Work Holding Methods

All work on the lathe is dependant on the blank being secured in a manner it that resists the forces applied when using gouges or chisels to shape the wood. The work holding method must consider:

- Longnitudinal and lateral forces likely to be encountered
- Structural integrity of the blank being mounted
- Flexing of the workpiece
- Whether evidence of the holding method is to remain visible or is it to be turned away before the project is finished.

SPINDLE TURNING

Between centres

Mounting between centres refers to mounting a blank between a driving device in the headstock of the lathe and a live (rotating) device in the tailstock. The most common devices are referred to as centres and are shown in more detail below. Most centres are mounted directly into the headstock or tailstock on a Morse taper tang. Be sure to know whether your lathe has a Morse Taper 1 or 2 before purchasing centres.

Drive centres

Used to transfer the rotary motion of the lathe to the work piece (blank).

2 prong

As can be seen in the photo to the right this centre only has two drive prongs to engage the blank. There is also a centre spur to assist with accurate alignment of the centre with the workpiece. Once the most common drive centre available it has been replaced in popularity by the 4 prong, safety or steb centres.

4 prong

This centre has four driving prongs to engage the blank usually resulting in better grip on the workpiece. Once again it has a centre spur to assist with accurate alignment.

Safety

The safety centre relies on the friction forces associated with the outer ring contacting the workpiece. The centre spur is often spring loaded and in some cases the tension can be adjusted. The benefit of the safety centre is that if a catch occurs the workpiece will spin without damaging the work. Not usually suitable for irregular shaped blanks.

Cup

Cup centres have concave faces (without centre spurs) to hold work with curved surfaces such as spheres etc. The photo depicts drive centres, but live cup centres are also available. It is often advantageous to make your own centres to match the curvature of the work you wish to hold. Your shop made centres can be fitted over shop bought centres.

Steb

Once the proprietary name for this type of centre it now refers to any multi-pronged drive or live centre. The centre pin is spring loaded in good quality centres resulting in considerably less damage to blanks which can be critical in some projects.

Live centres

Used to align and support the workpiece from the tailstock end of the lathe. These centres are usually mounted on a Morse taper 1 or 2 stub. The section of the centre which engages the workpiece is mounted on bearings which allows it to spin freely supporting the wood without undue friction being generated.

Cone

As the name implies the head of this centre is cone shaped. Excellent for use where there is a central hole in the workpiece as it will help to accurately centre the workpiece. Care should be taken to ensure engaging the cone does not cause the wood to split. If this is likely or even possible the choice of another type of live centre could be warranted.

Ring

As shown in the photo to the right this centre is equipped with a ring to engage the workpiece. A centre cone may or may not be incorporated into this live centre. Often used to reduce the likelihood of splitting end grain blanks or to reduce the indentation associated with cone centres

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Cup

See drive centres above.

FACEPLATE TURNING

A wood lathe faceplate makes a secure mechanical attachment between a lathe and a wood bowl blank using screws or other fastening systems. There are no moving parts within a wood lathe faceplate. The two components of a wood lathe faceplate are a threaded collar that attaches to the lathe headstock spindle and a vertical plate with screw holes to attach the bowl blank or waste block

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Faceplates

An undersized wood lathe faceplate can be inadequate and not correctly support the wood bowl blank at hand. A good rule of thumb for sizing a wood lathe faceplate is to use a faceplate about one third the diameter of the bowl blank.

If the faceplate is too small, the bowl blank may flex slightly or severely when the lathe is brought up to speed.

A vibrating surface makes smooth bowl gouge cuts next to impossible. Severe vibration can possibly cause the wood bowl blank to make an unscheduled departure from the lathe.

Faceplate ring

Acts in the same manner as a face plate but is designed to be held in a scroll chuck.

Screw chuck

A faceplate with a central coarse screw onto which the blank is screwed. Provides very secure holding of the workpiece as long as the workpiece is engaged hard against the faceplate.

Scroll chuck

Usually has four self centreing jaws to engage a spigot/tenon in compression or in a recess in expansion mode. It is important to make the tenon/recess the correct size to match the chuck jaws as incorrect sizing does hold the wood securely. Correct sizing occurs when the gap between the jaws is approximately 2.5 to 3 mm apart (the jaws can then grip around the entire diameter rather than on the corners or jaw centres.

Jam chucks

Usually shop made chucks from scrap wood with a recess cut into the face to allow a partially finished turning to be remounted to allow finishing of the bottom. The sides of the recess are cut at a very shallow angle, typically one or two degrees, to ensure the workpiece fits tightly in the recess.

