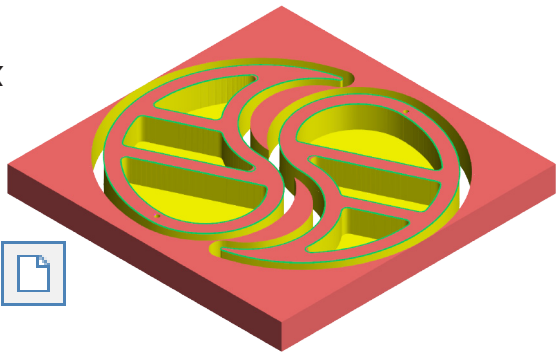
Jewelry Box
Tray



A. Sketch Tray 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.

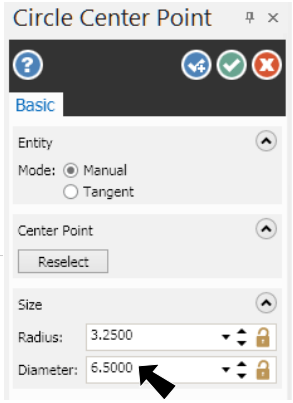


Fig. 1

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**.

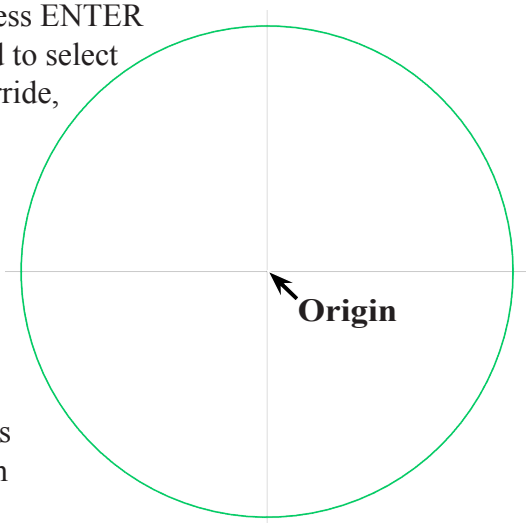


Fig. 2

B. Twin Edge Point Circles.

Step 1. On the Wireframe tab WIREFRAME click **Circle Edge Point** Circle Edge Point.

Step 2. Use the **upper quadrant and Origin** for the two points to sketch circle, **Fig. 3**.

Step 3. Repeat, and sketch second circle using **lower quadrant and Origin**, **Fig. 4**.

Step 4. Click OK in the Circle Edge Point function panel.

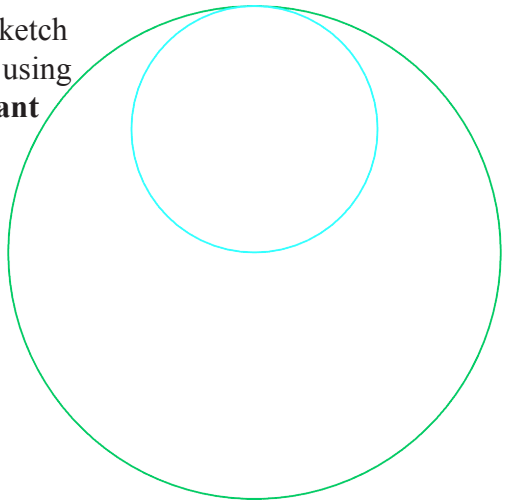


Fig. 3

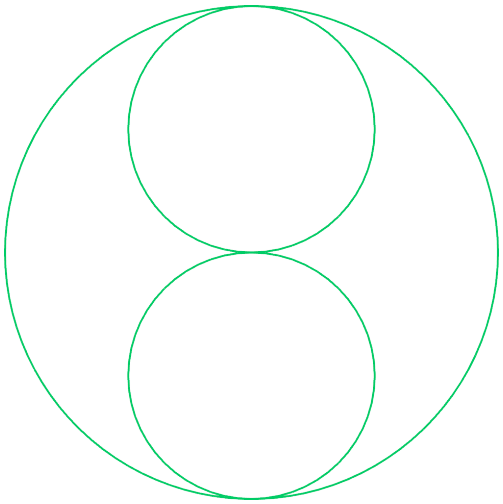


Fig. 4

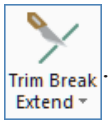
C. Save As "TRAY"

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

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

D. Trim Divide.

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



Step 2. In the Trim Break Extend function panel:
under Type, **Fig. 5**
select **Divide/delete**
Trim arcs, **Fig. 6-9**.
Click OK when done.

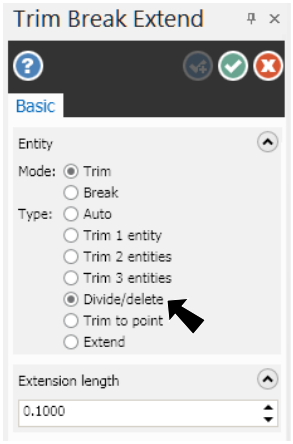


Fig. 5

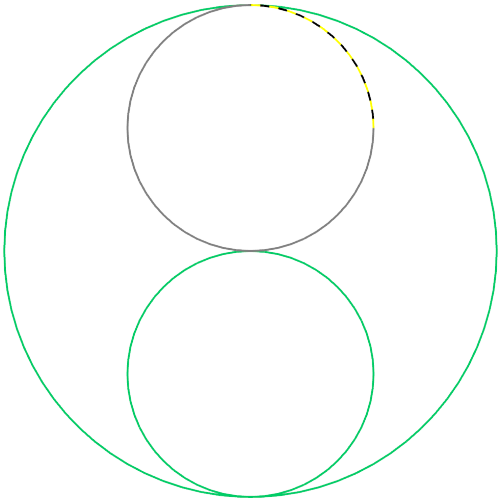


Fig. 6

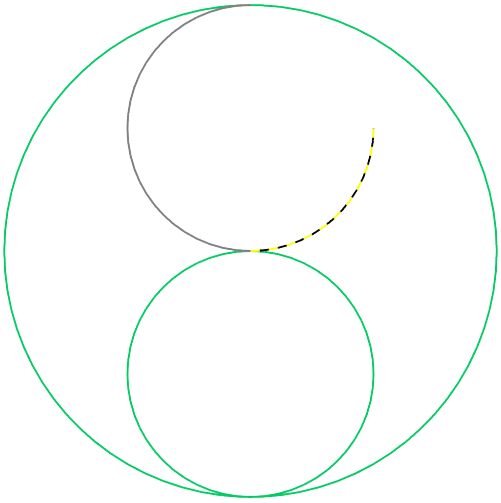


Fig. 7

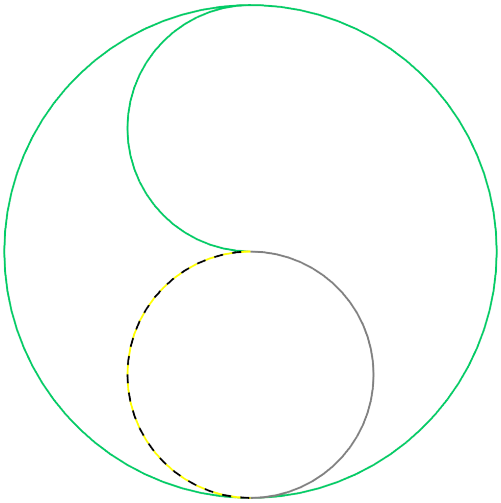


Fig. 8

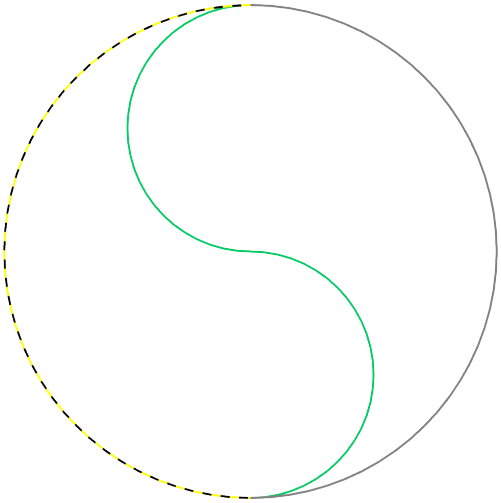


Fig. 9

E. Fillet.

Step 1. On the Wireframe tab WIREFRAME click **Fillet Entities** Fillet Entities.

Step 2. In the Fillet Entities function panel:
under Radius, **Fig. 10**
Radius .05
Click **both arcs at tip**, **Fig. 11**.
Click OK.

Step 3. Save (**Ctrl-S**).

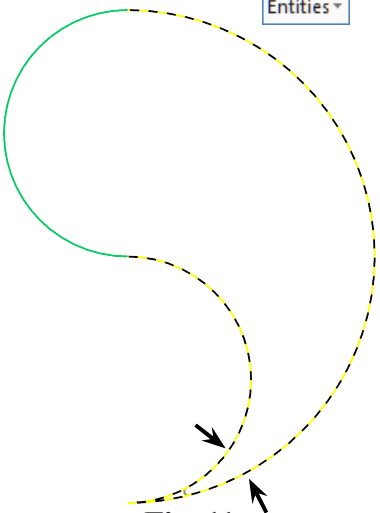


Fig. 11

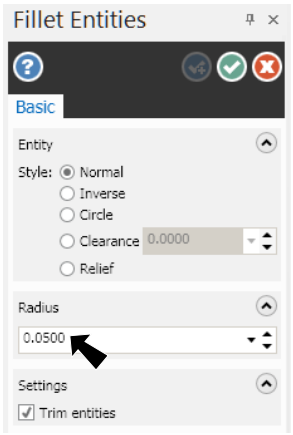


Fig. 10

F. Offset Contour.

Step 1. On the Wireframe tab WIREFRAME click **Chains** Chains on **Offset** Offset drop down.

Step 2. Click Chain in Chaining dialog box.

Step 3. Click **any arc**, **Fig. 12**.

Step 4. Click OK in Chaining dialog box.

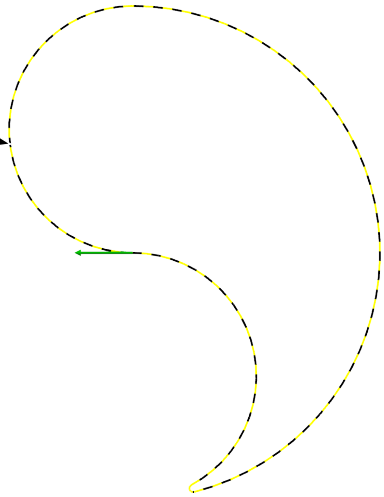


Fig. 12

Step 5. In Offset Contour dialog box set:
under Mode, **Fig. 13**
Select **Copy**
Set **Distance** **.35**
and press ENTER.

The **purple offset should be inside** the red original, **Fig. 14**. If it is not, click **Direction** in Offset Contour dialog box, **Fig. 13**.

Click OK in Offset Contour dialog box.

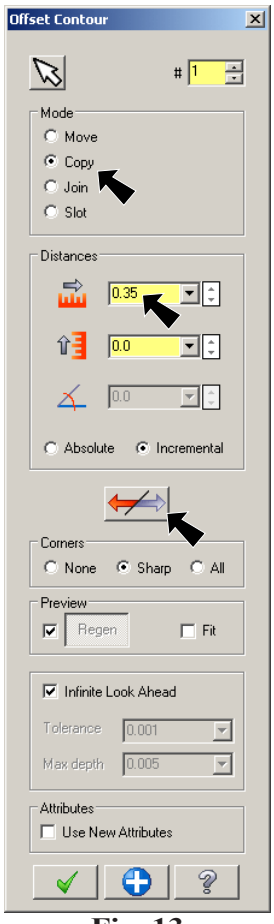


Fig. 13

Step 6. **Right click** the graphics window and click **Clear Colors**.

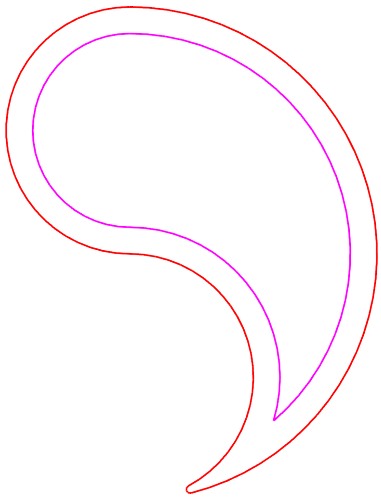
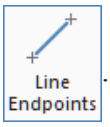


Fig. 14

G. Create Line.

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

.

Step 2. In the Line Endpoints function panel:
under Dimensions, **Fig. 15**
Lock **Angle**
Angle 25 and press ENTER
Sketch **line from Origin up to right out past offset arc**, **Fig. 16**.
Click OK .

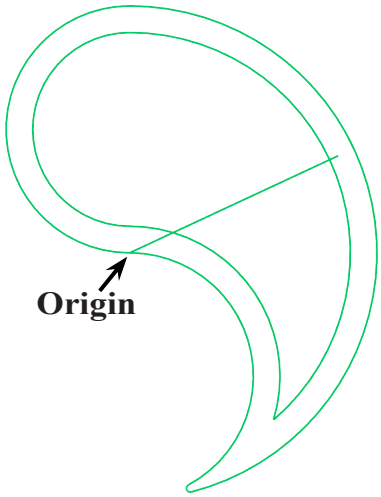


Fig. 16

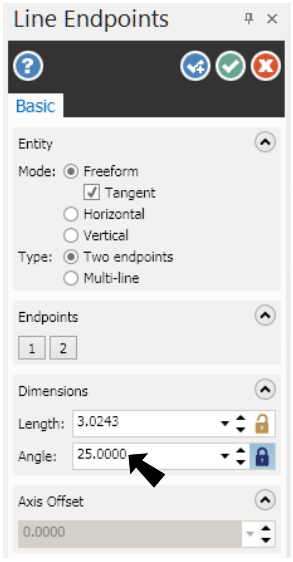
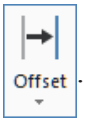


Fig. 15

H. Offset Lines.

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

.

