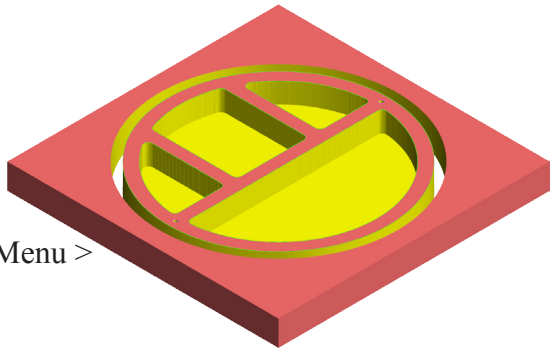
Jewelry Box
Base



A. Sketch Base Circle.

Step 1. If necessary start a new Mastercam file, click FILE Menu > New .

Step 2. Click CREATE Menu > Arc > Circle Center Point.

Step 3. Key-in **6.5 for diameter** in ribbon bar, **Fig. 2**.

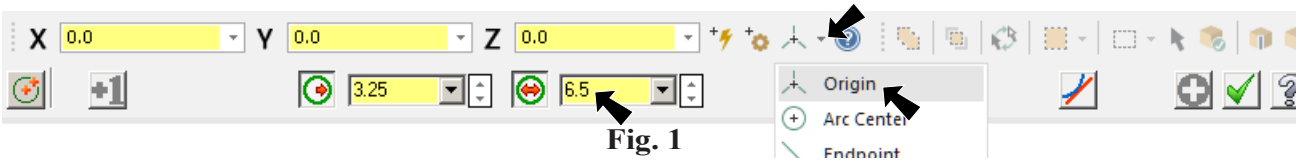


Fig. 1

Step 4. Click the down arrow in Auto Cursor ribbon bar and click Origin to place rectangle, **Fig. 2**.

Step 5. Click OK in ribbon bar to fix circle and close ribbon bar, **Fig. 1**.

Step 6. Use **F9** to toggle Origin/Axis display on and off to confirm Origin, **Fig. 2**.

Step 7. Fit (**Alt-F1**).

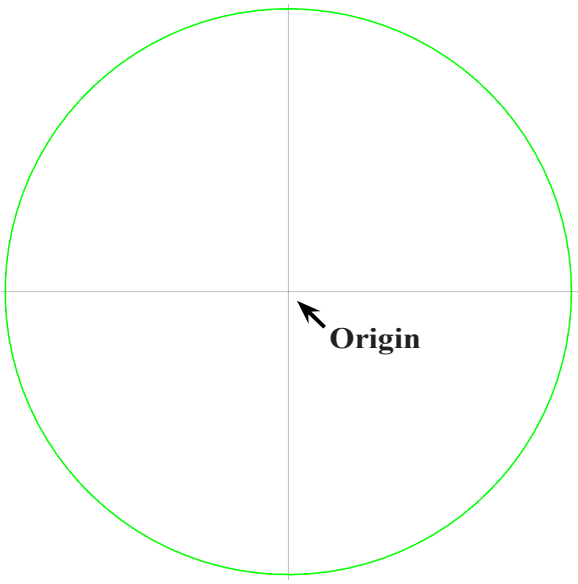


Fig. 2

B. Save As "BASE"

Step 1. Click FILE Menu > Save As.

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

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C. Offset Circle.

Step 1. Click XFORM Menu > Offset.

Step 2. In Offset dialog box: **Fig. 3**

Copy

Distance **.35**

Step 3. Click circle, then click **inside**, **Fig. 4**.

Step 4. Click OK in Offset dialog box.

Step 5. **Right click** drawing area and click Clear Colors (**Alt-R C**).

Step 6. Save (**Alt-F S**).

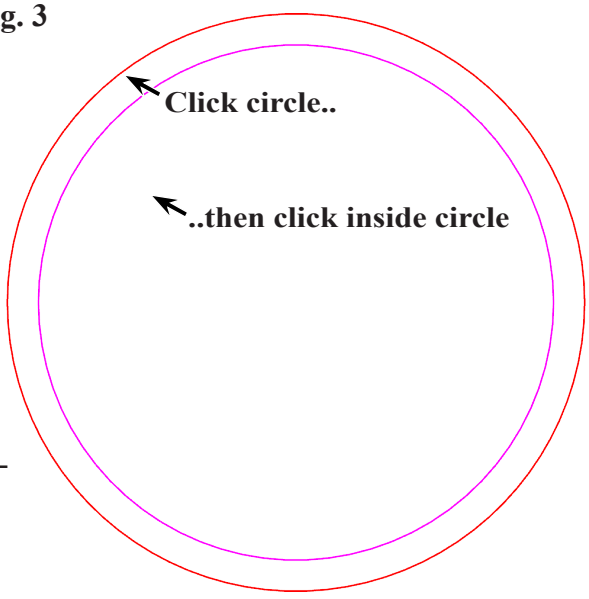


Fig. 4

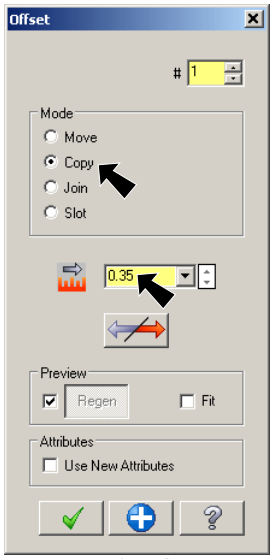


Fig. 3

D. Create Center Lines.

Step 1. Click CREATE Menu > Line > Endpoint or click Line Tool in toolbar.

Step 2. Create **line horizontal starting from the center** of the circle **extending left** to the offset circle, **Fig. 5**.

Step 3. Create **line vertical starting from the center** of the circle and **extending upward** to offset circle, **Fig. 5**.

Step 4. Click OK in ribbon bar to fix line and close.

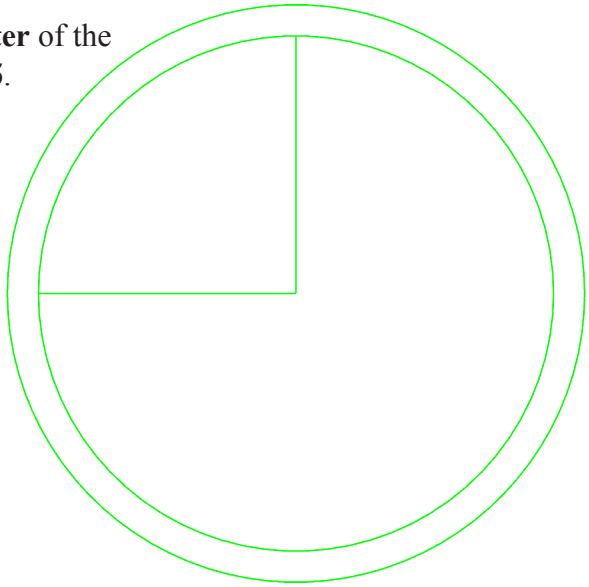


Fig. 5

E. Offset Lines.

Step 1. Click XFORM Menu > Offset.

Step 2. In Offset dialog box: **Fig. 6**

Copy

Distance **1.225**

Click horizontal line, then click **above**, **Fig. 7**.

Click **Apply** .

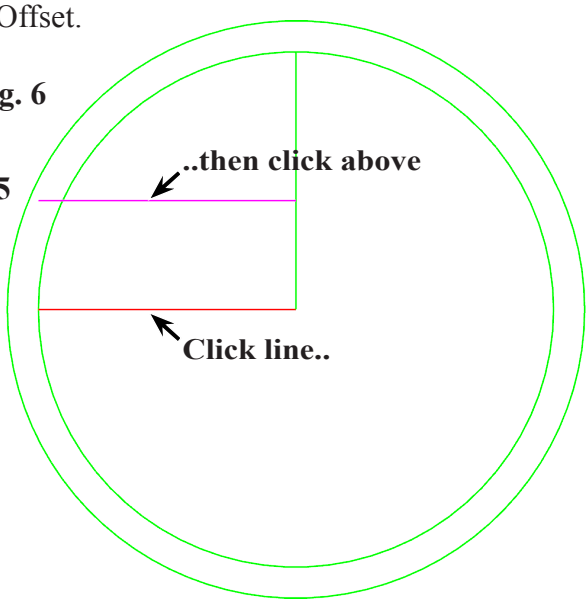


Fig. 7

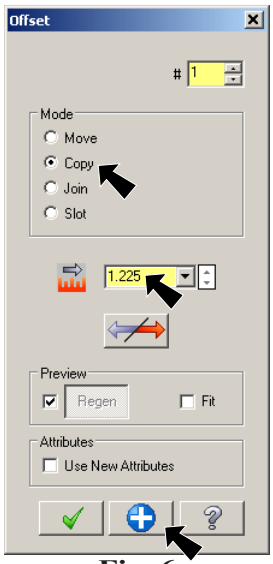


Fig. 6

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 **left** side, **Fig. 11**.

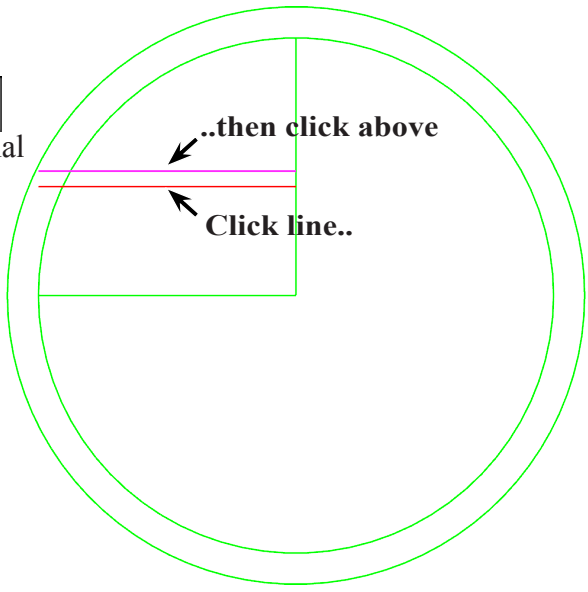


Fig. 9

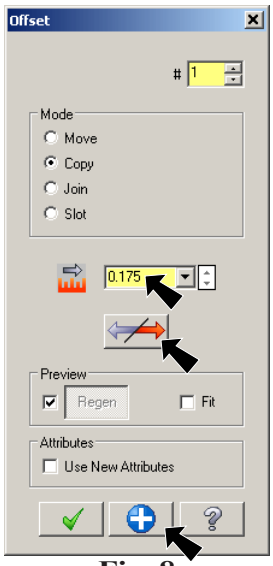


Fig. 8

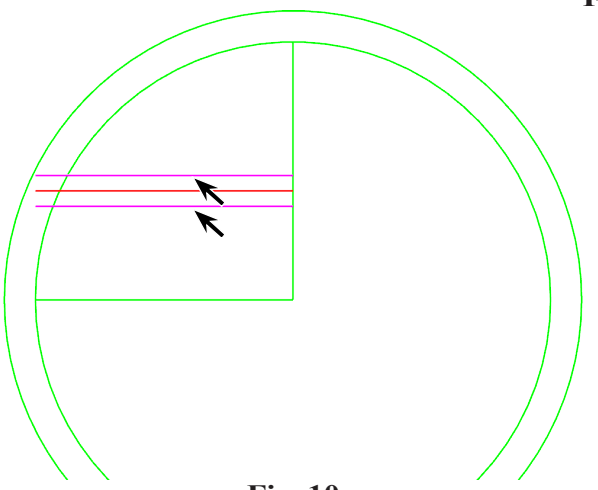


Fig. 10

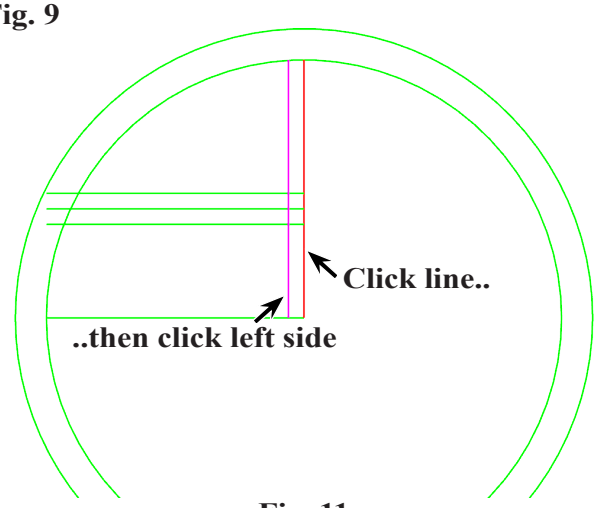


Fig. 11

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

Step 7. **Right click** drawing area and click Clear Colors (**Alt-R C**).

