent more than a single-story building of the same square footage depending on the layout and options. Load-bearing dustcovers can provide storage space at a fairly economical cost, adding as little as 25 percent to the cost of the building.

Sound control planning

Providing a sound-conditioned environment for individuals in a plant setting is one of the primary reasons for using modular in-plant offices. A number of conditions determine the noise reduction capabilities of any building, the primary one being the sound transmission coefficient (STC) rating of walls, dustcovers, and ceilings. STC ratings are established in laboratory tests and only for the individual components being tested. A modular in-plant building is made up of

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many different materials: panels, glass, ceilings, lights, steel deck, etc. The STC rating for the building is only as good as its weakest part. A wall with a 45 STC rating will not provide good sound control if the door in it is rated at 26 STC.

Some practical do's and don'ts regarding noise control are:

1. If there is a specific noise source, locate any openings, i.e., doors, air conditioning units, ventilating fans, etc., on the opposite side of the building. A door is generally 20 percent less efficient in stopping sound when compared with the adjacent wall panel, so locating doors away from noise sources is important. Sliding and overhead doors are less efficient in stopping sound because they cannot be properly sealed at the edges. They should not be used with buildings that require a high degree of sound control.

2. Openings, as small as $\frac{1}{8}$ in., can reduce the effective sound rating of a material by 30 percent. Make sure all joints and gaps are sealed during the installation process. Use a closed cell foam gasket under the floor track, between the top track and the roof decking, and at existing walls.

3. Use sound-absorbing material inside the building. Acoustical wall panels and ceilings can help reduce the intensity of any noise that does penetrate the building.

4. In buildings that require a high degree of sound control, ventilation paths have to be carefully controlled. Vent stacks should have multiple angles in them to prevent a straight line path that lets outside noise enter easily. Louvers should have multi-angled vanes for the same reason. Placement of the stacks and louvers on a side opposite the noise source is critical.

Specific product options for modular in-plant buildings that can increase the sound control capability of a building are:

Ceiling and deck: Using $\frac{5}{8}$ in. thick vinyl faced gypsum board ceiling tile with an STC rating of 44-46 makes the ceiling system 10 times better at stopping sound than standard material. Installing fiberglass insulation over the ceiling tile, and using closed cell foam rubber roof deck

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plugs to seal the open ends of the dustcover, will reduce noise penetration. Attaching

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in. plywood to the top of the deck will improve the STC rating of the dustcover.

Walls: Cavity wall systems are the best at stopping sound and can provide a quiet office environment even in a very noisy plant setting. Whether using cavity walls or unitized panel systems, the heavier, more dense Class A, fire resistant panel construction is the most effective at stopping sound.

Glazing: Thermally insulated, double glazed windows and door glass lites are approximately 20 percent more efficient than standard single piece glazing.

Doors: Solid core wood doors are approximately 70 percent more effective than hollow core doors or hollow metal doors. Door sweeps will seal the gap under the door when it is closed, reducing sound penetration.

Panel layout planning

A well-planned building insures that all personnel and their equipment will fit in the most efficient and desirable locations. Here are a few prerequisites to consider:

1. Check possible fire code requirements to determine if doors must swing out, away from the building and, in training or conference rooms, if emergency hardware is required.
2. In floor-to-ceiling height interior wall installations, one post in any one wall has to be a two-piece post and cannot have an electrical outlet.
3. Electrical outlets cannot be located in the corner posts.

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4. Air conditioners should not be used in window panels if avoidable, due to reduced efficiency in being placed in the bottom panel.

5. As you face a through-the-wall air conditioner, the outlet must be placed in the post to the left because of the length of the electrical cord.

6. If you require panels with special cutouts for conveyors, consoles, robots, etc., oversize the opening by 1 inch for field fitting.

7. On all glazed walls longer than 24 ft., place one solid panel on either end, to be field cut for dimension adjustment.

