

One Week to Woodturning

by Rex Krueger

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What this Book is For

Here's how it goes: someone wants to start turning. They buy a lathe. They need tools, so they go online and buy a "starter set." But those tools need to be sharpened, so a fancy grinder is ordered. The grinder is hard to use freehand so they buy some sharpening jigs. Someone on a woodworking forum says that you absolutely *have to* buy a chuck. So they buy a chuck.

And on.

And on.

Woodturning is complicated. Not the actual art itself; that's pretty simple. It's all the *stuff*; the lathes, tools, sharpening gizmos, and work-holding gadgets. That's what makes it complicated, especially for new turners who are trying to get set up. And the woodworking industry preys on these people by encouraging them to buy things they don't need.

When I got started, I didn't buy all the gear. I was a broke English teacher with a new house and a new family and very little money for my woodworking. So I bought a cheap lathe and I didn't even set it up for months because I didn't have the money for turning tools. Then my wife got a raise and she bought me a grinder. I built

myself a sharpening jig. Finally, six months after I bought my lathe, I actually turned my first piece of wood. Getting set up was an agonizing process because it took so long and it was hard to figure out what I actually needed.

I'd like to save you the trouble. I wrote this book as a concise guide to the *equipment* of woodturning. That's it. I don't tell you what to turn or how to do it. There are already plenty of books on turning techniques. But as far as I can tell, there isn't a single book on the market that explains all the stuff you *need* for turning, the other stuff that makes your turning easier, and the really expensive, fancy stuff that you might not need at all.

If you have the money to buy all your gear at once, that's great. This book lays out the options so you can get the tools and get to work. If you're broke like I was, that's fine, too. Throughout the book, I focus on budget-friendly options and bare-bones tools that will get the job done at minimum expense.

I've set the book up as a series of seven steps, one for each day of the week. Of course, it doesn't need to take you all week. If you have the attention span and a credit card, you could probably sit down and order everything in one shot. If you're a little more cautious or cash-strapped, you might go more slowly. It makes no difference. The book's seven-day structure is just a convenient way to organize things. Woodturning can be

daunting, so I've tried to break it up into manageable steps. Just buying a lathe might get your head spinning; there are so many options. But once it's done, you only need a few more essential items before you begin turning. All the fancy stuff can come later.

The important thing is to get started.

A Note About Safety

Woodworking is dangerous. Since I started doing it, I've also taken up welding and blacksmithing and both these crafts are (surprisingly) much *safer* than making furniture. Woodworking constantly exposes you to spinning blades and high-velocity cutters. Table saws by themselves cause an astounding number of injuries each year.

In comparison, turning is pretty safe. Since the tools are always stationary in your hand and pointing away from you, there is little chance of being cut. Most turnings are cylinders that can't hit you. The shavings and dust pose a threat to your eyes and lungs, but these risks are easily minimized with a face-shield and respirator.

Still, you *can* get hurt. If you mount a rough or square piece on the lathe, you'll be dealing with sharp corners or other protrusions that may be spinning at hundreds or thousands of RPMs. If one of these catches a part of your body, you may be seriously injured. You can also be harmed by things flying *off* the lathe. It's a common mistake to leave the key in your chuck and then turn the lathe on. Even a small chuck key then becomes a

dangerous projectile. A good practice is to always stand clear of the work while you start the lathe. Items can also come off the lathe *during* turning. You may take a heavy cut and knock a chunk of wood off the work-piece. When dealing with a chuck, it's always possible that the whole piece might come off and strike you. I've been hit in the head by a bowl that came out of my chuck. The work was nearly done and very light, but it still hurt.

Pay careful attention to speeds and vibration as you turn. Rough blanks must always be turned at the lowest possible speed, both to reduce load on the lathe and for safety. If your lathe is vibrating or shaking as you turn, reduce speed immediately. A shaking lathe is never safe.

You must also be conscious of the lathe pulling you in while it's spinning. Long hair, loose clothes, or jewelry can get wrapped around a turning and pull you into the work where you might be injured. Tie your hair back, tuck in your clothes, and remove any jewelry. If you need to wear gloves, make sure they are snug. Some turners even cut the fingers off their gloves for added safety. You must also never use a cloth rag on your work for the same reason. I do all my finishing with paper towels, which will tear before they can pull on me.

Take precautions any time you have visitors in the shop. I generally don't turn with other people in my shop. But if I do have anyone else around, or if I'm teaching, I insist that my visitors wear the same eye and breathing

protection that I wear.

Overall, turning is not very hazardous. I've never gotten anything worse than a scratch or bruise from turning, while my table saw has sent me to the emergency room. There's no need to be scared of your lathe, but you must take responsibly for your own safety. Be cautious and don't do anything you're uncomfortable with.

Day 1: Buy a Lathe

A lathe holds a piece of wood and spins it. It's a simple machine with only a few parts to learn (Fig 1.1). At the left side of the machine is the **headstock**, which provides the power to turn the wood. The headstock houses the **spindle**: a steel cylinder that spins in a pair of bearings. It's the spindle that actually turns your work. Opposite the headstock is the tailstock, which holds the far end of the wood. In between the two is the tool rest. which sits on a bracket (called the "banjo"). This tool rest can be moved into any position and adjusted up and down for different tools. All of these parts sit on two parallel bars called the "ways." On most lathes the ways are made of cast iron, although some older lathes use a pair of metal tubes. The tailstock and tool rest slide back and forth on the ways to grip different size pieces of wood. The headstock is generally designed to stay in one place, although many of them rotate to make some kinds of turning easier. The ways are bolted down to a workbench or a stand to get the lathe at the correct height for the user.

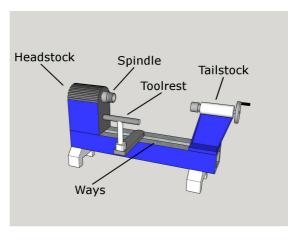


Figure 1.1: Parts of the standard wood lathe.

Some expensive lathes add accessories like digital speed controls, but these are just extras, still attached to the same basic machine. Because lathes are simple, they are easy to maintain and repair, even by people without much mechanical experience. If your lathe needs a new belt, you can install it.

Even though lathes are mechanically simple, they come in many sizes. Some lathes are made to turn custom pens, while others are designed to make huge salad bowls. Because there are so many different types of lathes, buying one takes some research and thought. Turners usually buy a lathe to get started and then upgrade later when they have a better idea of what they like to turn. Even though your first lathe won't be the only lathe you ever own, it's good to get something that you *think* will be big enough and sturdy enough to make the projects that interest you. Whatever you want to do, you can find a lathe to do it, but you have to understand lathe terminology to buy the right machine.

Lathes basically come down to four things: capacity, power, construction, and speed control. If you keep these four factors in mind and buy something appropriate to the work you want to do, you'll probably be happy with your first lathe for several years.

Specifications

Lathe specifications tell you what the machine can do. Just a handful of numbers describes the length and diameter of wood that a lathe can handle, the power of the motor and speeds available. These specifications tell you pretty much everything you need to know to buy the right lathe.

Swing

A lathe's swing is the maximum diameter you can

turn. Swing is generally measured as the distance from the spindle down to the ways. This number is doubled to give you the total diameter the lathe can handle. So, a lathe that measures 5 inches from spindle to ways has a 10 inch swing.

This number can be a little bit deceptive. A lathe with a big swing might not have a powerful enough motor to actually turn at its maximum capacity. My lathe has a 12 inch swing, but the motor is a bit under-powered and I find that about 10 inches is my maximum practical diameter.

Also, you will do most of your turning with the banjo (which holds the tool rest) positioned *under* your workpiece. This means that the height of the banjo will cut into your available swing. Honest tool manufacturers will list the swing as two numbers: swing over ways, and swing over banjo. In many situations, the swing over banjo is the number that really matters.

The last thing you need to know is that some lathes come with a "gap bed." This gap is a cutaway in the ways near the headstock. It has the effect of increasing the swing for turning short items like bowls and platters. Since you never use the tailstock or the tool rest up close to the headstock anyway, it makes sense for manufacturers to make a gap in the ways and give you more swing. Gap bed lathes will be listed with the swing over the ways and over the gap.

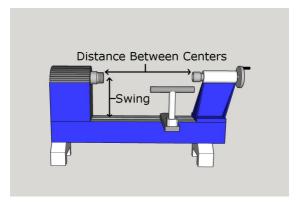


Figure 1.2: Swing and distance between centers.

Distance Between Centers

This is the maximum *length* of wood your lathe can hold. The **distance between centers** is just the distance between headstock and the tailstock, but it's measured by placing a **spur center** in the headstock and a **live center** in the tailstock and measuring the distance be-

tween them. Since you can only turn spindles between a pair of centers, it makes sense to measure this distance with centers actually installed. If a lathe is listed as having 36 inches between centers, then the longest piece of wood your lathe can hold will be 36 inches.



Figure 1.3: The spur center is placed in the headstock and drives the work for turning between centers.



Figure 1.4: The live center is placed in the tailstock and allows the piece to rotate freely.

Swing and distance between centers describe the overall **capacity** of a lathe. A manufacturer will often refer to a lathe by these specifications, so they will call one model a "10x14" lathe, meaning it has 10 inches of swing and 14 inches between centers. These numbers are often included in the model name of a lathe. If a tool company calls their lathe the "Rocket 1232", you can bet that it's got a 12 inch swing and 32 inches between centers.

Horsepower

All electric motors have a rating for **horsepower** (hp). This is a measurement of torque, or rotational force. It has nothing to do with the speed of the lathe, but horsepower gives you a rough idea of how much mass your lathe can move.

Most lathes that fit in a home workshop run on 110v power and have a motor somewhere between ½ hp and 1 hp. Having a full horsepower (or more) is helpful because it allows you to turn large pieces, work with hard woods and take heavy cuts without stalling the motor. One-half horsepower is enough for spindle turning, but too weak to do much else. Some older lathes that were only intended for light-duty **spindles** have even smaller motors, rated around 1/3 hp. Depending on the machine, a motor this small might still be adequate for spindles, but it won't handle bowls or anything large.



Figure 1.5: Long, thin turnings like the legs and back of this chair are called spindles.

Unfortunately, many manufacturers exaggerate the power rating of their motors. This is particularly true on cheap import models. My own lathe has a motor rated for ¾ hp, but it's probably a bit less. Even having a rough idea of the horsepower of your lathe is helpful. More important than the exact number is what the lathe

will actually handle. If you are considering a certain model and you're concerned about the power rating, it's best to read reviews and find out what the lathe will turn. Users are happy to share their experience and can tell you what a lathe can and can't do. Additionally, turners with a bit of mechanical experience can often upgrade a motor to a more powerful one, with a bit of tinkering. Almost every appliance in our lives has an electric motor in it and used ones are cheap.

Speeds

The AC motors in most power tools can only turn at one speed and most variable-speed tools use pulleys and belts to get different speeds. Lathes work the same way and turners often move belts from one pulley to another to change speeds. More expensive lathes come with DC motors and electronic speed control, but these machines are often too expensive for a beginner.

To pick the right lathe, you need to know what speeds it is capable of. You may think that higher speeds are better on a lathe, but the *lowest* speed matters much more. A lathe that has a good low speed (400 RPM or less) will handle out-of-balance blanks more easily and will deliver a lot of torque for heavy roughing cuts. Since AC motors turn at such high speeds to begin with, finding a lathe with a high top speed is easy. Getting a

lathe with a slow and powerful low speed, however, is much more valuable. My own lathe has a low speed of 600 RPM and that's a little bit fast, especially for big bowl blanks, but it's never kept me from turning some sizeable bowls.

You also need to know *how many* speeds your lathe can deliver. Some budget models only have a few speeds, while more expensive lathes might have 6 to 12 different speeds. Ideally, you want as many different speeds as possible and they should only be a few hundred RPM apart. Having several speeds allows you to choose a slow-speed for roughing, several medium speeds for cutting and shaping, and a high speed for scraping and friction-finishing. Many modern lathes deliver top speeds of over 3000 RPM, but I rarely turn at more than 2400 RPM and I wouldn't worry about finding a lathe with an ultra-fast top speed.

The last thing you need to know is how to change speeds. Less expensive and older lathes change speeds with **step-pulleys**. The user physically moves the belt to different steps to get different speeds. This is the least convenient way to change speeds, but there's nothing wrong with it. On a well-designed lathe, even manual speed changes take less than a minute. More expensive lathes have electronic speed controls and digital readouts that allow you to dial in an exact RPM. Some of these lathes have both electric speed control *and* step-pulleys to

give you several ranges of variable speed.

In the middle range, there are many types of *mechanical* speed controls that give you different speeds by moving a lever or turning a dial. One common system is called the **Reeves Drive**, which uses a pair of mechanically variable pulleys. These pulleys expand and contract as you move the speed lever, effectively changing their diameter to generate faster or slower speeds. A mechanical system like the Reeves Drive is a great choice for turners with modest budgets. These systems give you virtually instant access to a variety of speeds and they are much less expensive than electronic speed controls.

Headstock and Tailstock Specifications

Modern lathes have standard headstock and tailstock specs, so feel free to skip this section if you plan on buying any lathe produced in the last 30 years. Some older lathes have unusual configurations that make them difficult to use with modern accessories, so if you're looking at a vintage or rare model, it's useful to understand spindle threads and tapers.

A lathe spindle can hold accessories in two ways: screwed onto the threads or inserted into the taper. Spindles have a threaded section that sticks out of the headstock over the ways. The most common threaded section is 1 inch in diameter and has 8 threads per inch

(1x8 tpi), although several other pitches are common. Standard spindle threads will accept chucks, face plates, and other accessories. Most manufacturers also make adapters that allow several thread pitches fit their products. Some older lathes do not have a threaded spindle at all. Don't buy one of these because they will not work with any chucks or faceplates and this limitation severely limits your workholding.



Figure 1.7: A modern lathe spindle has threads <u>and</u> an internal taper for holding tools and accessories. Pictured is a spur center on a taper about to be inserted into the spindle.

