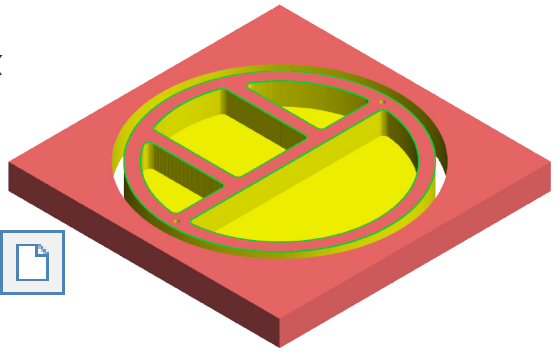
Jewelry Box
Base



A. Sketch Base Circle.

Step 1. If necessary start a new Mastercam file, click **New** (**Ctrl-N**) on the Quick Access Toolbar QAT.

Step 2. On the Wireframe tab WIREFRAME click **Circle Center Point** Circle Center Point.

Step 3. In the Circle Center Point function panel:
under Size, **Fig. 1**
Diameter **6.5** and press ENTER
Press **O key** on keyboard to select AutoCursor **Origin** override, **Fig 2**.
Click OK.

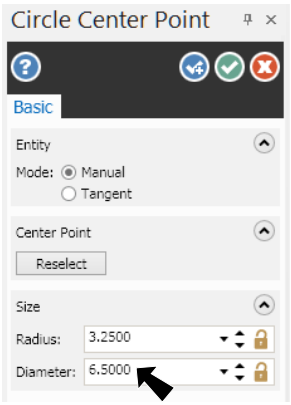


Fig. 1

Step 4. **Right click** the graphics window and click **Fit** (**Alt-F1**).

Step 5. Use **F9** to toggle Origin/Axis display on and off to confirm Origin, **Fig. 2**.

B. Save As "BASE"

Step 1. Click **Save As** (**Ctrl-Shift-S**) on the Quick Access Toolbar QAT.

Step 2. Key-in **BASE** for the filename and press ENTER.

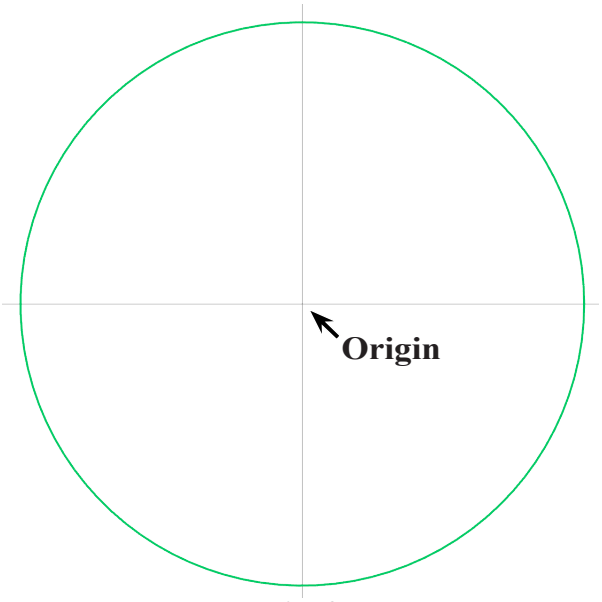


Fig. 2

C. Offset Circle.

Step 1. On the Wireframe tab WIREFRAME click **Offset** Offset.

Step 2. In Offset dialog box:
under Mode, **Fig. 3**
select **Copy**
Distance **.35**
Click circle, then click **inside**, **Fig. 4**.
The purple offset should be inside of the red original.
If it is not, click Reverse button, **Fig. 3**.
Click OK.

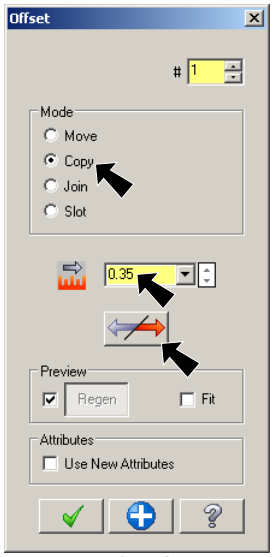


Fig. 3

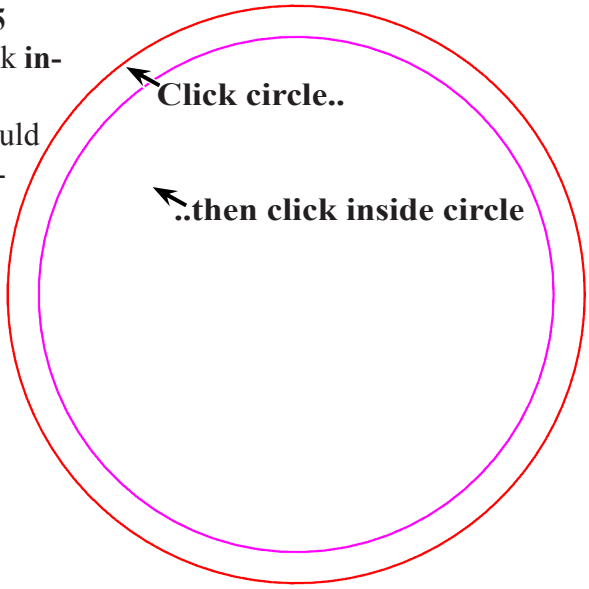


Fig. 4

Step 3. **Right click** the graphics window and click **Clear Colors**.

D. Create Center Lines.

Step 1. On the Wireframe tab WIREFRAME click **Line Endpoints** Line Endpoints.

Step 2. In the Line Endpoints function panel:
Sketch **horizontal line from the center** of the circle **extending left** to the offset circle, **Fig. 5**. Move cursor to center of circle and center point will display.

And sketch **vertical line from the center** of the circle and **extending upward** to offset circle, **Fig. 5**.

Click OK when done.

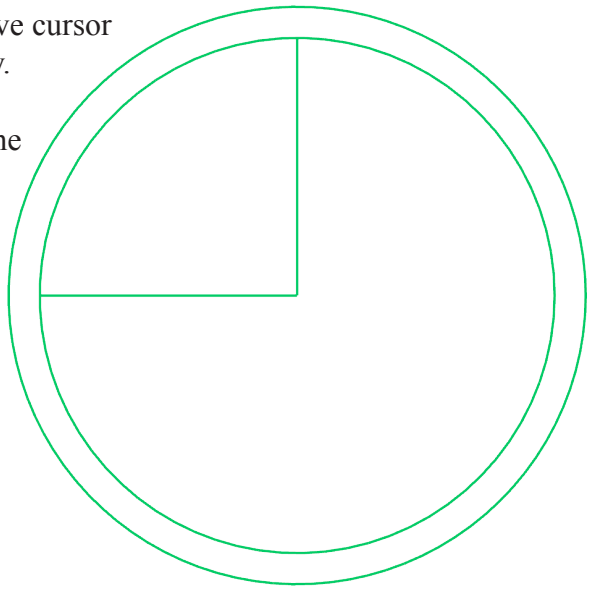
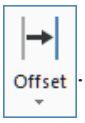


Fig. 5

E. Offset Lines.

Step 1. On the Wireframe tab WIREFRAME click **Offset** 

Step 2. In Offset dialog box:
under Mode, **Fig. 6**
select **Copy**
Distance **1.225**
Click horizontal line, then click **above**, **Fig. 7**.

Click **Apply**

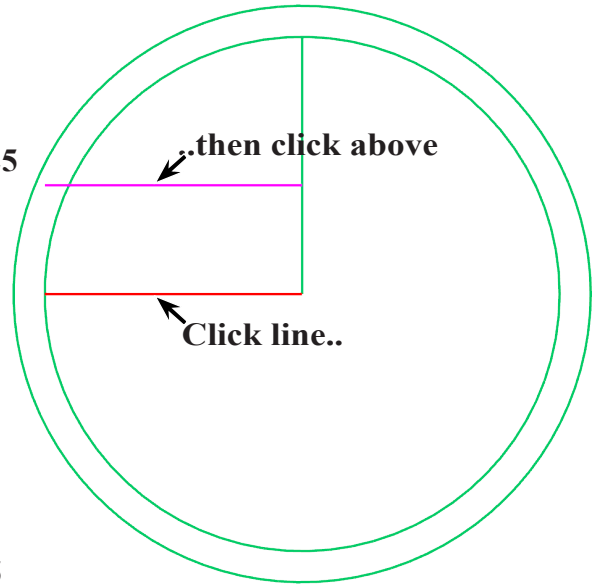


Fig. 7

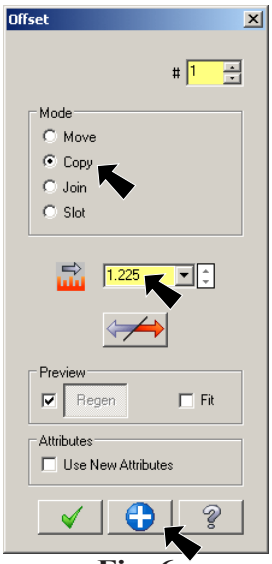


Fig. 6

Step 3. In Offset dialog box:
Fig. 8

Distance **.175**
Click offset line, then click **above**, **Fig. 9**.

Step 4. Click **Direction** until (twice) bi-directional lines appear, **Fig. 10**.

Step 5. Click **vertical line**, then click on **right** side, **Fig. 11**.

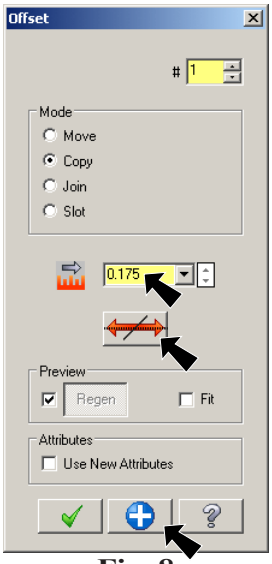


Fig. 8

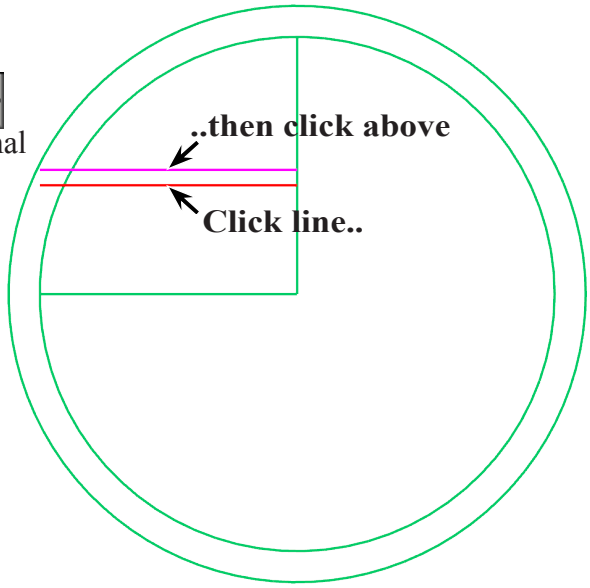


Fig. 9

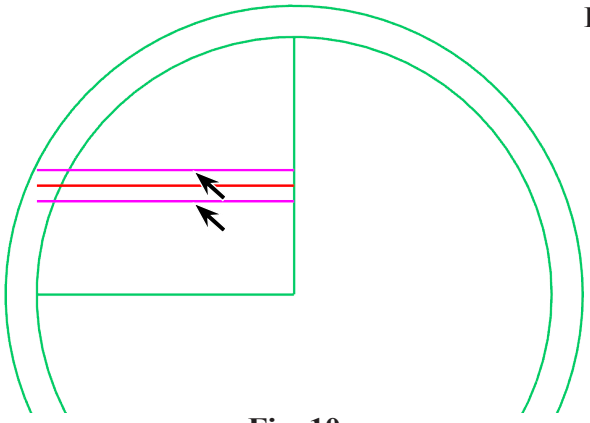


Fig. 10

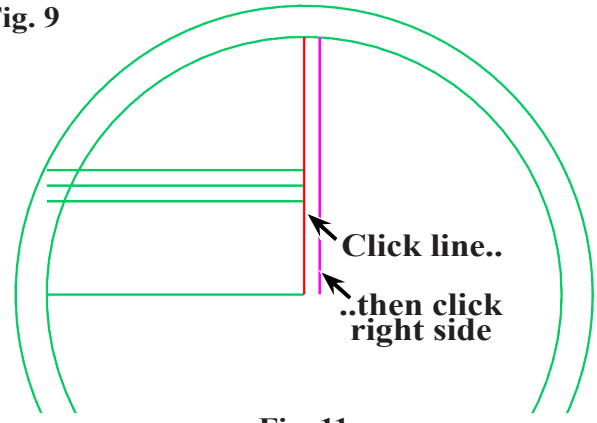


Fig. 11

Step 6. Click **Direction** until (twice) bi-directional lines appear, **Fig. 12**.
Click OK in Offset dialog box.

Step 7. **Right click** the graphics window and click **Clear Colors**.

Step 8. **Delete the three centerlines**. To delete, click and press Delete key, **Fig. 13**.

