GIBBSCAM | 2027 CAM for Production Machining

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Tombstone Management System (TMS)

GIBBSCAM

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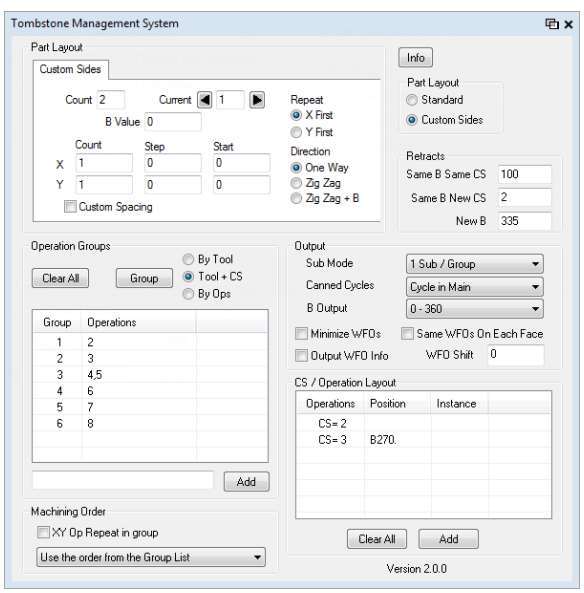
Introduction

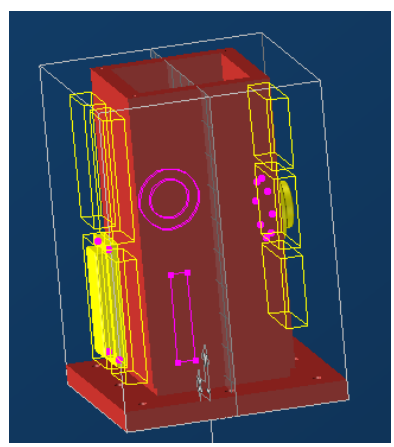
About the Tombstone Management System

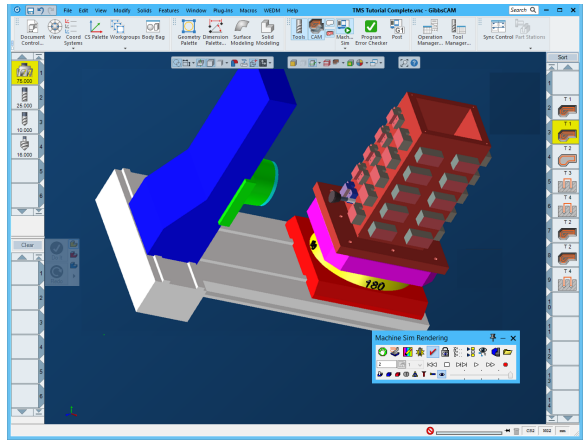
The Tombstone Management System (TMS) is an optional module that lets you more easily generate multi-part setups for tombstone machining and create appropriate G-Code output. TMS requires the 2.5D Solids or SolidSurfacer module, a customized processor to generate the G-Code, and the Machine Simulation option to properly render the output.

Without TMS, one of the techniques described in the Advanced CS guide must be used to force the correct output. The TMS system makes this much easier and more complete, and you only have to define a single part with operations. TMS is not limited to creating only one part at a time; multiple parts or sides of a part can be set up on the tombstone, and you simply tell the TMS what to cut on each side of the tombstone.

Please Note: This applies to active operations only; inactive operations are unaffected. For more information about active and inactive operations, see *Common Reference*, chapter "Miscellaneous", section "Lists", subsection "Active and Inactive Operations".





