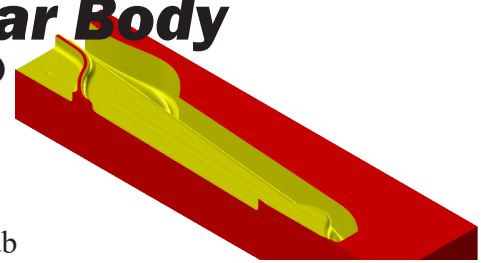


Toolpaths for Rail Car Body

Cut Body (Equal Scallop)



A. Machine Type and Stock Setup.

Step 1. If necessary, open your file from Chapter 20.

Step 2. If necessary, display Toolpaths Manager. On the View tab



Step 3. If Machine Group is **not** displayed in the Toolpaths Manager,

Fig. 1 on the Machine tab , click Mill  > **Default** from the menu.

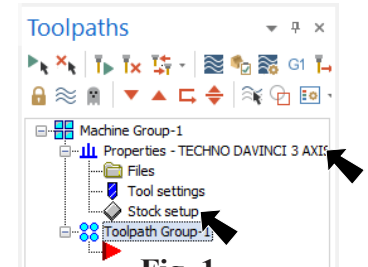


Fig. 1

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

Step 5. Confirm Stock Plane is **Left Cut**, **Fig. 2**.

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

Step 7. Click **top left corner** of the red stock to move the Origin. After you click corner the arrow will point to corner.

Step 8. Key-in X, Y and Z stock dimension:
X 305
Y 70
Z 42

Step 9. Key-in Stock Origin coordinates:
X 0
Y -36
Z -13

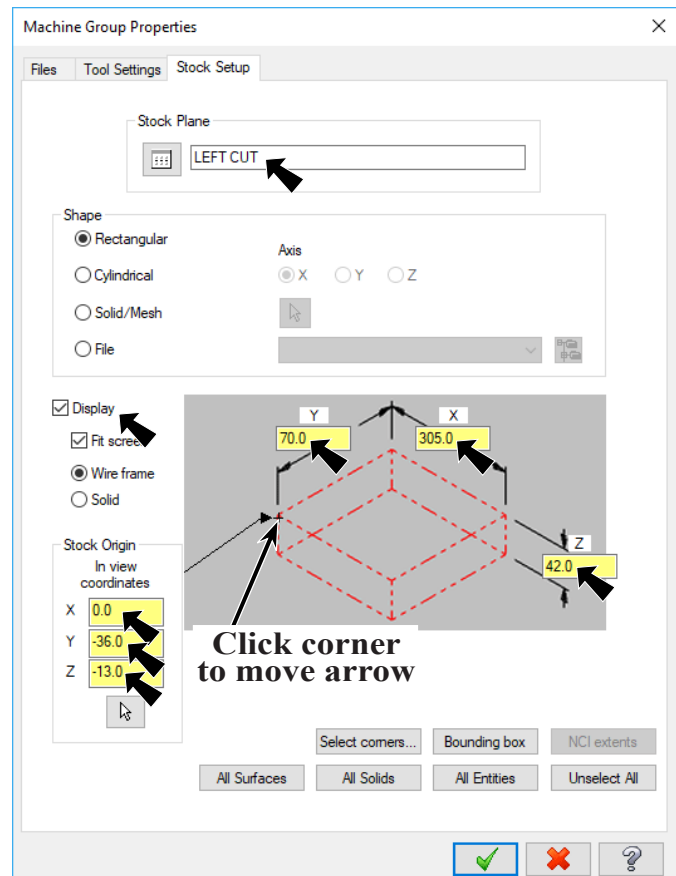



Fig. 2

Step 10. Click OK  in the Machine Group Properties.

B. Confirm WCS LEFT CUT.

Step 1. The Stock is displayed as red wireframe, Fig. 3.

Step 2. In Status bar at bottom of display, confirm **CPLANE:LEFT CUT**, Fig. 3.

Step 3. Confirm **Left Cut Origin**. Use **F9** to toggle axes.

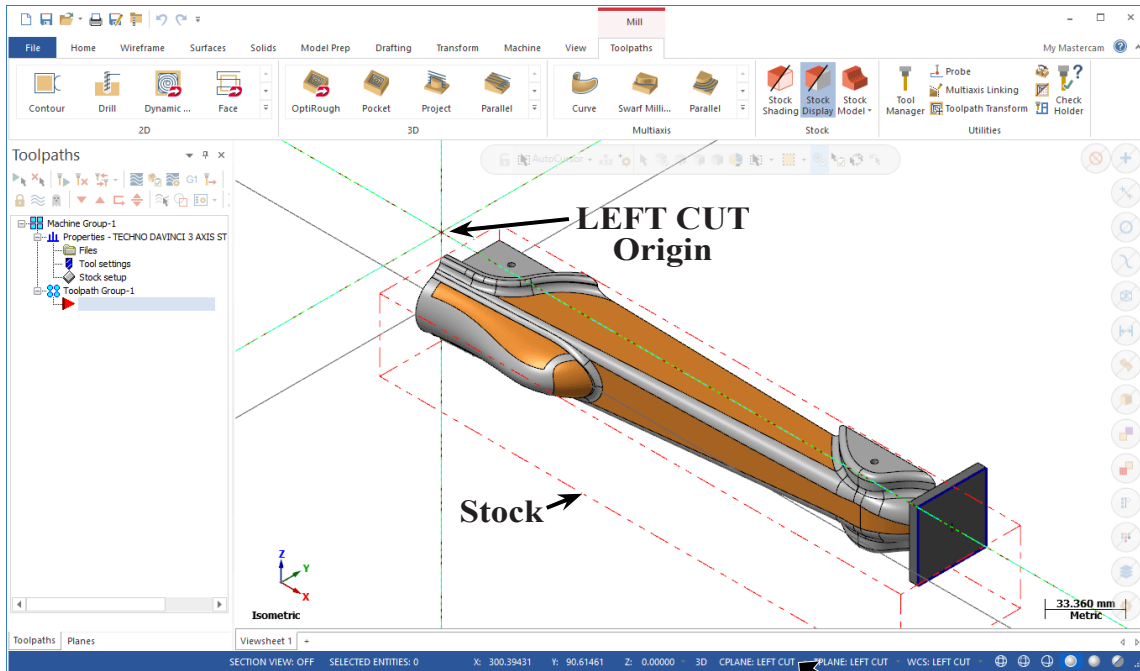


Fig. 3

C. Left Cut Finish Equal Scallop Toolpath.

Step 1. On the Toolpaths tab **Toolpaths** in the 3D group click **expand gallery** button and click **Equal Scallop**, Fig. 4.