Step 2. In Offset dialog box:
under Mode, **Fig. 17**
Copy
Distance **.8**
Click line, then click **above**, **Fig. 18**.

Click **Apply** .

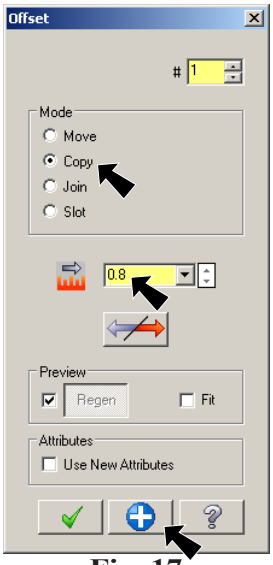


Fig. 17

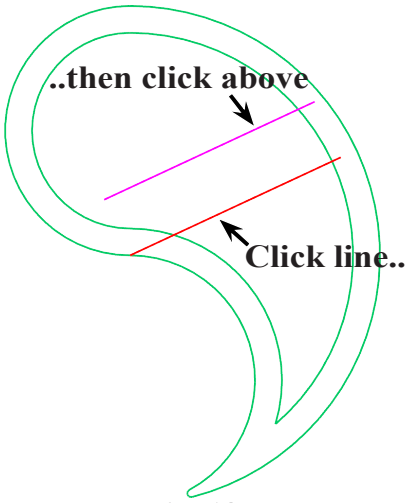


Fig. 18

Step 3. In Offset dialog box:
under Mode, **Fig. 19**
Distance .7
Click **angled line again**, then click **below**, **Fig. 20**.

Click **Apply** .

Step 4. In Offset dialog box:
under Mode, **Fig. 21**
Distance .175
Click **offset .8 line**, then click **below**, **Fig. 22**.

Click **Direction** until (twice) bi-directional lines appear, **Fig. 22**.

Click **Apply** .

Step 5. In Offset dialog box:
Click **offset .7 line**, **Fig. 23**.
Click OK .

Step 6. **Right click** the graphics window and click **Clear Colors** .

Step 7. **Delete the three centerlines**.
To delete, click and press Delete key, **Fig. 24** and **Fig. 25**.

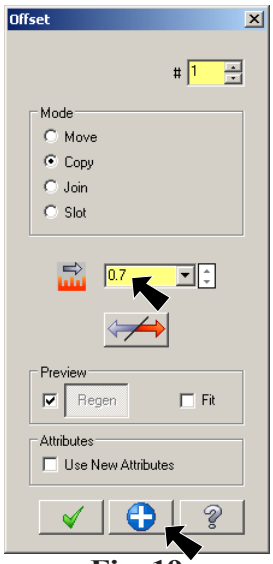


Fig. 19

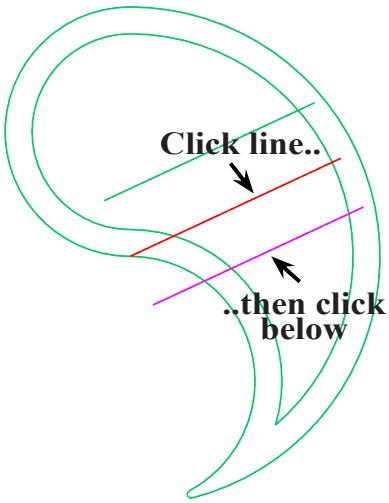


Fig. 20

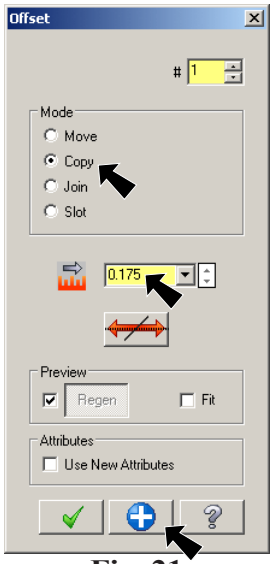


Fig. 21

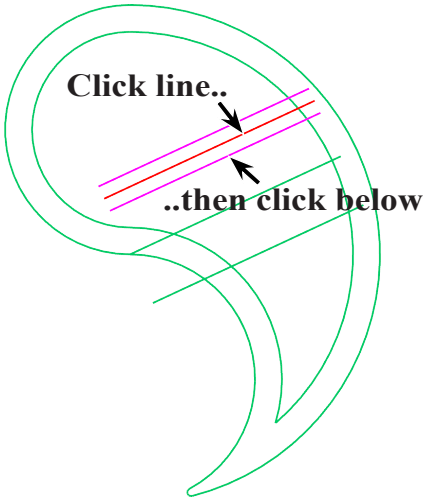


Fig. 22

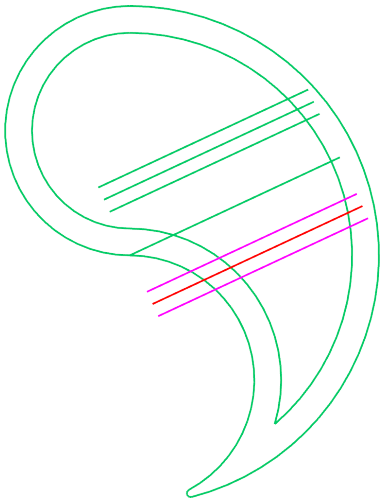


Fig. 23

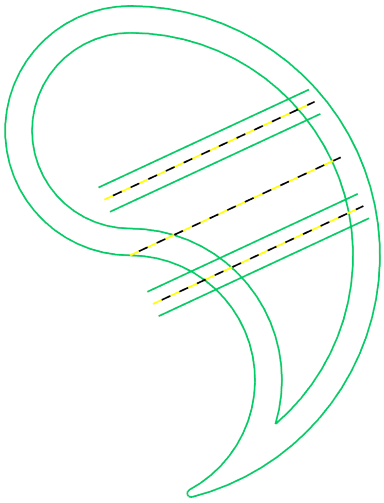


Fig. 24

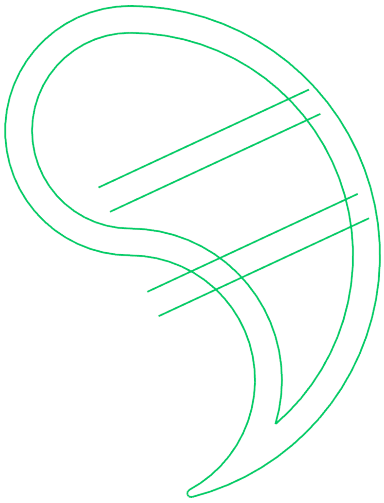
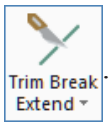


Fig. 25

I. Trim Divide and Trim 1 Entity.

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

.

Step 2. In the Trim Break Extend function panel:
under Type, **Fig. 26**
select **Trim 1 entity**
Trim lines to inside arc, **Fig. 27**.
To trim, click line on side you want to keep, then click arc.

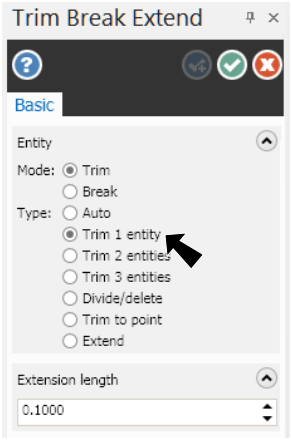


Fig. 26

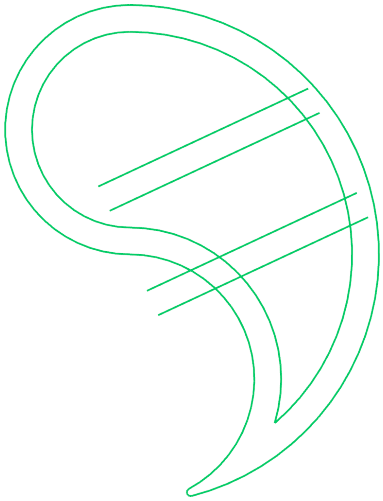


Fig. 27

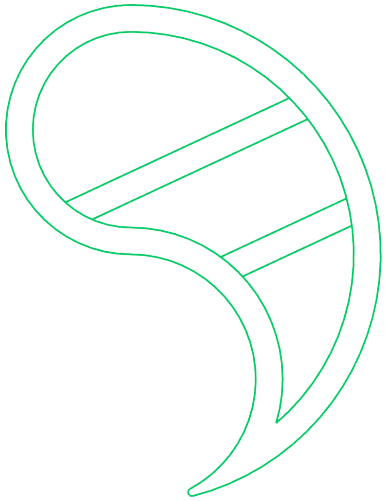


Fig. 28

Step 3. In the Trim Break Extend function panel:
under Type, **Fig. 29**
select **Divide/delete**
Trim all short arc segments between lines.
To trim, click arc segment between lines, **Fig. 30**.
Click OK  when done.

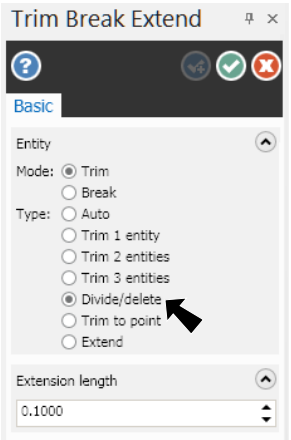


Fig. 29

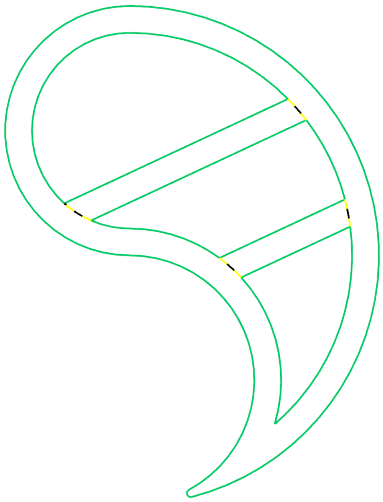


Fig. 30

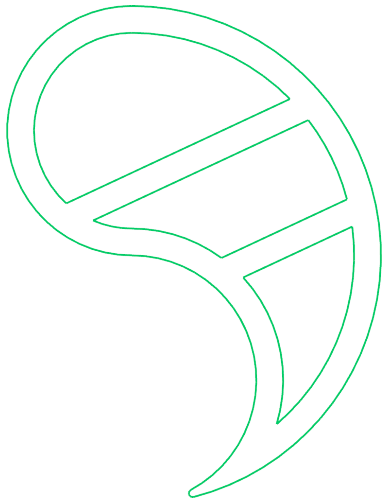


Fig. 31

J. Fillet Chains.

Step 1. On the Wireframe tab WIREFRAME click **Fillet Chains** Fillet Chains on **Fillet Entities** Fillet Entities drop down.

Step 2. Click Chain in Chaining dialog box.

Step 3. Chain geometry of **each pocket**, **Fig. 32**.

Step 4. Click OK in the Chaining dialog box.

Step 5. In the Fillets Chains function panel:
under Radius, **Fig. 33**
Radius .125
and press ENTER
Click OK .

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

Fig. 32

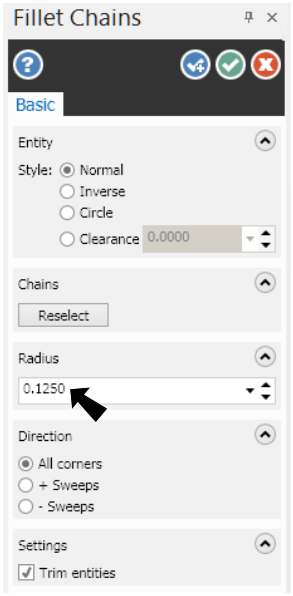


Fig. 33

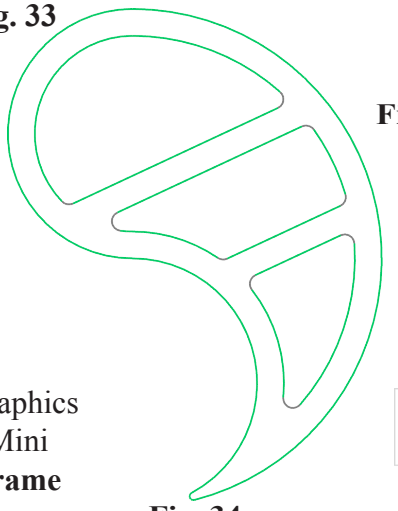


Fig. 34

K. Pin Hole Circle.

Step 1. **Right click** in the graphics window and on the Mini Toolbar click **Wireframe Color** drop down arrow and select **magenta**, **Fig. 35**.

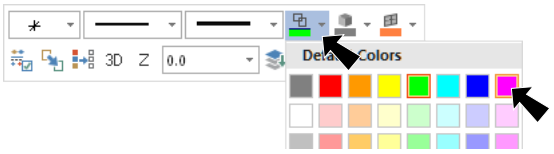


Fig. 35

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. 36**
Diameter .125 and press ENTER
Key-in **0, 3.035** 0,3.035 in AutoCursor **Fast Point** and press ENTER **twice**.
Click OK .

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

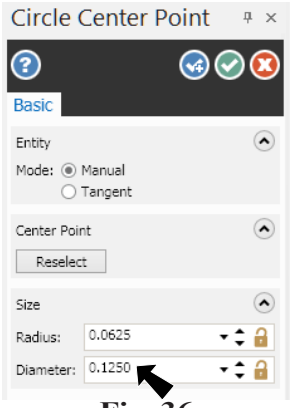


Fig. 36

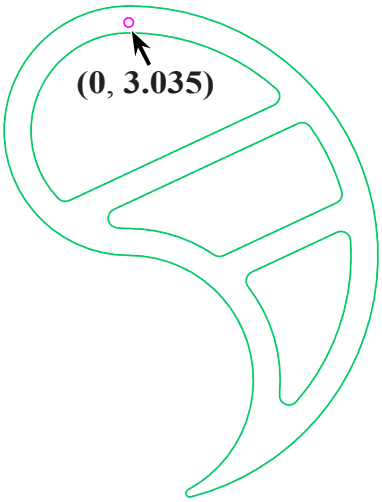


Fig. 37

L. Cut Pockets.

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 **outside arc** to chain, **Fig. 38**.