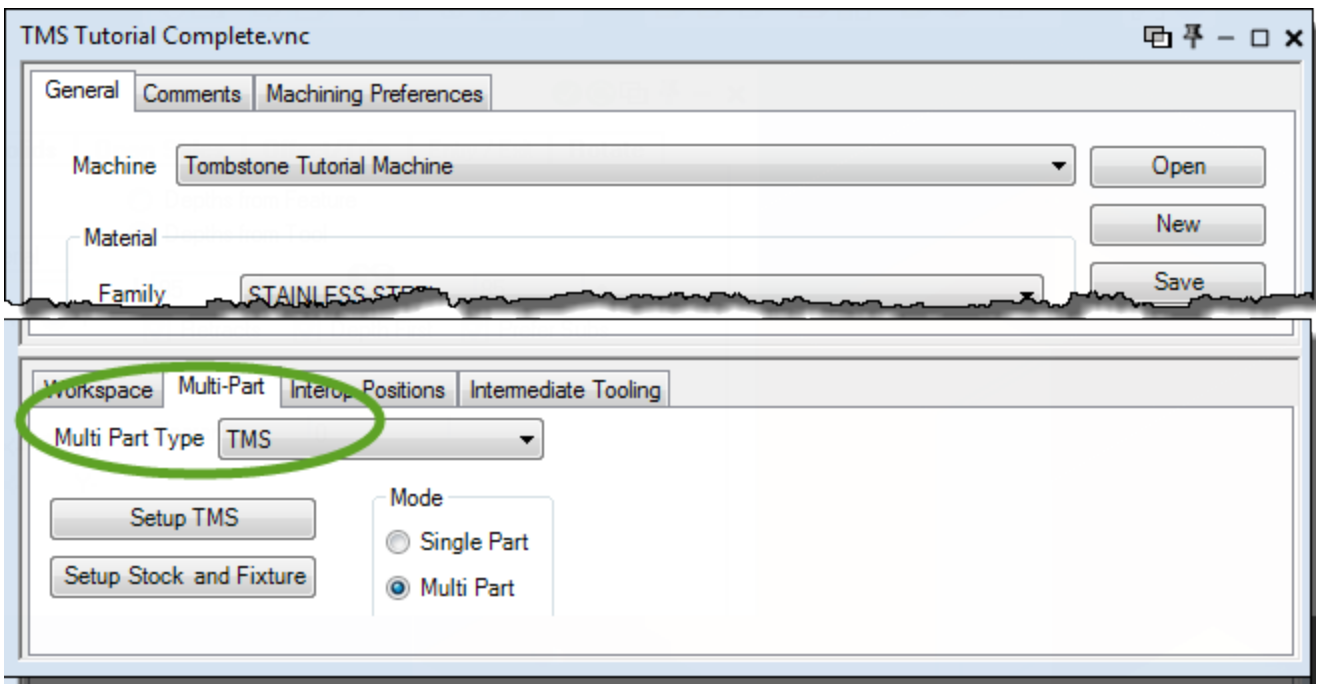


TMS setup dialog, stock setup, and part rendered in Machine Simulation

Note: The capabilities and user interface described in this and other guides apply to GibbsCAM Industrial Edition with all product options licensed and active. GibbsCAM Viewer, GibbsCAM Operator and GibbsCAM Student Edition provide a subset of the full functionality.

Interface

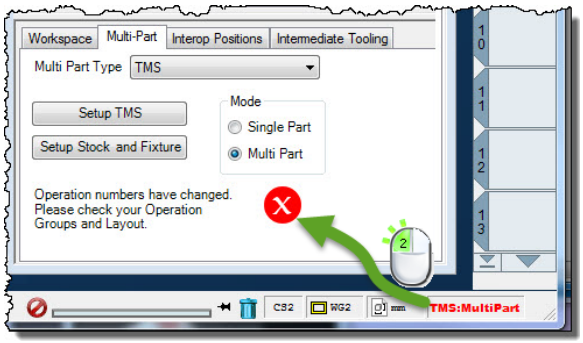
The Tombstone Management System is accessed through a pull-down choice on the **Multi-Part** tab in the lower section of the DCD.



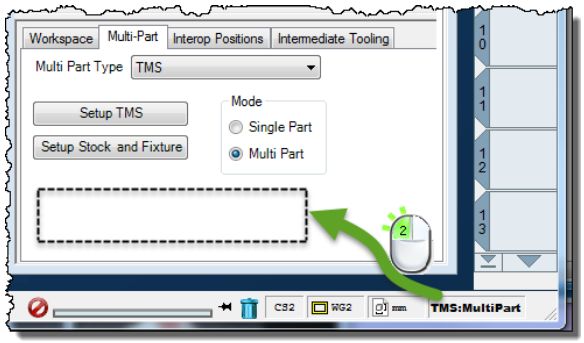
Setting Multi Part Type to TMS and then clicking the Setup TMS button opens the Tombstone Management System dialog, which allows you to define the setup on your tombstone. For information on this dialog, see “Tombstone Management System dialog” on page 6.