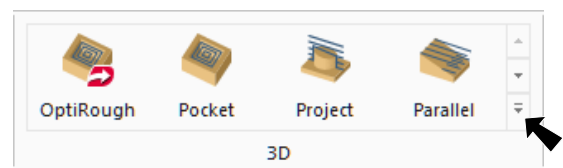
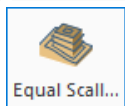

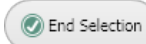


Fig. 4

Step 2. Select **Model Geometry** from the tree control and set:

Under **Machining Geometry** click **Select entities** button  **Fig. 5.**

Step 3. **Triple click the solid car body** to select as machine geometry and click **End Selection**



(ENTER), Fig 6.

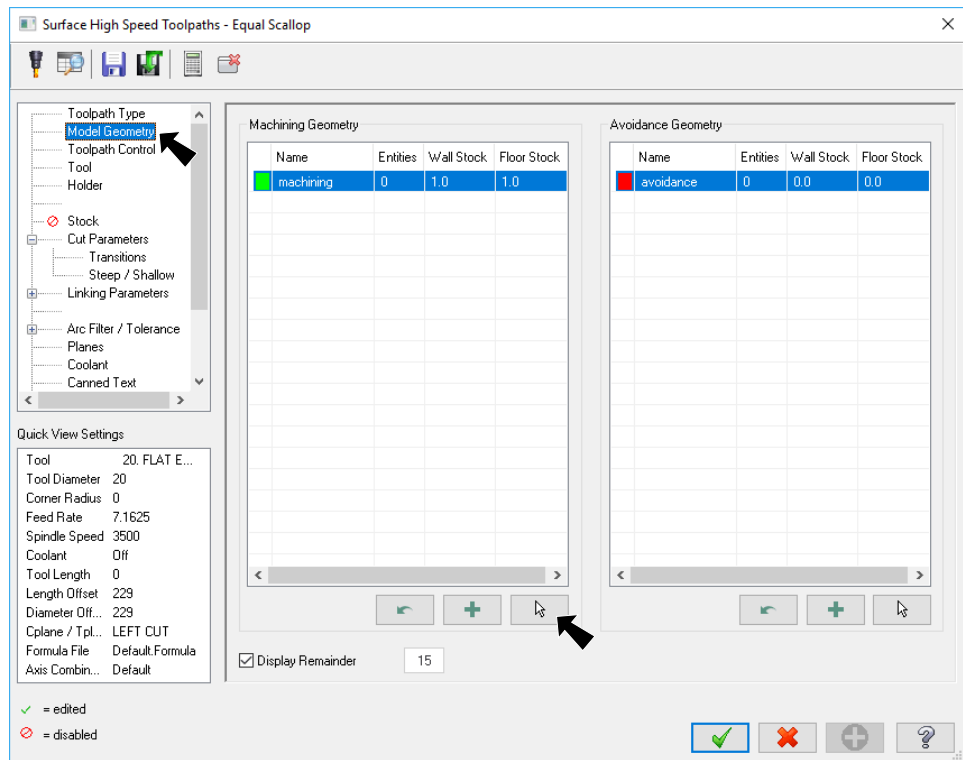


Fig. 5

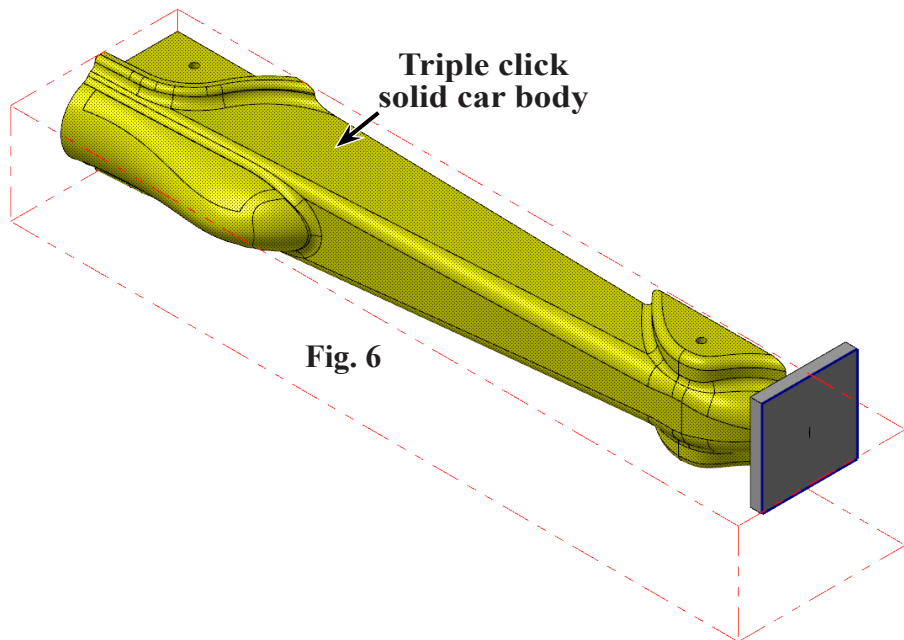


Fig. 6

Step 4. Back in **Model Geometry** page set:

Wall Stock 0
Floor Stock 0
 To set, double click and key-in.

Under **Avoidance Geometry** click **Select entities** button
Fig. 7.

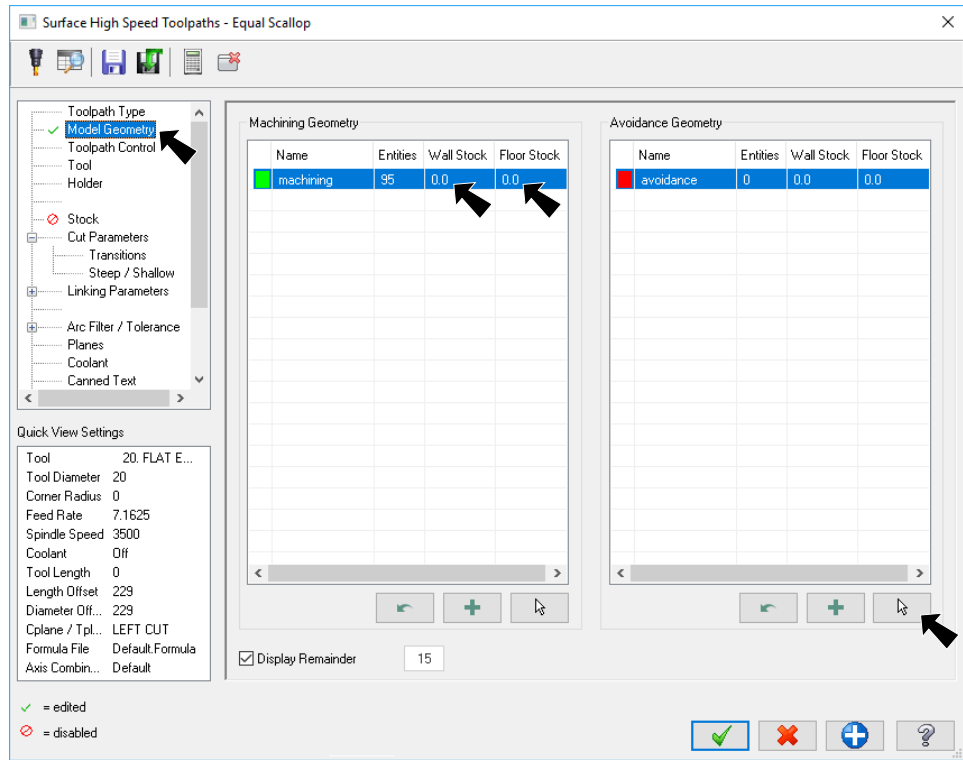


Fig. 7

Step 5. **Triple click the check body** to select as avoidance geometry, **Fig 8.**

