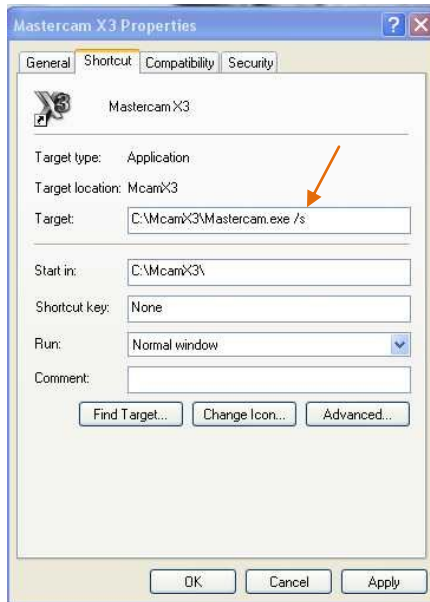


Procedure for bringing GIS Data into MasterCam

1. Make sure MasterCam has the solids option loaded. To make sure edit your shortcut icon by right clicking on the icon and choose "Properties". In "Target" add a space, forward slash, S, after the .exe command.



2. Once your terrain geometry is a single solid in Rhino you can export it to MasterCam. Do not export multiple overlapping solids (these must be booleaned to be joined edge to edge to form one body). You will also export some other features such as curves and surfaces also as separate STEP files.
3. You should make sure that in Rhino your geometry can fit inside a 12x12x2" high box and that the highest point is at the top of the box. This will give you the most material under your model and prevent warping. One lower corner of the 12x12 box should be on the Rhino origin with all geometry in the positive x, y, z direction.
4. Export geometry from Rhino as a STEP file (.STP), AP203ConfigControlDesign
5. Open the template named "GIS-MasterCam template"
6. You will want to save the original template for reference. So choose save as and save this file as GIS-xxxxx, where the x's are your GSD username (e-mail name).
7. Select ALL and Delete. This will delete all existing geometry
8. The operations will now all be marked with a red X indicating that they do not have any geometry to refer to.
9. Go to File, File Merge/Pattern and locate your .STEP file that has your solid terrain model.
10. The .STP file Options should be set to "Import Solids", Edge Curves, all other options should be unchecked. Import your solid terrain file
11. When you bring in the other curve and surface STEP files you will want to bring them with the Options set to "Trimmed Surfaces", "Edge Curves". You may want to change the System Color

at the bottom of the MasterCAM window before importing each of the STEP files to make it easier to find them later.

12. The file should not have to be scaled, mirrored or anything else since this work should have been done at the Rhino level. Just hit the green check mark to close the Merge command.
13. The solid geometry should now be turned into a surface. Create, Surface, From Solid and click on the solid geometry from Rhino. In the command box for this command you can choose to erase the original. Check ok.



14. Now that you have your geometry in the right place the geometry of each operation has to be reassigned to the new geometry.

By operation 1-Surface Finish Parallel:

1. Expand the folder for the operation and click on the Geometry symbol
2. Click on the Drive Surface Tab and Select all the surfaces by using a selection box
3. Click on the Check surface tab and select the surfaces of the roofs of your buildings one by one. Make sure to get them all.
4. Click the green ball at the top right of the mastercam toolbar to accept your geometry additions.
5. Close the geometry dialog box and left click on the red X on the Toolpath Symbol. You will be prompted to regenerate the toolpath, to which you should say yes.

2-Surface Finish Leftover

1. This operation is used to add more definition to areas of the topography that were left behind by the large diameter of the $\frac{3}{4}$ " ball mill used in the first operation but we don't want it to do the whole model. Choose create line, endpoints. Make sure the multi-line option is on in command bar. Go to top view and draw a polygon around the area which could use more resolution. Ignore areas around building as we will have another operation do this. Make sure the polygon is closed and goes beyond some boundaries of the model so it is easy to pick. Double click to end the polyline.
2. Expand the folder for the operation and click on the Geometry symbol
3. Click on the Drive Surface Tab and Select all the surfaces by using a selection box
4. Click on Containment. This will open a dialog box that will let you choose the chain you just created.
5. Close the geometry dialog box and left click on the red X on the Toolpath Symbol. You will be prompted to regenerate the toolpath, to which you should say yes.

3-Surface Finish Parallel (Detailing around buildings)

1. This operation is used to add more definition to areas of the topography near buildings that were left behind by the large diameter of the ¾" ball mill used in the first operation but we don't want it to do the whole model. Choose create line, endpoints. Make sure the multi-line option is on in command bar. Go to top view and draw a polygon around the area which could use more resolution. Choose an area where there are buildings. Make sure the polygon is closed and goes beyond some boundaries of the model so it is easy to pick. Double click to end the polyline.
2. Expand the folder for the operation and click on the Geometry symbol
3. Click on the Drive Surface Tab and Select all the surfaces by using a selection box
4. Click on the Check surface tab and select the surfaces of the roofs of your buildings one by one. Make sure to get them all.
5. Click on Containment. This will open a dialog box that will let you choose the chain you just created.
6. Close the geometry dialog box and left click on the red X on the Toolpath Symbol. You will be prompted to regenerate the toolpath, to which you should say yes.