Update Tracking

Every change in the operations, such as deleting, moving or creating new operations, will flag the TMS operation as being out of sync. The icon shows this by putting the tombstone status in red letters. This is a warning that operations have changed and that the multi-part definition should be double-checked to ensure you will get the desired output. Double-click the red text to open the DCD to the **Multi-Part** tab — see illustration below. Then click the Setup TMS button to double-check your settings. When you exit the dialog box, the TMS status is reset to normal.



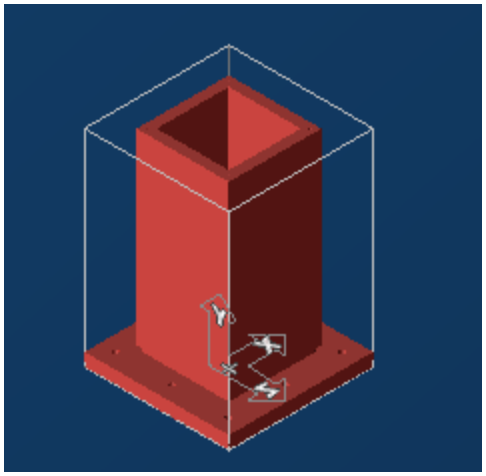
Out of Sync



Normal

Part Setup

There is nothing special that needs to be done to a part file to use TMS. However, the part should be set up with the center of the base of the tombstone at XoYoZo. It is recommended that the +Y value should be the height of the tombstone, and the X and Z values should be length and width of the tombstone plus the parts.



The suggested part setup for TMS

If the Tombstone Management System will be used with Machine Simulation, you will need to use the custom MDD that is associated with the machine assembly file that was created for your machine. Simply select the MDD from the Machine Type menu in the Document Control dialog. For more information see the section on Rendering in the *Common Reference* Guide.

A part that previously used the Multi-Part Mode of TMS is automatically converted to Multi-Part when it is opened in this release. However, to take advantage of Multi-Part post improvements requires a post upgrade. (Without such an upgrade, old posts will continue to work, but will use longhand.) To request a post upgrade, contact your Reseller or the Gibbs Post Department.

Tombstone Management System dialog

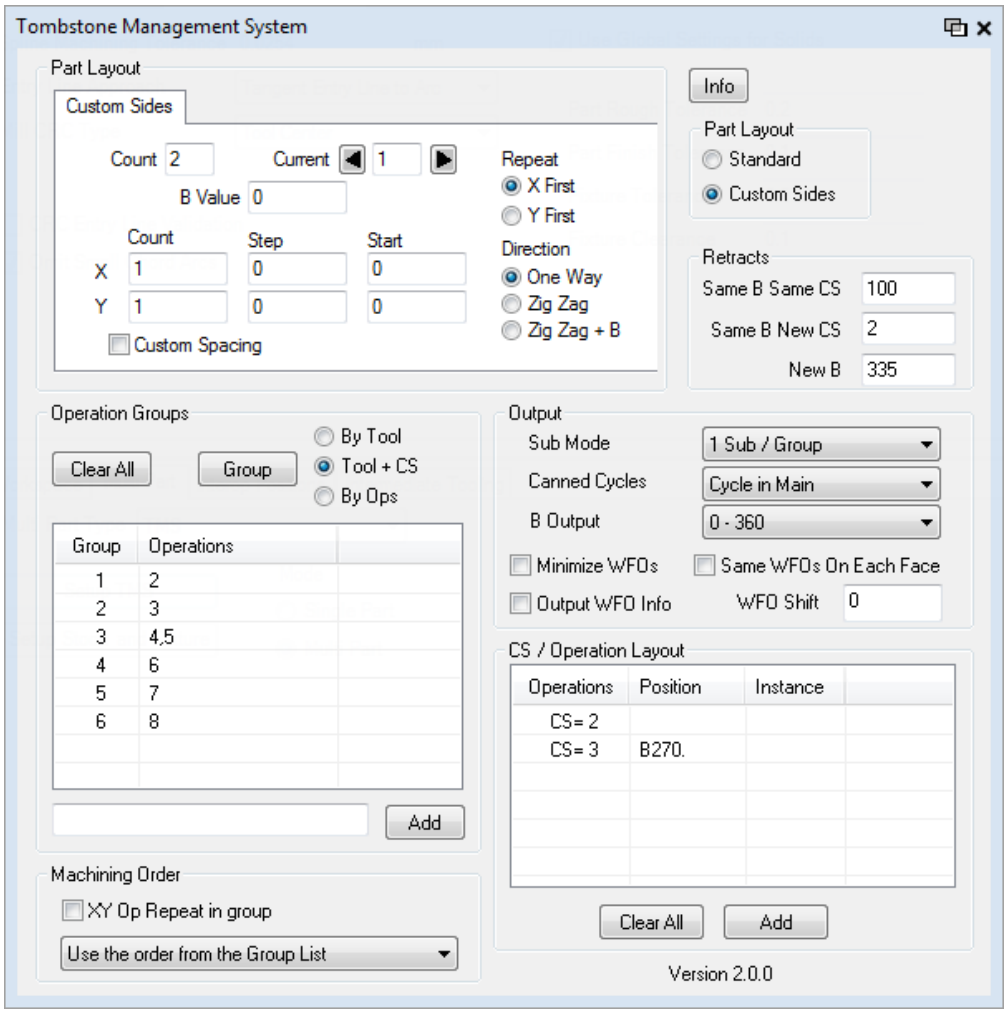
To create a TMS part, follow these steps.

