

SECRETS OF A Floor Refinisher

For a smooth, level floor that will
take stain and finish well, match
equipment and sanding grits
to floor conditions

I had an argument once with a guy who tried to tell me, “All floors are the same. You get in, you sand ‘em, you coat ‘em, and you get out.” But that’s wrong. In fact, the truth is the exact oppo-

by Sean Barry

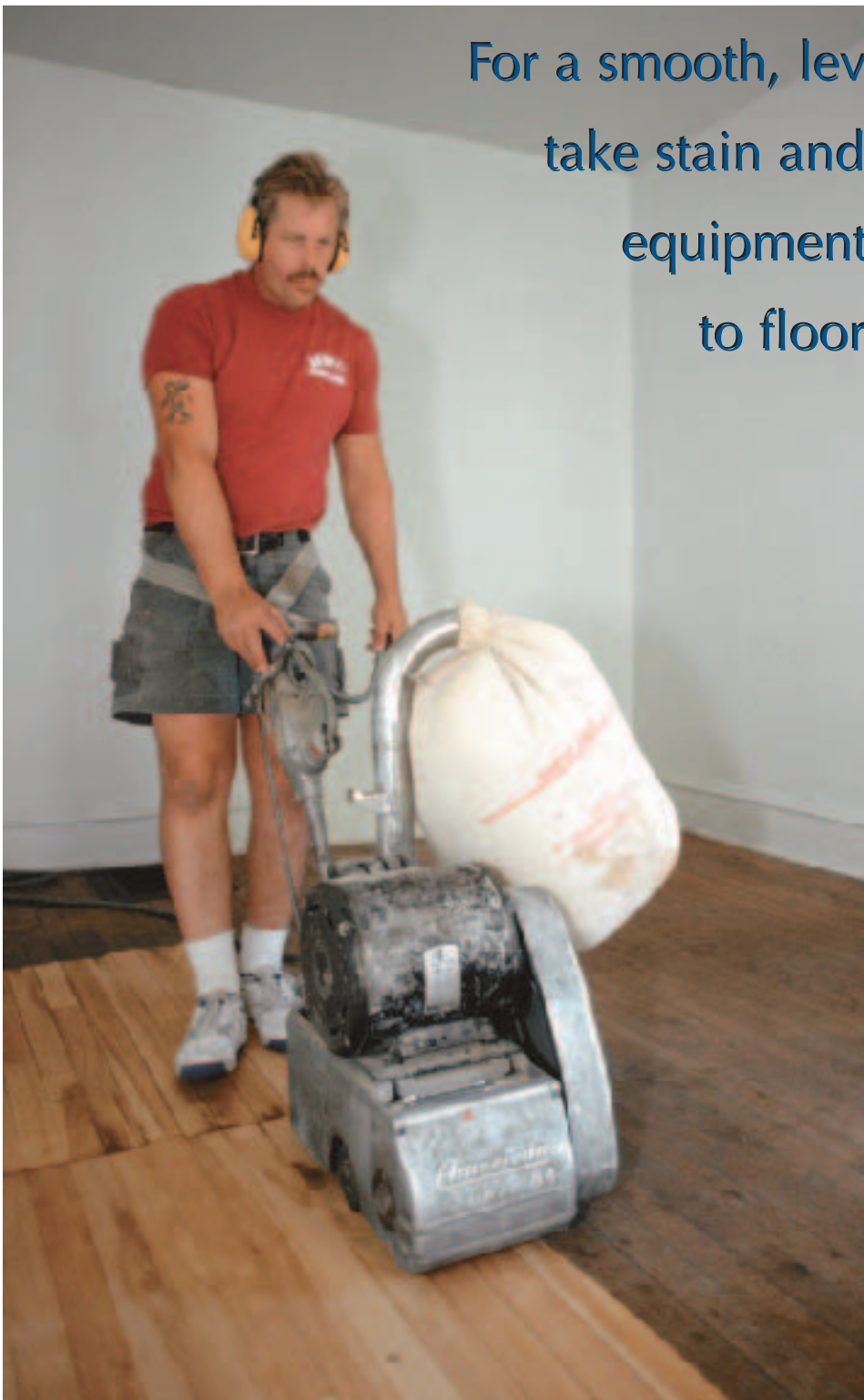
site: Every floor is different. You could take a batch of oak flooring and put it in ten different houses and have ten different sets of problems.

