Setting up a Woodworking Shop

By Gordon Sampson

Introduction

Quite a few woodworkers are either building new shops or upgrading their existing shops. With this need to expand, there are always questions: "How should I construct my shop? What amenities should I include? How should I lay out my tools and shop furniture? What tools should I buy?" The layout and size of your shop will be determined by your woodworking needs. What you put in your shop and how you construct it is a different matter. There are guidelines that can be used when constructing a shop and filling it with tools. I've tried to cover most areas in the following paragraphs. I may have missed a few items but this will give you a basic understanding of what makes a shop a safe, efficient, and comfortable place to work.

Safety

- Room to move – Make Safety the number one concern when planning your shop. Make your aisles wide enough for passage and leave plenty of room around each of your machines. Sharp edges on machines should be either padded or placed in a position that will not interfere with persons moving around the shop.

- Fire Extinguisher – A fire extinguisher should be placed at each end of the shop; preferably by the entrance or exit. One should also be placed in the finishing room—if you're lucky enough to have a finishing room. An "ABC" fire extinguisher is the best choice for shop use because it will extinguish a wood fire, electrical fire, and chemical fire. Size the extinguisher to fit the size of your shop. Small extinguishers that are generally found in the kitchen are not acceptable in a woodworking shop.

- Mats – Rubber mats are great for the legs and back when standing for long periods of time. Place these mats where ever you'll be working for extended periods of time. Shop mats are not much of a safety issue but when we are fatigued, we tend to make mistakes. And the rubber shop mats help relieve physical stress when in the shop.

- First Aid – A safety item that doesn't get much attention when designing a shop is the first aid kit or cabinet. I just built and installed a first aid cabinet in my shop. The cabinet has a large mirror, which comes in handy when looking for that piece of sawdust that found its way into your eye. I stocked the first aid cabinet with hydrogen peroxide, bandages, medical tape, band aids, eye wash, tweezers, and what ever else I may need in the shop. I suggest you stock you first aid kit or cabinet with items that will deal with an injury quickly.

Construction

Planning is everything! Making dozens of modifications before construction does take time but it takes less time than ripping out a wall or ceiling to install a pipe, conduit or a duct for your dust

collection (DAMHIKT). Run your design by your woodworking friends and your wife or husband. You'd be surprised what a spouse would point out that you didn't even consider.

- Ceilings – If you're building a new building to house your shop, be sure your ceilings are at least 9 foot. That leaves you room for heating & air conditioning ductwork, vents, ceiling fans, dust collection ducting, and extra storage. And insulate. Temperature extremes and humidity will make your time in the shop uncomfortable and stress your tools and machines. A sky light or two would be nice to have for natural lighting. Paint the ceiling to reflect the maximum light. There are paints on the market that are formulated to reflect and amplify the available light.

- Walls – Insulate, insulate, insulate. Also run any electrical and plumbing before putting the wall material up. Sheet rock is probably the most widely-used material to use in a shop but don't rule out peg board for one or more of your walls. It comes in brown, white, and a wood grain that looks great. Peg board (1/4 inch) is very useful in a small shop and will help you organize your tools, etc. Before you install any wall covering, be sure you've identified locations for cabinets or other heavy objects that will hang from the walls and require extra support.

- Doors and windows – Idealistically, a shop should have two exits—one at each end of the shop—for emergency evacuation. If having two doors is not possible, provide a door and window at opposite ends of the shop. Besides providing an emergency exit, they will provide you with great cross ventilation. Install a large door that will be large enough for bringing in sheet material and large tools and that will also allow you to exit the shop with your finished product. Natural light is still the best lighting and windows will help provide this. Windows also allow for ventilation of your shop. Narrow horizontal windows high up on your walls will provide you with the natural light and ventilation without taking up lots of space.

- Floors – Most shops have concrete floors. If you're pouring concrete, run any electrical and plumbing lines prior to pouring the foundation. Sounds dumb, but you'd be surprised how many people think of plumbing and electrical *after* the floor is poured. If you're planning on having a concrete floor, paint it. Painting the floor will eliminate much of the dust and provide a surface that is easy to sweep and mop. There is a water-based two-part epoxy kit that contains a cleaner and paint. It comes in two colors: tan and gray. It also has little flakes that you sprinkle on that displace the paint to let the slab breathe. I used it in my garage shop and it's one of the most useful additions to the shop. The cleanup is effortless and it resists just about everything you could spill. It's sold at Home Depot and Lowes, and other home centers. You can clean and paint your floor in one weekend.