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

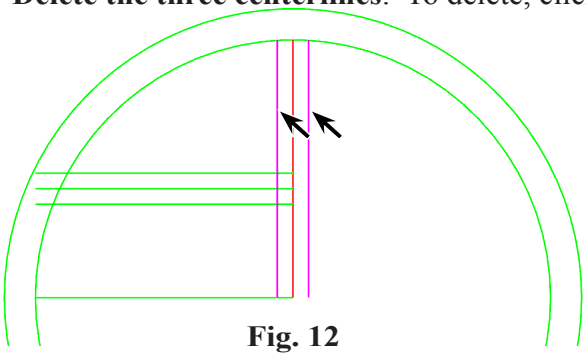


Fig. 12

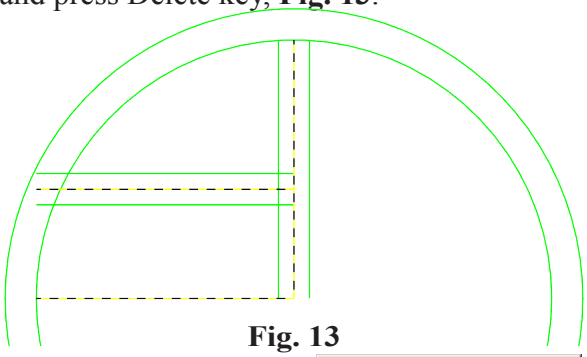


Fig. 13

F. Mirror.

Step 1. Click XFORM Menu > Mirror.

Step 2. Click the **4 lines**, **Fig. 15** and click End Selection (ENTER) in ribbon bar to accept.

Step 3. In Mirror dialog box:
Select **Copy** , **Fig. 14**
Select **X axis**
Click OK to close Mirror dialog box.

Step 4. **Right click** drawing area and click Clear Colors (**Alt-R C**).

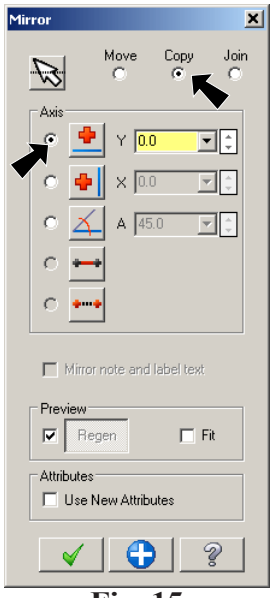


Fig. 15

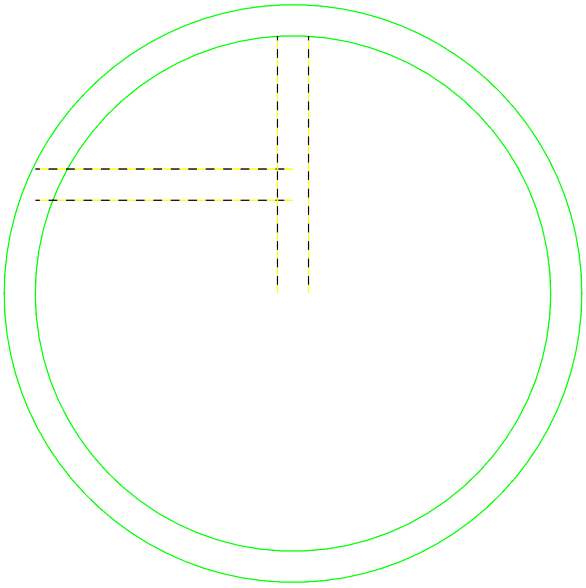


Fig. 14

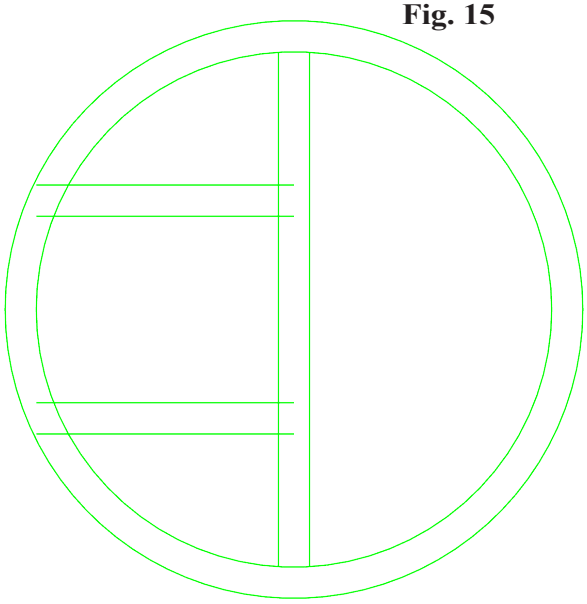


Fig. 16

G. Trim Divide and Trim 2 Entity.

Step 1 Click EDIT Menu > Trim/Break > Trim/Break/Extend.

Fig. 17

Step 2. Click **Divide** (**D**) in ribbon bar, **Fig. 17**.

Step 3. Trim all segments between lines and arcs. To trim, click the segment between the line or arc, **Fig. 18**.

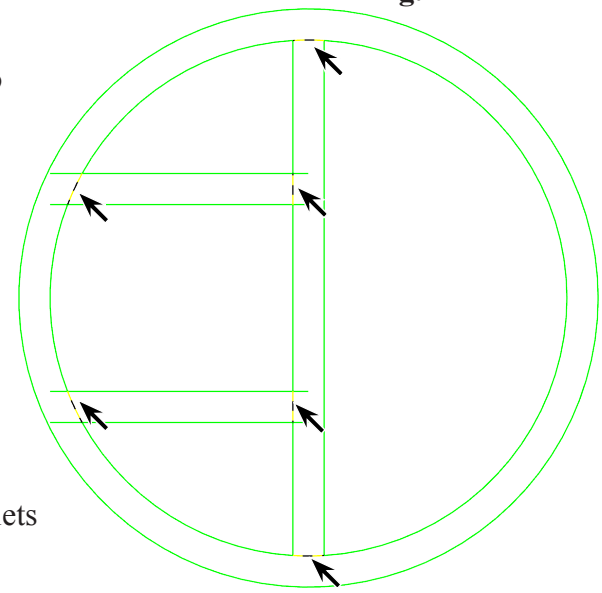


Fig. 18

Step 4. Click **Trim 2 Entity** in ribbon bar, **Fig. 19**.

Step 5. Trim at each intersection, **Fig. 20**. Even at 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 to close ribbon bar when done.

Step 6 Tip: To confirm trimming is complete use ANALYZE Menu > Chain.

Fig. 19

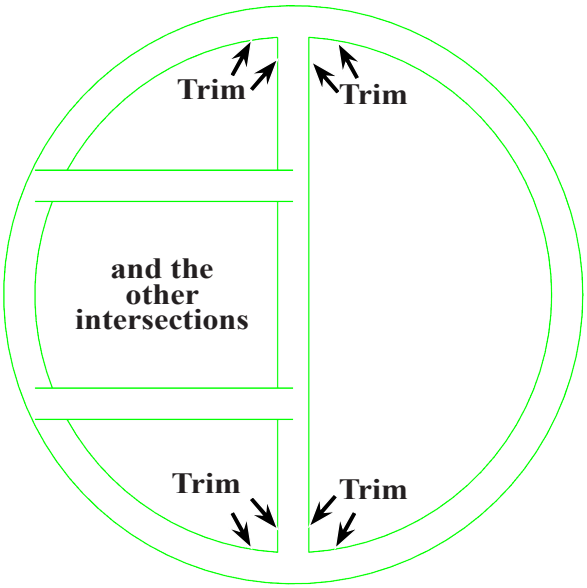


Fig. 20

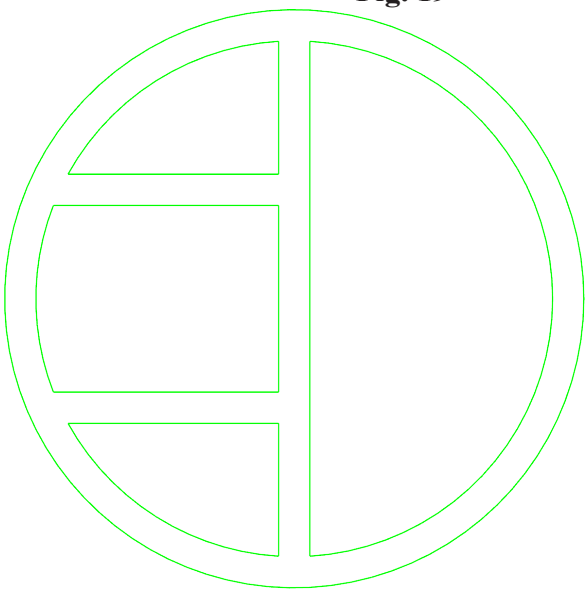


Fig. 21

H. Fillet Chains.

Step 1. Click CREATE Menu > Fillet > Chains.

Step 2. Click Chain in Chaining dialog box.

Step 3. Click to chain geometry of each pocket, **Fig. 22**.

Step 4. Click OK in Chaining dialog box.

Step 5. Key-in **.125 for Radius** in Fillet ribbon bar, **Fig. 23**.

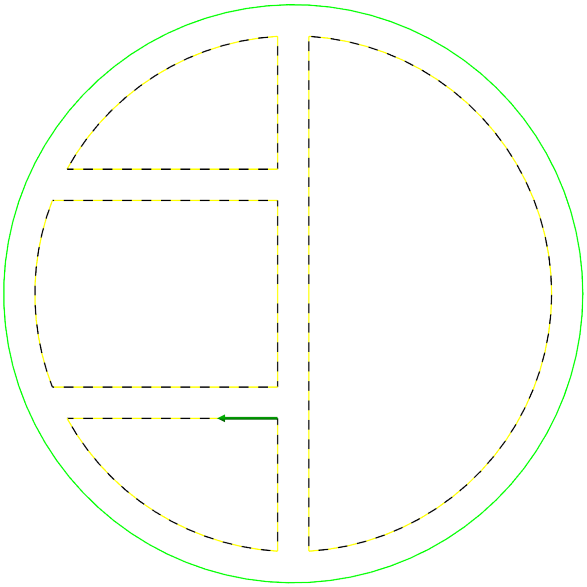


Fig. 22

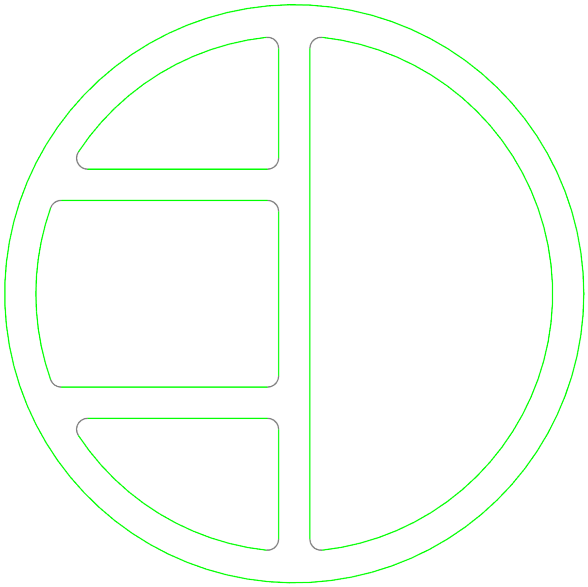


Fig. 24

Fig. 23

Step 6. Click OK in ribbon bar to fix and close.