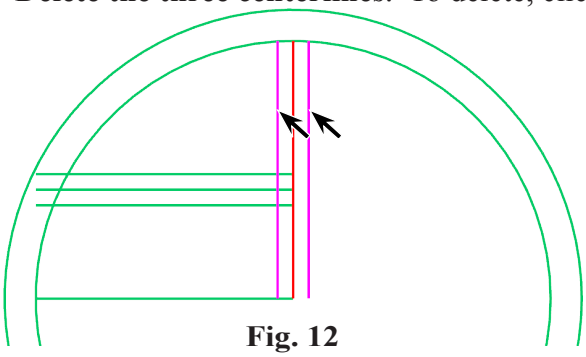


Fig. 12

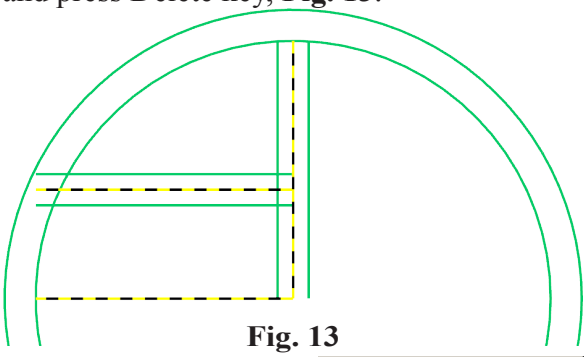


Fig. 13

F. Mirror.

Step 1. On the Transform tab TRANSFORM click **Mirror**.

Step 2. Click the **4 lines** and click **End Selection** (**ENTER**), **Fig. 14**.

Step 3. In Mirror dialog box:
Select **Copy** , **Fig. 15**
Select **Mirror about X axis**
Click OK.

Step 4. **Right click** the graphics window and click **Clear Colors**.

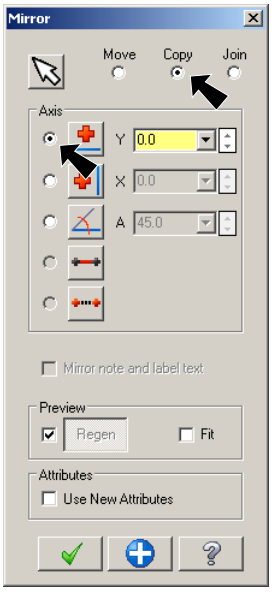


Fig. 15

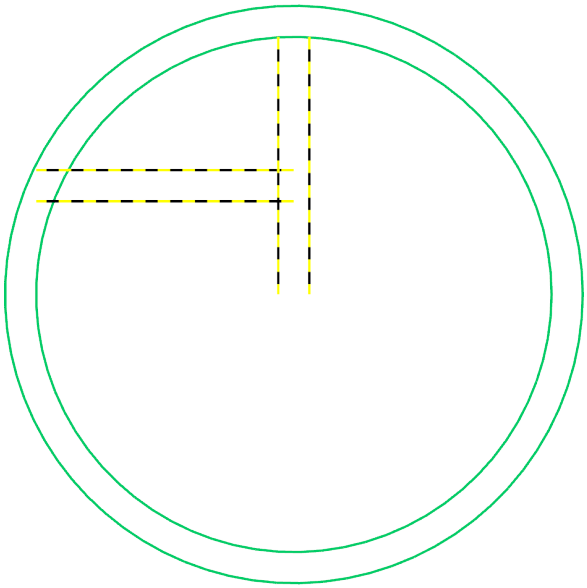


Fig. 14

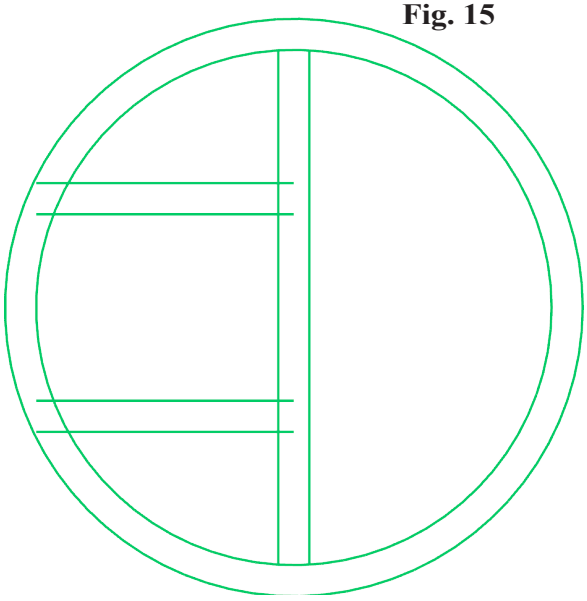
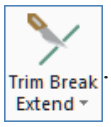


Fig. 16

G. Trim Divide and Trim 2 Entity.

Step 1. On the Wireframe tab WIREFRAME click **Trim Break Extend** 

Step 2. In the Trim Break Extend function panel:
under Type, **Fig. 17**
select **Divide/delete**
Trim all 6 segments between lines and arcs. To trim, click the segment between the line or arc, **Fig. 18**.

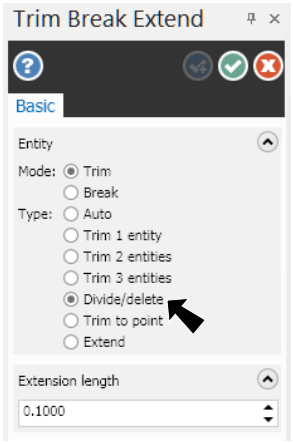


Fig. 17

Step 3. In the Trim Break Extend function panel:
under Type, **Fig. 19**
select **Trim 2 entities**
Trim at each intersection, **Fig. 20**. Include the vertical lines at arc as the lines extend beyond the arc. The line can be seen if you zoom in. To trim, click entities at each intersection. If all is not trimmed chains for fillets will not be correct.
Click OK when done.

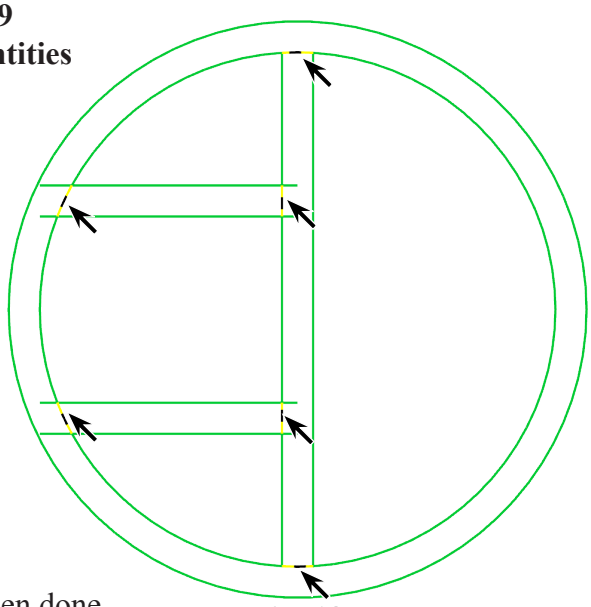


Fig. 18

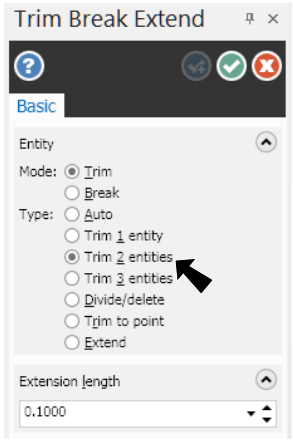


Fig. 19

Step 4. **Tip:** To confirm trimming is complete use Analyze Chain, on the Home tab HOME in the Analyze group click **Chain** 

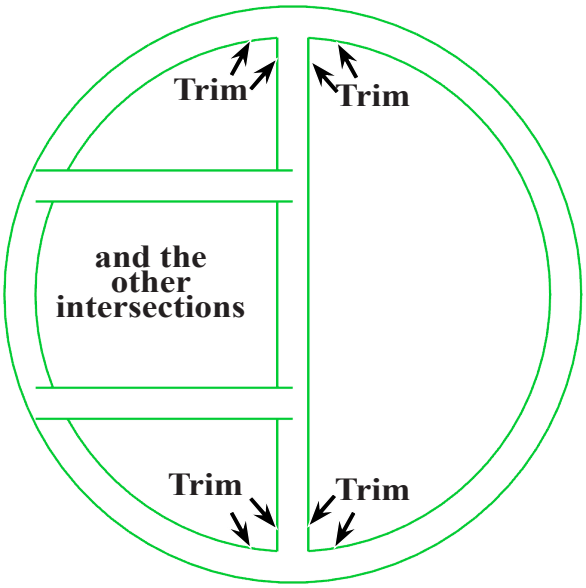


Fig. 20

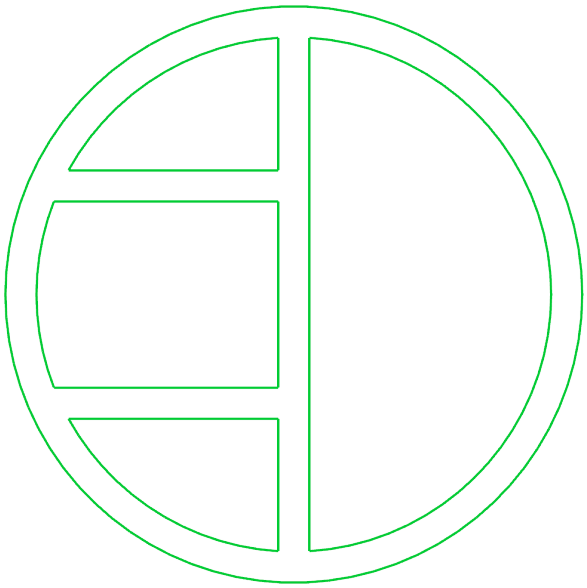
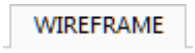
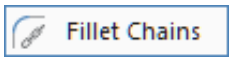


Fig. 21

H. Fillet Chains.

Step 1. On the Wireframe tab 

click **Fillet Chains** 

on **Fillet Entities** 

drop down.

Step 2. Click Chain  in Chaining dialog box.

Step 3. Chain geometry of **each pocket**, **Fig. 22**.

Step 4. Click OK  in the Chaining dialog box.

Step 5. In the Fillets Chains function panel:
under Radius, **Fig. 23**
Radius .125
Click OK  .

Step 6. Save  (**Ctrl-S**).

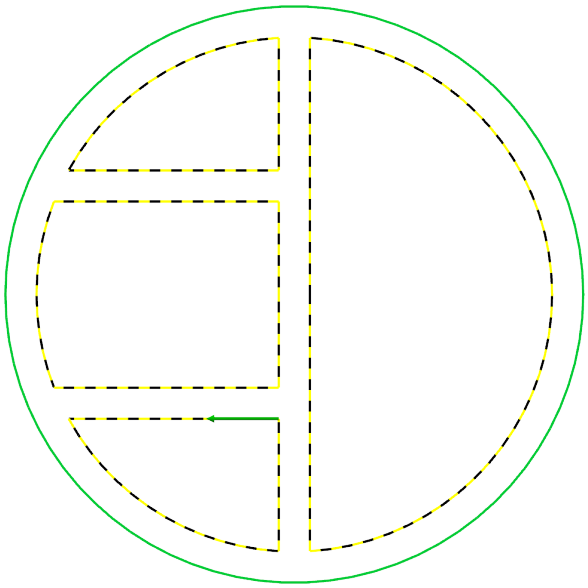


Fig. 22

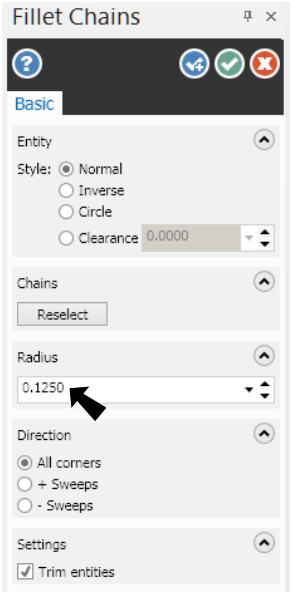


Fig. 23

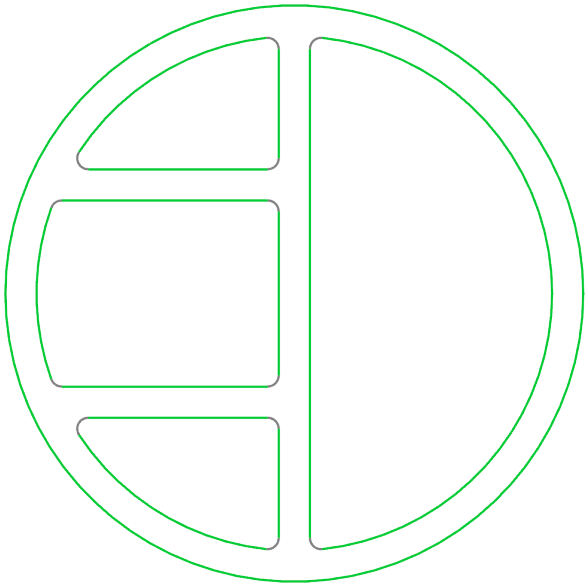


Fig. 24

I. Pin Hole Circles.

Step 1. **Right click** in the graphics window and on the Mini Toolbar click **Wireframe Color** drop down arrow and select **magenta**, **Fig. 25**.

