

Guide To Your Workshop's

Walls, Ceilings, Floors and Insulation



Contents

Chapter 1: Walls and Ceilings	5
Drywall.....	7
Wood paneling	9
Moisture Barriers	10
Chapter 2: DOORS	12
Separating workspaces.....	14
Shop Security	15
Electric openers.....	16
Padlocks	17
Screws and bolts	18
Chapter 3: Floor Treatments.....	20
Concrete Floors.....	21
Floor Mats and Cushioned Tiles	22
Painting Concrete	23

Wood Floors	25
Laying a floor over concrete	25
Subfloor systems	28
Chapter 4: Insulation	30
Insulating conventional ceilings	32
Chapter 5: Sound Abatement	34
Reducing Machine Noise	35
Smart Ways to Reduce Machinery Noise	37
Windows and Doors	39

The first shop I set up had paper-thin walls and a dirt floor. The room was cold on foggy mornings; and, it would become hot in sunny afternoons. The dirt floor was often damp at best, while quickly becoming wet or muddy whenever it rained. My tools and equipment rusted quickly without little to no protection from these elements. I would occasionally come and find tools or machines missing, since my shop hadn't a closeable door. I actually built pretty nice pieces there, but I must admit that I was young and somewhat foolish. For a long time, I didn't realize how much the shortcomings were costing me.

Now, I want a comfortable and cozy workshop: one that protects all possible shortcomings, and most importantly, a shop in which can be a safe space while I am working.

Chapter 1:

Walls and Ceilings



While the walls are the most basic parts of a workshop and, in fact, the most important, you can easily take them for granted. Sam Maloof, a noted furniture maker, once told me that building his first proper shop; he took almost two years between putting up the roof and walls while then putting on the siding and sheathing to enclose them. In the interim period, he would work in the workshop daily, covering his machines up during the nights to protect them from the morning dew.

While many workshops have walls sheathed on the exterior, most small shops including sheds and home garages, often have bear stud walls inside. Covering the walls on the inside makes the interior feel and look more comfortable besides also improving the quality of your workspace.

Light-colored interior walls will bounce around artificial and natural light. This improves the effectiveness of the light

getting in through skylights, windows, doors. It also includes the artificial light from the light fixtures. Covering the interior presents an opportunity for adding some insulation, making your shop even more comfortable.

Drywall

Drywall is readily available and affordable. It is quite easy to install, and most importantly, it prevents a fire from spreading in a building. This is the reason most building codes require people to use it on interior surfaces. While it can be quite a task to install drywall on the ceiling and high walls (because of its heavy weight), its density significantly reduces the noises escaping from the shop as you work with various machines. You may choose to skip the taping, painting and texturing. These, after all, are usually the most difficult parts of drywall installation.

If you are able to cut and fit pieces together and mount them on the ceilings and walls using the drywall screws, you can cover a small workshop within a day and end up with a clean-looking off-white interior.

However, the trouble with drywall is its effect on the sound quality in your shop. Hard and smooth drywall usually tends to reflect high-frequency sound waves very efficiently, which can make sounds from running machines like a table saw with, say, a whiney blade very unpleasant.

Fortunately, you can add cabinets, shelves, or machines into your workshop to help dampen the reflected sound. If the shop has a large and open drywall surface, you could attenuate the interior noise through installing a sound channel. Furthermore, you could cover the surface with, for instance, a sound board or some heavy pleated drape that's

made of fabric, like burlap.

Wood paneling

Thin wood paneling-typically made from inexpensive plywood or a composite board that's covered with some "photo-grained" vinyl which makes it look like real wood- is affordable and relatively light. Some less popular styles like the "marshmallow ash," which you can find in most local lumberyards, are more inexpensive. It is advisable to choose a light-color finish since it will help in diffusing and bouncing light. If you like a more traditional look and feel, then go for darker natural-wood finishes. They can also make your workshop feel warmer. But again, it's perhaps, best to install dark paneling on only one side. Paneling the whole shop can make your space feel more like a cave.

