UltimateSmallShop.com Presents

HOW TO SET UP A COMPLETE SHOP *on a* BUDGET

PLUS MEGA LIST OF "GREAT VALUE" TOOLS!

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Introduction

Do you want a great woodshop, but are on a tight budget and space?

It's easy to find plenty of books that will provide you with guidance on setting up a woodworking shop. It would be fairly easy to setup a fully functioning shop if you have the funds and the space. I was unable to find alternatives regarding space and cost; although, anyone can easily go out and equip a shop to their specifications.

You can buy top-of-the-line equipment which you can afford, And, shop layout would be a breeze if you have the luxury of space. You do have to consider many factors, however, if you do not have the space or funds. How should you setup a functioning shop in your existing home with limited funds? That is the main focus of this book.

CHAPTER 1: HOW MUCH SPACE DO YOU NEED?

If you are looking to set up a shop on a budget and are doing so for the first time, you need to first consider what space do you have available for your shop and what you are hoping to make in your shop, not necessarily in that order.

For example, a crafts person looking to make some gifts like boxes is different from a crafts person looking to set up a business selling gifts in quantity to make a living.

A DIYer person with a home shop looking to make cabinets, tables, and furniture for their home is different from someone crafting the same things for customers. Some people are looking to be a woodworker primarily in the old school of hand tools while others are primarily a power tool person with little interest in hand tools. Do your interest lie in fine woodworking like wood carving, lathe turning, scroll sawing...or carpentry or furniture building or just furniture restoration?

The other significant consideration is what space is available. It is always kinder on the budget to use the space you have. This is

sometimes the first consideration. A novice might ask what kind of woodworking can be done in the available space? Is it a basement, a garage, a "bedroom" in an apartment? Is the garage or basement space small, medium or large? Is it quite narrow but long, or a medium or large open room?

It would be nice if we could all have as much as we want but, realistically, that's usually not possible. It seems that I could always use more space, even with my personal shop.

Half of my shop is dedicated to nothing but woodworking, while the other half I consider moveable. The pickup gets to reside outside when I have a major project in progression, such as building new bathroom cabinets. I roll various pieces of power equipment into place, plus I add a 4' x 8' work surface that folds up when not in use.

Don't be discouraged if you do not have adequate space.

The smallest functioning shop I've seen is 36 square feet. It consists of a "workbench" that stands18 inches tall. So, you could setup a shop and start woodworking if you have more space than 36 square feet!

Photo of the 36 Square Feet Shop

I would recommend going for 10x18 if you do have more than 36 square feet of space.

Why that dimension?

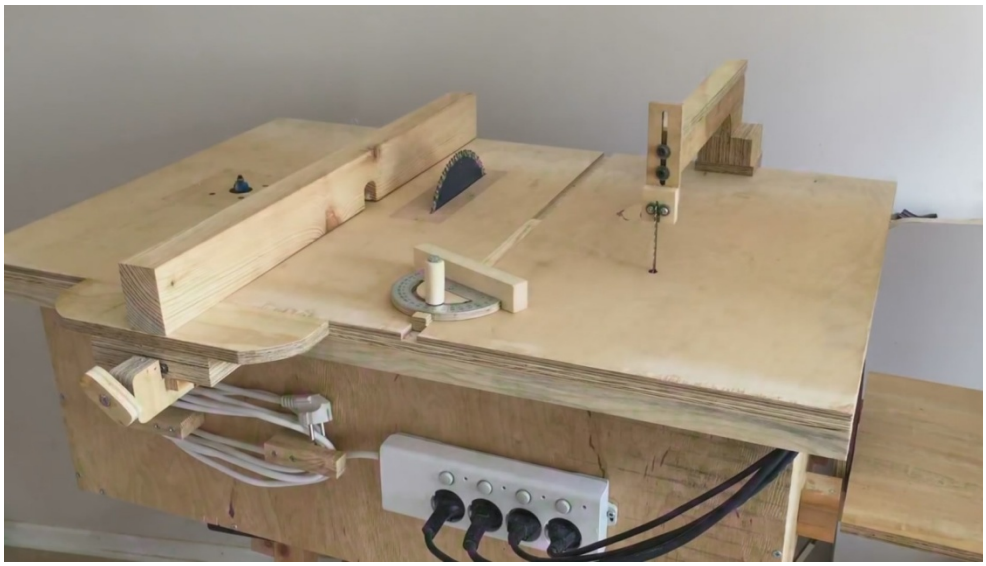
Personally, I like to have enough space to be able to cut a 4'x 8' sheet of plywood or medium-density fiberboard (MDF).I need 8' of clearance for the blade on my table saw and 8' of clearance behind it.

Most big box retailers who carry lumber, such as Home Depot or Lowe's, will do some cutting for you. I have used those services, but I really prefer to buy my sheet goods as full sheets.

One thing that makes any shop a little more user-friendly is to have your major equipment "moveable." This is a requirement if you have your shop in a garage, sharing space with the family vehicles. It is useful, too, in the basement if your basement is crowded. At a minimum, I recommend having a mobile table saw.

For such space spaces, it would be ideal to have a 4-in-1 type of workstation that maximizes the use of your space.

One such example is the build below:



CHAPTER 2: TYPES OF HOME SPACES

In this chapter, I'll discuss the different shop spaces you can setup within your home. **This includes the pros and cons of each setup, while pointing out specific factors to take into consideration.** You'll learn methods for improving your current shop, while effectively creating more space through remodeling efforts.

A home workshop has many conveniences. For instance, it saves transportation time if your shop is located across town. You save money because you don’t need to buy or rent a place for your workshop.

Finding the best location can be challenging, even though you may have enough space in your home. So, I will highlight possible places to locate your shop in case you considering setting up a home workshop but can't find the best location. Each space comes with its advantages and disadvantages; these, too, I will explain more in-depth.

If you already have a workshop, you may want to learn about ways you can gain more floor space. These may be utilized

through remodeling or shop reorganization. So here we go:

Setting Up a Shop inside a House

An in-house workshop may be the only recourse when you don't have enough space outside. Of course, buying or renting some space nearby is an option.

On the contrary, setting up a workshop inside your house can come with daunting problems. Basements, porches, walk-in closets, and attics are some of the spaces you need consider for setting up an in-house workshop. The appropriateness of these spaces often largely depends on the scale of your project and the design of your house.

Attics

An attic could be used for your workshop if it has ample space. Avoid attic spaces above any residential living space, due to safety concerns and to avoid various issues (like noise). Even attics that have relatively large floor spaces often have limited headroom because of the roof's slope.

Again, note that access to an attic workshop is mainly upwards in a narrow stairway. This may make getting tools and machinery into the basement quite difficult. Moreover, attic floors become inadequate to bear heavy woodworking machinery and tools. Noise can be transmitted to the entire house through floor vibrations as you work.

Temperate weather, too, usually makes attic workshops are overly warm. Heat rises, and most attics lack proper ventilation, and so the tools or machines you will be using will be limited to smaller models.

You will need some creativity if you have a large attic space and intend to set up your workshop there; you have to make it workable. For instance, you will need to devise means of ventilating your attic shop.

Basements

Basements are ideal if it is free from clutter and does not flood after it rains. You might have just found the best space to set up your in-house workshop; however, basements also present access challenges. There are always ways to overcome this.

Basement workshops often need large doors and wide stairs, both of which make it easy to bring in large machinery and

lumber. You can support the floor of your basement shop by strategically placing large foundation members or posts in the basement. You will need to prevent accumulation of sawdust to avoid a fire hazard. This is especially important if you have a central furnace in the basement. See to it that the system does not blow dust into the entire house.

Basements workshops have various advantages. One advantage is temperature control. Even on hot sunny days, a basement shop is typically cool – even on hot, sunny days. It remains comfortably warm during winter.

There are a few disadvantages though; the moisture that gets in through bricks or concrete may put some expensive machinery and tools at risk of damage. You can, however, control this by installing sumps or using a moisture proofing treatment. Humidity can also be an issue, but you can control it using a dehumidifier.

Setting Up a Shop Attached to a House

This is perhaps the next best place to set up your workshop. Setting up workshop next to your house comes with various advantages. The noise from your shop, for instance, stays away from your living quarters. Sawdust, finishing vapors and other pollutants are also kept out.

Another important thing is that it is easier to bring lumber and heavy machinery and tools into and out of your workshop.

Garages

The average garage often has a concrete, waterproof and level floor. Most garages have at least essential power and lighting. Many homeowners may also choose to have their garage double

up as a laundry room. Therefore, it will likely have 220-volt electricity, along with perhaps one or two sinks that have running water.

Noise from the garage is usually a significant problem inside many homes, particularly when the main living house and the garage share a wall. The wall transmits vibrations. This can be a real bother to people in the house, especially when there is work going on in the garage in the evenings. This is when the home's occupants want to relax or concentrate. Therefore, the noise factor can limit the time for power-tool operations in your garage – as well as the hours of power-tool operation in your shop.

Converting the garage into a shop

The process of converting your garage into a workshop can range from simple to complex. This depends on such factors as its size, how much tools and machinery you have, and the type of work

you will be doing in there. Now, even if your garage has just one electrical outlet, a few good-quality extension cords should sufficiently power small stationery and portable machines and tools. But if you have a bigger complement of machines, some of which have 220v motors, then you will need additional circuits or even a full electrical upgrade.

A typical four-foot fluorescent garage fixture, or single bulb, hardly gives sufficient lighting for you to do your work safely in the shop. You might, therefore, want to add another circuit for more lighting fixtures. Adding skylights or new windows should also help to illuminate your workshop.

Note that many home garages are often un-insulated; they lack some means of heating. This may be a problem, depending on which time of the year you will be working or your local climate. However, to make your workshop more comfortable during the hot summers and cold winters. You can insulate the garage's roof or attic space. Insulation will also assist in reducing moisture problems which result in rust.

Sharing the garage with vehicles

If your garage-cum-workshop still houses your family car, the layout of workspace and machinery should be compact. Thus, it provides room for you to work and for your vehicle. You can also make your machines and benches mobile, allowing the workshop to be compressed when you are not using it. Better still, if you don’t want to continue sharing your workshop space, then consider a remodeling. Many garages are great candidates for floor-space expansions.

Setting Up a Shop in an Outbuilding

You probably have enough places to locate your workshop if you are living on a ranch or farm; for instance, you could set up your shop on an old chicken coop, a tractor shed, or a corrugated

metal structure. Whether old and rustic or new and clean - an outbuilding workshop can offer you a perfect place to run a furniture business, a small cabinet, or just pursue your woodworking hobby.

It is worth noting that old buildings that were previously used as animal houses. These typically have dirt floors that are not very appropriate for shop floors since they do not offer a solid ground for your heavy machines and equipment. They also easily transmit rust-promoting moisture, besides also retaining odors of which can be irritating and difficult.

You may need to run new wiring from a distance away. It may present challenging problems; and, your outbuilding might lack proper insulation, depending on your local climate. Nevertheless, an outbuilding workshop may be precisely the kind of shop you have been yearning to have.

Barns

A barn may offer you a particularly comfortable and spacious working place. Typically, barns have a lot of unencumbered large

and spacious doors to provide easy access. There are large windows for adequate ventilation. They may also have hay lofts which you can use for storage. The open spaces between the loft bays often have high ceiling that is great for headroom, especially when you want to build big projects or work with significantly large sheet goods. You can choose to add skylights to bring in some more light and further increase spaciousness.

Mobile Home Shops

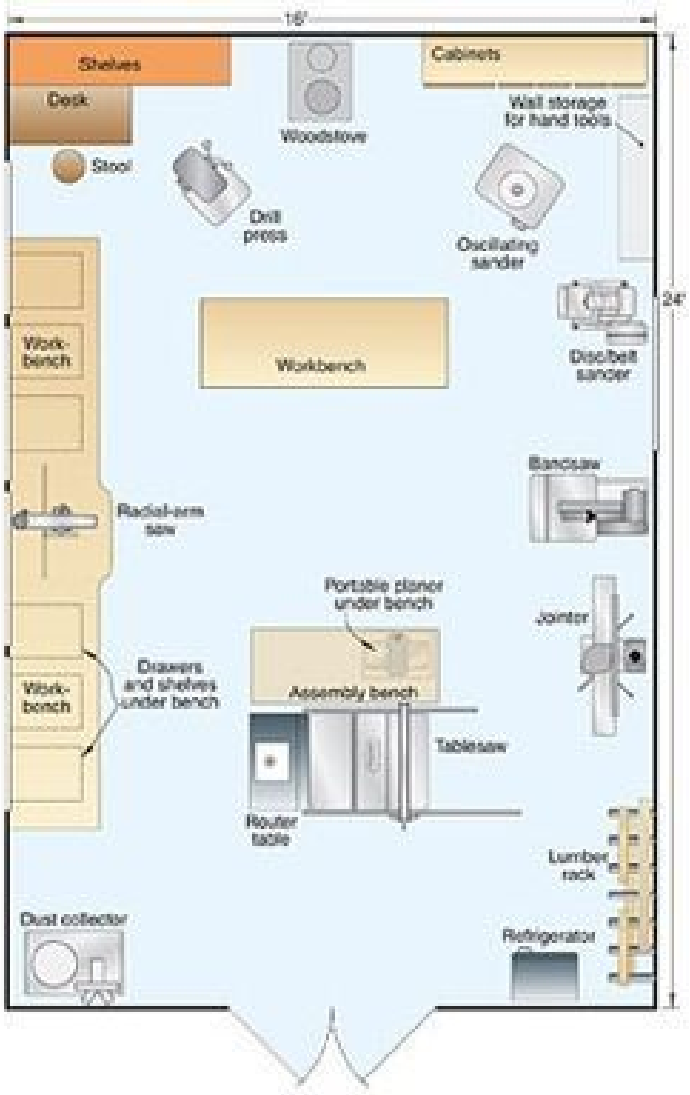
An older mobile home is usually a self-contained building typically complete with windows and doors, insulated ceiling and walls, plumbing, electricity, and heat. And as its name suggests, a mobile home can be moved from place to place.

Mobile homes can be turned into very practical workshops, but the truth is, the process comes with some challenges. Firstly, a

mobile home usually has a narrow space. Unless you find a double-wide one, which is again relatively expensive and a little harder to move, many mobile homes are just about eight feet wide. This fact implies that you will be doing all your work involving large sheet items outdoors. Again, you will need to get outside, to say, flip a long board end for end.

Another potentially challenging problem is floor integrity, especially when using power tools. The floor in a typical mobile home is not designed to bear the weight of heavy stationary machines like a band saw, a planer, or a table saw.

CHAPTER 3: SHOP LAYOUT



Lets discuss shop layout. **Let's be clear about one thing: No workshop is perfect for everyone.**

If there were an ideal workshop, I could simply give you a precise plan to follow with clear dimensions. Every person who comes to the hobby or profession of woodworking has his or her own particular collection of tools and unique work styles, skills, and desires pertaining to the kind of woodworking he or she wants to do.