1. Open an existing VNC file containing the part you want to machine. If the operations are not all on the same part on a single side of the tombstone, special filters will need to be

applied in the Tombstone Management System dialog. If filters are not applied, TMS will start all operations on side 1 of the tombstone.

2. In the DCD, lower section, **Multi-Part** tab, set Multi-Part Type to TMS.

3. Click the Setup TMS button.



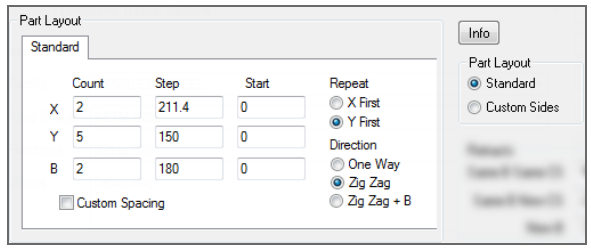
4. Supply settings and values in this dialog and then close it. Later, you can re-open this dialog and make changes as needed.

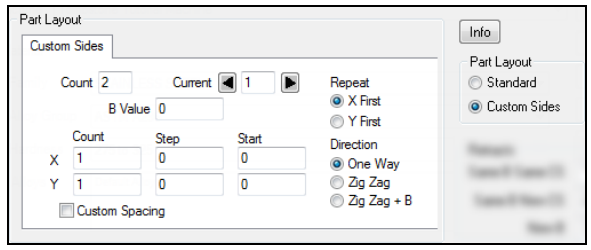
Info

Clicking the Info Info button opens the **Generate Report** dialog that provides for creating a variety of reports of the current setup. For more information, see “Info and Reports” on page 19.

Part Layout

The Part Layout area of the TMS setup dialog defines the tombstone, the multiple parts on it, and how tools should move from part to part. Its appearance depends on the choice in the upper right side: Standard or Custom Sides.

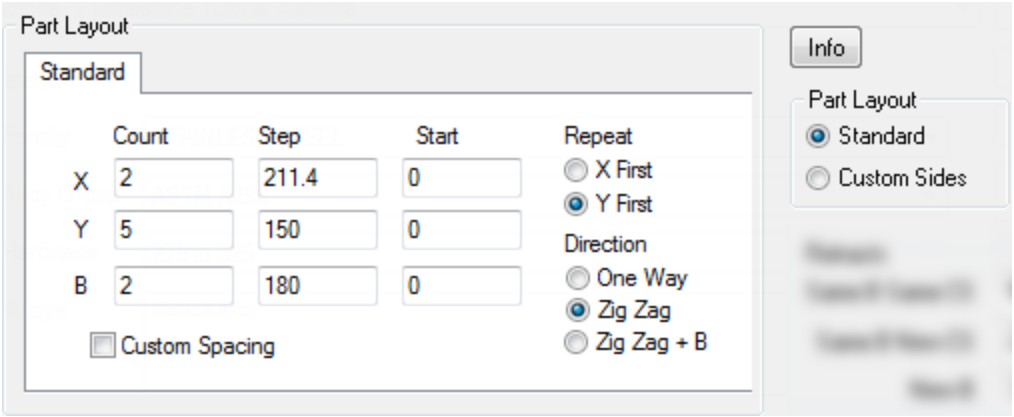




- Standard layout is used to define a situation where the same setup is used on all sides of the tombstone.
- Custom Sides is used when multiple types of parts or part conditions are set up.

