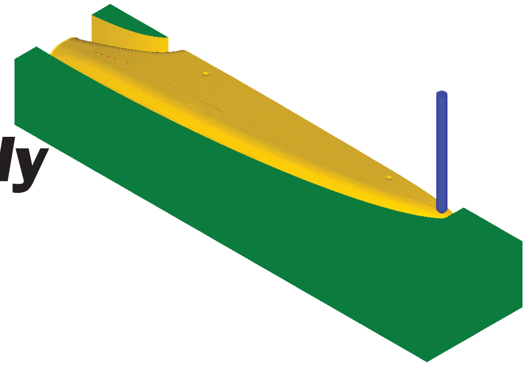
CO2 Shell Car



HST Toolpaths for CO2 Body

Wheel Shells (HST Area Clearance/Raster)
Cut Body (HST Scallop)

A. Machine Type and Stock Setup.

Step 1. If necessary, open your file from Chapter 3.

Step 2. If necessary, display Operations Manager. Use **Alt-O**.

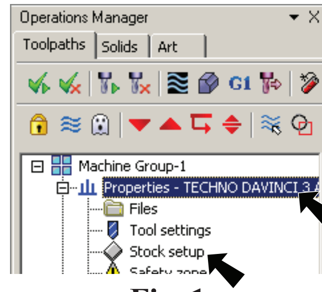


Fig. 1

Step 3. If Machine Group is **not** displayed in the Operations Manager, **Fig. 1**, click Machine Type Menu > Mill > Default.

Step 4. Expand **Properties** (click the +) in the Toolpaths Manager, **Fig. 1**.

Step 5. Click **Stock Setup** in the Toolpaths Manager, **Fig. 1**.

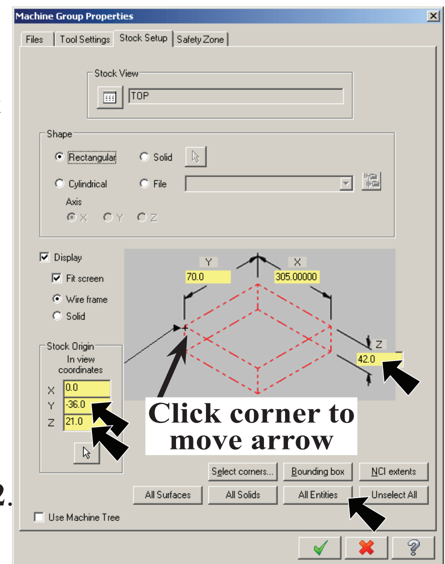
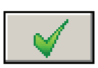


Fig. 2

Step 6. Click the **left front top corner of the stock** to move the origin, **Fig. 2**. After you click corner the arrow will point to corner.

Step 7. Click **All Entities** button in the Stock Setup, **Fig. 2**.

Step 8. Set Stock Origin coordinates:
X to 0
Y to -36
Z to 21, Fig. 2.

Step 9. Click OK  in the Machine Group Properties, **Fig. 2**.

B. Confirm WCS is set to BOTTOM CUT.

Step 1. In the bottom left corner of the display, confirm Tool Plane (T/Cplane) is **Bottom Cut**, **Fig. 3**.

Step 2. Confirm Bottom Cut Origin. Use **F9** to show and hide axes.

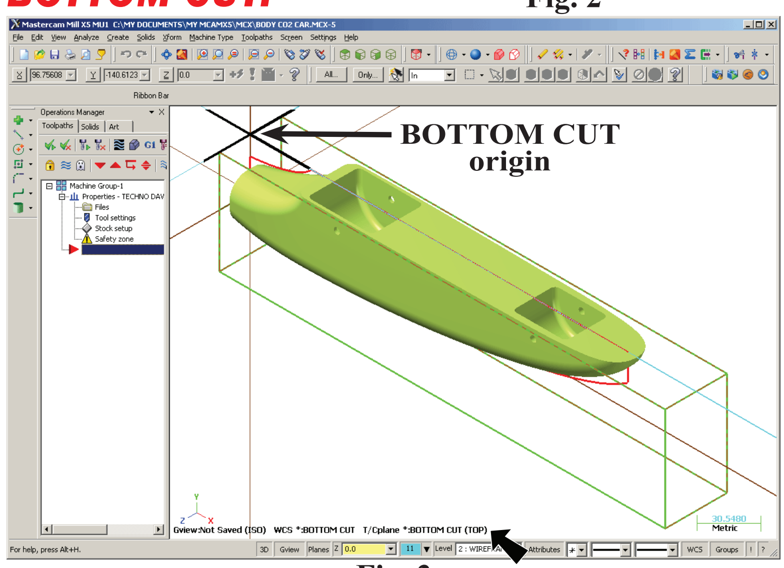


Fig. 3

http://www.cudacountry.net email:cudacountry@hotmail.com

C. REAR SHELL Rough Area Clearance Toolpath.

Step 1. Click Toolpaths Menu > **Surface High Speed**.

Step 2. Click OK in the NC name dialog, **Fig. 4**.

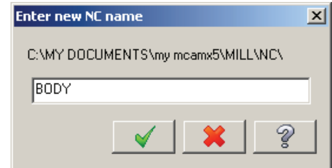


Fig. 4

Step 3. Click the **body solid** to select as Drive surfaces/ solid, **Fig. 5**. The solid will highlight when selected.

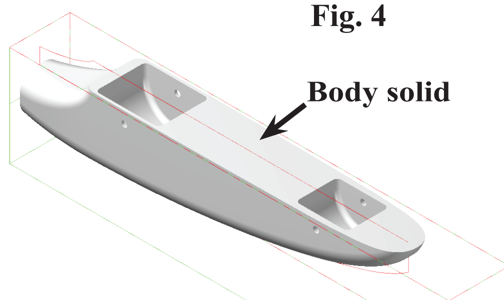


Fig. 5

Step 4. **Press ENTER** to accept solid selection as drives surfaces.

Step 5. Click **Containment Select** button in the Toolpath/ surface selection dialog box, **Fig. 6**.

Step 6. Click the **Solids** button in the Chaining dialog box, **Fig. 7**.

Step 7. **Turn off Face** button and keep **Loop** button on (depressed) in the Chaining dialog box, **Fig. 7**.

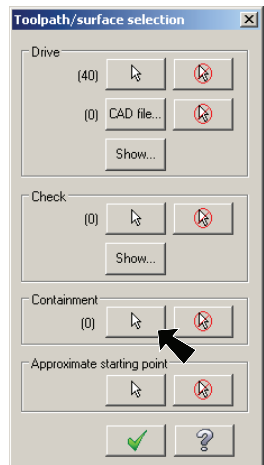


Fig. 6

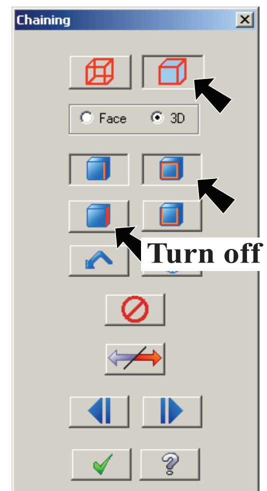


Fig. 7

Step 8. Click **edge of rear wheel shell**, **Fig. 8**. If the wrong edge is selected, click **Other face** in Pick Reference Face dialog box, **Fig. 9**. Click OK in Pick Reference Face dialog box.

Step 9. Click the OK in the Chaining dialog box and OK in the Toolpath/surface selection dialog box.

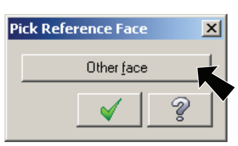


Fig. 9

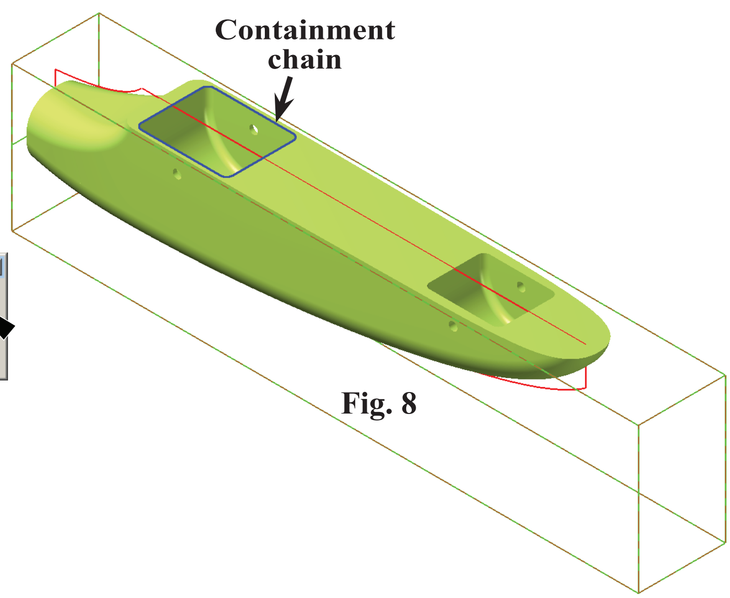


Fig. 8

Step 10. Select **Toolpath Type** from the tree control and select:

Roughing

Area Clearance Fig. 10.