Develop a Layout That Works for You

As noted earlier, each person is unique; therefore, one solution can’t work for everyone. I can only tell you about the important issues of consideration, rather than providing you with plans for a “perfect” shop layout. Then, I will offer you strategies and guidelines for planning your shop. These will make your workshop comfortable and efficient- one that is hopefully perfect

for your needs.

You should plan your shop while in its developmental stage, unless you like frequent workshop remodeling. This saves yourself the agony of having to work in a poorly organized and uncomfortable space. Again, you will save money and time which you would otherwise use remodeling your shop.

Machine Placement

Placement of essential machines is one of many critical decisions that affects your shop layout. Choosing machine locations in your shop depends partly on the work you do. This determines the essential clearance area surrounding the machines for, say, handling large sheet goods or long stock. Your shop layout also reflects your workflow. Prevent excessive running around the shop by placing the machines in an efficient order.

The following section discusses the most common issues in regard to machine placement.

1. TABLE SAWS

There are four different placement options for your table saw, which is an essential machine for woodworking. The first option is placing it at the center of your shop. This lends maximum

flexibility and space for panel sawing, crosscutting long boards and ripping. Your shop should be wide and long enough, however, to allow adequate room for the work-piece on the out feed and the infeed sides.

If you have a long and narrow shop, you can get maximum space on the left side of the fence, where you will be handling large plywood sheets. Consider building the table saw into some extension table surround if you usually work with full plywood sheets or other sheet items.

Consider orienting the table saw diagonally in the workshop, just in case your shop doesn't provide enough space for ripping your long boards. If this doesn't work, try gaining an outfeed area by aiming the back of the machine towards an operable door.

Finally, keep the table saw close to the door if the workshop is in your garage where you compactly store your machines whenever they are not in use. Therefore, you can drag or wheel it outside when you want to saw large items.

2. JOINTERS AND PLANERS

It’s common to work with either a planer or jointer when dressing lumber. For this reason, place the jointer closest to the saw, on the extension table’s right side. Then, place the planer adjacent to the jointer or nearby. Alignment of these tools gives your shop a long axis.

Place a portable planer beneath the saw to save room. All three tools may be oriented towards the garage-style door, which allow ripping of long boards. Try positioning the planer and the jointer against the other wall if the shop is narrow and the table saw is close to a wall. Place the machines in an operable doorway if the shop is not long enough to adequately accommodate long workpiece.

3. OTHER MACHINES

Once you put the major machines in place, the others may be arranged wherever there's space for them. you can tuck them into unused areas since there is often not enough room in the middle of the shop.

Workshops which have centric table saws may have a spindle sander, a router or a shaper upon a table. It has identical height

as the table saw at the extension table, which is placed on the outfeed side of the table. You can build a router into the extension table of the table saw; it's an excellent way of saving space.

Machine and Workspace Proximity

Many other woodworking machines and tools work best whenever aligned against walls. They're easily powered and connected to dust collection. The space between these machines usually depends on the size of stock with which you are working. It depends, too, on whether or not adjacent machines have tables with similar height, and how much room you have in the first place. You can easily pull a tool away from against the wall if you need additional space.

GROUP-RELATED TOOLS AND MACHINES

The machines or tools should be grouped to make your everyday tasks easier. The jointer, the thickness planer, and the table saw should be placed close to each other since the process of, say, ripping lumber and dressing its surfaces and edges involves repeatedly using the three machines.

Layout your bench area such that it is close by and portable power-tools. It should also be near the various supplies that you always need in the work area.

DIVIDING SHOP SPACE

Performing all your woodworking operations in a single room can prove to be very tiresome, just like living in a single-room house presents its challenges. For instance, it is an extremely bad idea to start applying a finish in a room that has just sanded parts. You get the point, right?

Bench tools are popular in multi-person workshops. One person runs machines while the other works in peace. However, in such shops, complexities such as workflow and shop layout often multiply exponentially. In fact, having two woodworkers successfully operate in the same room is twice as hard as having a single person work successfully in the same place.

FINISHING AREAS

Creating a separate area or room is crucial if you have a specialization in wood finishing or it is just the biggest part of your woodworking business. Consider installing a spray booth. This is perhaps the easiest way to come up with a fire-safe and adequately ventilated finishing space.

You can wall off a section or a corner of the main room. Or, consider making a small addition to the back of your shop. Add a

small ventilation fan in your finishing room. Then you can work without worrying too much about the finish fumes, which in fact, can pose health risks.

MOBILE MACHINES

Mobile machines come with a lot of conveniences. Fitting some, or all, of your equipment with wheeled bases allows you to reposition them easily. You can find a variety of ready-made

wheeled bases for most modern stationary machines.

The base is bolted to the machine's bottom. It rests on the floor whenever you are not using the tool. You will engage the retracted wheels of the base by cranking down a hand screw or pressing a pedal, depending on the type of base and its design.

Build your own mobile bases

It is easy to build a wheeled base upon construction of a good wheel-retraction system. Here I will explain two designs. In the first design, you will screw two wheels to an edge of plywood and lumber-frame bolted to the tooled base. The tool or machine will firmly rest on the ground until you tip it back onto its wheels.

In the second design, mount two non-pivoting wheels on one side of your base. Secure with heavy bolts on the opposite side. This way, you can move the machine by tipping it up slightly. One side of your machine will always rest on the wheels, so use this design on extremely heavy tools that are not prone to vibrations and

movement.

You can mount lighter machines and tools on shop-made platforms which ride on regular locking-casters. These have rubber wheels which you can find in most hardware stores.

CHAPTER 4: EQUIPMENT LISTS

We've come to arguably the most important section of this book. **Most beginner woodworkers spend money on tools that they don't need or use.** Many have the misconception that starting a shop is expensive.

Common wisdom that *"you get what you pay"* for. This is not necessarily correct as some are overpriced, some tools are gems which you'll get much more than you paying for.

So, let's break it down and talk about shop equipment. *More importantly, let's discuss budgeting for it.* Most of you would probably need help to answer questions such as the following:

- Where do I start?
- What do I really NEED to buy?
- What should I buy first and why?
- Where can I get the best prices?

I'll answer all of those questions and more. I will provide specific recommendations - based upon what I have found works for me. These recommendations will probably work just as well for you, while never losing sight of the fact that cost needs to play a role in our decisions.

Let’s start with the basics above all else.

What equipment do you REALLY need to get started?

I'll break this chapter up into multiple parts and lists. That way, you'll find a list that is suitable for your current situation

1) Essential Shop List Under $5000
2) Start Up Shop List Under $1000
3) Hand Tool Only List Under $500
4) Lowest DB (quietest) Shop List Under $1000

Essential Shop List Under $5000

For efficient space planning, ***it is important not to go crazy and buy large power tools or equipment.*** The ability to use floor space more efficiently must be considered.

As an example my table saw has the ability to mount a router. Also, there are many table saws which are portable and generally smaller in size. It's a good idea to consider them for small spaces. Even better are rolling work stations and multi tool tables.

One tip to work with small spaces is to buy tools as you need them. Consider this:

- does this tool meet my need today?

- If it does, how long will I take to outgrow it, if ever?

If you don't need them yet, you don't know if you will need them in the future and you might *just end up wasting money.*

Here is a shop inventory that I did some time ago for my own purposes:

Items had to meet specific criteria to be placed on the list. This includes:

- is the item is capable of building furniture projects within a reasonable time frame;
- the item is of acceptable quality.

There is overlap in function between a few items on the list; however, several were never included. That is, if a task could be accomplished while using an item without too much extra effort. I see the minimum inventory when I look at this list. I could build furniture with or without a significant loss in quality or time.

The provided list is not meant to be a recommendation for a specific brand or model number of tool. Rather, the brands and model numbers listed are representative of certain quality levels or capabilities.

It is also geared towards furniture building or home improvement projects, as such it does not contain some specialty items. I have included a couple of items worth mentioning on the list. Likewise, I have listed a certain level of the contractor-type table saw.

It is possible to complete projects while using lower grade equipment. This type of machine should present fewer problems in operation, particularly in its' usability and alignment.

However, the table saw is the core power tool in this "shop" (like most). Any improvements made to this item will have a LARGE positive impact upon the whole shop. This reflects progressive capability, accuracy, and usefulness. Additionally, I have included a planer and jointer, which are two halves of the same machine in my opinion.

The capability these tools bring to the shop far outweigh their cost, even though I can (and have) built projects without them. Stock material is neither flat nor straight while it is possible to purchase stock S4S or S2S-r1e, compared to the level of flatness and straightness you can achieve using your own tools. A large amount of frustration can be avoided by beginning with flat stock of consistent thickness. It would be possible to forgo the power jointer and planer and use hand planes instead. The only drawback to this is that it takes much more skill and time to prepare stock.

There are some notable absences, such as: a circular saw, shop vac, miter saw, air compressor, and spray gun (to name a few). While these items would be welcome additions, they are not absolutely required (your circumstances my dictate otherwise).

Minimal Shop Inventory

No.	Qty	Item	Type	Unit Cost	Total
1	1	dovetail jig (set) PC 12"	accessory	100.00	100.00
2	1	drum sander, 2" with bearing	accessory	15.00	15.00
3	1	drum sanders, 1" and 3"	accessory	18.00	18.00
4	1	router edge guide, bosch	accessory	34.95	34.95
5	1	sanding belt cleaner with handle	accessory	5.00	5.00
6	8	clamp, 1/2" pipe, 48 long	clamp	12.00	96.00
7	2	clamp, bessy 31, long	clamp	38.00	76.00
8	2	clamp, bessy 50, long	clamp	44.00	88.00
9	4	clamp, quick grip 18" long	clamp	20.00	80.00
10	1	drill bit set, plug cutter, 3pc set	cutter	28.00	28.00
11	1	drill bit set, spade 8pc set	cutter	9.99	9.99
12	1	drill bit set, twist, 29pc	cutter	79.75	79.75
13	1	drill bit, forstner set, HSS, 7pc	cutter	27.50	27.50
14	1	drill bit, set counter bores, 5 pc	cutter	32.50	32.50
15	1	drill bit, vix #1	cutter	8.00	8.00
16	1	router bit set, 1/4", 3/8", 1/2" roundover, Freud	cutter	79.00	79.00
17	1	router bit set, raised panel, Freud	cutter	145.00	145.00
18	1	router bit, 1/2" mortising with bearing, Freud	cutter	21.00	21.00
19	1	router bit, 1/2" od flush trim, Freud	cutter	18.00	18.00
20	1	router bit, 1/2" up spiral, 1 1/4"	cutter	42.36	42.36
21	1	router bit, 1/4 up spiral, 1"	cutter	15.16	15.16
22	1	router bit, rabbet kit, Freud	cutter	35.00	35.00
23	1	saw blade, Forrest WW2	cutter	100.00	100.00
24	1	saw blade, Freud safety dado, 8"	cutter	116.00	116.00
25	1	saw blade, thin kerf rip, 24t, lm72-10	cutter	39.00	39.00
26	1	crosscut sled, large (shop built)	fixture	25.00	25.00
27	1	crosscut sled, small (shop built)	fixture	20.00	20.00
28	2	extension cord, 25'	fixture	8.91	17.82
29	5	organizers	fixture	12.37	61.85
30	1	router table (shop built)	fixture	150.00	150.00
31	1	work bench, main with vise (shop built)	fixture	400.00	400.00
32	1	adjustable wrench set, 3pc	hand tool	28.00	28.00
33	1	awl	hand tool	6.00	6.00
34	1	bench brush	hand tool	8.00	8.00
35	1	center punch, self centering strike	hand tool	4.95	4.95
36	12	driver bits, average	hand tool	2.00	24.00
37	1	dust broom, push	hand tool	12.00	12.00
38	1	ear protectors	hand tool	20.00	20.00

39	1	files, 6pc set	hand tool	30.00	30.00
40	1	hammer, 16 oz rip	hand tool	22.50	22.50
41	1	hammer, rubber face	hand tool	11.00	11.00
42	1	hand saw, dozuki	hand tool	30.00	30.00
43	1	honing guide	hand tool	15.00	15.00
44	1	nail set 3pc set	hand tool	9.75	9.75
45	1	panel carrier	hand tool	15.00	15.00
46	1	plane, block low angle, veritas	hand tool	69.50	69.50
47	1	plane, jack, record #5	hand tool	67.50	67.50
48	1	pliers, channel lock, 10"	hand tool	10.40	10.40
49	1	pliers, diag cutter, electrician	hand tool	12.30	12.30
50	1	pliers, end cutter	hand tool	14.25	14.25
51	1	pliers, lineman	hand tool	16.55	16.55
52	1	pliers, needle nose	hand tool	13.65	13.65
53	1	prybar, flat	hand tool	7.00	7.00
54	3	putty knives, small, med., large	hand tool	2.00	6.00
55	1	safety glasses	hand tool	15.00	15.00
56	1	scissors	hand tool	6.00	6.00
57	1	screw driver set, Irwin, insulated	hand tool	25.00	25.00
58	1	screwdriver, #0 square	hand tool	3.00	3.00
59	1	screwdriver, #1 square	hand tool	3.00	3.00
60	1	screwdriver, #2 square	hand tool	3.00	3.00
61	1	socket set, inch / metric, Sears	hand tool	100.00	100.00
62	1	utility knife	hand tool	5.00	5.00
63	1	wood chisel set, 4 piece, 1/4" to 1"	hand tool	20.00	20.00
64	1	wrench set, allen, inch, 13pc	hand tool	8.25	8.25
65	1	wrench set, allen, metric, 9pc	hand tool	7.85	7.85
66	1	wrench set, combination, inch, sears	hand tool	40.00	40.00
67	1	wrench set, combination, metric, sears	hand tool	40.00	40.00
68	1	drill press, Delta, 16 1/2", 17-900	machine	350.00	350.00
69	1	jointer, Delta 6" 37-195	machine	500.00	500.00
70	1	planer, Delta 22-560k benchtop type	machine	320.00	320.00
71	1	tablesaw, Delta 36-444k contractor type	machine	600.00	600.00
72	1	compass	measure	12.00	12.00
73	1	level, 48" Starrett	measure	40.00	40.00

74	1	rule, 24" stainless steel	measure	7.00	7.00
75	1	rule, 6" stainless steel	measure	2.40	2.40
76	1	square, framing, 24"	measure	5.86	5.86
77	1	square, machinist, tri, 12"	measure	67.50	67.50
78	2	tape measure	measure	9.94	19.88
79	1	drill, Dewalt 3/8 electric, dw106k	power tool	70.00	70.00
80	1	jigsaw, bosch 1587avsk	power tool	155.00	155.00
81	1	router, bosch 1613evs	power tool	195.00	195.00
82	1	sander, bosch 5" orbital, 3107dvsk	power tool	120.00	120.00
83	1	sander, bosch belt 3x24, 1275dvs	power tool	220.00	220.00
			Sub Total		$5,398
			Tax and/or shipping at 7.25%		$391
			Grand Total		**$5,789**

Start Up Shop List Under $1000

It seems implausible to setup shop with equipment under $1000. However, I started to piece together a "starter list" for beginners as I started looking at beginner workshops and talking to several aspiring woodworkers.