I’ve been refinishing wood floors for more than 25 years — up until a couple years ago, when I decided to give my knees a break and retire. I figure I’ve sanded and coated more than 3,000 floors — everything from chicken coops and old storefronts to castles and multi-million-dollar mansions — and each floor has been unique. I came away from every single job learning something new. A lot of it I learned the hard way — by making mistakes and surviving by the skin of my teeth.

In this article, I want to go over some of the basics of sanding wood floors. In a future issue, I’ll discuss staining and finishing.

The Rookie

I did my first floor job with rented equipment. I had been refinishing



Ideal Wood Moisture Content by Region

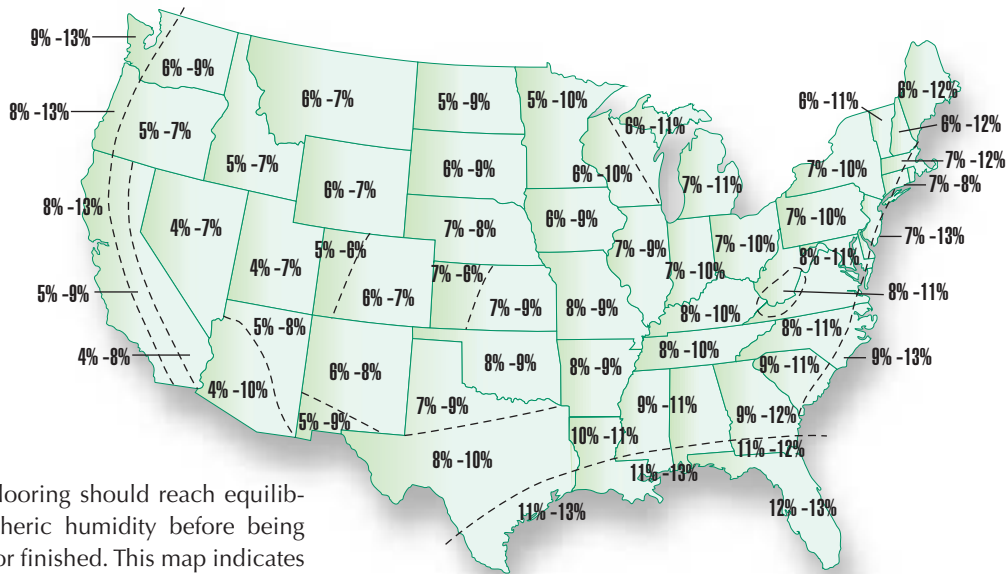


Figure 1. Wood flooring should reach equilibrium with atmospheric humidity before being installed, sanded, or finished. This map indicates appropriate ranges of wood moisture content.

woodwork in old Victorian homes for a while, and when a customer said, “My floors are wood — can’t you do them too?” I said, “Why not?”

I rented a floor sander, edger, buffer, and vacuum and bought some urethane and some sandpaper. I didn’t know what grit I needed, so the clerk told me, “You have to have a rough cut, a medium cut, and a fine cut.” And he sold me a 16-grit, a 50-grit, and a 100-grit. Needless to say, after that first floor, I nearly got sued.

One thing the clerk at the rental store didn’t tell me was that I had to feather the drum sander to the floor. I just dropped the drum down and started to go, and I dug a trough parallel to the end walls that you could plant geraniums in. Nor did anyone tell me that the 7-inch edger disk would stop an inch and a half away from the corner, and that I had to do the corners with a scraper, by hand.

I didn’t know that the big drum sander, the edger, and the scraper would all leave different scratch patterns on the floor, making it crucial to go over the whole floor with a finer-grit buffer screen before staining or finishing to rub out all those varying textures. In short, I didn’t know about any of the many things that will create different imperfections in the wood surface — flaws that you often can’t see in the bare wood, but that could and did become glaringly obvious after I’d stained and coated the floor.

