



What you need to know about indexing

Kurt Hertzog explores the subject of indexing systems

With all of the niceties that come with modern lathes, the two that jump to the very top of the list for me are variable speed and indexing. For those who have variable speed, you know what I'm talking about – especially when the speed will go to zero. Don't confuse a locking spindle with indexing: locking the spindle will allow you to wrench free that stuck faceplate or chuck.

So, what is indexing? And why is it so great? Indexing also allows you to lock the spindle, not for the brute force wrenching, but for the precise orientation of the spindle. If your lathe is equipped with an indexing head, you not only know it, but

probably know the number of positions available. Indexing is simply dividing a full rotation into a number of equal parts, with the ability to lock the spindle at any of those positions. As delivered from the manufacturer, the full circle rotation of the headstock is usually divided by even numbers, such as 12, 24, 36, or more. Each of these positions has a detent of sorts to allow you to lock the headstock at that particular position.

This month, let's explore indexing systems, delve into the ways to create one if your lathe isn't equipped with one and look at some of the useful things you can do with an indexing system.

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Makers' Guild Council and is a member of the Board of Directors of the American Association of Woodturners (AAW).

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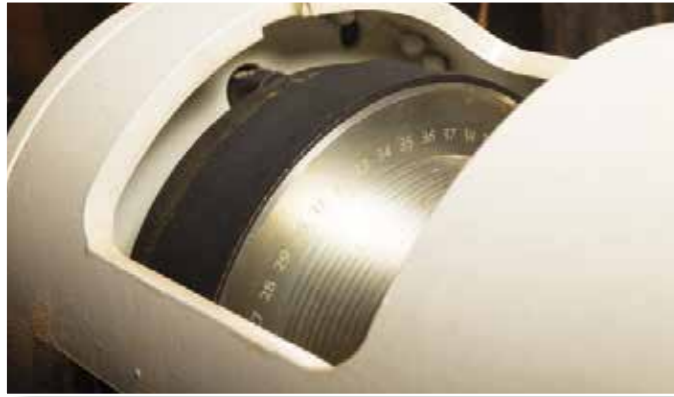
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◀ **FACTORY BUILT INDEXING SYSTEMS**

When you order your lathe, or pick one from inventory, you'll often have the option of an indexing system. It is an added cost, but is usually modest. The manufacturer will usually offer several different indexing arrangements called out by number of positions or degrees of rotation.

The mechanisation is holes on an internal pulley or wheel, fastened to the spindle shaft, that a pin can be advanced in to. The more holes, the more resolution you have around the circle. Cost is based on the number of holes they need to put into the pulley. Most of the locking pins are quite sturdy, but the

manufacturers will caution you about applying too much force when the spindle is locked. The indexing pulley will be marked to indicate the relative position of each of the locking points. Since these indicators are sometimes out of sight, you normally count 'notches' as you step around the circle.



Factory built indexing is ordered based on the number of divisions desired. The accuracy is superb and there is usually zero slop or backlash



The engagement pins on my lathe represent two different measurement methods. While sturdy and well built, it is good practice to not stress the locking mechanism

COMMERCIALLY AVAILABLE INDEXING SYSTEMS

For the most part, if you don't get your indexing system installed at the factory, there isn't a way to add the factory version afterwards. If you didn't get it, or it isn't available up front, you'll need to add the aftermarket versions of an indexing system. Depending on whose you buy, the wheel can be mounted on the inboard or outboard side of the headstock. It all depends on what the locking pin arrangement is and where it is mounted. Like the factory versions, aftermarket comes with varying numbers of holes dividing up the circle into that many pieces. Made from steel, aluminium or plastic, these aftermarket versions are pinched between the spindle shoulder and a nut, or sometimes the workholding device you are using.

KEY POINTS TO REMEMBER

1. When buying an indexing system, the upfront cost difference is minimal for more resolution
2. Use the 'locking' positions gingerly, marking is in order. Not brute force
3. Develop your own method of counting skipped positions to reduce error
4. Do all of your marking in one session as repositioning or remounting introduces positional errors

Aftermarket indexing systems can be made for the specific model or be generic. This setup is specifically made for the Jet mini lathe



The locking pin mechanism mounts to existing hardware and provides precision locating and locking. The rotation is broken into 72 positions or 5°



The generic model has even more resolution with holes every 3° and a method of interpolation. The locking pin mechanism is mounted with rare earth magnets



The indexing wheel can be mounted on the inboard or outboard side of the headstock spindle. The locking pin arrangements vary from quite simple to complex