The goal is to make basic and functional furniture within a city. Power tools are acceptable, but keep in mind space and noise are both issues.

Specifically, the main question is: What tools and brands are most necessary?

You will want to carefully configure which tools you actually need, since you will only be budgeting $1000.

Also, it is wise to be honest with yourself on what you need. Doesn't make sense to pay extra for tools with features you'll never use or for expensive tools that you'll use a couple times a year, especially when less expensive versions are available

Here are the tools I'd recommend for basic fundamentals, as well as building simple small crafts for the beginner workshops:

Chisels

Irwin Marples Blue Chip Chisels

(Cost: $70)

There are lots of specialty chisels you could add over time, but I don't think you can skip the basic set.

Hand Planes

I have an antique Miller Falls #4 right now, which cost me $40

(Cost: $40)

I had to spend hours cleaning it up and tuning it. I think you'll have to do the same with most new hand planes.

I'd like to get a #7 or #8 plane and a scrub plane first, and then add more specialty planes as I learn how to use them. (I'd probably get a jointer and a planer if I had the money, the space, and a dust collection system.) I'm expecting to pay at least $100 for the larger #7 or #8 plane. It will hopefully cost around $20 or less for the small scrub plane.

Spokeshave

Kunz151 Flat and Round Bottom Spokeshaves

(Cost: $27)

Sharpening System for Hand Tools

Japanese 1200/8000 Combination Water Stone

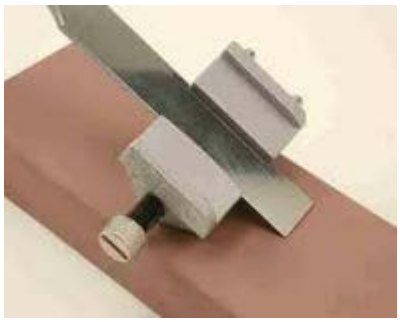
(Cost: $35)

G9650 9" x 12" x 3" Granite Surface Plate, 2 Ledges

(Cost: $30)

Somax No 22 Honing Guide

(Cost: $12)



You'll go through LOTS of sandpaper when you're initially tuning your hand tools. Therefore, expect to spend at least $100 on sandpaper. But the good news is that you only have to go

through the flattening process once. Then, you're just working on maintaining your edge.

Hand Saws

Japanese Gyokucho Dovetail Saw for Fine Work

(Cost: $42)

Coping Saws

(Cost: $5)

You can find a lot of value coping saws over at HarborFreight.com

Marking and Measuring

Engineering Squares

(Cost: set of four for $30)

(LeeValley.com)

Robert Larson Combination Squares

(Cost: $9)

Marking knife

LV Marking Knife

(Cost: $11) -LeeValley.com

Clamps

The rule is that you can never have enough clamps. I only have four bar clamps, two speed clamps, and a couple of cheap C clamps.

(Find value clamps over at HarborFreight.com)

Power Tools

For buying power tools at low costs, visit BigSkyTool.com and HarborFreight.com first.

BigSkyTool offers refurbished tools at low prices so you can find an incredible deal every once in a while

HarborFreight.com offers discounted prices all year long on a lot of budget tools as well. The tools offered on HarborFreight are not "top of the line stuff" - most of them are beginner/budget

options. However, there are plenty of gems (especially hand tools) so take a look at their offerings.

Power Tools To Get:

- Table saw
- Band saw
- Mitre saw
- Jig saw
- Drill press
- Corded drill
- Cordless drill
- Orbital sander

Everything on this list should you back under $1000.

TIP ON HANDTOOL BUYING: Estate sales, antique stores and eBay are a really great way to acquire hand tools cheaply.

Hand Tool Only List Under $500

I'm a big fan of hand tools. It is inexpensive to get started, quiet and it *serves as a good foundation* for your woodworking journey.

Many articles/books point to the expensive, pro tools, but could just as easily done with less expensive hand tools or lesser power tools. Books tend to focus on the easiest and most expensive solutions, rather than more practical tools for us

A few simple (and inexpensive) saws, chisels, combination square, hand planes, these will always be your best friends, and relatively come at a low cost *(all can be acquired under $100 total)*

As you start building stuff, you realize that many power tools are very handy. And then you can decide which ones you'd want to buy and in what order. - depending on project. I have yet to read or hear a woodworker say that they wish they had focused more on power tools when starting off.

Below is a list of my top recommended hand tools to start with.

These are all you need to startup your shop and start making projects. The best thing about them is their great value!

Jack Plane:

Many people recommend it as the first plane you buy because it is versatile. Often used similarly as a scrub plane when blade is cambered. If you do use it as your only bench plane, it's best to have 2 blades, one cambered and one not.

Low-angled jack planes are often recommended as your jack plane bacause you can swap out blades with different angles and they work well as a shooting board plane.

WoodRiver No. 5 v3

Cost: $169

Block Plane:

These little planes can be used to trim your joints, put chamfers on board edges, trim end grain, etc. I would recommend finding a low angle block plane, because the low angle lets you cut difficult grain more easily.

Stanley 12-220 Block Plane

Cost: $16

Marking Knife:

Marking knives are more accurate than pencils because the marks have no thickness and chisels naturally register into the cut.

LV Marking Knife

Cost $11

Marking Gauge

Marking gauges allow you to consistently mark distances from the edge of a board. Most people prefer versions that use a knife or wheel/disc over the ones with a pin. Mortise gauges have 2

knives that are set to the width of your mortise chisel. Eventually it's nice to have a few.

Marples Beech Half Round Cutting Gauge

Cost: $16

Square 6”

You need a combination square, either a 12 inch or 6 inch. While 6 inch combination squares are not as common, I find them to be a more useful size: big enough for accuracy, yet small enough to not get in the way. If you opt for a machinist square, make sure your 12 inch is a combo

LV Engineers square 6"

Cost: $18

Tape Measure

One of the most basic and essential tool you'll need. You can't go wrong with your choice. If you're on a budget, you can take a look at Harbor Freight's selection:

https://www.harborfreight.com/hand-tools/measuring-tools.html

Try Square

A try square is used to square up your workpieces for precise-fitting joints. If you're not confident enough to build your own try square yet, you should purchase a good metal try square (somewhere between 9 and 12 inches). It'll be used for scribing square lines down the face of your boards, such as a line for where to cut with your saw.

Lee Valley Engineer's Squares

Cost: $26

Mortise Chisel 1/4”

To start off you only need either a 1/4″ or 3/8″ mortise chisel (or some size close to those). You don’t need a whole set of mortise chisels. Mortise chisels (also spelled “mortice”) are used for chopping mortises (rectangular holes) into the side of your board for insertion of a tenon. “Mortise and Tenon” is a very common and very strong joint that most people have heard of.

Narex Mortise Inches

Cost: $14

Bench Chisel 1/4”, 1/2" and 1 1/2"

For bench chisels you can also take a look at other Narex offerings:

Narex Classic Inches

Cost: $20

Mallet

Mallet choice can be very personal, but almost any mallet will work to start with. The differences are mostly shape (a square Joiners Mallet vs. round Carvers Mallet) and weight (lighter for detail work vs. bigger for heavy work like mortises).

Consider something between 16oz to 20oz (4-1/2″) to start with. If you choose to make a mallet, the laminated ones are the easiest to build and most forums have great examples and tutorials. More expensive mallets are often made with different materials, like brass, urethane, or resin-impregnated wood, to change the weight, size, or durability.

Crown Mallet 20oz

Cost: $20

Claw Hammer

Nails are as traditional as dovetail joints, and hammers are essential for your kit. Traditionalists like wooden handles, smooth heads, and curved (not straight) claws. Woodworkers tend to use smaller hammers than carpenters so 16oz or less is preferred.

Tekton Hammer 16oz

Cost: $9

Rip Hand Saw

A rip saw is a good choice for your first hand saw because making rip cuts is more arduous than cross cuts. One reason hand tools have gotten a bad wrap the past few decades is because quality saws weren't made anymore.

Today there are a lot of quality hand made saws but they also then to be expensive. There aren't many inexpensive options. Instead many buy vintage saws and use it to learn the skills of sharpening. One alternative is to start with a cheap saw, like this Stanley or Japanese Ryoba, and save up for something nicer.

Stanley Combo 20″ 9pt

Cost: $15

Carcass Saw

Carcass (carcase) saws are typically medium sized back saws filed crosscut with 12-14 teeth. It is used for the cutting pieces to final size, along with typical fine cross grain cuts, like tenon shoulders and dados. This is a great first backsaw saw to purchase because its medium size allows it to be used in a lot of cases. Consider also the hybrid-filed sash saws which were a traditional option in combination with a finer dovetail saw.

LV Carcass 11" 14 tpi Crosscut

Cost: $80

Rip Dovetail Back Saw

“Back saws” are specifically designed for fine joinery work (they have a rigid steel or brass back to keep the blade stiff). Dovetail back saws are the smallest back saws (typically 8-10″) and are configured with fine rip-filed teeth (15-20 ppi) for cutting along the grain (think dovetails). Thinner blades (0.02″ ish) are preferred and I like the pistol grip handle because of my big hands.

I'm a fan of certain Japanese saws and this model is one of my absolute favorites for dovetail work. It is a modern variation of the traditional Japanese pull-stroke saw and I use it for all types of joints.

[Ryoba 9-1/2" Double Edge Razor Saw for Hardwoods from Japan Woodworker 1.7mm Teeth Pitch]

Cost: $38

Coping Saw

The very affordable coping saw (often less than $20) is regularly used for rough cutting shapes in the board, but especially for removing waste from dovetail joints (one of the most common wood joints).

An affordable coping saw will work just fine as long as you have plenty of replacement blades on hand (also very affordable).

Olson Saw SF63510 Coping Saw Frame Delude Coping Frame/End Screw

Cost: $13

Miter Box and Miter Saw

A good miter box & miter saw (a very large backsaw) will enable you to cut your wood to very accurate lengths, at accurate angles. This will especially save you a lot of time in trying to square your board ends when building boxes/tool chests. The long miter saw glides back and forth through a rigid saw frame.

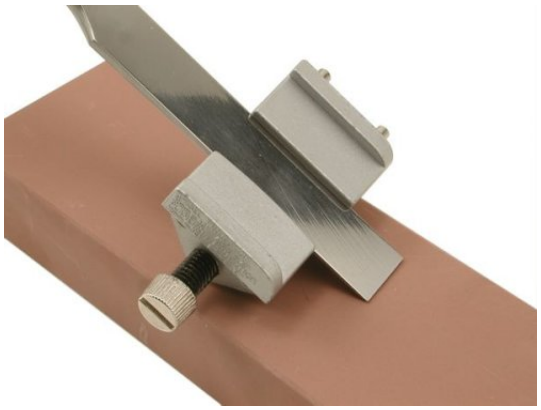
Stanley 20-600 Clamping Mitre Box with Saw

Cost: $14

Honing Guide/Jig

Honing guides make sharpening easy. While many suggest learning to sharpen without guides, using a guide makes sharpening consistent for the beginner. Certain guides are better for different blades.

The Eclipse-style side clamping guide is great for most blades, specially with some customization.



Eclipse Style Honing Guide

Cost: $12

Wooden Handscrew

Wooden Handscrews are a great first set of clamps to purchase because of their versatility. Because of their shape you can clamp these clamps onto a table or workbench to create a temporary front vise or to hold wood to mortise. Buy 2.

Harbor Freight Handscrew 10"

Cost: $8

Total Cost Of These Tools: $499

Tip: You can pay an even lower cost if you substitute some tools listed here for budget options located at harborfreight.com

Lowest DB (quietest) Shop List Under $1000

If you're sensitive to noise levels, live in an apartment or you need for find the quietest tools in your situation, you'll find this list useful.

Do note that the "quietest" tools are still hand tools. However, there are many machines and power tools that are extra quiet (l43 decibels or less) and I'll list them here.

In my experience, Ryobi and Bosch power tools are generally quieter than other offerings.

Do also be aware that the sharper your blade is, the quieter the machine will be.

Here is a list of the lowest DB power tools that are great value:

Bosch Special Edition IXO Cordless Screwdriver

Cost: $60

Worx WX477 550W Jigsaw

Cost: $40

Bosch PSM 100A Sander

Cost: $53

Simple Value Palm Sander - 105W

Cost: $20

Black & Decker Mouse Detail Sander

Cost: $33

Dremel MM30 2.5-Amp Multi-Max Oscillating Tool Kit

Cost: $$50

Bosch Random Orbit 5 inch Sander/Polisher ROS20VSC

Cost: $69

Ryobi 10 in. Drill Press ZRDP103L

Cost: $180

Ryobi 15 Amp 10 in. Table Saw with Steel Stand RTS10G Reconditioned

Cost: $190

You can get it at a reconditioned unit at great deal for: $130 at this link:

https://www.ebay.com/p/Ryobi-Rts10g-15-Amp-10-In-Table-Saw-With-Steel-Stand/1437893340?iid=282071740874

As of writing, it is still available

Ryobi 15-Amp 10 in. Sliding Miter Saw with Laser

Cost: $169

Ryobi CSB143LZK 14-Amp 7-1/4 in Circular Saw

Cost: $75

Total Cost Of These Tools: $912

Tip: You can get these tools are a lowest cost if you find great refurbished units at BigSkyTool.com, eBay.com or your local Ads.

Chapter 5: My Personal Recommended Tools and Where to Get Them at Low Costs:

I would always suggest that new woodworkers start by getting the necessary tools to build the first project, and then go from there.

In my case, it was to rebuild my backyard fence. this was when I got my Dewalt Mitre saw and 14.4V drill. My next project was my daughter's crib, which was completed 1 year after she was born.

The idea is to buy what you need. before making the purchase. The most important 2 things to realize are:

- Does this tool meet my need today?
- If it does, how long will I take to outgrow it, if ever?

The last thing you want is to spent good money on a tool, and finding out that it no longer meets your needs a year later, etc. That's what happened when I first bought my Dewalt Benchtop

saw for $500 and then upgraded to a Delta Unisaw 14 months later!

Case in point; I always thought that a lathe would be the coolest thing on earth to own so I made it my first power tool purchase. Now several years later, I use it, but only when whatever project I am working on requires it

With that said, lets dive into this chapter.

I'll discuss about all the tools and specific recommendations in accordance to the brands, reviewing how to get these tools and the costs involved.

First, let's separate power tools into four general categories:

1) Stationary Power Tools
2) Portable Power Tools
3) Other Power Tools

STATIONARY POWER TOOLS

These include:

- Table Saws
- Radial Arm Saws
- Bandsaws and Drill Presses
- Jointers and Planers
- Lathes
- Bench Grinder
- Compressors

PORTABLE POWERTOOLS

- Hand Drills

- Sanders
- jig Saws
- Circular Saws
- Multi-Function Tools
- Routers
- Reciprocating Saws

Other Power Tools

- Pneumatic

There are probably many more brand names with which I am familiar.

The major brands I personally own (or have owned) have had the most success. These are: Craftsman, Delta, Dewalt, Ridgid, Hitachi, Skil,Jet,PSI Woodworking and Ryobi.

So, let's dive right in...