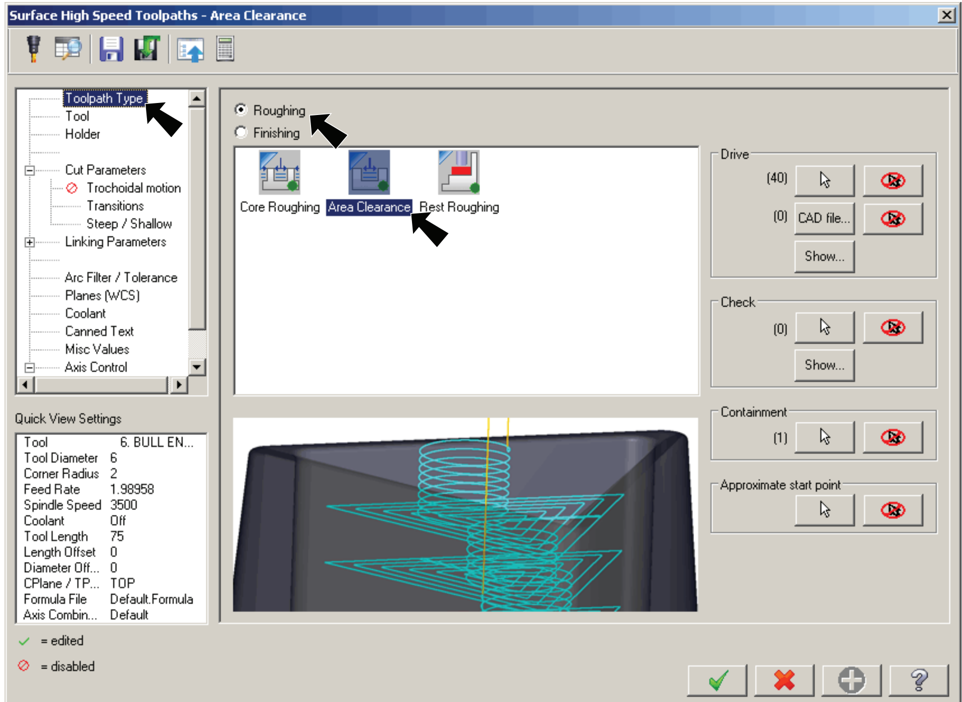


Fig. 10

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

click **Select library tool** button, **Fig. 11**.

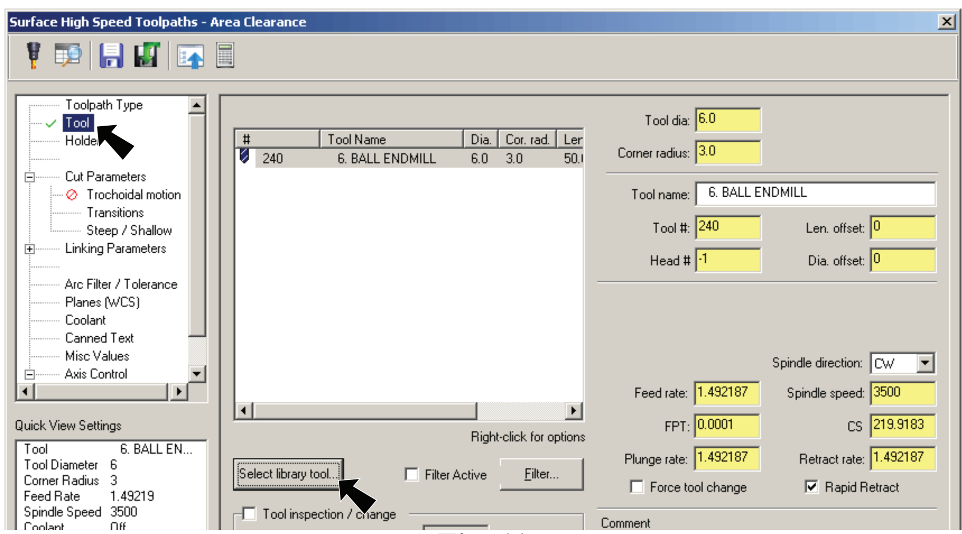


Fig. 11

Step 12. Click the **Filter** button, **Fig. 12**.

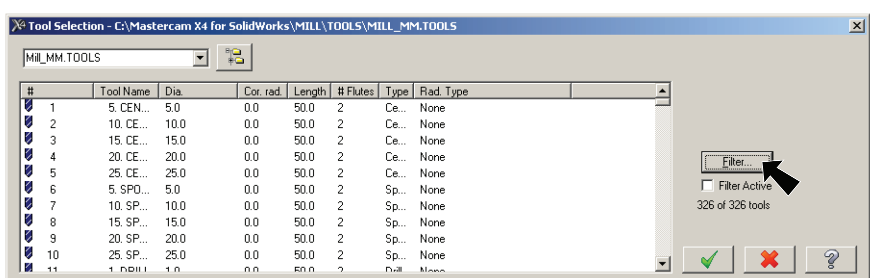


Fig. 12

Step 13. Click **None button under Tool Types**, **Fig. 13**.

Step 14. Click **Endmill2 Sphere** button (second button top row), **Fig. 13** and click OK.

Step 15. Click **240 Ball Endmill 6mm**, **Fig. 14** and click OK.

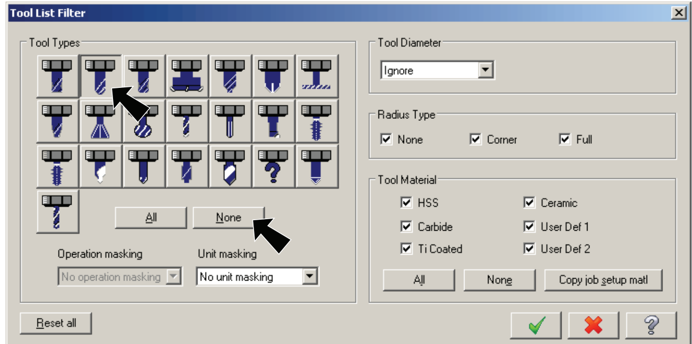


Fig. 13

Step 16. Back in **Tool** page set:

Tool number 1

Head number 1
Fig. 15.

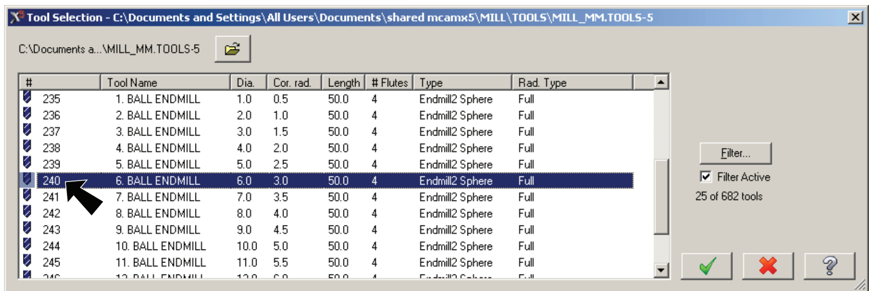


Fig. 14

Step 17. Select **Cut Parameters** from the tree control and set:

Cutting method Climb

Stepdown 12.5

Tool containment Compensate to: Inside

uncheck Add offset distance to tool radius

XY stepover % of dia. 45

Stock to leave on walls and floors 1
Fig. 16.

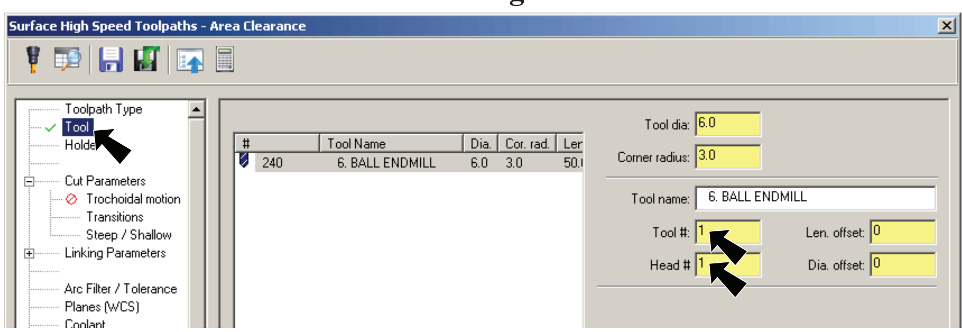


Fig. 15

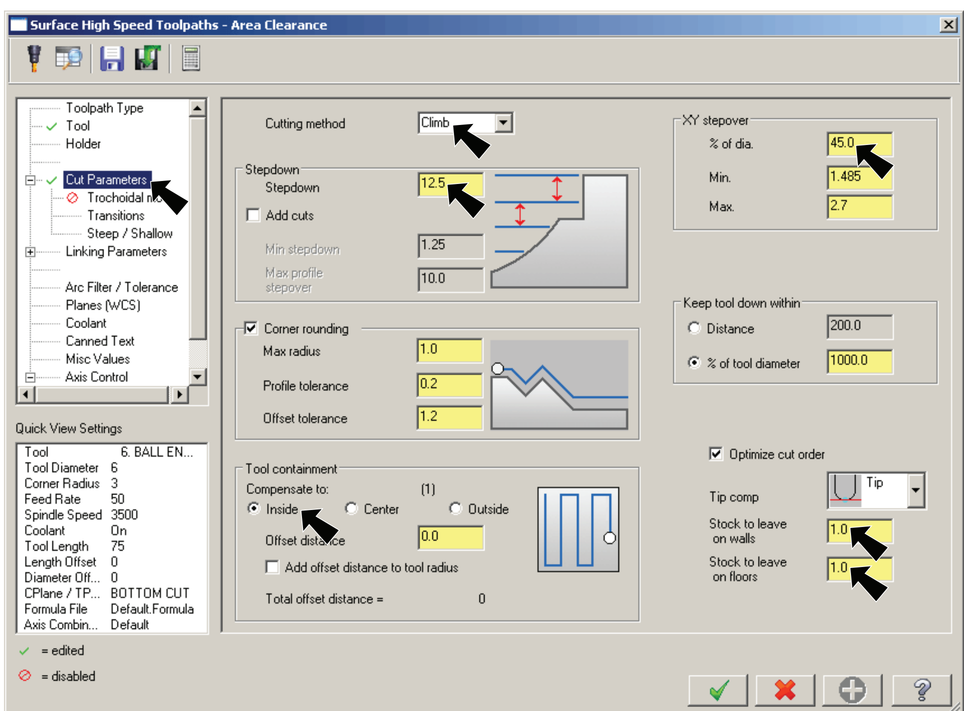


Fig. 16

Step 18. Select **Trochoidal motion** from the tree control and set:

Minimize burial
Fig. 17.