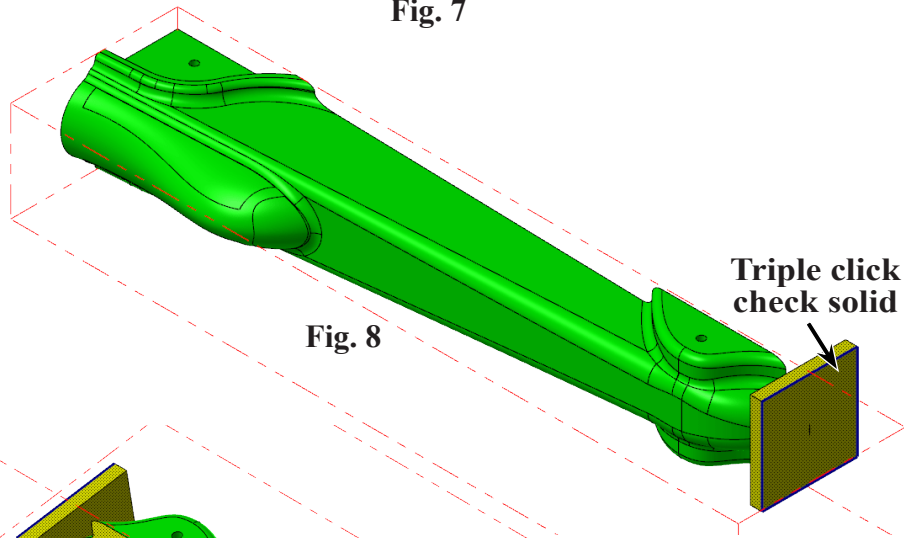


Fig. 8

Step 6. Rotate view to view **bottom** and **rear surfaces**, hold down middle mouse button (wheel) and drag to rotate view, **Fig. 9.**

Step 7. Click **flat side surface at wheel well, bottom and rear surfaces** to select as avoidance geometry and click **End Selection (ENTER)**, **Fig 9.**

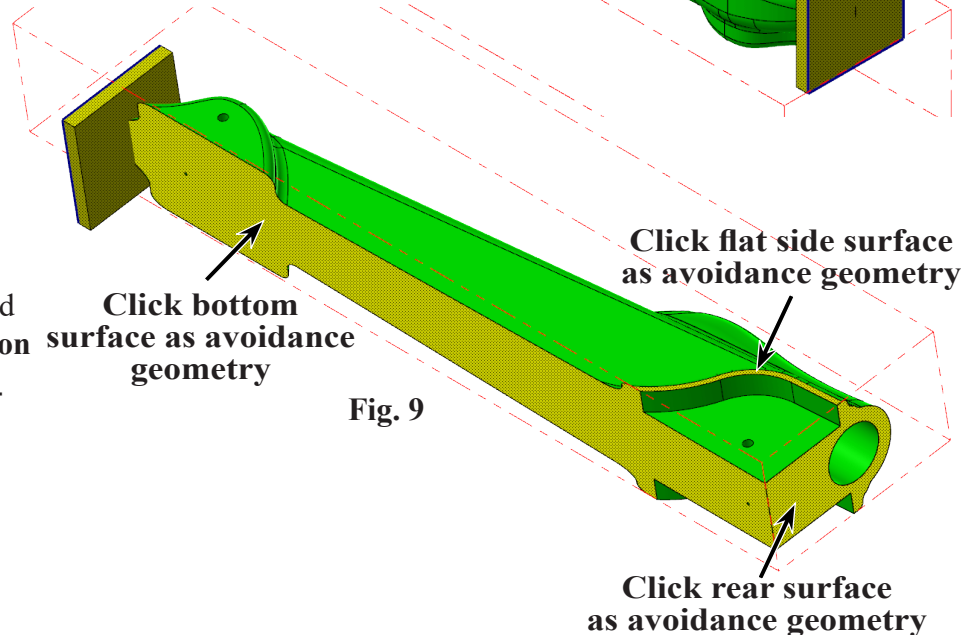


Fig. 9

Step 8. Back in **Model Geometry** page under **Avoidance Geometry**:

Confirm **9** **Avoidance entities**

Confirm **Wall Stock 0** **Fig. 10.**

Step 9. Select **Tool** from the tree control and:

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

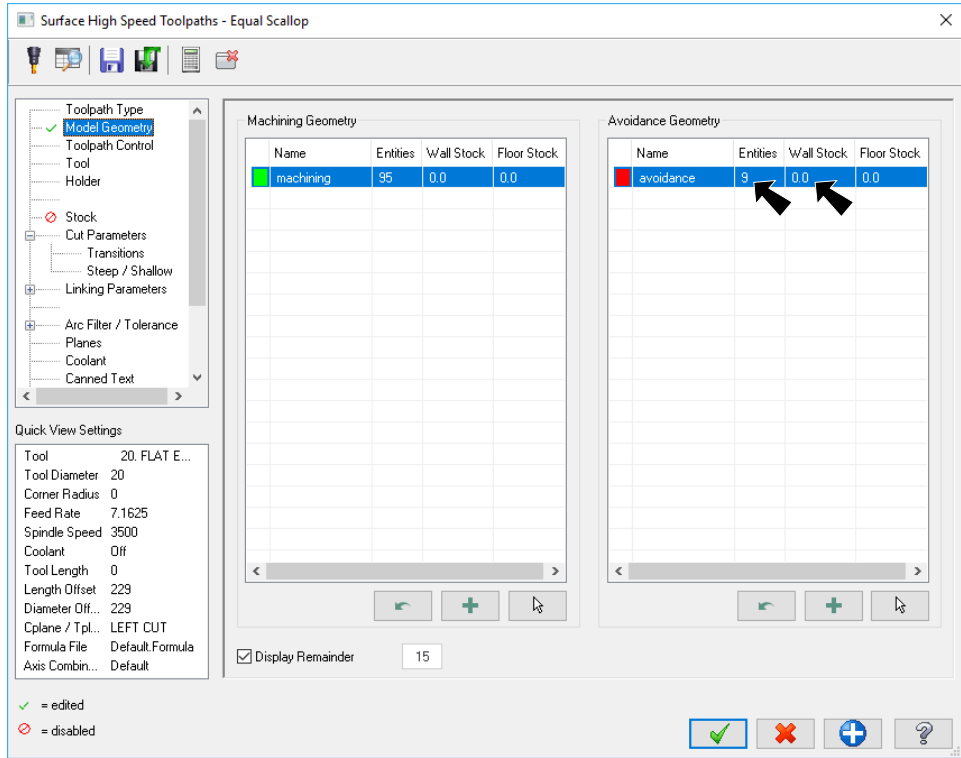


Fig. 10

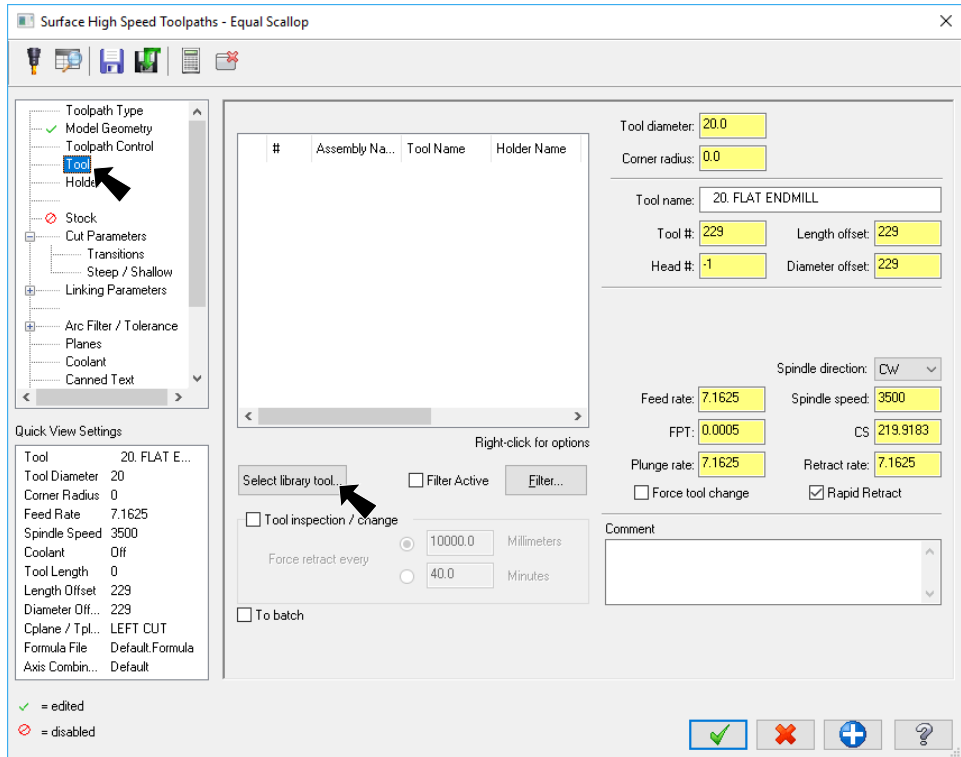


Fig. 11

Step 10. Click the **Filter** button
Fig. 12.

Step 11. Click **None** button under Tool Types

Click **Endmill2 Sphere**



button (second button top row),

Click OK



Fig. 13.

Step 13. Select **BALL-NOSE ENDMILL 6.0 mm Diameter** and click OK



Fig. 14.

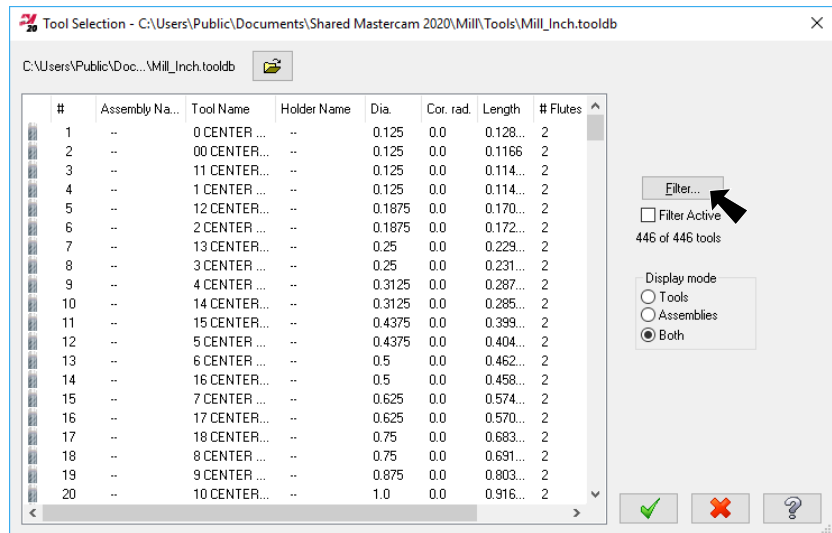


Fig. 12

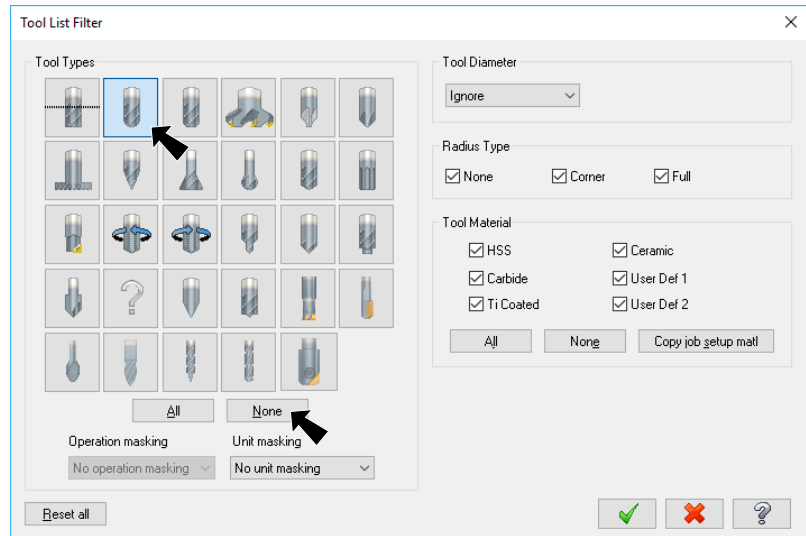


Fig. 13

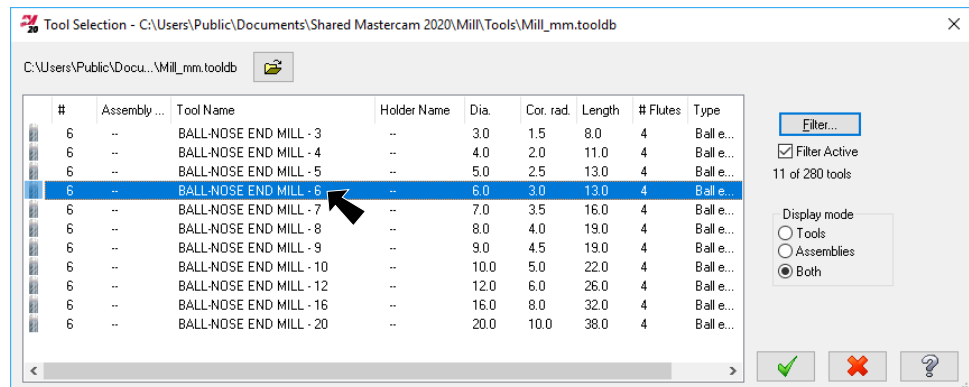


Fig. 14

Step 14. Back in **Tool** page set:

Feed rate 300

Plunge rate 200

Fig. 15.