- Finishing room – Provide a separate finishing room with its own exhaust fan to the outside, if space allows. You won't regret it. Having a separate room that is dust free will make your life easier. It will also keep fumes and other off-gassing byproducts out of your main work area. Two areas of egress (door and window) are highly recommended for a finishing room.

- Electricity – I recommend that you have a sub panel (60-amp or greater) installed that will be dedicated to your shop. I just had a sub panel installed for another reason but it will also

accommodate a few extra circuits in the shop. Planning the placement of tools and machines in your shop will help you identify locations for electrical outlets. I color-coded my outlets (white for 110 VAC/15A; brown for 110 VAC/20A). This makes it easy to distinguish which outlet to use for each tool. I feel it's a safety matter—you wouldn't want to plug a 20-amp tool into a 15-amp outlet. The height of your outlets should be just above bench level (approx. 38-44 inches). And don't forget to place an outlet or two in the ceiling for air cleaners or whatever. Your lighting should be on a separate circuit from your tools. Break up the shop lighting into two grids. That way, if one circuit develops trouble, you still have light from the other circuit to use when fixing the problem. I've listed three common circuits that can be found in a home shop and some of their uses.

- 110 VAC/15A circuits – Each wall in your shop should have at least one 110 VAC/15A outlet. I recommend that each group (per wall) of 15A outlets have its own breaker. 15A circuits are generally used for battery chargers, radios, TV (tapes of Norm), and low power electric hand tools.

- 110 VAC/20A circuits – Each wall in your shop should have at least one 110 VAC/20A outlet. I recommend that each group (per wall) of 20A outlets have its own breaker. 20A circuits should be used for hand, bench, and floor-mounted power tools and machines.

- 220 VAC, 20A circuits – Each wall should have at least one 220 VAC outlet. Although I mention 20A circuits, some of you may have machines that require 30A service. Each 220 outlet should have its own breaker. You may have your dust collector and table saw wired up for 220 and both of these machines will be running at the same time. 220 VAC circuits will accommodate larger tools, such as a table saw, band saw, dust collector, air compressor, drill press, jointer, planer, lathe, etc.

- Lighting – I discuss three types of lighting that can be found in the shop. I do not discuss incandescent lighting (the common light bulb) because I believe these lights do not provide adequate lighting and are expensive to operate for sustained periods of time. Providing adequate lighting is something that should not be overlooked.

  - Natural lighting – Natural lighting is the best light you can have in a shop. Sky lights and windows will provide this. Try to put a sky light over each work area (table saw, band saw, work bench). You will not regret it!

  - Fluorescent lighting – Fluorescent lights are good for general lighting. I use 48-inch lights in my shop but 96-inch bulbs are also available. The 96-inch fixtures are more expensive than the 48-inch fixtures but give a neater look and require less wiring than twice the number of 48-inch fixtures. Either way, I recommend using special "daylight" bulbs in your shop. They provide a better light than standard bulbs.

  - Tract lighting – Tract lighting is great over benches and floor-mounted machines. I have tract lighting with 50 watt, lower power, halogen bulbs over my benches and other work areas. They are mounted to the ceiling and provide spot lighting without shadows.

Setting Up Shop

- Plumbing – Make sure you run all your plumbing BEFORE pouring the floor and putting up the sheet rock, peg board, or other wall covering. Having a deep sink in a shop is really nice. Deep sinks are great for cleaning brushes, washing up after a day in the shop, and other chores. Make sure the sink is located the proper distance from any electrical outlet. If you want hot water in the shop, explore the possibility of putting in a system that heats the water only when it's needed. These units can be placed under a sink. An eye wash station is also a nice addition to any shop.

  Plan to run a few air lines in your shop for nail guns, spray guns, and other pneumatic tools. Run a couple of lines along the ceiling to benches and other work areas—especially assembly areas—where you would use compressed air. A coiled line or spooled line is helpful in keeping the air hose out of the way until needed. DO NOT use PVC for your air lines. This material can rupture and shatter when under high pressure; especially in cold weather or when struck with an object while under pressure. Check your local building codes before installing air lines.

