DRILL PRESS

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To me the drill press is a piece of equipment I couldn't do without in my workshop.

With a bit of imagination and some accessories it becomes a versatile piece of kit.

Drilling holes is just the start of it.

Safety.

The drill press is top heavy and wouldn't take too much effort to knock it over, damaging the machine, or injuring someone. Therefore, it needs to be bolted to the floor or bench, which will also help to reduce any vibration.

Never drill directly on to the table; place a sacrificial material between the piece being drilled & the table.

PPE is necessary when using a drill press.

Eye/face protection must be used.

Loose and long clothing can be caught up with a rotating drill or swarf.

Use hand protection when necessary. Gloves are NOT recommended as it becomes a fixture on the hand. Use of a separate protective material between the hand & item is preferred.

Never leave a key in a chuck.

Never turn away from a machine and leave it running.

Drill Press Components

The drill press consists of the head, (which includes the spindle, chuck, motor and feed lever), the column, the table and the base.

The Head

The drive from the motor to the spindle is via a set of 'v' belts and various size 'v' pulleys. The spindle speed is adjusted by moving the belts up or down the pulleys. A table is attached to the machine for the belt position on pulleys which will give the RPM of the spindle. The table may provide speeds for frequencies for both 50 and 60 Hz (Hertz). Australia operates on 50Hz and therefore 60Hz must be ignored. Hz should be marked on the motor.

The spindle holds the chuck, and the chuck holds a straight shank drill. The chuck is mounted on a morse taper which marries into an internal morse taper in the spindle shaft. A morse tapered drill can be inserted directly into the spindle shaft. The spindle can be moved vertically up & down; the 'rest' position is spring loaded with the spindle up, ready to drill downward into the material. The spindle has a rack machined into the length of it. The feed lever is attached to a pinion, which meshes with the rack and moves the spindle up & down. The feed lever mechanism has two locks built into it. The first lock will hold the spindle in any position within its range of movement and the second lock is a depth stop, i.e. the spindle can't be moved downward past a designated point. This will allow several holes to be drilled to exactly the same depth. A scale on the feed shows the depth of movement of the spindle.

The Base. The base supports the whole machine; the base must be bolted to the floor (or bench) for stability of the machine. A vice may be bolted to the base.

The Column is attached to the base, and the head is attached to the top of the column.

The Table.

The table is mounted on the column or post. It can be moved vertically, up & down on the column or be rotated about the column. It can then be locked in any position. The arm supporting the table can then be rotated 360 degrees to be at any desired angle, although the normal position is horizontal which is at 90 degrees to the spindle in any direction. Once the arm is locked in position the table can be rotated about its supporting axis, and again locked in any position.

Drilling.

Drilling speed charts are available on the Net. Speeds vary as to the type of drill being used, material being drilled and the diameter of the drill.

When drilling, the material being drilled wants to rotate in the direction of the drill rotation. Consider how you will hold the piece to stop it from rotating. It is acceptable to hold the piece by hand. You may need to use hand protection (not wear a glove), hold it with vice grips, clamp it to the table or hold it in a vice, which is bolted to the table. If the piece is long, it needs to be supported by a stand or the column may be used a stop.

Before drilling all material should be centre popped for each hole to be drilled. The drill is then lined up with the centre pop. This prevents the drill from wandering as it starts to cut. To drill larger holes, it is recommended not to attempt the large hole straight off but to step up in sizes, which maintains the position accuracy. When drilling larger holes, the piece must be held securely on the table & the position not moved. Each subsequent size drill will be located accurately.

