

# Lathe setup and adjustment

by Kurt Hertzog

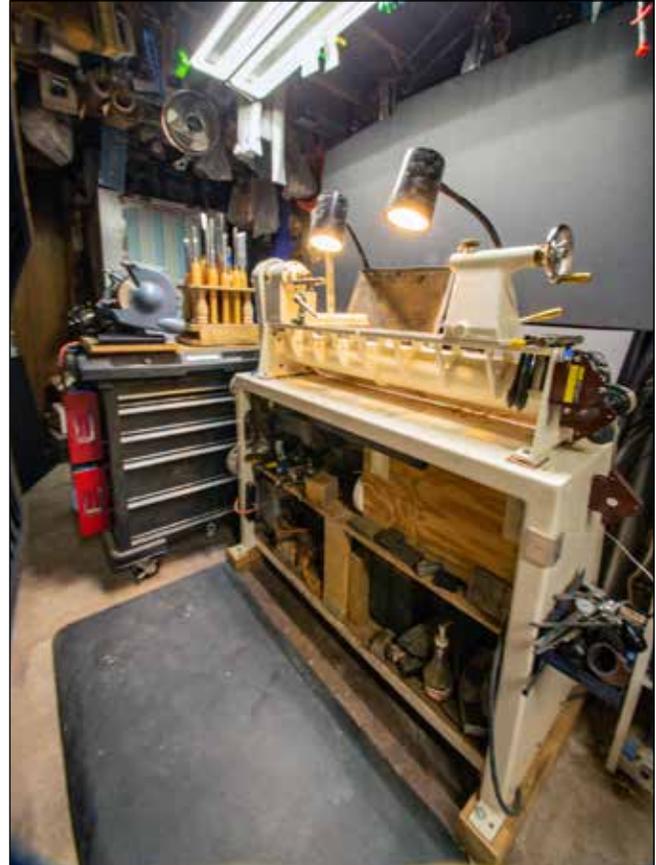
Your lathe is the heart of the turning shop so you'll want to set it up carefully. A new lathe may require assembly and removing preservative greases; an old one will need to be dusted off, cleaned and lubricated, and checked for missing parts. If you don't have the owner's manual, look for it online.

## Floor plan

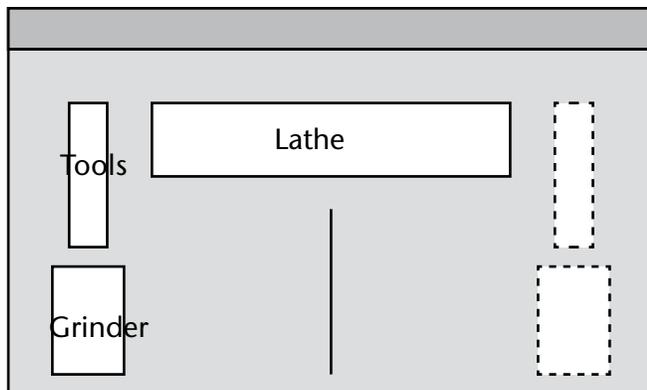
Placing your tool storage and grinder adjacent to the lathe will make sharpening and tool changes easy and efficient.

I prefer having the lathe parallel to a wall. The wall supports a contrasting backboard for visibility, and helps control chips for easy cleanup. For the right-handed, tool rack and grinder work best on the left side; lefties the opposite.

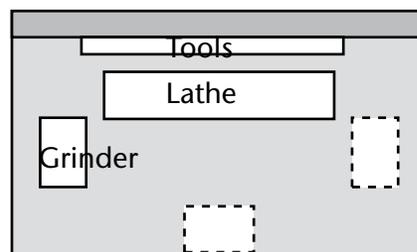
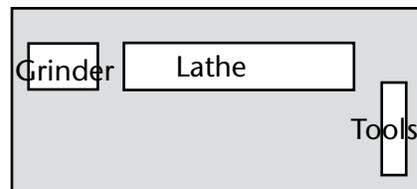
Some turners prefer the grinder adjacent to the headstock of the lathe, below right, with tools to the right or sometimes behind the turner. It's less convenient, and not safe when the lathe is running, to reach over the lathe for tools, bottom right.



**A good setup** – For efficient turning you need a height-adjusted lathe, anti-fatigue mat, grinder adjacent, convenient tool storage, dust extraction, and good light.