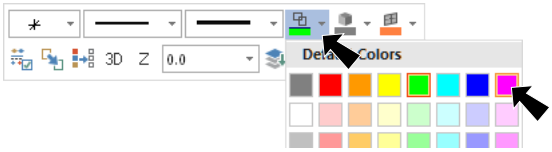
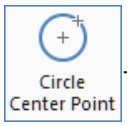


Fig. 25

Step 2. On the Wireframe tab WIREFRAME click **Circle Center Point**



.

Step 3. In the Circle Center Point function panel:

under Size, **Fig. 26**

Click **Locked**

Diameter .125 and press ENTER

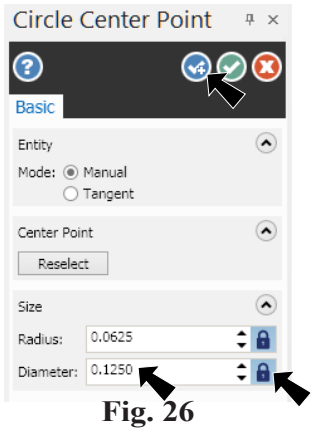


Fig. 26

Press **spacebar** to activate AutoCursor **Fast Point**

Key-in coordinates shown below and press **ENTER** after keying-in coordinate.

Pin Holes

0, -3.035

0, 3.035

Click OK .

Step 4. Save (**Ctrl-S**).

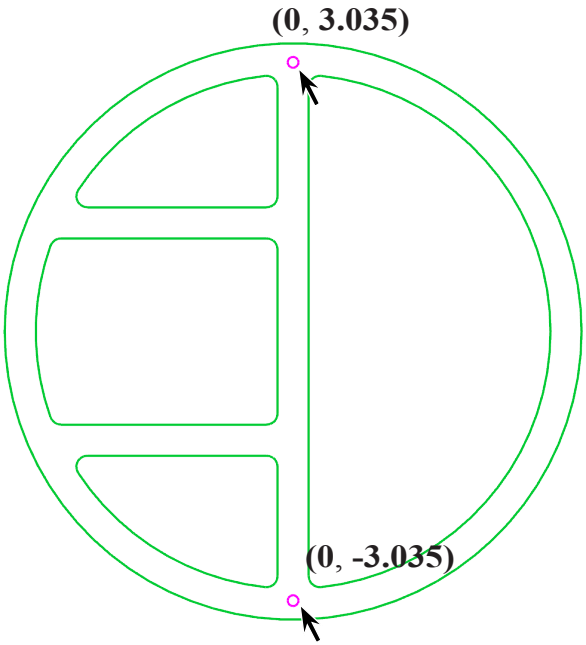


Fig. 27

J. Extrude Solid.

Step 1. Change to the Isometric View. **Right click** in the graphics window and click Isometric (WCS) (**Alt-7**).

Step 2. On the Solids tab SOLIDS click **Extrude** Extrude.

Step 3. Click Chain in Chaining dialog box.

Step 4. Click **Base circle** to chain, **Fig. 28**.

Step 5. Click OK in Chaining dialog box.

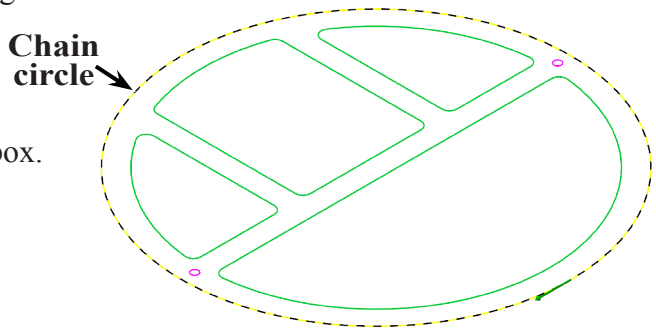


Fig. 28

Step 6. In the Solid Extrude function panel:
under Operation, **Fig. 29**
select **Create body**
under Distance
Distance .75 and press ENTER
The direction arrow should **point down**, **Fig. 30**. If arrow points in wrong direction, click Reverse All, **Fig. 29**.
Click **OK and Create New Operation**.

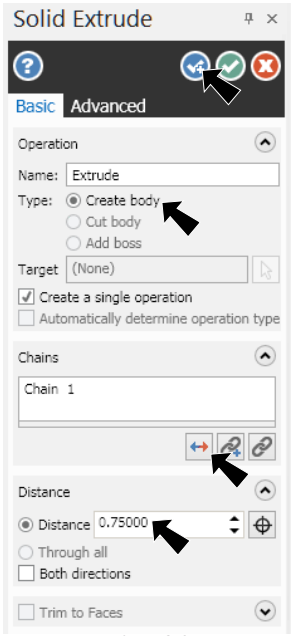


Fig. 29

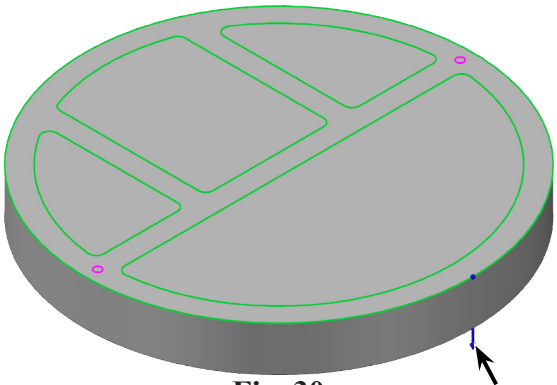


Fig. 30

K. Cut Pockets.

Step 1. Click Chain in Chaining dialog box.

Step 2. Click **any geometry of each pocket**, **Fig. 31**.

Step 3. Click OK in Chaining dialog box.

Step 4. In Solid Extrude function panel, **Fig. 32**
Select **Cut Body**
Select **Distance**
Set **Distance .65**

The direction arrow should **point down**, **Fig. 33**.
Click **OK and Create New Operation**.

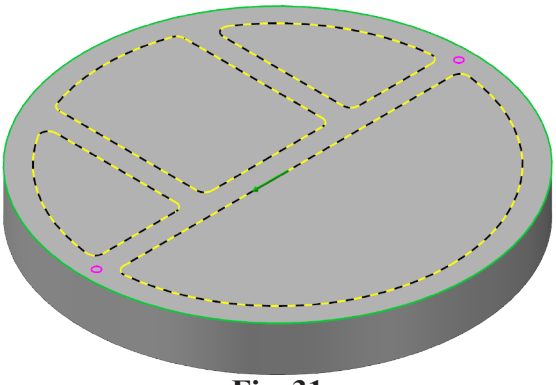


Fig. 31

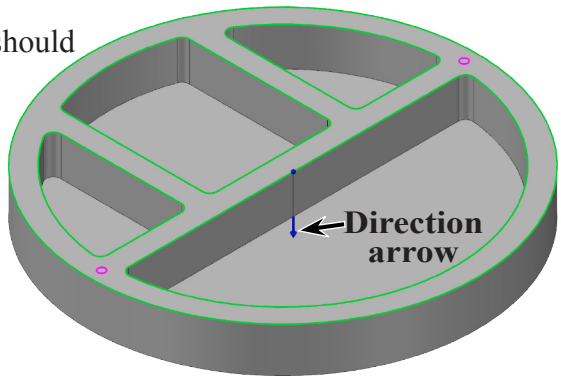


Fig. 33

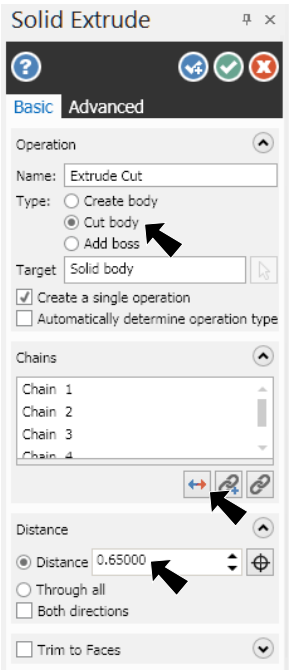


Fig. 32

L. Cut Pin Holes.

Step 1. Click Chain in Chaining dialog box.

Step 2. Click **both Pin holes (magenta)** to chain, **Fig. 34**.

Step 3. Click OK in Chaining dialog box.

Step 4. In the Solid Extrude function panel:
under Operation, **Fig. 35**
Select **Cut Body**
under Distance
Select **Through All**
The direction arrow should **point down**, **Fig. 36**.
Click OK.

Step 5. Save (**Ctrl-S**).

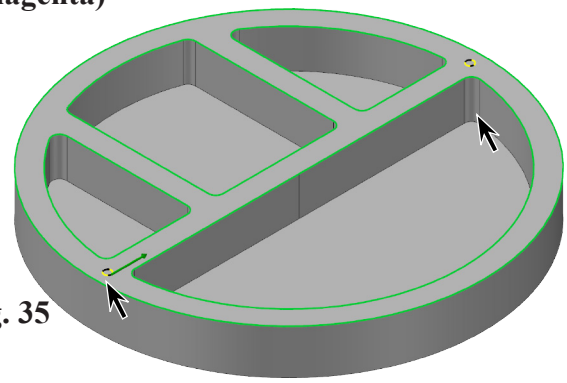


Fig. 34

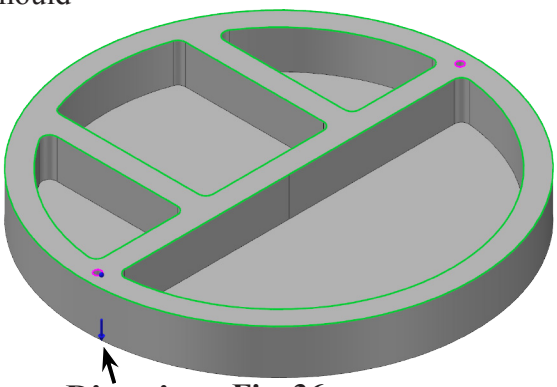


Fig. 36

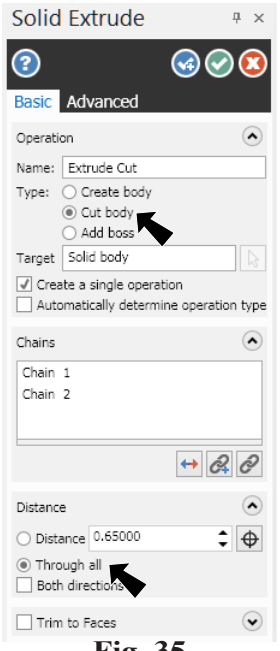


Fig. 35

M. Machine Type and Stock Setup.

Step 1. If necessary, display Toolpaths Manager. On the View tab VIEW click Toolpaths (**Alt-O**).

Step 2. If Machine Group is **not** displayed in the Toolpaths Manager, **Fig. 37** on the Machine tab MACHINE, click Machine Mill > Default from the menu.

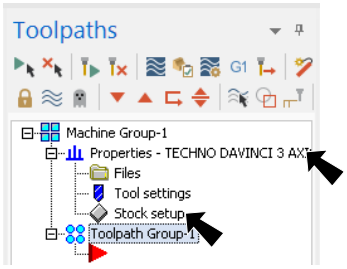


Fig. 37

Step 3. Expand **Properties** in the Toolpaths Manager and click **Stock Setup**, **Fig. 37**.

Step 4. Confirm Stock Plane is **Top**, **Fig. 38**.

Step 5. Confirm **Display** is checked.

Step 6. Key-in for X, Y and Z stock dimensions:
X 8
Y 8
Z .75

Step 7. Confirm Stock Origin coordinates:
X 0
Y 0
Z 0

Step 8. Click OK in the Machine Group Properties.