Step 19. Select **Transitions** from the tree control and set:

Entry helix
Radius 3
Fig. 18.

Step 20. Select **Steep/ Shallow** from the tree control and set:

Check **Z depths**
Minimum -9
Maximum -35

Click Apply

Fig. 19.

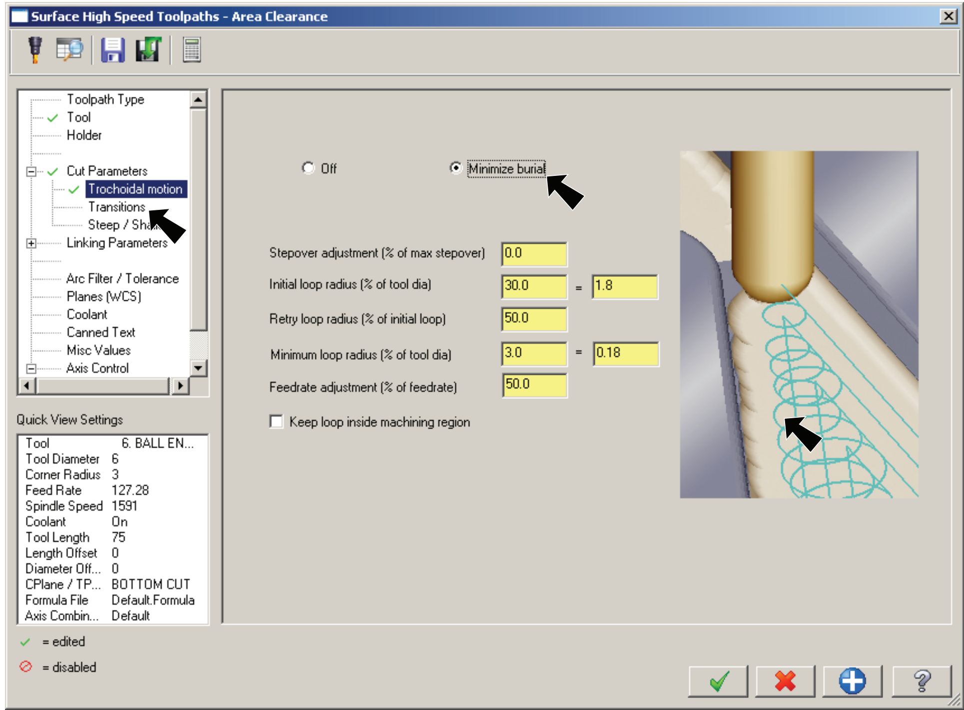


Fig. 17

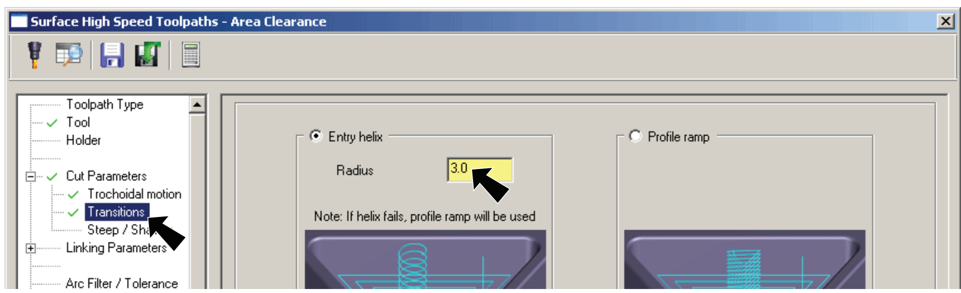


Fig. 18

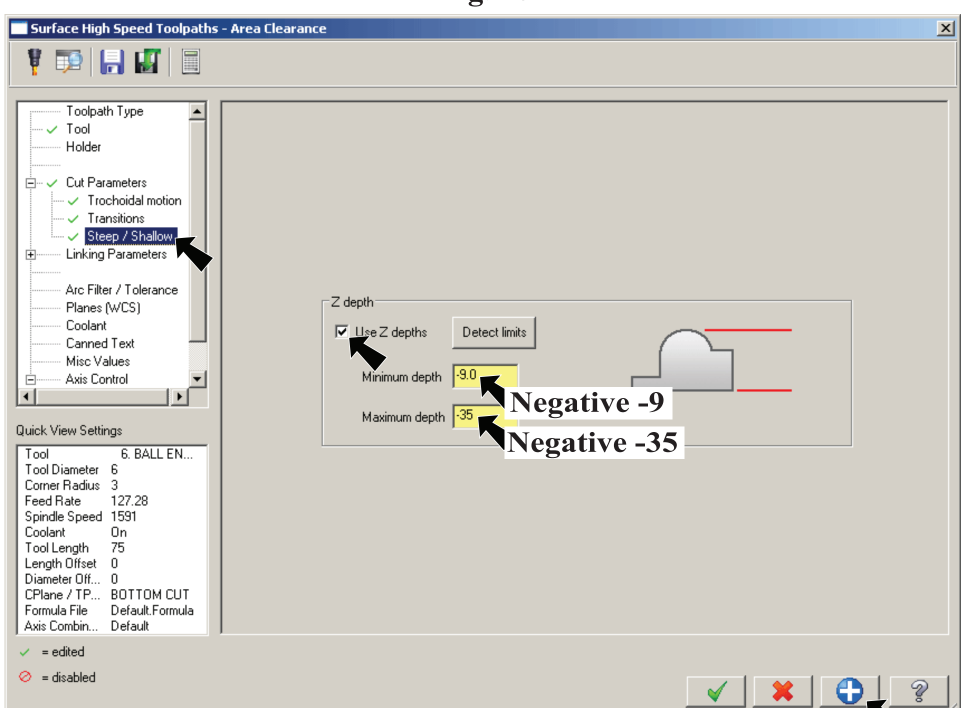


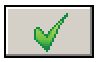
Fig. 19

Step 21. Select **Linking Parameters** from the tree control and set:

Clearance plane 0

Part clearance 0

Leads 0
Fig. 20.

Step 22. Click OK  in Area Clearance dialog box.

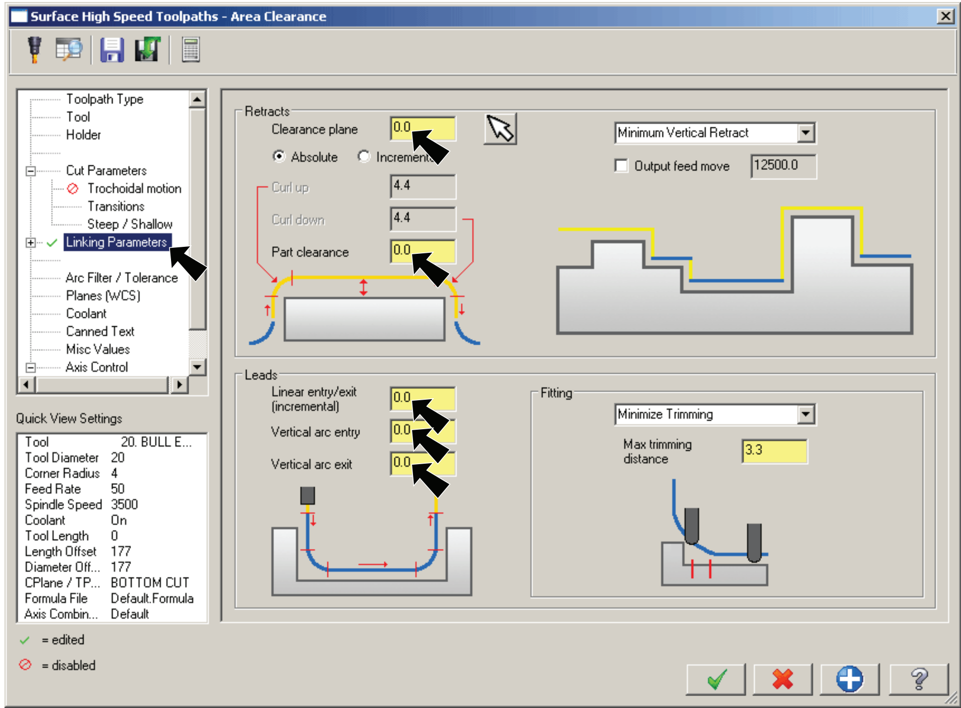
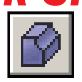
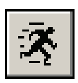


Fig. 20

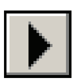
Step 23. Allow Mastercam to calculate the toolpaths.

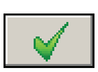
D. Verify REAR SHELL Rough Area Clearance.

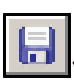
Step 1. Click **Verify**  in the Toolpaths Manager, **Fig. 21**.

Step 2. Click **Machine quickly**  in Verify dialog box, **Fig. 22**.

Step 3. Turn on (button depressed) **Simulate tool** .

Step 4. Click the **Play**  in the Verify dialog box to start the machining.

Step 5. Click OK  to close Verify dialog box.

Step 6. Save . Use **Alt-F S**.