SPECIALITY CHUCKS & FITTINGS

Eccentric chucks

Designed for off centre turning of workpieces. Proprietary chucks can be expensive whereas shop made chucks can often be made out of wood scraps and fasteners normally found in the hobbyist's shed. Seek advice from and experienced turner should you wish to make your own.

Pen chucks

Generally designed to take pen blanks up to 22 mm square to allow the accurate drilling of the hole in the centre of the blank.

Vacuum chucks

Vacuum Chucking systems have been designed to aid in Woodturning. It enables an item to be re-mounted on the lathe for finishing without risking further holding marks. Rotating Unions are designed to enable the lathe spindle to turn freely whilst the hose and connection remain stationary.

Collet chucks

Designed to hold cylindrical workpieces of specific diameters. Collets need to be changed to suit the workpiece or the diameter of the workpiece reduced to suit the collet.

Pin chucks

These chucks have a cylindrical shaft extending from the spindle thread with a flat ground along all or part of the shaft. A hole very slightly larger than the shaft diameter is drilled into the workpiece and the workpiece is placed over the shaft along with a loose pin on the flat. When the lathe is turned on the centipedal force associated with the rotating workpiece moves the pin to the side of the flat jamming the workpiece in place. The pin automatically releases when the lathe stops. Great when

turning multiples of the same turnings.

Jacobs chuck

The most common use for a Jacobs chuck is to hold drill bits be that in a drill press or in the headstock or tailstock of a lathe. However, a Jacobs chuck can be used to mount small workpieces when fitted to the headstock. Care needs to be taken to ensure the chuck is firmly engaged in the headstock otherwise it may become loose creating chatter on your work

Shop chuck

Shop chucks refers to any home-made chuck you produce to solve a specific problem or to save the cost of store-bought models. I would be concerned with the safety of using the chuck shown in the photo to the right – the pipe clamp could cause serious injury to the user or damage tools if they come in contact with the clamp. Scary stuff!

Donut chuck

A chuck consisting of two circular rings which sandwich the workpiece between them in such a manner that the exposed portion of the workpiece can be turned.

Cole jaw chuck

A set of chuck jaws fitted to a scroll chuck and usually used to reverse chuck a bowl to refine the foot. Can be relatively easily adjusted to adapt to the size of the bowl being produced.

Longworth chuck

A chuck usually used to reverse chuck a bowl to refine the foot. Can be easily adjusted to adapt to the size of the bowl being produced. Be prepared for a lot of noise as the turbulence created by these chucks is significant.

Mandrels	Used where there is a central hole that passes all the way through a workpiece. The best example is pen turning where mandrels are used extensively.	

Other work holding techniques

Glue blocks	Glue blocks are often made from scrap wood and can be held on faceplates (screwed) or in scroll chucks. The workpiece is then glued to the block using good quality wood glue, epoxy or hot melt glue. Glue blocks are often used where the turner does not want to waste valuable wood on tenons/spigots etc.	
Hot melt glue	Hot melt glue is a great way to attach workpieces to glue blocks. Hot means very hot – not just warm. Don't let hot glue get on your fingers or hands – it burns and adheres to skin and flesh whether you want it to or not. Care needs to be taken to ensure that glue bond can be broken without damaging the workpiece. The bond can be so strong that the wood fibres tear rather than the glue releasing from the workpiece.	
Masking tape	For very light work masking tape can be used to hold the workpiece against wooden faceplate or glue block. This is particularly effective when holding pendants to turn an offset hole in the centre.	
Double sided tape	Face-plate turning can be greatly simplified with the use of double-sided tape instead of screws to hold the turning blank. Use of an industrial-quality tape with a heavy; hightack rubber/resin adhesive on both sides of a cotton backing is	

preferred. These tapes are generally designed for holding light weight objects only. Tailstock support is recommended wherever possible. Carpet layers double sided tape can be used in many situations. Where you are not confident the tape will retain your workpiece chose another holding method.

Paper joints

Most of the time when you glue something together, you're hoping that it's forever. But some applications demand that you're able to eventually disassemble the joint. For instance, a dummy board glued onto a bowl blank, or an architectural turning you need to split into two equal halves. These are perfect applications for a paper joint.

Like any glue joint, start by getting the glue surfaces flat and smooth. Apply glue to both surfaces. Before bringing the parts together, insert a piece of paper into the joint. It's important that the paper is porous. Brown paper grocery bags work great. Shiny non-porous paper, like from a magazine page, won't allow the glue to penetrate the paper, and the joint won't stay intact while you work on the piece. Clamp the parts and allow the glue to dry. After the glue is dry, work the piece as you normally would.