Accessory		Softwood	Hardwood	Acrylic	Brass	Aluminum	Steel
Twist Drill Bits							
1/16" - 3/16"	(1.6 - 4.8 mm)	3000	3000	2260	3000	3000	3000
1/4" - 3/8"	(6.4 - 9.5 mm)	3000	1460	2190	1150	2260	1150
7/16" - 5/8"	(11.1 - 15.9 mm)	1460	840	1460	840	1460	540
11/16" - 1"	(17.5 - 25.4 mm)	840	510	NR	440	1150	330
Brad-Point Bits							
1/8"	(3.2 mm)	1650	1150	1460	NR	NR	NR
1/4"	(6.4 mm)	1650	1150	1460	NR	NR	NR
3/8"	(9.5 mm)	1650	840	1460	NR	NR	NR
1/2"	(12.7 mm)	1650	840	1150	NR	NR	NR
5/8"	(15.9 mm)	1650	540	840	NR	NR	NR
3/4"	(19.1 mm)	1460	260	840	NR	NR	NR
7/8"	(22.2 mm)	1150	260	540	NR	NR	NR
1"	(25.4 mm)	1150	260	260	NR	NR	NR
Forstner Bits							
1/4" - 3/8"	(6.4 - 9.5 mm)	2260	750	NR	NR	NR	NR
1/2" - 5/8"	(12.7 - 15.9 mm)	2260	540	260	NR	NR	NR
3/4" - 1"	(19.1 - 25.4 mm)	1460	540	260	NR	NR	NR
1 1/8" - 1 1/4"	(28.6 - 31.8 mm)	1150	260	260	NR	NR	NR
1 3/8" - 2"	(34.9 - 50.8 mm)	540	260	NR	NR	NR	NR
Hole Saws							
1" - 1 1/2"	(25.4 - 38.1 mm)	540	330	NR	260	260	NR
1 5/8" - 2"	(41.3 - 50.8 mm)	540	260	NR	170	260	NR
2 1/8" - 2 1/2"	(54 - 63.5 mm)	260-540	NR	NR	170	260	NR
Spade Bits							
1/4" - 1/2"	(6.4 - 12.7 mm)	2190	1460	NR	NR	NR	NR
5/8" - 1"	(15.9 - 25.4 mm)	1650	1460	NR	NR	NR	NR
1 1/8" - 1 1/2"	(28.6 - 38.1 mm)	1460	1150	NR	NR	NR	NR

Drilling steel

High speed steel twist drills are used to drill steel. They are a double twist drill. The drill is sharpened to an included angle of about 120 degrees.

When drilling steel, swarf, like a continuous shaving comes off the cutting edge of the drill. Continuous swarf is a sign of good cutting; that is, the drill is sharp & the feed is correct. While swarf is a good sign, long lengths are dangerous as it is sharp and strong. Long lengths coming from the drill can catch clothing & hands, wrap around the drill or damage anything it comes in contact with. To overcome this, as the swarf grows in length ease pressure on the feed lever momentarily which stops cutting & reduces the length of the swarf. When drilling steel, the drill tends to grab as it comes through the other side of the piece. To help overcome this, reduce the pressure on the feed, also a sacrificial piece of (preferable) steel be placed between the work piece & table. This will also protect the table from damage.

Drilling steel also benefits with the use of lubricant, making a better cut by keeping the drill cool.

Drilling timber

When drilling timber, the work piece should have a sacrificial piece of timber between the work piece & the table. This prevents tear-out of the timber as the drill comes out of the work piece. It also protects the table from being damaged.

High-speed steel twist drills can be used to drill timber, provided tear out at entry & exit of the hole is acceptable. Flutes can clog with timber & need to be cleared continuously; otherwise overheating & burning will occur.

Spayed bits are made for use on timber & are usually used in the building industry where tear out is not an issue. They drill quickly as shavings are expelled from the hole while drilling.

Brad point bits are made for drilling timber. They are a drill with a pitch much greater than a HSS drill for steel. They have centre pin & side cutters, which gives a cleaner start & exit with timber.

Augers are used for drilling timber. Originally used in a hand brace and have a pointed twist at the tip which pulls the drill into the timber as they rotate. I would not recommend using one in a drill press, as they are more difficult to control.

Forstner bits are mostly used in the woodworking industry to drill holes that are larger than those that can be made with ordinary drill bits. While other drill bits, such as spade bits, can perform a similar function, Forstner bits are significantly more precise and produce a clean cut with a flat bottom.

Hole saw; is a circular saw blade, which has a guide twist drill, which is located in the centre of the body on which the saw is attached. The hole saw can be used to make discs or wheels with a hole in the centre for an axle, or the hole saw can simply be to make a hole of a desired size.