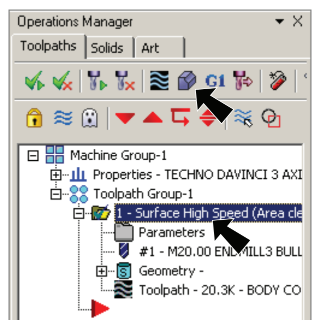


Fig. 21

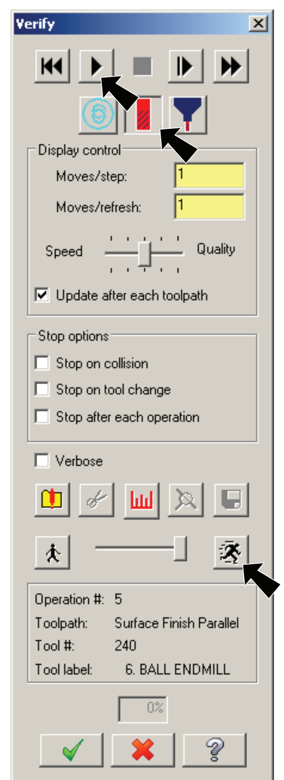


Fig. 22

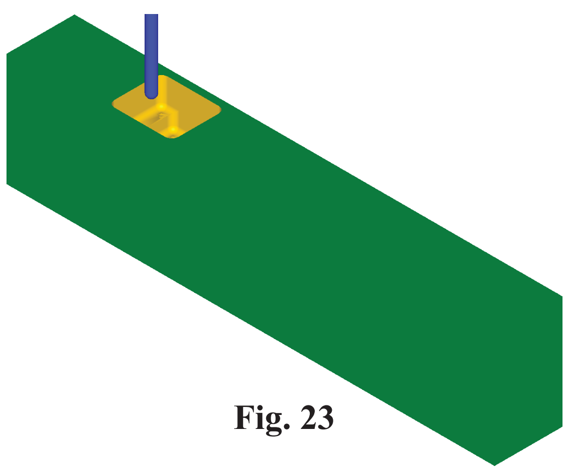


Fig. 23

E. FRONT SHELL Rough Area Clearance HST Surface Toolpath.

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

Step 2. Copy Roughing toolpath in the Toolpaths Manager. To copy, **hold right mouse button and drag the Surface High Speed** toolpath down under the operations. Release the mouse button and click **Copy After** from menu, **Fig. 24**.

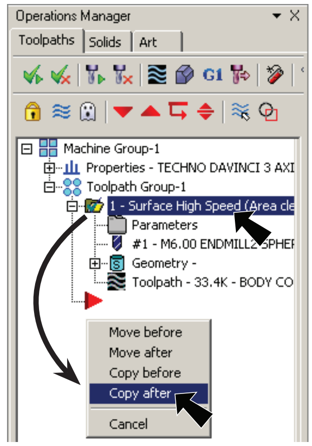


Fig. 24

Step 3. Expand the copied toolpath Surface High Speed and click **Geometry**, **Fig. 25**.

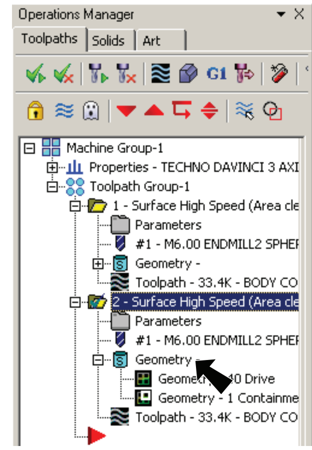
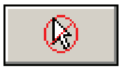
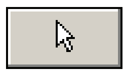
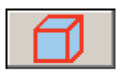
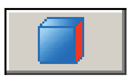


Fig. 25

Step 4. Click **Deselect Containment** button  in the Toolpath/surface selection dialog box, **Fig. 26**.

Step 5. Click **Containment** button  in the Chaining dialog box, **Fig. 26**.

Step 6. Click the **Solids** button  in the Chaining dialog box, **Fig. 27**.

Step 7. **Turn off Face** button  and keep **Loop** button  on (depressed) in the Chaining dialog box, **Fig. 27**.

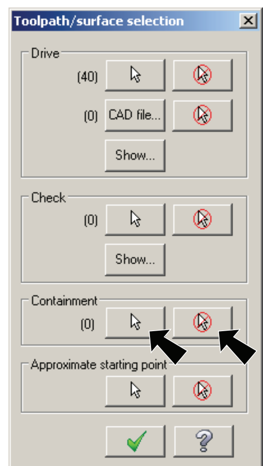


Fig. 26

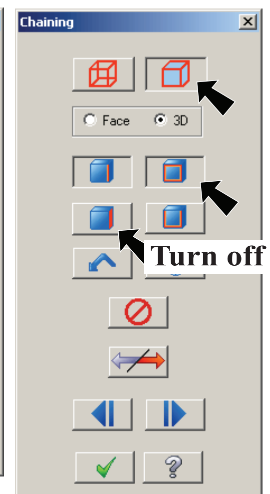
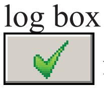


Fig. 27

Step 8. Click **edge of front wheel shell**, **Fig. 28**. If the wrong edge is selected, click **Other face** in Pick Reference Face dialog box, **Fig. 29**. Click OK  in Pick Reference Face dialog box.

Fig. 29

Step 9. Click the OK  in the Chaining dialog box and OK  in the Toolpath/surface selection dialog box.

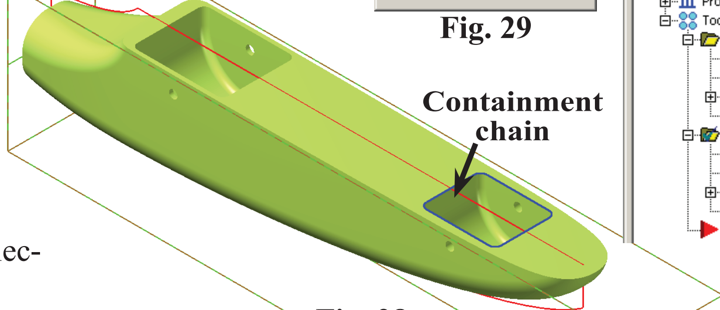


Fig. 28

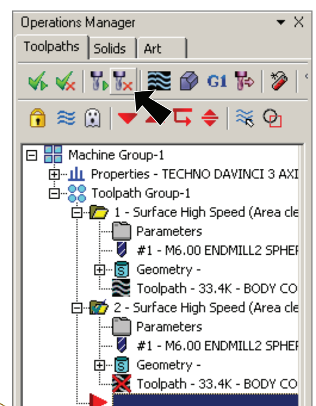
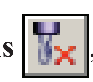
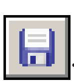


Fig. 30

Step 10. In the Toolpaths Manager, click **Regenerate all dirty operations** , **Fig. 30**.

Step 11. Save . Use **Alt-F S**.

F. BOTH SHELLS Finish Raster HST Toolpath.

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

Step 2. Copy the second Roughing toolpath in the Toolpaths Manager. To copy, **hold with right mouse button and drag the Surface High Speed** toolpath down under the operations. Release the mouse button and click **Copy After** from menu, **Fig. 31**.

Step 3. Expand **3 - Surface High Speed** and click **Parameters**, **Fig. 32**.

Step 4. Select **Toolpath Type** from the tree control and select:

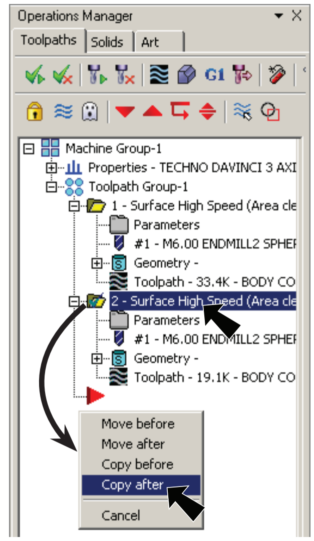


Fig. 31

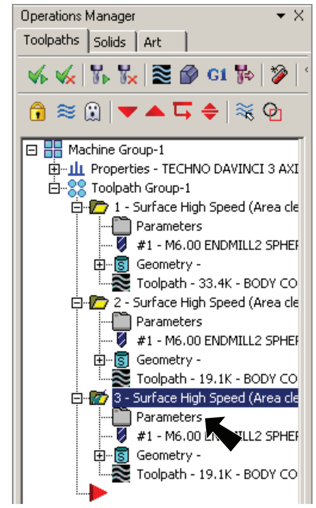
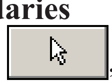


Fig. 32

Finishing

Raster
Fig. 33.

Step 5. Under Containment, click **Select containment boundaries** button , **Fig. 33**.

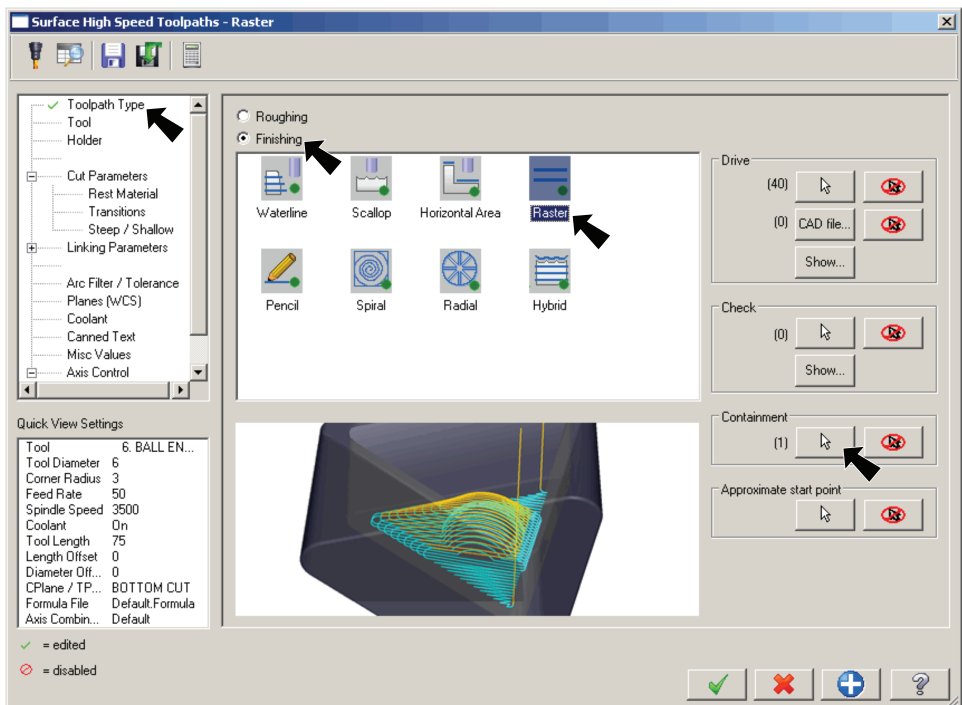
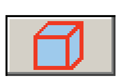


Fig. 33

Step 6. **Right click** anywhere in the Chain manager dialog box and click **Add Chain** from menu, **Fig. 34**.