Step 15. Select **Cut Parameters** from tree control and set:

Cut style Both to Other Way

Check Optimize cut order

Stepover 1

Keep tool down within 100%

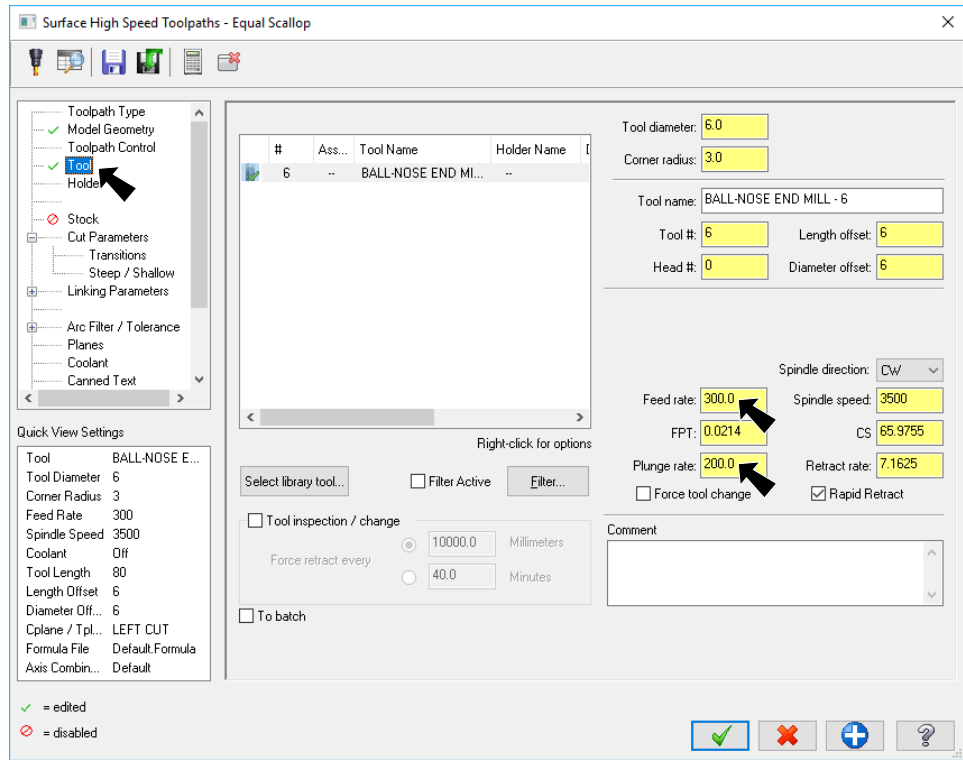


Fig. 15

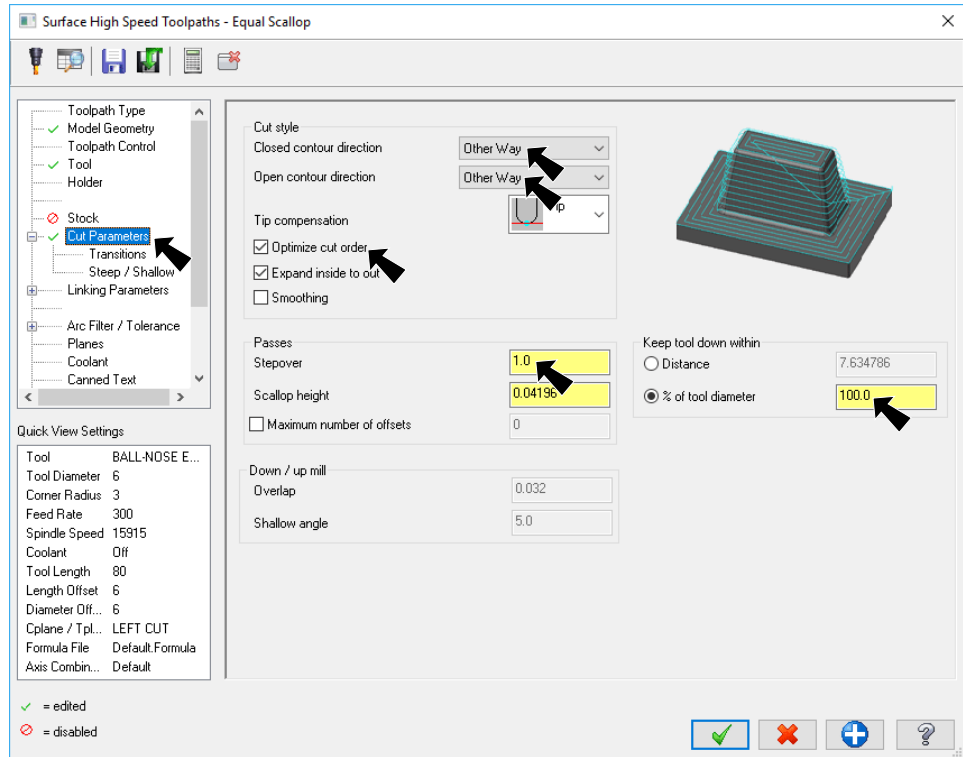


Fig. 16

Step 16. Select **Steep/ Shallow** from tree control and set:

Check **Minimum depth 0**

Check **Maximum depth -37**

Click **Apply**

Fig. 17.