Step 5. Click OK in Chaining dialog box.

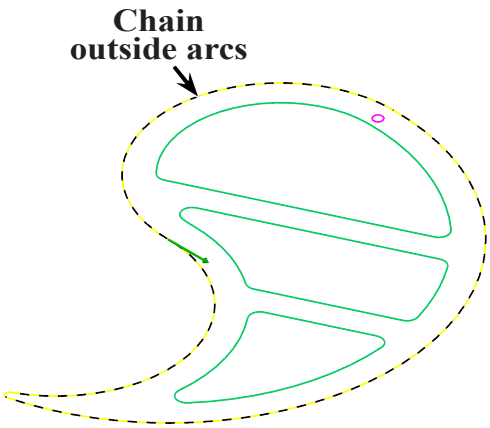


Fig. 38

Step 6. In the Solid Extrude function panel:
under Operation, **Fig. 39**
select **Create body**
under Distance
Distance .75 and press ENTER
The direction arrow should **point down**, **Fig. 40**. If arrow points in wrong direction, click Reverse All , **Fig. 39**.
Click **OK and Create New Operation** .

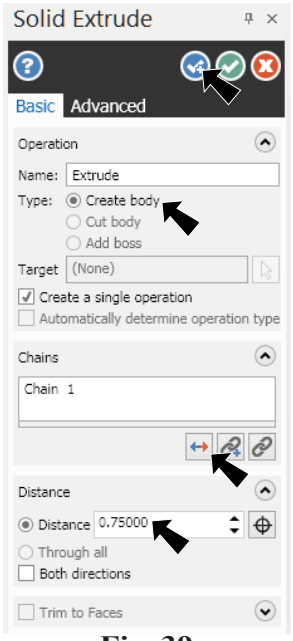


Fig. 39

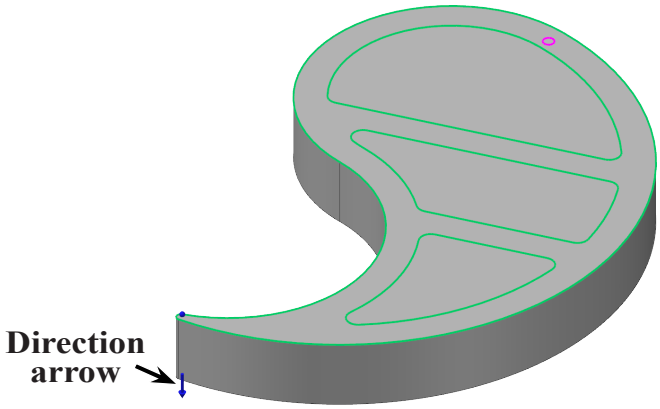


Fig. 40

M. Cut Pockets.

Step 1. Click Chain in Chaining dialog box.

Step 2. Click **any geometry of each pocket**, **Fig. 41**.

Step 3. Click OK in Chaining dialog box.

Step 4. In Solid Extrude function panel, **Fig. 42**
Select **Cut Body**
Select **Distance**
Set **Distance .65**

The direction arrow should **point down**, **Fig. 43**.
Click **OK and Create New Operation**.

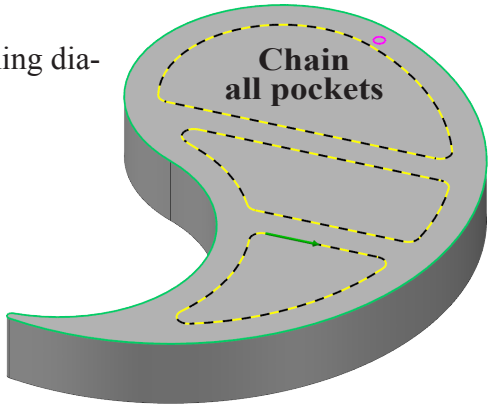


Fig. 41

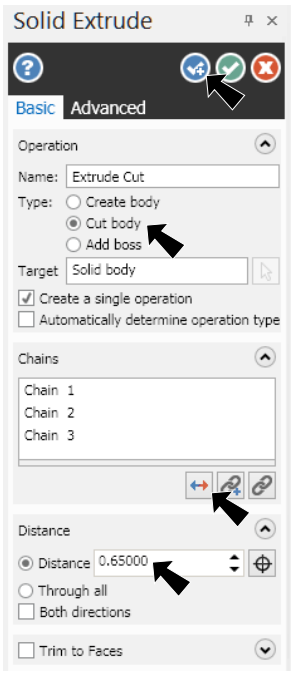


Fig. 42

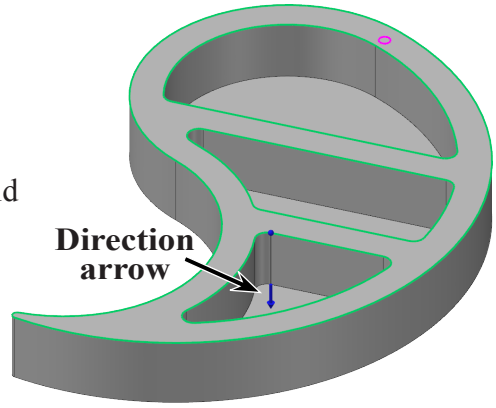


Fig. 43

N. Cut Pin Holes.

Step 1. Click Chain in Chaining dialog box.

Step 2. Click **Pin hole (magenta)** to chain, **Fig. 44**.

Step 3. Click OK in Chaining dialog box.

Step 4. In the Solid Extrude function panel:
under Operation, **Fig. 45**
Select **Cut Body**
under Distance
Select **Through All**
The direction arrow should **point down**, **Fig. 46**.
Click OK.

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

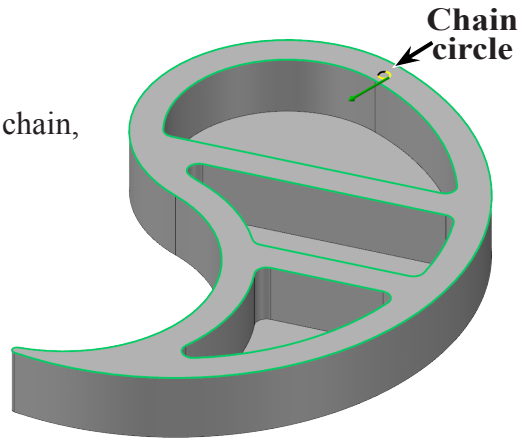


Fig. 44

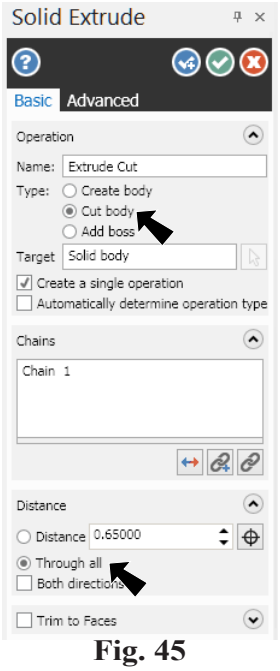


Fig. 45

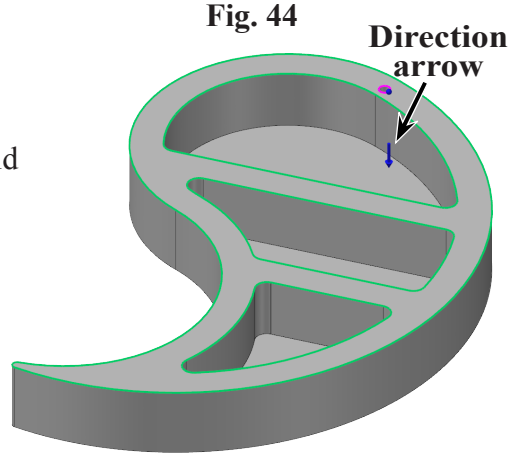


Fig. 46

O. Translate Solid.

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

Step 2. Use **F9** to toggle Origin/Axis display on.

Step 3. On the Transform tab TRANSFORM click **Translate** Translate.

Step 4. Click the **solid body** to select it and click **End Selection** End Selection (**ENTER**), **Fig. 47**.

Step 5. In Translate dialog box set:
Select **Move** **Fig. 48**
ΔX **.5**
ΔY **.1**
Click OK.

Step 6. Click Yes to move defining wireframe entities, **Fig. 50**.

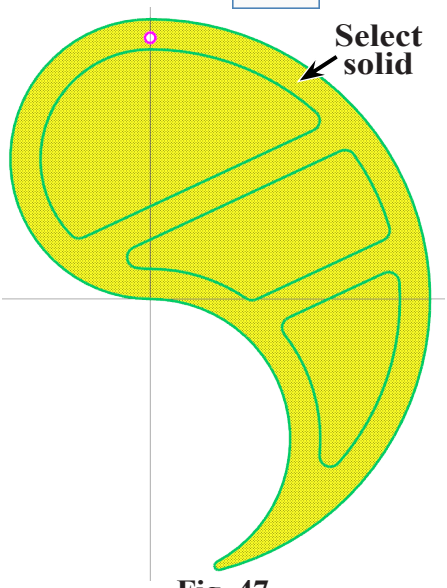


Fig. 47

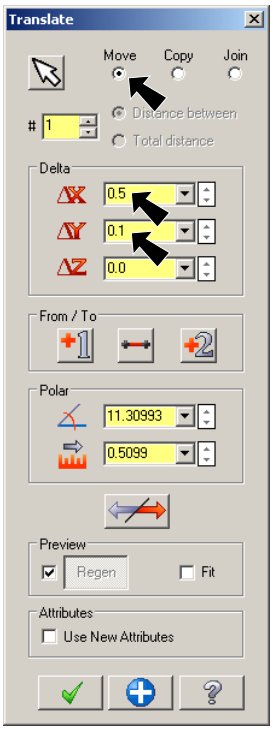


Fig. 48

Fig. 49

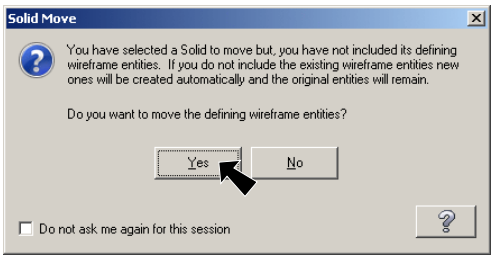
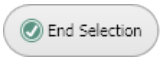


Fig. 50

P. Rotate Solid.

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

.

Step 2. Drag a window selection around all to select all and click **End Selection** 

(ENTER), **Fig. 51**.

Step 3. In Rotate dialog box set:

Copy **Fig. 52**

Number of Steps **1**

Rotation Angle **180**

Click OK .

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

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

Make window selection

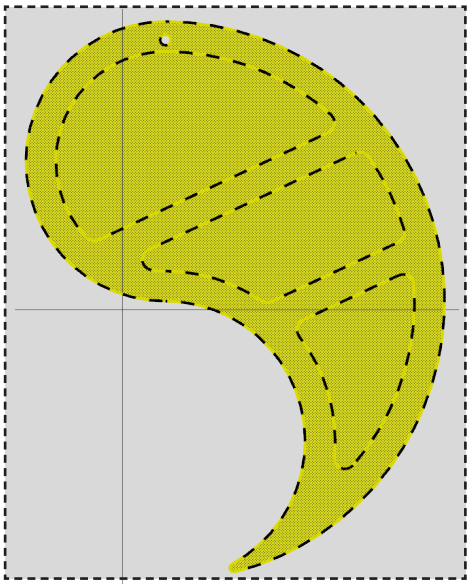


Fig. 51

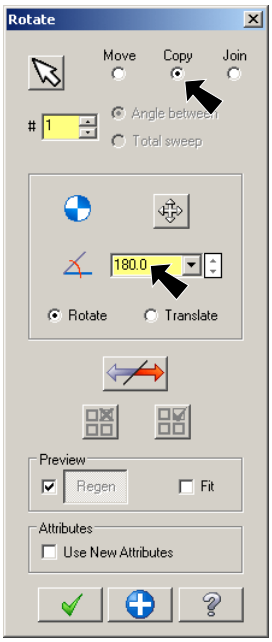


Fig. 52

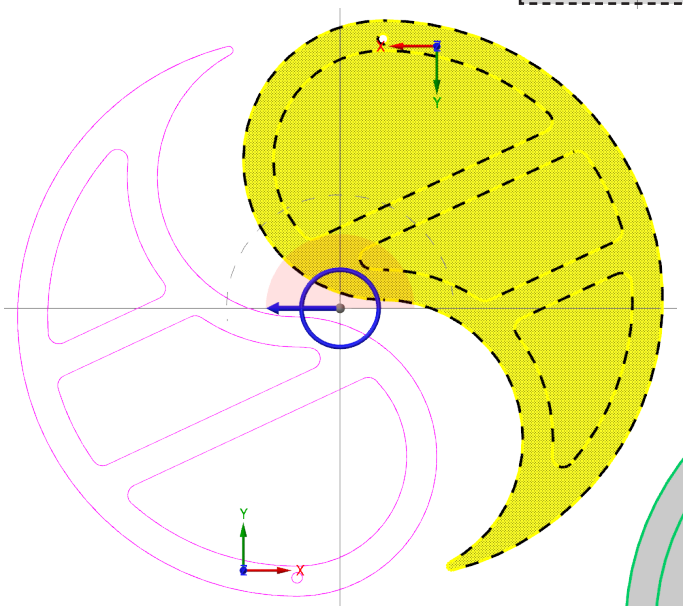


Fig. 53

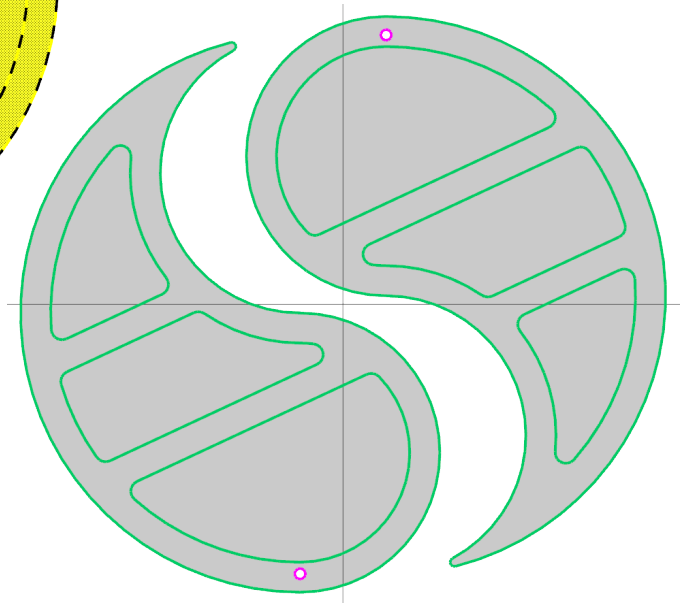


Fig. 54

Q. Machine Type and Stock Setup.

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

Step 2. If necessary, display Toolpaths Manager. On the View tab VIEW click Toolpaths (**Alt-O**).