STATIONARY POWER TOOLS

TABLE SAWS

What is the first stationary power tool that almost everyone buys -and that you should buy? Give yourself an "A" if you guessed the table saw.

All home workshops start with a table saw. And they are priced around $150-$3000. I would personally go for a SawStop 3 HP Professional Cabinet Saw if money was not an object.It has a 52" Professional T-glide Fence System.

Their model PCS3 1 2 is sold at WoodCraft.com

You would be hard-pressed to find a better saw. I say that with no reservations.

Here is the write-up from the WoodCraft site:

> *The SawStop 230, 3 HP 10" Professional Cabinet Saw is engineered to fit the unique demands in a home setting. This*

saw's 230V power and footprint make it ideal for the many challenges of a home shop while delivering the peerless fitand finish of the Professional Cabinet Saw. With Sawstop's legendary safer system, and an uncompromising quality and industry leading dust collection, the 230 Professional Cabinet Saw is engineered to be the cornerstone of a high-end home shop.

How much do you "need" to spend on a Table Saw to suit your woodworking projects? I didn't have a lot of money when I bought my first table saw many years ago; so, I budgeted, and I went with a **Delta, model TS200LS.**

There are several other similar saws. The Black & Decker BDTS200, for example. The Rockwell RK7240,1 is another.

Saws of this type usually retail for between $100- $200 if you can't afford anything better. You can do an Amazon search for table saws and you will see several. If you want to economize, I suggest you do it someplace other than on your table saw. You will thank me.

I still have my Delta TS200LS and still occasionally use it. It’s hard for me to part with any of my tools. I do, however, especially like three table saws -all below $900.

First is the **STEEL CITY 13-Amp 10'in Table Saw, model 35990C available at Lowes.com for about $830**.

This is just a work horse. You can usually get either five percent off or special financing from Lowe's.

Here is a more complete description:

- Motor: 1-1/2-HP TEFC, 120volt/240volt
- Seamless cast iron table top provides the best environment during operation.
- Maximum blade speed is 3,450 RPI
- The precision-machined cast iron trunnions are mounted to the top cabinet to ensure perfect blade alignment. This increases stability and ease of adjustment.
- Table saw is backed by a two-year warranty

Craftsman 10"is the second table saw which is of exceptional value. Contractor Saw - Sears # 21,833, model 351,218330.

At $549.99, this saw is a bargain.

By the way, Sears also has one more model that is worth your time.

That's the Craftsman Professional 1-314 HP Premium Hybrid 10" Table Saw (Sears #22116).

It's a little heavier (432 pounds vs 288) than their 21833 - which has castors. It is more suited to a shop where it will not have to be moved.

So, there you have it. I think the Sears 21833 is a good all-round table saw for any shop.

Frankly, at $549.99, you will be hard-pressed to beat it, Remember, Sears has a lot of sales. Sears has stood behind the Craftsman name for a lot of years. I still have some of their tools that I bought when I was in high school.

RADIAL ARM SAWS / MITER SAWS

Many people don't buy one of these for their shops. I have always had one and I use it a LOT.

While the radial arm saw is primarily used for crosscutting, it does wonders with bevel mitering, mitering, bevel ripping, and bevel crosscutting. I have done all of those on mine.

The radial arm saw is both efficient and precise with laser-guarded cuts. If you add the various attachments that are available, a radial arm saw can become a router, sander, buffer, polisher, and even a boring machine. The size of any radial armsaw always refers to the size of the blade that the saw uses.

By far the most common size is the 10-inch model. These saws are also available in 12-inch, 16-inchand even 18-inch. The blade size dictates how deep the saw will cut. For example, a 10-inch

blade can cut up to a 3-inch depth. Many of the newer radial arm saws sold today come with an automatic blade brake that slows and stops the saw once the motor is shut down. My personal radial arm saw does not do that.

The radial arms saw is perhaps more dangerous than a table saw, but both require you to know where BOTH hands are ALL THE TIME. I have all my fingers and plan to keep it that way.

I used to have a Ridgid RS1000 that I bought on eBay for $350. I paid another $50 to have it shipped to me. It was almost brand new. This saw retailed for around $1500 when I bought it.

Unfortunately, Ridgid no longer produces a radial arm saw.

These days, a sliding compound miter saws (the bigger cousins of the chop saw) have taken the place of the radial arm saw.

Since Ridgid no longer produces radial arm saws, you will have to look at brands such as: Ryobi, Bosch, Delta, DeWalt, Rockwell, or Craftsman.

A radial arm saw is one piece of equipment that you will frequently find on Craig's List, eBay, and Amazon. The 12" models, and 16" models, are nice, but not necessary for most. If this is a piece of equipment that you think you would like, it's one item on which you can economize. I use mine almost as much as I do my table saw. Another alternative would be a compound miter saw. We will discuss this later.

About all that can go wrong with a radial arm saw are the bearings in the track on which the saw runs. This occurs as you pull the saw mechanism forward. (NOT a huge deal to change those.)

The only downside is if there is one that takes up a fair amount of floor space, but I would not be without mine.

A decent Radial Arm Saw currently available for purchase is the

Dewalt 300mm RADIAL ARM SAW

- Free standing radial arm saw with 507mm of crosscut capacity and 90 mm depth of cut
- Pre-assembled and adjusted, delivered in a wooden crate for maximum transportation protection
- Strengthened column assembly and base arrangement supports the extra arm length

For Miter Saws, my favorite would be the

RYOBI TSS120L 12" 15 Amp Sliding Miter Saw with Laser

- Sliding head provides maximum capacity for up to 13-1/4 in. cross cut
- Machined cast-in miter scale for accurate table alignment
- Fixed dust port maintains the ideal position to optimize dust collection efficiency

NEW, REFURBISHED, USED?

Let me take a short break here and discuss this. Which is best for you? I set up my last shop. I bought a lot of tools refurbished - primarily hand tools. I'll give you the sources I used when we get to that part of the book. I have absolutely nothing against both used and refurbished.

If you are buying refurbished, you want to make sure that the company doing the refurbishing knows what they are doing. Make sure they have done it for a while, and have a good reputation for doing it. Used tools are a little trickier.

One question I always ask is:"Why are you selling this? And I listen closely to the answer.

If they are selling it because they are upgrading, it gives me a better feeling. Most of us can tell if a tool is worn out. I'm not interested in buying something that won't give me good service, regardless of how "cheap" it is. Where do I (and where can you), find good used tools, both power and hand? I've had some really good luck with garage sales, especially when the seller is moving into a smaller home.

You can find some bargains on Craig's List, although I am personally not a big fan of Craig's list. I've also bought a fair number of tools on eBay and Amazon. Patience is the absolutely the key. You will find some terrific tools on the used market if you have patience.

BANDSAWS AND DRILL PRESSES

I did without these two items for many years after I started woodworking. I recommend that you seriously consider just how

much you will use a bandsaw or a drill press. Having said that, if you decide that either or both are necessary for your shop, then you need to decide how much you want to spend.

BANDSAWS

Bandsaws can be purchased, new or used. They generally can be purchased for under $200. The price of a bandsaw is partially determined by the width of material which it can cut - also referred to as the throat capacity.

A 9"'bandsaw can cut up a piece of material up to 9" wide. That may not be wide enough if you are a furniture maker. My use of a bandsaw is somewhat limited; I chose a 9" Ryobi - Model 85902. I bought a reconditioned one several years back and paid around $100 for it.

I like the 10" Rikon 10-305 a lot. I recently saw it advertised on sale in a catalog from HighlandWoodworking.com for $199.95.

***10" Rikon 10-305 (*HighlandWoodworking.com)**

The stand was another $59,95.Personally, I have simply built all of my own stands out of 1 x 4 md 2 x 4 stock. This is what I would buy if I were to replace my Ryobi. Rikon also makes a 14" model, model 10-325, which retails for $799.95 at Highland. Most places that sell power tools sell bandsaws. Sears still sells these as well.

DRILL PRESSES

Let's spend a little more time on drill presses. I use my drill press a lot more, as opposed to the bandsaw. That may or may not be the case with you. I do a fair amount of cabinet work. I usually use concealed hinges, which require the drilling of z 35 mm cup. Hard wood (such as poplar), which I use often, requires a decent amount of drilling power.

I'd go with a floor model if I were to buy a drill press again. The cost is anywhere from about $299 at Northern Industrial Tools to up to thousands. Lowe's has a Porter-Cable for $329.00, a Sunex for $629.00, and a Delta for $1287.00.

Porter Cable Drill Press - $329 (Lowe's)

Sunex Drill Press -$629 (Lowe's)

Delta Drill Press - $1287 (Lowe's)

I don't think most people need to spend more than a maximum of $400 for one. I bought a Performance Tool W50005 Bench Top drill press for about $100 several years ago.

I see them on Amazon these days for between $122.00 and $153,00. It's a little underpowered, but I have always been able to do the things I need to with it.

JOINTERS AND PLANERS

These two items are a must if you are a serious woodworker. I use both of mine a lot - in fact, I use them on almost every project I do.

I personally own the Delta JT160 Shopmaster Jointer.

Delta JT160 Shopmaster Jointer - $165 (Big Sky Tool)

I bought mine used for roughly $325. This is a general use machine. It has a variable speed of 6,000 and 11,000 rpm, which is more than adequate for most hardwoods. It has a two knife cutter head that can be easily leveled. This is easy to replace. It has an extra-large table which enables you to surface stock up to a full 6" wide.

This is the only machine which home woodworkers will ever need. You can certainly spend a lot more, but unless you plan to do production work on it, it's not necessary.

Check out other available products at Sears.com. I actually use my planer more than I use my jointer.

Still, the prices on the planer are all over the map. I bought a **reconditioned Dewalt DW734 15 Amp 12 ½" 3-inch blade benchtop model for $170**

Then, I built a wooden stand for it. Lowe's sells it new these days for $399.00.

Their item number is 221857.This planes wood so smooth that only light sanding is necessary. It is self-feeding.

LATHE

This was the last item I added, and I haven't used it as much as I first intended. So, take into consideration how often it will be used before you purchase it.

I went with a PSI TCLPROVS Turncrafter Pro VS Variable Speed Wood Lathe model for $375.

PSI TCLPROVS Turncrafter Pro VS Variable Speed Wood Lathe - $375 (Big Sky Tool)

I added a 10-inch extension bed for another $90. You can pay thousands for a lathe. The midi lathes are adequate for most woodworkers. Harbor Freight sells several imported models from harborfreight.com if you are looking for a larger model.

Sears sells several wood lathes that range in price up to $2,650.00.

Woodcraft also sells several ranges which are priced all the way up to $7,500.00! Too rich for my blood.

BENCH GRINDERS

Every, shop should have a bench grinder. I own (and recommend) the **Dewalt DW758 Bench Grinder** - which you can usually buy for around $100 from Amazon. It has a 3 + hp motor and runs at 3600 rpm. This is hard find anywhere else.

DEWALT DW758 8-Inch Bench Grinder - $100 (Amazon)

This is a tool that you will frequently use. You can spend more or less for it, but this is a reasonably priced grinder that has served me well. Something else I will add shortly is a Work Sharp W3000 Tool Sharpener, for about $200. This can be purchased from Rockler.com.

Work Sharp W3000 Tool Sharpener - $200 (Rockler)

This is specifically designed to sharpen chisels and planes. It is somewhat of a specialty item, but worth the money. Yes, you can do that with the Dewalt DW75B.

COMPRESSORS

Finally, the last item that I think every shop needs is a compressor. I personally have two, one that is mostly portable and somewhat underpowered. I bought this from Harbor Freight on sale for around $30. Its item number is 95275.

Pancake Air Compressor: Oil less, 1/3 horsepower, three-gallon, 100 PSI - $30 (Harbor Freight)

- Air delivery: 0.6 CFM at 90 PSI
- 1.0 CFM at 40 PSI

- Low maintenance oilless pump
- Built-in accessory storage
- Easy-to-read gauges
- Fully enclosed motor housing with easy carry handle
- Includes quick connect coupler
- Thermal overload protection

The other one, a Hitachi EC510, has a maximum working pressure of 140 PSI and retails for around $300.

Although,it can be bought used $300 and bought refurbished for $112.

Hitachi EC510 - $112 (Refurbished BigSkyTool.com)

The one I bought was purchased from BigSkyTool.com.

I also purchased a lot of other tools from them, which were all refurbished. I have never had any problems with any of these. We will discuss more on these tools later.

This concludes the basic stationary power tools that most people consider whenever equipping their woodworking shop.

PORTABLE POWER TOOLS

There is a wide array of portable power tools that most of us buy. These days, many of those are battery-powered and rechargeable. I still use a lot of corded models, but battery-powered items (such as hand drills)really are useful and highly portable.

HAND DRILLS

Let's start with hand drills. There are so many of them on the market; a person could probably write a book about them. I have two that I have used for some time which I have found to be reliable. One is a corded hand drill and the other is battery-operated. I've had my corded drill for many years; the Craftsman, model 315.101,230. I don't find it at www.sears.com anymore. Still, if you like Craftsman tools such as I, then this is their item #

00910114000P, model #315. It looks pretty much the same and retails for $49.95.

Craftsman-3/8-in Corded-Drill $49.95 (Sears.com)

I like a 3/8" hand drill vs. a 1, f 4" drill the best; there are a LOT of them out there. I've seen them for as low as $19,00.

I bought my Grade "A" reconditioned Hitachi model DS18DVF3 18 Yolt1.f2"hand drill with interchangeable flashlight, for $65.00 from BigSkyTool.

Hitachi DS18DVF3 -$60 (BigSkyTool.com)

They offer a Grade "C" reconditioned one for $39,95.It’s hard to go with that as well. I subsequently bought an extra battery from Lowe's.

SANDERS

I recommend purchasing two sanders: one belt sander and one orbital sander. I use a Hitachi 3" 2 speed Belt Sander,model SB-

75B. BigSkyTool recently advertised one: Grade C Reconditioned sander for $68.77.

Hitachi 3" 2 speed Belt Sander,model SB-75B - $68.77 (BigSkyTool.com)

Here is what they say about condition:

- Condition: Certified Reconditioned - Grade C. This means it may have a more worn, used look than Grade A. Still, it comes with the full certified and reconditioned warranty!

I presume by now that you realize my faith in BigSkyTool.

I've saved a LOT of money buying from them, and I have never had ONE problem with anything.

The other sander that I consider invaluable is the Porter Cable 1.9 Amp Orbital Power Sander. I bought this from Lowe's for $49.97.

Porter Cable 1.9 Amp Orbital Power Sander - $49.97 (Lowes.com)

It uses eight hole and loop sanding discs that are easy to change and readily available. I have mine hooked up to my shop vac, but

it comes with a self-contained dust collection system, although it has a limited capacity.

It has a speed (Surface Feet/Orbits per minute) of 12,000. This is item 241473 and model 382, available at Lowe's.

Another inexpensive sander is the Skil Detail Power Sander, available for $29.98 from Lowe's. Its pointed tip is ideal for sanding corners; aside from this, you may want to add the 3M (or similar) 2.75" x 5" Rubber Sanding Block.