Lathes spindles also have a **taper:** a hole bored in the spindle that is wider at the end and narrows as it moves inward. A tapered spindle bore creates a friction-fit with tapered tools that are inserted by the user. Tapers are common in machine tools and are found on metal lathes and drill presses. They provide a quick and sturdy way of holding tools in a spindle, but tapers must fit exactly in order to work. Because of the need for an exact fit,

tapers are standardized according to the **Morse Taper** specifications. Morse tapers are numbered 0-3 according to their size and are abbreviated MT#. MT0 is the smallest (and hardly ever used); MT3 is the largest. Almost all wood lathes use MT2 tapers in both the headstock and tailstock. This standard system allows accessories to fit almost any machine. If you buy MT2 accessories for your starter lathe, you will be able to use them on your new lathe when you upgrade.

Many older lathes have unusual tapers and thread pitches in their headstock and tailstock. Some of these older lathes are not compatible with modern accessories, which vastly reduces their usefulness. Some vintage lathes are a good value for the beginning turner, but you should research the taper and thread pitch of any used lathe you are considering. Getting a vintage lathe into your shop only to discover that it won't work with any modern chucks or centers will really ruin your day.

Types of Lathes

There are so many sizes and styles of lathe out there that it's easy to get confused. The first consumer-grade lathes were aimed at amateur furniture makers who needed to turn spindles for tables and chairs. In the decades since, turned spindles have fallen out of fashion and turners have gotten more interested in pens, bowls, and artistic hollow forms. Because of these changes,

modern lathes generally have a larger swing, a smaller distance between centers, and more powerful motors. Modern turners make a lot of things and tool manufacturers produce lathes to fit every project and budget.

Mini Lathes

In the 1990s, as pen turning was becoming popular, tool manufacturers brought out miniature lathes made for pen turners. These machines had a small swing (typically 10 inches) and a short distance between centers (12-15 inches). These lathes were also used by model makers and woodworkers on a budget who needed a compact, affordable machine that could be brought out and set on a bench top when needed.



Figure 1.8: A standard mini lathe

Mini lathes are still popular with pen turners and beginners and there are many models available. Mini lathes are generally bare-bones machines with manual speed changing and low power, but their modest specifications make them cheap and reliable, especially for a beginner. A mini lathe won't turn a large bowl, but it will do smaller hollow forms, ornaments, tool handles, and pens. These lathes are easy to store and don't need a dedicated stand.

Mini lathes can be found for \$200-\$500, and less used. I would recommend a beginner buy a less

expensive mini lathe. For the money you would spend on a high-end mini lathe, you could buy a midi or even a full-size lathe with greater swing and more power.

Midi Lathes

As mini lathes became popular, tool makers began offering larger and more powerful machines that were still compact. The **midi lathe** is a medium-size machine that has a bigger swing than a mini but keeps the short distance between centers. Midi lathes can have a swing of 12 inches or more, which makes them equal to many "full-size" lathes in the diameter of work they can handle. 12 inches of swing will allow you to turn fairly large bowls and platters, and the short distance between centers is only a limitation if you want to turn furniture spindles or baseball bats.



Figure 1.9: A midi lathe mounted on a stand.

If the midi lathe's short distance between centers is a problem, many manufacturers offer bed extensions and heavy-duty steel stands as aftermarket accessories. With these add-ons, a midi lathe can grow with you as your turning needs change. Buy a machine with a big enough swing when you're just getting started and you can increase the distance between centers anytime. Move your midi lathe from the bench-top to its own stand and

you essentially have a full-size machine.

Midi lathes might be the most popular lathe currently sold and there are dozens of models to choose from. At the higher end, you can find features like digital speed control. While these expensive machines are pricey (\$1000 or more), a midi might be the only lathe you ever need. If you think you might stick with a midi for a long time, buy a machine with as much power as you can afford. A full horsepower is a good idea if you plan to make bowls or hollow forms. Bed extensions and stands can always come later.

Full-Size Lathes

This category is hard to define because a lot of lathes might be considered "full size." To make things simple, let's say that a full-size lathe should have enough swing to turn bowls (12 inches or more), enough distance between centers to turn furniture spindles (at least 36 inches) and enough power to use the lathe's full capacity (at least ¾ hp). You can get a lathe of this size by buying a midi lathe and adding accessories, or you can just start with a larger machine. At the lower end, full-size lathes cost about the same as a midi and you're unlikely to outgrow a full-size machine very quickly.

Quality full-size lathes start at around \$700 and prices go all the way up to several thousand for top-of-the-line models. Expensive full-size lathes can have 18 or more inches of swing, 42 inches between centers and motors that deliver 2hp (or more for a 220v model). These large, high power machines are enough for many professionals and certainly overkill for beginners, but big and expensive lathes are always waiting for you if turning becomes a serious hobby or part of your business.

Vintage Lathes

In general, lathes have improved a lot in the last 40 years. Modern lathes generally have more capacity and power than many vintage, consumer-grade machines. That being said, there are several vintage lathes that have good capacity and power and offer good value for the beginner.

Companies like Delta/Rockwell and Walker-Turner produced a number of cast-iron lathes with the capacity of a modern full-size model. These lathes have the size and rigidity you need for most turning projects and old lathes can be very cheap. Most of these vintage lathes have relatively low-power motors, but these can often be upgraded at a nominal cost. Very few vintage lathes came with any kind of variable speed control and speeds are adjusted by moving the belt to different pulley steps. Many vintage lathes either were not sold with stands or the stand will be missing when you buy the machine, so





Figure 1.11: This vintage Delta/Rockwell lathe would be a good choice for a beginner or intermediate turner. It has a threaded spindle, good capacity, and sturdy, cast-iron construction. It changes speed with step pulleys and only offers three speeds, but the handy user could upgrade these features.

Buying a vintage lathe can be tricky. On one hand, lathes are mechanically simple and companies like Delta built their tools to last. If a lathe runs smoothly, makes

no strange noises, and has no obvious damage, it's probably fine. On the other hand, a vintage machine might need new bearings, new pulleys, and other fixes or upgrades. Be aware of your own mechanical ability. If you've never changed a bearing before, you probably don't want to practice on your first wood lathe.

In buying a vintage machine, you also have to pay extra attention to parts and accessories. At minimum, any lathe needs to have a complete tailstock, banjo, tool rest, knockout bar, and centers. I would pass on any lathe missing the tailstock, no matter how good the price, because replacement tailstocks will be expensive and difficult to find. If your prospective lathe is missing any of the other accessories, you might want to negotiate a much lower price.

You should thoroughly research any vintage lathe before you go to look at it. There are many excellent web sites (like www.lathes.co.uk) that catalog and review antique machinery and you should be able to find the original owner's manual for an old machine. Read it thoroughly. Check out the spindle thread and the tapers in the headstock and tailstock. Make sure they are compatible with modern accessories. Check to see what motor the lathe originally came with. A replacement a motor is no problem, but you'll want to make sure that it is at least as powerful as the motor that came with the lathe originally. Many vintage lathes came with

relatively low-power motors that produced around 1/3 hp. This much torque is fine for spindle work, but you might find it frustrating if you try to turn a bowl or something larger.

Finally, you need to know what range of speeds your vintage lathe is capable of. Many of them had very quick low speeds of 700 RPM or more. If you're interested in bowl-turning or other face-plate work, you might want to modify your lathe for different speeds. Handy woodworkers have been making things like speed-reducing jackshafts for a long time, but these modifications can be technically challenging projects if you've never done them before.

My Lathe

I do all my turning on a Central Machinery 34706, an inexpensive, full-size lathe produced by Harbor Freight. Since woodwork and fabrication is my fulltime job, I have to keep expenses to a minimum and tools must pay for themselves. Even though the 34706 is a cheap lathe with some shortcuts in the construction, it has good capacity and features for astonishingly little money.



Figure 1.12: The Harbor Freight 32706 is a cheap but surprisingly capable machine.

The 34706 is a 12x42 lathe with a ¾ hp motor and a variable-speed Reeves Drive that gives 10 different speeds. It has cast iron ways, an 8tpi spindle thread and MT2 tapers in both the headstock and tailstock. The lathe comes with a spur center, a live-center, a faceplate, and a sheet-metal stand. Depending on sales and coupons, the lathe can be purchased for as little as \$300. If you have the space for a full-size machine and your budget is tight, I highly recommend the 34706.

Be aware that this lathe is cheaply produced and some

owners tell horror stories of broken parts, poor alignment, or motors that burn out quickly. The motor is rated for ¾ hp, but is almost certainly less, and I find it underpowered for larger turnings. The motor has no thermal protection and will get alarmingly hot if you turn a large item for a long time. When turning a big bowl, I stop every half hour and point a fan at the motor until it's cool enough to touch.

Despite these shortcomings, the 34706 is the only lathe the I've owned for almost four years. I've used more expensive models by companies like Jet and Delta and I can see how these lathes are superior to mine in their greater power, lower vibration, and sturdier construction. At the same time, these lathes cost a lot more money than mine and have roughly the same capacity. I would love to upgrade to a big, expensive, variable-speed "professional" lathe, but until turning becomes a bigger part of my business I'm happy to stick with my 34706. If you buy one and it turns out to be a lemon, Harbor Freight has a very forgiving return policy.

Lathes to Avoid

Even if you're on a tight budget, there are some lathes that either aren't worth the money or aren't smart for the beginner because they are either under-powered, underbuilt, or not compatible with modern accessories. Avoid buying one of the models discussed below.

Tube-Bed Lathes

Many inexpensive lathes have been made with steel tubes as the bed rather than an iron casting. This construction allows lathes to be sold very cheaply and tube-bed lathes by companies like Craftsman are common on the used market. Often, sellers ask high prices for these lathes because they are considered "vintage."

In reality, tube-bed lathes were produced to a price point and are often lightweight and flexible. You might find a lathe like this frustrating to turn on, especially because they also came with relatively weak motors. These lathes *do* work, especially for light spindle turning, and you might find one acceptable for getting started, but you're likely to outgrow it quickly.

Shopsmiths

The **Shopsmith** is a multi-purpose woodworking machine that has been around since the 1950s. It's kind of like the Swiss Army Knife of the woodworking world. The Shopsmith can function as a lathe, table saw, drill press, jointer, disk sander and horizontal boring machine. When you first hear about it, the Shopsmith

sounds brilliant. The machine is expensive, but it can perform all the operations of a fully-equipped woodworking shop and it doesn't take up much space.



Figure 1.13: The Shopsmith is a multipurpose woodworking tool. It works as a lathe, but not as well as dedicated lathes, which usually also cost less

Woodworkers either love them or hate them. You can buy a new one, but there are always *a lot* of Shopsmiths on the used market. If the Shopsmith interests you, try

one out. You might like it. But if you're considering buying a used one and using it as a dedicated lathe, you might want to reconsider. As a lathe, the machine is mediocre. It works, but the machine's size and complexity don't offer any advantages. The Shopsmith's construction makes it less rigid and more prone to vibration than most full-size lathes and I've never met a serious turner who uses one.

"Professional" Lathes

Beyond the full-size lathes I discussed above is a whole range of enormous and ultra-powerful "professional" lathes. Companies like Powermatic, Oneway, Nova, Robust, and Grizzly make machines with huge capacities (up to 22 inches of swing and 50 or more inches between centers), as well as very powerful motors. Most of us will never own one of these precision monsters.



Figure 1.14: The Laguna 18|36 is an excellent lathe, but also too large and powerful for most beginners.

Even if you have the money to drop \$3000 to \$6000 on a lathe, I recommend you cool it until you have solid experience on a lathe of more manageable size. If you have a big, professional lathe, you might be tempted to mount up some ridiculous 200-pound chunk of oak and start turning. Even for the experienced turner, these big projects require care and a slow pace. For a beginner,

trying something like this could be downright lifethreatening. It's best to not even own a huge lathe until you know what to do with it.

The Best Lathe is a Free Lathe

Turning has been a popular hobby in America for decades and there are a lot of used lathes floating around. As you're just getting started, get the word out to your friends, family, and neighbors that you're looking for a wood lathe. I'm often shocked at what people have sitting in their basements and barns. Many times, neglected lathes can be had for nothing. Turners pass away and their relatives are happy to get rid of bulky machinery.

If you are offered a free lathe, I recommend giving it the barest inspection and then getting it home before someone changes their mind. My list of lathes to avoid doesn't apply if the lathe is free. A vintage Craftsman tube-bed lathe for free? Grab it. By saving money on the lathe, you can invest in higher quality tools and accessories, learn your basic turning skills, and then upgrade down the line. You might find you only enjoy occasional turning and even a mediocre lathe like the Shopsmith will get you by, especially if it's free.

If you do get a free machine from a friendly neighbor or relative, don't forget to bring them a little turning like a small bowl or Christmas tree ornament to say thank you. Not only is it good karma, people with one machine often have more and who knows what kind of deals you might strike if you stay on people's good side.

The Bottom Line

You should research your first lathe, but don't obsess over it. If you have a general interest in turning, grab a mid-priced midi lathe with optional add-ons. If you want to turn long spindles, get a full size lathe, perhaps even the ultra-cheap 34706. If money is tight and you're handy, scour the classifieds for a vintage cast-iron lathe and upgrade the motor if necessary.

Once you've purchased your lathe, you can relax a bit. Your biggest and most complicated purchase is behind you.

Day 2: Buy Your Tools

Woodturning tools are complicated and there could be a whole book on just chisels and gouges. But for the beginner, we're going to keep things simple. The first thing you need to know is that there are two kinds of woodturning tools: **cutting tools** and **scrapers**.

Cutting Tools

Cutting tools include chisels, gouges, and parting tools. They're very similar to the chisels and gouges used in other kinds of woodworking. The tip of the tool is ground to a **bevel** where the back meets the edge, and the **edge** is ground or honed until it is sharp.



Figure 2.1: A gouge (left) and a chisel (right) are both cutting tools. Chisels are generally flat while gouges are curved in profile.

Cutting tools slice the wood with the edge along the workpiece and the bevel rubbing on the work. The bevel of the tool rides on the wood, supporting and controlling the edge. The cutting action of these tools makes long shavings, rather than chips or dust. These tools can be used at many different angles to achieve complex shapes

like **beads** or **coves**. Cutting tools take some time to learn, but they're also extremely versatile and flexible. Most turners do the bulk of their work with cutting tools.

Scrapers

Unlike cutting tools, scrapers are generally kept flat on the tool rest and the tool's edge is plunged straight into the work, usually at a 90° angle. The bevel does not rub on the wood. Rather than cutting long shavings, scrapers make dust or fine chips.