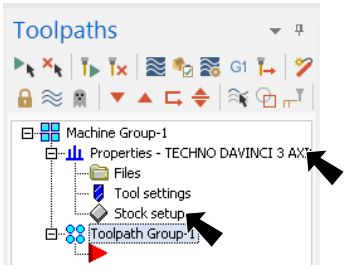


Fig. 55

Step 3. If Machine Group is **not** displayed in the Toolpaths Manager, **Fig. 55** on the Machine tab MACHINE, click Machine Mill > Default from the menu.

Step 4. Expand **Properties** in the Toolpaths Manager and click **Stock Setup**, **Fig. 55**.

Step 5. Confirm Stock Plane is **Top**, **Fig. 56**.

Step 6. Confirm **Display** is checked.

Step 7. Key-in for X, Y and Z stock dimensions:

X 8
Y 8
Z .75

Step 8. Confirm Stock Origin coordinates:

X 0
Y 0
Z 0

Step 9. Click OK in the Machine Group Properties.

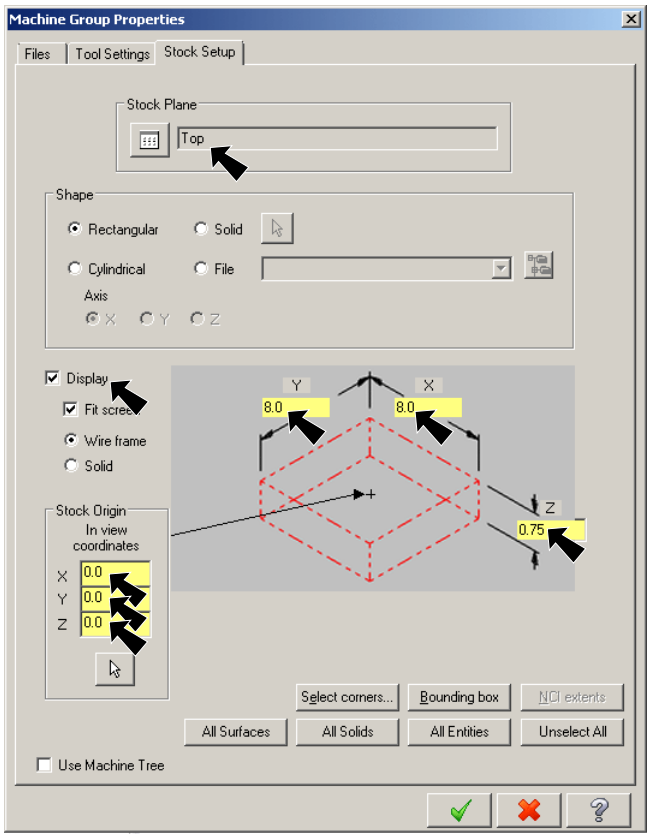


Fig. 56

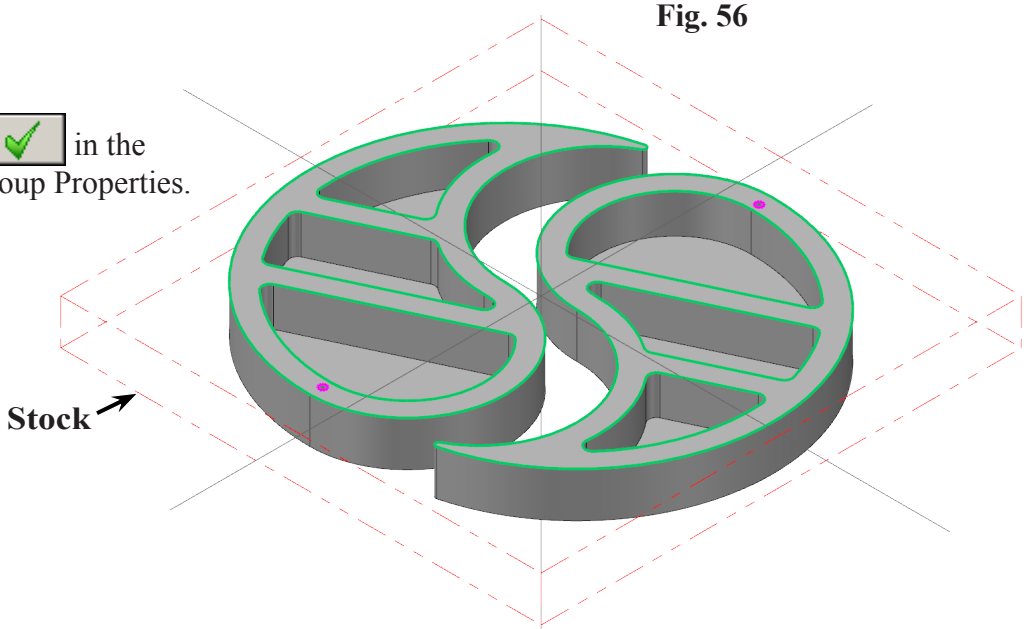
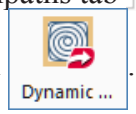


Fig. 57

R. 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. 58**.

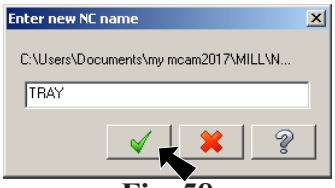


Fig. 58

Step 3. Select **Machining regions** button in Chain Options dialog box, **Fig. 59**.

Step 4. Select **Chain** in Chaining dialog box, **Fig. 60**.

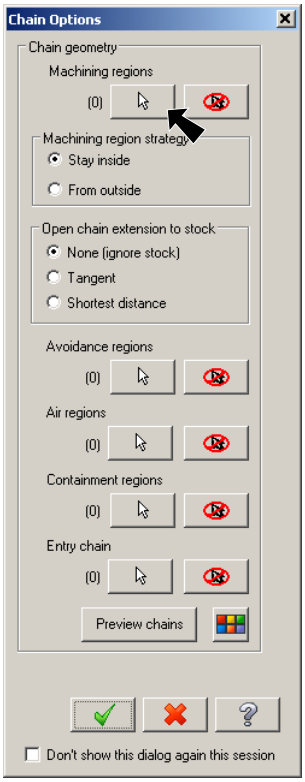


Fig. 59

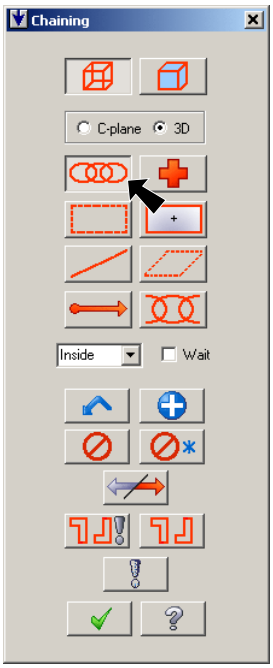


Fig. 60

Step 5. Click **any geometry of each pocket** to chain all pockets and click OK in Chain dialog box, **Fig 61**.

Step 6. Click OK in the Chain Options box, **Fig 62**.

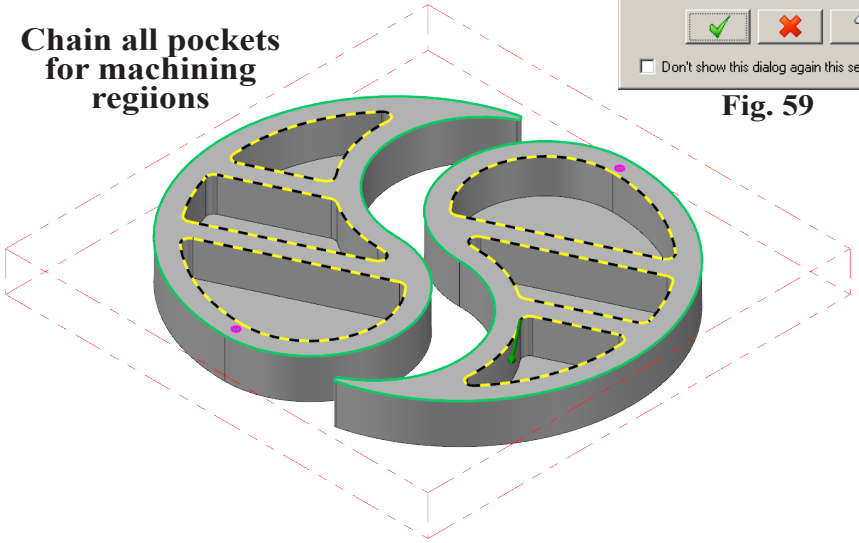


Fig. 61

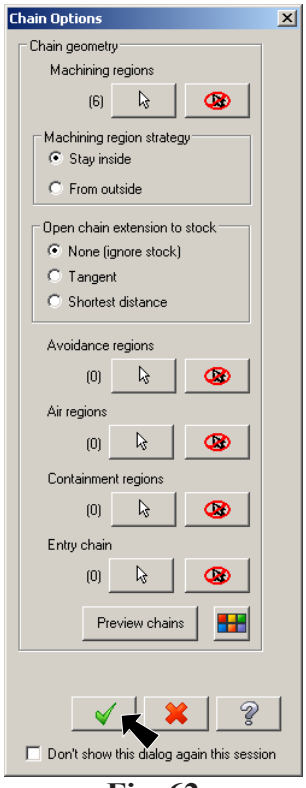


Fig. 62

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

Dynamic Mill toolpath

Machining regions 6 Fig. 63.

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

Click **Select library tool Fig. 64**.

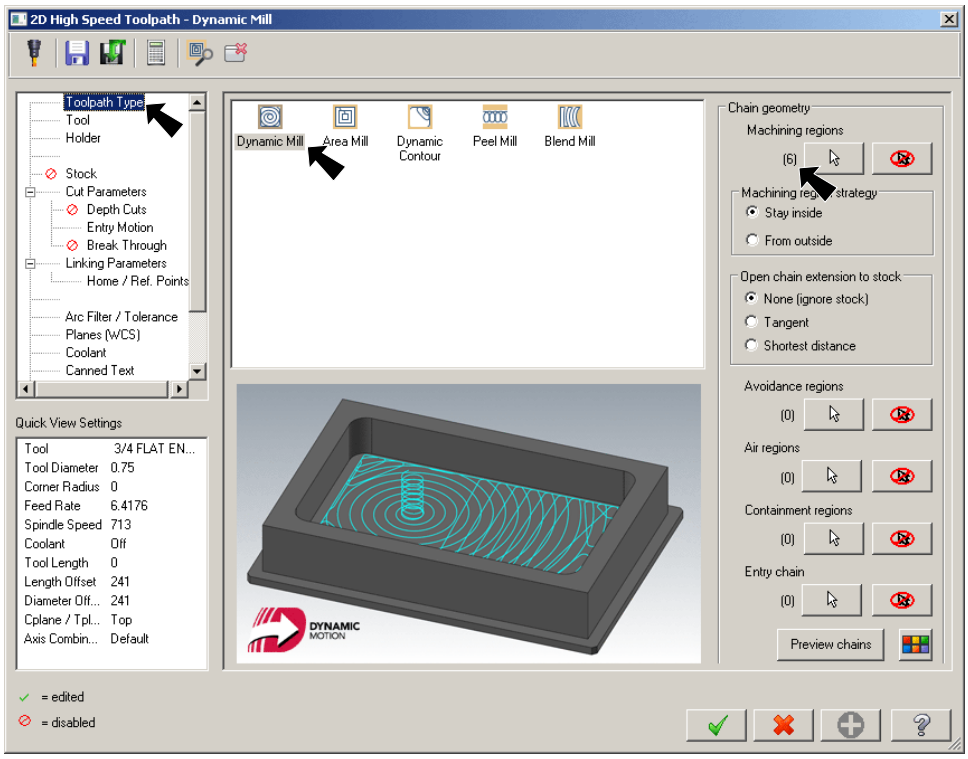


Fig. 63

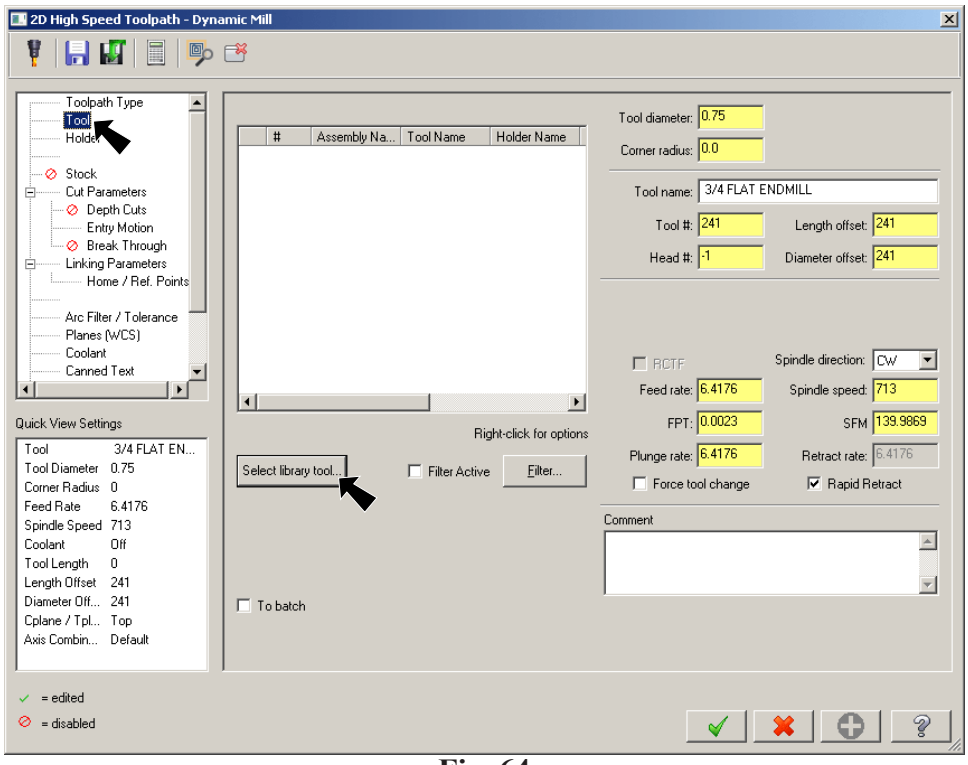


Fig. 64

Step 9. Click **285 1/4 FLAT ENDMILL** and click OK **Fig. 65**.