Step 7. Click the **Solids** button  in the Chaining dialog box, **Fig. 35**.

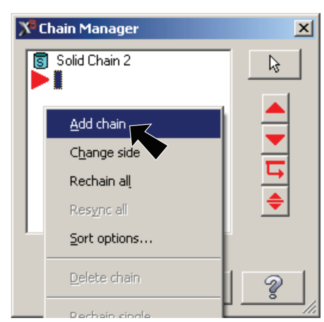


Fig. 34

Step 8. Click **edge of rear wheel shell**, **Fig. 36**. If the wrong edge is selected, click **Other face** in Pick Reference Face dialog box, **Fig. 37**. Click OK in Pick Reference Face dialog box.

Step 9. Click the OK in the Chaining dialog box.

Step 10. Click OK in the Chain Manager dialog box.

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

Cutting method Zigzag

Stepover .5

Tool containment
Compensate to: Inside

Check Add offset distance to tool radius

Stock to leave on walls 0

Stock to leave on floors 0
Fig. 38.

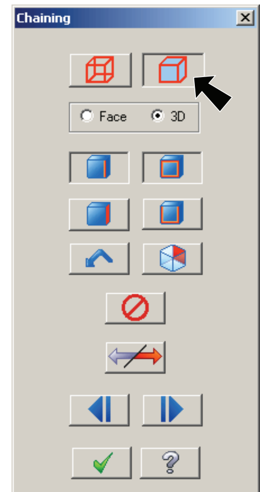


Fig. 35

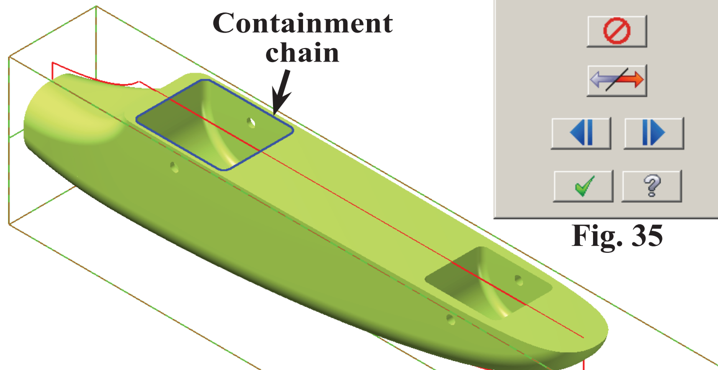


Fig. 36

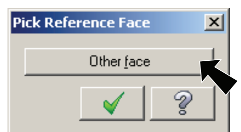


Fig. 37

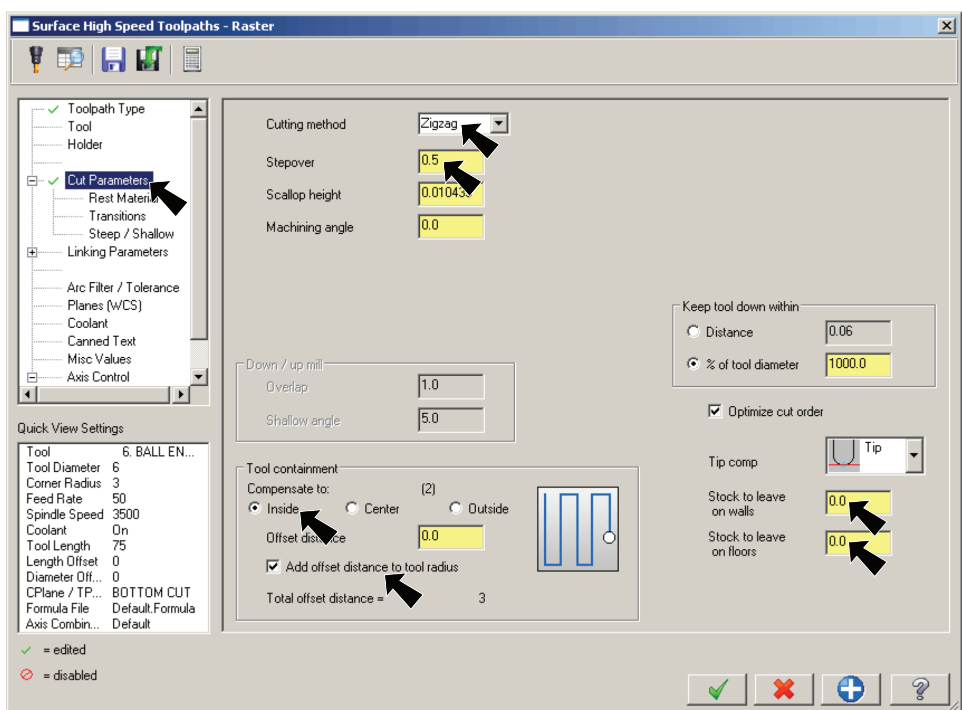


Fig. 38

Step 12. Select **Steep/ Shallow** from the tree control and set:

Uncheck Use Z depths

Click Apply

Fig. 39.

Step 13. Click OK in Raster dialog box.

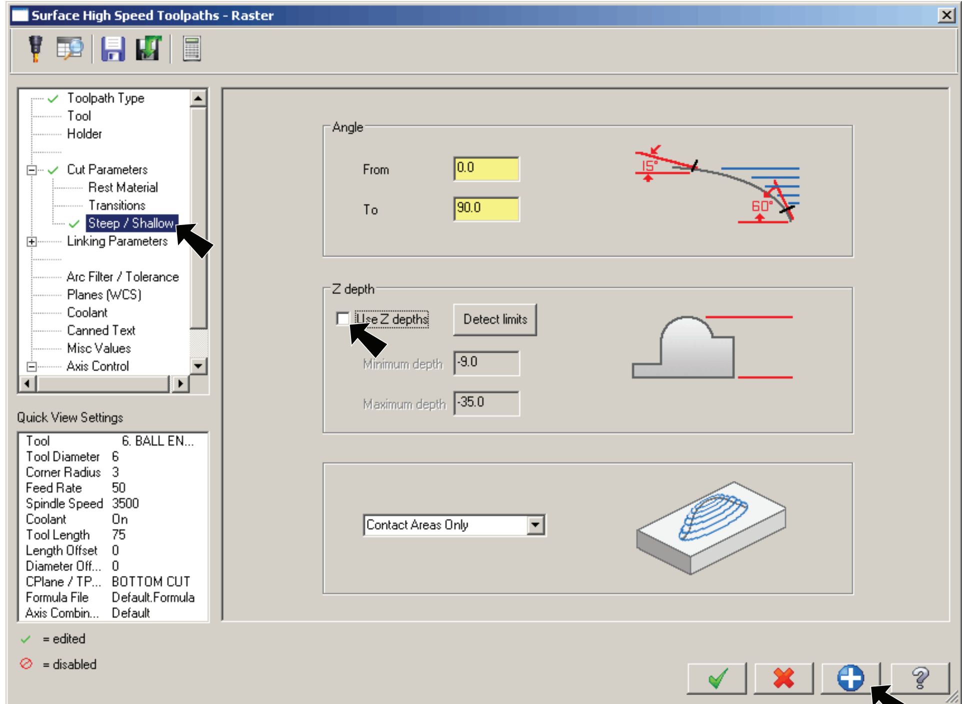


Fig. 39

G. Verify Wheel Shells.

Step 1. In the Toolpaths Manager, click **Regenerate all dirty operations**, **Fig. 40**.

Step 2. Click the **Toolpath Group-1** to select **all three** shell toolpaths, **Fig. 40**.

Step 3. Click **Verify** in the Toolpaths Manager, **Fig. 41**.

Step 4. Click the **Play** in the Verify dialog box to start the machining.

Step 5. Click OK to close Verify dialog box.

Step 6. Save . Use **Alt-F S**.

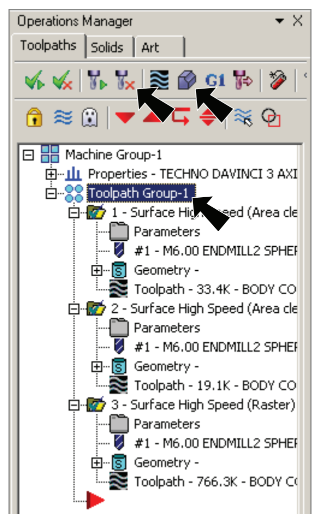


Fig. 40

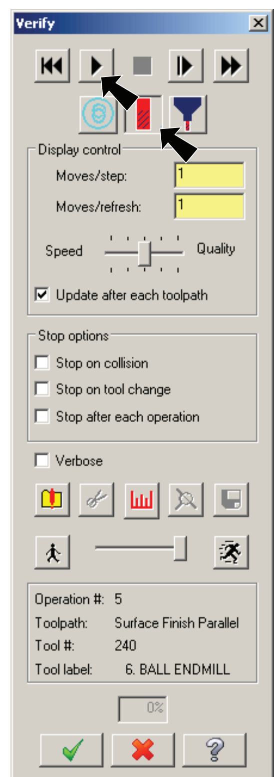


Fig. 41

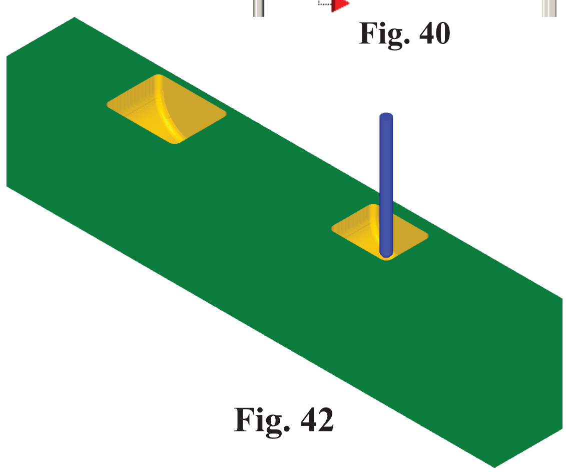


Fig. 42

H. Rename Toolpath Group WHEEL SHELLS.

Step 1. **Rename Toolpath Group-1 to WHEEL SHELLS** in the Ops Manager. To rename, click and hover cursor over the Toolpath Group-1 and key-in **WHEEL SHELLS**, **Fig. 43**.