Depending on your skills and the equipment available, you can work with a variety of materials. A reclaimed gear and some metal parts silver soldered make the indexing system



Rotating the washer from the ground flat to the original outer diameter locks this indexing system in position. Far stronger than needed but made from scrap parts



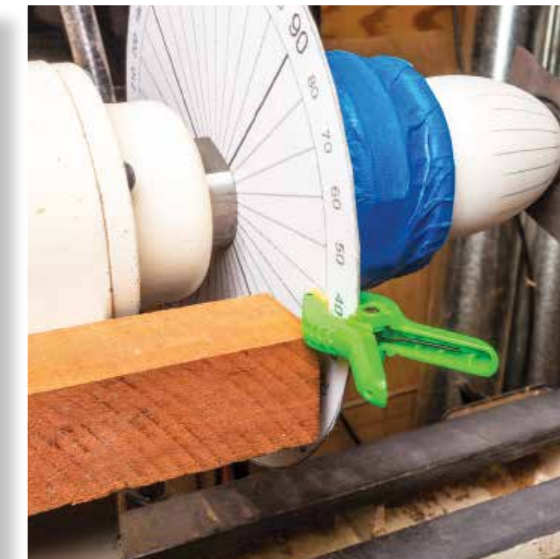
Your home-made indexing system can be built around a protractor glued to a board or a computer print, attached to a board with spray adhesive



A tool cut to assist locating the drill makes the plywood and paper indexing system easy to make and certainly inexpensive. A nail and a hole in a wooden block complete the system



The indexing wheel has holes or slots for whatever 'latching' mechanism you use. Double-sided tape holds the wood block in place with the nail located on top of the block



Even easier and cheaper, a piece of cardboard with the pattern glued to it. A plastic clamp located on the line and resting on the wooden block provides the indexing

MAKING AN INDEXING SYSTEM

Making an indexing system for your lathe can be a fun project on its own. Depending on whether your intention is a one-time, quickly made indexing system, or a long-term, built-to-last system, your design and materials will vary. It would be a pretty serious undertaking to create an indexing system similar to the manufacturer after the fact. Permanently fastening to the spindle shaft and locating inside the headstock casting are well beyond the capabilities of the home hobbyist. That said, very effective indexing systems can be added to the inboard or outboard ends of the headstock spindle. The easiest method to add an indexing system is to pinch a graduated wheel between the spindle shoulder and the workholding hardware – that can be a faceplate or chuck. Either those, or a nut that is threaded onto the spindle thread to lock the wheel in place.

Creating your graduated wheel can be as simple as spray mounting a computer generated pattern print on to a scrap of wood.

Finding or making your pattern gives you complete control of diameter and number of divisions. In practice, larger diameters are more forgiving of layout and drilling errors. You need to consider your lathe swing and the space you'll need to have access to your work. Since the wheel will fit onto your spindle shaft, you'll need to be able to drill – or turn – your centrehole to a close fit dimensionally. Any slop in this diameter will introduce error into your indexing, as well as be prone to slippage. Your material can be anything that you can drill through or cut slots into. Depending on your available equipment, you can work with metal, wood, plastic or even cardboard. Making your indexing wheel from cardboard is fast, low cost and, by using a simple clamp, allows you to make a fully functional indexing system in a matter of minutes. Your pin mechanism can be as simple as a nail pushed through the wheel into a woodblock, fastened to the headstock with double-sided tape. This very temporary method allows for

quick use and easy removal. Whether you use plywood with a nail pushed through the various holes into a stop block taped to the headstock, or have a replica of the various aftermarket offerings with so many different measuring opportunities, your tool is now in place to get creative.

KEY POINTS TO REMEMBER

5. The larger the diameter you make your wheel, the easier it is to make an accurate indexing system
6. Your wheel needs to be thin enough to allow for meaningful engagement of threaded workholding mechanisms
7. Once setup, do all of your indexing operations without repositioning your work. Accuracy always suffers on remounting
8. Do not overtax your indexing locking mechanism. Use the indexing system to mark things or for light duty. Do the heavy lifting elsewhere after marking