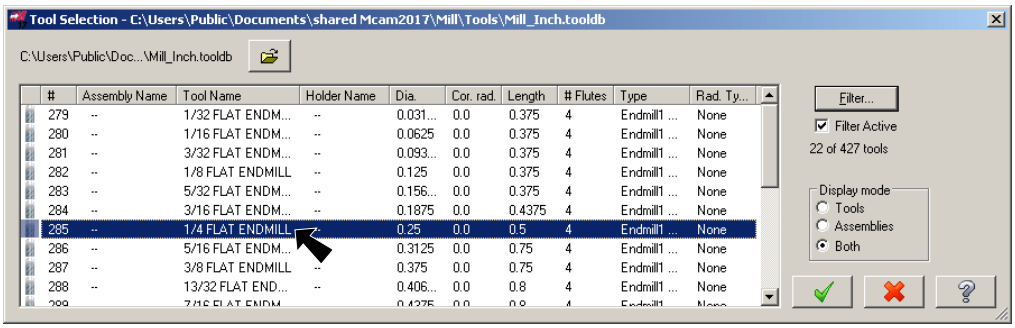


Fig. 65

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

Feed rate 40
Plunge rate 20
Fig. 66.

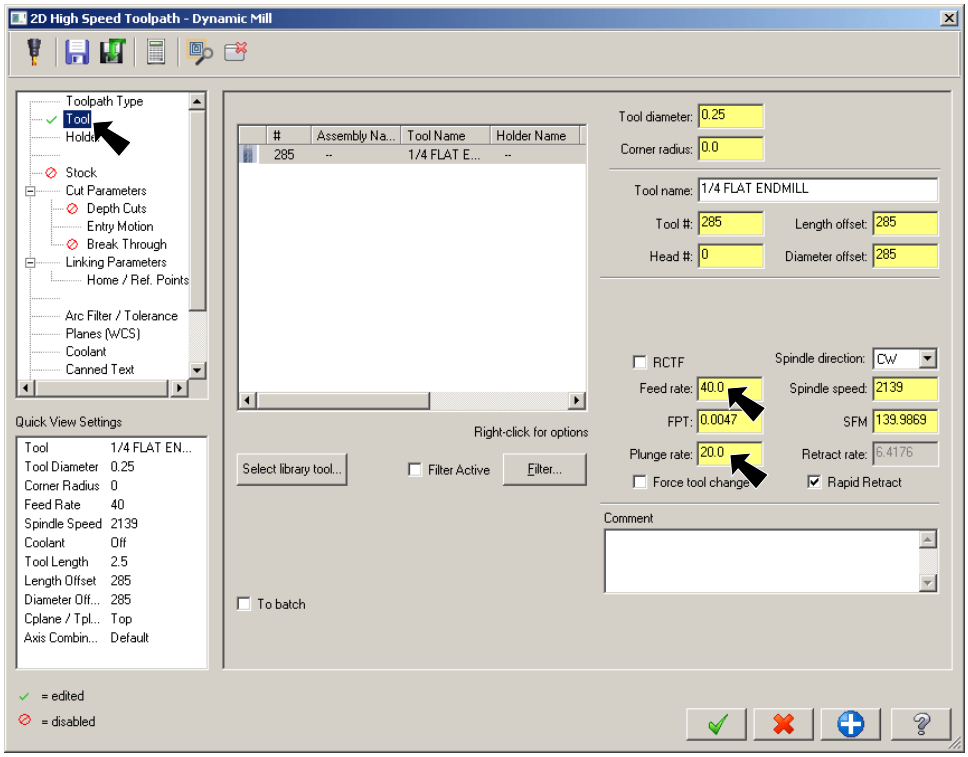


Fig. 66

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

Cutting method Climb

Stepover 45%

Stock to leave on walls and floors 0
Fig. 67.

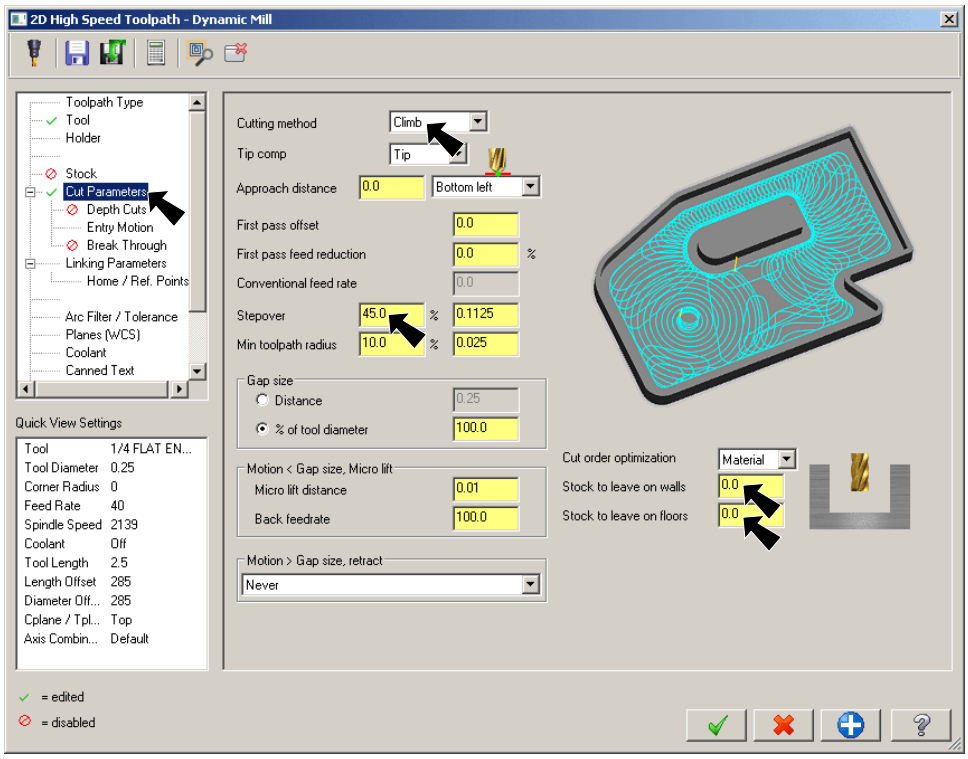


Fig. 67

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

Check **Depth cuts**

Max rough step .2
Fig. 68.

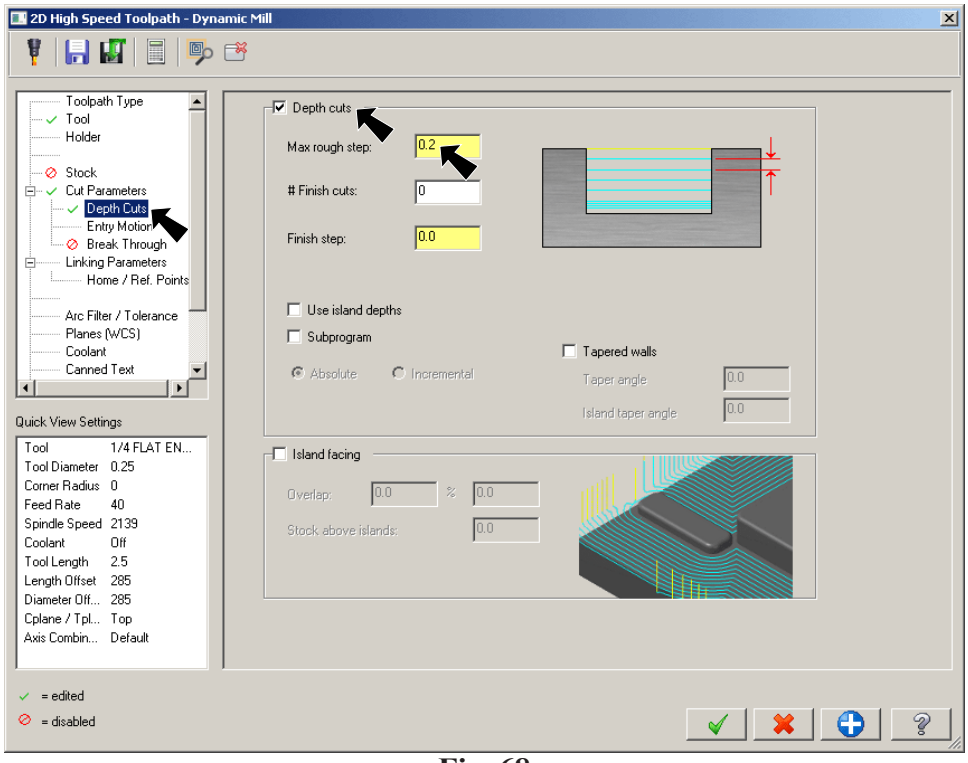


Fig. 68

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

Plunge angle 10
Fig. 69.

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

Clearance 1

Depth -.65
Fig. 70.

Step 15. Click OK  in Dynamic Mill dialog box.

Step 16. Allow Mastercam to calculate the toolpath.

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

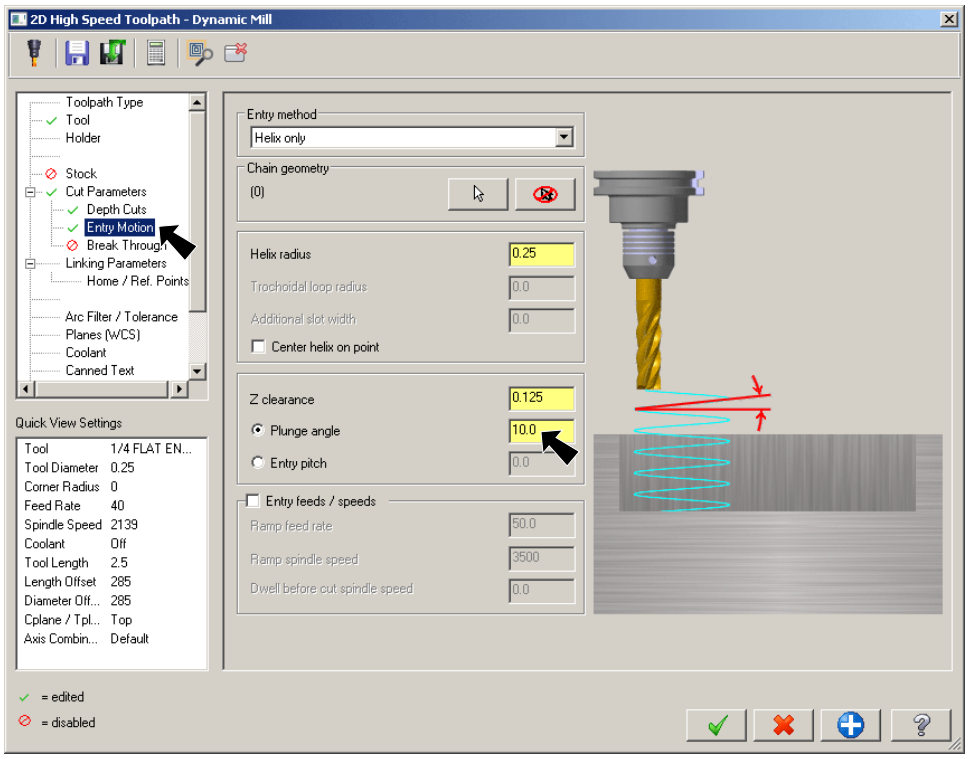


Fig. 69

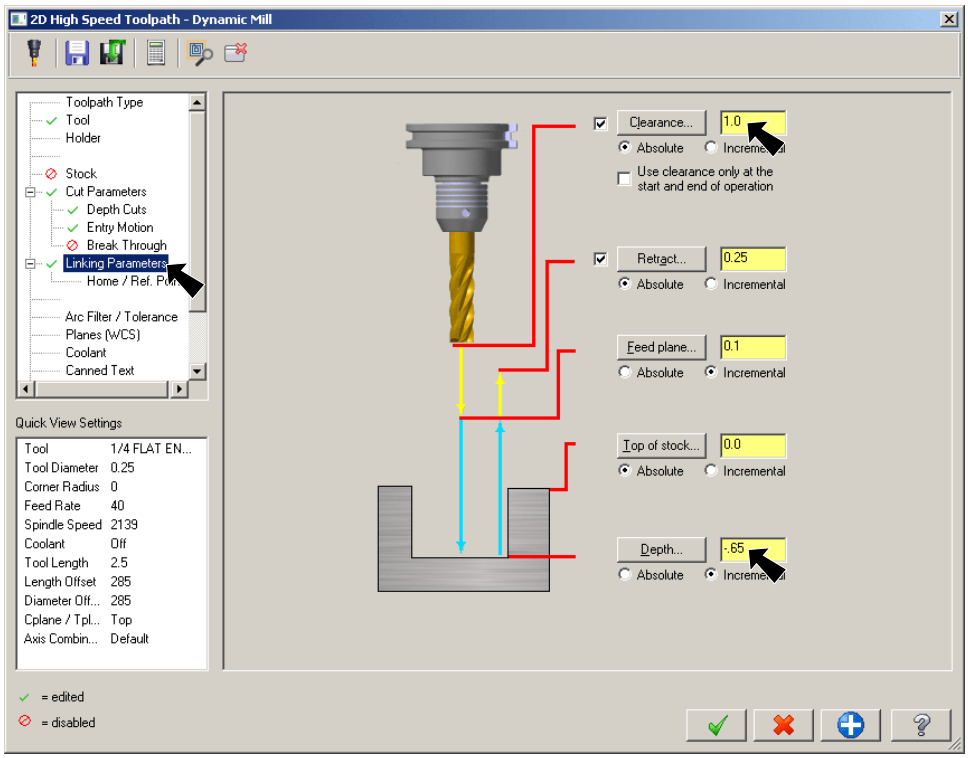


Fig. 70

S. 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** Contour.

Step 3. Click **Chain** (**C**) in Chaining dialog box, **Fig. 71**.