Figure 2.2: A scraper cuts with a edge plunged straight into the wood. The bevel does not contact the workpiece.

Scrapers are most often used to clean up torn grain or leave a smooth surface on a nearly finished piece, but these tools have many other uses. Scrapers can be used for rough stock removal, cutting into tough end-grain, and even some delicate shaping tasks. Scrapers are easy to use and some turners use them as their main tools.

Many wood turners are surprisingly snobbish about scrapers and they think these tools are only good for people without the skill to use gouges and chisels. I've never understood this attitude because lots of fine pieces have been turned using scrapers. Most turners use a combination of cutting tools and scrapers and you can

learn to use both without too much effort.

What are tools made of?

As you start looking at tool catalogs, you will see many confusing phrases like "cryogenically treated steel" and "powdered metal." These fancy materials might interest you later, but for now, you only need to worry about three metals.

Carbon Steel

Steel is an alloy of iron and carbon. The carbon allows the steel to be hardened and keep a sharp edge. **Carbon steel** has been the material of choice for centuries for every cutting tool, from swords to plane irons. Until recently, all turning tools were made from plain carbon steel.

Carbon steel is a perfectly good metal for turning tools, but it has a couple of weaknesses. First, it dulls quickly and needs frequent sharpening. Second, carbon steel is sensitive to temperature. If you heat a piece of carbon steel too far, it will turn a bluish-black color and lose its hardness. (You might hear this called "drawing the temper" or the steel "losing its temper.") Overheating is no problem during turning because the friction between steel and wood doesn't build up much heat. The problem

comes when you grind your tool. Heat builds up quickly at the grinder and the tip of your tool can suddenly turn black and lose its temper. This isn't a catastrophe. Most of the time, the area of drawn temper is very small and you can quickly grind it away, exposing good steel. Still, carbon steel's relative softness and sensitivity to heat make it mediocre for woodturning. Still, if you happen to find older, carbon steel tools at a good price, buy them. These tools can be an inexpensive way of trying out a new style of tool or a new grinding technique.



Figure 2.3: A carbon steel plane blade with the edge blued from over-heating at the grinder.

High-Speed Steel

Since the 1930s, the machining industry has used complex steel alloys that combine iron and carbon with chromium, manganese, and other elements. These **high**-

speed steels can get very hot and keep cutting effectively. They also hold an edge much longer than carbon steel. Recently, high-speed steel has been introduced to woodturning and it has almost totally replaced carbon steel for every kind of tool.

Not only does high speed steel keep its edge much longer than carbon steel, it is very difficult to draw its temper during grinding. Even if a high-speed steel tool turns black at the edge, it probably hasn't lost any hardness. High speed steel tools are so popular with wood turners that even inexpensive beginner sets are now made from high speed steel. The tools pictured in figures 2.1 and 2.2 are all high speed steel.

If you are buying a new tool, it will almost certainly be made from high speed steel, but you might as well read the tool's description carefully because new carbon steel tools aren't worth the investment.

Tungsten Carbide

Tungsten carbide is not steel. It is an alloy of tungsten (a rare metal) and carbon. Like high speed steel, tungsten carbide was developed by the machining industry and later imported into the woodturning world. Tungsten carbide (often just called "carbide") is incredibly hard and has unmatched edge-retention. These qualities make it excellent for woodturning.

At the same time, carbide has some big drawbacks. It is both brittle and very expensive, so whole turning tools are never made from tungsten carbide. Instead, small carbide cutters or "inserts" are screwed to plain steel bars to make a turning tool. Tungsten also cannot be easily sharpened in a home workshop. When a carbide cutter edge gets dull, the user rotates the cutter to expose a new, sharp edge. When an entire cutter is dull, it is thrown away or recycled.



Figure 2.4: A carbide-tipped turning tool



Figure 2.5: Close-up of a carbide turning insert.

Carbide is attractive to wood turners for many reasons: you can keep turning without stopping to grind the tool edge and it's very effective on hard or exotic woods. I sometimes have trouble with woods like purpleheart and ipe, but carbide cuts right through them.

Since carbide inserts are disposable, many new wood turners *only* use carbide tools. This way, they can avoid the expense of a grinder and grinding jigs, and they can

begin turning immediately, without ever learning how to shape or sharpen a tool edge.

Finally, carbide tools are essentially scrapers. They are generally held flat on the tool rest and plunged directly into the work. This makes them easy to use. As a new turner working with carbide, you don't have to learn to ride the bevel of your spindle gouge or sharpen a perfect edge on your skew chisel. You just get right to work.

Which tools should you choose?

Carbide tools are kind of controversial. Traditional turners (who can be snobs) dislike carbide because they feel that any idiot can use a carbide tool and that sharpening is a necessary part of the turner's art. On the other side, carbide users like to point out that their turnings are often very good (maybe just as good as turnings done with traditional tools) and they don't need any fancy sharpening gear. They do good work while saving time and money.

You'll have to decide between high speed steel and carbide when you go to pick your tools, but here's my opinion as someone who uses both: While carbide tools do work very well, their fixed geometry and scraper-like action makes them less flexible than traditional tools. A high-speed steel chisel is capable of many different cuts

and can shape the wood in some surprising ways. Carbide tools are simply not as versatile.

The fact that carbide is not sharpenable seems like a good thing, but it has some drawbacks. For one thing, the shape of carbide tools cannot be changed. Most experienced turners will experiment with the geometry of their high-speed steel tools or regrind an old tool into a completely new profile. You can't do any of this with carbide.

Carbide tools also present some false economy. You don't have to buy any sharpening gear, but a grinder and jigs are not very expensive. Carbide tools themselves are not cheap and their replaceable inserts are pricey. Someone who turns a lot will go through inserts quickly, spending money each time they change inserts. And the carbide turner who runs out of sharp inserts can't do *any* turning.

I love carbide tools. I make them myself to save money, and I'm happy to use them for specific jobs or difficult materials. But most of my tools are inexpensive, high-speed steel gouges and chisels. Sharpening these tools isn't exactly easy, but I taught myself how to do it by reading articles in magazines like *Popular Woodworking* and watching videos on YouTube. It isn't rocket science. I can also control the shape and sharpness of my tools with a little careful grinding. High speed steel tools just give me more control.

I recommend you skip carbide and learn how to use high-speed steel tools first. If you start out with carbide, learning other turning techniques might seem like too much trouble and you might never learn some of the most useful cuts available with traditional tools. Once you've learned to use and sharpen high speed steel tools, you can buy or make a few carbide tools and use them wherever you find them valuable. I doubt you'll regret learning how to use traditional chisels and gouges.

Starter Tool Sets

Several tool companies sell sets of 8-10 tools for the beginning woodworker. These sets are generally a good value. For less than \$100, you get at least 6 useful tools, as well as one or two oddballs. My own starter set came with several good-quality tools that I still use today, but it also included a weird mini-skew chisel and some kind of mid-size gouge that I'm still not sure what to do with. Regardless of the set you buy, make sure it has a roughing gouge, spindle gouge, skew chisel, parting tool, and maybe a scraper or two. You can do a lot of work with this modest set of tools.



Figure 2.6: A starter tool set.

Starter sets are all produced overseas from high-speed steel but they are definitely not all the same. If you look at five different starter sets, they will each contain different tools, and different sets might be made from different alloys. It's worth your time to research a starter set carefully and buy something with a reputation for value and usefulness.

Individual Tools

Instead of getting a starter set, you can buy four or five individual tools. By going this route, you'll probably spend more money on fewer tools, but you can get high-quality chisels and gouges that you will keep for years and you won't end up with any odd or useless tools.

If you do buy individual tools, I recommend purchasing a **roughing gouge**, a **spindle gouge**, a **skew chisel** and a **parting tool**. If you buy a beginner set, pull out these four tools and set the rest aside for now.

You might notice that these are all **spindle tools**, and none of them are good for bowl or face plate turning. Spindle turning is both easier and much safer than bowl work or other large-diameter turning. All turners pick up the basics of spindle work before they move onto larger and more challenging objects. **Never use a spindle gouge or roughing gouge on a bowl or other large turning!!** These tools were not designed for the torque of big pieces and they can snap, creating a very dangerous situation.

Let's look at each of the four basic tools in detail.

Roughing Gouge



Figure 2.7: A roughing gouge.

This is a wide gouge with a shallow "C" profile and it makes things round. This gouge takes aggressive cuts off square or oddly shaped blanks and leaves a uniform cylinder that's ready for further shaping. The tool can be

used either straight-in or on its side. If used aggressively, this tool leaves a rough finish, but a sharp roughing gouge used with a light touch can also leave a smooth surface that's ready for sanding. The roughing gouge can also do some basic shaping. If you want to make a round table leg with an elegant taper, the roughing gouge might be perfect.

Spindle Gouge

This tool looks like a miniature version of the roughing gouge. It's used to add details, like coves and beads, to a spindle. After the roughing gouge, you can go directly to the spindle gouge for shaping and detailing your piece. The spindle gouge is a somewhat difficult tool. It can be ground into several shapes and it takes a while to master. Still, this tool is worth learning because it's capable of many useful cuts.



Figure 2.8: The spindle gouge.

Skew Chisel



Figure 2.9: The skew chisel.

The skew is a simple and versatile tool. It's just a big chisel with a bevel on both sides and the end ground at a 45° angle. It's also probably the hardest chisel to learn. For the beginner, the skew can be hard to control and might dig-in or catch against the work unexpectedly. Many turners (myself included) never really master the

skew and only use it occasionally.

But even though it's hard, the skew is worth learning. It's incredibly versatile and can make a huge variety of cuts. If you get good with the skew, it might be your *only* spindle tool. Many skilled turners do everything from roughing to details with only the skew.

Even if you never get really good with the skew, it's worth having around for a few things. The point of the skew can be gently pressed into the wood, leaving a v-shaped groove as shallow or deep as you want. These narrow grooves make great details on all kinds of pieces. The skew can also do a great "planing cut" where the tool skims the surface of the wood, removing a light shaving. Not only does planing with the skew leave a great surface, you can actually feel where the wood is thicker or thinner just from the feedback you get from the tool. A turner with a little bit of experience can use a skew to plane cylinders that are very uniform and nearly perfect down the whole length.

Parting Tool

The parting tool cuts or "parts" off pieces of your spindle. It also reduces diameters to make tenons or add details. If you need a whole spindle to be an exact diameter, you can use the parting tool to get the correct diameter on either end and then turn down the wood

between your parting cuts with a roughing gouge or a skew. Parting down to a given diameter gives you a valuable reference and helps you get spindles to exact sizes.



Figure 2.10: The diamond parting tool.

Parting tools come in two shapes: diamond and thin. The first tool is diamond-shaped in cross-section, which gives the top and bottom of the edge clearance and helps keep it from binding in the cut. This is a valuable safety feature, especially for the beginner. The thin parting tool is more like a knife. This tool makes a very narrow and exact cut, but it's also much more likely to bind in the cut, so commercially made thin parting tools are

generally pretty short and can't go very deep into the wood. Ideally, you would have one of each, but the diamond parting tool is longer, safer, and more versatile, so start with that one.

No scrapers?

I haven't listed any scrapers in my essential tool kit, but if you have the money, or if they come in your starter kit, you can start using scrapers right away. I use a ½ inch flat-nose scraper and a 1 inch round-nose scraper in many of my turnings. If you're learning spindle work, you might find the round-nosed scraper especially useful. Look around and see what shapes look good for the work you are doing. Scrapers are not very expensive and you can always regrind them into a different shape later if you want.

Measuring Tools

You need a couple of simple measuring tools for basic woodturning. A pair of **outside calipers** is essential for measuring the diameter of your work or turning something down to a specific diameter. Over time, you will probably buy several sets of calipers in different sizes. I like Starrett brand calipers because they're made for machinists and are the most durable and accurate I've

used. Starrett tools are very expensive new but they're also easy to find used and I pick them up at flea markets for a couple of dollars. To get started, feel free to buy an inexpensive pair of import calipers and keep your eyes open for higher quality tools that you can buy used.



Figure 2.11: Calipers (left and center) help you measure the thickness of a bowl or the diameter of a spindle. Dividers (right) are handy for marking out a recess for your chuck.

You also need a center-finder. It will help you find the exact center of both circles and squares. Like the calipers, you can get an expensive one made by Starrett, but there's no need to spend the money. A cheap one made of plastic will work fine.

Pick up an awl if you don't already have one. Once you find the center of a piece of wood, make a deep dimple in each end with an awl. Then your lathe centers will locate on these dimples and your piece will spin true

when it's mounted on the lathe.

The Bottom Line

Once you have a handful of spindle tools and a couple of measuring tools, feel free to stop spending money on tools. Every turner learns a bit of spindle work, but there's no telling what kind of turning you will end up being most interested in. Wait to see where your interests lead you before you buy any more pricey gouges or chisels.

Day 3: Assemble Your Sharpening Rig

After the lathe, your grinder is your most important power tool. To understand why, imagine a piece of wood 5 inches in diameter turning at a speed of 1200 RPM. In 1 minute of turning, that 5-inch piece of wood will bring 500 *feet* of wood into contact with your turning tool. No other edge tool cuts as much wood as quickly as a turning tool. These tools can get dull very fast and they need a lot of sharpening.

If you've done hand tool work, you probably **honed** your tools against a set of stones every few hours. This approach won't work with turning tools, which need much more aggressive and frequent sharpening. A wood turner might pause every few *minutes* and give their tool a light grinding. Some turners then quickly hone the edge with a diamond stone, but many people go from the grinder straight back to the lathe. In a full day of turning, you might go to the grinder several dozen times, so grinding needs to be quick, accurate, and easy on your tools. To make sharpening fast and effective, we're going to assemble a simple and inexpensive sharpening rig with a special grinder, good lighting, and a grinding

jig. Like everything else in this book, we'll skip the fancy stuff and focus on affordable, effective equipment.

Fast Vocabulary

Sharpening: Any process that puts an edge on a piece of steel.

Grinding: Sharpening or shaping a tool with a powered grinder. This is usually a wheel, but it coul also be a belt sander. In most forms of woodworking, the edge left by a grinder is considered too rough and the edge is refined further before it touches the wood.