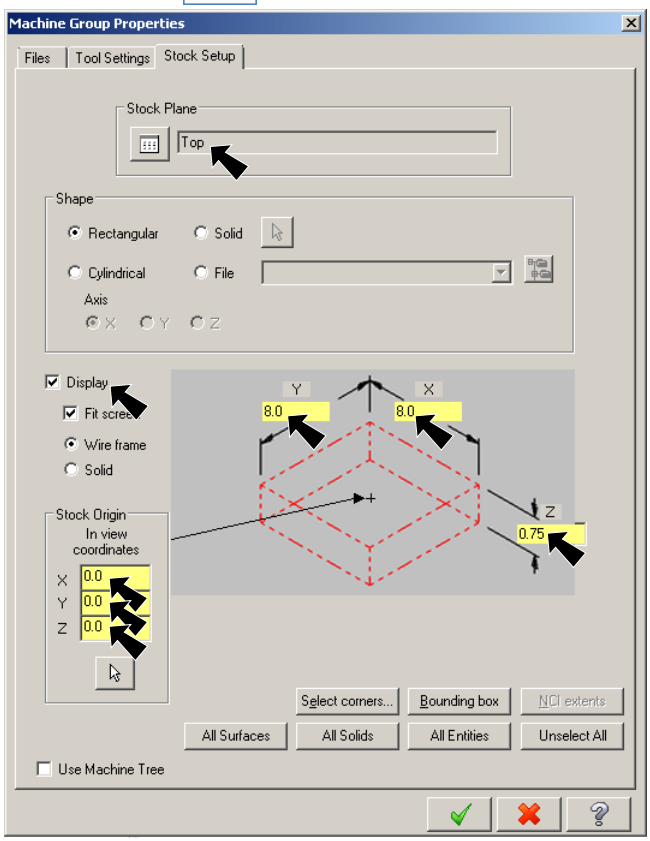


Fig. 38

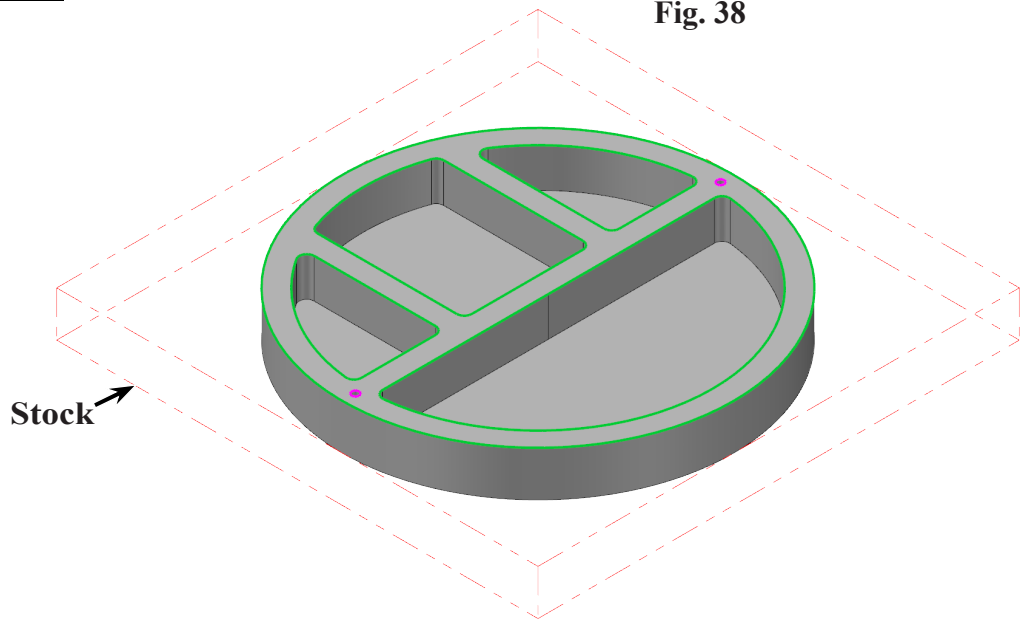
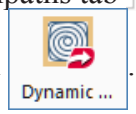


Fig. 39

N. Dynamic Mill Toolpath.

Step 1. On the Toolpaths tab TOOLPATHS in the 2D group click **Dynamic Mill** 

.

Step 2. Click OK in the NC name dialog, **Fig. 40**.

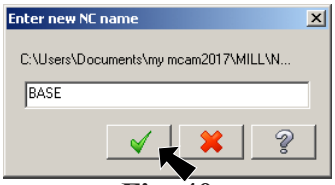


Fig. 40

Step 3. Select **Machining regions** button in Chain Options dialog box, **Fig. 41**.

Step 4. Select **Chain** in Chaining dialog box, **Fig. 42**.

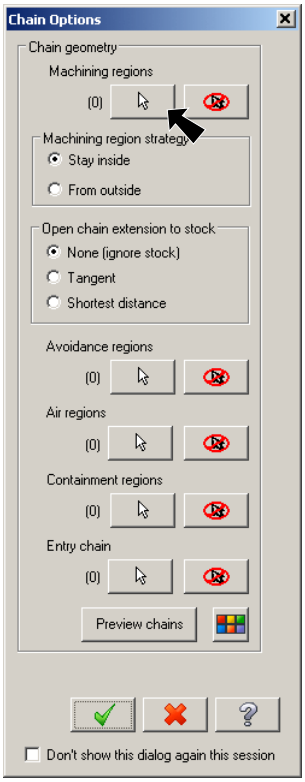


Fig. 41

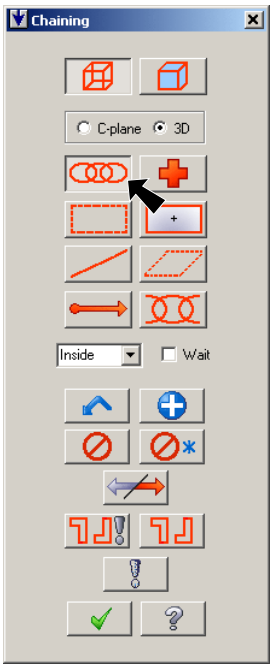


Fig. 42

Step 5. Click **any geometry of each pocket** to chain all pockets and click OK in Chain dialog box, **Fig 43**.

Step 6. Click OK in the Chain Options box, **Fig 44**.

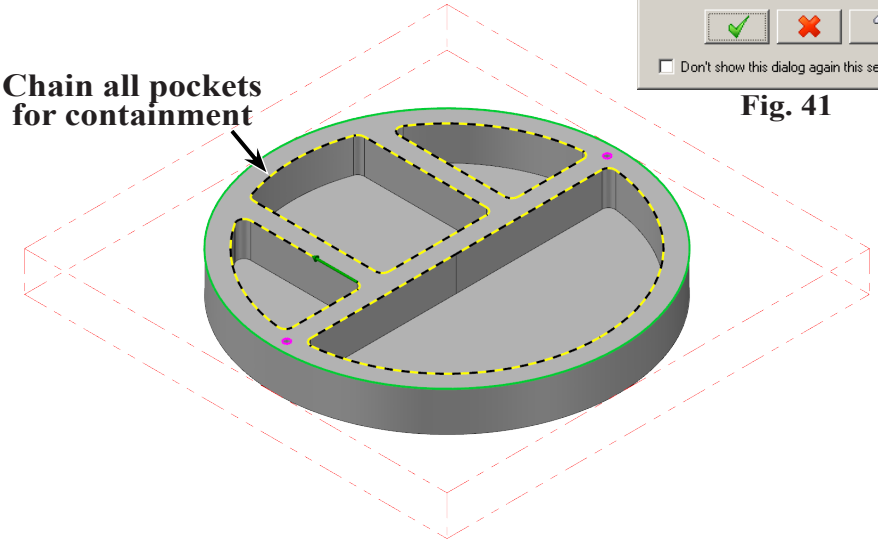


Fig. 43

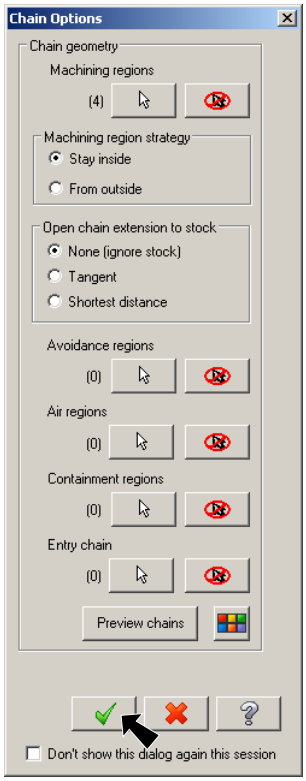


Fig. 44

Step 7. Select **Toolpath Type** from the tree control and confirm:

Dynamic Mill toolpath

Machining regions 4 Fig. 45.

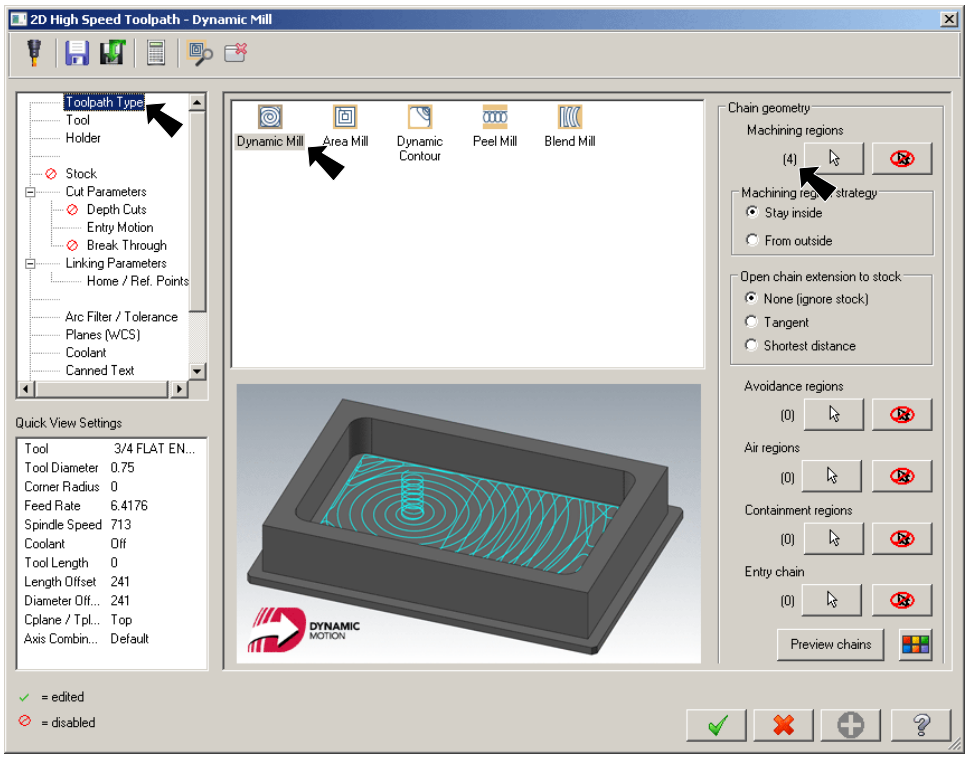


Fig. 45

Step 8. Select **Tool** from tree control and:

Click **Select library tool Fig. 46**.

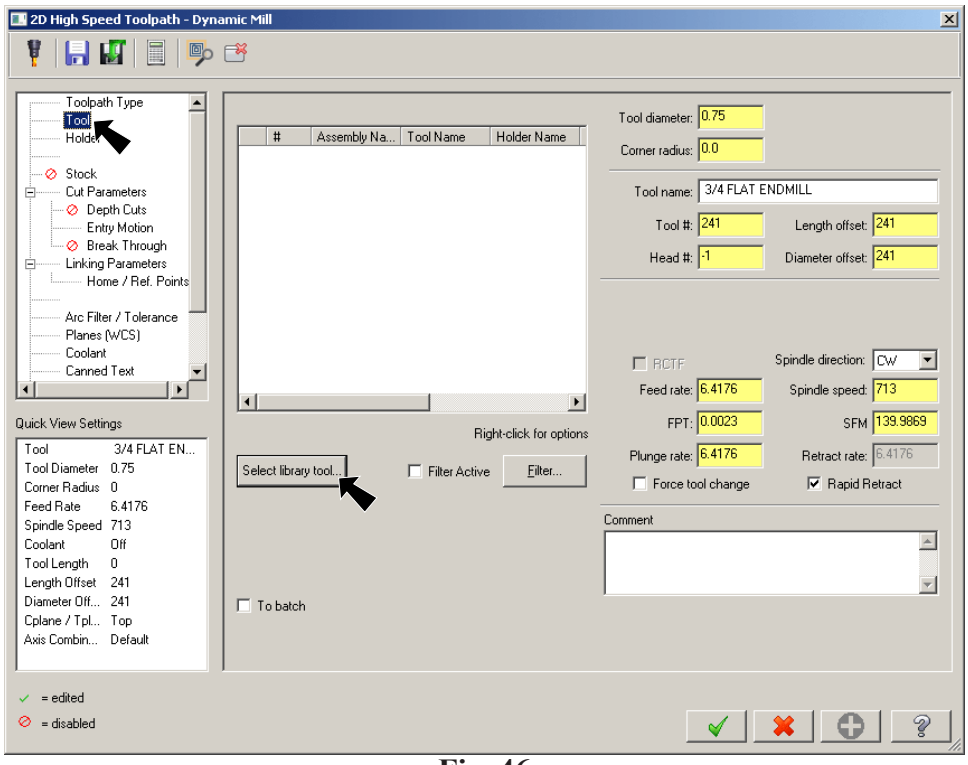


Fig. 46

Step 9. Click **285 1/4 FLAT ENDMILL** and click OK **Fig. 47**.

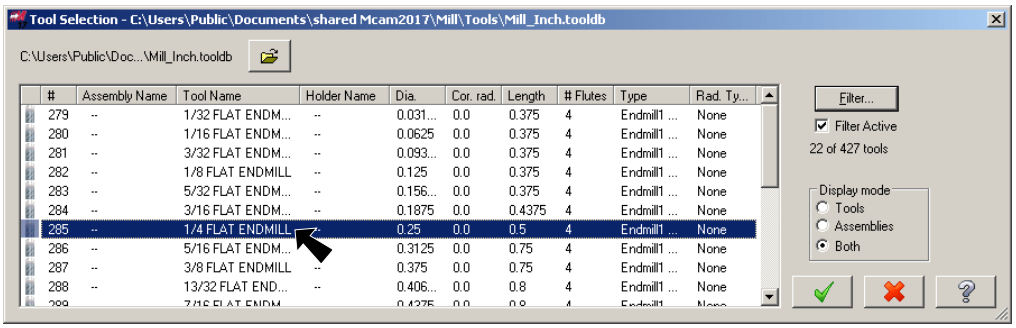


Fig. 47

Step 10. Back in **Tool** page set:

Feed rate 40
Plunge rate 20
Fig. 48.