- Heating & Air Conditioning – Yes, you will need both. Trying to put a finish on your project in a hot, humid room is horrible; if not impossible! Working in a hot or cold shop isn't much fun either. Plan and run all your ducting before putting in the ceiling and wall covering. Locate your heating and air conditioning vents away from work areas. Having cold or hot air blowing directly on you is uncomfortable and unhealthy. Air conditioning not only makes it more comfortable working in your shop; it also removes most of the humidity from your shop, extending the life of your tools. If your shop is located in a garage, as mine is, you have a few options: portable A/C unit; ceiling fan; large box fan; cutting a hole in a wall and installing a small fan to force air from the house into the garage. If you live in a very humid area, you may also want to invest in a dehumidifier.

- Dust collection – Dust collection is an area where there are many different opinions. I believe almost everyone agrees that having a dust collection system is essential. What type of system is best for your shop and how much power is required is always a topic of discussion. I suggest investing in the best dust collection system you can afford. You won't regret it. It will keep your shop *and* your lungs clean. There are basically three types of dust collection systems: bag type; separators; and cyclones.

  - Bag-Type – The bag-type dust collection system can be stationary or mobile and consists of a blower motor and one or more bags connected to the outlet of the blower to collect the debris. This method of dust collection works well but all the debris is sucked into the blower and through the impeller before it ends up in the bag(s). This could possibly damage the blades of the impeller if a large piece of debris were to be sucked in.

  - Separators – Separators are usually plastic devices that are mounted on top of a trash can and are located before the blower and bag assembly. They separate the debris and deposit larger pieces into the trash can. The rest of the debris goes through the blower and into a bag. Separators are useful in that they separate most of the debris but quite a lot still goes through the blower into the bag(s).

- Cyclones – The third type of dust collection system is the cyclone. The cyclone system consists of a cylinder/funnel assembly that is connected to a container below. The blower and filter (or bag) assembly are usually connected to the output of the cyclone assembly. The debris is sucked into the cylinder/funnel assembly, where it continues in a circular motion—losing velocity as it circles—and falls into the container below. A very small amount of the fine dust is sucked up a pipe, through the blower, and into a filter or bag. I believe the cyclone system is the most efficient dust collection system because it separates course *and* fine material before it has a chance to hit the impeller, extending the life of the blower. The only material that reaches the blower is very fine dust (and very little, at that).

A dust collection system with a 2 HP or larger blower motor is recommended for large shops. Smaller shops (20 ft x 20 ft and under) can usually get by with a 1 1/2 HP blower motor. My shop is located in a 2-car garage and I've built the Wood Magazine's cyclone dust collection system. The system uses a 1 1/2 HP, 760 cfm blower and is very economical to build and use. It also performs well in my shop. You can also buy a remote switch for your dust collection system. The remote switch makes it convenient to turn the dust collector on or off without leaving the immediate work area.

An air cleaner is also essential for your health and the cleanliness of your shop. You can either buy one for around $250 or build one. Unless you stumble across a free blower motor, I suggest buying the air cleaner because after you buy the motor, filter, and materials, you'll end up spending around $200. Air cleaners usually consist of a blower, 3-4 filters, and may have multiple speeds. They will cycle the air in your shop many, many times per hour. The air cleaner can be hung from the ceiling or placed on a bench. Remember to keep your air cleaner running for a while after you've left the shop to pick up that residual dust.

- Sanding station – You might want to include a sanding station in your shop. A downdraft table is great for dust-free sanding. You can either buy one or design and make your own. A tabletop with 1/4-inch peg board makes a great downdraft table. Just enclose the area under the tabletop and hook up a 4-inch line to your dust collector and you're in business. Your sanding station should include a belt sander, disk sander (may be a combined belt/disk sanding unit) and finishing sanders. Place your sanding station at the opposite end of the shop from your finishing room. Large, drum-type sanders are usually free-standing and are a great asset to any shop.

Power Tools

I'm going to list some common power tools that can be found in a woodworking shop. I'm not mentioning hand tools because most woodworkers have a pretty good idea what hand tools are required in the shop. One word of advice: Buy good layout tools. Spending the extra money on a good square, ruler(s), and other layout tools will pay off the first time they're used. I'll try to stay away from makes and models and provide a general overview of shop tools. You may want to try some of the forums at woodworking web sites for advice on tool selection.

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- Table saws – The table saw can be found in almost all shops and is usually referred to as the centerpiece of the shop. There are, in my opinion, three types to choose from: benchtop table saw, contractors saw, and cabinet saw. Basically, the one you choose will depend on your budget and available shop space.