JIG SAWS

Most shops have one jig saw; mine is no exception. You won't spend a lot for one and it may never wear it out from overuse. I have a fairly economical Hitachi CJ110MV 5.8-amp Top-Handle Variable Speed Jig Saw which was reconditioned from BigSkyTool for around $75- Grade C reconditioned.

Hitachi CJ110MV 5.8-amp Top-Handle Variable Speed jig saw - $75 (BigSkyTool.com Reconditioned)

Homebuilding Magazine stated this jig saw is a best value. It features:

- Four-Stage orbital action that increases cutting efficiency. It allows the user to select the aggressiveness of the cut based on the material or application.
- 5.8-amp motor has more than enough strength to power through the toughest materials with ease.
- Tool less blade change system allows the blade to be changed quickly and easily.
- A top mounted LED light illuminates the workspace. This improves cut-line visibility.

- Powerful dust blower pushes sawdust and chips away from the cutting path for a cleaner, more visible work surface.
- Electronic speed control maintains strokes per minute, even as load vanes.
- The lock-on, variable speed trigger allows the user to control the speed. It keeps it set without having to squeeze the trigger, preventing numb fingers after extended use.
- The cast is an aluminum nickel-plated base. It offers solid support during cutting and resists scratching work surface during use.
- Base plate bevels 45 degrees to the right and left to assist in different cutting applications.
- Soft, patented elastomeric compound that covers the jig saw absorbs vibration, prevents slippage and provides maximum control while cutting.
- Curved D-shape handle conforms to a secure grip.It is comfortable when held in many positions.
- Features Hitachi's pioneering design that incorporates ergonomics to make the tool more comfortable and easy to use.
- 4.9 lbs., lightest in its class to prevent user fatigue and make maneuvering the tool much easier.
- Accepts "T" shank blades only.

MITER SAWS

I have used mine many times; I have a pretty basic Hitachi Model C10FCH2.

Hitachi Model C10FCH2 - $100 (BigSkyTool Reconditioned)

This 10" compound miter saw offers the ultimate in form and function. There is no doubt that this saw is designed for the professional, due to its aggressive design.

The C10FCH2 features a powerful 15 Amp motor, a vibration-reducing horizontal handle, and a Hitachi's exclusive laser-marker system. The C10FCH2is the lightest saw in its class at just 26.5 pounds.

I bought mine, Grade A reconditioned, for just over $100 from bigskytool.com.

CIRCULAR SAWS

This is the second most popular tool in any shop, right behind the table saw. I have a Skil Model 5380 that I bought at Lowe's for about $40.

Skil Model 5380 - $40 (Lowe's)

It's a 1.2-Amp,45-degree and 7.25-inch corded model. It's a real work horse that has seen a lot of hours of use.

I do recommend one accessory, and that's the Kreg Rip-Cut Circular Saw Guide that sells for $34.98 at Lowe's. It is worth trice that to me. This is the handiest gadget I own; I wish I had invented it. The Lowe's item number is 287348;model KMA.2675.

And now, the details:

- Kreg Rip-Cut Circular Saw Guide
- Fast and accurate rip-cuts with full support through the entire cut
- Quickly and easily connects to most left- and right-hand circular saws
- Durable design with an easy-read adjustable scale
- Rips sheets of plywood in half in just one cut
- No measuring, no marking and no chalk lines
- Reversible guide-arm; right or left-hand use
- Cuts material up to 24-in wide

Kreg makes the finest joinery system available (in my opinion). It's called the Kreg Pocket Hole Jig System. It's available from many companies that sell woodworking supplies and equipment.

ROUTERS

This is another tool that should be in every woodworking shop. I have several of these. The one I use the most is table-mounted, so let's discuss that one first. Furthermore, we will spend a little time discussing the table itself.

The router I use here is the Hitachi M12VC - a 2.25 Peak HP Variable Speed Fixed Base Router.

Hitachi M12VC - $80 (BigSkyTool Reconditioned)

No router is quiet and this one is no exception. 79.5dB, Hearing protection advised. A router emanates a very high-pitched whine. Those are especially good at permanently damaging your hearing. I bought mine from BigSkyTool.com

It was a Grade A Certified Reconditioned unit and cost about $80,as opposed to $215 brand new.

RECIPROCATING SAWS

This is something you might not need, but I have found it helpful - both in and out of the shop. I have the Hitachi CR13 10 Amp model.

Hitachi CR13 10 Amp model - $115 (BigSkyTool)

It's usually available new from BigSkyTool for about $115. I even trim trees with it.

SCROLL SAW

Table scroll saws can be purchased for under $150. They are nothing more than the table version of the handheld scroll saw. They come in handy if you are doing projects such as puzzles - which I have done a lot of in the past, out of 2" wood.

Craftsman 16" Variable Speed Scroll Saw - $130 (Sears.com)

A couple of things are important to consider if you do projects like that. First, take into consideration the distance from the blade to its throat. I like the 16" models best because they provide the capability to work with wood up to 16" long. I also

like variable speed models that provide the ability to cut at a slower rate of speed.

This is especially beneficial when you are working with thin stock. If you go to sears.com, then you will see at least three models - all under $150

COMBO SANDERS

I have owned one of these in the past but haven't really needed one enough to buy a new one. They come in various sizes; these are a combination of a belt and a disc sander in one piece of equipment.

For reference only, look at WoodCraft.com and type in sander. They have a 6"x48" belt / 10" disc sander - a Rikon for $350. I like a 6" belt and 10 " disc.

Most people use a 4" belt paired with a 6" disk. Frankly, I think you are best to go with a little more capacity if you are going to buy a combo sander.

There are also combo sanders which have a 9" disc. This is certainly adequate for $199.99 that comes with an industrial stand. It has a table top 4" belt 6" disc for $59.99.

SPINDLE SANDERS

An Oscillating Spindle Sander can save you a lot of time if your projects include radius work. Try to get a model with at least a 14-inch table diameter. Harbor Freight has one for sale, priced at$129.99.

Oscillating Spindle Sander - $129.99 (Harbor Freight)

TIP: I recommend that you start with a good table saw if you are starting your first woodworking shop. Spend a few hundred for a high-quality table saw; don't economize here.

You can buy some really good table saws for less than a $1000. It will be the best investment you ever make.

From there, depending upon the projects you take on, add equipment when you think you will use it. Let projected frequency of use tell you what to buy and when to buy it.

PNEUMATIC TOOLS

There are several pneumatic tools that really save me in the shop. They are not expensive; the alternative is a hammer, which is probably cheaper.

The two I use are the 18-Gauge Brad Nailer that uses 5/8" to 2" brads. Then, the 3 1/2" framing nailer uses 2" to 3 1/2" framing nails. My 18-gauge is a Hitachi NT50AE2 that was recently on sale for $48 (Grade A reconditioned) from BigSkyTool.com

Hitachi NT50AE2 - $48 (BigSkyTool Reconditioned)

My framing nailer is a Hitachi NR90 AEPR. It sells for about $140 these days. Retail on this is $390.00. This tool makes fast work out of any framing project.

Hitachi NR90 AEPR - $140 (Big Sky Tool)

This one can always be rented if you don't need it often. I bought mine to build an equipment building so that I could store our lawn maintenance equipment. This includes a tractor. I probably paid for it with that one fairly large project in time saved.

CHAPTER 6: SOUNDPROOFING

It doesn’t matter if you’re a recreational DIYer or a serious garage guru, you make noise. It can’t be helped, especially with power tools. And if you’ve got close neighbors, you probably always think about that noise when you’re switching on a machine. Soundproofing your garage/workshop is the key to maximizing your freedom.

There are tons of ways to properly soundproof a workshop - from costly remodeling to simple economical solutions

If you have the option of redoing your walls, a double wall construction is one of the BEST value to stop all noise from leaking through.

Sound is either carried by air movement or is transmitted by conduction through material. In order to stop conducted sound, you need to isolate the interior membrane. Two layers of drywall works because it takes a *lot* of energy to make the whole thing resonate.

Another method of a double wall construction with used sand between the walls (heavy ply) is also very effective in killing noise.

Heavy duty insulation and dead air spaces work in the walls.

Overhead you have to have at least double walls and heavy insulation, not glass, but fiber, and something like R40-60.

Most noise proof workshops or studios use fiber or a rubbery substance on areas that leak noise. If this is a garage, some sound deadening for the neighbors will happen, but if you are in a residential building or have noise sensitive family or neighbors, then you should consider lining walls with heavy foam, and then noise dampening gooey rubber elsewhere.

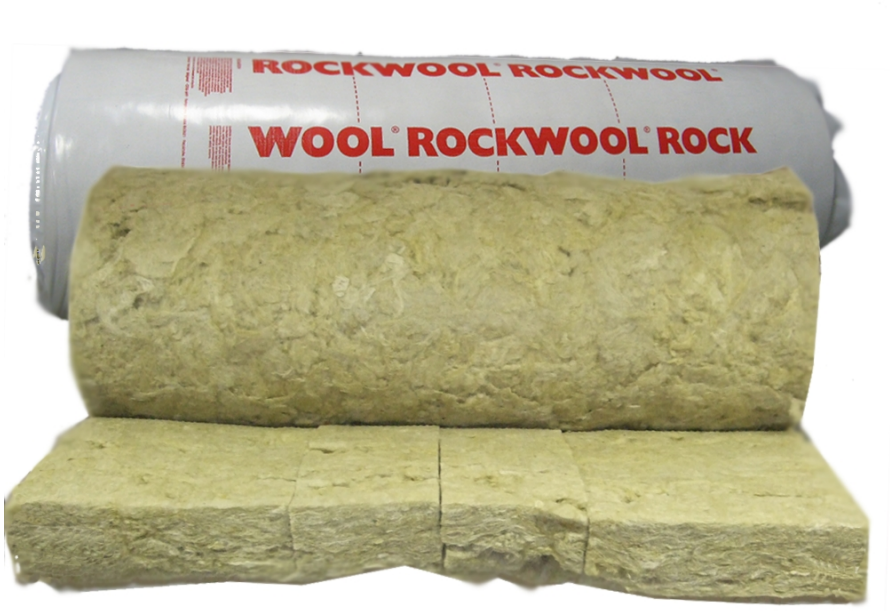
Some ceiling tiles made of fiberous material helps too.

The Economical Solution

If you do not have the time or funds to remodel your walls, there are a couple of low cost options you can consider to eliminate sound. (even up to 70%!)

Option 1:

Use Sound Insulation Batts.



Roxul makes rockwool sound insulation batts (Sound and Safe) which you can install on your shop ceiling or wall. They control a fair amount of noise. Home Depot sells them at about $45 for 12 4' batts IIRC. It also acts as a fire retardant for the rest of the home.

Option 2: (recommended for DIYers):

Using the Cleat method.

This method of soundproofing is one of the cheapest and most effective method I've seen.

Compared to a typical IsoWall system, the Cleat system is

- Much cheaper
- Much sturdier (if you decide you want shelves or other heavy things hanging from those walls)
- Is removable for tweaking if necessary
- Uses ordinary 2 x 4 lumber and not some fancy-shmantzy materials that need to be special-ordered
- One wall can be soundproofed to the same degree for about a fifth to a third of the cost. Sturdiness can be adjusted to your needs

The trick to this method is that the drywall panels are hung on a pair (or more) of wooden "cleats" made from a sliced 2x4.

The upper cleat on the back of the drywall is isolated from the lower cleat on the wall behind by inexpensive closed-cell foam tape. No part of the outer and inner walls touch directly. In practice, very little sound is transmitted through the foam, and the walls achieve a very high degree of soundproofing. The weight of the drywall keeps it in place so surprisingly well, that I use only two cleats: one near the top and one across the middle.

Before we start, lets:

1. Clear up some basic soundproofing theory
2. Explain some typical alternative methods.

"Soundproofing" (as distinguished from acoustical treatment) is concerned with blocking sound.

You block sound with 1. *mass*, and 2. *isolation.*

Putting foam or other absorptive things on the inside of the wall is not soundproofing, but *acoustical room treatment*, which is used to reduce echoes and resonances and prevent excess sound buildup within a room. Soundproofing and room treatment are completely different things. Room treatment improves the sound within the same room.

Soundproofing is about preventing sound from getting out or in. Definitely, putting foam on the walls can help keep your neighbors from calling, but it's not because of "soundproofing" -- it's because you have treated your room and in effect "turned

down the volume" like they asked you to do.

*Soundproofing a wall involves the principles of mass and isolation***.** A heavy wall will soundproof better than a lighter wall of the same construction. BUT isolation is the trick that will let you achieve the same results with a lighter wall.

A traditional wall involves panels (drywall, siding, stucco) connected to a frame, with drywall attached to the inside. There is usually fiberglass insulation inside the wall. It can typically block about 30dB of sound if constructed tightly. The way it works is mainly through the mass of the wall (drywall + frame) with some absorption by the insulation (effectively "turning down the volume") in the little "room" between the panels.

You can make a better wall by finding ways to isolate one panel from the other. In the staggered stud method, the vertical studs are staggered in depth so that the front and back panels are screwed into different sets of studs. However, they are still attached to the same top and base board of the frame, so some

sound will travel straight through.

The ultimate method involves "double wall" construction. You essentially create a room inside a room with no part of the inside wall touching any part of the outside wall. Double walls can block in the range of 55-60dB of sound. A disadvantage is that the extra wall thickness can eat up a lot of space within a small room.

In between these two extremes, there is the resilient channel method, which involves attaching springy metal strips to the studs of the outside wall, then screwing drywall into a flange on the strips in such a way that the wall can flex against the resilient channel without touching the outside wall's studs. When constructed properly, these walls can block into the 50dB range. Other implements can be added to the resilient structure to get into the high 50dB range, such as foam tape and varieties of "isolation clips" that are clever ways to attach the channel to the studs without screwing directly. Of course, the cost of these adds up quickly.

Here are the exact steps to build your own soundproof cleat system:

Step 1: Introduction

My method is also in between the single and double wall construction, and it is similar to the resilient channel method in creating a "springy" wall that will flex. Unlike the standard

resilient channel method in which the channels are screwed into both the stud and the drywall, in my method there is no direct mechanical path from the outside wall to the inside wall. So my performance should be most comparable in soundproofing capability to resilient channel methods with isolation clips. I will say, however, that it's "pretty darned good".

Of course, if you're running a commercial operation or otherwise have the funds, definitely look into a well-documented industry-standard soundproofing method like resilient channel or double-wall construction. They've been studied and measured thoroughly, and there's little mystery about why they work and how well they work. But if you're desperate and/or short on funds, this method could be just what you need to get excellent results without a lot of investment.

Step 2: Planning Ahead

I assume you will be soundproofing over an *outside garage wall with exposed studs and insulation*. Both are critical for the success of this project. If your wall is already drywalled, you'll need to remove it. If it is not insulated -- we're talking fiberglass batting or equivalent -- you will need to do that first, because it's part of the soundproofing structure.

