

Router Know-how

NEW SERIES

Straight cutters (Part 2)

PHOTOGRAPHS BY GIANANTHONY BAILEY



Welcome to 'Router Know-how,' a new series devoted to routing by our very own router devotee Anthony Bailey, otherwise known as 'the Editor.' Following on from Router Class, Anthony now looks at the subject more from the 'sharp end'; telling you all that he knows about cutters, how to use them, care for them, and the best routers and jigs to use with them. As always, Anthony would like to hear your questions and views on this very broad subject, and who knows, you may get published in our brand new 'Community' pages. Read on...

Above L-R: Pocket, stagger tooth, tenoning (upshear/downshear example) up spiral, up-down spiral, taper, acrylic and plastics, honeycomb core, replaceable blade

In the second part of his new series on cutter applications, **Anthony Bailey** looks at a second group of more specialised cutters that qualify as 'straight,' and shows us there is definitely more to a straight cutter than meets the eye

One can always argue over definitions but all the cutters mentioned in this article – with the exception of the tapered cutter, which manufacturers seem to regard as falling in the same category – produce straight sided cuts.

The reasons for making so many different types of straight cutter are many and various as I will go on to show you here. You may not have great need of them for those everyday tasks but you should consider whether they might not in fact be better options in particular cases. It is very easy to use the standard item and then wonder why the result is poor, or the cutter gives up early due to excess wear.

CUTTER TYPES

Pocket

1 The pocket cutter is designed for deep grooving, rebating and mortises. They are all shank and not much cutter and may additionally have recessed shanks to allow machining deep in the wood. The cutting head may have a single flute if it is a smaller diameter or two flute in larger sizes.

2 They should allow plunge cutting but as with all over-long cutters you must use very shallow passes especially in smaller diameters, to avoid cutter breakage. Note the cutter head is slightly wider than the body.



1

Stagger tooth (mortising)

3 The stagger tooth cutter is a bit of a beast, which I have used many times but under careful control. The cutting edges are split into two overlapping sections opposing each other. Thus you get a single flute cutting edge but in two separate sections 180° apart. This gives a rather rough cutting action with good chip clearance in a deep mortise, so a mortise box is essential to keep the router on track.

4 Stagger tooth cutters are not intended to plunge so a technique known as 'ramping' is required. Keep the plunge unlocked and move



4

This cut through section shows the method of 'ramping' to allow the stagger tooth to make deep cuts

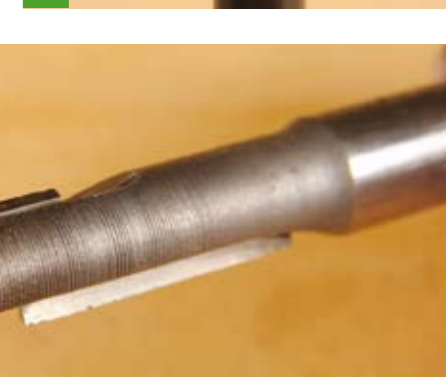
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1 The pocket cutter is equally at home doing shallow and deep recesses

2 Note how the short cutting edges are slightly larger diameter than the body metal to allow deep plunging

3 The stagger tooth has offset blades and no plunge cutting tip; this design allows fast chip clearance

2



3

around the jig in a clockwise direction plunging slightly with each pass and continue all the way to the bottom of the mortise before doing a final clean up pass to ensure it is full size and shape all round.

Down shear

5 Standard straight cutters defy common sense, because in a short cutter length and small diameter they strike the wood perpendicular to the feed direction, where a large planer machine can cut more efficiently due to the diameter of the cutterblock and number of blades – in some

cases three or four cutters. A shearing cut, i.e. attacking at an angle, has a smoother slicing action which this and the alternative up-down shear cutter are designed to do. It gives a fast cut and crucially a smooth finish on faced boards eliminating breakout or feathering.

Up-down shear

A similar result, except it gives a neat finish on both faces of a board. It has split cutters in a similar fashion to the stagger tooth cutter but mounted and ground to give a shear cut, not a straight across cut.



5

The right-hand edge section was machined with standard straight cutter; on the left a shear cutter has left the edge intact

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Up cut spiral

6 CNC machines make great demands on cutters and the cutters can be different in profile because of the tasks they perform, given the total control the CNC head exerts over tooling. However, there are some types that are compatible with hand-held routers and spiral cutters are some of these. The complex cutter geometry demands they are made from one solid piece of metal. The carbide version will handle hardwoods and abrasive manmade materials. Up-cut types reduce burning when plunging while down cut will help hold workpieces in place on vacuum jigs and additionally give a clean surface cut. The up-down cut variant gives a clean finish on both faces of hardwood but unsurprisingly this is an expensive piece of tooling. Note the conventional straight cutter on the left is very burnt and coated.