  - Benchtop table saws don't provide the accuracy and capabilities that cabinet and contractors saws provide but they will give you the ability to rip and crosscut material at a very affordable price. They are also very easy to move from one location to another. They cost from $100 to around $250.
  - Contractors saws offer precision at an affordable price. The average saw will run you from $500 to $800. I have a contractors saw with a 30-inch fence and really like it. Check out the woodworking shows. You can get pretty good deals at those shows.
  - Cabinet saws will give you more capabilities (cutting depth, horsepower, precision) in an enclosed cabinet. They can run from approximately $900 to $2000.

- Band saws – Band saws can be purchased in either a benchtop model or floor model. The benchtop models are generally 8-inch to 10-inch saws and will provide sawing capabilities at a very affordable price. If you're going to be using the band saw often in your shop, I would recommend getting at least a 14-inch saw. A good 14-inch band saw will cost you between $500 -$900.

- Compound miter saws – This tool is very useful for cutting miters and 90-degree cuts on molding and other long stock. Many good 10-inch and 12-inch saws are available but the majority of woodworkers who own a CMS have the 10-inch saw. This is usually due to budget. You may want to go with a sliding compound miter saw. The SCMS will allow you to cut wider boards than the standard CMS. Expect to pay from $200 - $700 for the CMS and SCMS.

- Radial arm saws – Many woodworkers feel that this saw is unsafe, difficult to keep tuned, and unnecessary in a shop. There are also those that feel that if you have a good table saw and SCMS, you won't need a RAS. I owned a RAS for a few years and it performed well. As with any other tool, if you maintain it and use it properly, it will perform just fine. Most woodworkers use this saw for cutting dados and crosscutting. A good RAS will cost you between $400 - $800.

- Jointers – Get at least a 6-inch jointer. This will aid in joinery and flattening out those cupped and out-of-shape boards. I suggest a jointer with an enclosed body. This will aid in dust collection. Expect to pay around $500 for an enclosed 6-inch jointer. The 8-inch and wider jointers offer greater capabilities and a longer table at a higher price. Again, the size of your jointer will be based on your budget.

- Planers – A portable planer is what most of us use in our shops. Larger planers (15-inch or larger) are nice to have but very expensive. You shouldn't pay more than $400 for a good 12 1/2-inch or 13-inch planer. I highly recommend providing dust chip collection to your planer. You can generate quite a pile of chips in a very short time.

Setting Up Shop

- Routers – Routers are contagious. They also seem to multiply in the shop. Both plunge and fixed-base routers for hand-held work are nice to have. There are many good routers available from 1 1/2 HP to 3 1/2 HP. Ask 10 woodworkers for opinions on router makes and models and you'll get 10 different answers. D-handle routers are becoming very popular for hand-held routing. They provide great control, allowing you to turn the router on and off without taking away that control. Trim routers (laminate trimmers) are also available for trimming laminate and other stock.

- Router tables – You can either build your own or buy one. A good router table with a very good fence will cost you quite a lot of money. I'm building mine because I have specific requirements for my table and cabinet and there is a fair amount of pride in building your own shop equipment. Size your table to fit your needs and space. Many woodworkers include a router in their table saw extension table. This method provides you with a router table without taking away any shop space. Either way, provide your table with the best fence possible and add dust collection capabilities to your table. I would also recommend dedicating a specific router to your table

- Shapers – Shapers used to be out of the price range of most small shops but that's changing. Shapers usually have more power than router table setups which allow for larger router/shaper bits. Many companies are offering shapers that are competitive with prices of good router table setups. By the time you buy a heavy-duty router, router table (home-built or store-bought), fence and accessories, the price of a router table is very close to that of a shaper. The drawback of a shaper is that it is not as flexible as a router table in its uses.

- Lathes – If you're interested in turning, you may want to invest in a lathe. A lathe will allow you to turn spindles, bowls, pens, and other decorative items. They come in many sizes and prices to fit your needs. There seems to be one major problem with owning a lathe: once you have one, you may find yourself neglecting your other machines. It's that much fun. What other tools allow you to go from a block of wood to a finished product in a few hours?

- Drill presses – Drill presses come in two styles: bench model and floor model. Bench models are fine for many jobs but a floor model is recommended. I have a bench model with a 5/8-inch chuck and it's served me well. I'll be upgrading to a floor model as soon as budget allows. Most drill presses in the moderate price range have a quill stroke (down stroke) of around 3 1/4 inches but newer moderately-priced drill presses are being offered with quill strokes of over 4 inches. This is nice in that you have a greater drilling capability. Expect to pay from $100 - $250 for a bench model and $150 - $500 for a decent floor model.