It is easy to cut and also steam wood paneling; you can nail

large pieces or staple them to joists and studs in minutes. However, wood paneling will not prevent noise transmission as drywall does. Since the thin material may resonate from the low-frequency noise, your machines produce, running a bead of some construction adhesive along the framing members before you nail the panels is a good idea. This will prevent the wood paneling from buzzing and rattling.

Moisture Barriers

In certain climates, you need a moisture barrier before installing wood, wallboard, or drywall paneling. Some insulation will come with some form of facing such as Kraft or foil paper. This acts as the vapor barrier. A vapor barrier keeps the moisture within your shop from finding its way into the insulation chamber. Choose barriers that are continuous for maximum effectiveness. Again, consider

getting barrier with clear materials so that you can easily see through when you staple it on to rafters and studs.

Chapter 2:

DOORS



In case you are working in a single or double car garage, you probably have no problem getting in and out of your shop; the garage's door is wide enough. Now, it is advisable to fit a door at least 36 inches wide if you are setting up a shop in a shed or an outbuilding. Again, you might also want to consider installing double doors, if possible. You will be using one for your day-to-day comings and goings. The other will prove important, for instance, when you need to move in wide items like machines or large pieces you built outside.

Big sliding doors like those on most modern barns also offer a lot of access. They usually run on over-head tracks. You can size them as needed, even up to the entire length of your shop wall. However, note that such large doors require substantial physical effort to open and close them, so they can be a little tiresome with which to deal. Again, locking them correctly can be time-consuming, which could be a security factor. You can, however, solve this problem by

adding a smaller entrance door through the big slider. Just cut out some part and fit in a small hinged door.

Separating workspaces

If your shop has multiple rooms, you will need to ensure that dust coming from the machine room does not waft into clean spaces like your design room, offices, or bathrooms. The dust issue is a major problem particularly for in-home workshops. Dust can easily get into your living spaces. One way to solve this issue is to keep the doors closed. Consider fitting spring-loaded hinges instead of standard ones, or better still; you may build an automatic door-closing mechanism using some pulleys, a length of cord or cable, and some old sash weight.

Shop Security

Doors and windows are the most common routes for thieves unless your shop is attracting a burglar having a serious attitude, and such equipment as a wall-cutting chainsaw. To protect your investment as well as the valuable machines and equipment in your shop, it is imperative to put all the necessary security measures that will prevent burglars from gaining access to your shop. Most doors are locked by bolts, which secure into some wooden door frame. They open inwards, thus providing very little resistance to, say, a battering ram or strong kick.

One way to make your workshop doors more resistant is making them open outwards and reinforcing the jams. So, if someone tried to kick in, they would be kicking against the whole doorstep. Fit the entry doors with non-removable pin door hinges and mount a steel security plate over the entire

lock area. Also, you can add reinforcing plates in the jams and also around the door's lock assembly to make the entry doors even more resistant. You can protect your other doors (especially those opening onto passages and alleys where a thief can hide) by, for instance, barring them. Steel bar brackets that take a 2x4 bar must be through-bolted using heavy carriage bolts or carriage bolts to strong studs.

Electric openers

Electric openers not only add security to your shop but also come with convenience. The door cannot be lifted without activation through a key switch or a remote whenever using an electric opener. For even greater security, shut the door openers off or flip their security switches on each time you leave your shops for long periods. This is important because there are electronics-whiz burglars that can crack the remote-control code. If you have wide doors, which a crook

can easily twist to gain entry, consider adding some hasps and padlocks or latches on either side.

Padlocks

If you are using padlocks, do not scrimp on the strength and size of the locks. Often cheap locks can easily be knocked off using a sledgehammer or any such tool. Again, you will need to find the best locks and hasps specially designed to protect your padlocks' shanks from tampering. However, it is worth noting that while a hardened lock shank is resistant to shearing, it may still be shattered through quick freezing using canned Freon and then being struck with, say, a hammer.