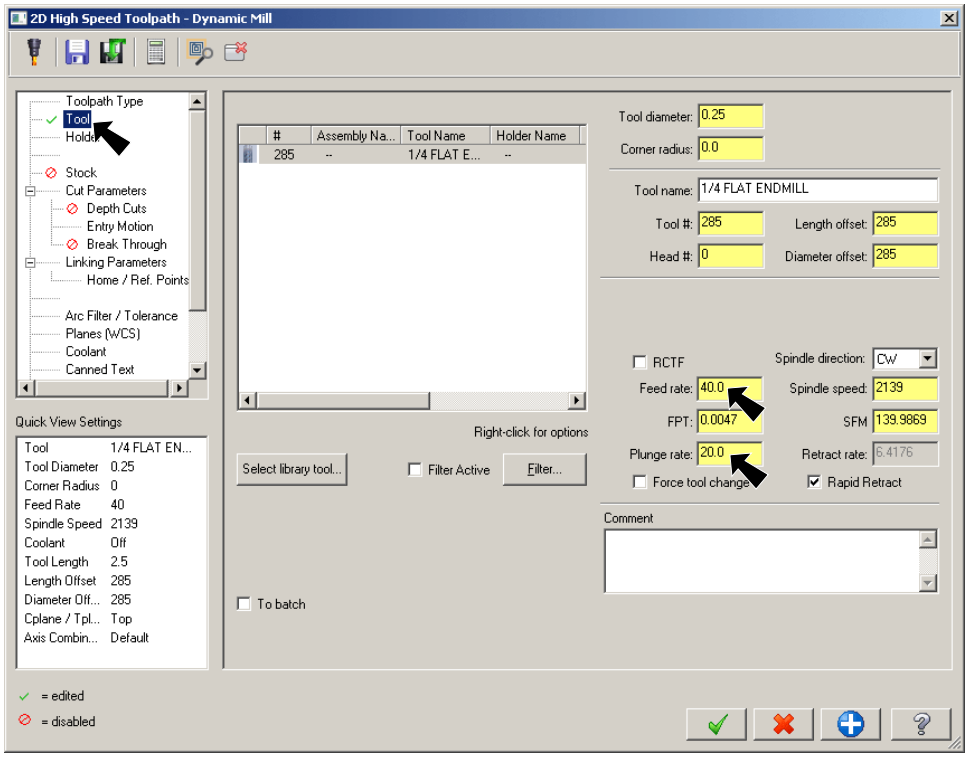


Fig. 48

Step 11. Select **Cut Parameters** from tree control and set:

Cutting method Climb

Stepover 45%

Stock to leave on walls and floors 0
Fig. 49.

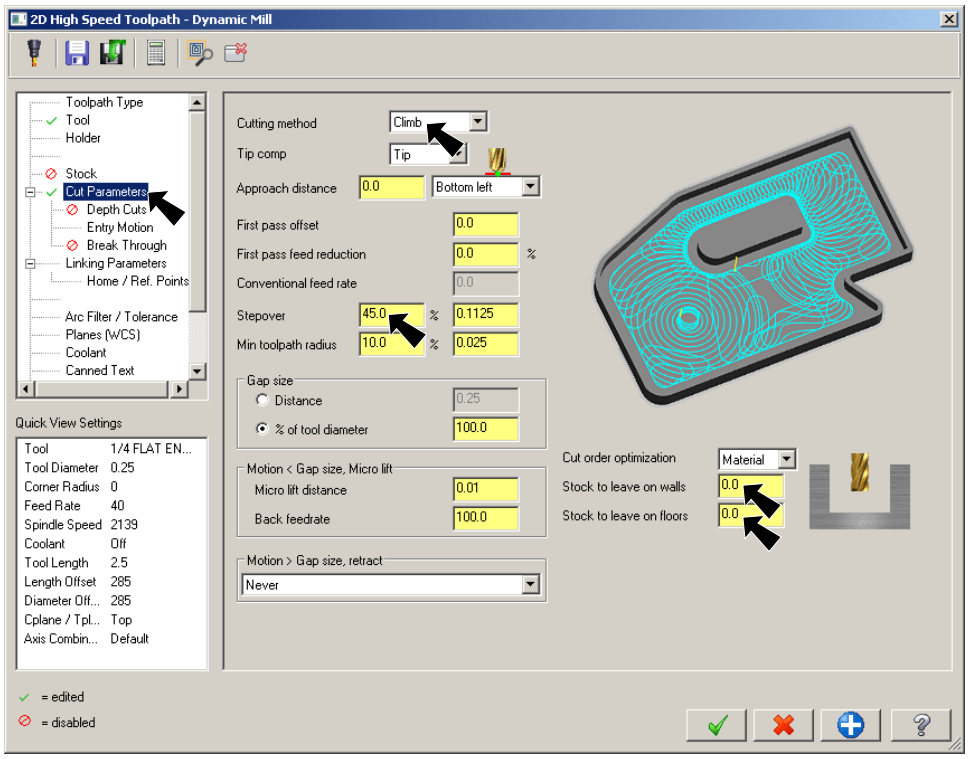


Fig. 49

Step 12. Select **Depth Cuts** from tree control and set:

Check **Depth cuts**

Max rough step .2
Fig. 50.

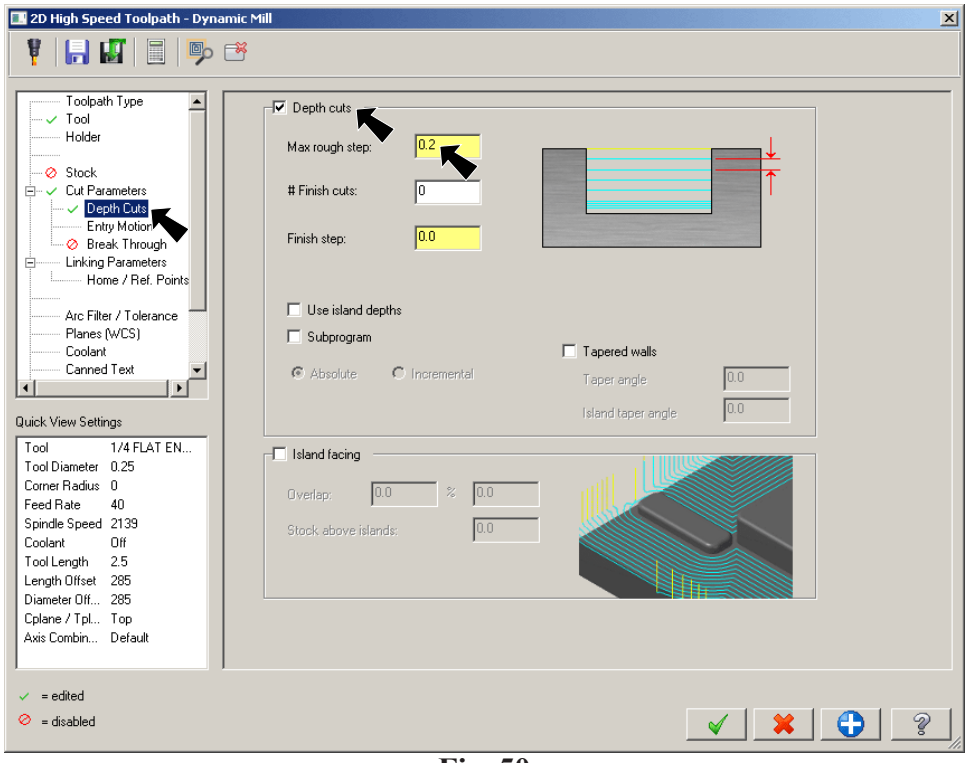


Fig. 50

Step 13. Select **Entry Motion** from tree control and set:

Plunge angle 10
Fig. 51.

Step 14. Select **Linking Parameters** from tree control and set:

Clearance 1

Depth -.65
Fig. 52.

Step 15. Click OK  in Dynamic Mill dialog box.

Step 16. Allow Mastercam to calculate the toolpath.

Step 17. Save  (**Ctrl-S**).

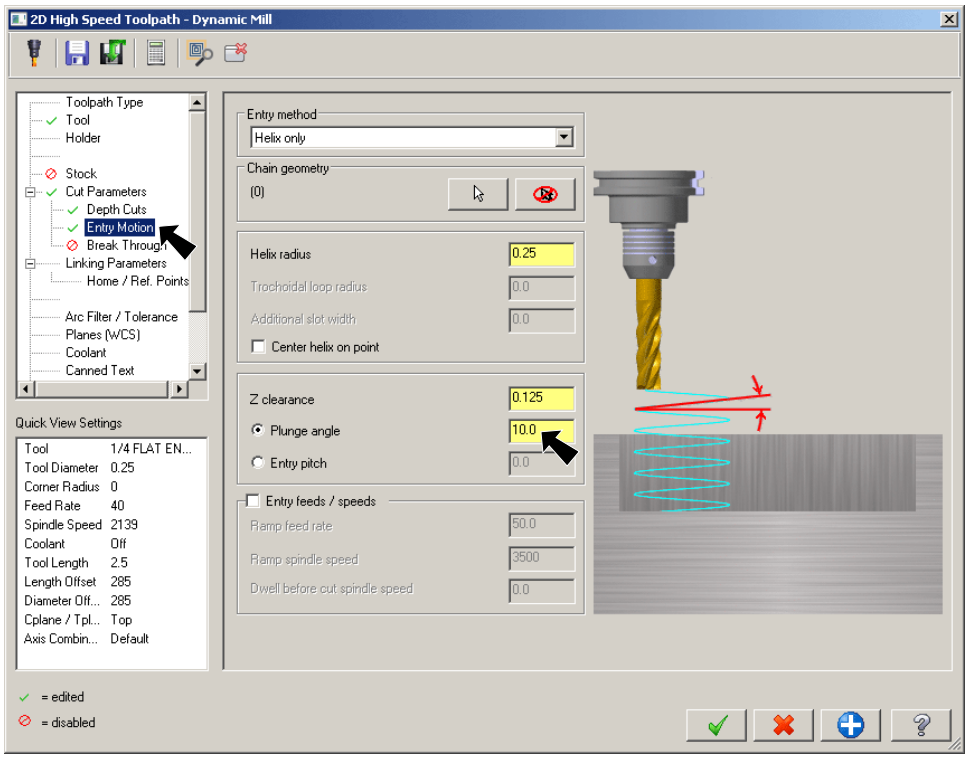


Fig. 51

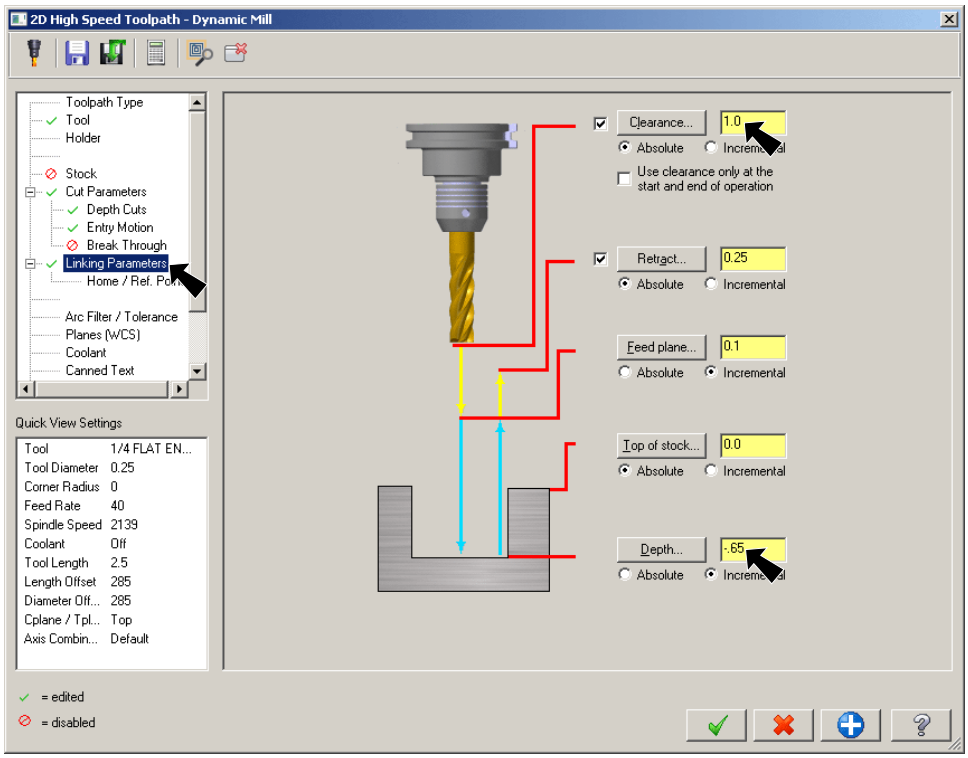
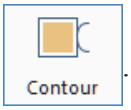


Fig. 52

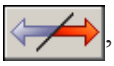
O. Contour Toolpath.