**Basic setup** – Lathe parallel to wall, tools and grinder nearby to right or left.



**Not so good** – It's not convenient nor safe to reach over the lathe for tools. ↗

## Light

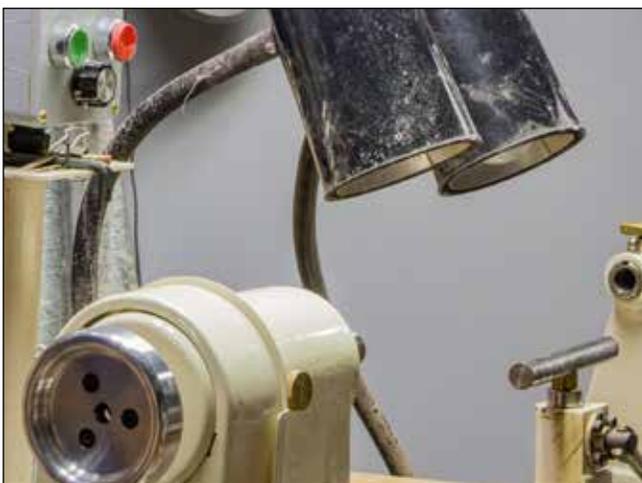


**Daylight** – Natural lighting is ideal when it is available. For evenings and dull days, supplementary overhead and focused task lighting can assist.



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**LED light** – Overhead LED fixtures are economical, fast on, and cool running. In this setup, the light support mounts to the lathe stand and also supports a tool bar and a roll of background paper for visibility.



**Task light** – Get good task lighting for your work zone. Gooseneck lamps work well, whether clip-on, bolted on, or magnetic base.

## Backing board



**Contrast** – Being able to see well and discern shape subtleties requires good lighting and contrast. A plywood backing board spray-painted grey could also help manage wood chips.



## Spindle height



**Right height** – The turner can stand upright and present the tool comfortably. This helps with back fatigue.



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**Elbow height** – Start with the lathe spindle at elbow height. Adjust to suit your own body and style. See also The Seated Turner, next page.



**Change height** – Blocks raise the lathe. Build a low platform to raise the turner. Be certain to include the mat thickness in your calculation.



**Adjustable stand** – Many manufacturers offer an adjustable stand for their lathes. Also available are generic adjustable stands capable of fitting virtually any mini-lathe.



**Bench** – Small lathes may be just right when bolted to a workbench; adjust upward with blocks, or “downward” by standing on a mat or low platform. As little as 1/4” (6mm) can make a discernable difference.



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**Wood stand** – Sturdy shop-made stand can be tailored to the turner’s height and preferences. This one was built from select 2x4s planed smooth and square, and joined butcher-block style with glue and screws.





### *The Seated Turner*

A good starting height is lathe axis level with the turner's elbow when comfortably seated in the work chair. It helps to have adjustable height, plenty of between-center distance for the legs, and the ability to tilt the lathe about 15° forward to compensate for the standing turner's overhang.

Many seated turners find short tool handles to be versatile and comfortable.

### *Banjo, tailstock*



#### **Cam, nut, washer**

— The locking nut and washer on the bottom of the banjo and tailstock controls the tightness and position of their lockup handles. You want an easy slide and secure lock, with the

handle ending where it's convenient and not in your way. I prefer the levers to lock pointing downward at 45° to the bed.

### *Lathe bed*

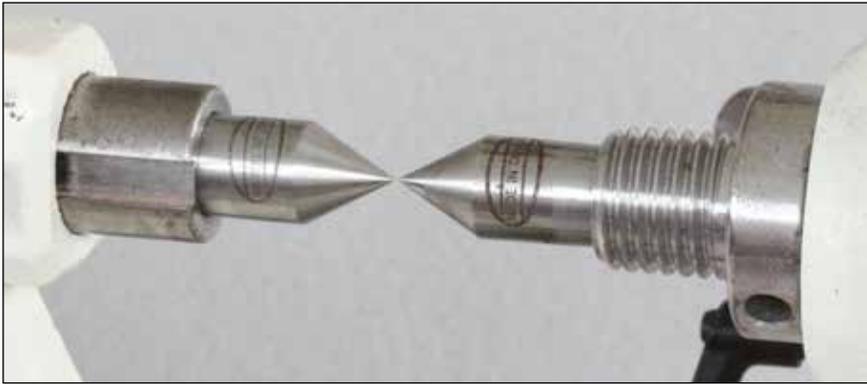


**Wax it** — Waxing the ways prevents rust and helps the banjo and toolrest slide smoothly. Your lathe may also benefit from filing any dangerously sharp corners, edges and burrs.