Step 4. Click **both outside edge geometry** to chain both, **Fig. 72**. The chain arrow should point **clockwise** around **each** chain. If a chaining directions arrow is pointing in the opposite direction - click Reverse , **Fig. 71**.

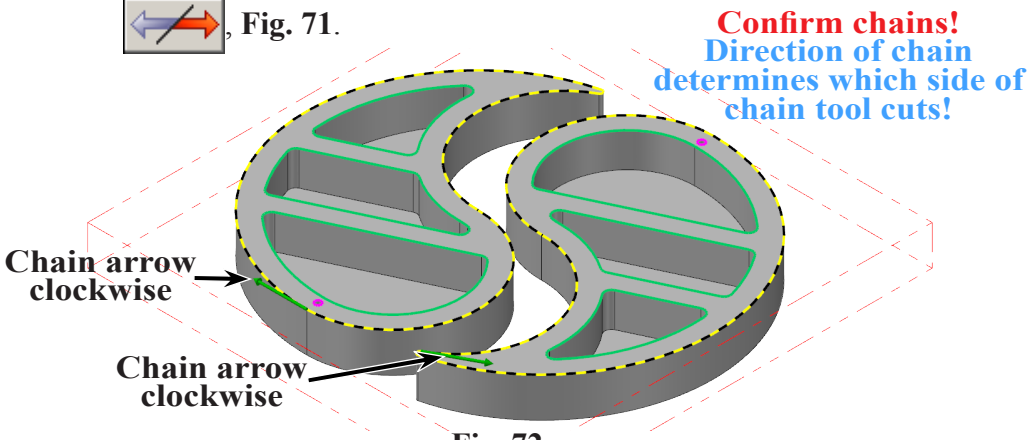


Fig. 72

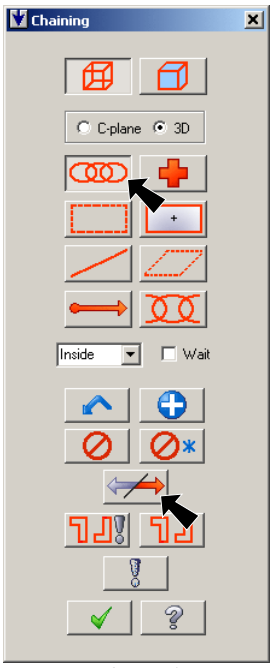


Fig. 71

Step 5. Click OK in Chaining dialog box.

Step 6. In the 2D Toolpaths Contour dialog box confirm **2 Chains** **Fig. 73**.

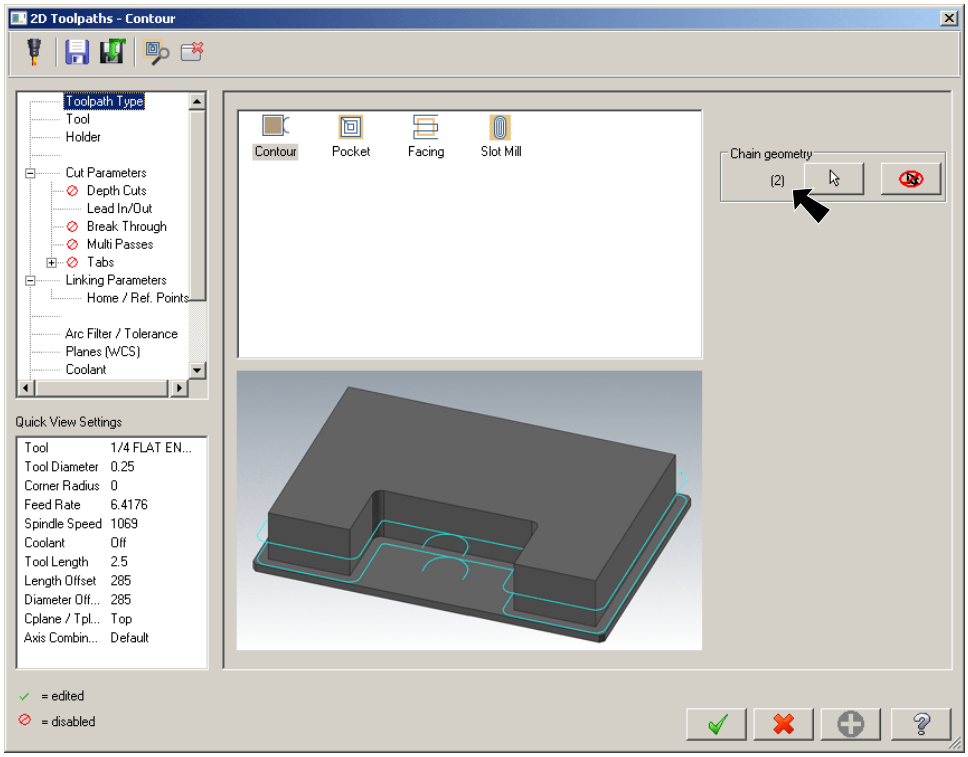


Fig. 73

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

Confirm **285 1/4 FLAT ENDMILL**

Feed rate 40

Plunge rate 20
Fig. 74.

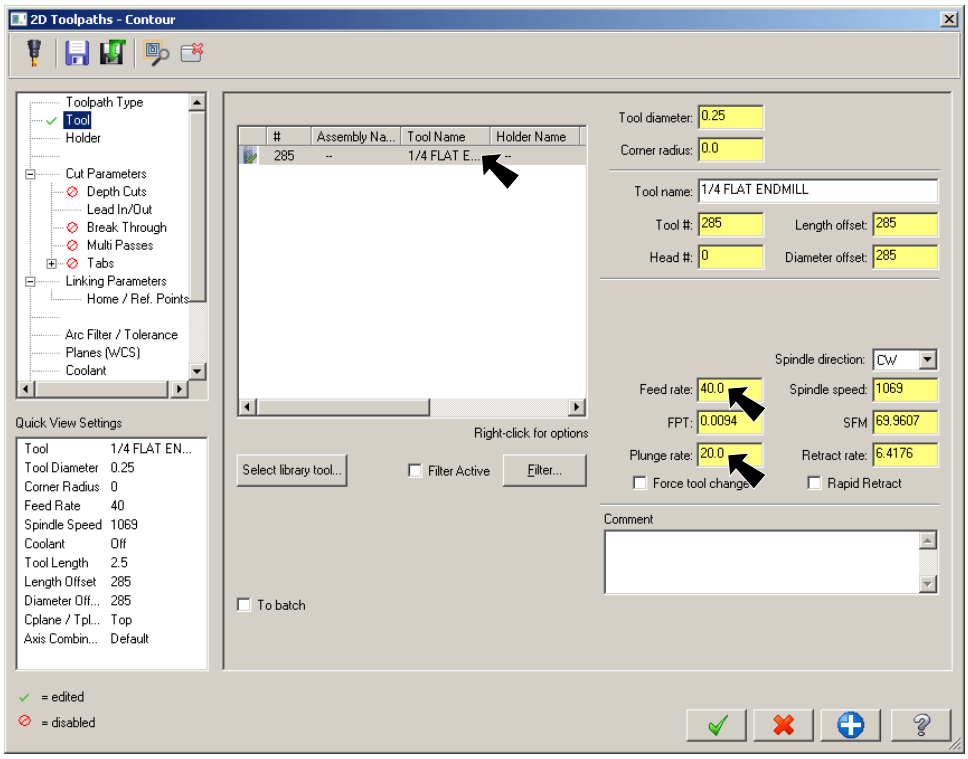


Fig. 74

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. 75.

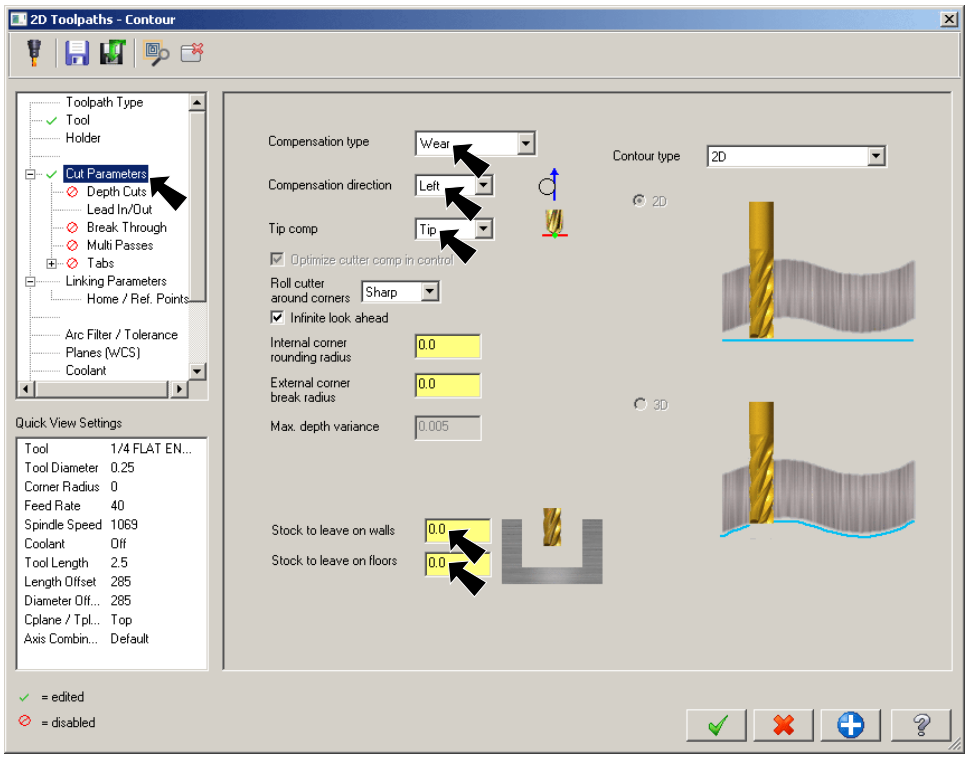


Fig. 75

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

Check **Depth cuts**

Max rough step .2

Check **Keep tool down** **Fig. 76**.

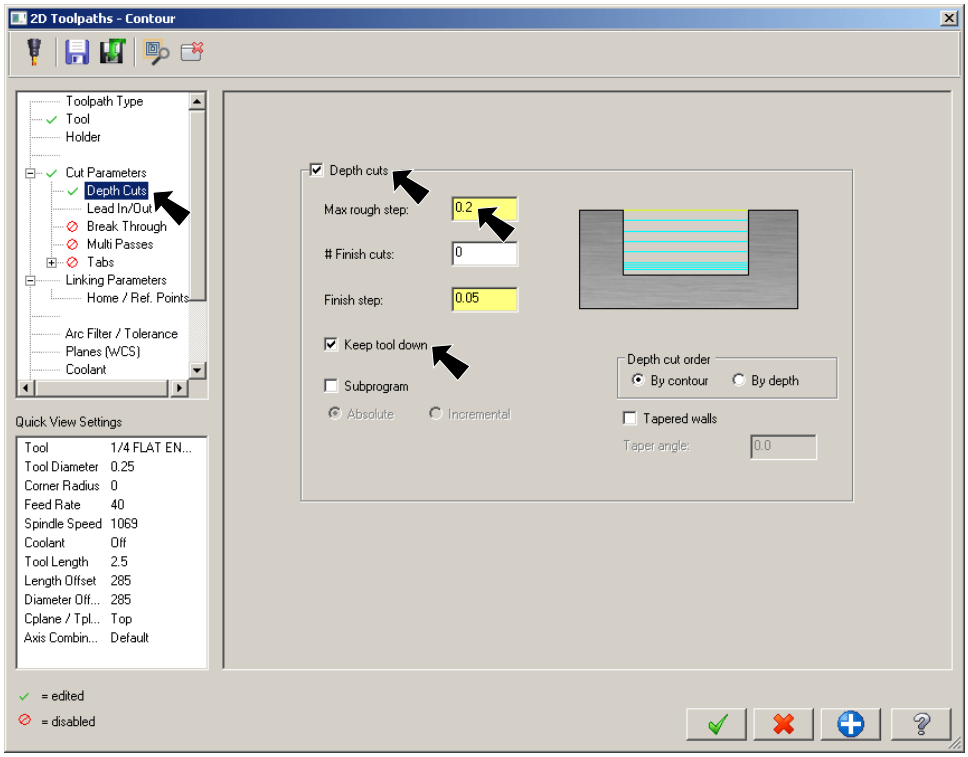


Fig. 76

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

Uncheck **Lead In/Out** **Fig. 77**.