I learned those details, and a lot more little items,

on that job and on future jobs. I learned that different woods sand differently and take stain and finish differently. I learned not to take a job over the phone and not to give a square-foot price. And I learned to use good equipment.

Professional Equipment

A good floor refinisher needs to have his own equipment, and he needs to take good care of it. You can’t do a top job with equipment from a rental center, because it has probably been abused and doesn’t get properly cleaned or maintained.

There are four main power tools required, and each one has its special function. There’s a big, heavy floor sander for removing old finish and creating a smooth, flat surface on the main floor. There’s an edger for grinding next to the wall where the big machine won’t reach. There’s a “platypus” with a long bill for sanding under radiators and the like. There’s a buffer for getting an even texture on the raw wood and for scuffing between finish coats. And, as I mentioned, you need a sharp scraper for corners and other areas that have to be hand-scraped.

Drum sanders. The drum sander most rental places carry has a big cylindrical drum with two cracks in it. You take a large sheet of sandpaper, wrap it around the drum, tuck the ends into the crack, and then turn two bolts to tighten it. The only problem is that you’ve got a perfect cylinder with a flat

spot on it. Every time that crack hits the floor, it causes what's called a chatter mark. When you look at the finished floor, you can see this repeating symmetrical pattern perpendicular to the boards.

The better choice is a model like my German-made machine, which has a main drum with a small roller up above it that takes belts. The belts are seamed together on the diagonal, so there's no chatter mark. To change belts, you lift up a little lever that takes the tension off the roller. You slip the old belt off, slide the new one on, and you're back in business.

Good models also have a lever for feathering the drum slowly onto the floor as you move forward. That way you don't burn trenches into the wood every time you start and stop. Unlike the buffer, edger, and platypus, the big machines run on 220-volt power.

Edgers. Edgers haven't changed much in 50 years. The motor drives a 7-inch disk of thick, heavy D-grade paper, anywhere from 12-grit up to 100-grit. The disk has a hole in the center, and you invert the edger, take out the bolt and its concave washer, take the old disk off, mount a new one onto the stiff rubber pad, bolt it, turn the machine over, and turn it on. The edger has two steel wheels in the back, which I like to wrap masking tape or duct tape around so they won't put marks in the floor.

The platypus. The platypus is designed for sanding under low objects. It's a little 3-horse motor with a pulley belt gear on the bottom of it, two big wheels at the rear, and a long extension on the front that looks like a platypus bill. At the end of the extension is another wheel driven by a V belt, which has a 7-inch edger disk mounted to it. The machine handles like a bicycle. You get down on the floor on your knees, very carefully ease the nose down, and drag it back and forth. It's a lot of work.

The buffer. A buffer is a pretty simple machine, and it will last forever if you take care of it. It's basically just a motor with a 14- or 16-inch brush. You set the brush down on a synthetic fiber pad, with a screen under the pad, loaded with anything from a 50-grit up to a 120-grit. The brush wheel rotates slowly — maybe 80 rpm — and under the buffer's 75-pound weight, the screen smooths down the scratches made by the drum sander and edger, leaving fine, uniform scratches over the whole floor.

In the old days we used steel wool under the buffer, instead of the synthetic fiber pad and screen. The pad and screen are a big improvement — fine bits of steel wool used to rub off and get rust into the floor. Other than that, though, the buffer also is the same machine it was 50 years ago.

A lot of the buffers in rental stores are 25 to 30 years

old; I still have the first buffer I bought. You blow the dust out of it, put new brushes in the motor, clean it once in a while, and it'll keep running. You can pull the brushes out and replace them for about \$5 a set. Of course, if you don't do that, the core of the copper wears out, and that's a \$900 replacement.

Scrapers. The scraper has a wooden handle with a Carborundum blade on the end of it, which has to be sharpened with a file over and over after not very many strokes. You pull the edge over the wood in the corners, or anywhere that a machine can't reach. It's tedious, but there's really no other way.

Estimating Refinishing Jobs

Hundreds of times, I've answered the phone and heard, "Listen, I need a floor stripped. What do you get a foot?"