Honing: Refining a ground edge to make it finer and smoother. Most plane irons and chisels are honed on oil or water stones, but these stones are not hard enough to cut the high speed steel used in turning tools. Many turners skip honing all together and go straight from the grinder to the work. If they do hone, turners use diamond plates, which can sharpen high speed steel and leave a good edge.

A Special Grinder

You might already own a grinder; probably a 6-inch, high-speed bench grinder with coarse gray wheels. These

grinders are very useful, but they're not great for sharpening turning tools. Chisels and gouges get sharpened a lot, so you need a grinder that's going to take off the minimum amount of metal and leave a nice surface on the tool.

For most turners, the ideal choice is a 1725 RPM, 8-inch grinder. Some manufacturers refer to this as a "slow speed" grinder, but that's just marketing. 1725 RPM is a common speed for electric motors and there's nothing very slow about it. 8-inch wheels are most common for grinding turning tools because the larger radius leaves a flatter bevel on the tool and a flatter bevel is easier to control.

The good news is that 1725 RPM grinders are cheap, especially the imported ones, which cost around \$100. These machines aren't very robust or powerful, but they don't need to be. Grinding turning tools is light-duty work and puts little strain on the machine. Pretty much any 1725 RPM, 8-inch grinder will get the job done, but hold off on buying it until you figure out what wheels you're going to use. Pay attention to the arbor size on your grinder and make sure it's compatible with your wheels. If the hole in the grinding wheel is different, you can often get an adaptor bushing to fit the wheel to the shaft, but you'll want to research all this before you spend money on the grinder.

Grinding Wheels: Way Too Complicated

If you thought lathes and tools were complex, brace yourself. The world of abrasive wheels is filled with hype and complicated technical terms. You might choose aluminum oxide wheels, but then you have to decide if you want the ones blended with chromium oxide. Alternately, you might choose microcrystalline, vitreous-bonded wheels because they last longer and they're produced with "radical new ceramic technology." That sounds good, right? If you have money to spend, why not spring for a pair of wheels coated in cubic boron nitride (CBN)?

Is your head spinning yet? Don't feel bad. I've been turning for years and I still don't know what half this stuff means. Let's simplify.

The gray wheels on standard bench grinders are too aggressive for turning tools, so we won't use those. For sharpening turning tools, the cheapest option is plain white aluminum oxide wheels (often just called "white wheels"). These wheels are "friable," which means they shed abrasive as you use them, constantly exposing fresh crystals. White wheels need little maintenance to cut well. The downside of these wheels is that they're quite soft and will wear out quickly if you're aggressive with them. But for light, controlled grinding, they can last a

long time. I've had my current set of white wheels for over two years and they still have some life left in them.

The other wheels I mentioned are quite a bit more expensive than white wheels. For instance, a single Cubic Boron Nitride wheel can cost \$150. By all accounts, they're worth the investment because they cut better and last much longer, but I think the best move for the beginner is to start with a set of white wheels and then upgrade when they wear out.

The Combination Package

Several manufacturers make 8-inch grinders specifically for wood turners. These grinders come with white wheels already installed, so there's no guesswork about arbor size or correct rotational speed. The grinder can be bolted down, switched on, and it's ready to go.



Figure 3.1: This Rikon grinder comes with white wheels already installed and also includes a diamond dressing stick. Virtually identical grinders are also made by other companies, including Wen.

These grinders typically sell for \$140 or less and this price is a good value. Even cheap 8-inch grinders usually cost \$100 or more and a pair of white wheels generally costs more than \$50.00. By buying the complete package, you'll save money.

It's worth mentioning that all of the 8-inch, white wheel grinders I've seen are clearly the same unit and each manufacturer just has them rebranded with their own logo. These are inexpensive, import machines and several users do report problems with bent shafts or wheels running badly out of true. My grinder has always worked perfectly, but I recommend you purchase yours from an outlet with good customer service and an easy return policy.

Wheel Maintenance

Your grinding wheels should work great right out of the box, but they won't stay that way for very long. As the wheel removes metal from the tool, a lot of the metal ends up embedded in the surface of the wheel. You'll see the wheel slowly turn from bright white to dull gray as the metal builds up.



Figure 3.2: This white wheel is loaded with metal and is slightly dished in the middle. The diamond dresser will return this wheel to being clean and flat.

Grinding also wears the wheel unevenly. You should try to use the whole surface of the wheel as you grind, but most of us use the middle more. Soon, your wheel is dished in the center and higher at either side.

When your wheel is no longer square and/or it has picked up a lot of metal dust, it's time to dress the wheel.

The most common tool for a white wheel is a diamond dresser. This is a T-shaped piece of metal with fine diamonds embedded in the top. Some grinder packages even come with one of these dressers included, but they're cheap no matter how you buy them. Brace the dresser on a tool rest or the edge of a guard and hold the diamond side against the wheel. Hold it in place until the wheel is square and has the clean, white color restored. This is a dusty operation, so wear your breathing protection.

Dressing the wheels makes them work like new, so the temptation is to do it a lot. Unfortunately, dressing the wheels also wears them down, so you want to dress as little as possible. You'll notice quickly if your tools aren't getting sharp or if you can't get them to ride smoothly on the wheel. When either of these things happens, it's time to dress with your diamond tool. I should also mention that these diamond dressing tools aren't made to last forever. Throw yours away when it wears out and get a new one.

Recently, I've started using a different kind of dressing tool. It's just a bar of carborundum abrasive and the user holds the tip against the wheel to dress it. I've only just started using this new dresser, and it's too soon to say if it will be my new favorite, but the initial results are promising. The carborundum dresser is more aggressive than the diamond tool and works faster, but it still leaves

a good surface on the wheel. Rather than being coated in abrasive like other dressers, the entire tool is made of abrasive and it's over 6 inches long. This tool should last a long time and it only costs \$9.

The Sharpening Jig

Some of your turning tools can be sharpened freehand. Other tools, especially gouges, really benefit from being ground on a jig. A grinding jig allows you to make a single sweep across the wheel and refresh the edge of your tool while removing the minimum amount of metal. Jigs take out all the guesswork and they preserve the geometry of your tool during sharpening. By sharpening with a jig, you will always return to the lathe with a cutting tool that behaves exactly the same way.

The standard grinding jig is the Wolverine system, produced by Oneway. The Wolverine consists of a variable-length arm that mounts under one wheel of your grinder. At the end of this arm is a simple cup that holds either the handle of a turning tool or the end of a grinding jig. Gouges with a simple profile, like a roughing gouge, are placed with the heel of the tool in the cup. The arm is then adjusted to the correct length, and the gouge is rotated against the wheel until sharp. As long as you are working with a single tool, you can leave your Wolverine set up and each time you sharpen the gouge, it will come

out exactly the same way.



Figure 3.3: A roughing gouge in a Wolverene jig. Rotating the gouge against the spinning wheel leaves a keen and consistent edge with minimum loss of metal.

Tools with a more complex geometry, like a spindle or bowl gouge, need a bit more setup. These tools are inserted into a second jig called the "Vari-grind," which grips the tool in the middle of the shaft and has an adjustable stem that can be set for different angles. This stem is set into the cup of the Wolverine and the tool is ground with a sweeping motion across the wheel. This whole arrangement is hard to describe, but it's easy in practice.



Figure 3.4: A bowl gouge being sharpened in a Wolverine Varigrind jig. Although this jig is complicated, a simpler version can be easily made in the home shop.

On the other side of the grinder, the Wolverine consists of a simple, variable-angle platform for sharpening flat tools. The user sets the platform for the correct angle, sets the edge of the tool against the wheel, and then slides or rotates the tool across the platform to sharpen. Again, it's an easy procedure.



Figure 3.5: The Wolverine platform is adjustible for different angles and allows steady, semi-freehand sharpening of scrapers and skew chisels. Like every other part of this jig, a functional version can be made in the home shop.

Unlike a lot of other tools, the Wolverine is robustly constructed and gets high marks from users. The whole setup, including the Vari-grind jig costs less than \$150. If you have the money, I recommend you purchase the Wolverine and be done with it.

Of course, many of us are on a budget and \$150 for a grinding accessory is unrealistic. The good news is that the Wolverine is not complicated, and many turners just make their own versions. All you really need is a sliding arm with a cup at one end and an adjustable platform. I do a bit of welding, so I made mine out of steel. I used scrap materials, which cost me nothing, and making the jig took about half a day. A more experienced welder could have done it faster.

If you don't weld, you can make a good grinding jig out of wood. Plywood works especially well for this and the basic parts of the jig are easy to construct. Any moderately experienced woodworker should be able to make the whole system. The Vari-grind jig is a bit trickier to make, but its variable-angle stem isn't really necessary. I make simple tool holders from a block of wood, a set screw, and a metal rod. Each time I make a new one for a new tool, I figure out the correct sharpening angle and just build the holder with that angle built-in. This arrangement is non-adjustable and I have to build a new holder for each gouge, but in several years of turning, I've only had to build 3 holders. The investment in time and materials has been very small.

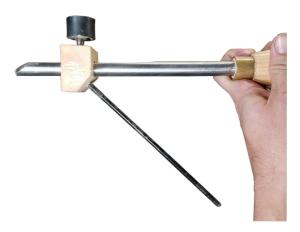


Figure 3.6: A homemade version of the Varigrind jig. With just a metal rod, a block of wood and a screw, this jig is easy and and quick to make.

Setting Up Your Grinding Station

Your grinder needs a permanent setup where it's bolted to a secure surface, elevated to the correct height and well-lit. Setting your grinder up correctly makes the

machine more consistent and safer to use.

Start by finding a solid surface where you can bolt your grinder down. Any bit of bench space will do the job, or you can find an old piece of furniture. My grinding station is an old media cart from an elementary school. I screwed two pieces of scrap laminate to the top as a table and it works great. Most people like their grinders to be above waist-height so they can see what they're doing more easily. You'll probably also need to elevate your grinder above the table surface. Jigs like the Wolverine require the grinder to be at a certain height to work correctly. I have a single piece of ¾ inch MDF under my grinder and it's at the perfect height.



Figure 3.7: My grinding station holds 2 grinders, lighting, and my sharpening jig. I made it from an old piece of surplus furniture and it works great.

You'll also want excellent lighting so you can see the grinding process and inspect your tool edges. There's no need to spend a lot of money here. I have a light fixture directly above my grinding station and an old desk lamp

on an arm that I can put right over the grinder when I need extra light. Between your grinder(s) and whatever lights you have on your grinding station, you might want to install a power-strip and plug everything in there.

Even if you don't turn every day, it's worth having your grinder and jig permanently installed on a secure, stable surface that's not too far from your lathe. If you have a small lathe, you might store it when it's not in use, but it's probably too much trouble to do the same thing with your grinder setup. Since I've started turning, I've also found my white wheel grinder to be useful for other fine tools like carving gouges or delicate chisels. I use it even on days when I'm not turning.

The Bottom Line

Sharpening is a source of frustration for many new turners. People who buy a lathe often don't expect they're going to spend several hundred *more* dollars on a special grinder, fancy wheels, and a grinding jig. Even once you have all the gear, the tools don't sharpen themselves. Sharpening takes time and patience to get right and you will have some difficult moments where a tool isn't cutting and you don't know why. The good news is that there's tons of information on sharpening turning tools and a lot of it is free. Magazines like *Fine Woodworking* frequently publish articles and videos on

turning and sharpening. Likewise, online forums like Sawmill Creek are filled with posts by knowledgeable amateurs (and a few uniformed blowhards). Do a bit of research and you'll probably solve any problem you're having. You also might take a one-day class at a store like Woodcraft. Getting some one-on-one instruction might quickly solve any sharpening problem you are having.

Once you learn to sharpen effectively, you'll never need to relearn it. The gear is a bit of an investment up front, but it's a one-time thing. The grinder and the jig will last for years and the only thing you should ever have to replace is the grinding wheels.

At this point, you're pretty much done spending money, so relax. The hard part is over.

Day 4: Set Up Your Shop

If you already do woodwork (or some other craft) it's pretty easy to integrate turning into your existing shop. All you really need is a place for the lathe, a place for the grinder, and some tool storage. If you don't have a shop, it doesn't take much to set up a turning studio. I've even known people who turned in a spare bedroom in a city apartment. You just need a modest space (8 feet square is probably enough) and a way to contain the dust and shavings. The obvious places to set up your lathe are a garage or basement, but any space with electricity and good lighting will get the job done. Be aware that the shavings and dust from woodturning are flammable. Don't set your lathe up near any sources of heat or fire.

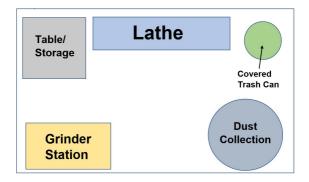


Figure 4.1: A sample turning studio. Note that the grinder is close to the lathe, but the trash is far from the grinder.

Lathe Location

You can pretty much put your lathe anywhere it fits. I have mine tucked into a little alcove in the back wall of my shop. You rarely need access to the back of the lathe, so feel free to put that against a wall. Your lathe must be stable on the floor; it cannot rock or move. If your floor is uneven, many lathes have adjustable feet. If necessary, shim the feet with small pieces of wood until your lathe

sits level and solid.

You will need access to both ends of the lathe to turn the tailstock wheel or use the knock-out bar on the headstock. You only need about a foot of clearance on the tailstock end and maybe 18 inches of open space on the headstock end.

You should have access to at least two electrical outlets: one for the lathe, and one for other powered accessories you might want to use. Sometimes it's worth having an electrician run some extra power to your turning studio. Additional outlets are handy for plugging in lights, sanders, dust collectors, and anything else you might use. If you do get extra power installed, ask for a 20-amp circuit, rather than the 15 amps common for household usage because many tools draw more current than household appliances. With 20-amp circuits, you are much less likely to flip a breaker and your tools will be getting enough current to function properly.

Wherever you turn, it needs to be a somewhat contained space. Woodturning is a messy operation that generates a lot of shavings, chips and fine dust. Dust collectors help, but you'll never capture 100% of the stuff that flies off your lathe. Turning in a dedicated room is usually the best solution, but if you have to turn in a larger space and still keep your dust contained, you can make a "room" by hanging some plastic sheeting. This project is usually cheap and easy. Even clear shower

curtains might work well to keep dust contained while still allowing light in.