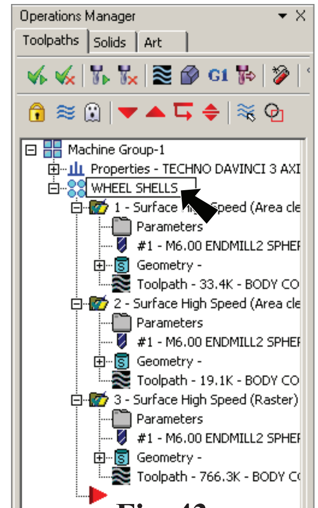


Fig. 43

I. Insert LEFT CUT Toolpath Group.

Step 1. Insert new **Toolpath group**. To insert group, **right click Machine Group 1** at the very top of the Ops Manager and click **Groups > New Toolpath group**, **Fig. 44**.

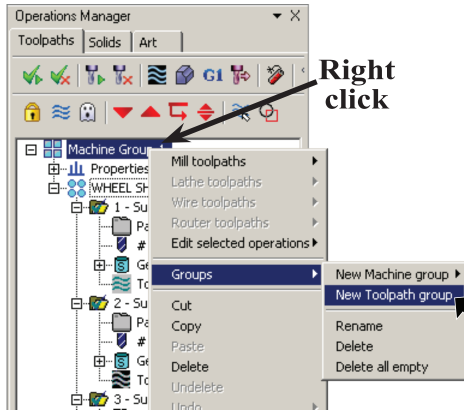


Fig. 44

Step 2. Rename new Toolpath Group to **LEFT CUT**. To rename, click and hover over Toolpath Group-1 and key-in LEFT CUT, **Fig. 45**.

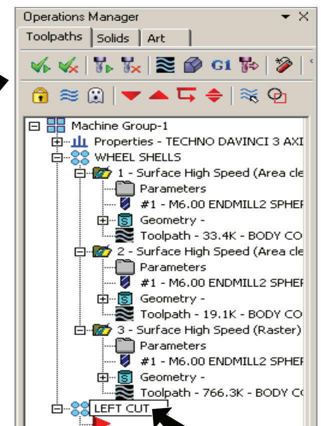
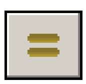


Fig. 45

J. Set WCS to LEFT CUT.

Step 1. Click **WCS** in the Status Bar at the bottom of the screen and click **View Manager**, **Fig. 46**.

Step 2. Click **LEFT CUT view** from the list of views in the View Manager, **Fig. 47**.

Step 3. Click Set All  button, **Fig. 47** and click OK .

Step 4. Change to Isometric View. Use  or **Alt-7**.

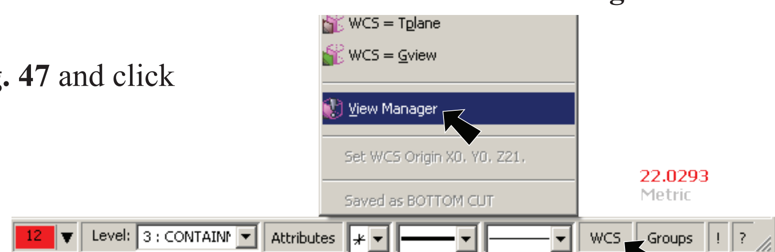


Fig. 46

Step 5. Confirm Left Cut Origin, **Fig. 48**. Use **F9** to show and hide axes.

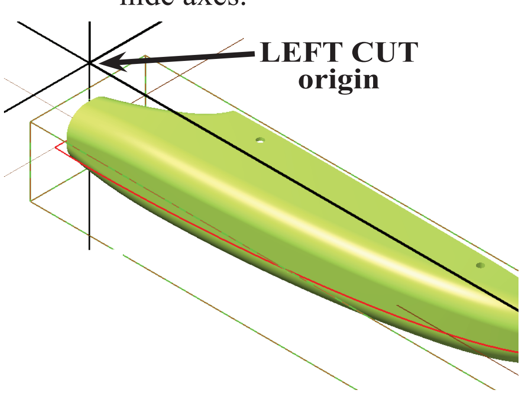


Fig. 48

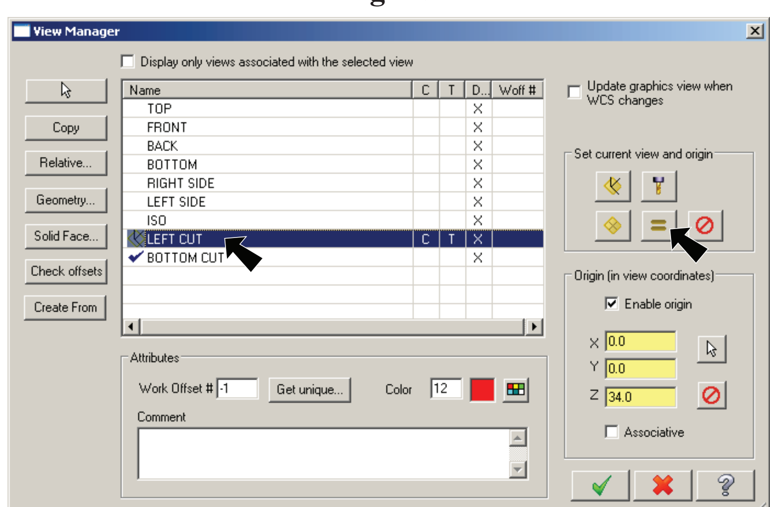


Fig. 47

K. Left Cut Finish Scallop Toolpath.

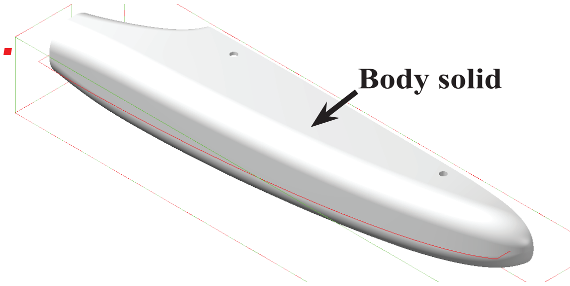


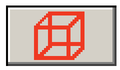
Fig. 49

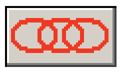
Step 1. Click Toolpaths Menu > **Surface High Speed**.

Step 2. Click the **body solid** to select as Drive surfaces/solid, **Fig. 49**. The solid will highlight when selected.

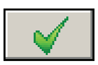
Step 3. **Press ENTER** to accept solid selection as drives surfaces.

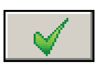
Step 4. Click **Containment Select** button in the Toolpath/surface selection dialog box, **Fig. 50**.

Step 5. Click **Wireframe** button  in the Chaining dialog box, **Fig. 51**.

Step 6. Click **Chain** button  (**C**) in the Chaining dialog box, **Fig. 51**.

Step 7. Click any **containment geometry**, **Fig. 52**.

Step 8. Click OK  in Chaining dialog box, **Fig. 51**.

Step 9. Click OK  in the Toolpath/surface selection dialog box, **Fig. 50**.

Step 10. Select **Toolpath Type** from the tree control and select:

Finishing

Scallop
Fig. 53.

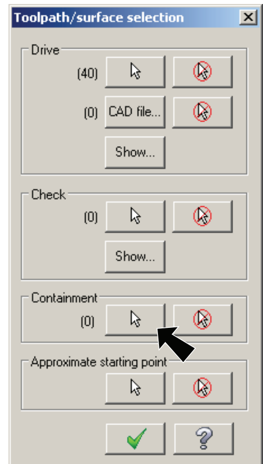


Fig. 50

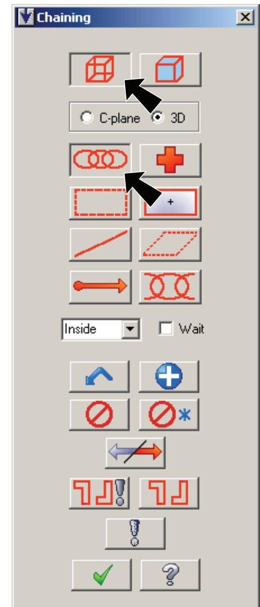


Fig. 51

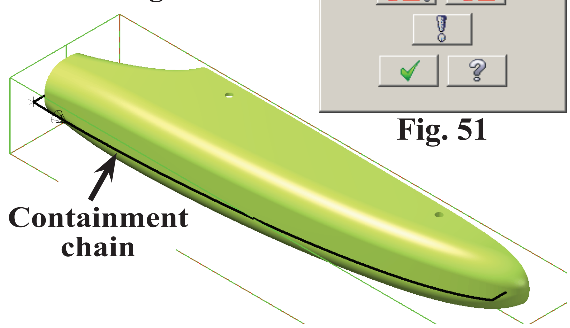


Fig. 52

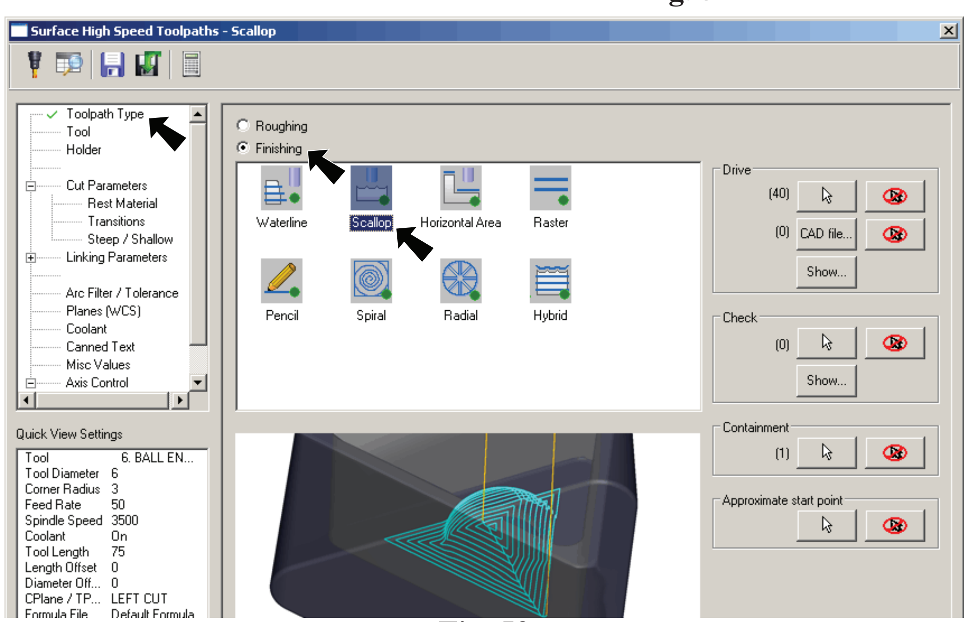


Fig. 53

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

Cutting method Zigzag

Stepover 1

Tool containment Compensate to: Center

Stock to leave on walls and floors 0

Fig. 54.