4-Surface Finish Parallel (Mills tops of buildings)

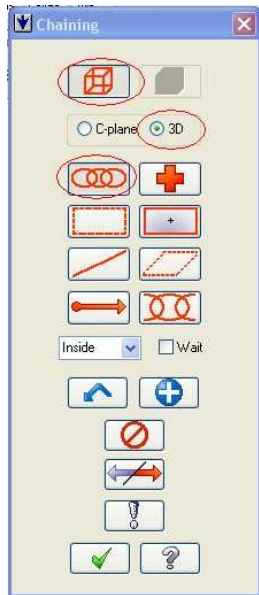
1. Expand the folder for the operation and click on the Geometry symbol.
1. Click on the Drive Surface Tab and select the surfaces of the roofs one by one. You should have created these surfaces in Rhino and imported them as STEP surfaces. This will make them easy to pick. If you have a lot of roofs you should put them on a layer in MasterCam. MasterCam is not very good with layers. For instance you can't pick everything on a layer unless you hide every other layer and window select the objects you need. MasterCam calls layers "levels". To add something to a layer you should select the item and then right click on the levels button in the bottom command bar.
2. Close the geometry dialog box and left click on the red X on the Toolpath Symbol. You will be prompted to regenerate the toolpath, to which you should say yes.

5-Contour (3D) (This mills the sides of the buildings)

2. Expand the folder for the operation and click on the Geometry symbol
3. The Chain Manager dialog box will open. Right click inside it and choose add chain



4. Another chaining dialog box will open:



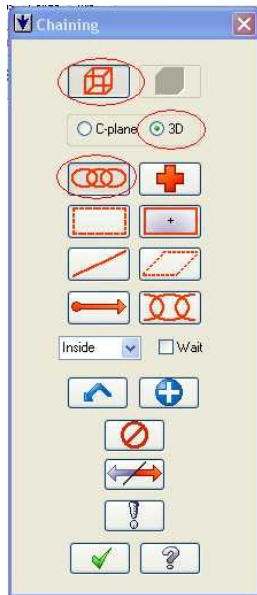
5. You will want to pick a separate chain for each building (or group of buildings if they are closer than ¼" apart).
6. You should have created these contour curves in Rhino and imported them as STEP curves. This will make them easy to pick.
7. If you have a lot of curves you should put them on a layer in MasterCam. MasterCam is not very good with layers. For instance you can't pick everything on a layer unless you hide every other layer and window select the objects you need. MasterCam calls layers "levels". To add something to a layer you should select the item and then right click on the levels button in the bottom command bar.
8. Make sure that the arrow that indicates which side to cut on is pointed out from the building. Ignore the error, "Cutter compensation not successful".

6-Contour (2D) (This mills the outside limits of the site and cuts it out of the work-piece)

1. Expand the folder for the operation and click on the Geometry symbol
2. The Chain Manager dialog box will open. Right click inside it and choose add chain



3. Another chaining dialog box will open:



4. You will want to pick the bottom edge of the limits of your site model.
5. Make sure that the arrow that indicates which side to cut on is pointed out from the site.

Simulation:

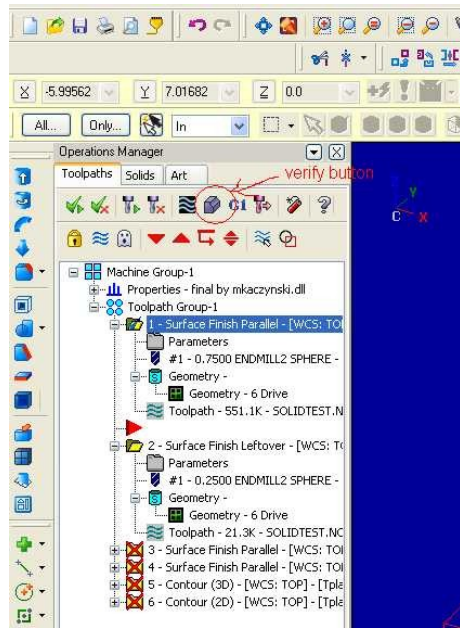
You will now want to do a Back Plot and a Verification to make sure your toolpaths look correct. You can also do this several times during the creation or modification of the toolpaths. This is one of the most powerful tools MasterCam provides and it should be used often

To Backplot:

1. Left click on the toolpath you want to see and it will automatically bring up the Back Plot function. Just click play on the long tool bar that is separate from the Back Plot dialog box.

To Verify:

1. Choose one or as many operations (toolpaths) as you want to see and click the Verify button at the top of the Operations Manager.



2. This will open the Verification Dialog Box. Just hit the forward arrow.