Step 7. Save (**Alt-F S**).

I. Pin Hole Circles.

Step 1. Click Wireframe color in Status Bar. Key-in **13 for magenta** color number and press ENTER.

Step 2. Click CREATE Menu > Arc > Circle Center Point.

Step 3. Key-in **.125 for diameter** and click Diameter to **lock**, **Fig. 25**. The field turns red when locked.

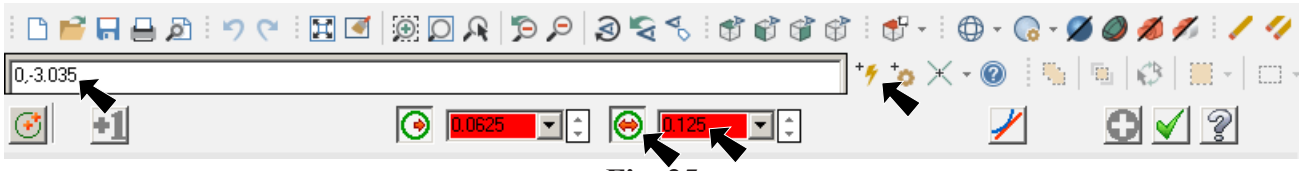


Fig. 25

Step 4. Click Fast Point (**spacebar**) to the right of the X, Y, and Z fields in Auto Cursor ribbon bar set, **Fig. 25**.

Step 5. Key-in the X, Y coordinates into the Fast Point long field and press ENTER after keying in coordinate, **Fig. 26**

Pin Holes
0, -3.035
0, 3.035

Click OK in ribbon bar to fix circle and close ribbon bar.

Step 6. Save (**Alt-F S**).

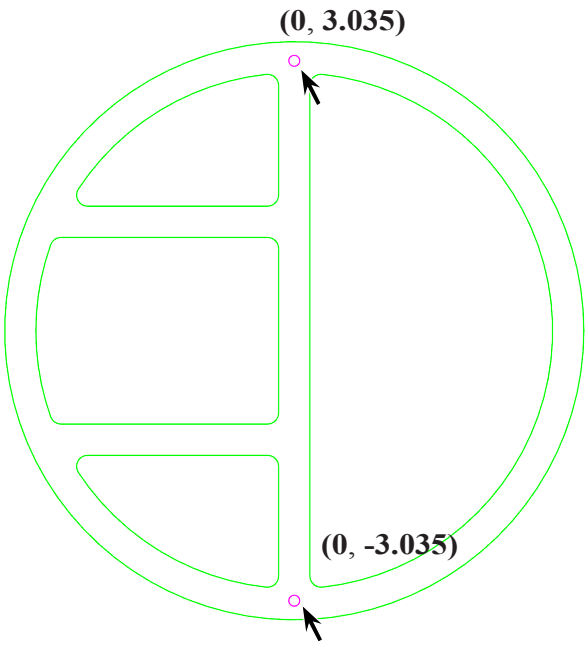


Fig. 26

J. Extrude Solid.

Step 1. Change to Isometric View (**Alt-7**).

Step 2. Click SOLIDS Menu > Extrude.

Step 3. Click Chain in Chaining dialog box.

Step 4. Click **Base circle**, **Fig. 27**.

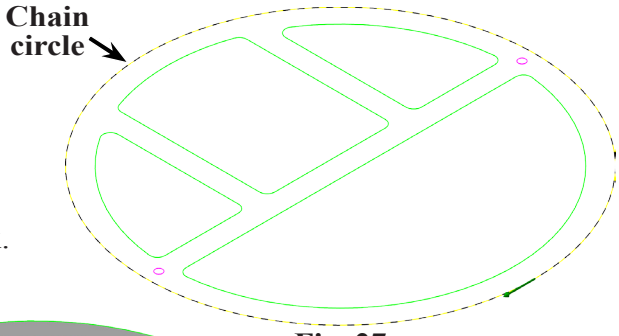


Fig. 27

Step 5. Click OK in Chaining dialog box.

Step 6. In Extrude Chain dialog box:

Select **Create Body**, **Fig. 28**

Set **Distance .75**

The direction arrow should **point down**, if arrow points in opposite direction check **Reverse direction**, **Fig. 28**.

Click **OK and Create New Operation**.

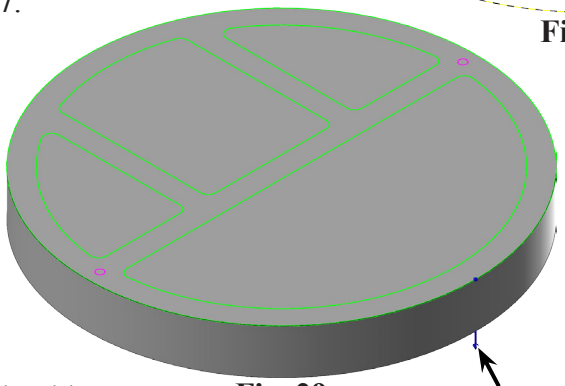


Fig. 29

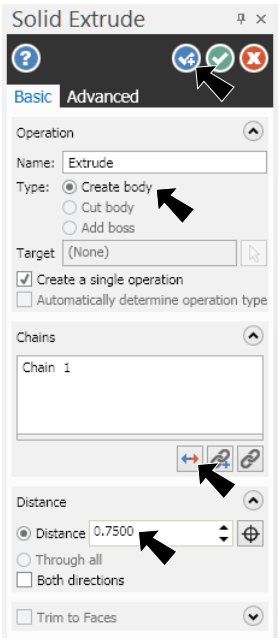


Fig. 28

Step 7. Fit (**Alt-F1**).

K. Cut Pockets.

Step 1. Click Chain in Chaining dialog box.

Step 2. Click **any geometry of each pocket**, **Fig. 30**.

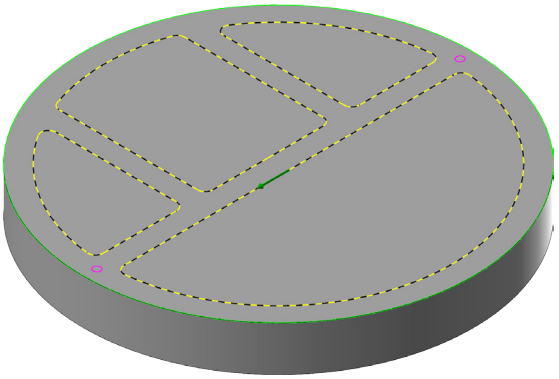


Fig. 30

Step 3. Click OK in Chaining dialog box.

Step 4. In Extrude dialog box, **Fig. 31**

Select **Cut Body**

Select **Distance**

Set **Distance .65**

The direction arrow should **point down**, **Fig. 32**.

Click **OK and Create New Operation**.

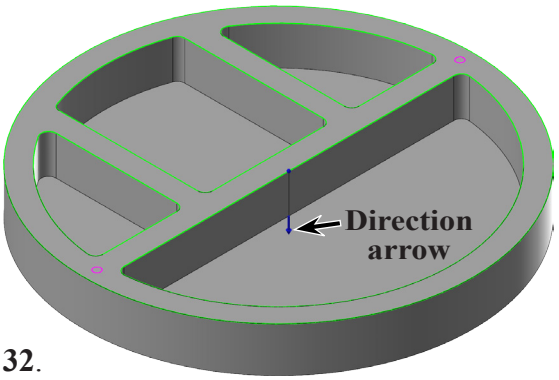


Fig. 32

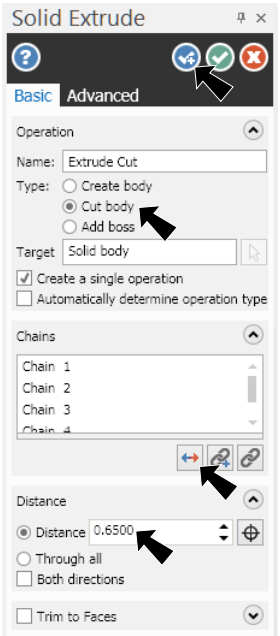
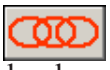


Fig. 31

L. Cut Pin Holes.

Step 1. Click Chain  in Chaining dialog box.

Step 2. Click **both Pin hole circles**, **Fig. 33**.

Step 3. Click OK in Chaining dialog box.

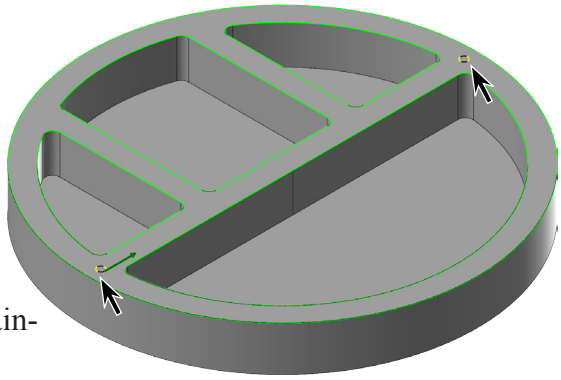


Fig. 33

Step 4. In Extrude dialog box, **Fig. 34**
Select **Cut Body**
Select **Through All**

The direction arrow should **point down**, **Fig. 35**.

Click OK .

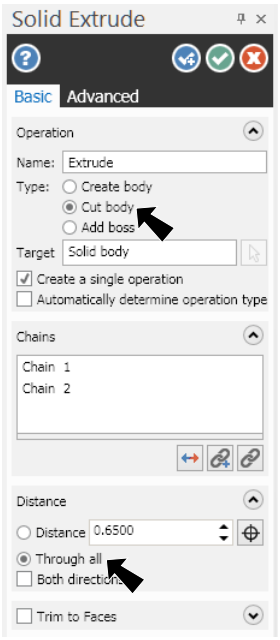


Fig. 34

Step 5. Save (**Alt-F S**).

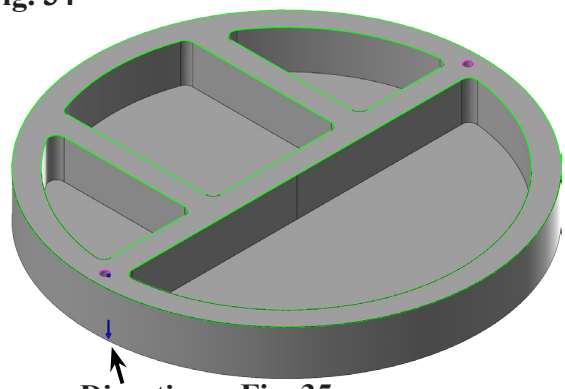


Fig. 35

M. Machine Type and Stock Setup.

Step 1. If necessary, display Toolpaths Manager. Use **Alt-O**.

Step 2. If Machine Group is **not** displayed in the Operations Manager, **Fig. 36**, click MACHINE TYPE Menu > Mill > Default.

Step 3. Expand **Properties** in the Toolpaths Manager and click **Stock Setup**, **Fig. 36**.

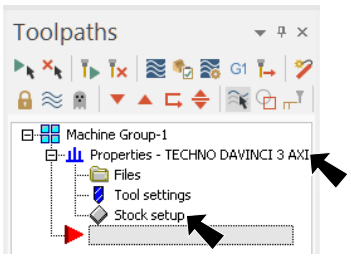


Fig. 36

Step 4. Confirm Stock Plane is **Top**, **Fig. 37**.

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.