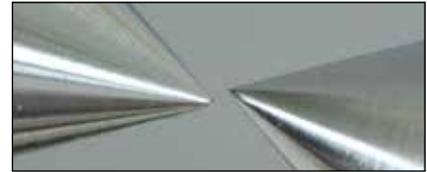


**Don't wax it** — Wax can induce tailstock slippage under pressure. Some turners prefer a little tarnish for resistance.

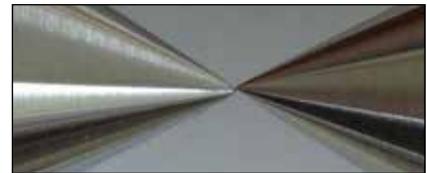
## Alignment



**Alignment** – Mount a pair of sharp-pointed centers and slide them together. Lock the tailstock, and inspect alignment from all angles. Because the tailstock moves, there’s always a bit of play.



Not in alignment.



You probably can’t get it perfect but you can get close.

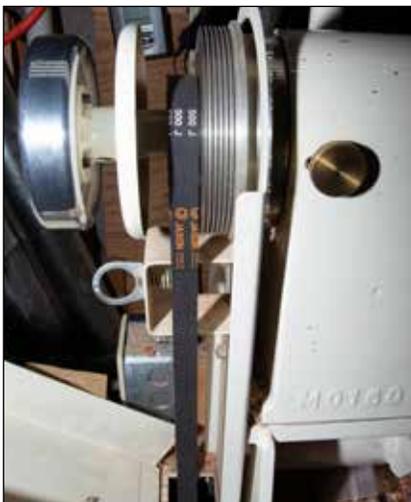


**Headstock** – Sometimes it’s enough to just loosen the headstock bolts, shift within the hole tolerances, and re-tighten. Note the slop in how this headstock fits the lathe bed.



**Shims** – For height or tilt misalignment, add shims made of tape, foil, or paper. It’s also possible to file the bolt holes a bit larger, and to file the machined surfaces on the bottom of the headstock.

## Drive belt(s)



**Pulleys** – Inspect belts and pulleys for alignment, side chafing, and looseness. You may need to shift and tighten the pulleys on their shafts.

**Tension** – Pinch belts together in the middle to assess tension. A small amount of slack helps tracking, reduces stretching fatigue, and slips in a hard stall. The most common error is too tight.



## Dust extraction



**Dust hood** – Breathing dust particles too small to see poses a serious long-term threat to your health. It’s best to extract the dust and chips right behind the work, drawing air from the front.



**Not fancy** – The bare vacuum hose extracts a visible plume of sanding dust. There are many different designs for dust hoods. You won’t intercept it all, so also wear appropriate personal protection, a dust mask or filtered-air faceshield.

## Floor mats



**Noisy machine** – Locating the dust collector outside the workshop reduces noise and exhausts the unfiltered small particles away from the turner.



**Floor mats** – Standing at the lathe tires you out. Anti-fatigue mat intended for food service has flexible spacing dimples and large holes for easy cleanup. Mats designed for shipping fragile high-end electronic assemblies are expensive, but very comfortable, below.



**Comfy** – Closed cell foam mat has protective hard shell.



# Grinder setup and adjustment

by Kurt Hertzog

The grinder is essential for sharpening steel tools, so having it nearby and readily accessible will encourage you to touch up quickly and often. Regardless of size, speed, and manufacturer, setup fundamentals will help nearly everyone be more efficient.

Your grinder will be easy and safe to use if it is securely fastened to a bench or stand. The grinder spindle should be about elbow height, same as the lathe for both standing and seated turners. To maintain portability, mount to a baseplate that can be clamped in each location.

Most woodturners find that sturdy, easily-adjusted toolrests and aftermarket sharpening systems add value. Aftermarket fixtures should be mounted to the same baseplate as the grinder itself, so that they can travel with it.