There are 5 steps to this project:

1. Arrange to slice ("rip") the 2x4 boards longwise with a mitered cut to create a top and bottom cleat.
2. Nail the bottom cleat to the studs and staple foam across the face of the bottom cleat, then set the top cleat in the valley of the bottom cleat with foam sandwiched in between.
3. Cut the pipe insulation to set up a squishy track for the drywall to sit in.
4. Let the drywall panel in the track and screw it into the top cleats.
5. Assuming it's how you'd like it, caulk the seams.

And here are the essential parts, listed in order of use.

2x4 lumber - You will need one 8 ft length of 2x4 for every 8x4 ft panel of drywall. If you choose to use more than one cleat at the top and one cleat in the middle, plan accordingly after reading all the instructions.

Helpful Hint: If you buy the wood from a lumberyard rather than a home improvement store, you can ask them to rip the wood for

you. Lowe's and Home Depot cannot do the cut required for this project.

STEP 1:

(Optional for the DIYer)

- **Table saw or Band saw** (must have miter capability.)
- **Measuring tape and pencil** to mark the cut line.
- (Recommended "No-Power-Saw" Alternative)
- **Ask the lumberyard (not Lowe's or Home Depot) to cut it for you for a small fee.** See the section on "ripping the boards", where I tell you what to say to them to get the cut we want.

STEP 2:

- **Hammer and 2-1/2" Nails.** You'll be nailing cleats into the studs.
- **Closed-cell foam tape.** Does not need to be sticky. This blue roll is from Lowe's in the insulation section and was very cheap. In general closed-cell foam is identified by little *closed* bubbles. It does not look like a sponge. It should be about 1/4" thick. The foam tape will be cut and attached between the two cleats and along the front face of the bottom cleat.
- **Staple Gun.** (Needed if your tape is not sticky. If your roll of foam is sticky, you won't need the staple gun.)
- **Scissors** for cutting foam tape. If it works, use it.

STEP 3:

- **Pipe insulation tube** for 1/2" pipes. Your drywall panels will sit in these to isolate them from the floor. You should get the "polyethylene" tubes rather than the really squishy black ones. They need to be very resilient.
- **Utility Knife** to slice the pipe insulation in half longways.

STEP 4:

- **Drywall** - thicker is better, but you can always increase the thickness later if you desire, by gluing more sheets on the face. There are many advantages to doing it this way, including being able to seal the seams very easily by overlapping them with the new sheet. I used 1/2" thick drywall.

- **C-Clamp** (not shown) - at least 6"

- **Screw gun** for attaching drywall to the top cleat.
- **Drywall screws.** Pick your favorite. I ultimately used self-drilling screws.
- Optional (Very helpful): A **drywall prybar** that helps to lift drywall at the foot.
- **Acoustical Caulk and Caulking Gun** - Acoustical caulk is "Non-Hardening" or "50 year" caulk. An important principle in acoustical isolation is flexibility. Rigidity is an enemy.

Step 3: Be Willing to Break the Rules

For any construction heads reading this, I'll take the opportunity to warn you of some ways in which soundproofing construction

methodology is different from and often the opposite of conventional methodology:

In soundproofing...

Flexible wins over solid. Sound travels easily over rigidly-braced and strongly-connected construction. We want the opposite. Instead of a strong-as-a-steel-rail metaphor, we are going towards limp-as-a-fish. Of course a fish does not make good construction material, so therein lies the challenge. We need it to be *just strong enough.* The inside walls don't need to support a roof and hold the building together like the outside walls do; they just need to be heavy and not move. If you don't expect people to be bashing the walls in (mine will often have cabinets in front of them) then there is absolutely no need to do more than prevent it from falling down on you. Therefore use as little traditional construction (nails, screws, bracing, etc) as you can get away with.

Walls before ceiling. In conventional construction, the ceiling

comes before the walls. But in soundproofing, this would be problematic for constructing a "hanging ceiling". It's much easier to set up the walls, and then hang the ceiling to either sit atop the new wall or butt tightly up against it.

Vertical may work better. In conventional construction, drywall is usually hung sideways on the walls. That's fine when you're screwing the sheets straight into the studs and cutting the edges flush with the ceiling. But in soundproofing, it's important to get a good seal at the top and the bottom, and it's often easier to get a good seal by letting the weight of the drywall sit on a strip of foam, and to let the ceiling panels sit on the top of the walls. In my case, I will let the ceiling panels butt up against the walls, but the bottom will sit in the groove of the pipe insulation to get a good seal.

Drywall also absorbs bass. The main role of drywall in soundproofing is as a high-mass-barrier. But drywall construction also plays a huge role in room treatment as a bass absorber. Of course, the drywall itself is not very absorptive; but the wall

construction definitely is. You've surely experienced that hitting a wall with your fist is like banging a huge bass drum. Banging that drum takes energy. Sound within the room is constantly beating on the big bass drum created by the wall, and thus is losing energy in the bass region. The effect is a lot greater when there is insulation to absorb the sound within the big drum.

This is relevant to the way you construct the walls. Adding more mass in the form of studs or bracing will add to the mass-barrier effect, but depending on how it is done, *extra bracing may decrease desirable bass absorption within the room.*

For example, decreasing the distance between studs to add more bracing has the same effect as shortening the length of a vibrating string: the resonating pitch goes up. You can easily determine the resonant frequency of the wall after-the-fact by banging on it lightly and listening for the tone. Is it higher or lower than you want? Does it seem more broadband (like hitting a normal wall) or more tuned-to-a-note (like a tom-tom). **A great**

advantage of my design is that you can easily remove the wall to adjust the tuning!

In the case of my own walls, the construction of which I am describing, they seem to be tuned in a very broadband way around approximately 60hz vs. my normal house walls which seem to be tuned more tightly around 100hz or so.

Flexible caulking NOT Mud Along the lines of the flexibility principle, we want to use acoustical caulk which is commonly available as "50-year" or "non-hardening" caulk. The seals need to be flexible, because the panels need to flex. Therefore, absolutely no "drywall mud". We use only acoustical caulk to seal the seams.

No short-circuits! Resilient-channel methods are commonly defeated by sloppy or unknowledgeable installation that allows the outside wall to touch the inside wall via a screw or a nail that wasn't tightened all the way in or some other tiny missed detail that allows a direct path from the outside wall to the inside. It is a

mechanical "short circuit". My wall is less prone to this, but you must be vigilantly aware of the possibility. The weak points in my design will be the staples and foam, so I will warn again when we get to that step.

Step 4: Buy and Rip the Boards.

After buying your 2x4s (one 8ft board per 4x8 drywall panel)...

You'll first need to arrange a way to slice (rip) a mitered cut

longways through an 8ft length of 2x4.

Recommended Easy and Completely Non-Dangerous Way: Go to your local lumber yard and ask them to cut the boards for you. If you buy the wood there too, you can get it all done in one shot for just a small fee. (note: Lowe's and Home Depot cannot do this cut)

What to tell them: *"I want to rip each these boards once down the center, mitered at 25 degrees."* Show them with your hands how it should be cut, and ask them how much they would charge.

As they cut the boards, set them aside as matched pairs. Tape or tie them together.

If you have to be DIY about it:

Here are the essential steps of the board-ripping stage:

1) Set your power saw to miter at about 25 degrees.

2) Adjust your cutting line so that the mitered cut will rip the board in half evenly.

   . . . (For 25 degrees, that works out to be 2" from the right)

3) Rip the board longways, leaving two trapezoidal pieces.
4) Set aside the boards as a matched pair.

Remember that you'll be using matched halves of wood that won't even be touching each other directly, so don't fuss too much about accuracy.

Step 5: Prepare the Bottom Cleat

Once the cleats are cut from the 2x4s, we need to nail the bottom cleat to the wall and place foam tape across the front and on the top where it meets the studs. Once prepared, we simply lay the top cleat across the foam and move to securing the drywall.

1. Nail the bottom cleats to the wall horizontally. Starting with one 8 foot 2x4 pair, choose one of the halves to be the bottom cleat. Orient it on the wall according to the pictures. (The top surface should slant upwards towards you.) If you've cut them unevenly, I suggest saving whichever one of the pair has the larger small-side to be the top cleat. (The reason is that you will be screwing the drywall to the top cleat's small-side blindly, so you may as well use the one with the larger surface.)

The only real variable here is location. The drywall will be supported against the wall at three locations: the floor, at the middle, and near the top. You interpret where that means for your garage. I chose the middle to be well above the cross members of the framing system, in order to reduce the risk of

accidentally shorting out the soundproofing. I chose the top to be about 2 inches below the ceiling, since that would assure that I have room to raise and detach the drywall if I need to adjust something.

Nail the cleat to the studs. I don't believe it's necessary to nail it in more than about 3 times - at the middle and both ends. I recommend using a level, but it's not a big deal if you don't. In any case be sure to line up the next 8-footer with the first.

2. Add foam across the front face. I cut my foam (with scissors) longwise down the middle to make it an appropriate width, and then cut it into 8" or so lengths and stapled them across the face. You don't need to attach them contiguously -- it's better to leave space between them so that the foam can expand sideways. *After stapling with as few staples as possible (just one in the middle works fine) hammer each staple all the way in with one blow to make sure it is well below the surface of the foam.* Avoid hammering away the bubbles as much as you can.

Upgrade Hint: If you have the patience to use glue for the foam, then you eliminate all stapling issues. I found gluing to be frustrating, but maybe you can find a good way to do it.

3. Apply foam to prevent the top cleat from contacting either the studs or the bottom cleat. Next cut some smaller strips, about 4 inches, and staple the strips vertically to the studs about 2 inches above the cleat. *See the photo.* Again, hammer the staples all the way in so that they don't short out the whole thing. You can avoid this issue by stapling well above the height of the top cleat.

4. Once you've got everything padded like the photo, simply lay the top cleat in there snugly and move the next step.

Step 6: Cut the Resilient Track

This step is pretty easy. Using a utility knife, slice a 1/2" (inner diameter) pipe insulation tube in half longways. Here is what I did:

1. One side is pre-sliced. Open it by ripping through with the butt of a utility knife, as in the photo.
2. Clamp the insulation tube lightly in the portable benches, just to keep it straight.
3. Score the other side with a utility knife and rip it open with the butt end.

Once cut, lay each half down as a track for the drywall.

Step 7: Secure the Drywall to the Top Cleat

1. Set the drywall panel in the track. This may be the most frustrating part, as the lightweight pipe insulation wants to move under it. Do the best you can before you clamp it. Make the bottom of the wall the same distance from the wall as at the middle cleat.

2. Clamp the drywall to the bottom cleat.*See photo*. The clamp makes everything so much easier. Since the panel is somewhat

flexible, use the opportunity make final adjustments to the track. I found a drywall pry very helpful at this point.

3. Sound Check: Now is a good time to check your acoustical construction. Press your ear up to the drywall and scratch on the top cleat. Compare the volume of that sound to the sound of scratching on the studs behind. There should be a huge difference - scratching on the stud should sound very far away in another room. If the difference is not so great, backtrack to the previous steps and search for signs of short-circuiting, through a staple, nail, or a point where the drywall is actually touching the bottom cleat. Remember that the wall should flex -- if it's not flexing, there may be a problem in that location. Once the sound check is satisfactory...

4. Double-check the top cleat: Make sure it's snug in the "trench" before you screw it in place. Check again that there are no signs of short-circuiting -- when you wiggle it around in there, it should never feel like you're hitting something.

5. Screw the drywall sheet into each top cleat. Again, for soundproofing reasons don't get carried away with screws. I used just three at each level. Since this is a blind maneuver, you'll find it helpful to pre-mark where you are going to drill, based on the level of the top cleat at the sides of the drywall panel.

6. Check again! Before you caulk it up, it's a good time to check to whole operation. Is the resonant frequency as you'd like it? Is it as sturdy as you require? Is anything too crooked for your tastes?

Step 8: Caulk the Seams

The last step is simple:

Load your caulking gun with some acoustical caulking, a.k.a. "non-hardening" or "50 year" caulk. Apply it liberally to the seams and over the screw holes.

We'll we're done with one step of a long project.

You should now have a pretty solid acoustical wall that both soundproofs very well and absorbs deep bass from within the room. Unlike a resilient-channel wall, which you should NOT screw into since there's nothing solid behind it to block the sound that will come through the screw hole, with my wall, you could even use the top cleats as a way to secure supports for shelving, tools, or acoustical devices. If you try this, I would advise drilling the hole, then filling it with caulk before adding the screw.

CHAPTER 7: ELECTRICITY AND LIGHTING

In this chapter, I'll explore electricity and lighting for your shop once it’s equipped it with the tools you need.

Obviously, electricity is essential in any woodworking shop. You will need electricity unless your shop is powered by a waterwheel, steam or you are only using hand tools only. Electricity provides essential light, so that we no longer need to schedule our work by the setting and rising of the sun.

How safely and conveniently your machine and tools plug in (or switch on) will largely depend on how you handle the conduit carrying the power into your shop. You probably understand the value of having proper electrical distribution if you have previously struggled with a workshop in which the only light and power source was from a single wire dangling from the ceiling.

Having your electrical wiring adequately planned and installed will not only efficiently power all your machines, regardless of your shop’s size. It will also be convenient, while saving time and money. For instance, you will not have to continually reset

tripped breakers or swap cords. You will also decrease chances of blowing fuses. Proper wiring means efficient lighting so that you can work in an adequately illuminated shop, promoting safe work.

Now in a perfect world, I think all shops would be wired with 230V 60H2.3 Phase service. This which is good enough to run anything - including one of those $3000 table saws. Capacity would be great if money was no object.

Unfortunately, money was an object when I set up my current shop. I have one "barely sufficient" 20 Amp, 110 V drop. No, I can't run everything I own at one time, but I have yet to blow a breaker. It's realistic and relatively inexpensive to put in a couple of.20 to 50 Amp circuits. The old shop (10' x 12') that I tore down in order to build my current one had one 20 Amp circuit to it. I did not enhance that, but if you are starting from scratch, go for ***at least two 20 Amp (minimum), 110-volt circuits if you can't afford to put In 230V***. Finances do play a role, as with most things in a woodworking shop.

Nothing beats good lighting, regardless of where your space is located. Frankly, it should be a priority issue in any shop. In my current shop, I *use two bulbs, 96" florescent fixtures, with Philips F96T12Cool White/High Output single pin bulb*s. The color output is excellent, and the coverage is great. There are probably cheaper bulbs, but a single bulb is so easy to change. These cost $8.99 each from http://bulbs.com

They come packed 15 per case. They have an average-rated life of 12,000 hours so you won't be changing them very often.

I have them installed in a Lithonia lighting two-lamp white ceiling commercial strip fixtures from Home Depot - $40.78 each.

I'm not a big fan of florescent lighting, but I don't think I could have found better lighting for less money. Cool white bulbs come as close to daylight as I have found.

DIY VS Hiring A Pro

Wiring a shop is not very complicated, especially if you have some prior experience doing some home wiring tasks. You can easily add new outlets and circuits around your shop all by yourself. However, if you have not done much wiring before, or in case your home does not have enough electrical capacity to handle the varying electrical needs of your power-tool working, then you might want to consider upgrading your workshop's wiring. This can be a little intimidating for you.