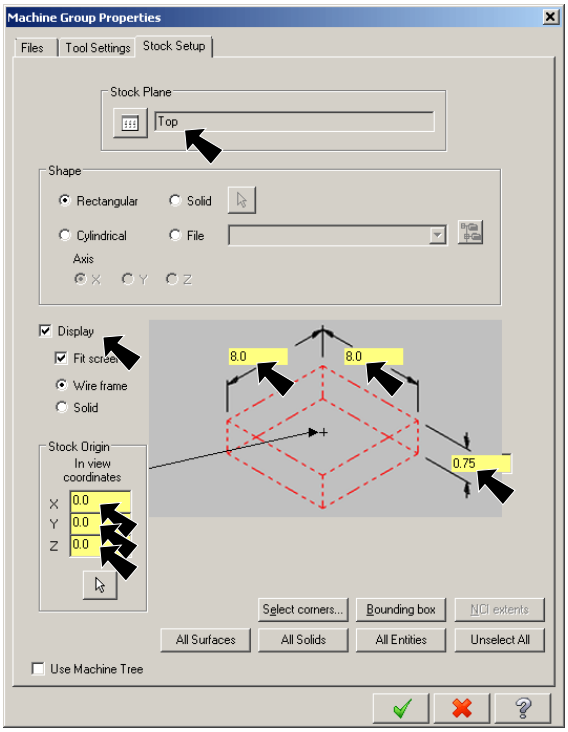


Fig. 37

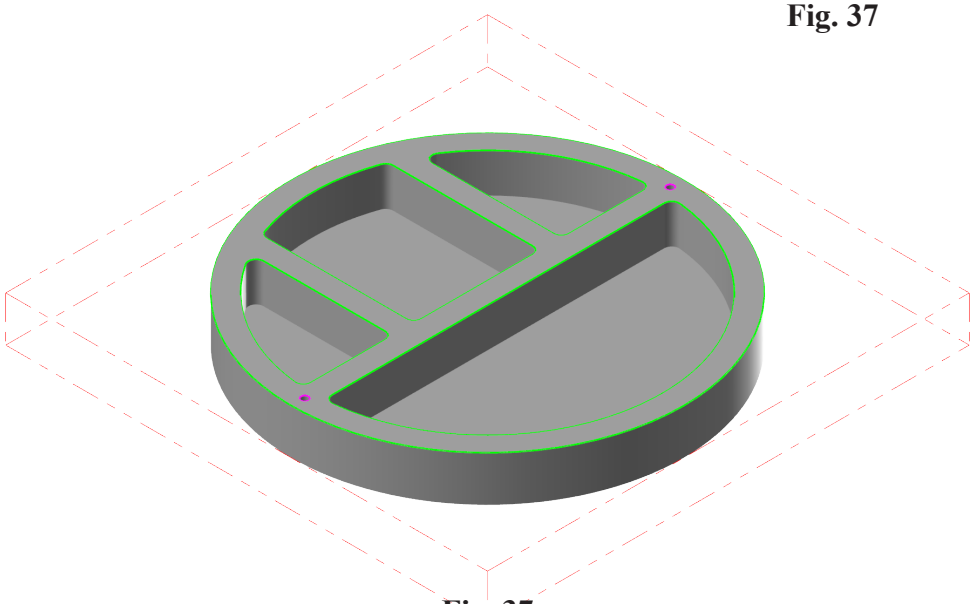


Fig. 37

N. OptiRough Toolpath.

Step 1. Click TOOLPATHS Menu > Surface High Speed > **Dynamic OptiRough**.

Step 2. Click OK in the NC name dialog, **Fig. 38**.

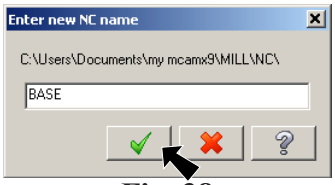


Fig. 38

Step 3. Click the **solid body** to select as Drive Surfaces, **Fig. 39**.

Step 4. Click **End Selection** (**ENTER**) in ribbon bar to accept solid as drive surfaces.

Step 5. Click **Containment boundary Select** button in the Toolpath/surface selection dialog box, **Fig. 40**.

Step 6. Click **Chain** (**C**) in Chaining dialog box, **Fig. 41**.

Step 7. Click **any geometry of each pocket**, **Fig. 42**.

Step 8. Click OK in Chaining dialog box, **Fig. 41**.

Step 9. Click OK in Toolpath/surface selection dialog box, **Fig. 40**.

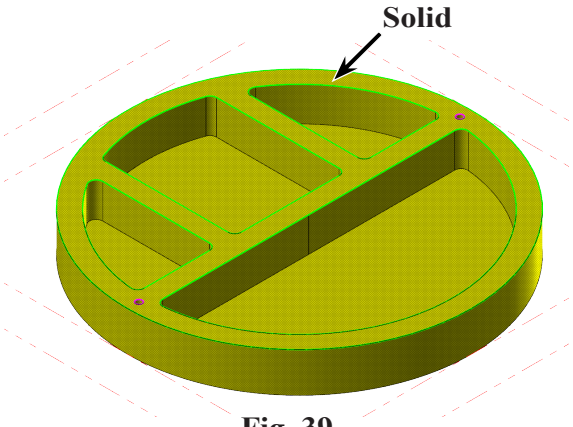


Fig. 39

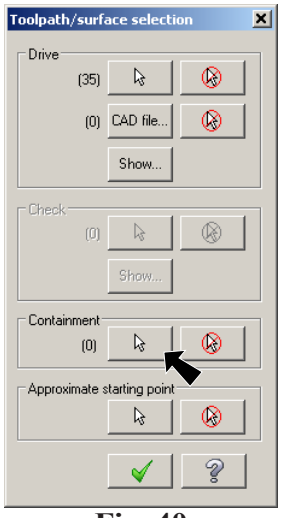


Fig. 40

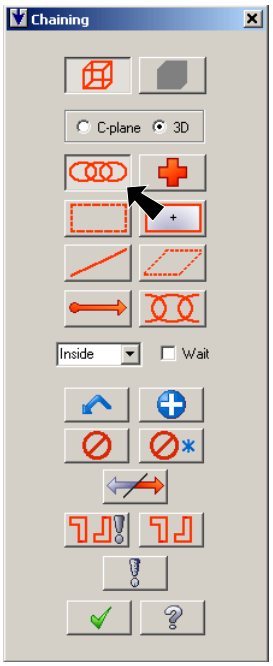


Fig. 41

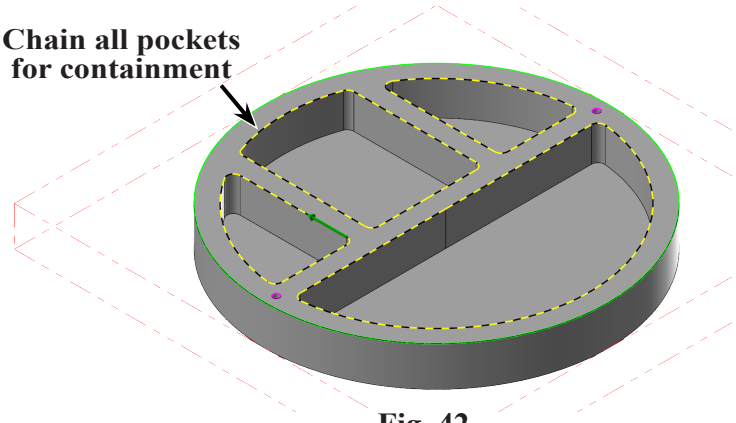


Fig. 42

Step 10. Select **Toolpath Type** from the tree control and confirm: **Dynamic OptiRough toolpath Drive surfaces Containment boundary Fig. 43**.

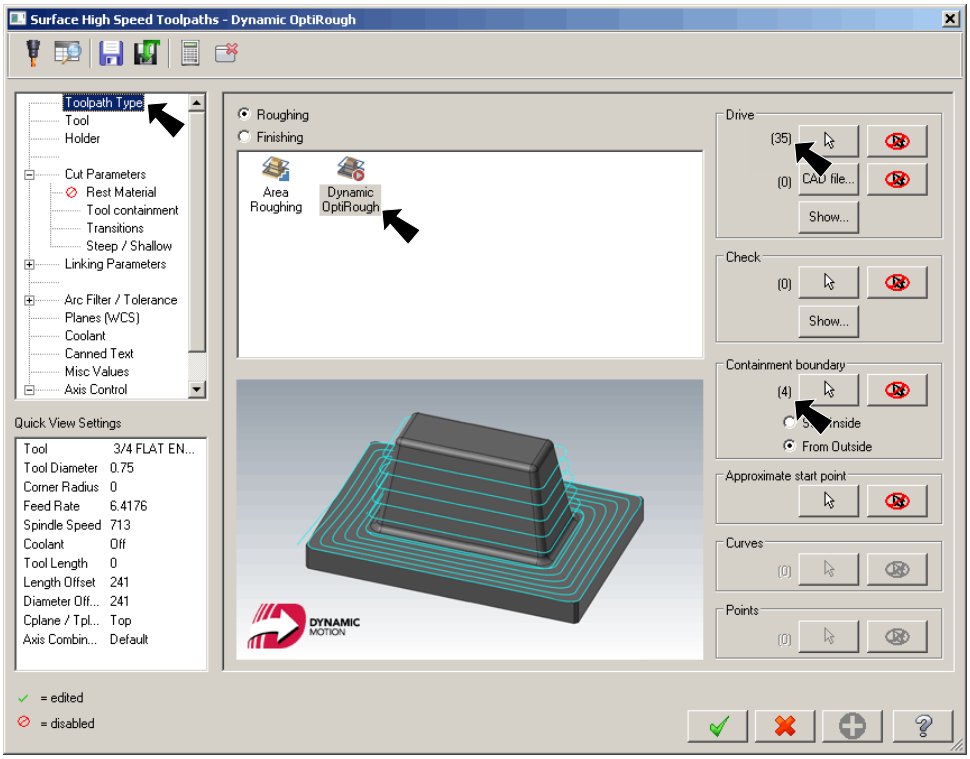


Fig. 43

Step 11. Select **Tool** from the tree control and:

click **Select library tool** button, **Fig. 44**.

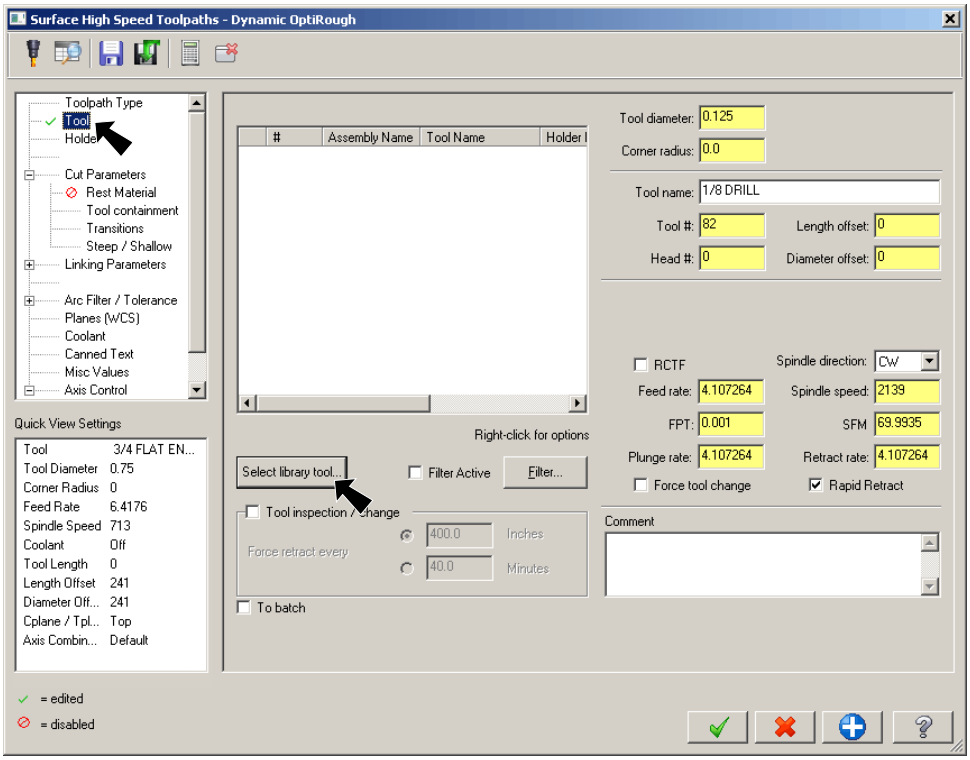


Fig. 44

Step 12. Click **285 1/4 FLAT ENDMILL** and click OK, **Fig. 45**.