8. When using computer room access floors, the perimeter wall height should be increased to prevent the interior floor-to-ceiling height from becoming too low. Also, specify the height of outlets and switches above the computer floor.

9. Consider the run of stairways on two-story buildings and how it will affect where they can be located. Occupational Safety & Health Administration (OSHA) code stairways have a rise and run that is approximately equal, i.e., a 9 ft. high stairway has a run of 9 ft. Building Officials and Code Administrators (BOCA) and Uniform Building Code (UBC) stairways have a run that is approximately 50 percent greater than the rise, i.e., a 9 ft. high stairway has a run of 13 ft., 10 in.

10. When using cavity wall systems, windows typically cannot be placed directly next to a corner post because of the wall thickness. Allow for a 24 in. wide flush panel to be placed next to the corner.

Electrical planning

To determine the number of electrical outlets and size of the circuit breaker box, it is helpful to make a list of the equipment that will be used in the building. Amperage or wattage can be found on the electrical requirements label of the equipment. When the total amperage is known, it can be divided among individual circuits. A handy formula is $\text{amps} = \text{watts} / \text{volts}$.

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Each 120 V circuit can carry 20 A and each 240 V circuit can carry 40 A. A general rule for office-type equipment such as calculators and typewriters is 10 outlets per circuit. Any heating-type device, such as a baseboard heater, copy machine, or coffee maker, generally draws more amps than other equipment. A separate circuit should be provided for the light fixtures.

An isolated circuit for sensitive equipment can be provided by connecting only one specific outlet to an individual circuit breaker.

HVAC planning

Providing 30 BTUs of cooling per square foot of building is recommended for interior office applications. If heat-producing equipment is enclosed, such as vending machines in a cafeteria or measuring equipment in a quality control lab, extra cooling capacity would be required.

The following options can be used to make air conditioning and heating as efficient as possible:

1. Three inch thick fiberglass ceiling tile, R value = 12, or 3 in. or 6 in. fiberglass batt insulation can be placed above mineral fiber ceiling tile.
2. Use closers and door sweeps to ensure that doors close completely and are sealed.
3. Double glazed, insulated windows increase the R value.

Installation of a conventional HVAC unit on a small platform next to the building or on the dustcover of load-bearing buildings allows ducting to be run through the plenum formed by the acoustical ceiling and the roof deck. Twelve inches of clear plenum space can be provided on standard height units, and up to 36 in. by using taller perimeter walls.

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Ducting from an existing HVAC system could be run into the building, provided it has enough extra capacity to carry the additional heating and cooling load.

Installation planning

Modular in-plant buildings are a complete product concept designed to provide prefabricated, prefinished buildings that can be installed quickly and at less cost than fixed construction. Taking into consideration the following points will help insure a quick and trouble free installation:

1. Most buildings can accommodate floor unevenness of up to $\pm 1/4$ in. in 10 ft. The level of the floor should be checked during the approval process. A new concrete pad or self-leveling grout should be used on floors that are severely out of level.
2. Check the existing floor for possible imbedded obstacles when using a mezzanine or load-bearing office with structural components that have to be anchored into the floor at a specific point.
3. When planning two-story or extra-height buildings, check for overhead clearance. Allow 6 in. from the bottom of any overhead material to the top of the dustcover.

Complete job drawings, installation instructions, and bills of material are typically provided with every modular in-plant building. All fasteners necessary for installation also are included.

Requirements for large office areas

Using existing plant or warehouse area and a modular in-plant building with divider walls for private offices and systems furniture for workstations can make a cost-efficient solution when current maintenance office space is overcrowded. Typical costs are 30 percent less than a conventional add-on to existing office buildings and have the relocation ability to meet future expansion needs. A local representative can help you plan, budget, and build an office area that is aesthetically pleasing and functionally efficient. **MT**

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[Eric McDonald](#) is national account manager, [O'Brien Partition Co.](#), 5301 E. 59th St., Kansas City, MO 64130; telephone (800) 822-3595