In a situation where the front and back of parts on different sides of the tombstone, the Standard or Custom Sides tab would be used. If the layout of the parts is identical on each side, (e.g. 3 rows and 2 columns of parts, in the same relative positions) then the standard tab is the best choice as it is simpler to use. A filter would be used to separate the machining processes, depending on the side of the tombstone. Using the Custom Sides tab should probably be limited to situations where the setups are actually different.

Standard



Count

The items in the Count column specify the number of parts in X and Y per side. The B entry specifies how many total sides are used by this part on the tombstone. The example has four sides to the tombstone with 10 parts per side, 5 vertical by 2 horizontal.

Step

The items in the Step column specify the distance between the parts in X and in Y. The distance is specified in part units. Use a positive value in X if the part you programmed is located on the left side of the face, and a positive Y value if the part is located at the bottom. The example shows a part programmed is located in the lower left corner. The X and Y steps are both positive. The B entry specifies the angular value for each rotation. In a typical situation, those values are equally spaced (0, 90, 180, 270 for 4 sides). All rotations are just like simple mill positioning. To visualize the direction of the rotation, look down along the tombstone axis of

rotation. The angles have a positive increment in the clockwise direction while the tombstone rotates counter-clockwise.

Start

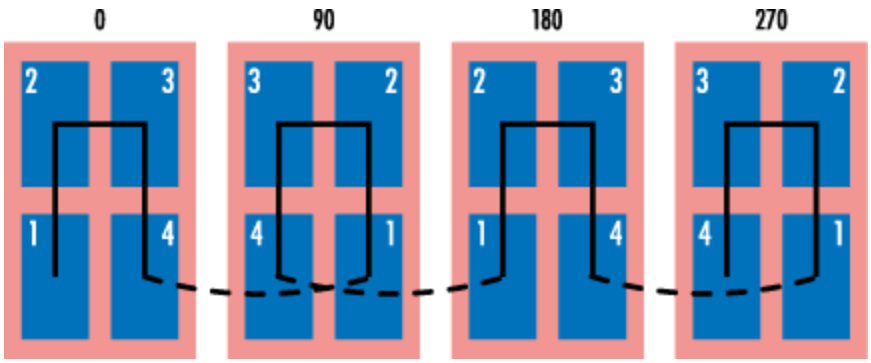
The items in the Start column specify the start position for the X and Y repeat. The values are typically set to 0. One exception could be for example the case where you have 3 rows (Y count = 3) and you program the part in the center row. In this case, you would enter a Y Start value that would be equal to –Ystep. The B entry allows for starting the program at a different side of the tombstone.

Repeat

Select one of the two buttons to define the order in which the parts will be machined. X First means that the parts will bemachined row by row. Y First means that the part will be machined column by column.

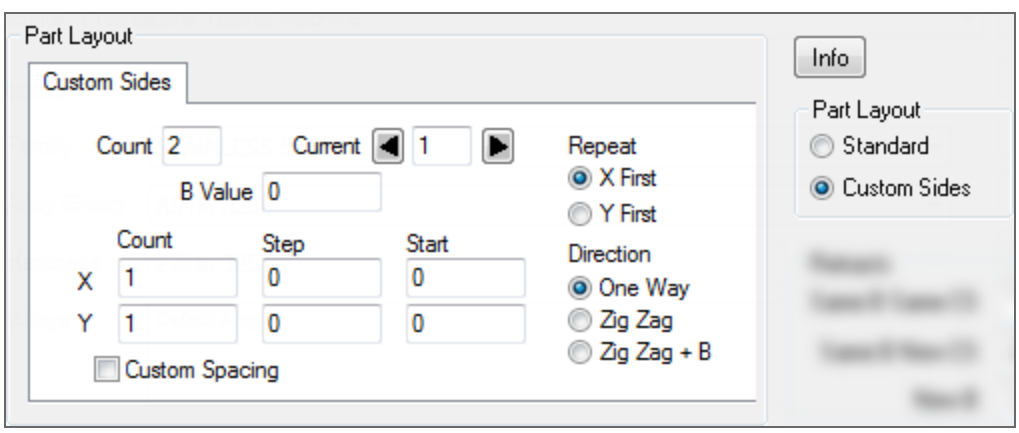
Direction

These buttons define the direction in which each row or column is machined. One Way means that each row will be machined from left to right (or right to left if the step is negative). Zig Zag means that the first row will be machined from left to right and the second row from right to left. Zig Zag+B means that a tool will not retract to the starting position after a rotation, but will clear the tombstone and cut the next side in the reverse order, going from a "zig zag" cut to a "zag zig" cut.