What do I get a foot? "I'm sorry, I can't give you a square-foot price. Every job is different."

Say you have a room to sand and coat that's 30 feet by 30 feet; that's 900 square feet. You've got 120 lineal feet of walls to edge, and there are four corners to scrape. But now consider a house that's 30 by 30 — same square footage — but with four rooms, a set of stairs, and a hallway. There could easily be 300 feet of wall to edge. With four rooms, plus the stairs and hallway, there are 24 corners to pull. Say in the hallway the boards run the short distance; then that whole space has to be done with an edger. If there are closets in the bedrooms, they have to be done with an edger, too. If there are radiators in a room, they have to be taken out; if they're baseboard radiators that can't come out, you have to use the platypus, which is even harder to run than the edger. Wherever there's a cast-iron radiator that won't come out, someone has to hand-scrape under the pipes.

It's an hour's work to do one radiator. Somebody could completely sand a 10x10-foot room in the time it takes to do one radiator. I would never hire anyone who gives a square-foot price.

Assessing moisture conditions. Before I start any job, or even price it, I go to the site and do what I call a primary survey. Is the house on a mountaintop, is it next to the beach, is it in a swamp? Is it in a forest and surrounded by trees so that all the moisture is trapped?

Moisture affects the ability of the wood to be sanded, stained, and coated. You always want to check the moisture content of the floor — it could be anywhere from 4% to 34%.

Ideal moisture contents vary in different parts of the country, because the wood has to come to equilibrium with the environment, and average

atmospheric humidity differs from place to place (see Figure 1, page 2).

My primary survey also includes a surface inspection. First I get the room completely cleared out and vacuum the floor. Then I get down on my hands and knees with a pair of kneepads on and examine it. If there's candle wax dripped here and there, it will get worked into the floor and prevent the finish from adhering. I scrape that up with a metal scraper. Sometimes I find little bits of black tar. That has to be cleaned up, too — if I grind tar into bare wood, it'll be tough to get out.

I also look for nails, and before I sand, I countersink them all (Figure 2). One nail can ruin a whole job. You get something called a nail run. Sometimes the nail is flush with the surface of the floor, and you don't see it until you sand it and it shows up as a little silver line. But that nail just put a groove in your sanding paper. Now, with every run down the floor, you'll duplicate that pattern on the floor. It makes this little raised tube on the surface of the wood; then when you stain the floor and finish it, the first screening will take the color off the top of those little raised strips. You're at the very end of the job and strips pop up everywhere. Nail runs are scary.

But even scarier is what can happen if you run over a drywall screw, or a dime or penny that has fallen into a crack between wide boards. Part of the reason for vacuuming is to suck up those things. If a floor sander hits a screw at 2,800 rpm and that thing sparks while your bag is full of fine sawdust and you're sucking in 1,600 cfm of air, you can get a fire in the bag. I've had bags blow up on me twice. I'm sanding along, and all of a sudden it smokes and boom! It just bursts into flames. That's why I have a fire extinguisher with me at all times. I can immediately shut off the machine, leave the bag where it is, and extinguish the fire right there. I don't carry the bag through the house, because I don't want to set the rest of the house on fire.

The Art of Sanding

When I sand a floor, I'm mainly trying to remove old finishes and stains. I don't want to remove any more wood than I have to. Most things in construction you can fix — you can touch up paint, and you can patch drywall. But once a wood floor is sanded, you can't put the sawdust back. That's gone forever.

Most floors have a life of two or possibly three refinishings. After that, there's nothing there. With $\frac{3}{4}$ -inch tongue-and-groove boards, when you wear down almost through the top lip of the



Figure 2. All nails need to be countersunk before any fine sanding takes place. If the drum sander hits a nail, it will groove the sandpaper and cause a disfiguring “nail run.”

groove, the lip starts to lift and people start to get big splinters. It's over.

You'll sand a floor several times each time you refinish it. It starts with a diagonal cut, using rough grit, to level up the boards. There's usually a second diagonal cut at right angles to the first. Then it takes one or two straight cuts (parallel to the boards) to smooth the surface, using progressively finer grits. Finally, you screen the entire floor with the finest grit to create a consistent fine scratch pattern.