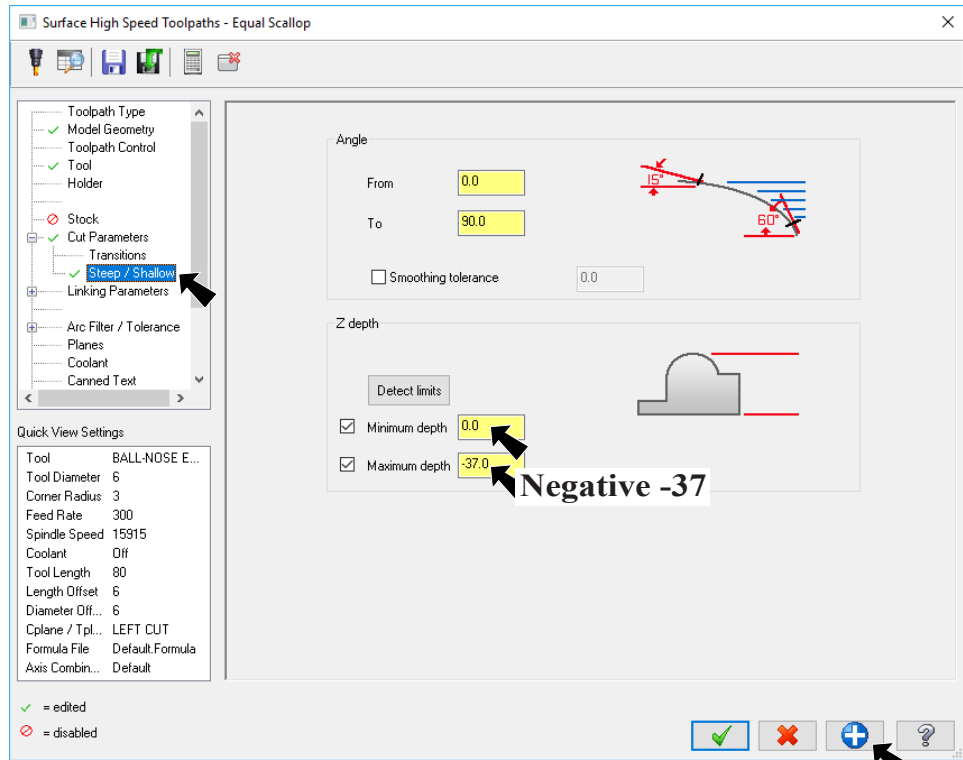


Fig. 17

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

Clearance plane 0

Select **Minimum Vertical Retract**

Part clearance 0

All Leads 0
Fig. 18.

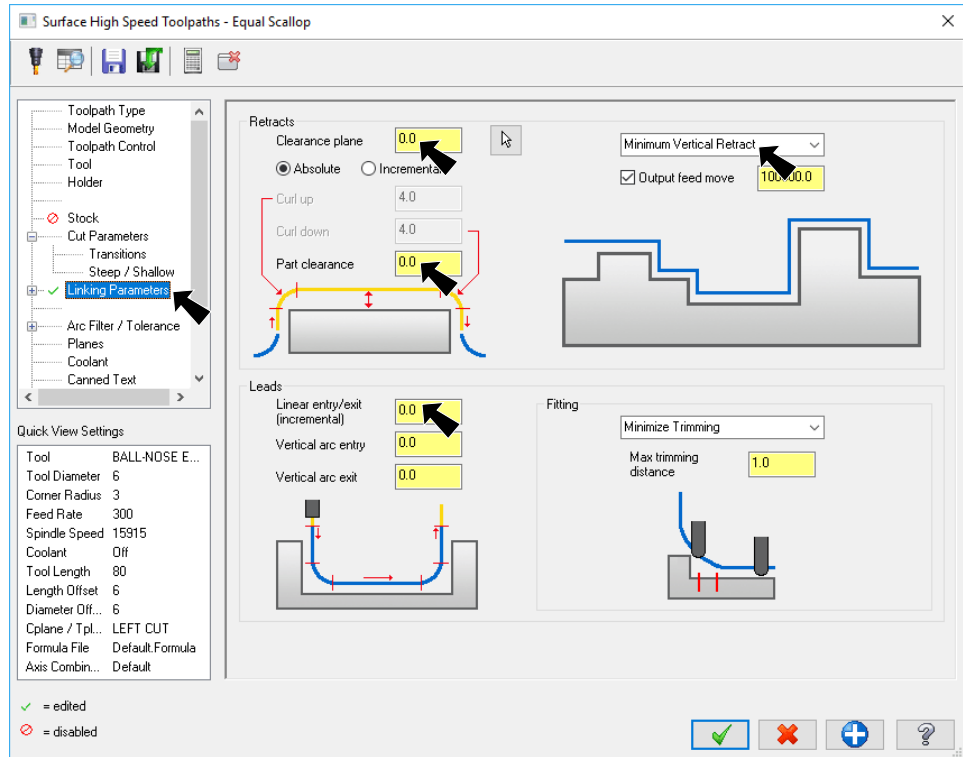


Fig. 18

Step 18. Select **Arc Filter/Tolerance** from tree control and set:

Total tolerance .0625

Check Line/Arc Filtering Settings

Uncheck Create arcs in XY

Check One way filtering

Set Minimum arc radius .0625

Cut tolerance 10%
Fig. 19.

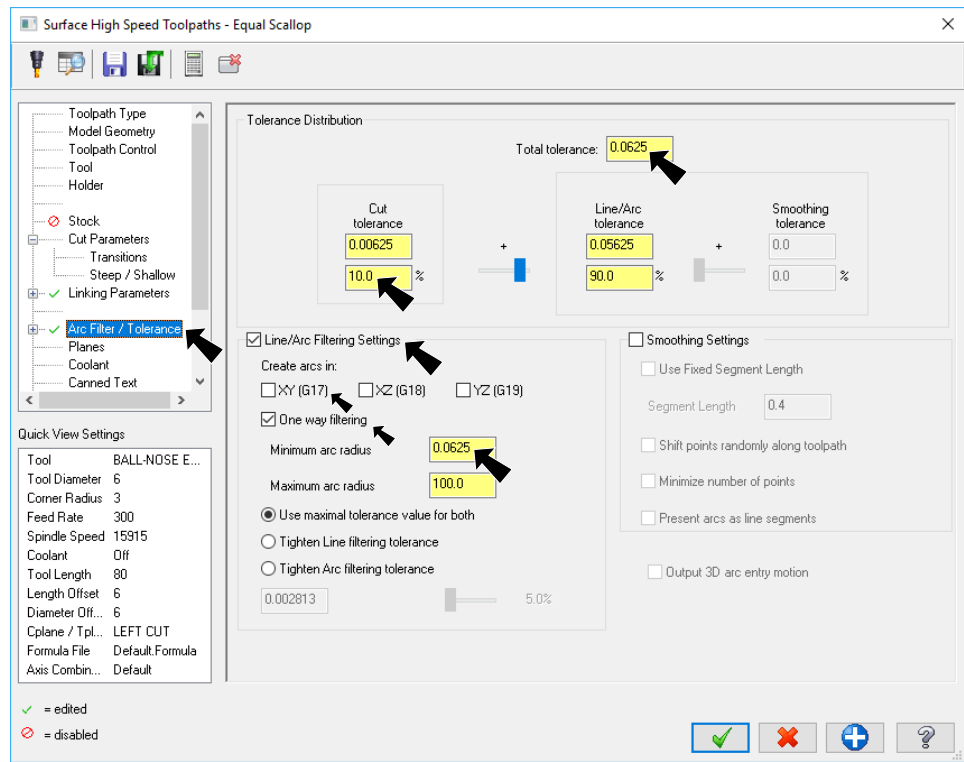




Fig. 19

Step 19. Click OK  in Equal Scallop dialog box.