Plug cutter. Plug cutters come in various sizes. Plugs are used cover faults or screw heads & can be cut to match grain.

L to R. Spayed bit, Brad Point. Auger, Clean cutter Auger, HSS with morse taper, Forstner, Plug cutter, Hole saw, Bevel box.

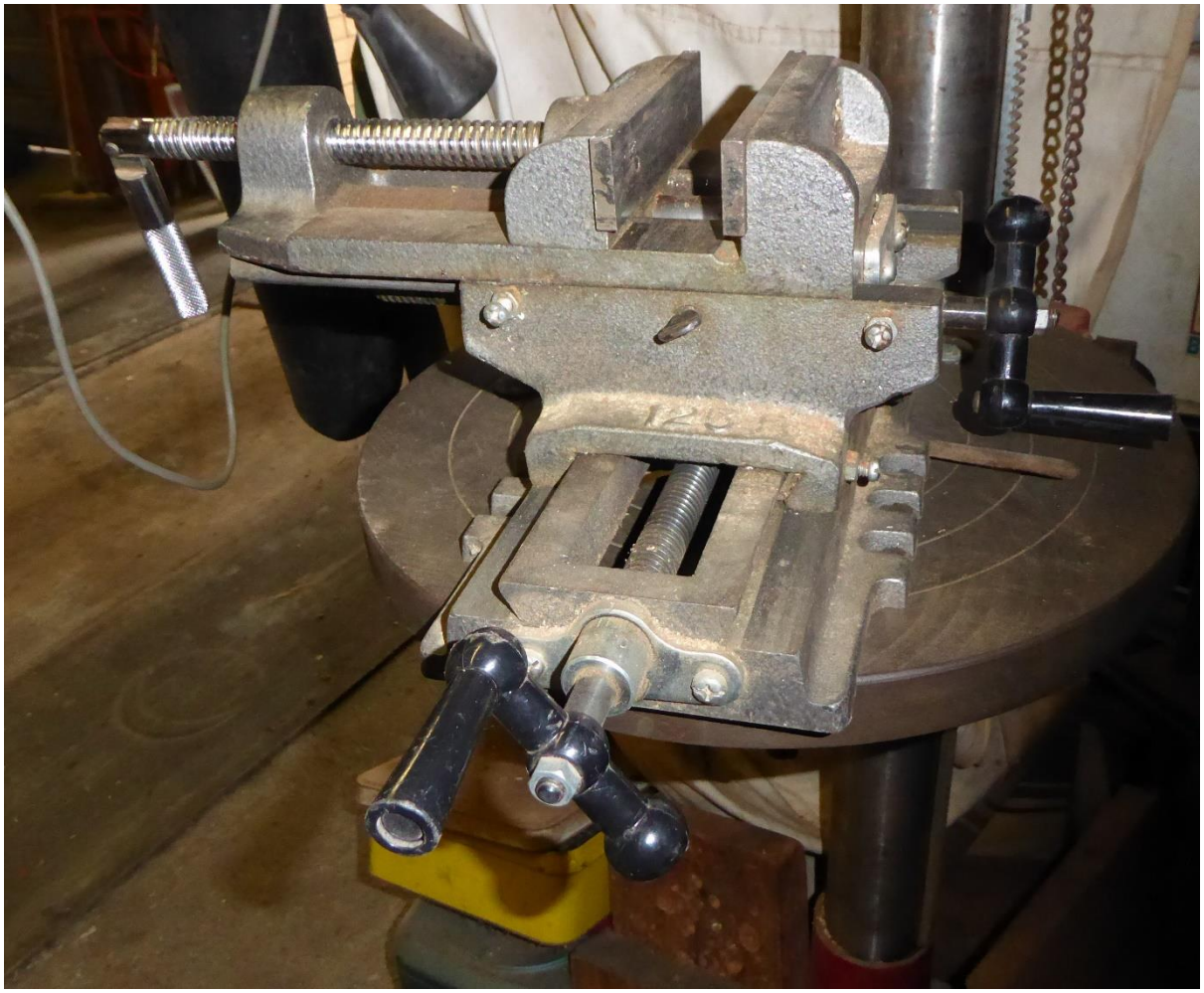
Bevel box. Bevel box is used to measure angles from a given vertical or horizontal face. e.g. a saw blade to the table or a drill press table to the spindle.