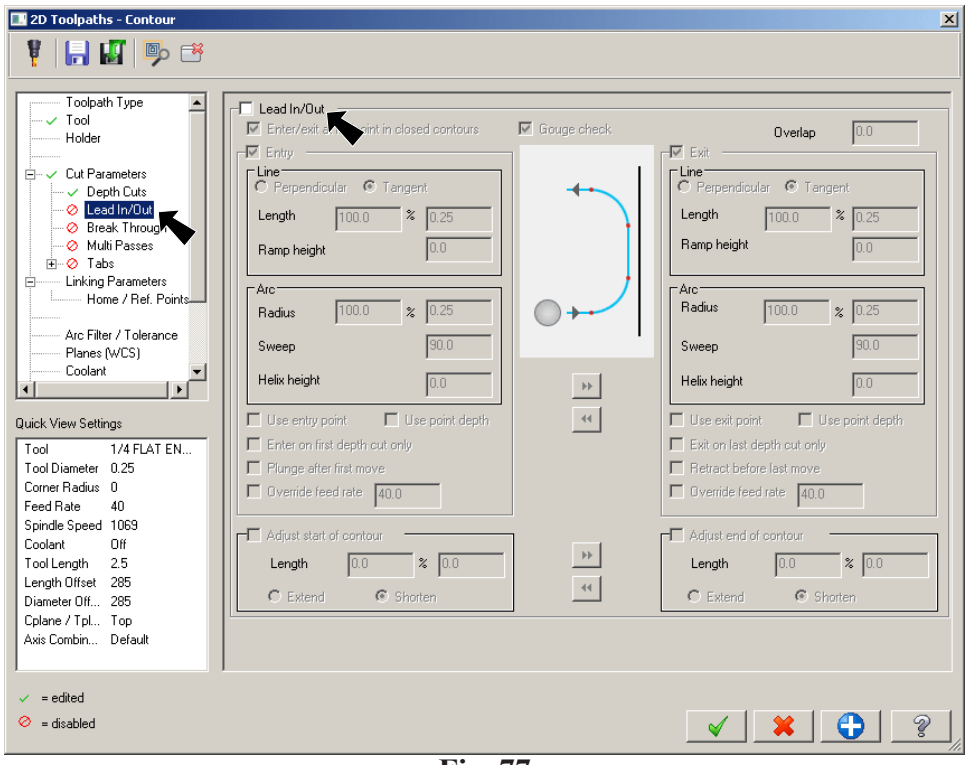


Fig. 77

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

Check **Break through**

Break through amount .01 Fig. 78.

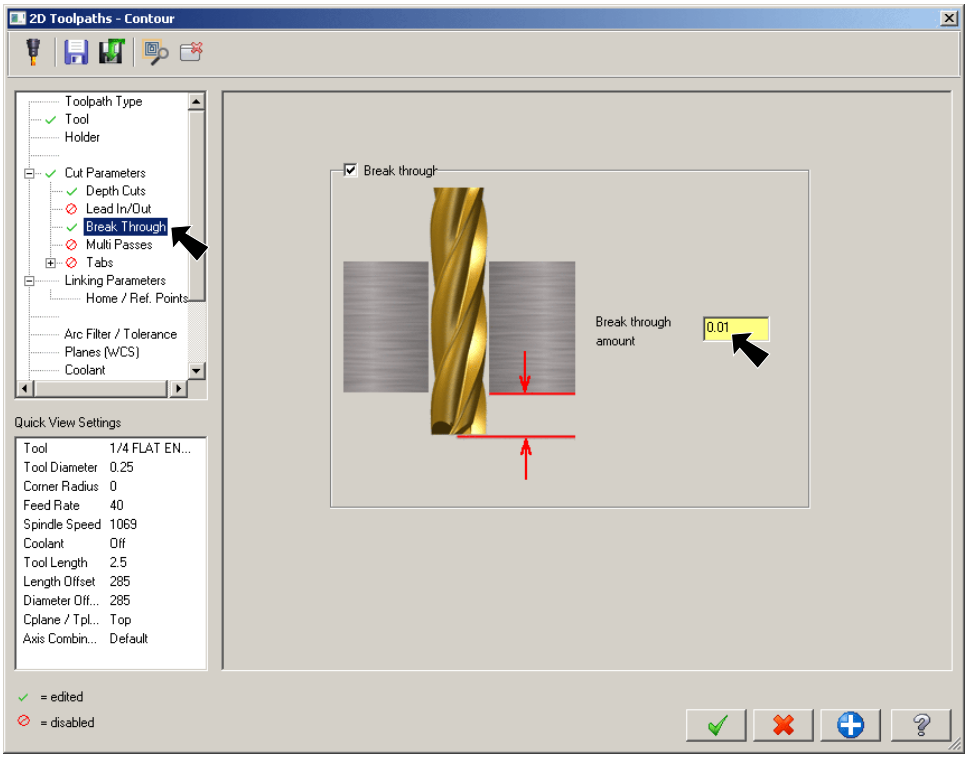


Fig. 78

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

Depth -.75 Fig. 79.

Step 13. Click OK  .

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

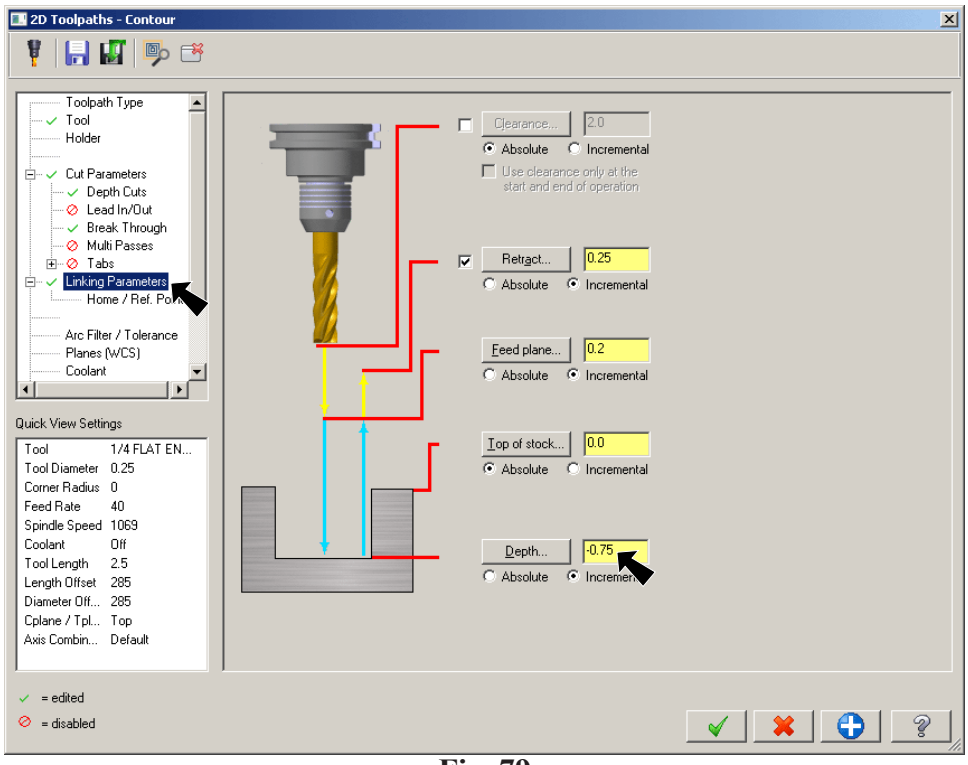


Fig. 79

T. Verify Toolpaths.

Step 1. Click **Toolpath Group-1** in the Toolpaths Manager to select **Dynamic Mill and Contour** toolpaths, **Fig. 80**.

Step 2. Click **Verify**  in the Toolpaths Manager, **Fig. 80**.

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 28 minutes 22 seconds**), **Fig. 81**.

Step 5. Confirm Contour toolpath is cutting outside green arc geometry, **Fig. 82**.

Step 6. Switch back to Mastercam (**Alt-Tab**).

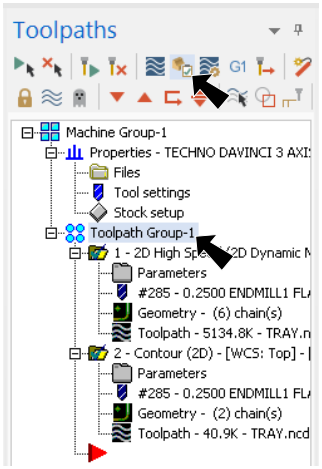


Fig. 80

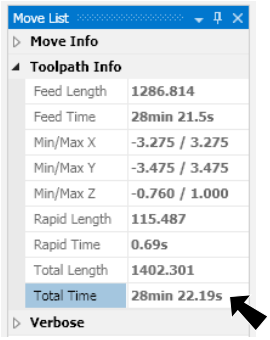


Fig. 81

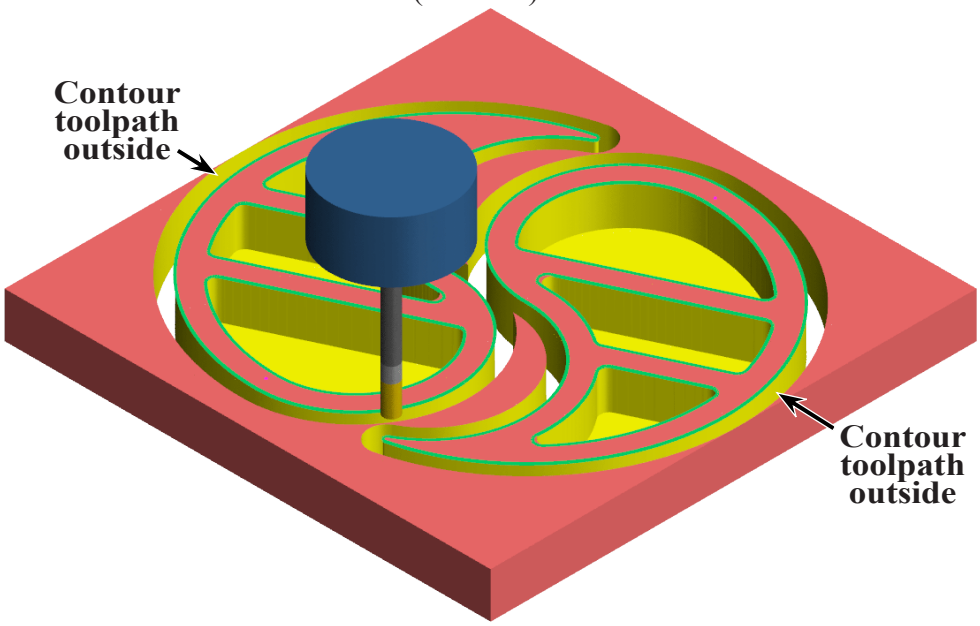


Fig. 82

U. FBM Drill Toolpath Right Tray.

Step 1. On the Toolpaths tab TOOLPATHS in the 2D group click **Expand gallery** button and click **FBM Drill** FBM Drill, **Fig. 83**.

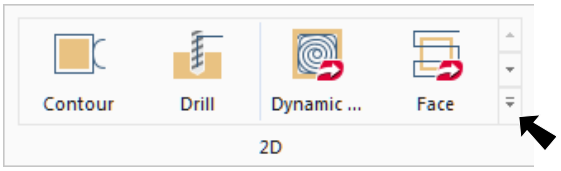


Fig. 83

Step 2. Click the **right Tray solid**, **Fig. 84**.

Step 3. Select **Hole Detection** from the tree control and set:

Confirm **Limit search to plane Top** **Fig. 85**.

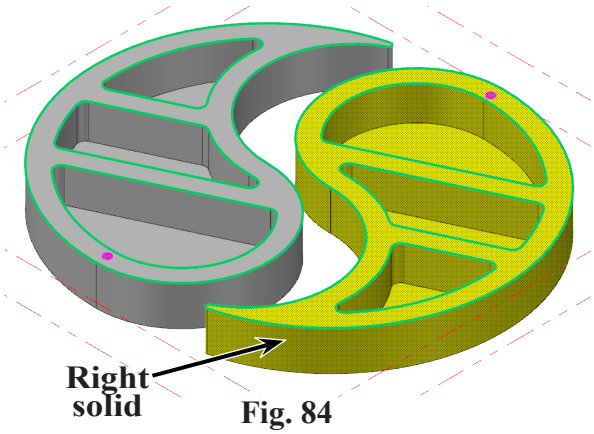


Fig. 84

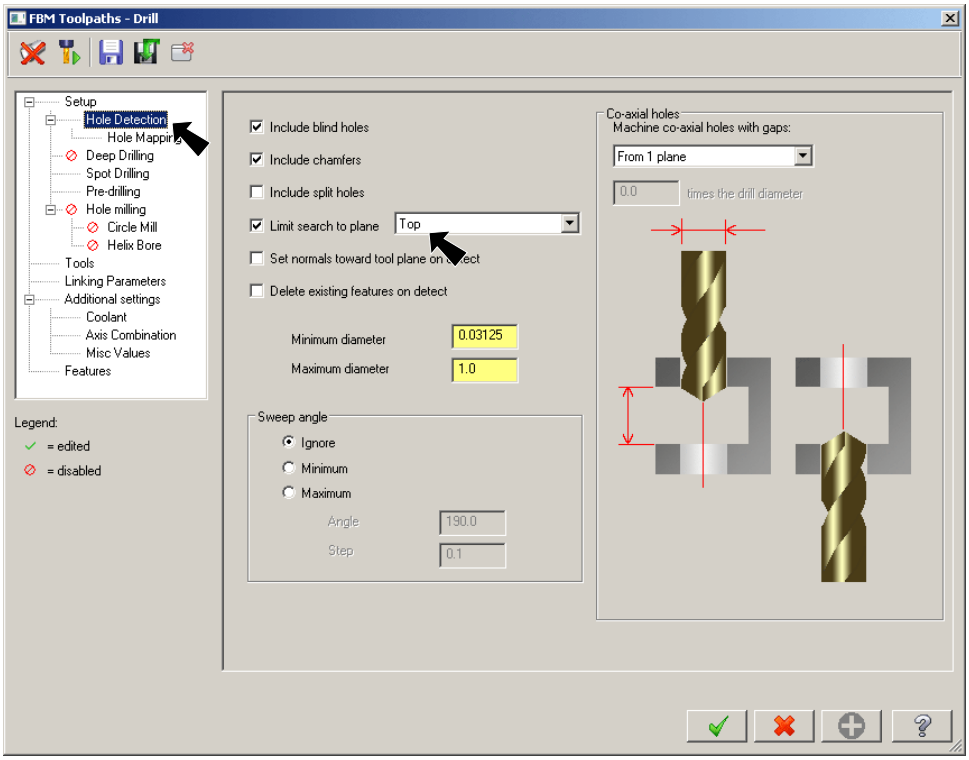


Fig. 85

Step 4. Select **Spot Drilling** from the tree control and uncheck **Spot Drilling** check box, **Fig. 86**.