This section will not provide you with all the information you need to understand about properly wiring an entire workshop by yourself. You can find more information on this topic from any book with sufficient coverage on basic electric wiring.

It is extremely important to mention that if, for any reason, you have some reservations about doing the wiring yourself - **do not hesitate to seek the services of a certified electrician.** I know you understand how dangerous electricity can be if not handled

carefully. In case you don’t want to do the wiring yourself, remember to provide your electrician with your plan so they can wire your shop exactly the way you want it.

Powering machines away from walls

Wiring tools and machines placed in the middle of a shop often presents a substantial workshop problem. For instance, if your shop does not have a raised floor under which you will feed electrical wiring, then you have to come up with means of getting the power cords to the tools without them lying in the way and posing a possible electrical danger.

A power cord can be dropped from an overhead beam or the ceiling to a machine with special cord-relief hardware. However, drop cords usually have some almost magical tendency to snag pipe clamps and long boards carrying them around. If you decide to use a drop cord for the table saw, be sure to place it near the

far-right corner of the extension table. But if you often work with significantly large sheet items, any table saw drop cord is highly likely to cause a continuing nuisance.

Running the power cords across the shop's floor is not any better solution. The cables can present a tripping hazard. If this is your only option, though, then route the power cords across a spot that has the least traffic. This is done to see if they are covered with cord dust.

Another strategy is installing an overhead power outlet in some spot that you can easily reach. Then, wire up longer power cords to the tools. This is a convenient and safe way because it will allow you to disconnect power to a machine before you change bits or blades.

Adding Lighting Circuits

Note: It is very vital to run separate electrical circuits for lights and power tools. This helps to avoid many electrical hitches,

some of which can be dangerous (like causing a fire). For instance, when you have separate circuits and, a breaker trips, then you won't be left in the dark while working at night with power tools.

CHAPTER 8: HEATING AND VENTILATION

I'll discuss heating and ventilation for your shop within this chapter, as well as choosing the right heat source.

In all climates, except the mildest, a workshop should be actively heated. *This is especially true in the cold season.* The woodshop is insulated against the outside heat (and perhaps heated) particularly when the mercury begins to soar. You have to control both the temperature and the humidity in your shop. You realize too much moisture can cause rust and too little may crack or wrap precious lumber.

You also realize that you will need fresh air while doing your work in the shop. **So, having adequate ventilation is imperative.** This should not be an issue when you are hand-planning a frame member or working out a mortise. Still, if you fill up the room with some finish or adhesive fumes, then ventilation begins to be critical for comfort, and even safety. Note that adequate ventilation can provide all or most of the cooling the shop needs in hot weather.

In this chapter, I examine the ways of heating a woodshop effectively and economically as well as dealing with harmful humidity. I also look at several methods of providing ventilation for your shop. These methods are both for cooling and comfort, while additionally for exhausting dusty air and fumes produced during finishing operations.

Heating Your Shop

Consider putting on thermal socks, underwear, and insulated boots to keep yourself warm if you are working in a very cold shop. However, avoid loose or bulky clothes since they can be caught in spinning tools.

You don’t want what may happen next. But if your shop has excellent temperature control, you won’t need to dress up as though you are on some expedition to Antarctica. Working in a cold workshop may present some health risks, even if you are

healthy. When temperatures fall drastically, you might find it painful to pick up icy metal tools. Glues and wood may refuse to bond properly because they are too cold. Veneers and wood can crack and check when quickly warmed in very low temperatures. Also, finishes may not dry and cure properly when temperatures are below 55ºF. Freezing temperatures can ruin water-based finishes and glues.

Therefore, a properly heated room will effectively avoid these and more problems. In this section, you will find out about the kind of heating that will best serve your workshop and how much installation and operation can cost you.

Choosing a Heat Source

There are many heating systems on the shelves. You will want to consider a few factors before rushing to get and install one. Depending on the local climate, you might be well-served by a small portable unit that is often used on the coldest days or by a large central unit that runs steadily for months.

You should also consider the costs. For instance, the initial costs of a two electric-space heater are somewhat low; but, the operating cost of a quality gas wall heater (that often has a relatively high installation cost) is far much lower. You may also want to factor in the fuel cost in your area. You can talk to your heating contractor as regards to choosing and installing the best heating system for your shop, just in case you decide that your workshop needs more than just the portable heater.

Insulate your shop first

Whichever heating system you choose will need less BTUs in case you have a well-ventilated shop. **You can reduce your heating bills by up to 50 percent, while using an average ceiling and wall insulation with some weather stripping around operable windows and doors.** You may make a significant difference by fitting large windows and double-glazed skylights, both of which reduce heat loss. Another way to achieve heat loss is using insulated blinds and other insulating materials.

Heat your shop safely

Heaters are very potent machines for indoor heating, but it is crucial to remember that they can also ***set a combustible on fire - especially since you will be using them in a workshop filled with kindling-quality lumber.*** You will see a potentially costly fire breakout by placing your portable electric stove too close to a pile of shavings or other combustibles.

Remember that using flammable finishing materials precludes using open flame-type heaters like propane or kerosene portables. Avoid electric heaters that have exposed filaments as they can easily ignite flammables. Radiant-style electric heaters and sealed-beam heaters are among the safest portables for your finishing area.

WOOD-BURNING STOVES

Wood heat is economical, pleasant, and can be efficient when it is generated by a properly designed and sealed stove. You only need a load of scraps to get rid of the morning chills and get your small shop (which you have properly insulated) into a suitable working temperature. Large shavings generated from planning and woodturning can be great for your stove, but finer sawdust tends to smolder rather than burn So, get rid of it by other means.

Modern stoves, especially those meeting the EPA's (Environmental Protection Agency) Phase 2 emission standards,

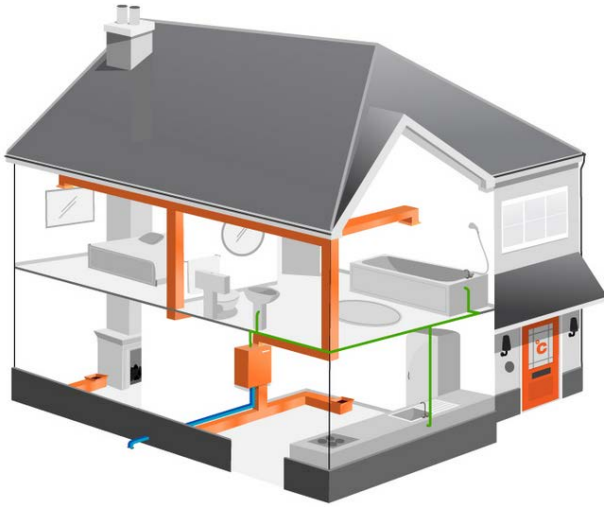
are often relatively expensive. They burn more efficiently and much cleaner than traditional stoves. You should consider getting a multi-fuel stove if you can easily access coal in your area, since it can use either coal or wood.

Safe placement of stoves is essential, especially since you will be using one in a room with combustibles like stored lumber. While the center of the shop is an excellent place to install a stove, this is often compromised by such practical issues as the workspace and machine placement. You can place your stove close to a wall where you can run the stovepipe out of the wall horizontally. However, ensure that the vertical stick on the outside still clears the roof line, say by three feet.

GAS HEATERS

Gas heaters can be very costly, but they're very economical to operate. The units that work on natural gas are the most affordable. You will need to pipe the natural gas into your shop. You have to install a heater running off some propane tank if you can't find a natural gas supply in your area. This comes with more installation costs.

YOUR HOME'S CENTRAL HEAT



You might want to consider using your central-heating system to heat the shop if your shop is inside your home - such as in the adjoining garage or the basement. You will even be luckier if the heating ductwork runs through the shop; then, you can easily cut into one duct and add new heat registers to warm your shop.

However, make sure that the home furnace system can handle an added heating burden. Bear in mind that the thermostat in the house will still control the amount of heat the shop will receive. So, you are going to have limited control. Again, keep in mind

that forced-air heat can at times significantly reduce the humidity in your shop.

One of the major issues that occur in in-house shops is that if your central-heating system draws air from the workshop. Fine dust can easily clog the heater's filters and pose a fire hazard risk. You can prevent this by seeking guidance from an HVAC expert as regards installation of filtration.

UNIT HEATERS

Gas-fired unit heaters are among the most popular ways of heating workshops. A unit heater basically consists of a metal box having gas burners. It is also a fan which circulates air and

distributes the heat around the shop. A unit heater is normally suspended from the ceiling. It works best in an open space, with a ceiling that is at least ten feet high. While it can be a very expensive investment, installing even the smallest unit heater in your shop will offer you enough BTUs to heat up your drafty space much more quickly than many other heating systems.

Gas-unit heaters, similar to central or wall heaters, require safe and proper installation which includes adequate venting. Also, it should be placed at a location that is away from combustibles. In case you decide on installing a gas-unit heater or any other type of gas heater, it is necessary to consult with a heating contractor for professional assistance. Also, ensure that you have all required permits before installing a heater.

An electric alternative:

Electric-powered unit heaters provide more substantial heating sources than portables. An electric heater has a powerful built-in fan that circulates air and distributes the heat around the shop. Their hanging design is such that the heater is moved farther from sources of combustion. You will have to clean an electric heater often, particularly if you are producing too much dust in the shop. Since the cost of operation of this heater is often very high, it is not advisable to use it for a shop that isn't properly insulated. Otherwise, your electric bills will skyrocket.

PORTABLE HEATERS

Portable heaters are very affordable and flexible to use, making them the most attractive heating solution for many woodworkers. Their flexibility makes them an excellent choice for patios, workshops, and even homes. They come in a variety of styles and designs. The heat they produce varies considerably, ranging from several hundred to several thousand BTUs. Their types of fuel also vary. Consider such things as safety, the practicability of operation, and cost whenever buying a portable heater.

Ventilating Your Shop

The main reason to ventilate your shop is simple: to remove stale, musty air and replace it with cool, fresh air. You need refreshing air in your shop just like you would need it in your office or home.

It’s necessary in order to breathe easy and feel good. *Good air circulation will whisk away adhesives and fumes from your finishes. T*he air is filled with fine dust, as well as smoke, that is generated during various operations like shaping. **It needs to be removed and replaced with fresh air.**

USING FANS

Fans are compact and affordable. They are not only a means of cooling your shop, but they also help in keeping it from becoming

stuffy. They are very useful in removing fine dust that is generated when sanding or other machining operations.

You may use a standard circulation fan that is mounted in your shop's window, or better still, get a special ventilation fan that is specially designed to be installed on a wall. Remember that if you are cooling, dehumidifying, or heating your workshop, ventilation will blow the conditioned air outside. Consider getting an air-filtration device if you want to use ventilation to get rid of airborne dust.

Ventilating Your Finishing Area

Proper ventilation is critical in your finishing area, whether you are doing your finishes on some clean bench-top or in a separate finishing room. Regardless of the type of finish, you are applying; you should not allow fumes to accumulate in the workshop. ***Fumes from such solvent-based finishes like varnishes, polyurethanes, and lacquers are unhealthy to your breathing system.*** If they get concentrated in some confined place, then

they can be explosive if ignited.

While many water-based finishes are not explosive, they usually have unpleasant ammonia fumes. You should remove these from your finishing room. The fumes can have more insidious effects than offending your nose if your workshop is in a basement or a garage with a furnace. Again, spraying water-based finishes can form strong alkali fumes which corrode and pit aluminum parts like your furnace's heat exchangers and gas burners.

Creating Good Air Circulation

The most effective method of dealing with finish fumes is by creating air circulation which brings in fresh air, blowing the fumes outdoors. One of the ways to ensure this is placing the piece you are finishing between you and your fan. Make sure you have an open window or door behind you that lets in fresh air. Often brushing, dipping, or wiping finishes generates just a small number of fumes which you can easily keep at bay using a small box fan.

Another more efficient ventilation technique for blowing out fine dust from various woodworking operations is by using two fans. One fan will be blowing cool, fresh air towards you while it blows the sanding dust towards the other fan (which you will set at the doorway or window) which exhausts it to the outdoors.

Controlling Shop Moisture and Humidity

If you allow your shop to cool beyond the dew point, it will allow condensation on outer glazing of skylights and windows. This occurs even on such metal surfaces as motors and machine tables. Therefore, keeping your woodshop at stable temperatures by heating and insulation is a major step towards minimizing excess moisture.

If you realize that excess humidity is becoming a nuisance even in

cold weather, then you might consider getting a portable dehumidifier to solve the problem. While they are relatively expensive, dehumidifiers can do a great job.

A dehumidifier is often sized depending on the number of pints of water it can it can get rid of from the air within 24 hours. Dehumidifying air in your shop will also reduce problems with fungal growth and mildew, which are particularly a nuisance in tropical climates.

CHAPTER 9: DUST MANAGEMENT

Whether it's a broom and dustpan or a state-of-the-art central collection system, every woodworker I know has some kind of strategy for dealing with wood waste in the shop. Of course, some of these methods produce better results than others in terms of fire safety, cleanliness and respiratory health. We all know that keeping a shop's floors, benches and machines clean of sawdust creates a safer environment that's more pleasant to work in. And even the least health-conscious among us knows that reducing the amount of fine wood powder that floats around the shop and gets into your nose and lungs is imperative for longterm personal health.

But regardless of the kind of dust control or collection equipment you have in your shop, sawdust can still become a problem unless you learn to use your equipment effectively.

Keeping dust out of a fresh finish can be a major accomplishment in a typical small, single-room woodshop. Unfortunately, sucking air through the shop to remove finish fumes tends to stir up wood dust. This potentially pulls in pollen, insects, and dust from the outdoors.

An easy way to deal with this is to use inexpensive furnace filters over the doorway or window. This enables fresh air to come into the shop. These filters can be taped in place temporarily or you can make a frame to hold them, while sliding them in when needed.

Furnace filters will keep wood dust from the shop from being sucked into your finishing space if you're lucky enough to have a dedicated finishing room. One way to allow fresh air into a finishing room that's adjacent to a shop is this: fill it with dust-spewing machines to add vents to the finishing room's door. Regular-spun fiberglass furnace filters (or more expensive corrugated filters that are better at catching fine dust particles) fitted into the vent openings will keep fine dust out while allowing fresh air inside. Its best to locate the vents on the surface that's opposite the wall. This contains the finishing room's exhaust fan. You can keep flying chips and dust off the filters by fitting simple doors over the vents if the vents are near woodworking machines.

Now let's discuss using one of methods to separate large items, such as wood chips from plain old sawdust. **It's even more important if you decide to use a vacuum system as I have done instead of just a plain old simple shop vac.**

The system I use consists of two items: a dust separator mounted on top of a 30-gallon metal flash can, and the dust collector itself. For the dust collection system itself, I chose a **SHOP FOX 171685. It has a 1.5 horsepower motor and a 72-inch steel impeller**. *It moves 1280 cubic feet of air per minute.* Quiet it isn't? It is efficient too.

SHOP FOX 171685 -$300 (Amazon)

You can find the SHOP FOX on Amazon and frequently on eBay. Expect to spend around $300 for the Shop Fox. While that may seem high, it's worth every penny if you are a serious wood worker -or plan to become one. Shop around and you can

probably find it for less. Look for a dust separator for woodworking on Amazon or eBay while you are at it.