- Drum Sanders – Drum sanders are becoming more and more popular with woodworkers. This is partially due to the fact that the level and financial status of the part-time woodworker has risen in recent years. Woodworkers are demanding more from their machines and shop and drum sanders are becoming more accessible. The most popular sanders seem to be the 18/36-inch models. Although they can be used with a course grit to "flatten" a board, they are generally used to finish-sand large, glued-up pieces in a uniform fashion. Expect to pay $700 and up for these machines.

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- Belt/Disk sanders – A stationary belt/disk sander is very useful in the shop for sanding edges and miters and for rounding corners. Most combination belt/disk sanders have dust collection ports that allow you to sand inside without filling your shop with a fine layer of dust. A 4-inch x 36-inch belt sander with a 6-inch disk will cost around $130. A 6-inch x 48-inch belt sander with a 9-12-inch disk will cost from $250 - $700.

- Portable Belt Sanders – Belt sanders also come in portable models. These are usually used to clean up a panel after gluing and can remove a lot of material in a very short time. They width and length of the belts come in different sizes (3 x 21, 3 x 4, 4 x 24) to meet your needs. They also come in two basic profiles. Expect to pay between $150 and $250 for these machines.

- Oscillating Spindle sanders – These are the latest craze. You used to have to buy a set of sanding spools for use in a drill press to sand curves and corners. Oscillating spindle sanders use sanding spools of different sizes to perform this task. Not only do they spin, but they also move up and down as they spin, providing a smooth surface on the object you're sanding. Oscillating spindle sanders will cost you between $200 - $800.

- Finish sanders – Finishing sanders generally come in either 1/4-sheet sanders or random orbital sanders. Either sander will give you a nice smooth surface. I prefer random orbital sanders because they cover a larger surface, and are easier to change out sandpaper. Random orbital sanders generally come in 5-inch or 6-inch models and can cost you from $55 - $250 and up, depending on the make and model. A good 1/4-sheet finish sander will cost under $100. Both sanders offer dust collection.

- Detail sanders – There are many types of detail sanders available but most don't perform any better than a patient hand and a block of wood. Detail sanders shaped like a triangle are, in my opinion, more useful than those sold with a dozen attachments. Face it, you only need this tool to get into places that are too small for your hands or other sanders. Anything else should be considered a gimmick. Besides, you'll spend more time changing out those tiny pieces of sandpaper than actually sanding. Detail sanders usually run from $30 - $100.

- Brad/Nail guns – This is one of those tools that you didn't think you'd ever need…until you used it for the first time. Then you wonder how you ever got along without it! No matter what you're building in your shop, a brad or nail gun will make life a lot easier. Ever try to nail one board to another while gluing a joint? How many hands did you really need? Brad guns shoot 18 gauge brads of various lengths. These are great for assembly and attaching detail molding and trim work. Nail guns shoot nails (16 gauge and larger) and are great for attaching large pieces, crown molding and other trim, framing, and roofing. I have an 18 gauge brad gun that shoots 5/8 – 1 1/4-inch brads and a 16 gauge nail gun that shoots 3/4 – 2 1/2-inch nails. Most of these guns require the use of an air compressor but some makes and models use a gas cartridge (much more expensive).

- Air compressor – If you're planning on using a nail gun, paint gun, or just want to blow off your equipment after use, I suggest you invest in a good air compressor. Many sizes of air compressors are available; from pancake to upright industrial. If you're just going to use the

compressor to shoot a few nails now and then, a small, 4 gallon compressor will do. If you plan on using it to spray lacquer, paint or whatever, I suggest you buy a larger compressor. A 20-25 gallon, 5 HP compressor will provide you with all the compressed air you need. Buy one that will meet your needs today and in the future.

- Cordless tools – The most popular tools in the household today are cordless. No more dragging around power cords for those on-the-spot jobs. The field of cordless tools is limited right now to drills, circular saws, and a few other tools but expect to see more and more power hand tools lose their cords in the future.

  The most popular cordless tool is the cordless drill. At the time of this writing, cordless drills range from 6V to over 24V. The heavy duty 24+ volt drills not only provide more power…they also require that you work out with weights on a regular basis. They are heavy! I recommend a drill between 12V and 18V. They will provide you with all the power you need, won't drain your budget (under $200) and won't wear you out in ten minutes.