Set up your grinder a few feet from the lathe. You'll be going to the grinder often, and there's no reason to have it all the way across the shop.

Three Places for Tools

Everyone has their own way to organize a workspace and you'll develop your own. I've tried a lot of systems and I have a method that works for me. I'll describe it and go over the requirements of good tool storage.

1) A Gouge/Chisel Holder

Everyone has the same goals when storing their tools. They want to protect tool edges, protect themselves from injury, and find tools quickly so they don't waste time. The most popular tool storage solution seems to be lengths of PVC pipe. These pieces of pipe are generally attached to the back wall, behind the lathe. I've also seen them arranged in a free-standing formation like an upside-down Christmas tree, or attached to a Lazy Susan so that the user can spin their tool collection and quickly grab the chisel they want.

I don't like any of these arrangements. Turners using PVC usually store the tools with the points facing *up*, and

this leaves chances for injury when reaching for a tool. I also don't like storing the tools behind and above the lathe, because it means reaching over a spinning lathe to grab the tool. There's an obvious safety hazard here, because you could either accidentally touch your spinning work or have your work catch on a loose piece of clothing and pull you into the lathe. Neither of these is very likely, but I don't take the chance.



Figure 4.2: My tool storage is just a piece of scrap lumber with holes drilled in it. I built it in a few minutes, but it works very well.

In my shop, I've bolted a piece of 2x4 between the legs of my lathe stand and drilled several holes that accept the shafts of my tools. This setup isn't very attractive, but my tools are within easy reach and they're pointing away from me. The downside is that I can't see the tips of my tools and I sometimes have to hunt around for the chisel I want. But I mostly keep chisels in the same place and

reach for the usual ones by habit. You could put numbers or colored dots on the ends of tool handles to eliminate confusion.

2) A Board for Small Tools

I have a lot of calipers, center-finders and chuck-keys. These tools are small and some of them are fragile. They would get lost fast if I didn't keep them organized. I keep all these tools on a peg-board mounted behind my lathe. These tools are all easy to grab and hanging them on a pegboard is safe because the lathe usually isn't spinning when I reach for a set of calipers or a chuck key. I can also tell at a glance if any of these tools is missing.



Figure 4.3: A small pegboard attached to the wall provides good storage for calipers, chuckkeys, and other tools that are small, fragile, or easily lost.

You can buy a piece of pegboard cheaply at the homecenter and spend a few more dollars on some assorted hooks designed for pegboards. Alternately, you can just take a scrap of plywood and add nails or screws to hang your tools from. Either option will work fine.

3) Drawers or a Small Cabinet

Lots of turning accessories won't fit on any kind of

rack or stand. Faceplates, chucks, and cans of finish are too heavy and awkward to hang. Usually, woodworkers put these items on shelves, but any horizontal surface near a lathe will get covered with chips and dust. I recommend a few drawers or a small cabinet for these items. Some turners build a custom stand/bench for their lathe and they incorporate drawers into the design. That sounds like a great idea, but also way too much trouble.

I have a little, three-drawer filing cabinet that I keep next to my lathe. It was free because my neighbor was throwing it away. This cabinet has two small drawers that are perfect for chuck-jaws, Allen wrenches, and other little bits that might get lost. In the big bottom drawer, there's plenty of room for bulky items like faceplates and cans of finish. My cabinet also gives me a little horizontal space right next to my lathe where I can throw bits of sandpaper or other small items. The top of my cabinet is usually a disaster, covered with scraps of this and that, as well as lots of shavings. In all my work, I find it's more useful to *contain* the chaos than try to prevent it entirely. Have a little space that can be messy and you'll save yourself a lot of trouble.

Dust Control

Lots of turners have dust collection in their studio. A common dust collector is basically a big vacuum that you

attach to a power tool. Lathes are tricky to hook up for dust collection, but there are tons of hoods and shrouds you can buy to add dust collection to your machine. These accessories are handy, especially for sanding. Most turning operations generate shavings or chips that fall to the floor, but sanding dust from a lathe is very fine and it goes *everywhere*.



Figure 4.3: A large dust collector can be an investment, but it can also be hooked up to several machines and keep your shop much cleaner.

If you're buying a dust collector, you can get a big, free-standing model that will handle your lathe and additional tools like a band saw. If you only want dust

collection for the lathe, a smaller, wall-mounted unit should be enough for turning. Neither of these machines is very expensive, and the cheap, import models are surprisingly good. Whatever you choose for dust collection, you have to realize that no solution will be perfect. You will always have *some* dust and shavings flying around your shop.

Many turners also get a powered air filter they can to mount the ceiling. This removes ambient dust that the big dust collector misses. If you do any kind of woodworking, it's a good idea to filter the air in your shop. Not only is fine sawdust an irritant to your nose and lungs, it might also give you cancer. If you can't spend the money on a commercial air cleaner, there are several DIY solutions that use a box fan and a furnace filter. Look around the Internet; you'll find lots of ideas.

My approach to dust collection is simple: I don't bother. My whole basement is a woodworking shop and there are least 10 different machines that throw dust into the air every day. I have a big dust collector for the large machines, like my table saw, but I don't do anything for the lathe. Lots of the wood I turn is green, so it makes heavy, wet shavings that just drop to the floor. When I'm sanding, I put a fan behind me, and a little to the left. Most of the dust is blown away from me and it lands in the far corner where I can just sweep it up. Most importantly, I wear a respirator when I'm turning,

sanding, or doing any other woodwork that generates dust. I keep the respirator on for an hour after I turn any machine off because this gives dust time to settle out of the air. Overall, a simple respirator (not a dust mask) is your cheapest and most effective defense against fine dust.

Cleaning Supplies

Some turners let shaving and dust accumulate under and around the lathe, but this is a bad idea. Wood dust is very flammable and you don't want slick shavings underfoot while you're running a power tool. No one will ever accuse me of being a neat-freak in the shop, but I sweep every day and keep my turning area tidy.

As long as you are gearing-up for turning, get a broom and dustpan that you can keep by the lathe. If cleaning is convenient, you'll do it more often. Get a hand-broom for brushing the lathe clean. Keep a waste-basket in a smart location. You don't want it near the grinder where a stray spark might ignite a pile of shavings. Even better, get a covered, metal trash-can. Kitchen stores sell nice ones with foot-operated lids, but even a metal bucket with a lid is safer than an open container. Empty your trash often and don't ever throw finishing rags in with wood scraps. Some finishes heat up as they dry and can spontaneously combust.

Lighting

Having a well-lit studio is simple. You mostly need one good fixture above the lathe. I recommend a 4-foot, double-tube LED light. These fixtures generate a lot of light and they consume so little power that you can run several of them from a single outlet. When you hang your lighting, put it above the lathe, and slightly in front of it, not directly over-head. If your lighting is right over your work, the lower part of your turning will always be in shadow. Moving the light towards you reduces this problem.

I also have several smaller lights that I can use for different tasks. Simple clip-on lights, or even an old desk lamp can shine light inside a bowl or under a big spindle. Lots of small LED lights now come with magnetic bases and you can stick them directly to your lathe.



Figure 4.4: A small LED lamp on a flexible stem is just the thing to light up the inside of a bowl.

Good lighting is essential to good turning. A piece that looks great in your shop might look like a mess in direct sunlight, so don't skimp on lighting. Lights are cheap; get a bunch.

The Bottom Line

Setting up your turning studio can be fast and easy. Locate your lathe first and everything else falls into place. Your lighting should be above and in front of the lathe. Your grinder should be a few steps from the lathe. Your trash should be near the lathe, but far away from the grinder. Keep your tools close-by and make them easy to keep organized. Hunting for a tool in the middle of a project is a drag. Make your workspace efficient and you can spend more time turning.

Day 5: Consider Useful Accessories

At this point, you have everything you absolutely *need* and you've set up a functional space for turning. You can get to work and forget about buying more stuff. But as you get going with turning, you might want a few more tools to make sharpening or wood preparation easier or faster. In this chapter, I'll talk about some useful accessories that will make it easier for you to prepare your blanks, mount your work, and sharpen your tools. You don't absolutely need any of these things, but they will all speed up your work.

A Jacobs Tailstock Chuck

This device is so useful that I hesitate to even call it an accessory. A Jacobs chuck grips narrow metal cylinders, like drill bits. Every drill or drill press you have ever seen has had some variation on the Jacobs chuck at the business end.

Having a Jacobs chuck and a selection of drill bits allows you to drill the exact center of any piece on your lathe. I use my Jacobs chuck with a 2-inch Forstner bit to hog out the waste at the center of large bowls. I use smaller bits for vases or to drill out tool handles. Even though I have a good drill press, I occasionally drill things with my lathe even when I don't have to. The speed is easily adjustable and it always hits the exact center of any piece.





Figure 5.1: A Jacobs chuck might be the most usefull accessory you can get for your lathe. I often use mine with a large Forstner bit to remove wood at the center of bowls.

Like any accessory, you must be sure you're getting the correct one for your lathe, but this should be easy. The vast majority of lathes have an MT2 taper in the tailstock. Buy a chuck on an MT2 taper and it should fit fine. Like many accessories, an American-made Jacobs chuck will be of the highest quality, but I have an inexpensive import chuck in my lathe and it works just fine. I like it so much that I bought a second one for my drill press.

Saws for Prepping Blanks

Most of the wood you turn will start out square or irregularly shaped, like a log straight off the burn pile. Square pieces of turning wood are referred to as blanks and they can be purchased from woodworking stores or made by the turner. You can mount these pieces on the lathe and start hacking away with a roughing gouge, but it will take time and these heavy, interrupted cuts are hard on the turner and the tool.

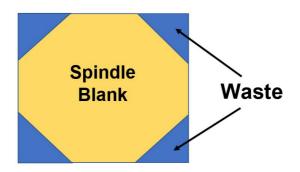


Figure 5.2: Cross-section of a squre spindleblank with the corners ripped off. Simply making this square shape into an octagon prior to turning makes it much easier to turn round on the lathe.

A good alternative is having a saw that can prepare your blanks and get them close to round before they go on the lathe. For instance, any table saw with a tilting blade can take the corners off a spindle blank. Just ripping off the corners gives you an octagon instead of a square and this shape is *much* easier to turn round. If you're a hand tool person, you might also use a draw knife or a hatchet to take the corners off a spindle blank. These methods work fine; they're just slower.



Figure 5.3: Even without a power saw, you can remove the corners from a spindle-blank.

If you want to do bowls or other faceplate work, you're going to be working with big, square blanks that are especially difficult to turn round on the lathe. Getting these blanks roughed out prior to turning will save you a lot of hassle. You might be able to do some roughing with a jigsaw or large hand saw, but nothing beats a bandsaw for making square things round. Even a modest bandsaw cuts smooth curves in big pieces of wood.

The bandsaw might be the most useful accessory a

turner can own. Bandsaws easily cut graceful curves and nearly perfect circles. A really high-quality band saw can also rip thin boards for laminated turning blanks. If you do other kinds of woodwork, a bandsaw is fantastic for furniture or cabinet work, too. I'm a hand-tool enthusiast, but I can hardly imagine being without my bandsaw.



Figure 5.4: This Delta 14-inch bandsaw has cut a lot of wood in its long life, but it still has many years left in it.

The ideal bandsaw for most hobbyists is the standard, 14-inch model with a cast-iron frame and table. This type of saw was largely invented by Delta and vintage Delta bandsaws are still very valuable as usertools. Most other 14-inch bandsaws are basically copies of the Delta, but many of them are quite good. I have a Grizzly bandsaw and I'm very happy with it its sturdy construction and smooth operation. My model is close to the top of their line, but even Grizzly's budget saws are solid machines.

If you're buying a used saw, they're simple machines. Bandsaws are a lot like lathes; a motor, a few pulleys, some bearings. Like many other tools, if it runs and has no obvious flaws, it's probably fine. A complete guide to buying used bandsaws is beyond the scope of this book, but there are many good resources online and you shouldn't have much trouble finding a reasonably priced used model.

If you can't afford a 14-inch saw (and I couldn't for years) look for an older Craftsman 12-inch model. These saws aren't very pretty and their construction has some compromises in accuracy and rigidity, but they have

served generations of cash-strapped woodworkers. The 12-inch capacity of old craftsman saws is pretty good for turning projects. An old Craftsman saw will probably come with rubber tires on the wheels and these are likely to be in bad shape, if they're even still there. Replace these tires with new Urethane ones and you'll give your old saw a new lease on life. Urethane tires are very durable, don't dry out like rubber, and rarely need to be replaced. It's a big upgrade for a little money.



Figure 5.5: Craftsman made several models of 12 inch bandsaw. This model tilts and has electronic speed control. Craftsman's more basic models were more compact and just as effective.

For preparing your bowl blanks on the bandsaw, find center and then use a compass to scribe the largest circle that will fit on the blank. Cut it out on the bandsaw, staying close to your line, but not crossing it. If you drift inside your circle, you'll have to turn the whole blank down to a smaller diameter. No problem, but why reduce the size of your bowl if you don't have to?

I also own inexpensive electric chain saw. This saw is excellent for turning logs into bowl blanks. The chain saw's rough blade isn't dulled by a little sand in the tree bark and the saw makes quick work of any piece of wood that will fit on my lathe. Because this is a plug-in saw and makes no exhaust, I also use it inside my shop, especially for taking the corners off really big blanks. I sometimes refine these pieces of wood on the bandsaw, but just as often they go straight to the lathe. If you can't afford a bandsaw right now, you might find an electric chain saw adequate for blank preparation. It goes without saying that these saws are dangerous. Read the instructions and take appropriate precautions.



Figure 5.6: Even an inexpensive electric chainsaw like this Harbor Freight model can make it much easier to process raw lumber into turning wood.

A Second Grinder

Your white wheel grinder is all you need for keeping your turning tools sharp, but it can be worth having a second grinder for rougher shaping of metal. I have a 6-inch, gray-wheel grinder with a coarse carborundum wheel and a fine wire wheel. The wire wheel is for removing rust and paint off old tools I'm restoring, and the coarse wheel is for fast grinding of metal.