An example of how the Zig Zag + B option moves.

Custom Sides



The Custom Sides tab allows you to set up a special configuration of parts on a tombstone. The number of sides is set and the arrangement of parts can be defined for each individual side. For example, if you have a four sided tombstone, you could define a setup with four different parts, a group of each per side of the tombstone.

Count

The Count specifies the number of positions on the tombstone, i.e. the number of sides on the tombstone.

Current

This is the current position being defined on the tombstone. The first position is 1, the last position is defined in the Count field. Click on the arrows to change the current position. All the other values on the tab refer to the values to define the current position.

B Value

The B Value is the angular value for the current position. In a typical situation, those values are equally spaced (0, 90, 180, 270 for 4 sides). All rotations are just like simple mill positioning. To visualize the direction of the rotation, look down along the tombstone axis of rotation. The angles have a positive increment in the clockwise direction while the tombstone rotates counter-clockwise.

Count

The items in the Count column specify the number of parts in X and Y for the current side. The count can be different for each side of the tombstone.

Step

The items in the Step column specify the distance between the parts in X and in Y for the current side. The distance is specified in part units. Use a positive value in X if the part you programmed is located on the left side of the face, and a positive Y value if the part is located at the bottom. In this specific case, the part programmed is located in the lower left corner. The X and Y steps are positive.

Start

The items in the Start column specify the start position for the X and Y repeat for the current side. The values are typically set to 0. One exception could be for example the case where you have 3 rows (Y count = 3) and you program the part in the center row. In this case, you would enter a Y Start value that would be equal to –Ystep.

Repeat

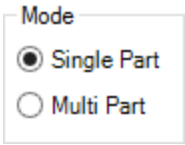
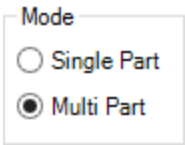
Select one of the two Repeat options to define the order in which the parts will be machined for the current side. X First means that the parts will be machined Row by Row. Y First means that the part will be machined column by column.

Direction

See Direction for a description of this function. Note that if Zig Zag + B is used inconsistently with custom sides, e.g., if only one of four sides is Zig Zag + B, then your program is not optimized.

Multi-Part Mode

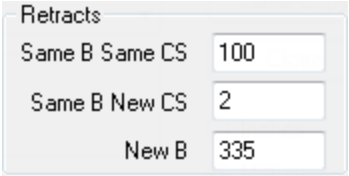
When Multi-Part Type is set to TMS, the choice of **Mode** (Single Part or Multi-Part) determines the type of posted output.

Mode	Setting	Meaning
Single Part		Each operation will be output only once. †
Multi-Part ON		The multi-part information will be used by the post to generate the correct output to machine the entire tombstone.

† The "Single Part" mode will generate an output where each operation will be called once, by taking in account the filters. The only difference is that the B direction will always be the same for each group loop. This will guarantee that the first instance of the second group corresponds to the same position than the first instance of the first group.

Retracts

The Retracts area of the TMS setup dialog defines the clearance planes for moving from part to part on the tombstone (or, in the case of Same B options *only*, from one operation to the next operation). These values must be in part units and are from the part origin, not the CS origin.



Same B Same CS

When moving from one operation to the next operation on the same side of the tombstone and in the same CS, the tool will retract to this value from the part's origin.

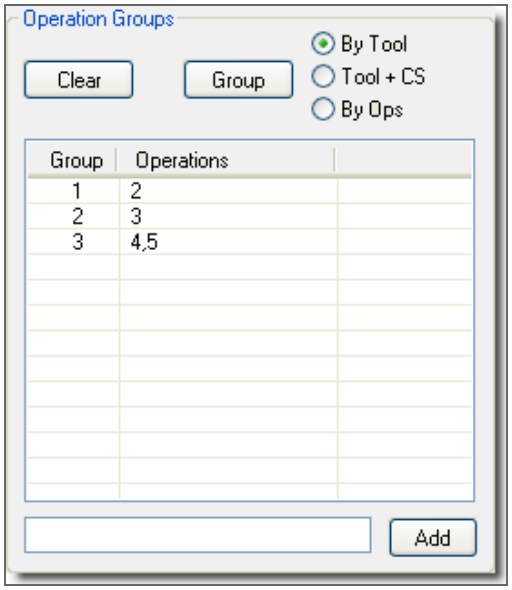
Same B New CS

When moving from one part to another part, or when moving from one operation to the next operation on the same side of the tombstone (but possibly in a different CS), the tool will retract to this value from the part's origin.