Usually, thieves will not bother removing a padlock; they will just pry out the whole hasp assembly. This is the reason you need to see to it that you have mounted the hasp

securely to the jamb and door. Also, a through-bolt hasp to both the jamb and the door with a carriage bolt using a large washer inside will deny thieves access to your shop.

Screws and bolts

If you cannot install electronic security for your windows, install screws and bolts that cannot be opened from outside even if the glass were to be broken. While there are many window designs with keyed locks, it is often cheaper to just drill holes and then add bolts or screws via window members. Screws and bolts are easy to open from inside your shop; therefore, you can open your windows when you want. You may also open the windows partially to allow in fresh air without compromising your shop's security. Aluminum sliding windows can be very vulnerable to

thieves. In case you are installing them, consider adding bars which will prevent them from sliding. However, note that this is still not enough; a thief can pry the whole window out of the frame. Screw the windows' frames to avoid this, or better still, add bars for even greater security.

Steel bars

Steel bars are great for better protection. Crooks won't get into your shop even when you forget to close the windows. Steel bars are usually through-bolted from the outside, preventing removal. The bars can as well be fitted inside the window openings just behind the glass, making your workshop look less fortress-like.

Chapter 3:

Floor Treatments



Well, woodworking in a workshop with a hard and damp floor isn't something you want. It is uncomfortable. It may make your feet, the ankles, knees, and even hips start aching after sessions of average work in the shop. You have to realize that having a comfortable floor to stand and work on is as important as putting on sturdy shoes which fit correctly. Thus, you need to very carefully select your flooring when setting up a new workshop. If you are currently working on a poor floor, make an effort of improving it.

Concrete Floors

Concrete is arguably the harshest flooring you can ever have. Besides being hard on your feet, it is the least flexible flooring material. For instance, you cannot route pipes or wiring under its slab, unless of course, you do it when pouring the concrete.

A concrete floor is also cold, which can be an advantage if you are living in a hot climate, but mostly a disadvantage. Concrete floors can transmit dampness, resulting in raised humidity. Dampness also makes slick surfaces more slippery. A concrete slab can crack, which is a factor you should consider, especially if you are in a country prone to earthquakes.

However, concrete flooring is less expensive than most flooring systems. It is also very hard to clean. A concrete floor can bear very extremely heavy machines when it is correctly installed.

Floor Mats and Cushioned Tiles

You can easily improve your shop's concrete floor by adding cushioned tiles or floor mats. The most affordable way is to get enough mats that will cover a large area of your shop. Rubber mats often come in a range of sizes, so you should quickly get any size you need.

Painting Concrete

If you have a concrete floor, you may have noticed that moisture travels easily through the slab. This makes your shop unpleasantly damp as a direct result. Just two coats of quality floor paint can go a long way preventing this problem, so that the moisture in the workshop will drop significantly.

Painting a dark and dingy floor using light-colored floor paint (like light-gray) will not only hide ugly stains but also help in reflecting light throughout the workshop, resulting in

way better illumination.

Before painting, make sure to vacuum and scrub the floor clean (using a strong cleanser like tri-sodium phosphate). Then, let it dry. Ensure that floor is completely dry before you start painting. The appropriate temperature of the floor before painting should be around 50°F. It is advisable to paint in warm weather. If there is some water seepage that keeps the floor continually wet, treat it with some masonry water-proofer. Before painting a super-smooth concrete floor, treat it with some muriatic acid wash to rough it up so that the paint can stick.

Mix a nonslip grit or sand into the paint to avoid slipping on smooth, concrete floors. Or, apply high-friction tape strips, which you can get at most home centers or hardware stores.