5.7: A second grinder is very useful for making or re-shaping tools. This 6-inch, high-speed model has one coarse wheel for rough grinding and a wire wheel for removing rust and paint.

I've made a number of my own tools, both for turning and for other kinds of woodworking and having an aggressive grinder is helpful for fast metal shaping. If you want to make a tool, or even just regrind one of your existing tools, you can use your white-wheel grinder. But those soft wheels will wear down quickly. Coarse gray wheels are not only aggressive, they're nearly indestructible and they last for years. I've had my 6-inch

grinder for 8 years and I'm still on the wheel that came with it.

Be careful any time you're using the gray wheel with carbon steel. Gray wheels heat metal up much faster than white and drawing the temper is a real danger. Keep a can of water close-by while grinding and dip your tool frequently to cool it. Keep your fingers close to the edge you're grinding so you can feel heat building up. If the whole piece gets hot, drop it in a bucket of water or leave it on a big piece of cast iron, like a table-saw. Thick cast iron makes a great heat-sink and will cool a tool quickly. If you do get a sudden change in color at the edge of a tool, don't panic. It's not really a big deal. Plunge it right into water and it will probably reharden right away. If you think you've really messed up an edge, just grind away the discolored steel until you hit bright metal again. I've overheated many tools in my life, but this discoloration has always been right at the surface and I've never ruined or even seriously damaged any tool by grinding it. Remember that high-speed steel tools are unlikely to be damaged by heat at the grinder, but you still want to avoid heating them unnecessarily.

Like every other tool, grinders come in a range of prices. My Dayton is built like a tank and I'm unlikely to ever need another one. If you need something inexpensive, scour the local tag-sales and flea-markets for a vintage Craftsman grinder. These machines are

robust and even old ones often have years of life left in them.

A Chuck (and Jaws)

A chuck is mostly used for bowls and similar large work. A woodturning chuck has four jaws that move together as you open or close them. These jaws can either expand into a recess or contract to grip a tenon that you turn on a workpiece. Once the workpiece is gripped in the chuck, it can be turned and hollowed easily.

Chucks can be used with a variety of jaws and accessories and understanding these jaws is key to getting good performance from your chuck.

Worm Screw

This accessory is just a piece of threaded rod that can be gripped in your chuck. You drill a hole in your workpiece and then run it onto the worm screw. In this arrangement, even the most oddly shaped piece of wood can be roughed out and shaped for further turning. Generally, one mounts a piece on the worm-screw and turns it round before adding a recess or tenon on the far end. The blank can then be flipped around and gripped in dovetail jaws.





Figure 5.8: The worm screw insert is gripped in the chuck jaws and threaded into a hole in the work. The chuck can then be mounted on the lathe.

Dovetail Jaws

These tapered jaws are made to grip a tenon or recess that you turn into a bowl-blank. By gripping the workpiece in dovetail jaws, you can easily hollow out a bowl and turn the outside. Dovetail jaws offer a good

hold, but they're not perfect. I've knocked many pieces off my dovetail jaws over the years. It's never fun to chase a workpiece around the shop, but it's the price you pay for convenience.



Figure 5.9: Dovetail jaws can expand into a recess in the bottom of a bowl. The workpiece can then be taken on and off the lathe with ease.

Cole Jaws

Whether you use a tenon or recess to grip your workpiece in a chuck, you're going to want to finish the bottom of your bowl when you're done. Cole jaws are specifically made to grip the rim of a bowl so you can turn off the tenon or recess that you used in a previous step. These jaws use movable threaded inserts and rubber cylinders to grab the rim of your work. Their holding power is somewhat weak, so you need to take light passes with the tool. When you take your piece out of the Cole jaws, it should be complete.



Figure 5.10: Cole jaws allow a chuck to safely grip the rim of a bowl so that the bottom can be finished. Often, the cole jaws are used to remove the recess or tenon from a previous step.

Specialty Jaws

Beyond the jaws that I've already discussed, there are dozens of other jaw sets you can buy for your chuck. Each set of jaws offers its own special holding

capabilities. Serrated jaws have ridges cut into them for additional holding power. Pin jaws can grip narrow stock for fine turnings. The list goes on and on.

If you are interested in bowl or other hollow-form turning, you can consider a chuck and the three jaw types I discuss above. As your work becomes more specialized, you can add new jaws to expand your work holding options.

Spindle Adaptors

Most chucks are produced with a single internal thread, which may or may not match the spindle on your lathe. Tool makers know that there are a variety of thread pitches on modern lathes, so they also sell adaptors to allow their chucks to fit the most common spindle specifications. This is why it's so important to buy a lathe with a modern spindle-thread. The chuck you buy might screw right on your lathe, or you may need to spend an additional \$25 on an adaptor. Either way, research your chuck's internal thread and check the available adaptors before you buy it.



Figure 5.11: Most chuck manufacturers produce a variety of spindle adaptors to make their chucks fit several different spindle threads. They are easy to install.

Buying a Chuck

Chucks are expensive, but you have a range of choices. Major chuck manufacturers include Nova, Oneway, and PSI. I have a small Nova chuck and I'm pleased with it, but it's the only chuck I've ever owned, so I can't swear it's the best. In addition to the major manufacturers, companies like Grizzly offer cheaper versions of the standard chuck and these might be worth looking into. Chucks rarely go on sale, but you can sometimes find package deals on a chuck and a selection of jaws. Since the jaws themselves can be expensive, you save money by buying a package.

My one piece of advice is to buy a chuck that tightens with a key, rather than a pair of tommy-bars. The tommy-bar setup requires you to hold one bar in each hand while tightening the chuck. This leaves you without a hand to steady the work and getting your work chucked-up can be frustrating. A key can be tightened with one hand and is far more convenient.

Finally, be aware that the majority of chucks manufactured worldwide are meant for *metal turning* lathes and are not suitable for woodturning. If you buy a four-jaw chuck designed for metal work, you will find it very difficult to use for woodturning. When buying a chuck, be sure it's intended for a wood lathe. I know this sounds obvious, but these mistakes are easy to make when you're just starting out.

Other Accessories

Extra Faceplates

Even though I have a good chuck and a variety of jaws, I do all my large turning on a faceplate. Your lathe should come with at least one faceplate, and this simple metal disk threads onto your spindle and allows you to hold large pieces with confidence. You can screw a work-piece directly to the faceplate, or you can glue it to a block of wood and screw *that* to the faceplate. You part off the glue-block toward the end of the turning process and you're left with just your project. This is how turners have done bowls for a long time before chucks were introduced.



Figure 5.12: The faceplate provides a rocksolid hold for large turnings. Here, I'm using it to rough a blank, but I could also do an entire piece with just the faceplate.

It's handy to have more than one faceplate around. You may have a big project mounted to your lathe and need to take it on and off several times while you do smaller projects. The most convenient thing is to just

leave the faceplate on your project and have a few more faceplates for other turnings. You can mount and remount projects to a single faceplate, but you always run the risk of your screw holes stripping. You might also remount the piece slightly off-center and have to turn it round again. Having more than one faceplate solves this problem.

You can also make your own faceplates out of wood. All you need is a screw tap that matches your lathe's spindle. Useable taps can be made from large bolts, or you can buy a commercial tap like the one made by the Beal company. Then, you can make all the faceplates you need out of scraps from your shop.

Pen Mandrel

Many wood turners get started with the craft specifically so they can turn custom pens. I've never done it myself, but it looks like fun. A standard lathe and tools will turn pens as easily as any other spindle, but you will need a pen mandrel. This narrow steel shaft fits between your headstock and tailstock and allows you to securely mount the parts of a pen for turning.

If you go down the rabbit-hole of pen-making, you'll probably end up with many other accessories, like a pen press and a mandrel-saver, but the only thing you absolutely must buy is the mandrel.

Bowl Gouge

Most bowl-turning is done with a single tool: the bowl gouge. This gouge looks a lot like your spindle gouge, but is much heavier in construction. Most bowl gouges are made from heavy-gauge round stock with a U-shaped flute milled in. These gouges are typically sharpened with an "Irish" or "fingernail" grind. The user generally grinds the tool to their own tastes and then keeps the tool sharp with a jig like the Wolverine.



Figure 5.13: The bowl gouge is a complex tool that is difficult to master but can shape almost every surface on a hollow-form turning.

The complex shape and sturdy construction of the bowl gouge make it a versatile tool, capable of roughing, hollowing, and scraping. Many turners even use the bowl gouge for spindle work. Of course, there are many other tools you can buy to help your bowl turning, but the standard bowl gouge is versatile and dependable. Once you become comfortable with spindle work and lathe safety, grab an inexpensive bowl gouge, learn to sharpen it and start turning your first bowls. It's easier than it looks.

Sanders

Most turnings need to be sanded prior to finishing. Many turners just use pieces of sandpaper held against the work while it spins. This method works well but sometimes leaves scratches that are hard to sand out and show up in the final finish. To achieve a superior surface, many turners use some kind of power or rotary sander. A standard random orbital sander will sand the outside of large bowls. You can also use a sanding pad attached to a mandrel and gripped in the chuck of a cordless drill. Both of these options work well for the exterior of pieces, but neither will fit inside a bowl. For sanding in these tighter confines, you might buy a right-angle drill and use it with a small sanding pad. For myself, I rarely use power sanding and I get good finishes with regular sandpaper. Still, the projects and woods you turn may need power sanding and you shouldn't hesitate to get these accessories if you feel you need them.



Figure 5.14: Even though it can be a bit clunky on smaller work, a standard random orbital sander is effective on the outside of bowls.

The Bottom Line

I've labeled all the things in this chapter "accessories," but only you can figure out what you need. Most people begin with spindle work and then move on to larger pieces, bowls, and hollow-forms. You might end up focusing on pens or some other turning that I've never even heard of. As you develop as a turner, you'll discover the accessories essential for your own craft. My only word of caution is that it's too easy to throw money at a problem that might be solved with creativity or patience. If you're not getting a good surface on your work, look at your tools and techniques and read up on surfacing techniques before you shell out the money for a fancy sander. Doing more with less will almost always make you a better turner.

Day 6: Find Some Wood

Once you're set up for turning, you're going to need some wood. In the beginning of your turning career, you will scrounge everywhere for wood; after about a year, you'll have so much turning wood laying around that you end up burning some so you can make room for more. In complete honesty, I have never paid for a piece of turning wood and with some time and strategy, you won't need to, either.

Where Can I Find Turning Wood?

In a word: everywhere. I've lived in four different states, all across America, and every one of them has had turning wood laying around for the taking. If you already do woodwork or make furniture, you're probably used to paying for long, straight pieces of commercially dried hardwood. When you're turning, you can use pieces that are short, oddly shaped, green, or even slightly rotten. Lots of woods that you would never touch for furniture making are perfect for turning.

Woods to Start With

If you already do woodwork, I guarantee that you have some turning wood sitting in your shop. Take the offcuts from a recent project and glue them up into a square; you now have a bowl-blank. Glue two narrow boards together and rip them so that they are square in cross-section to make a couple of spindle-blanks. Start turning.

If you're not already a woodworker, go down to the local home-center and buy an 8-foot 2x4 (kiln-dried; not pressure-treated). Cross cut it into eight equal sections and rip each of these in half. If you don't have the power tools for these cuts, pick up a cheap handsaw and use that. You now have 16 very cheap practice pieces. Grab your spindle tools and start making sawdust. Once you have destroyed all 16, you will probably have mastered the basics of spindle turning.

Collecting Local Woods

I love finding an ugly log by the side of the road and bringing it home to make into a bowl or a vase. One of the ironies of woodturning is that the ugliest pieces of wood often make the most beautiful finished products.





Figure 6.2: Surprisingly ugly logs that might be burned or thrown away can yield some lovely turnings. The log on the left in the upper picture became the live-edge bowl in the lower picture.

Local woods are frequently the best for turning. Homeowners, tree companies, and public utilities cut trees and leave the logs for garbage pickup. And that's good news because there's almost no such thing as a wood you can't turn. Green softwoods like pine might have too much sap to be worth dealing with, but

everything from oak to aspen can be turned on the lathe and even pine turns nicely when it's dry.

Local woods are also unique. Even the best hardwood dealers stock a relatively limited range of species. Wherever you live, you can probably find wood that you can't buy anywhere. I love turning dogwood. It's a pure, bone-white color and very dense. I use it for everything from bowls to chisel handles and I've never seen it for sale anywhere. When I go to the woodworking supply stores, I see the big stacks of exotic turning blanks, and I walk right past. My local woods are just as good and don't cost anything.

Parts of the Tree for Turning

You can use any part of a tree for turning. Branches can make good spindles, although narrow pieces that contain the pith might split or warp as they dry. These pieces are still great for practice, so don't throw them away. For spindles you intend to keep, narrow pieces of split wood make stable spindles that should dry without trouble.

Any thick part of the tree can make a bowl-blank. Trunk wood is preferred, and bowl blanks are typically cut *along* the grain because long grain is easier to turn and more stable than end grain. Thick branches can be just as good for bowls, especially when split in half. If

you find a piece of "crotch wood," where a trunk splits in two or where a large branch grows out of the trunk, you might find beautiful, highly figured grain inside. These pieces can be especially good for bowls and hollow forms, even though the swirly grain can be challenging to turn.

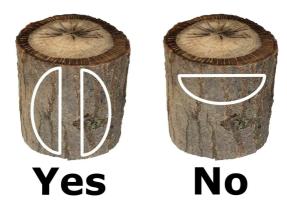


Figure 6.3: Bowls cut along the grain (left) are easier to turn and less likely to split as they dry. Bowls turned "end grain" (right) are more challenging to turn and much more likely to split across the pith.

As you collect wood, keep a lookout for **burls**. These are growths on a tree that come from disease or insects. The grain inside is often dramatic and filled with interesting features like bark inclusions. Burls are among the most prized wood for turning, so it's exciting to get one for free. They makes especially good bowls and

hollow-forms and some turners save them for years looking for the right project.



Figure 6.3: This silver maple burl could make a lovely turning when cut and dried. Be aware that cutting this burl would likely kill a living tree, so burls should generally be taken from dead trees or trees that are being cut down anyway.

I also love to turn pieces of tree root, especially root balls that form where the trunk splits apart into the roots.