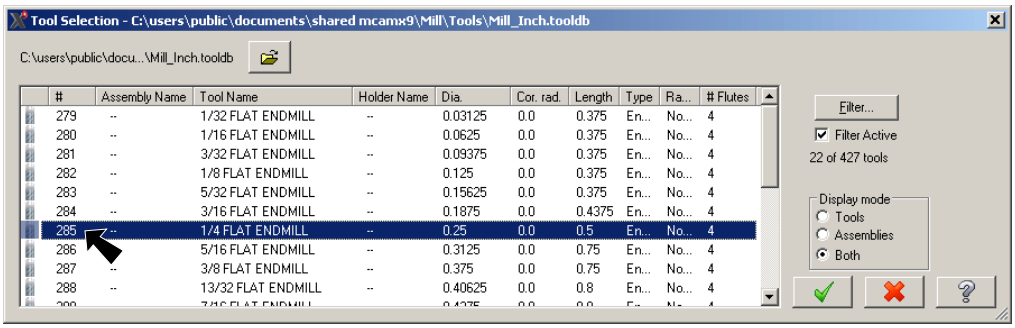


Fig. 45

Step 13. Back in **Tool** page set:
Feed rate 40

Plunge rate 20
Fig. 46.

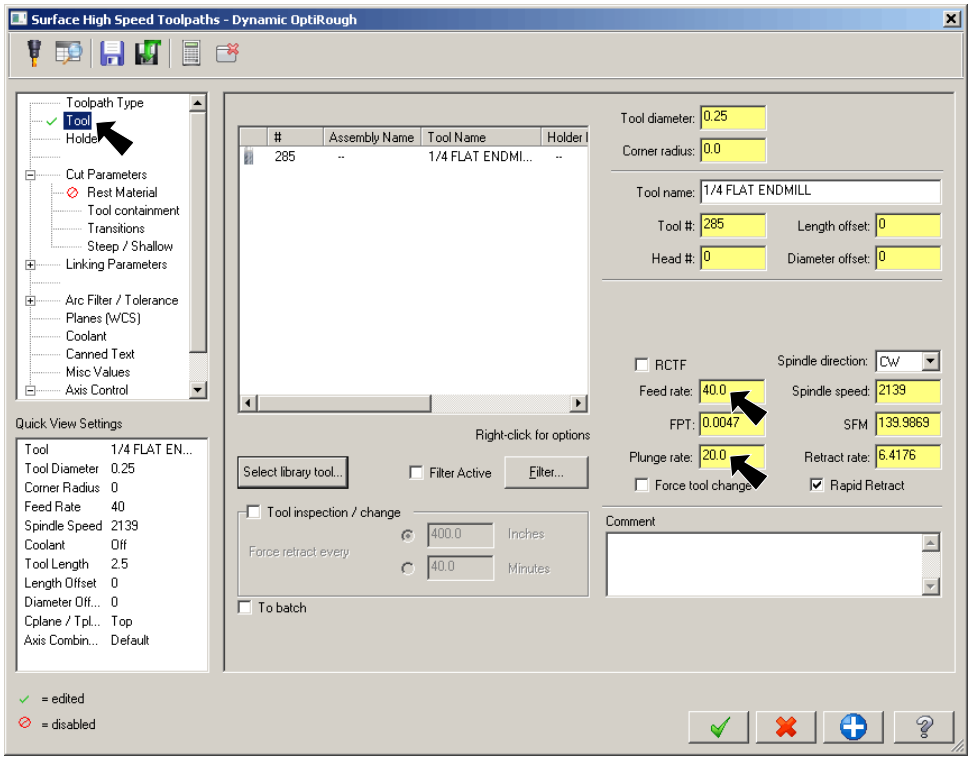


Fig. 46

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

Stepdown 60

Minimum toolpath radius 5

Stock to leave on Walls and Floors 0
Fig. 47.

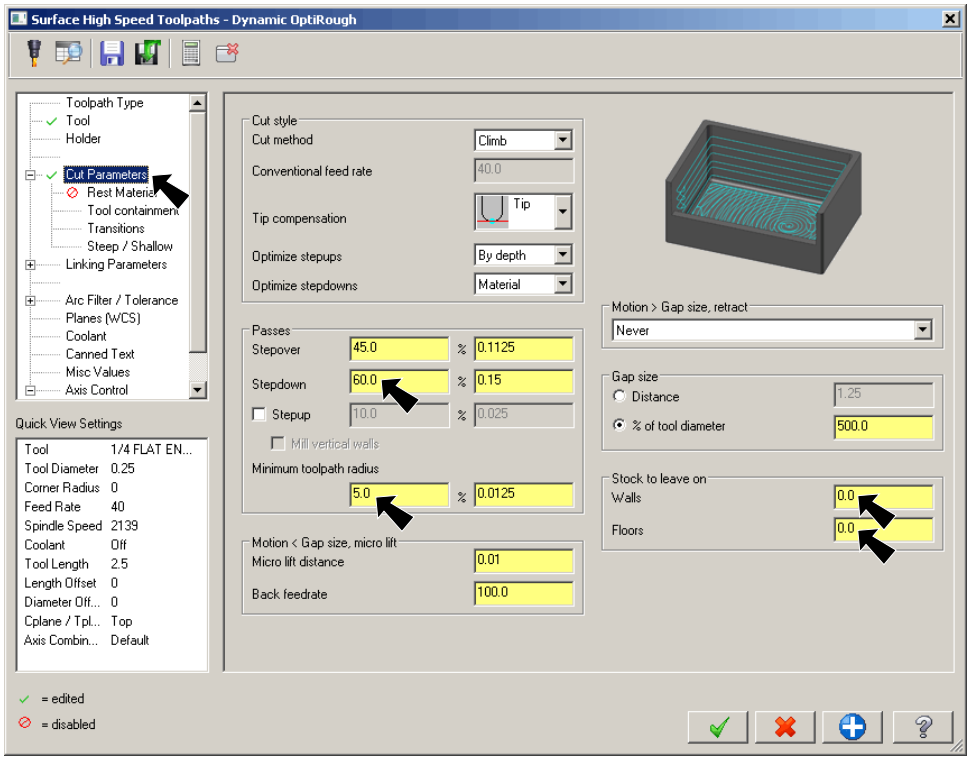


Fig. 47

Step 15. Select **Transitions** from tree control and set:

Plunge angle 10
Fig. 48.

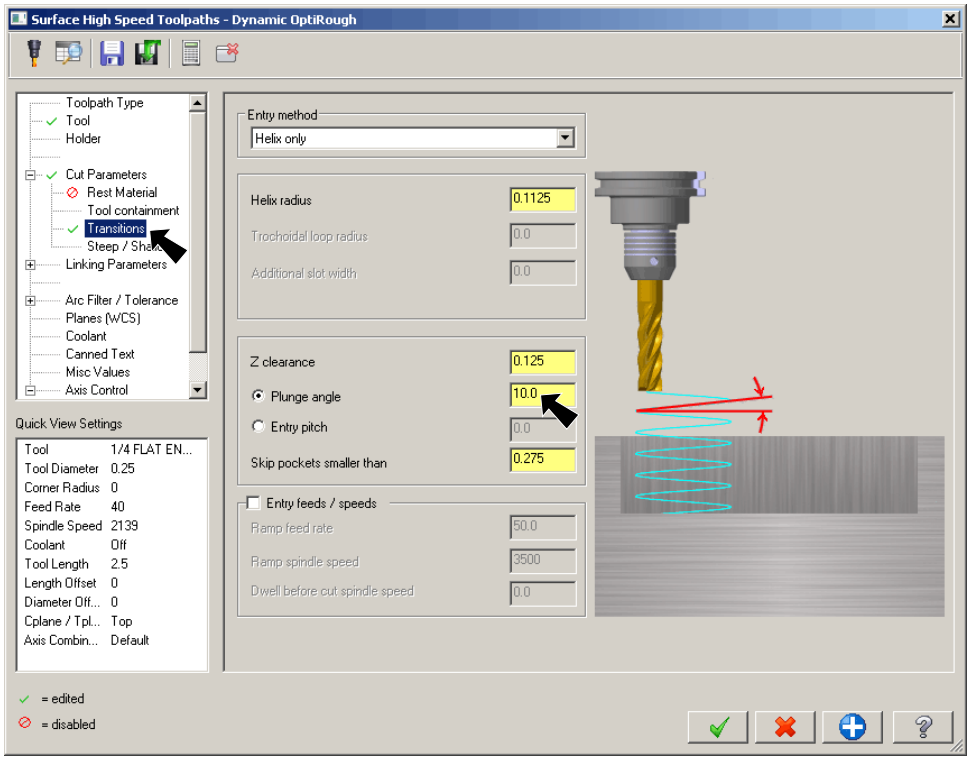


Fig. 48

Step 16. Select **Linking Parameters** from tree control and set:

Clearance plane 1

All leads 0
Fig. 49.

Step 17. Click OK in Dynamic OptiRough dialog box.

Step 18. Allow Mastercam to calculate toolpath.

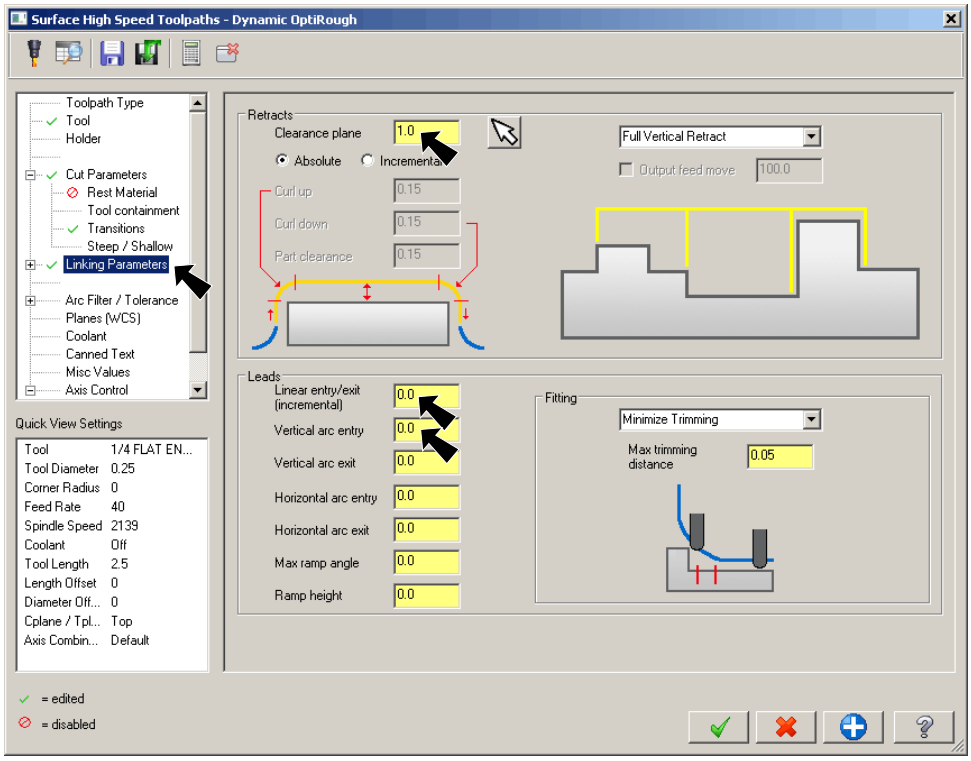


Fig. 49

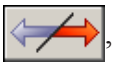
Step 19. Save (**Alt-F S**).

O. Contour Toolpath.

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

Step 2. Click TOOLPATHS Menu > **Contour**.

Step 3. Click **Chain** (**C**) in Chaining dialog box, **Fig. 50**.

Step 4. Click **Base circle** to chain, **Fig. 51**. The chain arrow should point **clockwise** around the chain. If chaining directions arrow is pointing in the opposite direction - click Reverse  , **Fig. 50**.