Step 1. Use **Alt-T** to turn off toolpath display.

Step 2. On the Toolpaths tab TOOLPATHS in the 2D group click **Contour** 

.

Step 3. Click **Chain**  (**C**) in Chaining dialog box, **Fig. 53**.

Step 4. Click **Base circle** to chain, **Fig. 54**. The chain arrow should point **clockwise** around the chain. If chaining directions arrow is pointing in the opposite direction - click Reverse  , **Fig. 53**.

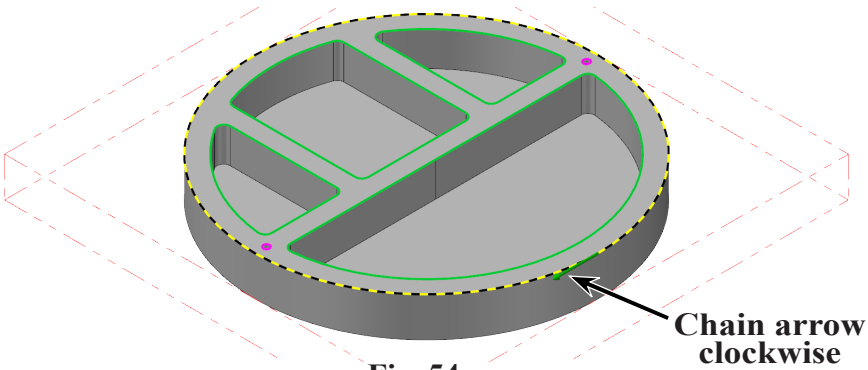


Fig. 54

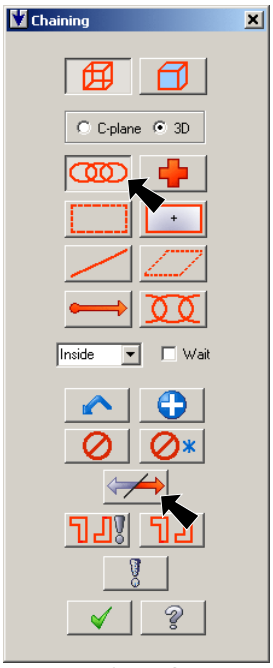


Fig. 53

Step 5. Click OK  in Chaining dialog box.

Step 6. In the 2D Toolpaths Contour dialog box confirm **1 Chain** **Fig. 55**.

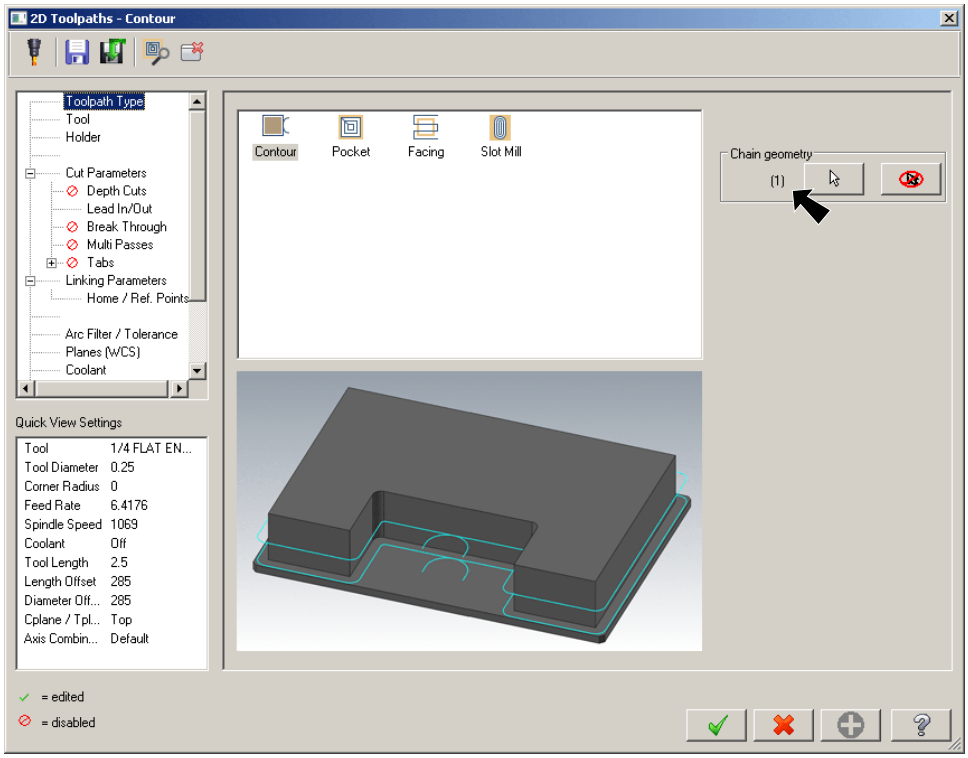


Fig. 55

Step 7. Select **Tool** from the tree control and:

Confirm **285 1/4 FLAT ENDMILL**

Feed rate 40

Plunge rate 20
Fig. 56.

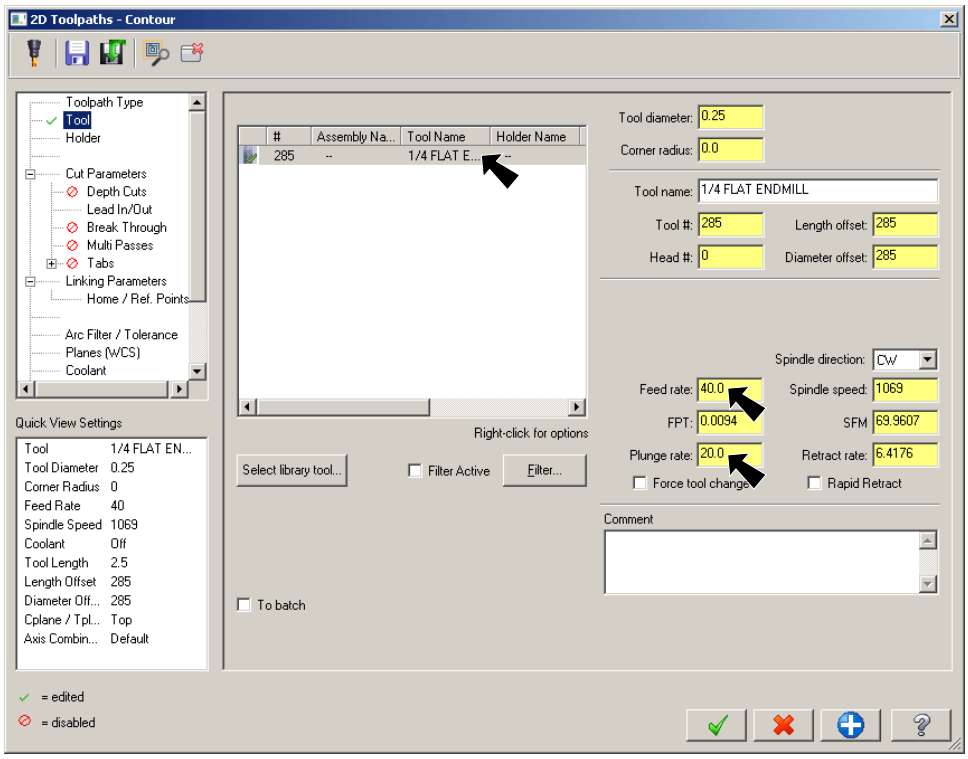


Fig. 56

Step 8. Select **Cut Parameters** from tree control and set:

Compensation type Wear

Compensation direction Left

Tip comp: Tip

Stock to leave on walls and floors 0
Fig. 57.

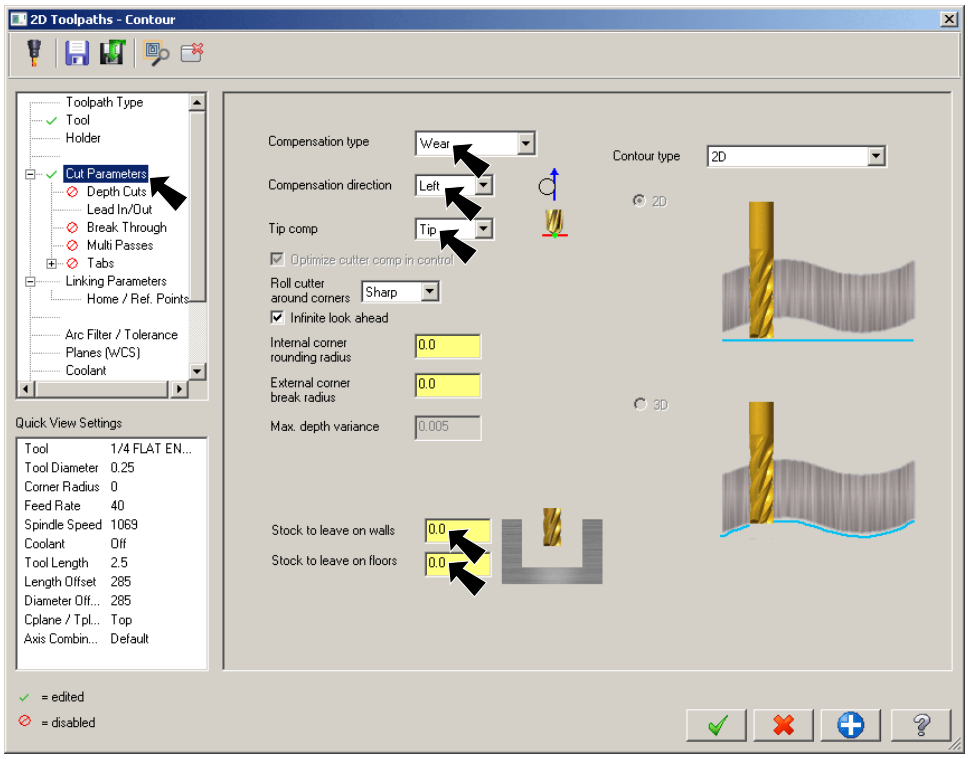


Fig. 57

Step 9. Select **Depth Cuts** from tree control and set:

Check **Depth cuts**

Max rough step .2

Check **Keep tool down** **Fig. 58**.

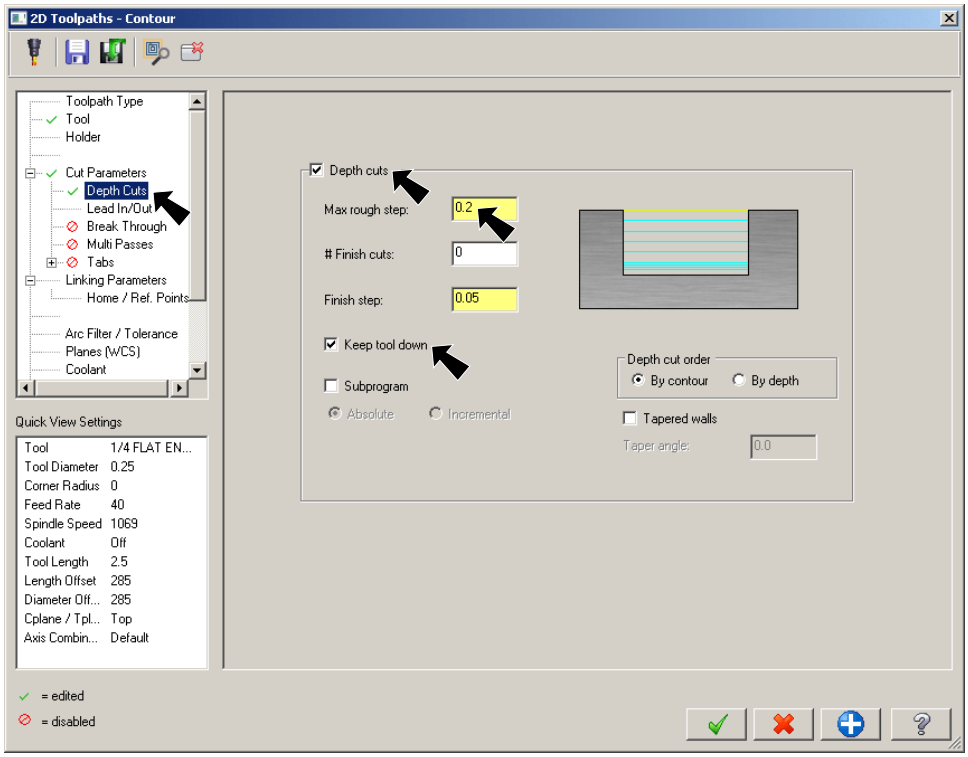


Fig. 58

Step 10. Select **Lead In/Out** from tree control and set:

Uncheck **Lead In/Out** **Fig. 59**.

