FESTOOL

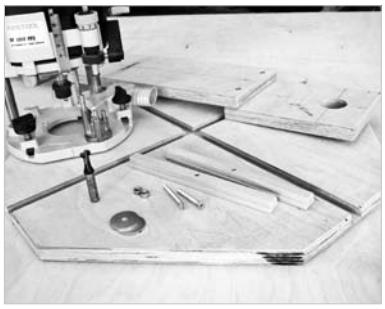
No. 315

Creating elliptical plates using the router

A Description

The manufacture of elliptical plates for modern table areas or this original rocking chair for children (Design: Guido Henn) for example is an extremely complicated task for many woodworkers without a CNC machine. This example provides a step-by-step explanation of how a trammel is created from wood for use of the portable router. This method can be transferred quickly and simply to almost every ellipse size and opens up a variety of creative design possibilities for the user without annoying formulas and calculations.

315/01



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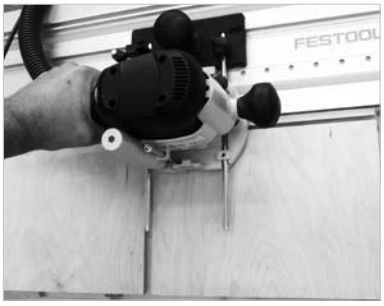
B Tools/Accessories

You need the following tools and accessories for manufacturing elliptical plates:

Designation	Order No.
CMS basic unit	561228
CMS-OF	574251
Router e.g. OF 1010 EBQ Set	574234
Copying ring, for e.g. Ø 30 mm	486033
T-slot cutter, shaft 8 mm	491035
Groove cutter, D12 x 30 with long blade and 8 mm shaft	491649
Cross-plate made from Multiplex, 15 mm thick	
1 guide made from beech, 15 x 10 mm and 300 mm long	
Circle arm made from Multiplex, approx. 15 mm thick, 1000 mm x 120 mm	
2 countersunk screws, M5 x 40 mm	
Double-sided adhesive	

C Preparation/Set-up



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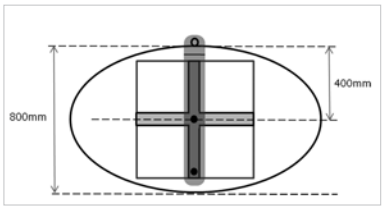

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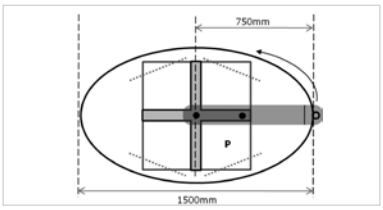

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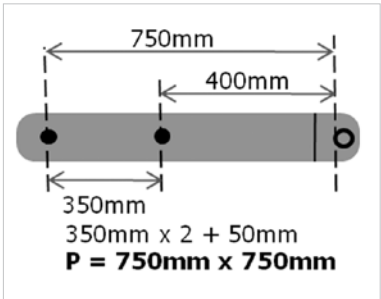
The following steps are necessary for the construction of a trammel from wood:

Depending on the size of the ellipse you will initially need a 15 mm Multiplex plate of corresponding size and quadratic in shape as a cross-plate. 9 mm deep and 15 mm wide T-slots are grooved into this Multiplex plate using a T-slot cutter. These grooves run crosswise in the centre of the plate. It is best to use a router with a guide rail to obtain a precise and straight groove.

The Multiplex plate size must be calculated first:
For this the length and the width of the ellipse are halved and calculated as shown in the example in Fig. 315/6.

In the application example an elliptical plate 1500 x 800 mm is produced. Half the plate length (750 mm) – Half the plate width (400 mm) = Half the circle path of 350 mm in the plate. These dimensions are also transferred later to the circle arm.

The 350 mm are doubled and then a safety path of 50 mm added to the calculation.



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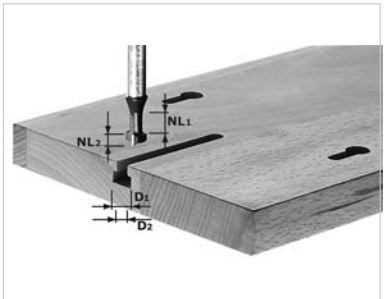
For an elliptical table 1500 mm x 800 mm one would need a 750 x 750 mm cross-plate.