Step 20. Allow Mastercam to calculate toolpath .

Step 21. Confirm **tool-path avoids flat side surface at wheel well, bottom and rear surfaces. Toolpath should not pass across the cartridge hole, Fig. 20.** Use **Alt-T** to toggle on toolpath display.

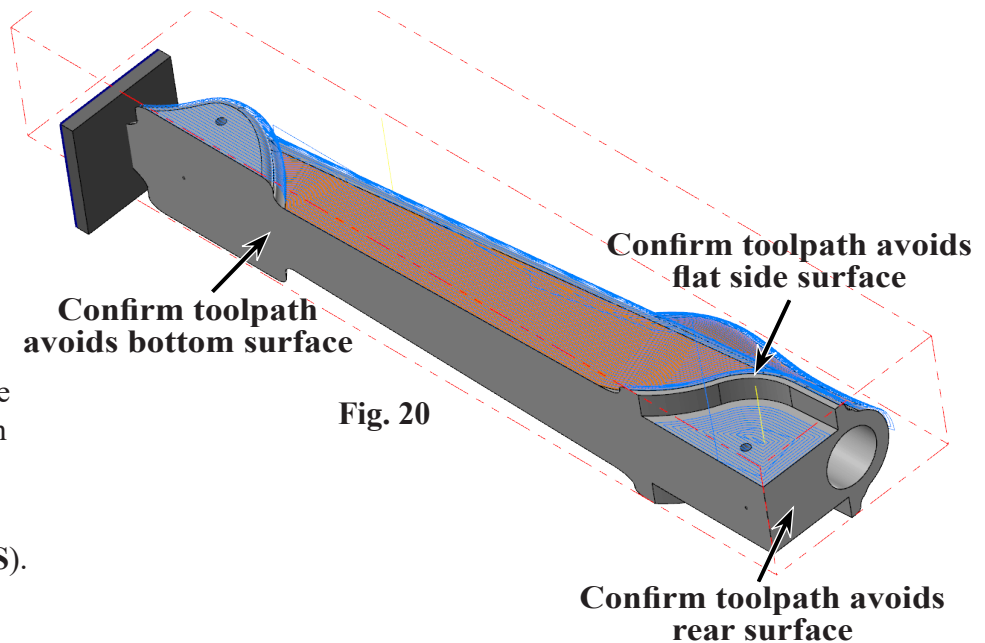



Fig. 20

Step 22. Save  (Ctrl-S).

D. Verify Left Cut.

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

Step 2. In the Toolpaths Manager **Verify** , **Fig. 21**.

Step 3. We like to **uncheck Wireframe** in the Visibility group on the Home tab, **Fig. 22**.

Step 4. Click **Play**  (R) in playback bar along bottom of the window, **Fig. 23**.

Step 5. Note **Total Time** to run program under Toolpath Info in Move List panel (**43min 47.12s**), **Fig. 25**.

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

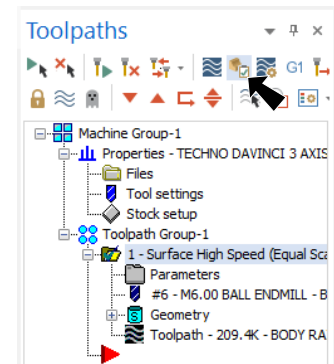


Fig. 21

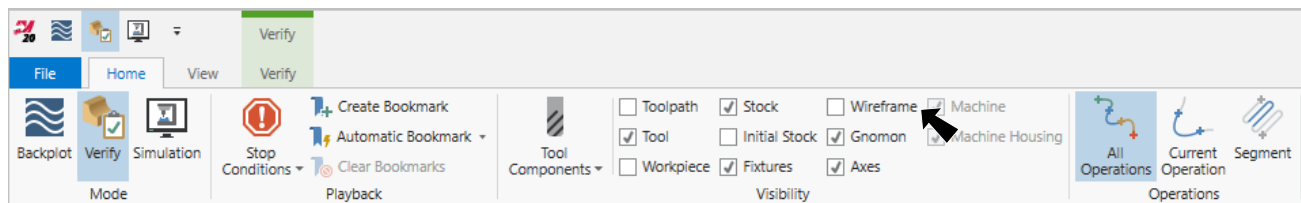


Fig. 22



Fig. 23

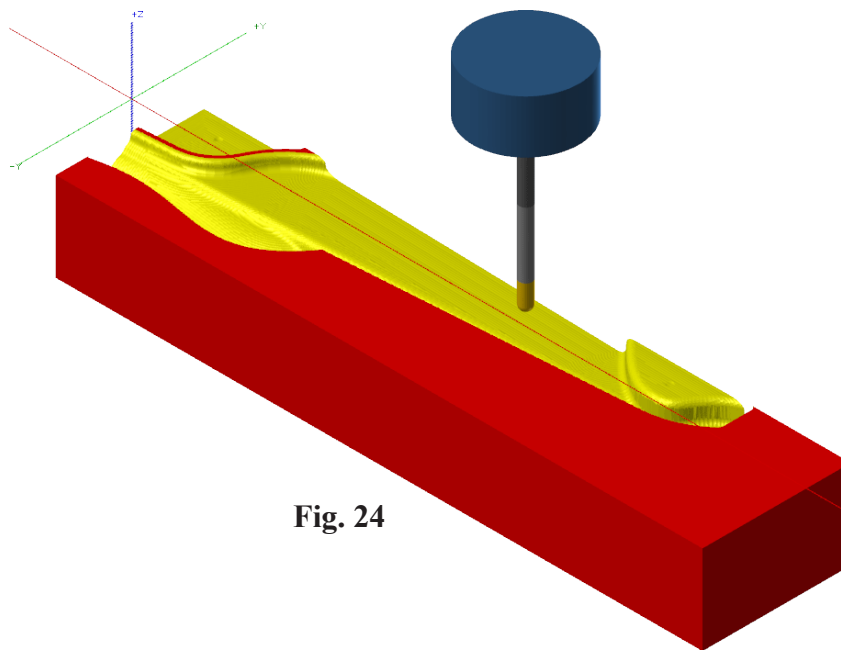


Fig. 24

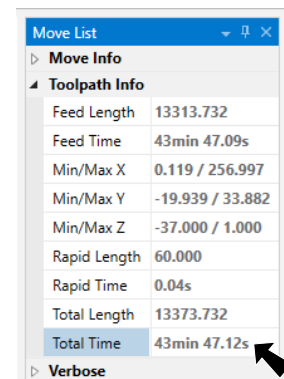
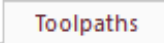
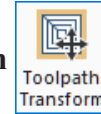



Fig. 25

E. Mirror LEFT CUT to RIGHT CUT Toolpath.

Step 1. On the Toolpaths tab  click **Toolpath Transform**




Step 2. In the Transform Operation Parameters dialog box:
 under Type, **Fig. 26**
 select **Mirror**
 under Source
 select **NCI**
 under Source operations
 select **Surface High Speed (Equal Scallop)**.