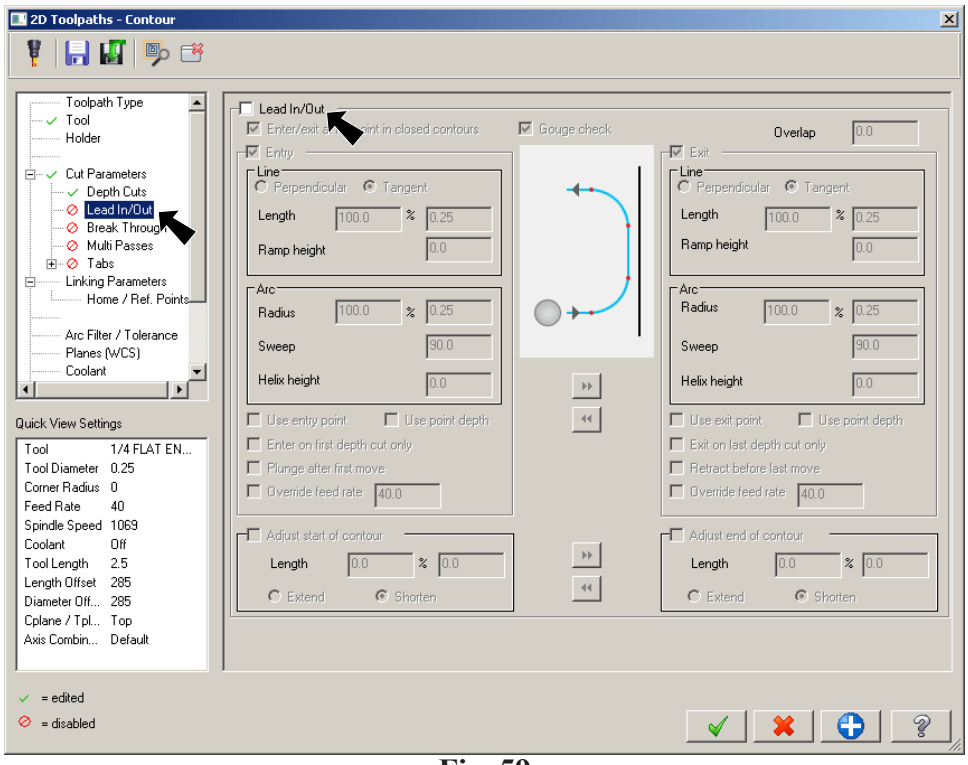


Fig. 59

Step 11. Select **Break Through** from tree control and set:

Check **Break through**

Break through amount .01 Fig. 60.

Step 12. Select **Linking Parameters** from tree control and set:

Depth -.75 Fig. 61.

Step 13. Click OK  .

Step 14. Save  (**Ctrl-S**).

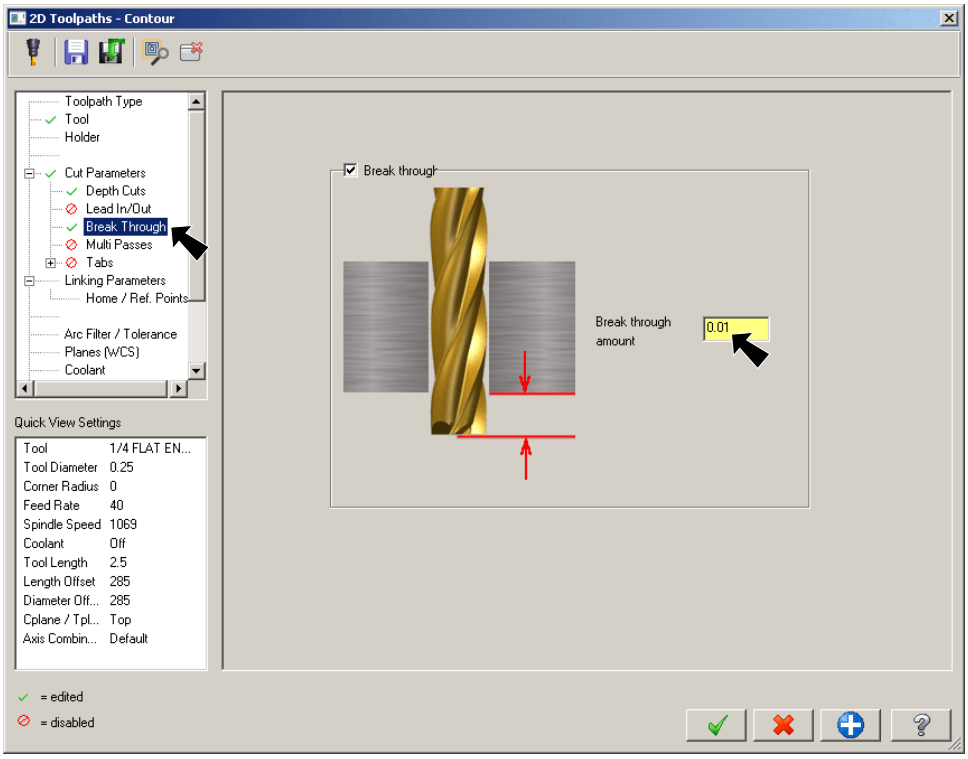


Fig. 60

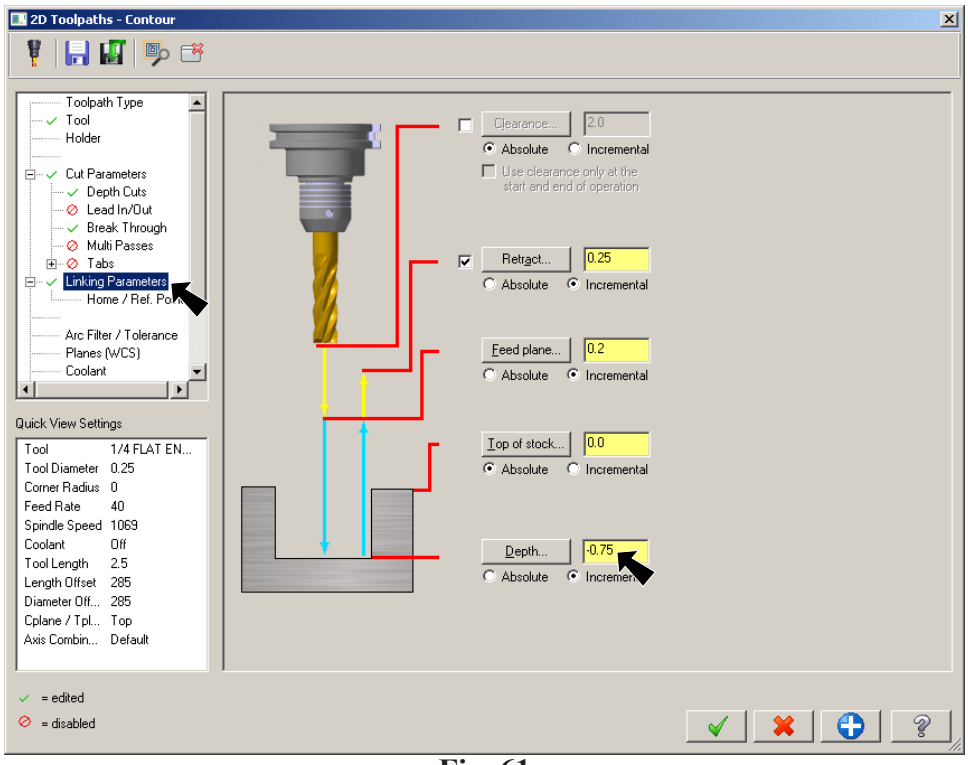


Fig. 61

P. Verify Toolpaths.

Step 1. Click **Toolpath Group-1** in the Toolpaths Manager to select **Dynamic Mill and Contour** toolpaths, **Fig. 62**.

Step 2. Click **Verify**  in the Toolpaths Manager, **Fig. 62**.

Step 3. Click **Play**  **(R)** in VCR bar.

Step 4. Note **Total Time** to run program under Toolpath Info in the Move List panel (**roughly 30 minutes**), **Fig. 63**.

Step 5. Switch back to Mastercam (**Alt-Tab**).

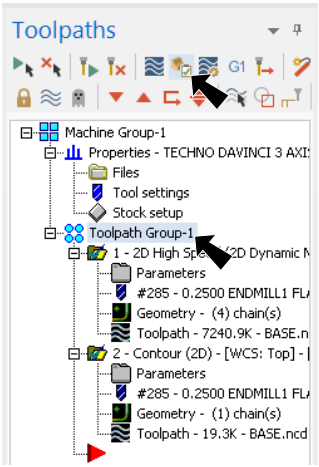


Fig. 62

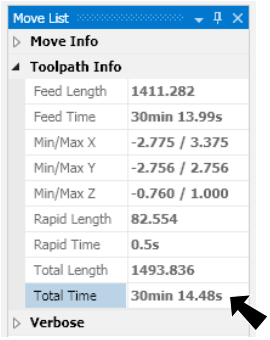


Fig. 63

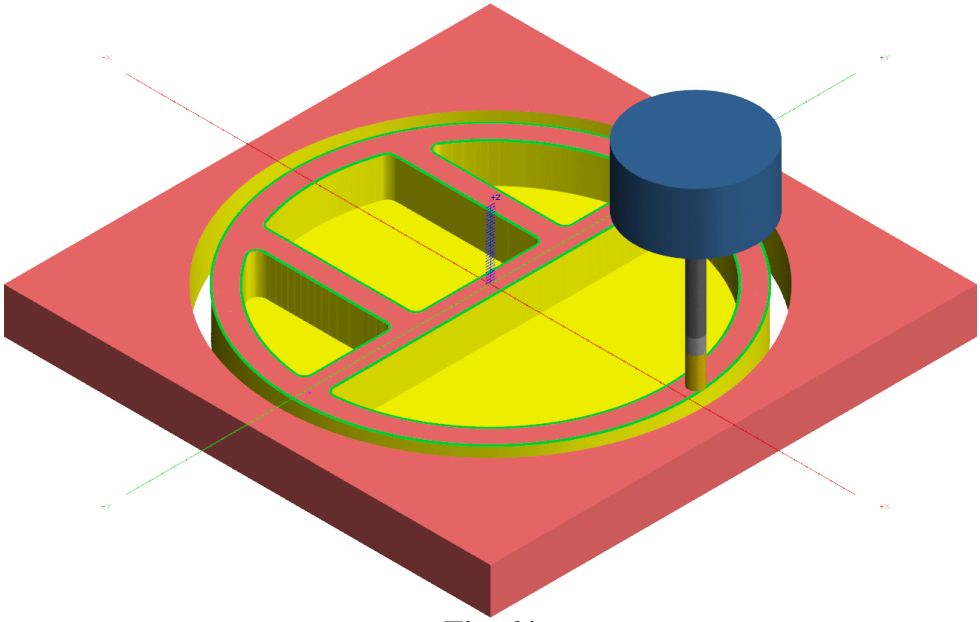


Fig. 64

Q. FBM Drill Toolpath.

Step 1. On the Toolpaths tab TOOLPATHS in the 2D group click **Expand gallery** button and click **FBM Drill** FBM Drill, **Fig. 65**.

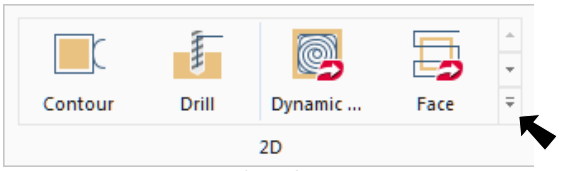


Fig. 65

Step 2. Select **Hole Detection** from the tree control and confirm:

Confirm: Limit search to plane **Top** **Fig. 66**.

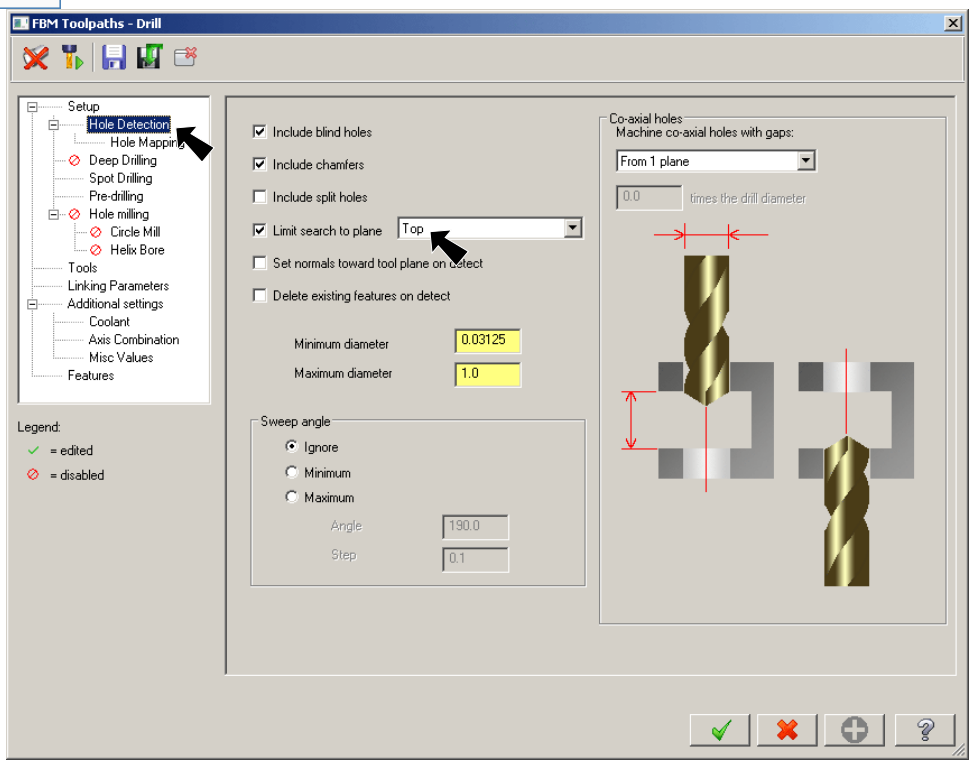


Fig. 66

Step 3. Select **Spot Drilling** from the tree control and set:

Uncheck **Spot Drilling** check box **Fig. 67**.