WOOD FLOORS

If you are setting up a new shop, installing a wood floor can be a good investment. It will make your shop warmer and cozier. It feels better to stand and walk on as well. If, however, you presently have a concrete floor, then you can add a plywood floor right on top of it. This takes more effort than installing mats, but it is worth it since it will allow you to add some vapor barriers for reducing moisture in your shop. It will even offer you an opportunity to run plumbing and electrical wiring underneath.

Laying a floor over concrete

When laying a new floor over existing concrete, begin by installing a good moisture barrier over the concrete and then laying the new floor. You will have two choices: using a

penetrating sealant like Sinak to coat the concrete or installing plastic sheeting. If you settle for plastic, begin in the center then proceed towards the walls. Make sure to leave enough around the baseboards which you will trim off later. Seams should be overlapped by about six inches. Then, seal them with, say, duct tape (use denatured alcohol to clean the seam area before sealing). If you seal your floor, be sure to thoroughly wash it first and then apply two light coats of paint.

Note that the cold air close to the concrete, and the warmer air inside your workshop, can lead to moisture issues beneath the floor. It is vital to both seal your floor and install a moisture barrier in case you are living in a wet environment and expect moisture issues.

It is worth mentioning that this type of floor is not the greatest idea, especially if the ground in your workshop is

wet. You have significant seepage problems in your slab.

The next thing to do is laying down wooden members (called sleepers or screeds). Then, fasten them over the sealed concrete or moisture barriers. Depending on the amount of under-floor space you want, you may use 1x4, 1x3 or 2x4 members - either edge or flat. While pressure-treated lumber is relatively more expensive than most standard construction-grade lumber, often, it is way more resistant to decay. It is an excellent choice for sleepers.

Space the sleepers twelve inches to six inches on center. Then, fasten them to the concrete with concrete anchors, concrete screws or powder-actuated fasteners. Concrete screws are often easy to use and require just a small hole drilled using a masonry bit.

Besides driving the fasteners, be sure to avoid penetrating or

damaging the plastic moisture barriers while you work. In case you do, you should immediately tape up the accidental tear. Add sleepers underneath the bases of heavy machines to give them more support. You can also lag-bolt down the machines to the sleepers after you lay down the floor.

Subfloor systems

A raised wood floor presents many advantages. You can run compressed-air piping, electrical circuits, and if there is sufficient clearance, you can even route dust collection ductwork underneath the floor.

Run them in conduit in case you want to route electrical circuits. You can use some water-proof materials, attaching them to the sleepers they run along. When wiring has to cross a sleeper, run a narrow channel. However, avoid

putting flush-mount electrical boxes underneath the floor as they often accumulate sawdust, which can pose a fire hazard.

After running your plumbing or wiring between sleepers, what follows is the application of a tongue-and-groove underlayment grade plywood flooring. Be sure to plan the cuts you will need to make such that the butted ends have mating grooves and tongues. Screw down the floor using galvanized deck screws. This will not only prevent floor squeaks, but it will also allow easy pulling up of sections of the floor repairs and fixes if, for instance, there is a moisture issue underneath.

Chapter 4:

Insulation



You may have noticed how expensive it is heating up an un-insulated workshop. Your space will feel very uncomfortable if your furnace system isn't working correctly, especially during the cold winters.

Adding good insulation to your workshop, especially on the walls and ceiling, will be to your benefit. And what's more? The job isn't difficult. It is inexpensive, and you can do all of it by yourself. For instance, if you are working in an outbuilding with an existing ceiling or in a wood stud garage, then insulation is likely to cost you less than a dollar for every square foot of your floor area.

Walls are usually a lot easier to insulate properly than roofs and ceilings. Don't stress yourself about ventilation; the size of wall studs will determine what insulation to use. Often R-11 or R-13 work best for 2x4 walls, whereas R-19 or R-21 is great for 2x6 walls. The R-value here indicates how well the

material insulates; the higher number indicates that it is a better and thicker insulator. Your shop can still have the insulation blown in if it has already been dry-walled or paneled. An insulation contractor should help you with this.