Nitty gritty. You always step from coarse grit up to fine grit, but the particular grits are different for different cases. You have to get a feel for it — going too coarse burns up too much wood, but going too fine burnishes the wood and can make it reject the stain.

The lowest grit we have is a 12. Twelve-grit means there are 12 pieces of grit per square inch of paper, so your grit is far apart and pretty thick. A 120-grit paper has 120 pieces per square inch; that's a fine grit for floor sanding.

A 12-grit paper is like gravel. I wouldn't hit wood with 12-grit — it'll shred it. But I would use it to tear off linoleum and tar and paint. Linoleum dust is nasty, but you can tear off linoleum in big chunks using a 12-grit belt. Old linoleum is often sealed



Figure 3. A first rough cut with the drum sander using coarse grit can pull off linoleum and its adhesive but may not expose the wood in low spots (left). The drum sander also leaves an unsanded area near the walls (above), which has to be sanded with the edger.

down with tar, but if you move fast with a coarse grit, that will come up in chunks with the tile, and you can sweep it up.

If you start with a 12-grit, you'll step up to a 36 or so next. Why just a 36? Well, you're trying to match what came before. You can't jump from a super-low-grit paper up to a fine grit in one step. A 100-grit paper would just clip the ridgetops off whatever the 12-grit left behind and leave the grooves there. You want to use a grit coarse enough to cut a lot off the high points, without digging any new low points.

For a bare wood floor, or one with nothing but old finish on it, I'd start out higher than 12 to begin with. Take a brand new oak floor, just installed. A good first cut would be a 40-grit on a diagonal; then I'd do a 60-grit straight cut, an 80-grit straight cut, and finally screen it with a 100-grit screen — or even just another 80. But if you're working with a sappy old fir floor with varnish on it, you might go down to a 36- or even a 24-grit for the diagonal cut. Then you'd step up to maybe 40 and 60 for your straight cuts, and screen it with — at most — an 80-grit. Use fine grit on a fir floor, and your belt will instantly load up with sap.

Diagonal cuts. Your first diagonal cuts bring the

board edges even. Boards are often at slightly different heights, so if you ran parallel to the boards, it would put the drum off kilter and keep you from sanding smooth. So I make a diagonal cut first, and get down to bare white wood.

In some old houses, you can encounter pine floors with boards more than 22 inches wide. Often the boards are cupped — some concave and some convex. In a true restoration you don't level those out — you hand-scrape them all.

On a newer house with a wide 1x6 or 1x8 pine floor that had some cupping, I might need two diagonal cuts to get it level. If the boards were convex, the center of the board would get cut first; if they were concave, just the edges would get cut. All along each board you would be able to see parts that were still untouched (Figure 3), so I'd make a second diagonal crosswise to the first one, to get the boards down level for a flat surface. (By the way, if it's the edges that are high, you may want to hand-scrape the floor or leave it alone. If you grind down just the edges on your early passes, you might end up exposing the tongues before you get the boards flat.)

All around the perimeter, the first cut leaves a

margin that's still the original color, because the drum sander can't reach all the way to the wall. We have to hit that with the edger next.

Once the whole floor's down to fresh wood, it gets harder to see where you've sanded and where you haven't on subsequent cuts. The trick is to get a carpenter's pencil and go around the whole perimeter of the room and scribble like crazy over about an 18-inch margin. Anywhere you don't hit on your straight cuts, you'll see pencil and you'll know you have to edge there.

Straight cuts. After the diagonal cuts and the first edging, it's time for a straight cut (Figure 4). I will hit the wood with two grits, but I don't like to start out any coarser than I have to. I always experiment first — take an old belt out of my truck, say a 50-grit, and put it on my drum. If it cuts the floor perfectly white, that's the lowest I'll go; then I'll step up to an 80.

I never go above 80-grit. I won't use a 100-grit belt — all it does is burnish the wood, preventing it from taking the stain or finish properly.