These pieces often have grain that's just as nice as any burl, but people throw them away. Root balls might have sand, bark, or small stones embedded in them and they can be hard on your tools, but I find them worth the trouble. I use them for bowls and vases, and some of the results have been stunning.





Figure 6.4: Both this bowl and this vase were turned from root balls. The original wood looked like clumps of dirt, but the grain of the root made for lovely turnings

Be aware that most of the wood you get for free will be

green, or wet wood. Unlike most furniture making, where wood needs to be dry, green wood is excellent for turning. A green log will turn much more easily than a piece of dry hardwood and you'll be surprised how quickly you can rough out a green-wood bowl. The downside of green wood is that it might warp or crack as it dries. Many turners rough-turn bowls and other hollow forms to a wall thickness of about 1 inch and then leave them to dry for several months before remounting them on the lathe and finish-turning them.

In recent years, turners have invented many good methods to speed up drying. Bowls that are soaked in denatured alcohol or dish detergent dry much more quickly. I like to microwave my bowls to drive off excess water before final turning. Each of these methods has their own quirks and special requirements, so you'll need to research them and find a method that works best for you.

Recycled Wood

Even though green wood is easy to turn, there are many times where you want to turn a piece of dry wood and be finished more quickly. This is where recycled wood comes in. Anything made from wood might be repurposed for turning. Thick legs from old tables or chairs can make excellent spindles. Much of the

furniture that people throw away is made of quality hardwood. You might have to cut it up and glue together blanks, but the work is usually worth it to get a solid turning blank that will be dry and ready to use as soon as it comes off the lathe.

Recycled construction woods can also be great for turning. Many old buildings were constructed from the kind of old-growth timber that you just can't get any more. Beams and joists from abandoned homes and old factories are often thick and thoroughly dry. You can buy pieces of reclaimed wood from companies that specialize in demolishing and selling these old buildings. Personally, I'm not above hopping into a dumpster if I see a nice piece of wood sticking out.

Construction sites and roadwork can also be great sources of reclaimed wood. Any wooden construction will have off-cuts that just go into the trash. I also get great chunks of wood from road crews laying water mains or new sewer pipes. These pipes are shipped with thick wooden beams in between them as spacers. For whatever reason, these spacers are generally made from hardwood and I have gotten beams that were made from maple, oak, ash, and birch; all for free. Of course, I always ask before I take anything from an active construction site, but I find workers are more than happy to get rid of things that were going into the dumpster anyway.



Figure 6.5: This large bowl was made from Ambrosia Maple beams salvaged from a pipelaying crew. Great wood is often free and is found in the most unlikely places.

Other Materials

Your wood lathe can also turn a number of other materials. You can work with plastics like acrylic and

composites like Corian. You can pour epoxy resin into a project and then turn it once it hardens. You might even turn soft metals like Aluminum. And many of these materials can be combined. Glue up a blank made from alternating sheets of plastic and wood and then turn something from that. Whatever you make, it won't be boring.

Personally, I love this kind of experimental turning, but I'm always cautious and I research my materials before I turn them. When turning an exotic material, I look to see if it's been turned before and what the hazards are. When dealing with synthetics or composites, you must also think about safety. Will a certain material produce flammable shavings or toxic dust? Better find out before you turn it. If you have some mystery material that you can't identify, don't put it on the lathe. Some materials react very poorly to heat and friction and there's no need to experiment when so many great turning materials are already out there.



Figure 6.6: I turned this composite bowl from plywood scraps and tinted epoxy resin. Many turners shy away from these unusual materials, but they can lead to some nice pieces.

Day 7: Learn Sanding and Finishing

One of the best things about woodturning is that you do your finishing right on the lathe and even dry your finish with friction. With most projects, your work comes off the lathe 100% done and ready to be displayed or sold. In furniture-making, finishing is a long and nerve-wracking process. For turners, finishing is a quick last step.

Before you can finish, you generally must sand your work. The amount of sanding you need will vary depending on the project and the type of wood, but you generally want to sand to a high grit like 220. And you need to be sure all the scratches from previous grits are gone when you're done. Sanding is a big topic, but here are a few quick tips:

1) Move the lathe slow and the sandpaper fast. Many turners think that high speeds must be better for sanding and they crank up the lathe when the sandpaper comes out. Most of the time, you want the opposite approach because sanding at a high speed is more likely to leave marks that are hard to remove. Set the lathe at a medium-low speed and

keep the sandpaper moving. The sandpaper shouldn't be still against your work for even a second. This precaution reduces concentric scratches that go all the way around your piece and are difficult to sand out.

- 2) Sandpaper is a cutting tool and it gets dull. Because of how fast the lathe turns, your paper will wear out very quickly. Dull sandpaper doesn't sand; it just crushes wood fibers and overheats them, making it difficult to sand further. Rotate your sandpaper frequently and back it up with a medium-soft object like a kitchen sponge. When your whole piece is dull, throw it away. Here's a good rule of thumb for sanding on the lathe: use your sandpaper as if someone else was paying for it.
- **3) Sand along the grain between grits.** Each time you finish with one grit, stop the lathe and manually sand the long way, from headstock to tailstock. Sanding this way helps reduce sanding scratches and gets you ready for the next grit.



Figure 7.1: I hand-sand the interior of my bowls. In between grits, I stop the lathe and sand from base to rim. This process reduces scratches and gives a more uniform surface.

4) Mineral spirits and denatured alcohol reveal flaws. By rubbing either of these solvents on your work (with the lathe stopped), you can get a pretty good idea of what your piece will look like finished. If the spirits or alcohol show scratches, go back to a lower grit and sand again. Scratches in the

surface will be very obvious after finish is applied.

When your piece is thoroughly sanded, you have a huge array of finishes to choose from.

Two Idiot-Proof Finishes

An excellent first finish is beeswax. You can buy it at craft stores or online. You want the yellow, soapy looking stuff, not the brown, unrefined wax that some beekeepers sell because that wax has too many impurities. Once your piece is finish-sanded, hold a chunk of beeswax against it until the friction starts to melt the wax. Move the wax slowly along your piece, making sure to keep the end hot enough to melt and flow evenly onto the wood. Once you've waxed the whole piece, take a dry paper towel folded into a pad and press firmly against your turning. Let the heat build up again, and slowly move your paper towel along the wood. In this last step, you are melting the wax again, driving it further into the wood fibers, and polishing off the excess wax. You should be left with a soft and inviting finish that others will enjoy touching. Beeswax is not the most protective finish because it is soft and not water-proof, but it is food-safe right away and offers some protection from moisture.

My favorite "easy" finish is mineral oil. This is the

clear, thin oil that is often sold as "cutting board conditioner." Don't buy the cutting board stuff; instead, buy your mineral oil from the pharmacy, where it's sold as a laxative for about ¼ the price.



Figure 7.2: Cheap, generic mineral oil makes a good, easy finish.

Applying mineral oil is easy. I often dip my sandpaper in it during the last few grits. Sanding the oil into the wood ensures good penetration and virtually eliminates sanding dust. After I finish sanding, I usually slather on some more oil and buff it off at high speed and a dry paper towel. This technique darkens and accentuates the grain and mineral oil is surprisingly long-lasting. I have bowls I finished with this method over six months ago and they still have a pleasing luster and a soft feel.

Other Finishes

Most wood finishes can be used on the lathe. Boiled linseed oil, Tung oil, shellac, lacquer, and polyurethane all work. One of my favorites is wipe-on polyurethane. This product comes pre-thinned and soaks right into the wood. You can then friction-dry it, just like you would beeswax or mineral oil. Add as many coats as you want to slowly build your finish. When I want a harder, glossier finish, I'll often take the piece off the lathe and spray a few coats of clear lacquer.

Some turnings require a glassy, super-hard finish, and two-part epoxy is perfect for this job. I use a boat-builders epoxy like West System, which comes in cans with pumps for convenient measuring and mixing. I

apply 2 to 3 coats of epoxy, following the directions on the can. Once the epoxy is fully cured, I sand it down with fine grit wet-or-dry sandpaper and mineral spirits as a lubricant. For the final gloss, I follow up with buffing compound, automotive polish, and wax. The final finish is brilliantly hard and glossy, but may be a little artificial. It's perfect for some turnings but would ruin the organic feel of others. As you continue turning, you will learn which finishes compliment which woods.



Figure 7.3: For hard and glossy finishes like epoxy, I sand and polish with automotive finishing products. Wet-or-dry sandpaper, swirl-remover, and polish are all expensive, but they last a long time and leave a brilliant shine.

A final, popular finish I should mention is friction polish, which is activated through heat and leaves a nice

gloss finish on your work. You can buy friction polish in a can, but there's no reason to. It's just an equal mixture of shellac, boiled linseed oil, and denatured alcohol. You can mix it up yourself and there are many recipes online.

You might notice that I only apply my finishes with paper towels. This is a safety precaution. You must never bring a cloth rag to a spinning lathe. Just like long hair or loose clothes, a cloth rag can get caught and pull you into the lathe. A paper towel will tear long before it pulls you in. Be aware that many finishes like polyurethane and boiled linseed oil heat up as they dry. Wadded-up paper towels or rags soaked in finish can burst into flames hours after you throw them away. If you've thrown them into a bin full of shavings, you might start a large fire. To dispose of finishing rags, you can push them into a lidded container filled with water, but I generally spread them out in a single layer on my concrete floor to dry. With concrete against one side, the rag is starved of the oxygen it needs to ignite. When the rag is stiff and dry, I just throw it away.

The Bottom Line

Turning is the one kind of woodwork where finishing is fast and easy. Most finishes work well on the lathe and look good. If you do mess up the finish, it's easy to sand it off and start over. At first, you will probably have one or two finishes that you're comfortable with. After a short time turning, you will build up a good collection of finishes and the knowledge to know when to use them.

And on the Eighth Day, They Rested

If you've followed the book this far, you might be a bit tired. I know it took me a lot longer than a week to get my lathe and accessories all set up. It might take you longer than a week; don't feel bad. I wrote this book because woodturning takes *a lot* of gear. Buying it costs money and setting it up takes time and thought. Take a moment and look around your new workspace. Appreciate what you've accomplished.

You now have a workspace with a lathe, tools, a grinder, and all the other accessories it takes to make spindles and hollow forms. No matter how long it takes, setting up a turning studio is a major accomplishment. The people in your life might think that it's cute that you have a new hobby, but turning is a lot more than that. Turning is a fine art, and the best turners exhibit their work in major galleries and command top dollar for their pieces. Someday, you might be one of these people. Even if you're not, you now have the tools to express your ideas in wood. Soon enough, you will make beautiful objects that your friends and family will cherish. There will come a day when you give someone

one of your turnings and they won't believe you didn't buy it in a store. You will see them cradle their new bowl or Christmas ornament as if it were the most precious thing in the world.

At that moment, you will know for sure that all the time, money, and practice has been worth it.

Good luck.

Glossary

Aluminum Oxide: a compound of aluminum and oxygen with a crystalline structure. This substance has excellent abrasive properties and is found in sandpaper, bench stones, and grinding wheels.

Band saw: a common form of power saw where the blade is a thin, continuous loop of metal with teeth on one side. The blade runs on two large pulleys that are driven by a motor. Because of the thinness of the blade, the bandsaw excels at curves and making extremely thin cuts.

Banjo: the bracket connecting the tool rest to the bed of the lathe. Not to be confused with the five-string musical instrument.

Bead: a common detail in spindle turning. A bead is a hump or protrusion on the spindle.

Bevel: the slanted part of any cutting tool. The bevel is the transition between the face or back of the tool and the edge.

Blank: a piece of wood that has been partially prepared for turning. Blanks are often sold cut square and dipped in wax to prevent splitting, but they may also be round. Blanks are available commercially, but many turners also prepare their own blanks and set them aside for future turning.

Boiled linseed oil: the oil of the flax seed, heated in the absence of oxygen. This process polymerizes the oil, making it a good wood finish that dries quickly. Boiled linseed oil (also referred to as BLO) offers only modest protection from moisture and scratches, but is also nontoxic, food safe, easy to apply, and smells pleasant. It's an excellent finish for woodturnings that will not see heavy use. It also accentuates the grain of nearly any wood and is compatible with most top coats, so it can be applied under polyurethane or lacquer to produce a more attractive finish. Don't confuse this product with raw linseed oil, which has not been treated, takes much longer to dry, and is less durable.

Bowl Gouge: a turning tool specifically designed for bowls and other face-plate work. The gouge is round in cross-section and has a deep flute milled into it. The tool retains its full thickness all the way into the handle, unlike more light-duty tools that may only have a thin tang inserted into the handle. This robust construction

allows it to stand up to heavy cutting on large pieces. The tool is very versatile and allows for several different cuts, as well as effective scraping.

Burl: a bulbous growth on a tree resulting from disease or insects. The unusual growth of the burl results in "wild" grain patterns which may swirl and reverse direction dramatically. Burls may also include pockets of bark or voids. This material is highly prized by woodworkers for its exciting grain but is also difficult to work with and can be fragile.

Carbon Steel: an alloy of iron and carbon where carbon represents less than 2% of the overall mass. Carbon steel has been used for centuries for all kinds of cutting tools. The presence of carbon in the correct proportion allows the steel to be hardened and become much more effective for cutting than plain iron. Until recently, all turning tools were made from carbon steel, but the recent introduction of **high-speed steel** and **tungsten carbide** has rendered carbon steel obsolete for woodturning.

Carborundum: the common name for silicon carbide. This substance makes an excellent abrasive and is used for sharpening stones and grinding wheels. Many sharpening devices referred to as carborundum are

actually aluminum oxide, but this makes little difference as both of them have good abrasive properties.

Center-Finder: a common measuring tool used to find the exact center of a circle or square. Machinists use highly accurate metal center-finders, which are also excellent for woodturning. Cheap, plastic center-finders function almost as well for woodwork at a fraction of the price.

Cove: the opposite of a bead. This spindle detail is a depression in the wood.

Cutting Tool: a general term for any woodturning tool (chisel, gouge, or parting) that functions by slicing the wood rather than scraping.

Dead Center: a metal cylinder with a 60° point sharpened on one end. The dead center is typically inserted in the tailstock and allows spindles to rotate freely when driven by the headstock. Dead centers are effective, but friction between the center and a workpiece can be a problem and dead centers require lubrication from wax or oil to function properly. In recent years, dead centers have fallen out of favor with turners because they have been replaced with cheap and effective **live centers**, which use ball bearings to allow the center to rotate with the work, thus eliminating heat buildup and

the need for lubrication.