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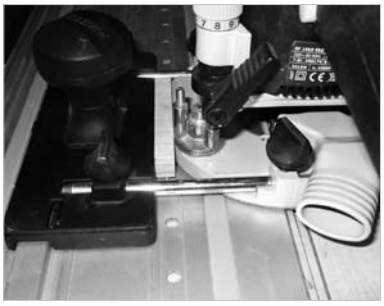
Machine tooling:

A T-slot cutter is fitted in the OF 1010 and then the guide rail adapter is mounted as in Fig. 315/3.

D Procedure



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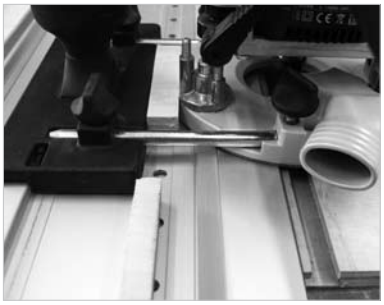
The T-slot nut must run precisely and without jamming in the T-groove.
To achieve this the guide rail used should be secured to the Multiplex plate using fastening clamps.
As the T-slot cutter with a width of 10.5 mm cannot create the groove in one work process, the router must be moved once on the guide rail.



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So that the two grooves are exactly the same, we use a 10 mm wide distance gauge, which is positioned between the router base plate and the guide rail adapter.
The T-slot cutter has a (large) diameter of 10.5 mm, the T-groove should, however, be 15 mm wide.
A second distance gauge is thus required, which is 4.5 mm wider than the first, i.e. 14.5 mm.

With one guide rail setting each, the T-slot is grooved precisely into the centre of the cross-plate through replacement of the distance gauges in 2 work processes as in Fig. 315/08 and 315/09.

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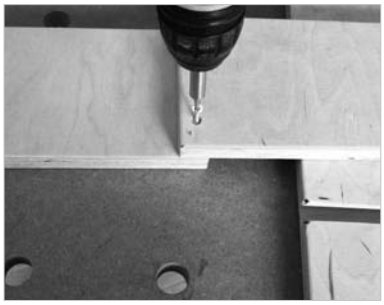
The 150 mm long T-slot guides are now produced. For this the 10 x 15 mm beech rails have a small rebate on the left and right. The rails are best created on a router table using a groove or rebating cutter. The CMS routing module offers the best and most precise results here thanks to the spring pressure units. During the creation it is necessary to ensure the smooth course of the rails in the T-slot previously cut. As you have no CMS you can also create these rails using a semi-stationary circular saw.
In the centre of the rails drill a 5 mm hole for the M5 countersunk screw.
The screwhead must be completely countersunk in the rail.



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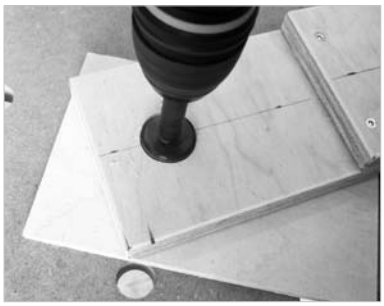
The circle arm is also created from the 15 mm Multiplex 1000 x 120 mm and forms the moveable arm of the circle design.
First of all, approx. 150 mm is trimmed from the 1000 x 120 mm strip and moved 20 mm from below and screwed again to the remaining strips.
A height compensation is created with this action.



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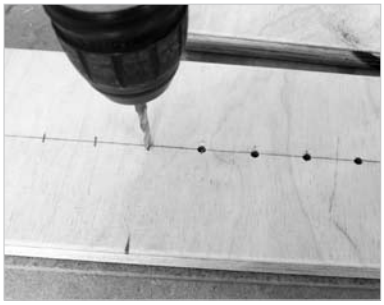
So that the router is held quickly and simply on the circle arm, the router is fitted with a copying ring. In this example we have used a 30 mm sleeve as this is included with most routers. Using a Forstner boring tool or a special-purpose boring tool a 30 mm guide hole is drilled into the Multiplex plate for the copying ring.

The hole sits in the centre in the circle arm 120 / 2 = 60 mm and is 50 mm from the front, Fig. 315/12.