Since heat rises, your shop will hardly benefit from floor insulation, except in scenarios where the floor's underside is exposed. This is the case when your shop is built on piers or some hillside which drops away.

Insulating conventional ceilings

Insulation becomes even simpler in case your workshop has an attic space over it or a drywall ceiling. Just lay bats of fiber-glass insulation between those ceiling joists. However, you will need to ventilate the attic space to avoid moisture problems. The climate in which you are living, and the average temperature you want to work in are some of the

factors that will determine the R-value of your insulation material. Search “Regional Insulation Recommendations for Residences” on Google for more information about the recommended insulation for various climatic zones. You should get the right material for insulation in most hardware stores.

Chapter 5:

Sound Abatement



If your shop is within a residential area and you want to limit neighbor complaints, then you'd better control the noise coming out your workshop. The doors, windows, and walls of your workshop offer the basic way of containing the machine noises. But what if your shop has thin walls, it is near your cranky neighbors, and you have to run noisy machines at night? Well, you will have to make alterations to your workshop.

Reducing Machine Noise

Try isolating the bases of the noisy machines from the floor to minimize the noise transmitted through wood floors. For instance, you could put the bases atop some dense foam or rubber. Get an anti-vibration pad for machines like central dust collectors and compressors which have to be bolted down.

You can also reduce the noise transmitted outside and inside the shop via the reduction of the sound energy transfer through direct or air vibrations. You might have noticed that shutting the windows and doors before you turn on a noisy machine (such as the table saw) actually makes a difference. Now, you can reduce the noise further by blocking off all the unnecessary openings between the outdoors and the shop.

Consider applying sound-deadening materials into your shop's inside walls to minimize higher-frequency noises like that generated by portable power tools. Soundboard is one of the most affordable materials, which you can nail or screw to studs of the shop's unfinished walls. However, attaching them to the top of dr1'wall will be more efficient.

Soundboard will not only cut the noise leaving your shop, but it will also significantly reduce the noises in the shop through absorbing high-frequency sounds besides also

decreasing their reflections off the walls. Unfortunately, the noises produced by such deep-throated roar devices as shapers, planers, and jointers are somewhat harder to control.

Smart Ways to Reduce Machinery Noise

The fewer decibels the machines in your shop generate, then the fewer get their way out. You can make a substantial difference by changing bits, cutters, and blades. For instance, table saw blades vary considerably as regards the decibels they generate.

You can also quiet your machines through the addition of some sound-deadening insulation. Note that enclosed metal stands can contribute a lot to the amount of noise coming from machines. Consider gluing soundboard or insulation foam inside the metal stands, or you can just stuff them with

Styrofoam.

One of the most effective and easiest methods of reducing both low and medium frequency noises is by isolating paneling or drywall from ceilings and walls. Proceed this way:

Beginning with ceiling joists and bare stud walls, attach some strips of a sound channel (also called resilient channel) to the joists or studs at regular intervals.

Screw the drywall into the furring strips that will prevent sound vibrations from being transmitted from the drywall into the walls' studs and subsequently to the outer sheathing.

Add one layer of fiber-glass insulation between studs before you apply any wall covering to make your shop quieter.

Windows and Doors

Doorways and windows are other channels for noise to escape your workshop. You can quiet the existing windows by fitting double-glazed replacements that work the same way as double walls to prevent vibration transmission. Inexpensive hollow core doors can also cause noise issues, which you can avoid by installing solid-core doors.

If you are setting up a new workshop, note that the location of windows and doors can also significantly determine how much noise problems you will cause. As much as possible, avoid placing windows on sides that face noise-sensitive areas.

If you have already dry-walled or paneled your shop, you can reduce the noise problem by adding mass. Fasten

another layer of drywall on top of thin wood paneling to minimize noise transmission.