Step 5. Click OK in Chaining dialog box.

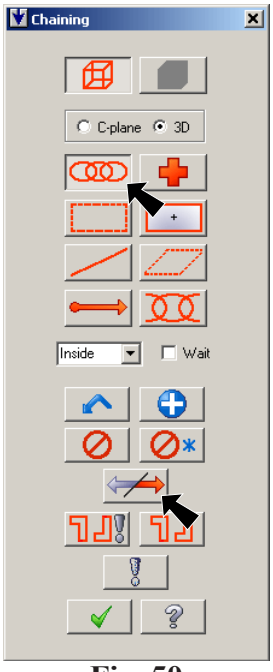


Fig. 50

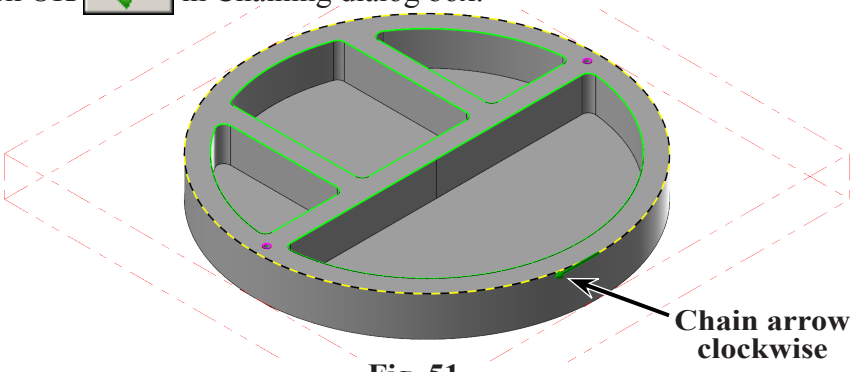


Fig. 51

Step 6. In the 2D Toolpaths Contour dialog box confirm **1 Chain** is selected **Fig. 52**.

Step 7. Select **Tool** from the tree control and: Confirm **285 1/4 FLAT ENDMILL**

Feed rate 40

Plunge rate 20 Fig. 53.

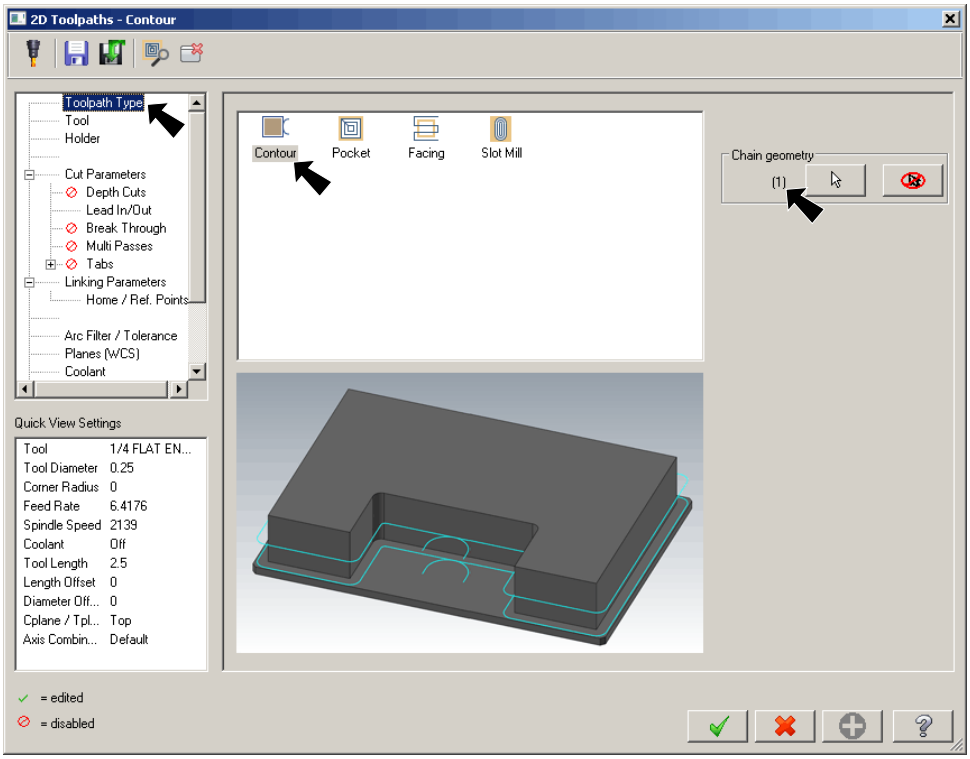


Fig. 52

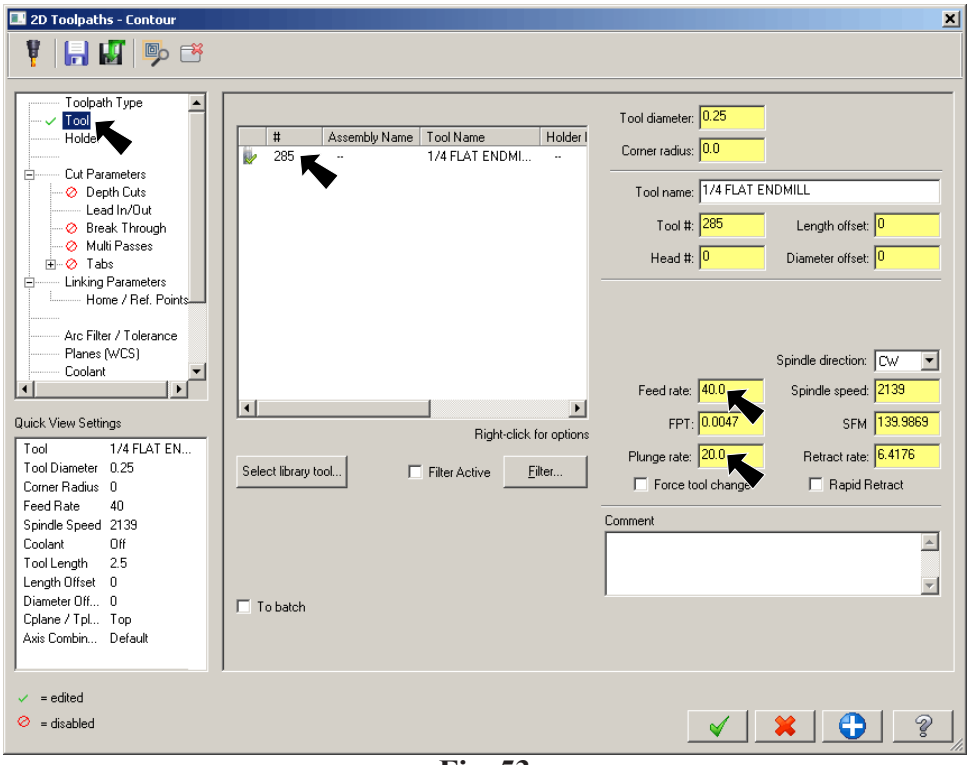


Fig. 53

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. 54.

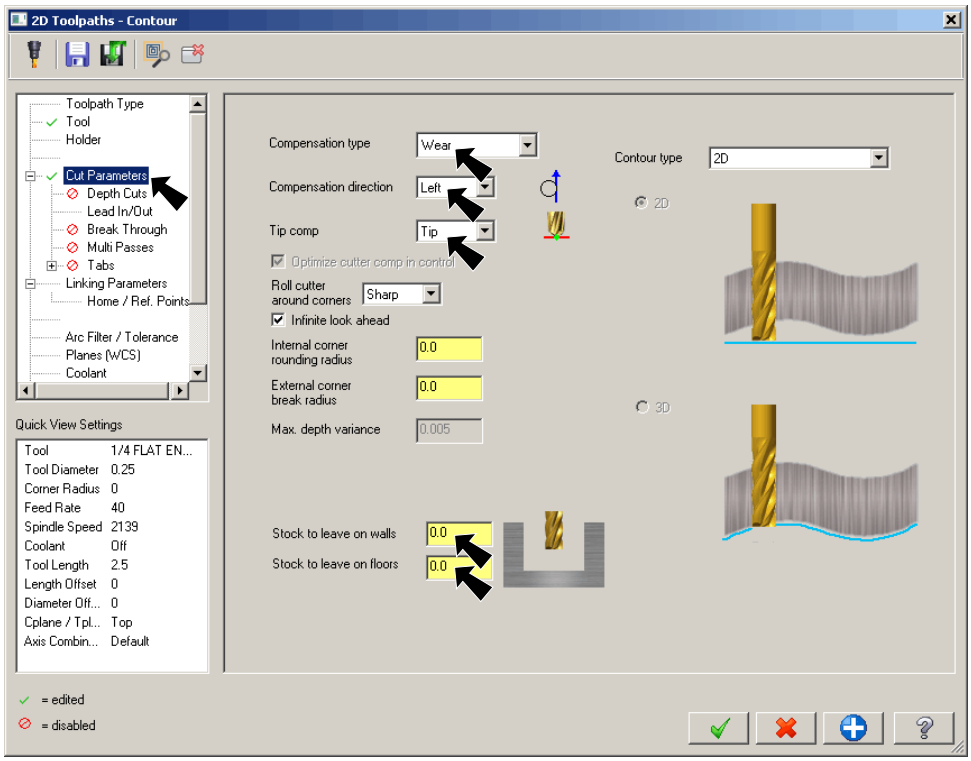


Fig. 54

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

Check **Depth cuts**

Max rough step .2

Check **Keep tool down**
Fig. 55.

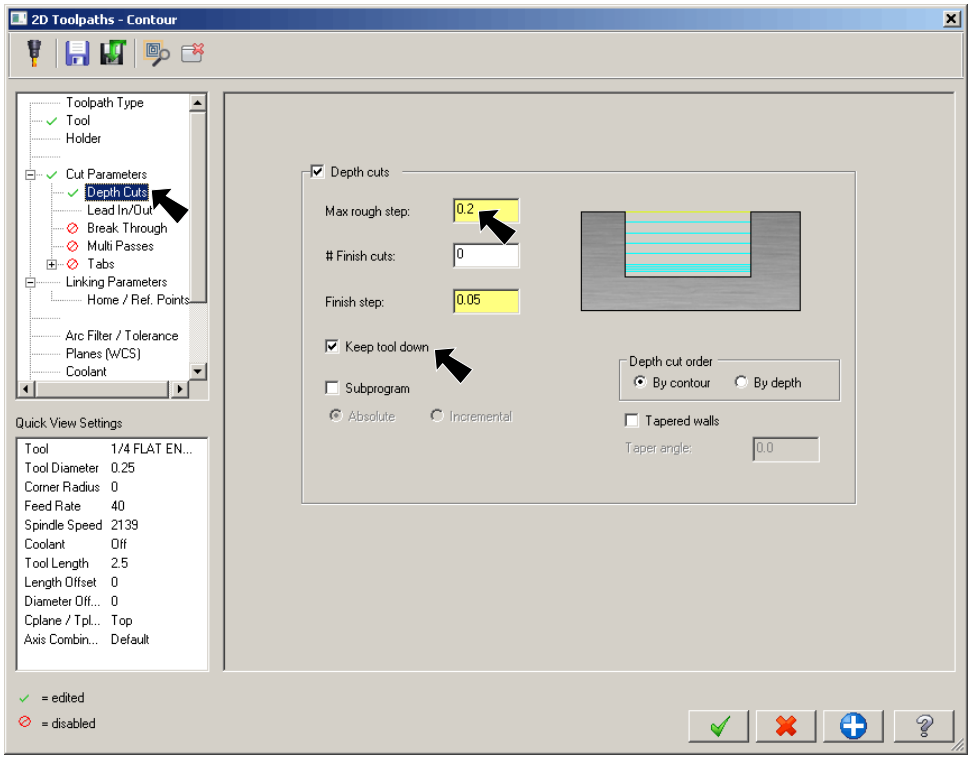


Fig. 55

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

Uncheck **Lead In/Out**
Fig. 56.

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

Check **Break through**

Break through amount .01
Fig. 57.