New B

When moving from one part to another and a rotation of the tombstone is required, the tool will retract to this value from the part's origin.

Operation Groups



The Operation Groups section lets you group similar operations to better define and control the TMS output. This provides control over which operations should be performed together, so that B rotations and tool changes are minimized. A single group should only contain identical tools using the same CS or part side. Operations can be automatically grouped and may be manually edited.

By Tool

Selecting this option and clicking on the Group button will automatically sort all operations based upon the tool used in the operation. All operations that use the same tool will be in the same group.

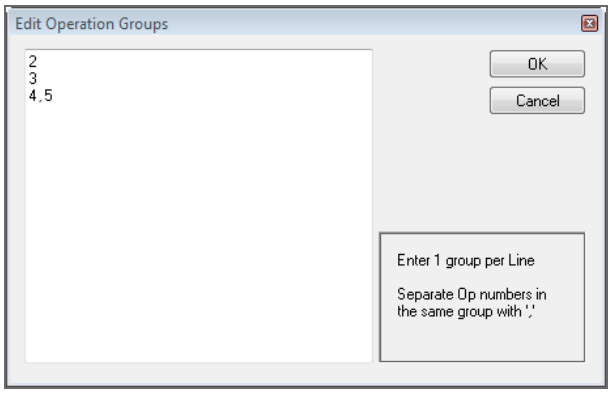
Tool + CS

Selecting this option and clicking on the Group button will automatically sort all operations based upon the tool and coordinate system used in the operation. All operations that use the same tool in the same CS will be in a single group.

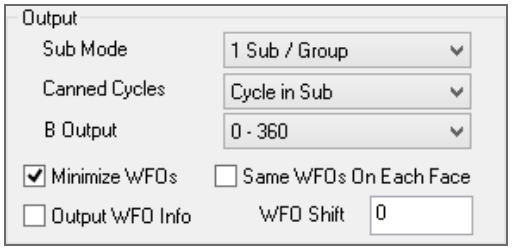
By Ops

Selecting this option and clicking on the Group button will automatically sort all operations based upon the operation number of the operation.

If you wish to override or edit the automatic grouping, simply double-click on the Operation Groups list. The dialog shown to the right will open. The dialog allows you to directly edit the list. Each group must be on its own line and each operation in a group must be separated by a comma (“,”).



Output



The Output section defines how your posted output will be formatted. There is support for how subroutines, canned cycles and B rotations are handled.

Sub Mode

Sub Mode defines how subroutines are formatted. The options include 1 Sub/Group, 1 Sub/Op and 1/Group + 1/Canned.

1 Sub/Group

This option will create one subroutine per group of operations, as defined by the Operation Groups.

1 Sub/Op

This option will create one subroutine per operation. The groups created in TMS will not be considered.

1/Group + 1/Canned

This option will create one subroutine per group of operations, as the 1 Sub/Group option plus it will create a separate subroutine for all canned cycles.

Canned Cycles

Canned Cycles defines how canned cycles are handled in the G Code. The options include Cycle in Sub and Cycle in Main.

Cycle in Sub

The canned cycle will be defined in its own subroutine.

Cycle in Main

The line defining the canned cycle will be called in the main portion of the output. Only the additional positions will be in a subroutine.

B Output

This item defines how B rotations are formatted. The options include 0-360 and Linear.

0-360

All B values are between 0 & 360. A rotation of 390° is output as “30”.

Linear

Using the Linear option B values over 360 can be generated.

Minimize WFOs

This item minimizes the number of WFOs that are generated. Normally a WFO is output for each stock position per rotation. This option will skip unused positions and rotations.

Same WFO On Each Face

This item is used to reuse the WFO settngs across multiple B-axis rotations. For this to function properly the various positions must have the same X, Y, Z locations between B-Axis settings.

Output WFO Info

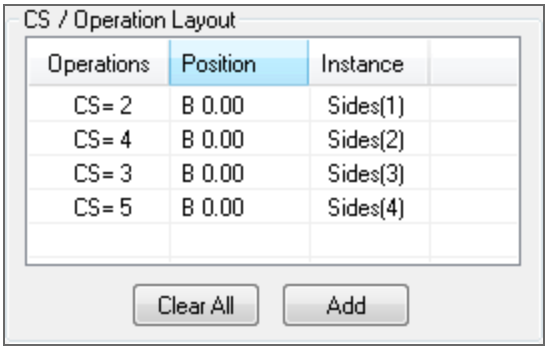
This item will output comments in the posted code that contain the WFO information. This may require a post modification.