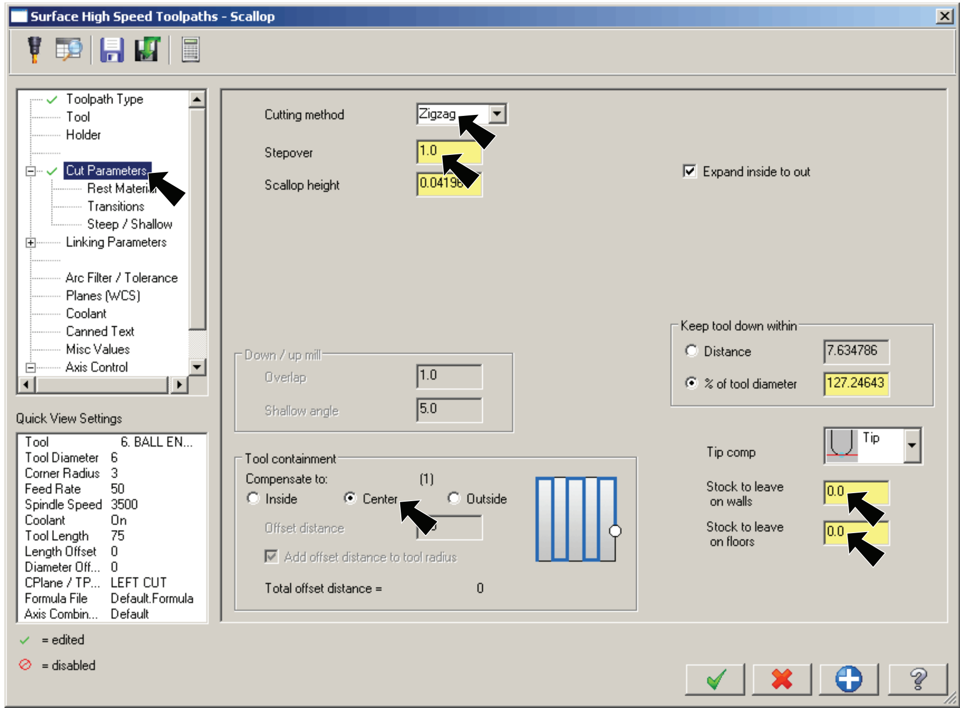


Fig. 54

Step 12. Select **Steep/ Shallow** from the tree control and set:

Use **Z depths Minimum 0 Maximum -37**

Click Apply

Fig. 55.

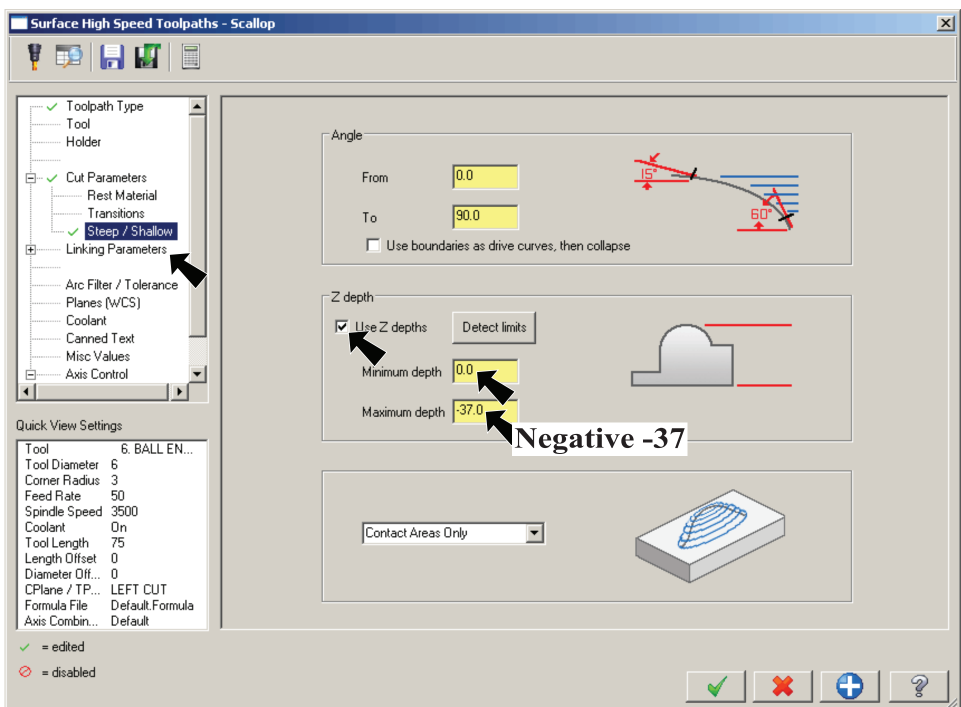


Fig. 55

Step 13. Select **Arc Filter/Tolerance** from the tree control and set:

Total tolerance .0625

click **Refine toolpath** button, **Fig. 56**.

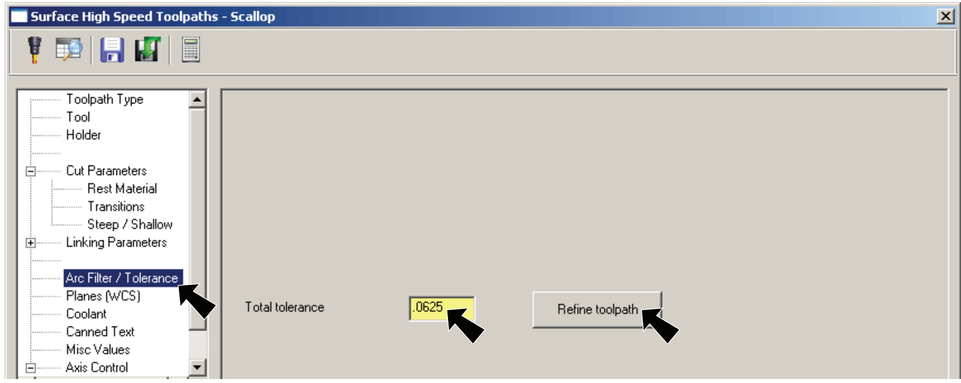


Fig. 56

Step 14. In the **Refine Toolpath** dialog box set: **Fig. 57**

check **Line/Arc Filtering Setting**

set **Minimum arc radius .0625**

uncheck **Create arcs XY** check box

check **One way filtering**

move NC program length slider to Short.

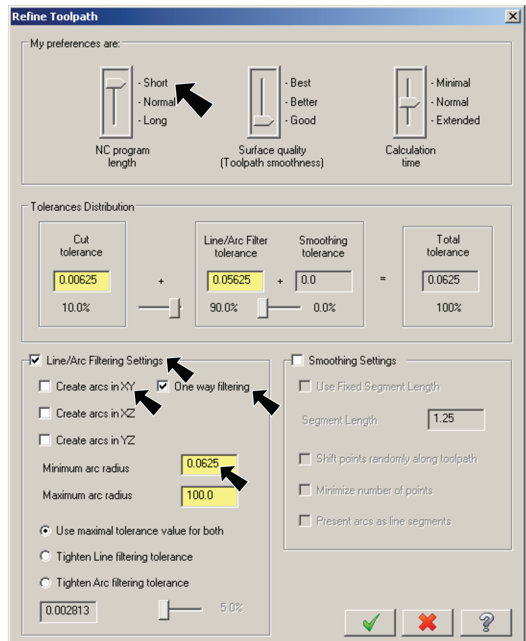


Fig. 57

Step 15. Click OK in Refine Toolpath dialog box and OK in Scallop dialog box.

Step 16. Allow Mastercam to calculate toolpath.

L. Verify Left Cut.

Step 1. In the Toolpaths Manager, click the **LEFT CUT Toolpath group** to select toolpath, and click **Verify** in the Toolpaths Manager, **Fig. 58**.

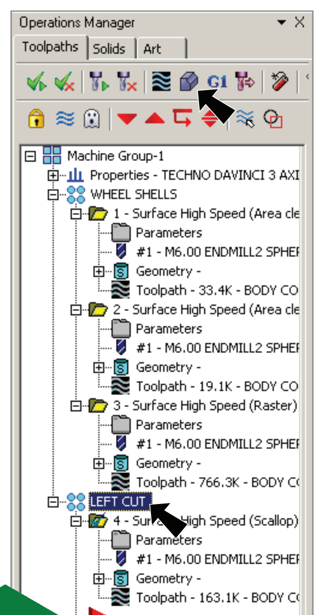


Fig. 58

Step 2. Click the **Play** in the Verify dialog box to start the machining, **Fig. 59**.