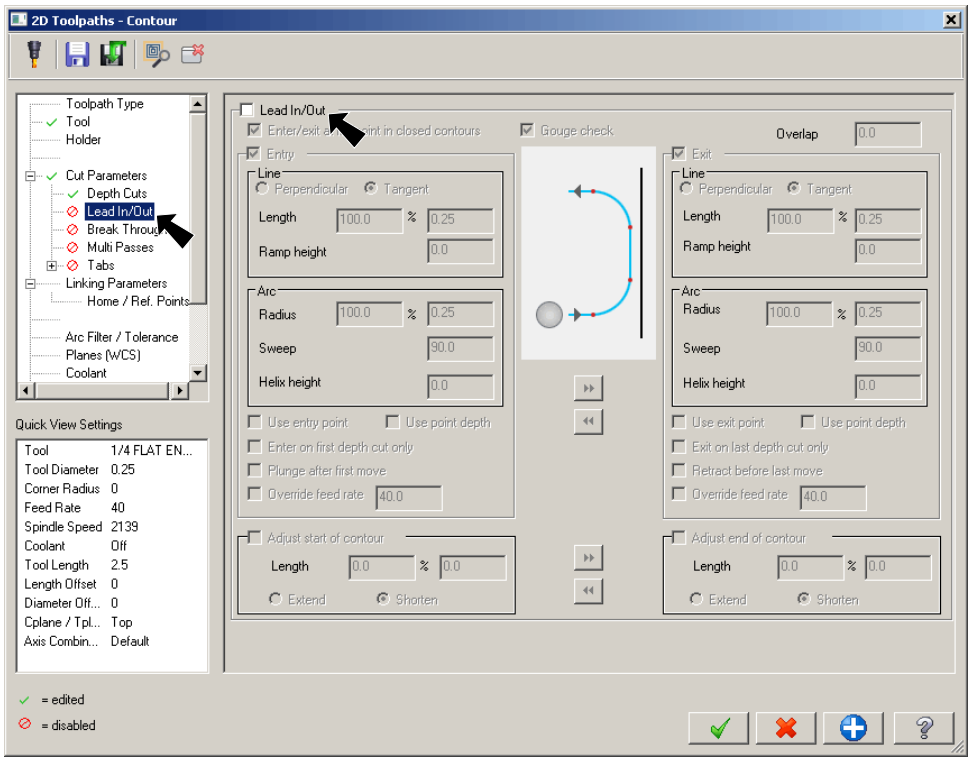


Fig. 56

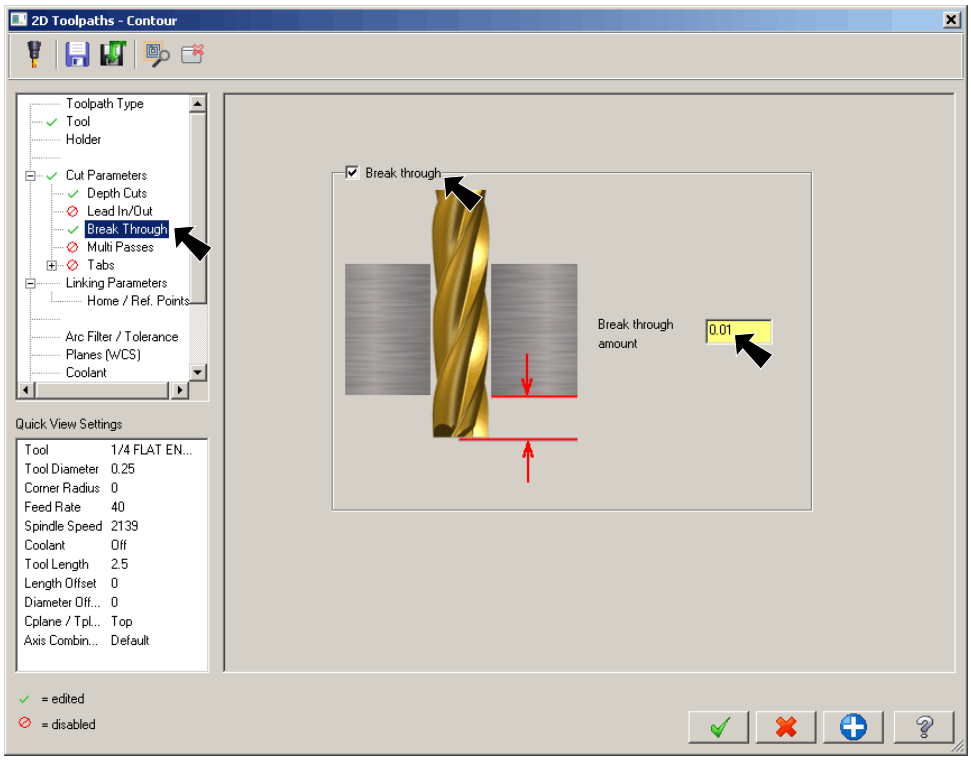


Fig. 57

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

Depth -.75
Fig. 58.

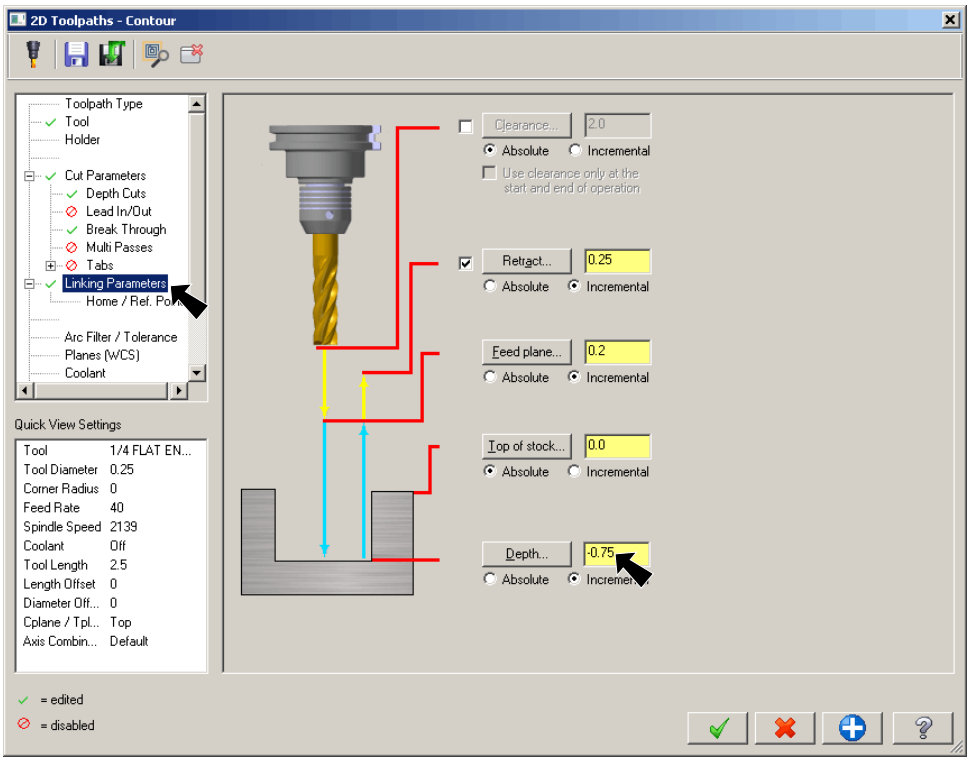


Fig. 58

Step 13. Click OK .

Step 14. Save (**Alt-F S**).

P. Verify Toolpaths.

Step 1. Click **Toolpath Group-1** in the Toolpaths Manager to select **OptiRough and Contour** toolpaths, **Fig. 59**.

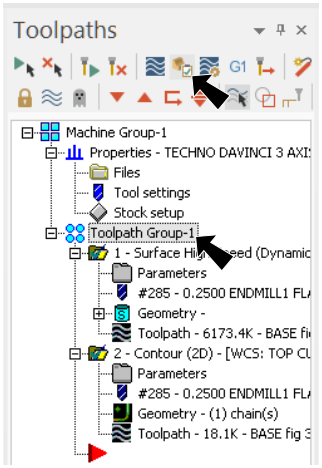


Fig. 59

Step 2. Click **Verify** in the Toolpaths Manager, **Fig. 64**.

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. 60**.

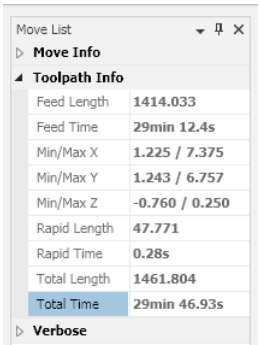


Fig. 60

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

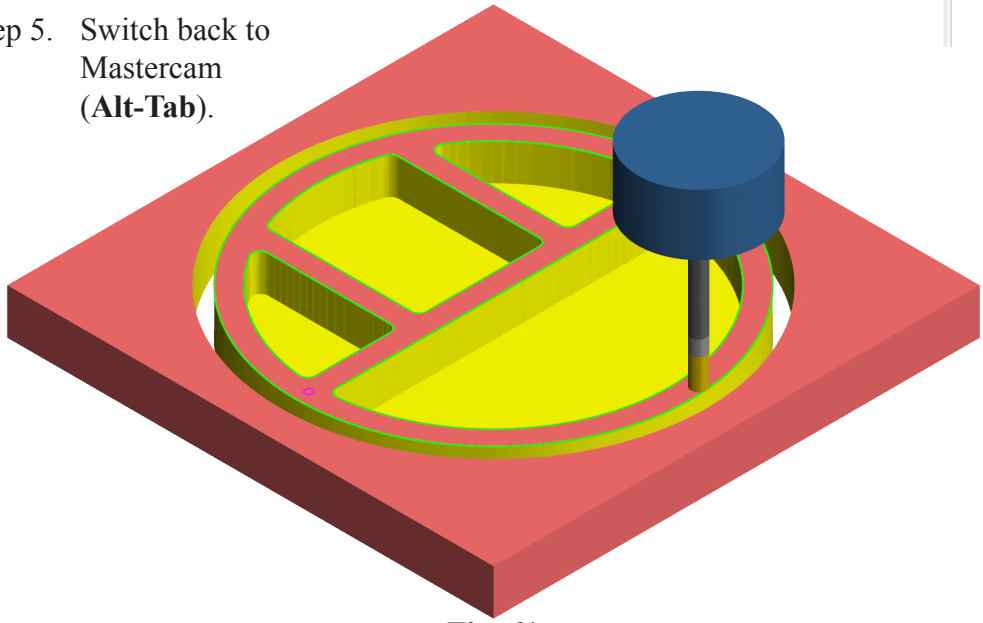


Fig. 61

Q. FBM Drill Toolpath.

Step 1. Click TOOLPATHS Menu > **FBM Drill**.

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

Confirm: Limit search to plane **Top**
Fig. 62.