High speed steel types are intended for softwood if up cut, again avoiding plunge burns, while specialist down cut variants are intended for pierce and trim operations in steel-foam sandwich material.

Tapered straight

7 This profile isn't in fact straight but it is the nearest thing to a straight cutter, which could easily get overlooked as not belonging to any other category. It is intended for wooden vacuum moulds to aid release. Anyone doing a lot of wood



8 Cutting plastic materials can create excess wear and uneven edges whereas a specially designed cutter will be much more suited to the work



6 The left straight cutter has created a lot of burning and heating of the cutter creating stuck on deposits. The up-spiral cutter is left in a much better state after machining its holes

machining could well be asked to do a 'special' and mould making might well be such an example. There could well be other uses for a cutter with a subtle taper like this.

Acrylic and other plastics

8 Years ago I was asked to machine cutouts in plastic covers that fit in office access flooring for cables. I managed to demolish the cutting edges of several standard straight cutters before all one thousand inserts were machined. Had I been able to obtain special plastics cutters they would have fared much better. There are several different patterns of cutter which depend on the type of plastic being machined.



9 The right-hand straight cutter is a typical length but for safety is much shorter than the 'honeycomb' cutter on the left



7 This taper cutter creates a very subtle slope which could prove useful for more than just mould making

Acrylics in particular fare better with multiple flute spiral cutters that have a polished finish to avoid the material melting and congealing in hardened lumps. Acrylic comes in various colours and is used for signs, templates, etc. Note the way static has made the shaving adhere temporarily to the router.

Extra long (honeycomb)

9 This straight cutter is worth mentioning because it is one to avoid for normal use. It is longer than normal and will not withstand the strain of machining wood. It is intended for lightweight manmade honeycomb material that offers limited resistance. Beside it is a standard straight cutter to give an impression of length.

Router cutter manufacturers and suppliers

Wealden www.wealdentool.com

Trend www.trend-uk.com

CMT www.cmttool.co.uk

Titman www.titman.co.uk

Makita www.makita.co.uk

Axcaliber www.axminster.co.uk

Whiteside www.routercutter.co.uk

Infinity www.infinitytools.co.uk

Replaceable blade

10 There are a number of different replaceable cutter types; however the straight variant has many obvious uses. The smaller sizes can be used with handheld machines while the larger cutters are for fixed head machines. Whether single or two cutter types, the blades can quickly be rotated or exchanged to give new edges at reduced cost and without demounting the cutter.

MOST USEFUL TYPES

11 These cutters aren't for everyone but the most commonly useable for everyday woodworking are the pocket cutter



10 If you do a lot of repetitious machining of hardwoods and manufactured boards, a replaceable tip blade makes sense

and stagger tooth patterns, which should see plenty of use if you machine slots and mortises on a regular basis. You can mortise using two fences providing you have long fence rods but mostly they aren't. More recently I have got into making 'tray jigs.' These can be used for various operations with large or small routers but the beauty of them is that the router can only go where you want it to and you can make it yourself to any size you want.

12 I have taken the standard idea of a U-shaped mortise box and simply put the tray on top with stops clamped to the outside of the box to limit the lengthwise travel of the tray and router in it.



12 The improved 'Bailey' mortise box with a tray on top that allows sideways movement to create wider mortises. Infill blocks are used to limit the sideways travel while wooden stop blocks limit the lengthwise tray movement



13



11

11 Most of us don't have a chisel mortiser so a router and mortise box makes perfect sense. You can even mortise tapered and angled components

13 The sideways movement which controls the mortise width can be changed by having drop in blocks of different sizes that determine the amount of movement.

Shear cutters

14 The other cutter type that should find more favour with woodworkers is the shear cutter, particularly the up-down shear pattern described earlier. If you work with a lot of faced boards or even rather soft timber that tends to fluff at the edges – feathering – then a shear cutter should improve the cut finish tremendously. ■



14

14 If you trim board edges that can fluff or breakout, use a shear cutter as it gives a much better finish

Hopefully the previous article and this one have given you some straight answers to straight cutters. Next time we look at another underappreciated cutter type, the rebate cutter.