

## Deep Drilling on the Lathe with forstner bits

It has come up several times at Guild meetings the need to drill holes deeper than ones forstner/sawtooth drill bit on the lathe... here is how I get around this.

Many of us use forstner bits to drill deep wide holes for various projects such as pepper mills. The problem is that often the drills only allow you to drill 2 or 3 inches into the piece before you run out of shaft length. My go to drills now are the Carbide forstner bits coming out of China from 15mm up to 90mm diameter. These bits cut end grain quite well, especially on the harder close-grained woods like maple and beech. The problem is that these bits only have about 3" (75mm) long shafts, which only allows you to drill about 2.5" deep.

One way around this is to use a *straight-shaft ER collet holder extension* in either a 100mm or 150mm (4" or 6") length. The convention for naming these straight extension shafts is "C" followed by the diameter of the extension shaft; followed by the ER#; followed by the length of the extension portion of the holder and "L".

For example a 100mm ER16, with a 12mm shaft would be C12-ER16-100L and a ER20 with a 150mm x ¾" shaft extension would be C ¾"-ER20-150L .

These extensions are best held in a MT2/ER32 collet holder in the tailstock, which lets one drill about an 8" deep hole for the 150mm shaft. (See Photo 7 for a drilling setup.) *(I don't recommend using a Jacobs chuck to hold this extension ER holder as it will mark up the shaft and not allow it to be used in a collet chuck later. A collet chuck completely holds the round shaft without scoring it, so the shaft keeps its concentricity.)* If a really deep hole is needed this can be accomplished using a second straight ER collet holder. (By using the tailstock to hold the drill, the drill bit is stationary (non-rotational), so any additional run out of the assembly is negligible.) Remember to always use a drawbar shaft to hold in the MT2/ER collet holder in the tailstock.

Straight shaft ER holders come in many sizes and collet nut configurations. My favorite combination is to use ER16M Type M collet nut (22mm outside diameter), which lets me hold any forstner bit with a shank size up to 10mm; for larger shank sizes up to ½" I use an ER20 holder. When using a pair of extensions for even more depth I usually use the C20-ER20-150L holder to hold a C12-ER16-100L Type M extension or for smaller diameter holes a C10-ER11-100L held in a C3/4-ER16 -150L either of which gets me almost to 12", (see Photo 1).



Photo 1) Top, ER20/ER16; Bottom ER16/ER11



Photo 2) ER11, ER16, ER20, ER25, ER32

There are two types of ER16 collet holders with different thread sizes and three possible collet nut sizes... (see Photo 2 for different sizes). The two collet holder sizes are a M19mm x 1 (fine thread), and a M22mm x 1.5 (coarser thread). The fine thread shaft has two options for collet nuts, an Type A mini hex nut with a cross section diameter of 25mm and a Type M, slotted nut with an outside diameter of 22mm. The coarse thread Type A hex nut has an outer diameter of 28mm.

ER20 collet holders also come in two thread sizes (although it is difficult to find the fine threaded holders 24x1); the fine thread M-type nut has a outside diameter of 28mm while the coarse thread A-type nut has an outer diameter of 33mm. See Table 1 for a list of the collet size range for each ER collet series.



Photo 3) -A typical setup used for drilling using an ER16 collet holder with a Type M collet nut on a 12mm shaft. This allows one to drill to about 6.5", while with a C 3/4"-ER16-150L you can drill to 8.5". I generally use either a MT2-ER32 or MT2-ER25 collet holder in the tailstock held in place with a M10 drawbar to hold the extension. When drilling keep in mind that chips need to be cleared often, which will require withdrawing the drill every 1/2" or so. With a rig like this the minimum diameter hole that can be drilled is about 24mm (1").

For a comparison of collet sizes ER11 to ER32 see Photo 4. For a comparison of the various collet nuts see Photo 5. For a comparison of MT2 collet holders see Photo 6.

If you have hex shafted saw tooth forstner bits from Lee Valley which have 1/2" hex shafts you can get an ER-hex collet that will hold these. In this case you would need to be using an ER25 collet holder, which will let you drill a minimum diameter of 44mm (1-3/4"). These collets are available from Maritool (USA manufacturer) at \$28 US each. [https://www.maritool.com/Collets-ER-Shaped-Collets-ER-Hex-Collets-ER25-Hex-Collets/c21\\_613\\_614\\_617/p18771/ER25-Hex-Collet-1/2/product\\_info.html](https://www.maritool.com/Collets-ER-Shaped-Collets-ER-Hex-Collets-ER25-Hex-Collets/c21_613_614_617/p18771/ER25-Hex-Collet-1/2/product_info.html)

I hope this helps out with drilling some holes deeper than your standard forstner bits allow.

DaveM

Table 1. ER collet nut dimensions and maximum holding diameter.

ER series	Thread d x pitch (mm)	Nut type	Nut width (mm)	Max collet diam.
ER11	M14 x 0.75	A	19 mm	7 mm
	M13 x 0.75	M	16 mm	7 mm
ER16	M22 x 1.5	A	28 mm	10 mm
	M19 x 1	A mini	25 mm	10 mm
	M19 x 1	M	22mm	10mm
ER20	M25 x 1.5	A	35 mm	13mm
	M24 x 1	M	28 mm	13mm
ER25	M32 x 1.5	UM	42 mm	16mm
ER32	M40 x 1.5	UM	50mm	20mm



Photo 4) ER11; ER16; ER20; ER25; ER32



Photo 5) MT2/ER collet holders ER32; ER25; ER20



Photo 6) ER 11 through ER 32 collets and collet nuts.