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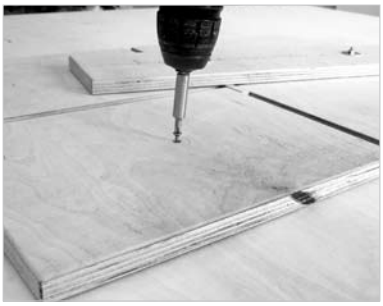
Finally you have to drill the 5 mm holes for the two M5 countersunk screws (in the guide rails).
The distance of these holes to the centre of the copying sleeve determines the outer dimension of the ellipse.

If you want an individual solution drill holes at a distance of 25 mm. The circle can then be screwed individually.
Alternatively, the 2 holes required for the size of the ellipse can just be bored.

The boring distance can be calculated simply:
For an elliptical table 1500 mm x 800 mm a boring distance of 750 and 400 mm has been calculated in Fig. 315/06. For this only half the cutting diameter, for instance for a Ø 12 mm cutter - 6 mm, must still be calculated.
Boring distance 1 = 756 mm and 2 = 406 mm from the centre of the copying ring.



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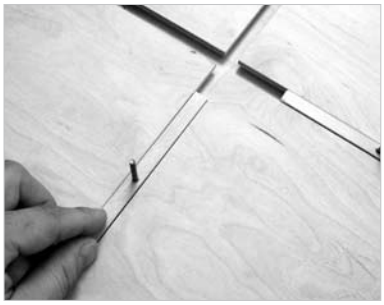
First mark the centre axes on your plate using a pencil. On these centre axes then align the base plate of the trammel and secure to the top surface of the plate either using two small screws on the bottom side of the plate or with double-sided adhesive tape. Only use adhesive tape that can be removed again without leaving any residue. Otherwise, the workpiece and base plate may incur damage due to the strong adhesive force.



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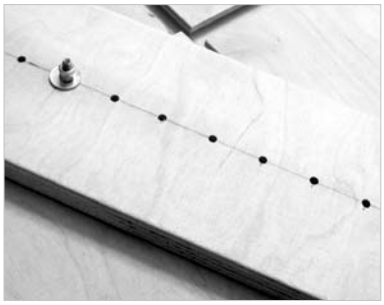
Then insert the two guide rails with the previously inserted 5 mm counter-sunk screws into a groove each.



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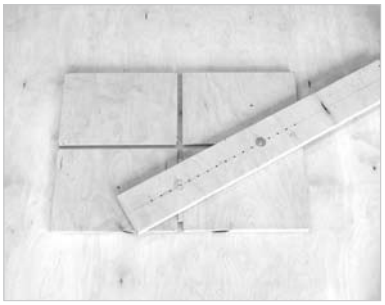
Then put the screws into the correct 5 mm holes of the circle arm and secure the entire thing using a washer and two nuts. It is important that the screws are not tightened too tight so that the circle arm can still turn above the guide rails. The locking nuts or also a stop nut are useful so that the entire structure does not become loose thus resulting in inaccuracies during routing.



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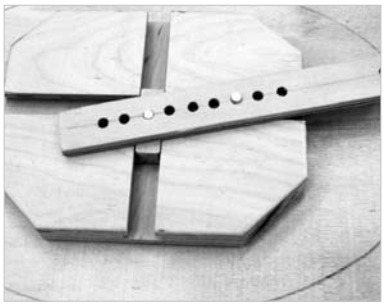
The routing of the ellipse is then a piece of cake as the router can be guided steadily and securely using a copying ring on the circle arm. Inaccuracies are more or less ruled out. The function of the tiered circle is also recognisable in Fig. 315/17. It ensures the router is sitting solidly and cannot tilt. This also means, however, that the router used must have a long blade in order to fully cut through a plate.

Using this method a perfect ellipse can be routed quickly and simply without using any annoying or complicated formulas.
Depending on the size of the ellipse a larger or smaller base plate may have to be produced.
The guide rails or the circle arm can be used again. During routing it mainly depends on a smooth course of the guide rails into the grooves on the base plate. If necessary, use lubricant or curd soap.



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Tip:
If the router is already set and one has children, one can also quickly make a trammel for a pencil in a "small format" The simple mechanics simply impress everyone!

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