Step 3. Click the **Mirror tab** at top of dialog box, **Fig. 27**.
 under Method
 select **Mirror about X axis** 

Click OK 

Step 4. Allow Mastercam to calculate tool-path.

Step 5. Save  (Ctrl-S).

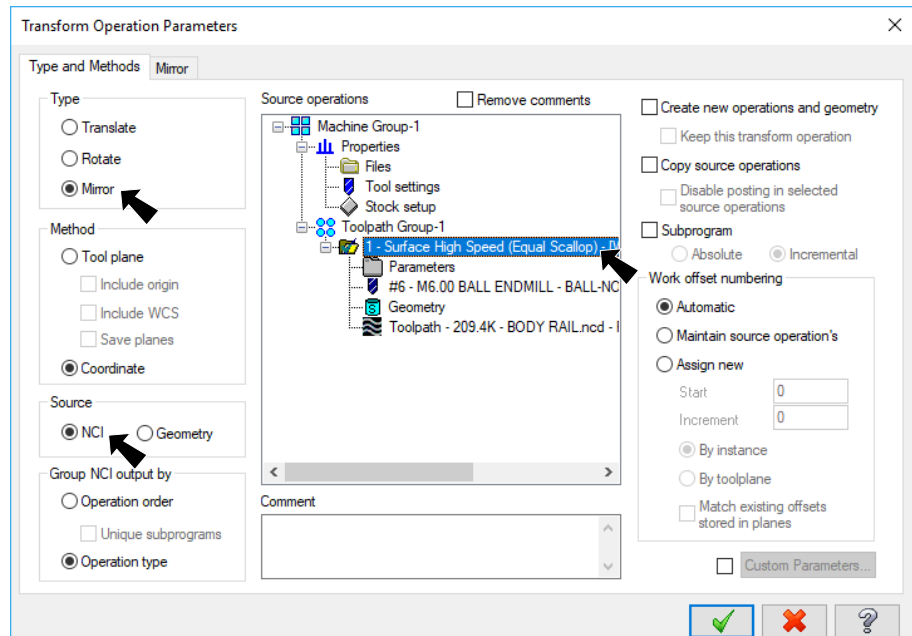


Fig. 26

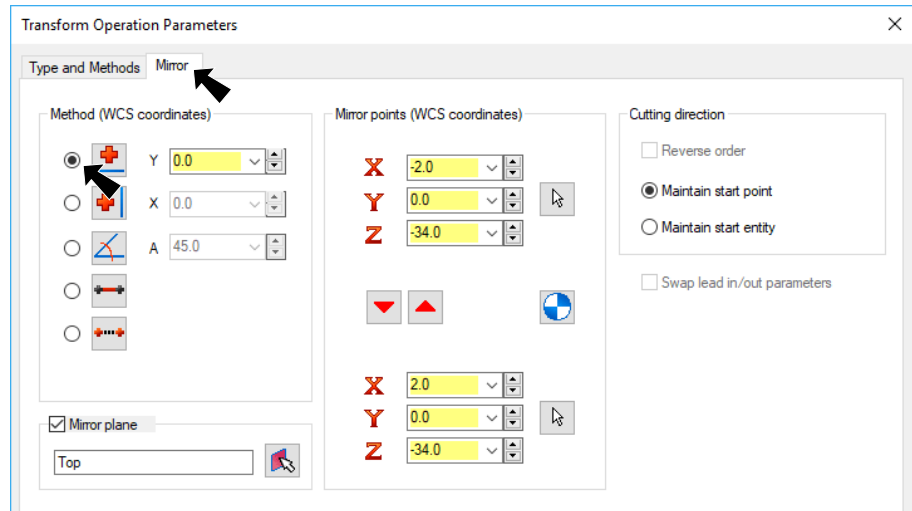




Fig. 27

F. Verify Right Cut.

Step 1. In Toolpaths Manager, click the **Transform/Mirror** toolpath, **Fig. 28**.

Step 2. Click **Verify**  in Toolpaths Manager.

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

Step 4. Click **Close**  to close Mastercam Simulation.

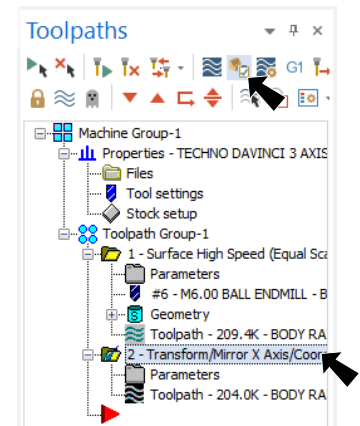


Fig. 28

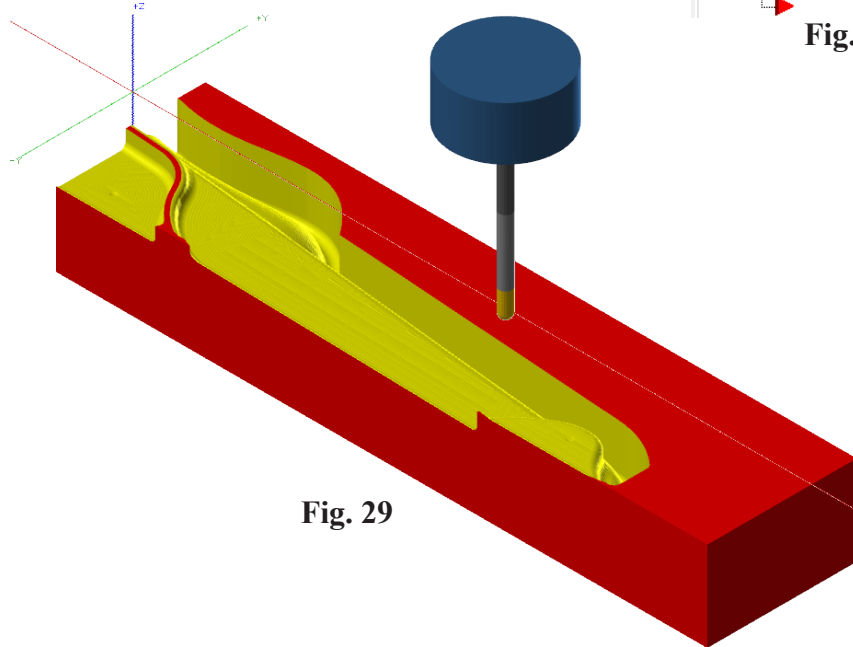


Fig. 29