Step 5. Select **Pre-drilling** from the tree control and uncheck **Pre-drilling** check box, **Fig. 87**.

Step 6. Click **Detect** button  at the top of the dialog box to find the holes, **Fig. 87**.

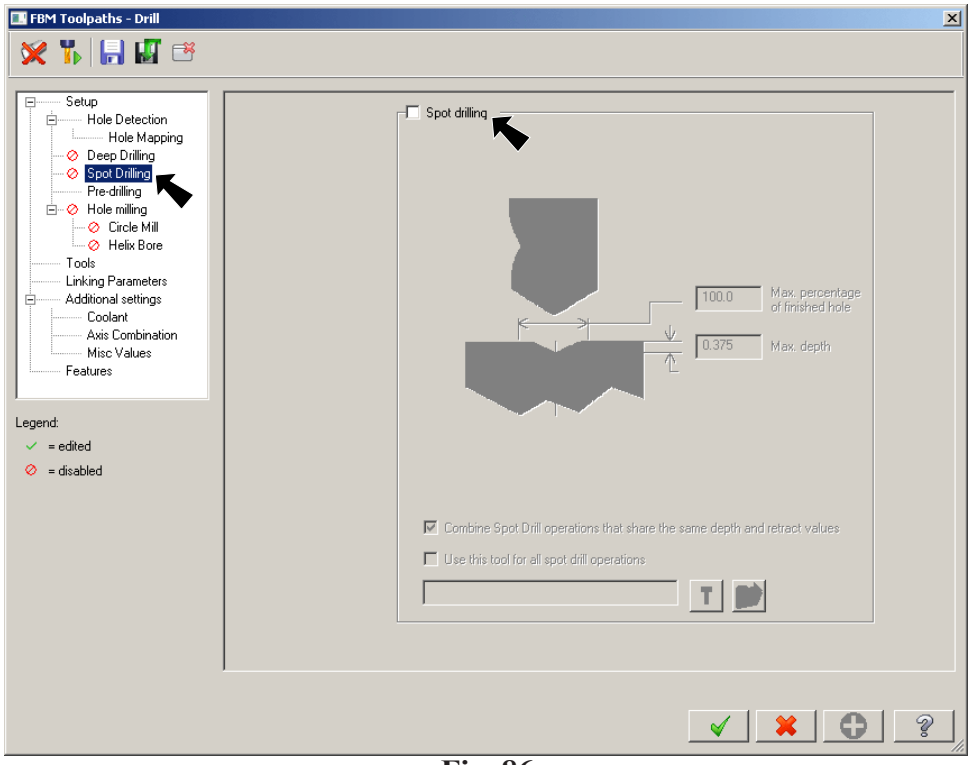


Fig. 86

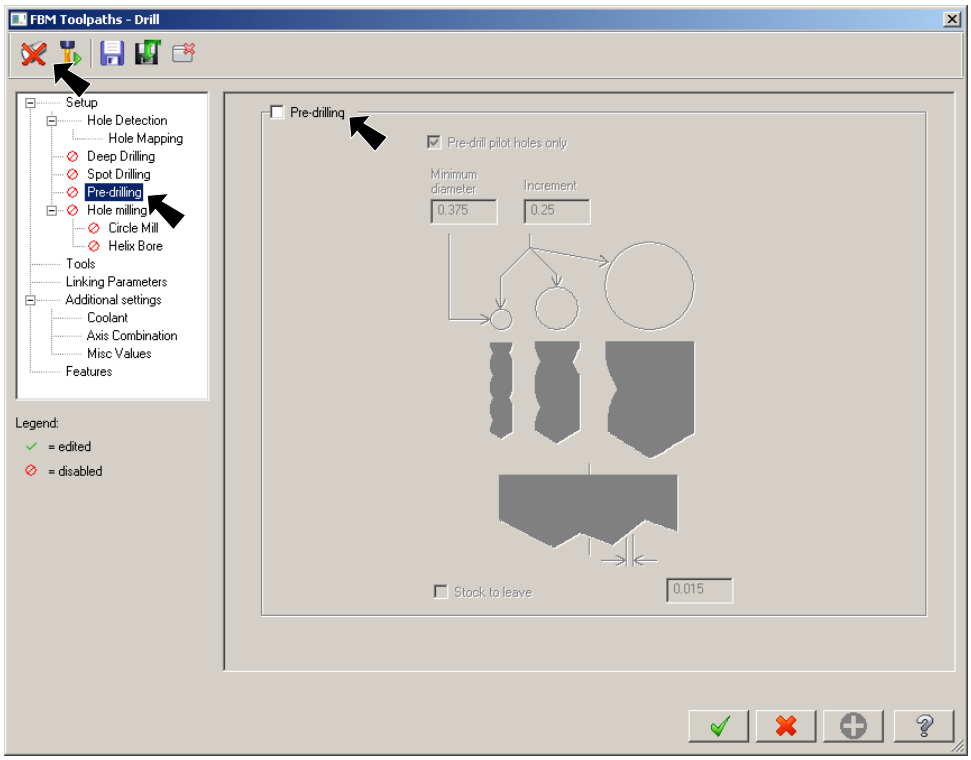


Fig. 87

Step 7. Confirm **1** hole with **depth of .75** is listed and click OK  , **Fig. 88**.

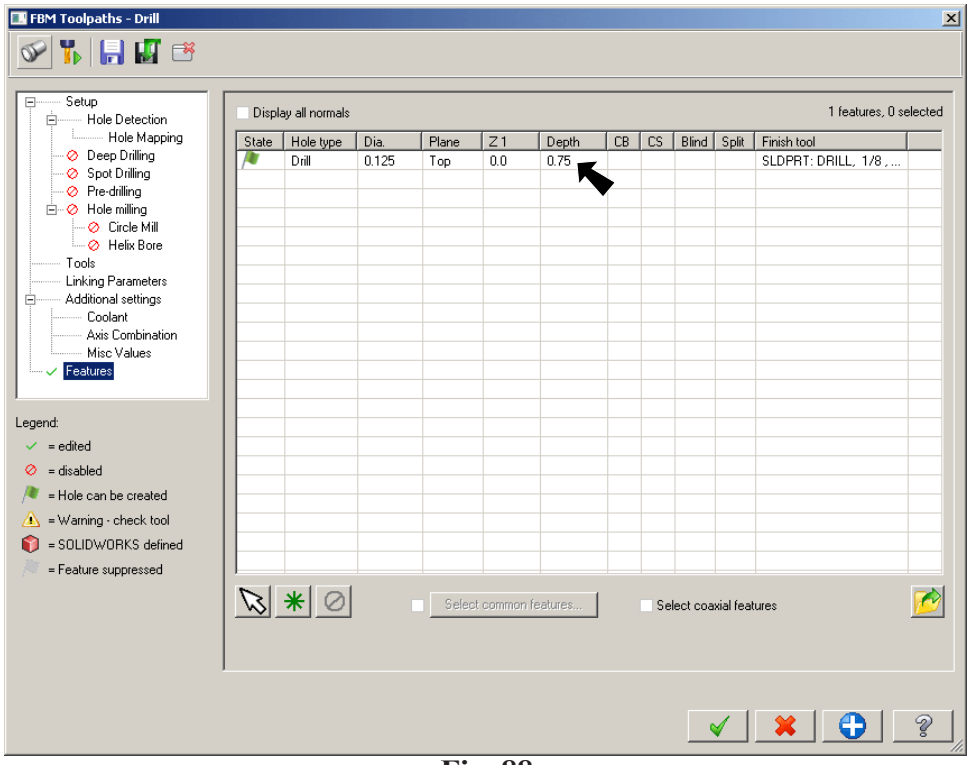


Fig. 88

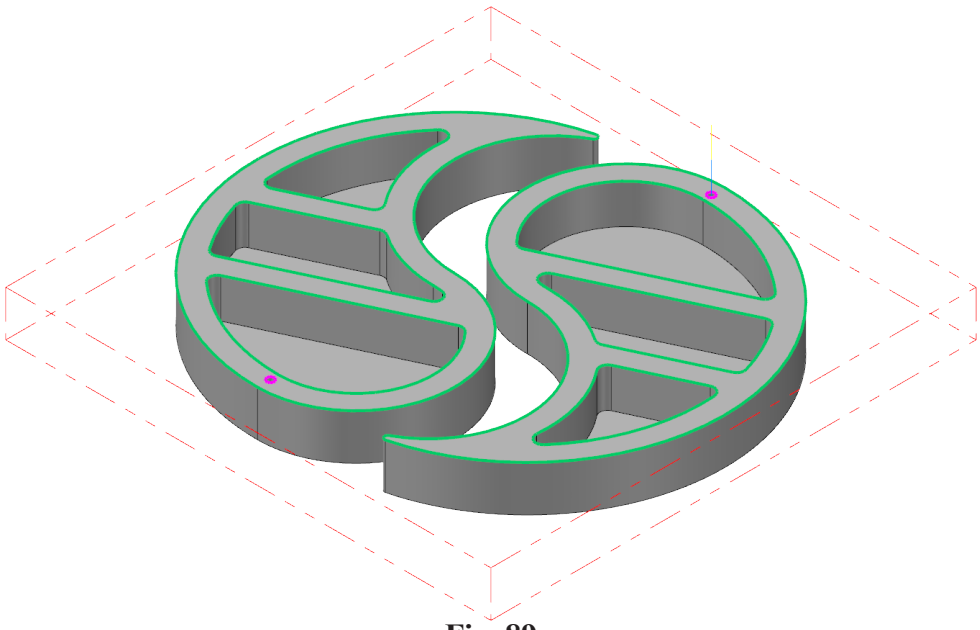


Fig. 89

V. FBM Drill Toolpath Left Tray.

Step 1. On the Toolpaths tab TOOLPATHS in the 2D group click **FBM Drill** 

.

Step 2. Click the **left Tray solid** and params are all set so just click **Detect** button  , **Fig. 90**.

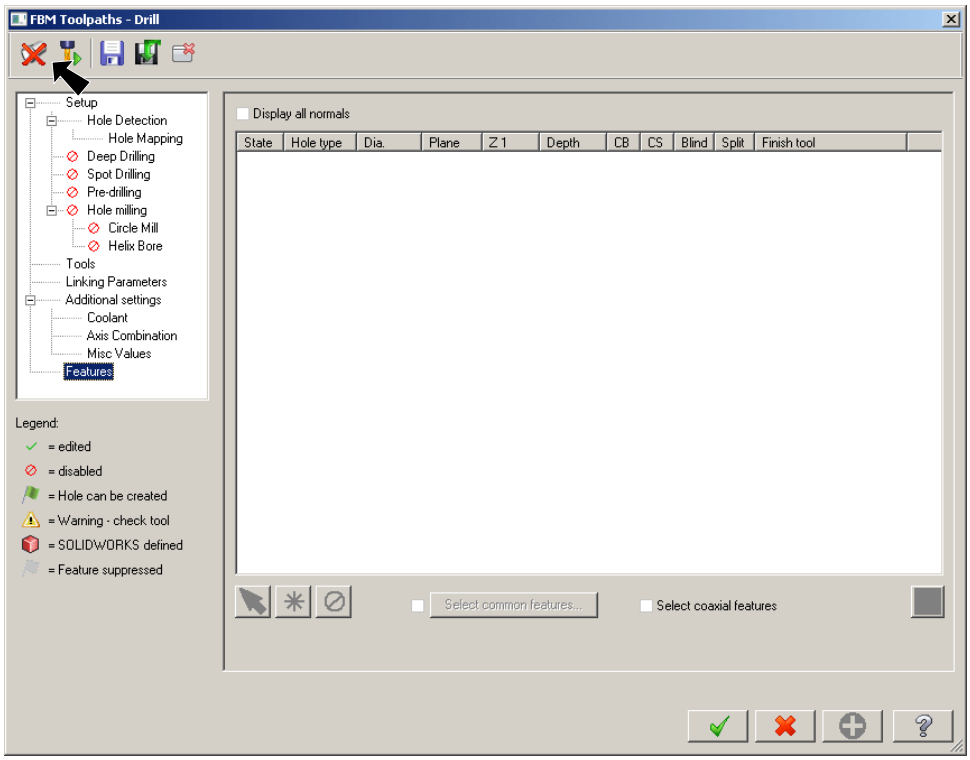


Fig. 90

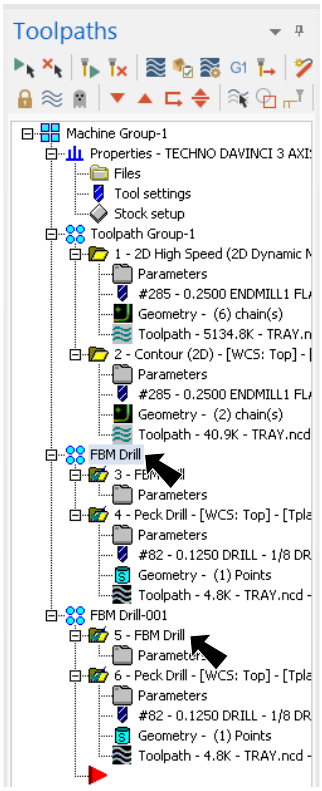


Fig. 91

Step 3. In the Toolpaths Manager **Ctrl click both FBM Drill Toolpath Groups** to select both Toolpath groups, **Fig. 91**.

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

Fig. 92