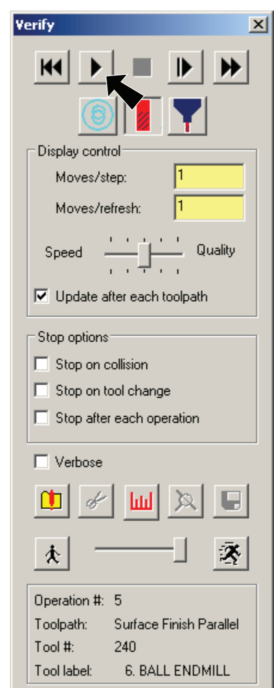


Fig. 59

Step 3. Click OK to close Verify dialog box.

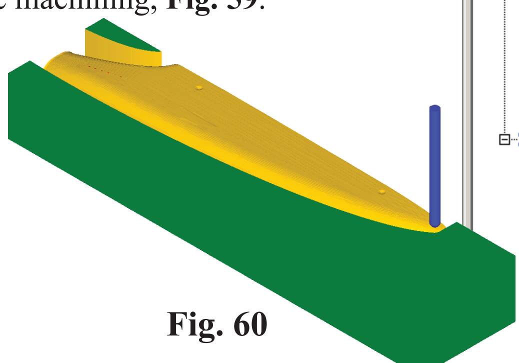


Fig. 60

M. Mirror LEFT CUT to RIGHT CUT Toolpath.

Step 1. Insert another **Toolpath group**. To insert group, **right click Machine Group 1** at the very top of the Ops Manager and click **Groups > New Toolpath group**, **Fig. 61**.

Step 2. Rename the new Toolpath Group to **RIGHT CUT**, **Fig. 62**.

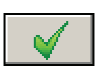
Step 3. Click Toolpaths Menu > Transform.

Step 4. Under Type, select **Mirror**, **Fig. 63**.

Step 5. Under Source operations **LEFT CUT** toolpath group, select **Surface High Speed (Scallop)**, **Fig. 63**.

Step 6. Click the **Mirror tab** at the top of the dialog box, **Fig. 63**.

Step 7. Under Mirror, select **Mirror about X axis** , **Fig. 64**.

Step 8. Click OK  in the Transform Operation Params dialog box.

Step 9. Allow Mastercam to calculate toolpath.

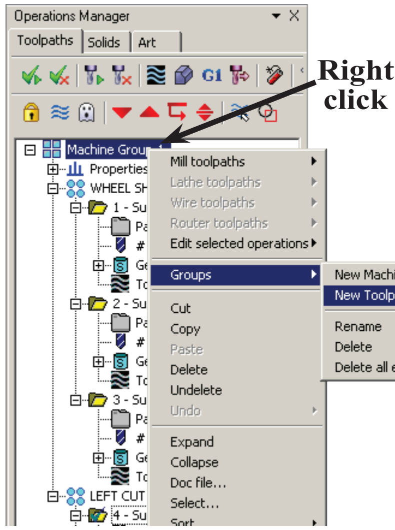


Fig. 61

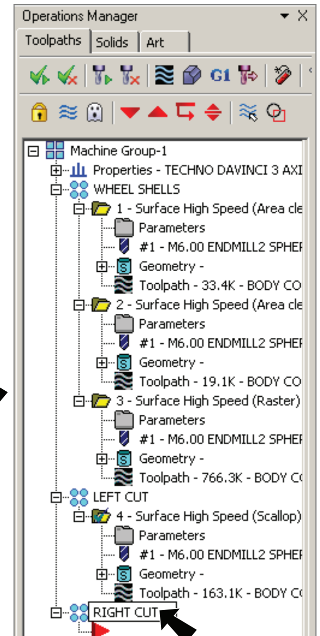


Fig. 62

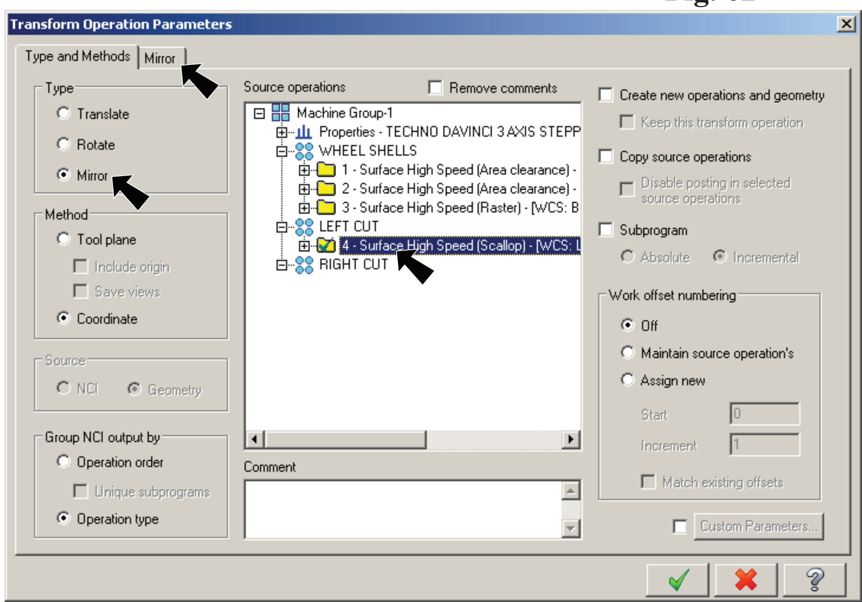


Fig. 63

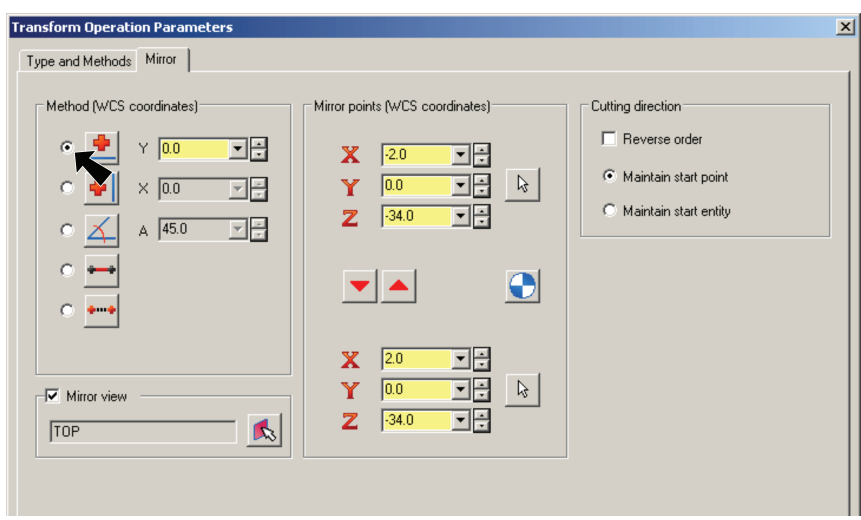


Fig. 64

N. Verify Right Cut.

Step 1. In the Toolpaths Manager, click the **mirrored Transform by Coordinate** toolpath, **Fig. 65**.

Step 2. Click **Verify** in the Toolpaths Manager, **Fig. 65**.

Step 3. Click the **Play** in the Verify dialog box to start the machining, **Fig. 65**.

Step 4. Click OK to close Verify dialog box.

Step 5. Save . Use **Alt-F S**.

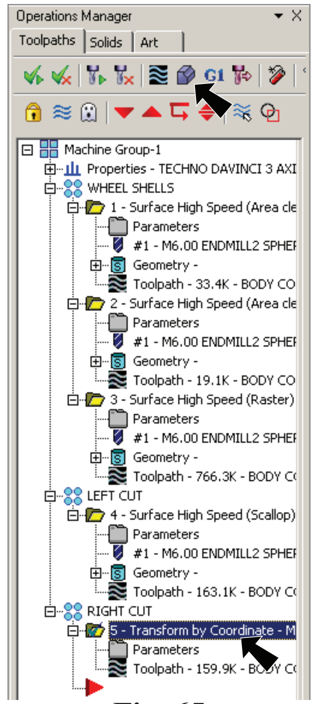


Fig. 65

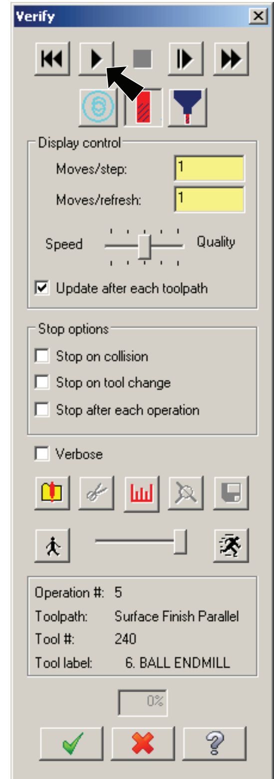


Fig. 66

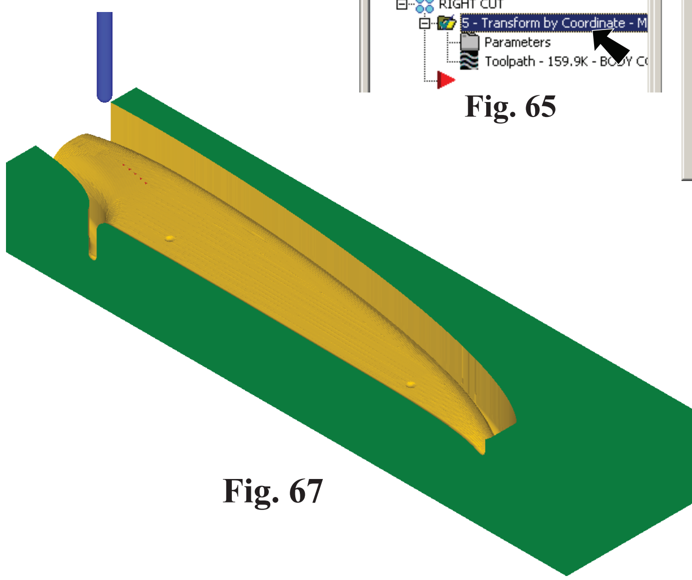


Fig. 67