## CBN vs AIO2

CBN stands for cubic-boron-nitride, extremely hard granules bonded onto a steel wheel body.

AIO<sub>2</sub> stands for aluminum oxide wheels, typically grey but can be colored white, pink, etc., depending on composition.

### CBN advantages:

- cuts on the face and on some, the side too;
- wheel doesn't change shape or size with use;
- expensive but can last a lifetime.

### AIO<sub>2</sub> advantages:

- traditional and widely available;
- clogs, can be dished, wears, and needs dressing;
- inexpensive but does wear down in size.

## Mounting



**Bench** — Mounting the grinder on a bench secures it from sliding and provides storage for accessory fittings.



**Baseboard** — Rubber feet stabilize the baseboard under this transportable grinder.



**Shopmade stand** — The right height depends on the turner's height. You can make a sturdy stand from 2x4s glued and screwed together.

Whichever you choose, most turners favor 8" dia. wheels, rather than 6" or 7", running 1725 or 3450 rpm on a 1HP motor. Good starting grits are 80 for reshaping tools, and 180 or 240 for touching up an edge.



## Grinder toolrests



**Toolrests** – The toolrest needs to be positioned correctly and rigidly to provide a stable and repeatable platform. It should be large enough to support long turning tools yet small enough for short tools, too.



**Adjustable** – Good setup has grindstones mounted at proper height, interchangeable toolrests that lock in place, and safety covers.



**Flimsy** – Cheapo grinders have small, flimsy toolrests and wheel shields.



**Solid** – Cast iron rest has a large platform and bolts securely in place.



**Versatile** – Aftermarket accessory packages offer specialized toolrests and tool-holding jigs.



**Bolt lock** – High-end setup has CBN wheels with robust bolt-locking guards, adjustable tool platforms, and bright task light.



### End shields

Grinder wheel-mounting nuts are reverse-threaded to help prevent loosening under load, but it happens. Composite wheels sometimes break up. End shields protect you from these risks, keep them in place.



**Safety** – End shields, even flimsy ones, protect against wheels coming off or breaking up.



**Sturdy** – A properly installed end shield still allows plenty of access to the side of this CBN wheel.

### Personal protective equipment

Do not count on the small plastic shields provided with the grinder to protect your eyes. You need to wear safety glasses with side shields, goggles, or a face mask. There is no such thing as too much eye protection.

Grinders also throw off noxious dust containing steel, glass, and abrasive particles. Put on a good filtering mask as a matter of course and at minimum. Many turners invest in an industrial-quality powered filter helmet with HEPA filter.

You can capture some of the metal debris with high-strength magnets stuck to the grinder's iron, as close as possible below the action.



**Protection** – While somewhat cumbersome and pricey, a self-contained, powered filter helmet using a HEPA filter provides excellent breathing protection.

### Task lighting

If your grinder is permanently mounted to a location in the shop, you can install effective task lighting. If you have a mobile grinding setup that moves, try a magnetic base gooseneck trouble light. You can position it as needed. Some turners prefer clip-on or magnetically attached battery powered LED lights. Err on the side of too much light rather than too little.

**Good light** – Plenty of task lighting at the grinding station is key. Some grinders have a flexible lamp wired to the grinder switch.





**Equalize** – Intentionally moving the sharpening position on the face of the wheel can equalize wear and minimize gulleys.



**Wheel tools** – Grinding wheels can be flattened and cleaned with a devil stick, a star wheel, or a diamond dresser.

### *Keep your grinder sharp*

Composite abrasive wheels wear unevenly and pick up debris. They need regular dressing to restore their flat, clean surface. CBN wheels don't wear and no dressing is required.

A diamond dressing stick or star-wheel dresser abrades the surface of the wheel, breaking up the smooth and plugged surface to expose new sharp grits.

The devil stick and star wheel dresser work but are from the past and can be aggressive. A light touch using the diamond dresser will dress the wheel.

Repeated grinding can dish out a gully, but dressing also flattens the wheel surface. To avoid creating gulleys in your wheel, try to equalize wear by using a slightly different position each time you sharpen.

**Dressed** – A properly dressed wheel will be flat across the face and dull in appearance, without embedded metal particles.

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**Dressing** – Clean the wheel by lightly traversing the diamond dresser back and forth across its face.