Distance Between Centers: an important specification for any lathe, this distance is measured with a center in the headstock and tailstock, and the tailstock moved all the way back. Distance between centers represents the maximum *length* piece of wood that a lathe can accommodate. New turners often confuse this specification with **swing**, which is the maximum *diameter* a lathe can accommodate.

Edge: the line where a tool's **bevel** to meets the back or front of the tool. The edge performs the actual cutting.

Epoxy: a synthetic resin consisting of two parts that are usually mixed in equal proportions. The resin hardens by chemical reaction to produce a hard, clear (or translucent) substance that can then be cut, turned, sanded, and polished. In recent years, epoxy and other resins like polyester resin have become popular with turners, who use them to stabilize rot or voids in wood and to create complex composites that were previously impossible. Handled properly, cured resins can be crystal clear or dyed and then polished to a high luster, creating dramatic affects in many areas of woodwork.

Faceplate: a round plate of metal (or occasionally wood) with a threaded stem on one side. The faceplate

can be threaded onto a lathe spindle and workpieces may be either glued or screwed to the plate for turning. Faceplates are less convenient than chucks, but offer unparalleled holding power, even for large or unbalanced work.

Forstner Bit: a drill bit where the end is a cylinder with a center point and a serrated cutting edge. Frostner bits are expensive and somewhat delicate but slice wood very cleanly and leave flat-bottomed holes with crisp edges. They are often preferred over **twist** or **spade** bits, especially for drilling large-diameter holes.

Gap Bed: a style of lathe where the bed is cut away near the headstock, giving an area of greater swing where larger diameter projects can be turned without interfering with the ways. This style of lathe also exists in the world of metal turning.

Green wood: wood that is relatively fresh from the living tree and has not been dried. In general, wood is considered to be dry when its moisture content is at or below 12%. Both green and dry wood can be turned on the lathe.

Grinder: an electric motor with one or two round grinding wheels. This tool is used for rough shaping of metal and for quick sharpening of turning tools. Most

craftspeople are familiar with the 6-inch grinder common to many wood and metal shops, but most turners favor an 8-inch grinder with specialized wheels to sharpen their turning tools.

Grinding: moving a tool back and forth against a spinning grinding wheel and removing metal to establish or reshape the bevel. This procedure is generally done with a tool rest and requires some practice to avoid burning the steel.

Headstock: the portion of the lathe where the work is driven. The headstock contains the spindle and spindle bearings, and may also contain the motor, various speed-control circuitry, or a mechanical speed-control like the Reeves Drive.

High-Speed Steels: a family of steel alloys where the iron and carbon are combined with chromium, manganese, tungsten, and a wide variety of other alloying elements. These steels were developed for the machining industry for their ability to work under high temperatures while retaining hardness. More recently, these steels have been adapted to woodturning tools because of their superior edge-retention and their resistance to losing temper when sharpened at a grinding wheel. High-speed steels have rendered carbon steel tools obsolete, and even

inexpensive turning tools are now routinely made from some kind of high-speed alloy.

Hollow form: turnings that are roughly round in shape and generally hollow. The definition of hollowform is somewhat loose, but it includes bowls, vases, goblets, Christmas ornaments, and numerous other shapes. Woodturnings are often divided into two groups: spindles and hollow forms.

Honing: the process where a tool edge is refined after grinding or re-sharpened after use. Honing is generally performed on stones (oil stones, water stones) but many harder alloys must be honed on diamond plates. Honing is also sometimes performed using a powered machine equipped with paper or cloth wheels charged with an abrasive compound. Some turners hone on a buffing wheel.

Horsepower: a unit of measurement of power, generally applied to machinery. Most lathe motors generate least ½ horsepower, although a full horsepower is desirable for bowls and larger work. Some larger "professional" lathes have motors rated for three or more horsepower and are capable of turning very large pieces of wood.

Jacobs Chuck: a machine chuck found on essentially

every drill in existence. The Jacobs chuck allows quick changing and secure holding of narrow metal cylinders like drill bits. Jacobs chucks are also commonly used in the tailstock of lathes where they can drill out the center of hollow forms or hold other tools. Unlike a drill or drill press, the Jacobs chuck on a wood or metal lathe generally does not spin because the workpiece itself is spun and this provides the rotation necessary for drilling.

Jig: any device meant to hold a tool or piece of material in a specific way for repeated operations. Jigs are very common in woodworking, where they might be applied to table saws and routers. In the world of woodturning, jigs are most common in sharpening, where they allow tools to be ground quickly and repeatedly with minimum set up from the user. The most common sharpening jig for turning tools is the Wolverine produced by Oneway.

Lacquer: a common finish. Lacquer comes in several chemical formulations but is a hard and durable finish. Lacquer is somewhat less tough than polyurethane but is still adequate for most applications. Unlike many other finishes that can be applied to a spinning work-piece with a rag, lacquer is usually sprayed. Adequate precautions must be taken, because most lacquers are both flammable and highly toxic until

they are cured.

Live center: a metal cone that is inserted into the tailstock of a lathe to hold the far end of a spinning workpiece. The live center is an improvement on the older "dead center," which was stationary and required periodic lubrication. A live-center spins in a set of ball bearings and requires no lubrication.

Mandrel: a metal shaft used to spin a tool or workpiece. Mandrels are common in the machining industry, but somewhat less common in woodturning. The most familiar mandrel in woodturning is the pen mandrel, which holds all the pieces of a pen in a straight line and allows them to be turned.

Midi lathe: "Midi" is a play on words, where the word "mini" is combined with the word "mid," as in midsized. After a mini-lathes became popular in the 1990s, tool manufacturers introduced slightly larger models, which were eventually named "midi lathes" to signify that they were still small, but larger than the minis. Midi lathes combine a relatively large swing (around 12 inches) with a short distance between centers (16 to 18 inches). These lathes are often expandable with aftermarket accessories like stands and bed extensions, which allow them to come close to the size of a standard

workshop lathe.

Mineral oil: a clear, odorless, tasteless, low-viscosity petroleum oil. Mineral oil is used as a lubricant, laxative, and cutting board finish, but it's also an excellent finish for woodturning. Is accentuates grain and offers some protection from moisture while also providing a pleasant-feeling, low-luster finish. Mineral oil is sometimes applied with sandpaper to a spinning workpiece. This practice virtually eliminates sanding dust and combines final sanding and finishing into a single process.

Mini lathes: a group of small lathes first introduced in the 1990s and marketed toward pen-turners, occasional hobbyists, or woodworkers with small shops. A mini lathe typically has a swing of 10 inches and 12 to 15 inches between centers.

Morse Taper: a standardized set of machine tapers in ascending sizes labeled 0-4. Morse tapers are the standard for many machine tools and are overwhelmingly used in wood lathes. Morse tapers are abbreviated MT#, where the last digit denotes the size of the taper. Thus, a Morse taper 2 is abbreviated MT2. This size is nearly universal in wood lathes and almost all lathes that accept a taper in either the headstock or tailstock will be sized MT2.

Parting tool: a group of cutting tools meant to trim down spindles to a specific diameter or cut pieces off a turning.

Polyurethane: a synthetic polymer found in many mass-produced objects. Polyurethane is also available as a liquid finish that dries by the evaporation of solvents. Polyurethane finish is probably the most durable wood finish available, especially in the home shop. With several coats, the resulting finish is very hard and scratch-resistant while offering excellent protection against water. Polyurethane finishes can be applied directly to a spinning work piece and dried with friction. The resulting finish is both durable and very quick to apply.

Reeves drive: a mechanical transmission that uses a pair of expanding and contracting pulleys to generate different speeds. The Reeves drive is a robust and well-tested technology that has existed for decades. While high-end lathes generally use DC or three-phase motors with electronic speed controls, the Reeves drive is still a practical and effective speed-control solution for low and mid-priced machines.

Roughing gouge: a wide, C-shaped gouge intended for initial shaping and making irregular pieces uniformly

round.

Scrapers: a family of lathe tools that cuts using a scraping rather than a slicing action. A turner using a scraper does not ride the bevel but keeps the tool flat on the tool rest and plunges it straight into the workpiece. Scrapers are easy to use, economical, and can perform a wide range of tasks including roughing and shaping. In general, they are favored for final surfacing. Used skillfully, a scraper can remove tear-out and tool marks and either reduce or eliminate the need for sanding.

Scroll chuck: a type of chuck where the jaws move in and out together. This type of chuck is also referred to as "self-centering." Almost all woodturning chucks are **four-jaw scroll chucks.** This can cause some confusion when talking to machinists, since scroll chucks in the metal-working world nearly always have three jaws and chucks that have four jaws allow each jaw to move independently. So a wood turner and a machinist mean very different things when they talk about a "four-jaw chuck."

Sharpening: any process by which an edge is put on a cutting tool. Sharpening processes can include grinding, honing, polishing, buffing, and rolling a burr.

Shellac: the refined and crystallized secretion of the

Lac Beetle. Shellac crystals are dissolved in alcohol to create a liquid wood finish that dries quickly and is reasonably durable. Shellac was the dominant furniture finish prior to the invention of lacquer and polyurethane and is still very popular with wood turners. Shellac is nontoxic, food safe, and generally thought to give wood a more pleasing feel than other film finishes. Shellac is especially popular with wood turners for its fast-drying properties. It can also be mixed with various other ingredients like Boiled Linseed Oil to create different tactile or visual effects. Shellac is compatible with nearly every other finish in existence and can be applied over or under virtually anything else.

Shop Smith: a multi-use woodworking machine tool that uses a single motor and a reconfigurable frame to function as a lathe, drill press, jointer, shaper, sander, and horizontal boring machine.

Skew Chisel: a flat, straight, double-bevel chisel where the end is angled or "skewed" at 45°. Generally used for spindle work, the skew is both difficult to master and extremely versatile.

Spade Bit: a drill bit that ends in wide, flat paddle with a center point and two spurs. Spade bits excel at drilling large holes. Although not quite as clean or

precise as Forstner bits, spade bits are also cheaper and more durable.

Spindle: the central spinning shaft of a lathe. Spindle shafts are generally hollow and have threads and an MT2 taper at one or both ends. The spindle sits in a pair of bearings and is generally driven by a belt from the motor.

Spindle Gouge: a narrow gouge with a shallow flute. Spindle gouges excel at adding coves, beads, and other details to spindles. For the beginning turner, the spindle gouge is easily confused with the bowl gouge, but a spindle gouge is not constructed for bowl work and is not safe for that task.

Spindle Turning: any turning that is long and narrow (and generally not hollow). Traditionally, spindle turners focused on table and chair legs, but more artistic spindles like magic wands have recently become popular.

Spur Center: similar to a dead center, but with several sharpened points around the rim. Spur centers are inserted in the headstock and used to drive work on the lathe.

Step Pulley: a "stack" of different size pulleys cast as a single unit. The different diameters of the various steps allow a single-speed motor to drive a lathe at different

speeds.

Swing: the specification that describes the diameter of workpiece that a lathe can handle. Swing is double the distance between the spindle and a lathe bed. For example, a lathe that measures 6 inches from spindle to bed has a 12-inch swing. This term is not to be confused with **distance between centers**.

Tailstock: a movable fixture that supports the far end of pieces being driven on a lathe. The tailstock can be slid back and forth on the ways to accommodate different length workpieces. The most important component of the tailstock is the **ram**, which is similar to a spindle but does not rotate. The ram is typically bored with an MT2 taper and it accepts various centers and drill chucks. The ram can be advanced and retracted with a large hand-wheel at the rear of the tailstock. It can be locked while the tailstock is supporting a piece being turned between centers, or advanced while the tailstock is being used to drill out a workpiece.

Taper: a cone that can be inserted into a corresponding cone-shaped hole. The taper system is one of the dominant tool-holding methods in machine tools. Tapers combine strong holding power with the ability to quickly change out tools.

Temper: the appropriate hardness of any steel tool. When tool steels are heat-treated, they are generally hardened to maximum hardness, which leaves them too brittle to be useful. These tools are heated again to a lower temperature and cooled slowly to reduce their hardness slightly. This process is referred to as "tempering," but **temper** is also a generic term referring to a tool's hardness. When a craftsperson refers to "ruining a tool's temper," they mean they have inadvertently softened the tool and removed its ability to hold an edge.

Tool Rest: a horizontal bar that sits above the ways on an adjustable bracket called the **banjo**. Holding a tool against the workpiece freehand would be impossible, as the spinning force of the lathe would constantly knock the tool away. The tool rest counters this spinning force when the turner places a tool on the rest and then presents it to the work.

Tube-Bed Lathe: a family of lathes produced by many manufacturers where the lathe bed is constructed from a pair of parallel tubes. In general, this was a cost-saving decision that resulted in mediocre construction, but some high-quality lathes use tubes or round bars as the bed.

Tung Oil: a wood finish pressed from the nut of the Tung Tree. Like boiled linseed oil, Tung oil is sold in either raw or polymerized form. Any product not labeled "pure Tung Oil" may have several additives including solvents, driers, and resins. It is reported that some products labeled "Tung oil" do not contain any actual Tung oil, but this claim is difficult to verify since manufacturers are not required to disclose the ingredients in their finishes.

Tungsten carbide: an alloy of tungsten (a rare metal) and carbon. Tungsten carbide is extremely hard and has excellent edge-retention. Small tungsten carbide inserts are screwed to the tip of mild steel bars to make a woodturning tools.

Twist Bit: the most standard and generic drill bit. The twist bit literally has a "twisted" appearance. These bits are generally intended for metal work, but they are also adequate for many woodworking tasks, although they can be difficult to start. In general, twist bits are favored for any hole smaller than ½ inch and spade or Forstner bits are used for larger holes.

Ways: the top surface of a lathe bed where the tool rest and tailstock slide back and forth.

About the Author

Rex Krueger is a craftsman, teacher, and content creator living in Cleveland, OH. He owns Rex Krueger Fabricaton, a company that specializes in making unusual objects out of wood, metal, and plastic. He produces content for YouTube, Instagram (@rexkrueger) and on his website: www.rexkrueger.com