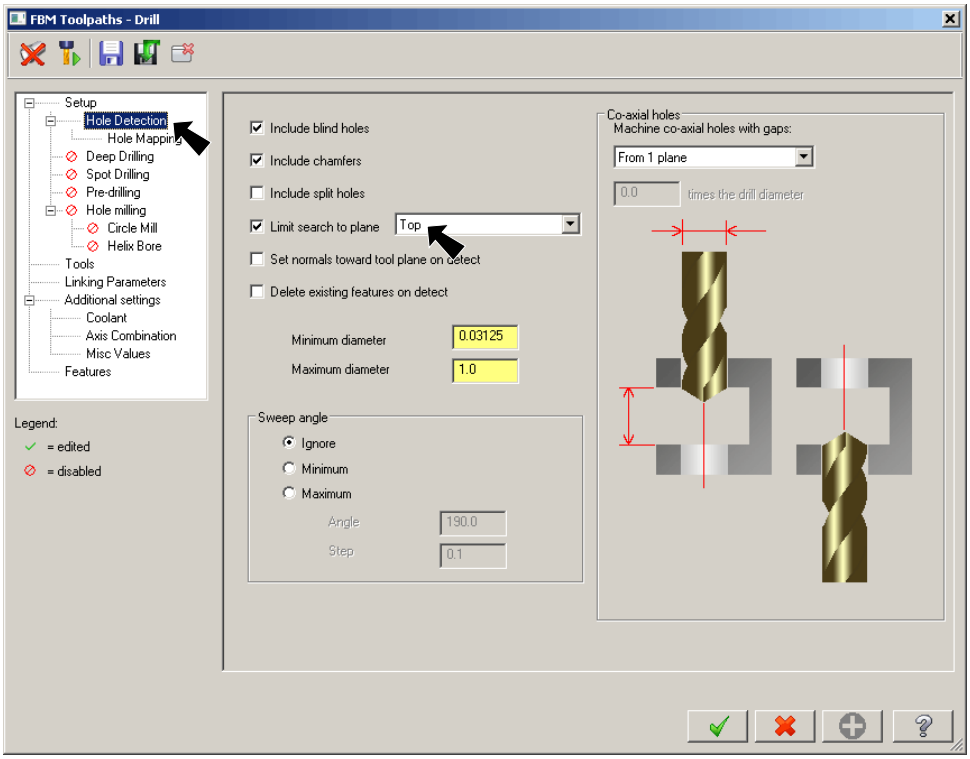


Fig. 62

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

Uncheck **Spot Drilling** check box
Fig. 63.

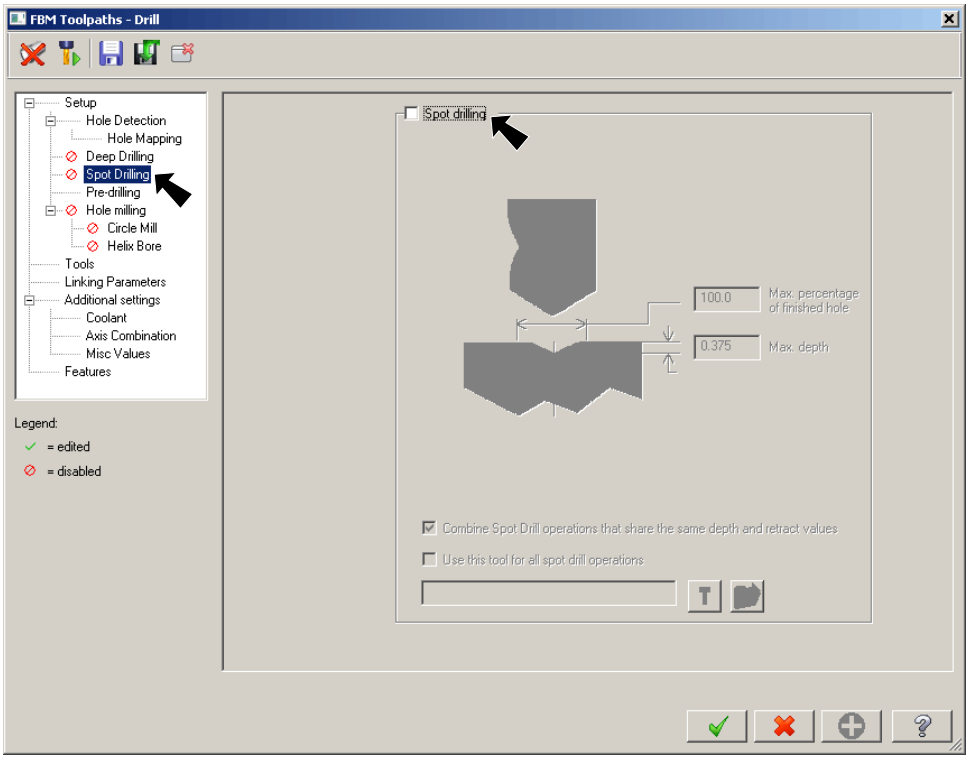


Fig. 63

Step 4. Select **Pre-drilling** from the tree control and uncheck **Pre-drilling** check box, **Fig. 64**.

Step 5. Click **Detect** button at the top of the dialog box to find the holes, **Fig. 64**.

Step 6. Confirm **2 holes** and **depth .75** are listed and click OK , **Fig. 65**.

Step 7. Save (**Alt-F S**).

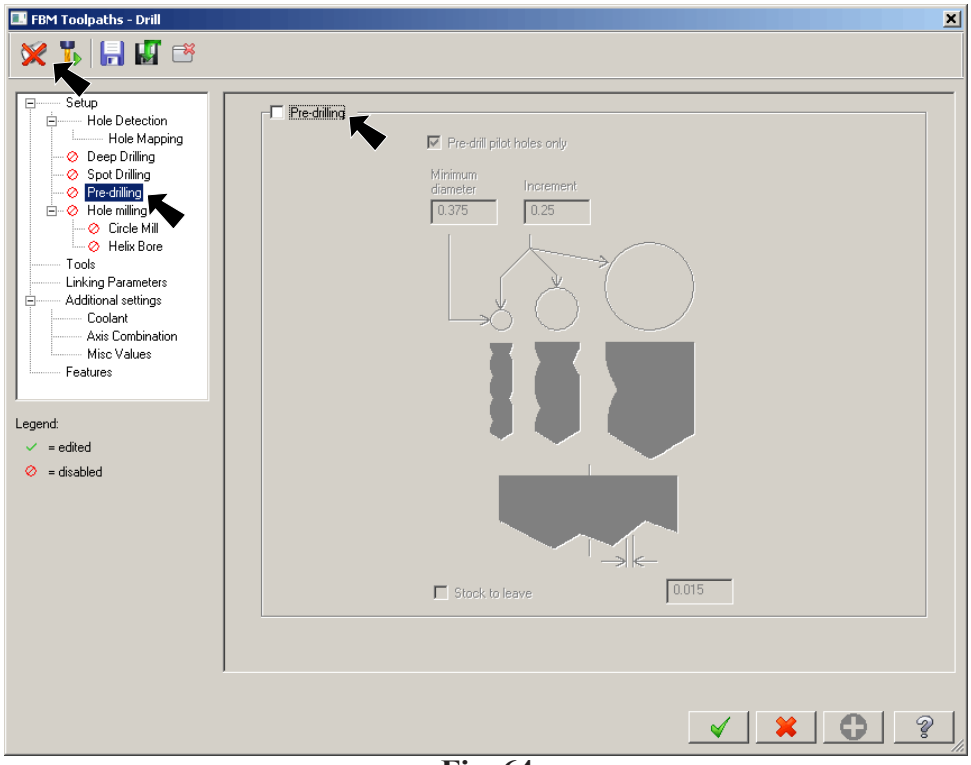


Fig. 64

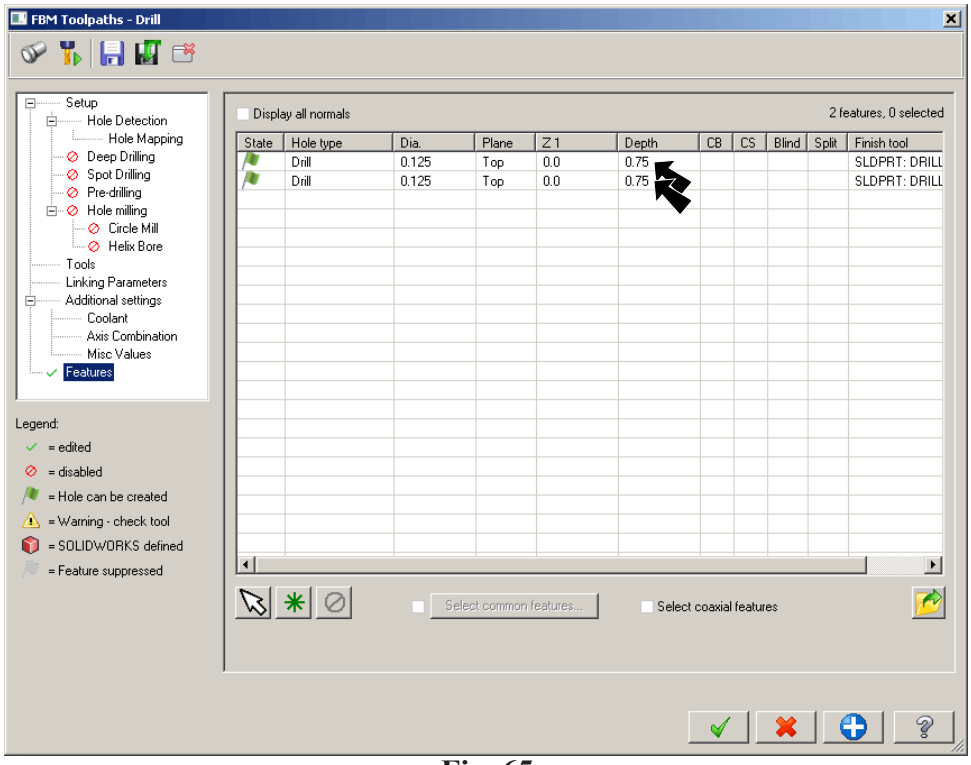


Fig. 65

R. Backplot.

Step 1. Turn **on** Wireframe (**Alt-S**).

Step 2. Click **FBM Drill** Machine Group in the Toolpaths Manager to select FBM Drill group, **Fig. 66**.

Step 3. Click **Backplot** in Toolpaths Manager, **Fig. 66**.

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

Step 5. Click OK to close Backplot.

Step 6. Turn **on** Shading (**Alt-S**).

Step 7. Save (**Alt-F S**).

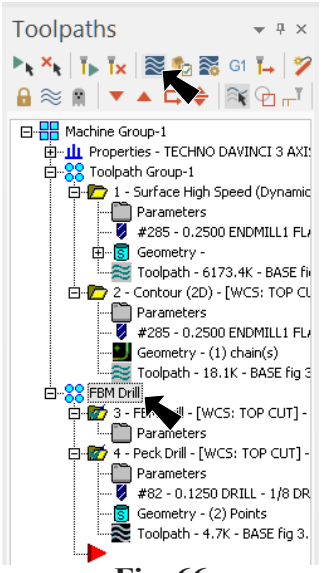


Fig. 66

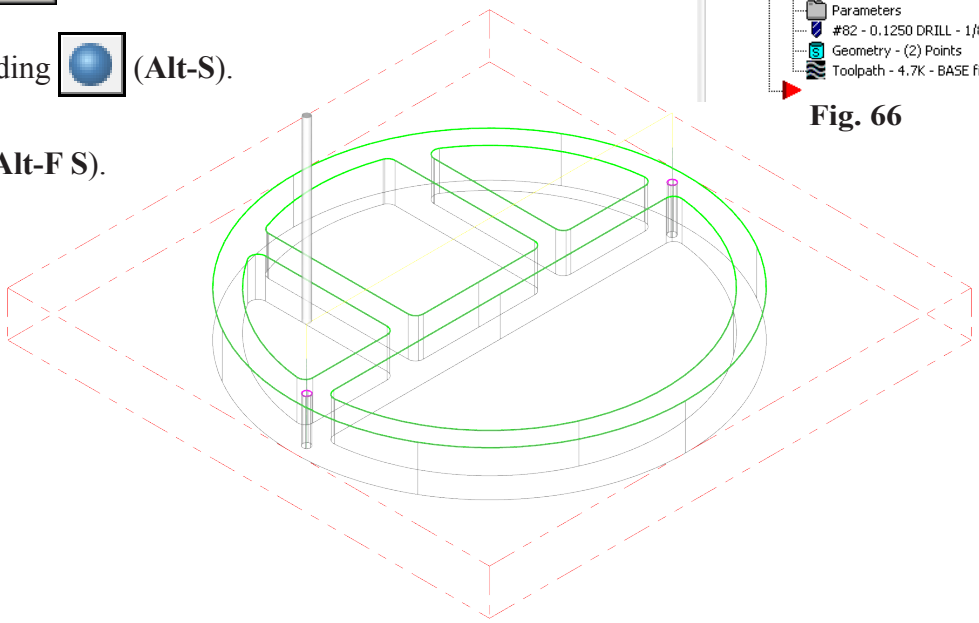


Fig. 67