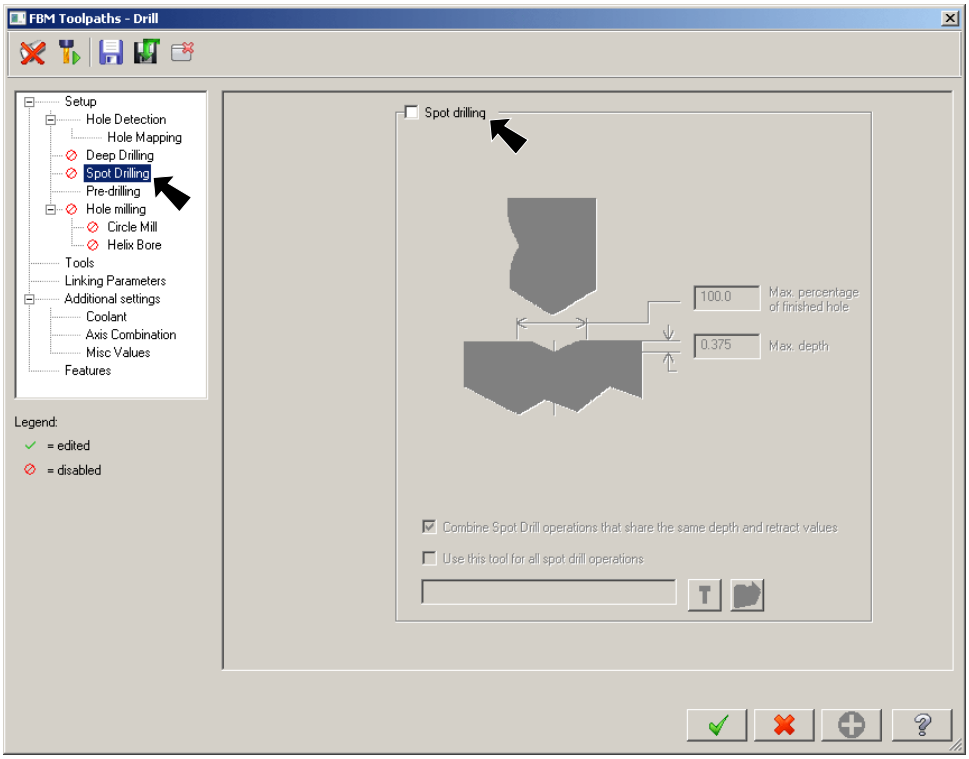


Fig. 67

Step 4. Select **Pre-drilling** from the tree control and uncheck **Pre-drilling** check box, **Fig. 68**.

Step 5. Click **Detect** button  at the top of the dialog box to find the holes, **Fig. 68**.

Step 6. Confirm **2 holes** and **depth .75** are listed and click OK  , **Fig. 69**.

Step 7. Save  (**Ctrl-S**).

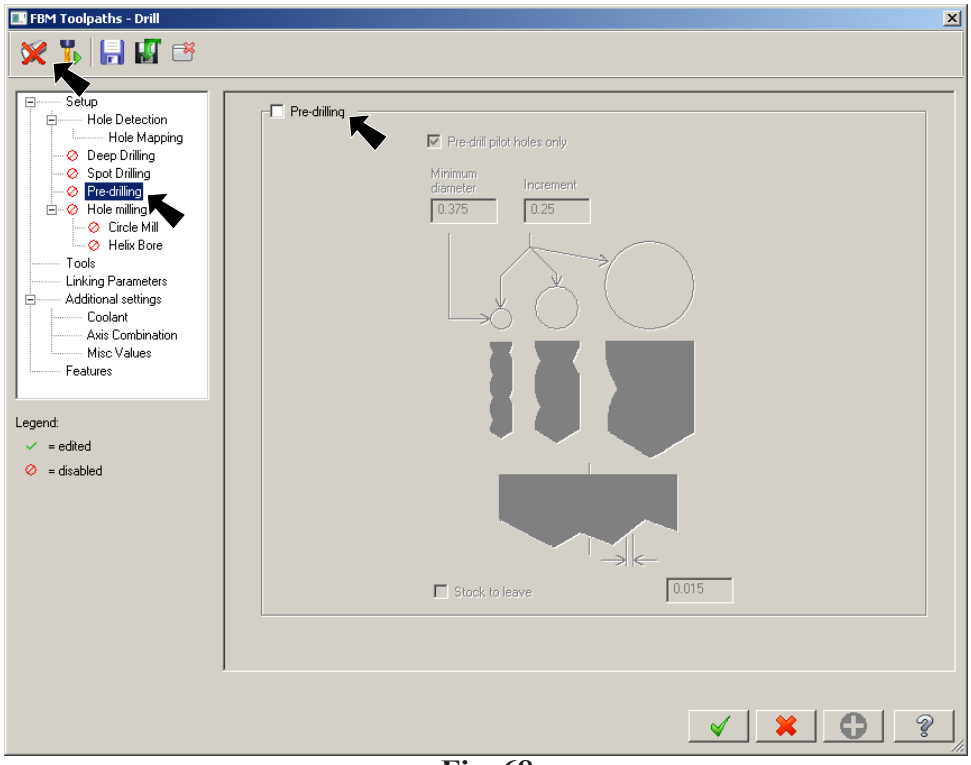


Fig. 68

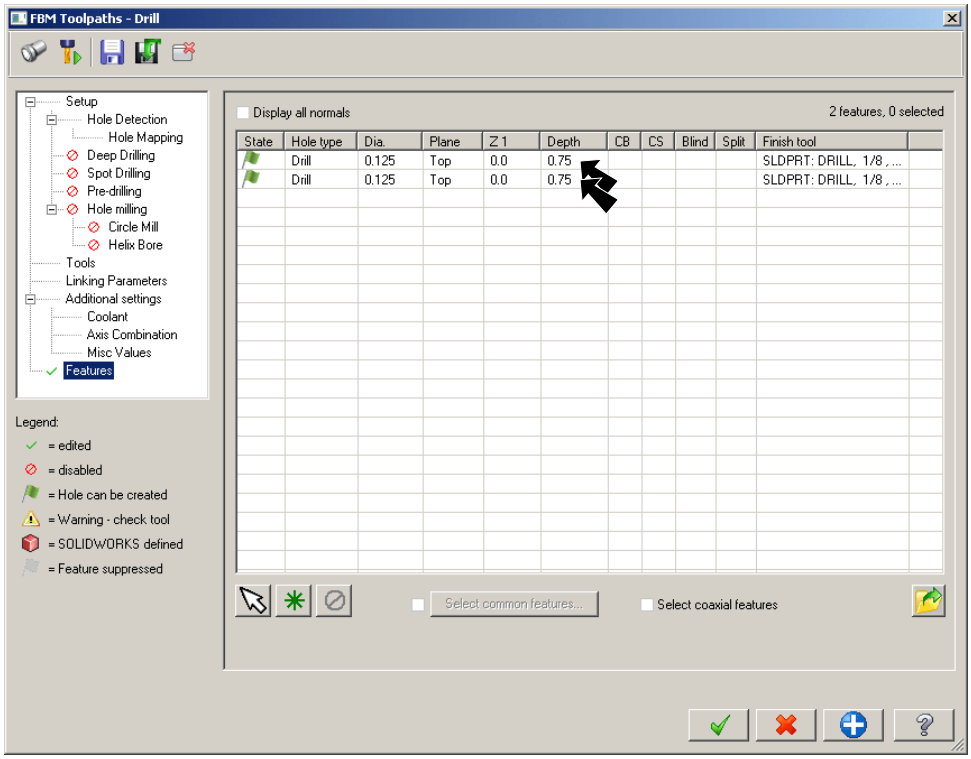


Fig. 69

R. Backplot.

Step 1. Use **Ctrl-T** to toggle **Translucency**.

Step 2. Click **FBM Drill** Machine Group in the Toolpaths Manager to select FBM Drill group, **Fig. 70**.

Step 3. Click **Backplot**  in Toolpaths Manager, **Fig. 70**.

Step 4. Click **Play**  in the Backplot VCR bar.

Step 5. Click OK  to close Backplot.

Step 6. Use **Ctrl-T** to toggle **Translucency**.

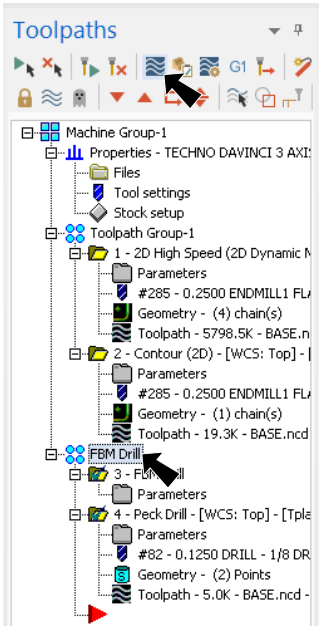


Fig. 70

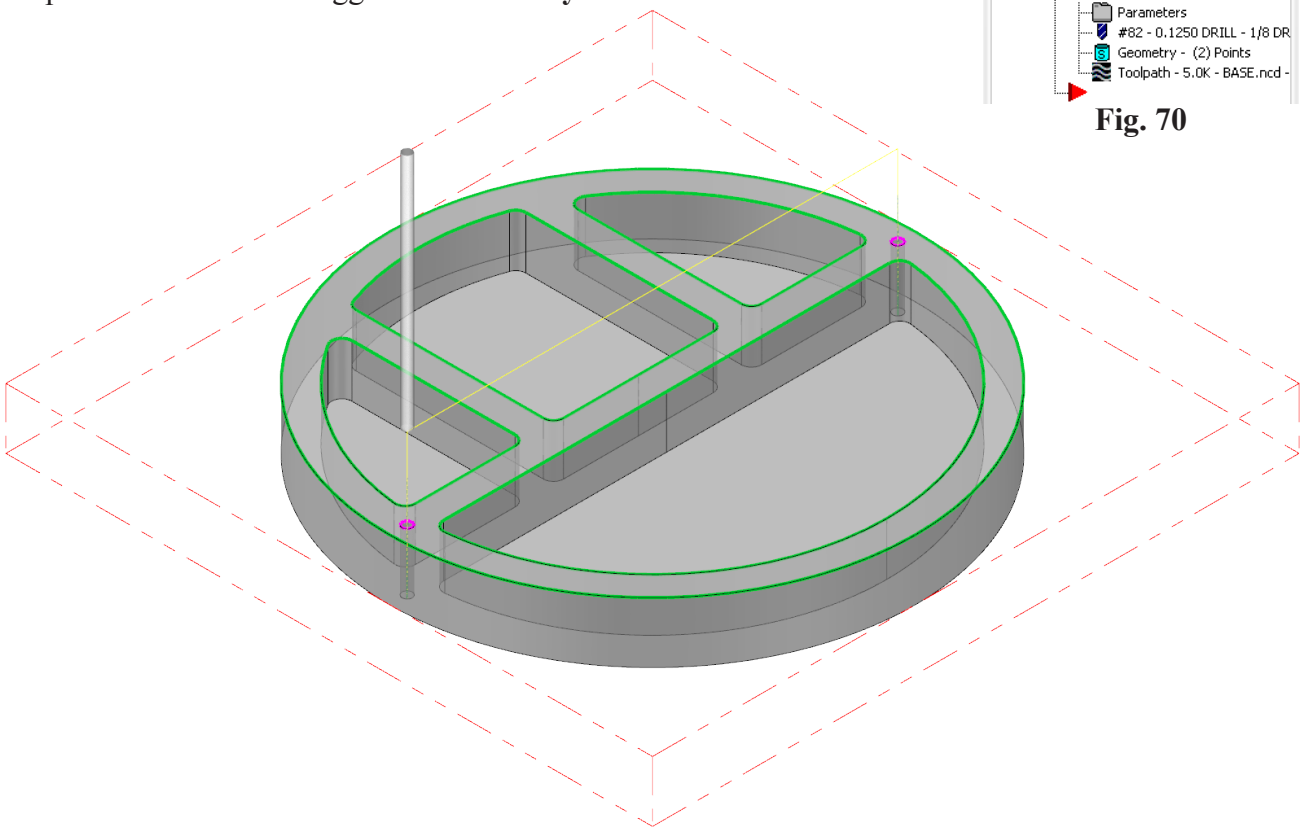


Fig. 71