Feathering. When you start each pass with the floor sander, you feather it gently down onto the floor as you move forward. The belt pulls the machine forward, and as you approach the wall you ease the machine back up, like taking a boat out of the water. Then you ease it down again and pull it all the way back in the same track. Now move it over and repeat the process, overlapping each track just a little bit.

Most sanders cut an 8-inch path. With 1x3 strip flooring, which has about a 2³/₄-inch reveal, I like to line up and take two boards at a time. On each successive course, I overlap about two thirds of a board. It keeps me straight and blends everything together.

At the end of each stroke, the machine will get within 6 or 8 inches of the wall. But you have to start each stroke 4 feet from the wall, because you're standing behind the machine. To hit that 4-foot section, you have to turn the machine around and go the other way. Instead of starting the same distance from the wall each time, however, I like to stagger my cuts. I'll start one stroke 4 feet out, the next 6 feet out, the next 5 feet out, and so on. Or I'll just start in the middle of the floor, and stagger randomly. When I turn around, I'll feather into each cut where I started the last one. This breaks up the pattern. Otherwise, the transition between the two sections that you sanded going in opposite directions will be clearly visible in the finished floor.

That visual pattern is caused by the way the sanding belt pulls on the wood fibers. It's called a corduroy effect because you can see the same thing on



Figure 4. Straight cuts parallel to the boards using grits as fine as 80 create a flat, smooth surface that will accept stain. It's important to wear hearing protection and to keep the power cord out of the way of the machine.

a pair of corduroy pants. Run your hand over the nap one way, and it will look one color; rub it the other way, and it will look darker or lighter. Just like fibers in cloth, wood fibers will lie one way or the other depending on which way the belt pulls them. You can't see it in the raw wood, but when the finish goes on, it jumps out and you can't miss it.

Edging

Where the big machine can't get to the wall, you have to edge. You don't just stab the edger in and out of the wall; you move it along the wall in circles, like waxing a car.

You have to stoop over to operate the edger (Figure 5, next page). If you do it hour after hour, it's pretty hard on your back. I like to keep my legs spread as far as I can and brace my elbows on my knees. That takes some of the strain off the back.

The whole 7-inch disk doesn't contact the floor — just the front inch and a half does. An edger



Figure 5. When operating the edger, the author rests his elbows on his knees to reduce the strain on his back. The edger is moved in a circular motion.



Figure 6. The buffer sits on a synthetic fiber pad and a sanding screen and sands with a circular motion. The whole screen should contact the floor as evenly as possible to create a uniform scratch pattern with no visible swirls. An 80-grit or, at most, 100-grit screen should be used to leave the wood rough enough to absorb stain and finish.

doesn't sit flat on the floor; it's tipped up. The wheel height is adjustable to vary the angle of the disk. It's crucial to learn how to adjust the wheels, because if those wheels are too high, the front of the disk will gouge the floor; if they're too low, the disk will clog up and won't even cut.

As I work the edger in and around, in and around, I'm cutting my pencil marks, so I know that the margins are now level with the center of the floor. Then I pencil it again, and do my final straight cut. After sanding and edging one last time with a 60-grit or an 80-grit at most, I'm ready to vacuum again and screen.

Buffing

The buffer's job is to create a uniformly scratched surface over the whole floor, blending the different patterns created by the other equipment (Figure 6). If the last grit on the drum sander was a 60, I'd buff with an 80-grit screen; if the last grit on the drum

sander was an 80-grit screen, I'd screen with a 100-grit. You should keep the buffer as flat as possible so as to buff evenly; if the buffer leaves swirl marks, you're holding it at too much of an angle.

It's really important to vacuum before and after each sanding or screening. Otherwise, the screen or paper just rides around on sawdust and doesn't scratch the floor. By the same token, there's no point using too fine a screen. The finest sander belt I'd use is 80-grit; the finest buffer screen would be one step higher: 100-grit. Anything finer just burinishes the wood, fills the fine grooves, and prevents the wood from accepting stain or finish.

Once the wood is clean and smooth, it's time for a stain and a finish. In a future article, I'll discuss the finer points of coating a wood floor. 

Sean Barry ran a professional wood floor refinishing business in New England for 25 years. He is now the proprietor of the Music Store in Great Barrington, Mass.