To adjust the drill press table. Mostly the table is set up at 90 degrees to the spindle. Using a bevel box, hold the box on the spindle and 'zero' the readout. Place the box on the table and rotate the table until it is at 90 degrees to the spindle. Similarly, if the table needs to be at a certain angle, rotate the table to that angle.

To transfer a point from one side of a work piece to the other side. Make a pointed centre pin to fit into the hole in the table. Locate a pointed pin into the chuck. Lock the spindle in the lowest position. With the two pins in place, adjust the position of the table so that the pins line up exactly, & lock in position. Release the spindle to the rest position.

Mark the work piece with the location to be transferred to the other side (with either a pencil or centre pop). Place it on the table with the mark facing up & line it up exactly with the pin in the chuck. Lightly tap the pin through the hole in the table (or mark with a pencil). You now have transferred the mark from one side to the other.

Compound vice is a vice, which can move a held object in two directions. The vice is bolted to the table and the table locked to allow the vice position to be adjusted in the two directions as required.



Cutting a slot

A slot can be cut into any material. A milling cutter is designed to cut sideways and are available in various sizes.

Hold the work piece in the compound vice & locate the vice in position for the cut. Check the positioning by winding the cross slide of the vice to ensure the cut is in the required position & adjust as necessary.

Feed the cutter down to start the cutting and lock it at the required depth; wind the cross slide to cut the slot. Small cuts in depth & slow feed of the cross slide will give best cutting results and it may take several runs to achieve the desired depth and or width.

Mortising Chisel.

This attachment will drill/cut a square hole.

Part of it is attached to the non-rotating part of the spindle head to which is attached the mortising chisel and a drill is held in the chuck. The piece into which is cut a mortice is held in the compound vice & adjustments made similarly to cutting a slot.

Sanding

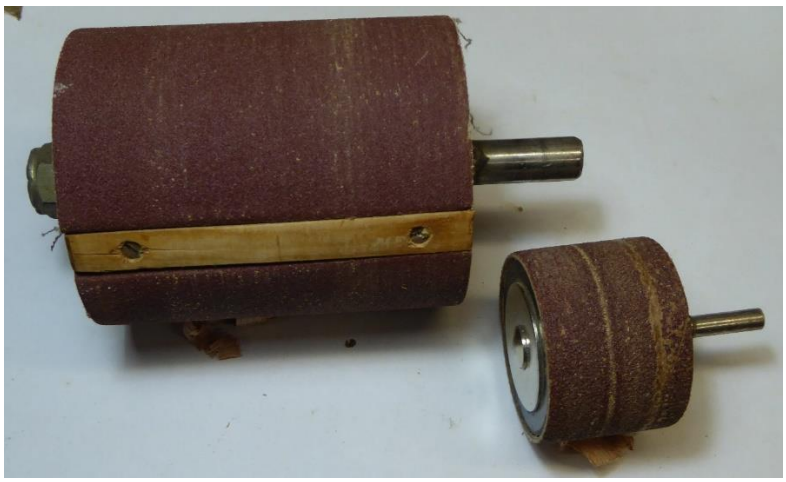
Belt sanding attachment

This is a sanding attachment that is mounted onto the column and driven by the spindle. It uses a standard 100mm wide sanding belt. Work pieces are supported on the table.

Drum sander. Drum sanders are used to sand curved edges while keeping the surface at 90° to the face. Using a base board with a hole in it allows for the full length of the drum to be used & allowing for even wear of the sleeve.

Using a temporary fence, the drum sander can become a thicknesser for small pieces.

Sanders can be purchased with replaceable sanding sleeves and can also be shop made to any desired diameter and sandpaper replaced as needed.



Shop made & purchased drum sanders.

Adjustable fence to use the drum as a thicknesser.