← THINGS TO DO WITH INDEXING

When I think of the things you can do with indexing, I'm at a loss to list them all – there just isn't the space available here! You've always had a method to mark radially. Now, add the ability to mark axially in as fine a resolution as your indexing system will allow. While many, including myself, will work on the turning while using the indexing system lock to hold things in place, I recommend that you use your indexing system to mark things. Once you've done your layout, you can do your painting, carving, drilling, pyrography or other work

with whatever workholding method best suits that task. With the ability to do radial and axial marking, you can create whatever twist you'd like for spirals. You can precisely locate holes, pockets, markers, inlay positions or any other pattern that begs for equal spacing or repeatability. For those making pieces of furniture, it is far more accurate to drill chair legs at the proper angles whether 90° or something else. Even drilling the holes in the seat of a three-legged stool will benefit by the ability to position the seat precisely at each 120° position using a drilling jig mounted

in the toolpost hole. The segmented turners doing open pattern segmenting rely on indexing for the precise positioning for gluing up their blanks. From the scientific standpoint of being accurate in positioning for clock face mountings or drillings to compound angle drillings for furniture legs or chair backs, indexing allows for proper measurement. If you are only interested in the artistic aspects, you can easily rotate your turning 15°, 30°, 40° or whatever number of degrees to sand in scallops in your plates, platters or other form.



While many of the indexing systems will support the use of tools and cutters, I favour using the indexing system to do marking. Once marked, the heavier work is done without stressing the lock



Adding the axial marking at proper positions along with the already available radial marking opens new opportunities. An entire spectrum of precision spirals can now be explored



Drilling spindles at precise angles is now very easy. Whether 90° or some other angle, the spindle can be marked for drilling or simply drilled when positioned



When there is no need for precision, parts can be indexed as needed for sanding, grinding or other processing. The candy dish rim scallops sanded with an air die grinder

THINGS TO DO WITH INDEXING



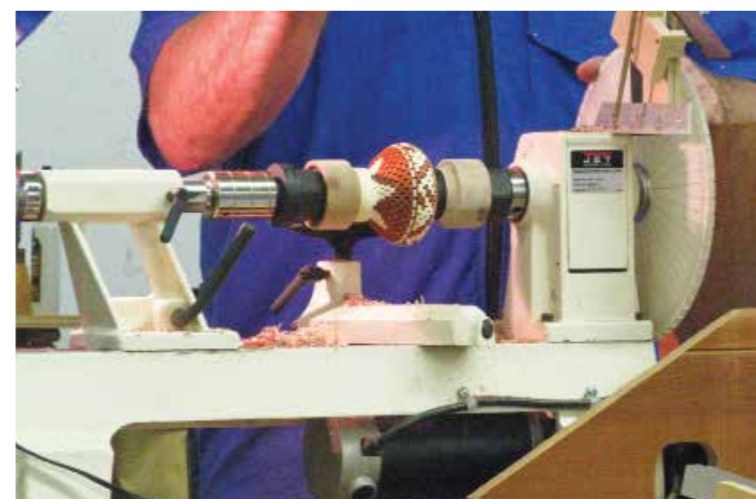
The accuracy isn't really needed, but it came for free. Easily done as the components were mounted on the lathe with no stress to the locking pin



There is a host of tools that can be brought to bear on turnings while they are mounted and indexed on the lathe. From the router article, a bowl being scalloped on the outside



The beginnings of a glue up of an open segmented hollow form. The indexing plays a key part in the precision needed for a successful open segmented turning



Glued up and turned in two-halves, the final form is assembled into a single finished turning. Note the large indexing wheel used in the two blanks creation



There is little room for error in any segmented turning much less an open segmented form. The eye is drawn to the minutest irregularity in the final product

CONCLUSION

Most of the aspects of woodturning don't involve precise measurements. While the numbers aren't terribly important, the visual appearance is. If you try to make a pattern of any sort, you need to be certain that if you try to be perfect, it must be. If not, the eye will be drawn immediately to any error. If you intentionally make it sketchy, then there isn't the need for absolute perfection. Other than the perfection of fit needed by some turnings, such as the angles in the drillings of chair spreaders and rails, the artistic can be close or hand done. That said, it doesn't hurt to be able to mark things

accurately and then decide how accurate you'd like them. The segmented turner doing an open segmented form will desire absolute perfection to keep the pattern perfect throughout the entire form. The flutes sanded into my multi-tier candy dish couldn't care a bit about absolute accuracy. Only needing to be visually close. If you have indexing on your lathe, why aren't you using it? There is a whole world of opportunity it brings. If you don't have indexing on your lathe, what are you waiting for? A piece of cardboard and a plastic clamp will get you going. Imagination is your only limit. ●

If you have indexing, use it. If you don't, you know how to make it as cheaply as a scrap of cardboard and nail. Easy to use and a huge array of possibilities