Another product that I have, and that I used before I bought my Shop Fox, is called the Dust Deputy. It comes from www.oneida-air.com.

If you don't plan to do a lot of woodworking, then combine this with a standard shop vacuum and it will serve you well. It did that for me for many years. I recommend at least a 16-gallon vacuum. It is available at both Home Depot and Lowe's, anywhere from $49 to $180. Most of these have a replaceable filter.

CHAPTER 10: FIRE SAFETY

There are a number of hazards in the wood shop that are unique .In many ways, they are more dangerous than other sources of fire in the home such as kitchens and garages (the two top problem areas in most homes).

In no particular order, these are:

1. Combustible Dust

Wood boards / chunks / pieces just burn and are easily controlled with extinguishers. In a worst-case scenario, it is easy to get away from (run). In contrast, combustible dust in an unconfined area flashes and ignites nearby flammable surfaces, potentially setting fire to large portions (or all) of your shop. Combustible dust in confined areas (such as small rooms, dust collectors, paint booths, and tool enclosures) explodes.

Combustible dust explosions kill people. They are a top safety concern of OSHA with recent high-profile incidents, such as the sugar plant explosion in Georgia. It doesn't take much dust to do

it either- as little as one-pound floating around your shop in the air can provide the perfect fuel-to-air ratio for an explosion. The fact that many shops are in basements, utility rooms, and garages where there are ignition sources such as water heaters and furnaces nearby, as well as unshielded tools and frayed cords arcing, is the perfect recipe for disaster.

Sources of combustible dust in the wood shop include sawdust, dust collectors, metal dust (if you're into metal working), and lint / paper products.

The best defense against combustible dust is good housekeeping. Clean up after yourself and don't let dust accumulate. Try to do your woodworking away from possible sources of ignition and open flames, such as pilot lights.

Many will argue for dust collection in the shop. A well-implemented dust collection system can minimize the risk. However, dust collectors pose special hazards of their own. Dust

collector explosions can occur when a burning bit of sawdust gets introduced to a huge bag of floating dust inside the collector.

Most dust collector fires in industrial settings get out of hand when the dust collector ignites and explodes. Then, because of bad housekeeping, all the dust moves outside the collector, shaken up and sent airborne by the dust collector popping. It gets ignited by the dust collector explosion.

2. Paint / Stain spray in the air and buildup on surfaces

If you want to make something really damn hard to put out when it catches on fire, put about 10 coats of old paint or poly on it. Spray painting creates the same hazards as combustible dust when in the air.

Use a paint booth or spray outside. Clean up your mess.

3. Metalworking

Metalworking creates metal shavings and dust. Metal shavings and dust burn when they get hot, and metal working is known to create heat.

If you have a metal fire, you can't put it out with a common Class ABC dry chemical fire extinguisher. They burn ridiculously hot, so you might not even be able to approach them to drag whatever is burning out of your shop. Spraying water on metal fires usually causes an explosion. They burn so hot that they catalyze the water in to Hydrogen and Oxygen (a flammable gas and an oxidizer to accelerate combustion), causing a violent ignition.

If you work on metal with any regularity and don't have a Class D fire extinguisher handy, then you're asking for your house to be burnt down. Most municipal fire departments, and especially rural volunteer departments, are ill-equipped to handle a metal fire. At the very least, you need to have a bucket of sand nearby, so you can cover up and slow the combustion process. Try to

prevent radiant heat ignition of the rest of your shop until the fire department arrives.

4. Oily rags

Oily rags which contain oil, finishes or paint go through a process of biological and chemical decomposition that creates heat. This decomposition occurs everywhere, even in rags sitting exposed on your workbench. This is a tiny amount of heat- it normally just dissipates in the air and is not even noticed. The problem comes when they are stored in a closed container with other oily rags- the heat can't escape. It speeds up decomposition when the heat can't escape, which in turn creates more heat. This, in turn, speeds up decomposition until the rags reach the auto-ignition temperature of the rags or chemicals they contain, causing them to spontaneously ignite.

The scary thing about this that is you don't have to be in your shop for it to happen. You can do your finishing, go to bed or work. Then, eight hours later while you're sound asleep, the rags

can reach ignition temperature. This can light your house on fire. It might take days for rags to reach ignition temperature, and having your house burn down while you're at work really sucks from what I've heard.

At the minimum, you should store oily rags separate from other waste and remove them from your house when you're done. A metal can with a tight-fitting lid is better; it can contain a fire and starve any that might start of oxygen. Best still is an OSHA-approved container that is rated for storing oily rags. They really aren't that expensive when you think about what is at risk (your home and your family).

5. Location

Where a fire starts in your home has a lot to do with if the fire department is going to be able to save your house and everything you own.

The two absolute worst places for a fire to start? The basement and the garage.

Where are many home workshops located? The basement and the garage.

You have about a 50/50 chance of losing your home when a fire starts in the basement, and even more so if your basement is below grade. Basement fires are hard to approach. Heat rises so a firefighter going down a staircase to the basement is going to get cooked; she or he may not be able to make it. Basement fires compromise the floor structure of the first level of your home, making firefighter entry in to your house a dangerous proposition. Some fire departments won't even enter a home when there is a basement fire burning. They don't want to see their men step on a soft spot in the floor and fall through in to an inferno.

Garage fires are dangerous for obvious reasons- people store flammable stuff in garages: paint, gas, chemicals, cars full of gas,

etc. If garage fires are not quickly controlled, then they can quickly burn out of control. Most garages are attached to houses in the US. The rest of the house is just one minimum code requirement wall away.

What can you do to minimize risk?

Those are the major threats. Here is what you can do to minimize the risk:

1. Have a fire extinguisher appropriate to the materials in your shop.

You should have, as a minimum, a 5 lb. Class ABC dry chemical fire extinguisher in your shop. You should have one in the garage and kitchen too.

If you are working with metals, you should have some Class D extinguishing agents nearby.

If anyone is wondering what the fire classes are, they are:

- Class A: Ordinary Combustibles (wood, paper, etc.)
- Class B: Liquid Fuel Fires (paint, stain, gas, etc.)
- Class C: Energized Electrical Fires (power tools, wiring shorts, etc.)
- Class D: Metals Fires

2. Clean up after yourself.

Ninety percent of workshop-related fire threats can be negated by cleaning up after yourself. A dirty shop is not just messy, it's unsafe. Your momma was right when she told you to clean your room.

Regularly clean up dust after working with wood products. Clean up spray booths and ventilate after spraying finishes. Take out your trash, and store oily rags properly.

3. Look around and realize what your hazards are in your shop.

We call this a pre-plan in the fire department, and most business locations have one on file with the department. So, they know what they're walking into when they approach a fire. As a home workshop user, you can do your own to recognize the hazards and minimize the risk.

Do you have a pilot light nearby that could light dust the next time you're sanding? Do you have frayed cords or overloaded outlets that can arc and start a fire? Do you have exposed electrical wiring? Do you have a pile of oily rags in the corner by your wood pile?

What can you do to minimize the risk to your home and family? Everyone who's house burnt down never thought it could happen to them. Still, one day everything they owned -their pictures, their memories, their pets, and sometimes even their family members - were gone. Nearly every house fire I've been to could have been prevented. You owe it to yourself and your family to take a minute and minimize the risk of fire.

4. Install a fire alarm

Really, this is a no-brainer. You should have a fire alarm in your shop, in your kitchen, and in your garage if is different from your shop. Additionally, have a smoke alarm outside every bedroom on every story of your home. Central monitoring is great if you can afford it, but at the very least, get one that will go off and wake you and your family up if there is a fire.

CHAPTER 11: PERSONAL SAFETY

The work shop is not the place to careless. It is the place to learn and adopt good safety working habits. This, in turn, will make woodworking more fun and enjoyable.

1. Always Wear Safety Equipment

This might seem like common sense, but it's important to remember. Wearing ear protection is a noted advantage during usage of loud power tools like routers and surface planers. Similarly, wear latex gloves while applying finishes. NEVER BE WITHOUT YOUR SAFETY GLASSES. These should be the first thing you reach for when entering the shop.

Also, know where both of your hands are at all times in relation to such things as a saw blade. This safety rule applies with any type of equipment which you are using.

2. Wear the Right Clothes

Wearing baggy or loose clothes increases the chance that a part of them might get caught in a cutting head or saw blade. As a result, try to wear clothes that matches the woodworking

environment, while also protecting you. This ensures that any dangling jewelry or metal, such as chains or bracelets, are removed before commencing work. Dust and lungs don't go well together. Wear a mask to keep them apart.

3. Avoid Using Anything That Can Impair Your Reaction Time and Judgment

It’s like when you’re driving a car: you want to stay out of the alcohol and drug cabinets to avoid accidents. In the wood shop, the dangers are even higher by inadvertently using the wrong tool because you’re too out of it to see what you are doing wrong. NEVER mix alcohol with work, even if it’s just a beer…or ten.

4. Disconnect Power

Always remember to disconnect the power source before changing blades or bits on your power tools. Additionally, make sure there is no electricity being powered to the tool. The switch can malfunction and/or accidentally get turned on.

5. Use A Single Extension Cord

Using one heavy duty extension cord for all your power tools will ensure that you switch off the power for each tool. Too many cords can get confusing and be a tripping hazard.

6. Never Use Blunt Blades & Bits

This might seem obvious since a dull cutting tool can still be dangerous. Dull tools must work harder to cut. As a result, they can bind or kick back. Sharp bits and blades will ensure cleaner cuts as well.

7. Check Stock for Existing Metal

Before sawing through or making a cut, ensure that the piece of stock doesn't have existing nails, screws or other pieces of metal lodged into it already. Spinning blades and nails (and other pieces of metal) don't mix well together causing damage to both the stock and the cutting head. It can also cause stock to kick back and cause injury, so always ensure (or use a metal detector to ensure for you) that the stock is clean.

8. Work Against the Cutter

Most power tools are built in a way that requires the direction by

which a piece of wood moves through the tool. This is the opposite direction of the cutting head's movement. So, you need to ensure that the blade or router bit cuts against the motion of the wood instead of with it.

9. Never Reach Over A Running Blade

Always wait until a spinning blade has stopped moving before reaching in order to remove waste or cut-offs. To be on the extremely safe side, remove waste by using a push stick or scrap wood. This ensures an inadvertent power tool switch malfunction, and therefore it doesn't turn deadly.

10. Minimize Distractions

When dealing with distractions, you want to ensure that you finish what you were doing (finishing a cut, especially when working with a power tool) before turning your attention elsewhere.

CONCLUSION

I hope all the information by which I have provided motivates many to set up a woodworking shop. Mine has given me hours of enjoyment; I'm sure that yours will too!

BONUS

Let's call this section a BONUS.

I have put together a list of the resources that I personally use. I think will help you become a better woodworker, and you should find this material helpful.

EQUIPMENT AND SUPPLIES SOURCES

Woodworker's Source

www.woodworkerssource.com

It is known as "Your Friendly Lumber Supplier" and they have been around since 1978. The great thing is they offer shipping so you do not have to drive down to their store.

It has plenty of lumber (100 hardwoods from around the world), tools, plywood, wood veneer, turning wood, tools, machinery and all types of accessories to make your next woodworking project a successful one.

You also can have wood custom cut to size, and get expert help and information on woodworking projects.

Rockler

www.rockler.com

I probably buy the bulk of my supplies from Rockler for several reasons. First, they have some really good sales. They frequently offer free shipping. I really appreciate that since most of my orders are fairly heavy.

Second, they have been in business since 1954,offering outstanding and top-notch customer service. I just got my copy of Master Catalog. This 195-page catalog has just about everything you could want or need for your shop. I'm sure they would be happy to mail you one. Simply call 1-800-279-4441 and ask for it. I receive a monthly catalog from them in addition to this issue, which is sent out annually.

WoodCraft

www.woodcraft.com

Fortunately for me, they have a store where I reside; and, I do shop there frequently. In fact, they have 70 locally-owned stores nationwide. They, too, have a great catalog. You can get your copy of it by calling 1-800-225-1153.Or,simply visit their website and request it. They hold a lot of classes.

They carry much the same things as Rockler, although these days I tend to do more shopping online than in person. I get a sale flyer from there every few weeks. I've found some really good bargains in those. They are knowledgeable and helpful people with whom to get acquainted if you have a store locally. Most of the employees I have met at fellow woodworkers.

Highland Woodworking

www.highlandwoodworking.com

This Atlanta, GA-based company has been in business since 1978.They have a 72-page catalog, but it is not as glitzy as Rockler and Woodcraft. I have found them a great source for higher end hand tools. This is a store you should visit if you happen to live in Atlanta. They are located at 1045 N. Highland Ave. NE. Their toll-free number is 1-800-241-6748.

They also offer a lot of great sounding classes for what I consider to be reasonable fees.

Eagle America

www.eagleamerica.com

This is the best source I have found for routers, router bits and router supplies. They pride themselves as "The World's Router Bit Source." I could not agree more. They have an 87-page catalog that you can get by calling them. This is a must-have if you are into routing.

Traditional Woodworker

http://www.traditionalwoodworker.com

You have come to the right place if you are looking for woodworking tools that are of good quality and reasonably priced. This family-owned and operated company stands behind their tools. They have a lot of carving tools, chisels, hand planes and spoke shaves together with some really top-notch items such as adzes, axes, and hatchets. It is located in Richardson TX. 1-800-509-0081

MLCS Woodworking

www.mlcswoodworking.com

This company only sells router-related items. They have a great catalog which you can request by calling 1-800-533-9298.They may also have more router bits than Eagle America, but all they sell is router related items. They are based in PA.

McFeely's

www.mcfeelys.com

McFeely's specializes in screws, while Eagle America and MLCS specialize in routers. I never knew there were so many choices. I'll bet they carry it if it's a threaded fastener. They also carry a fair amount of power tools: DeWalt, Bosch, Porter-Cable, Dremel, etc., and a fatly broad selection of other useful items. I've purchased a lot of fasteners from them. Forty-two pages worth in the last catalog. 1-800-443-7937.

Garrett Wade

www.GarrettWade.com

GW has been in business since 1975; they are located Cincinnati, OH. You can get their catalog by requesting it online or by calling 1-800-221.-2942.They offer woodworking tools, shop tools, home and office tools, and outdoor tools. This is one of the most

diverse selections of any company with which I deal; they are highly recommended.

Harbor Freight Tools

www.harborfreight.com

I have not seen a catalog from them, but they do put out lots of flyers. I seldom get a Sunday paper without one. Great shipping policies and a broad selection.

We have several stores where I live; fortunately, they are all "across town."My saving grace, I kid you not; I cannot go into one of their stores and walk out empty-handed, Seriously.

Northern Tool

www.northerntool.com

They tend to specialize in somewhat heavier items than I normally buy, therefore carrying a lot of things that a person would use in an automotive shop. Still, they do carry some woodworking items. They have a huge catalog and 90 locations around the country. You can request a catalog on their website, or by calling 1-800-221-0516.