

## Closed Slot

## ➡ Answers to questions:

1. The most practical tool selections would be sizes that are common, such as  $\varnothing 0.5$  and  $\varnothing 0.625$ , but any end mill with a radius smaller than 0.375 is suitable
2. The best start is one of the two arc center locations, because they are dimensioned in the drawing
3. A center-cutting end mill (slot drill) is the most common choice for plunging into the solid material
4. For the  $\varnothing 0.5$  end mill, the minimum lead-in/lead-out arc is 0.2501, for  $\varnothing 0.625$  it will be 0.3126
5. For both the  $\varnothing 0.5$  and  $\varnothing 0.625$  end mills, the maximum lead-in/lead-out arc will be the same, 0.3749

**Note that the lead-in/lead-out arc must be *larger than the end mill radius* and *smaller than the slot radius* !**

The above sizes are minimum and maximum within four decimal places. Practically, the lead-in/lead-out radius will be somewhere between, rounded to three decimal places. The greater the allowed radius, the smoother approach of the tool will be towards the finish contour.

The program example below uses R0.35 for the lead-in and lead-out motions, and either end mill can be used.

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(33-02 - CLOSED SLOT EXERCISE)
(1/2 DIA OR 5/8 DIA END MILL IN THE SPINDLE)
(X0Y0 LOWER LEFT CORNER - Z0 AT THE TOP)

(** CENTER CUTTING END MILL MUST BE USED **)
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N1 G20	(ENGLISH UNIT)
N2 G17 G40 G80	(STARTUP BLOCK)
N3 G90 G54 G00 X1.0 Y1.0 S800 M03	(RAPID TO START POSITION)
N4 G43 Z0.1 H01 M08	(CLEAR ABOVE PART)
N5 G01 Z-0.19 F8.0	(LEAVE 0.010 ON THE BOTTOM)
N6 X2.5 F15.0	(ROUGH CUT TO THE ARC CENTER)
N7 Z-0.2 F5.0	(FEED TO FULL DEPTH)
N8 G41 X2.15 Y0.975 D01 F10.0	(LEAD-IN LINE)
N9 G03 X2.5 Y0.625 R0.35	(LEAD-IN ARC)
N10 Y1.375 R0.375	(CUT THE RIGHT SLOT RADIUS)
N11 G01 X1.0	(CUT THE TOP WALL)
N12 G03 Y0.625 R0.375	(CUT THE LEFT SLOT RADIUS)
N13 G01 X2.5	(CUT THE BOTTOM WALL)
N14 G03 X2.85 Y0.975 R0.35	(LEAD-OUT ARC)
N15 G40 G01 X2.5 Y1.0	(LEAD-OUT LINE)
N16 G00 Z1.0 M09	(CLEARANCE ABOVE PART)
N17 G28 X2.5 Y1.0 Z1.0 M05	(RETURN TO MACHINE ZERO)
N18 M30	(END OF PROGRAM)
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