WFO Shift

This item will skip WFO values in the output. For example, if you wanted to skip `G54P1` through `P10`, this item should be set to "`10`" and the first WFO used in the code will be `G54P11`. Of course the actual code format output will depend on the post.

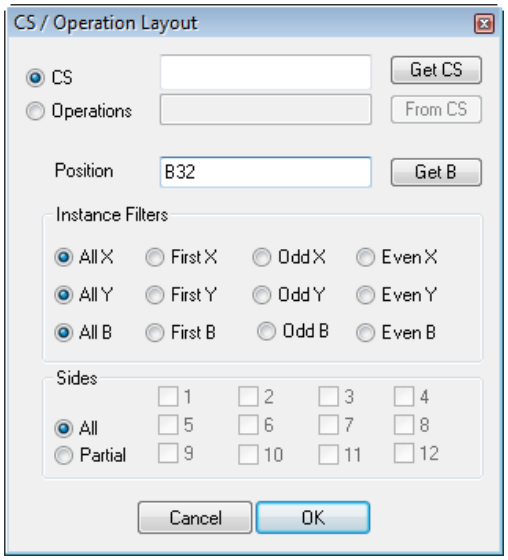
CS / Operation Layout

The Operation Layout area of the TMS setup dialog is used to set up custom B rotation positions. Any operation that is not at one of the rotated positions defined in the Part Layout section will need to be accounted for in this section. To add an entry to the list, click in the Add button. Clicking the Add button, or double-clicking an existing entry, opens the CS/Operation Layout dialog (see below), which helps define the non-standard rotations. To clear entries, click on the Clear All button.



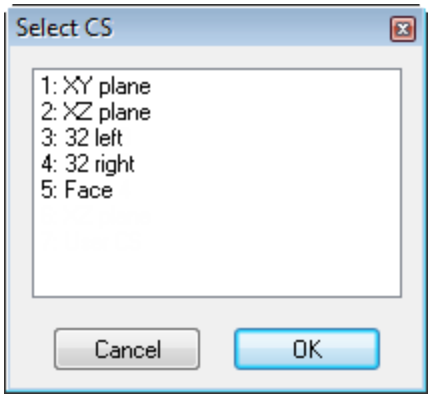
CS/Operation Layout Dialog

The CS/Operation Layout dialog is accessed by adding an entry to the Operation Layout list or by double clicking on an existing entry. This dialog helps define non-standard rotations. There are two ways to define non-standard rotations, by the operation that needs to be accessed or by the coordinate system that needs to be accessed. Once the operation or CS is selected the Position must be set, any desired filters should be applied and the sides to use must be stated.

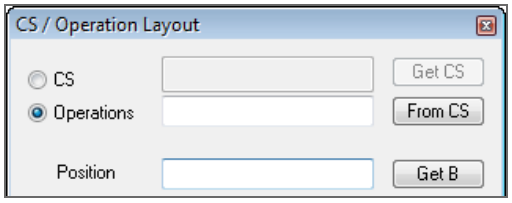


CS

This option is used to access a particular coordinate system and all operations in the CS. The CS number may be manually entered or the CS may be selected from a list by clicking on the Get CS button. The Get CS button opens the Select CS dialog. Select the coordinate system you wish to use and click OK. The CS number will now be displayed in the CS/Operation Layout dialog. This is the preferred method for specifying layout data.



Operations



This option is used to specify the individual operations to be used at a particular rotation. The operation numbers may be manually entered in the text box or they may be loaded automatically based on the coordinate system specified as the Machining CS. Clicking on the From CS button opens the Select CS dialog. Selecting a CS will load the operation number of all operations that use the CS. The Position (see below) needs to be set before clicking OK.

Position

This item will load the B angle of the CS. If you know the number you may enter it but it is easier, and more accurate, to click on the Get B button.

Instance Filters

Instance Filters provide the ability to control if a rotation will occur or not, depending upon whether the operation or CS meet certain X, Y and/or B criteria. This allows for non-standard setups without using Custom Sides data (see Custom Sides). For example, if a tombstone is set up with one part but the front of the part is on sides 1 and 3, while the back of the part is on sides 2 and 4, an instance filter could be set for the operations on the back of the part to only do even B rotations

The possible values for the filters for X, Y and B are:

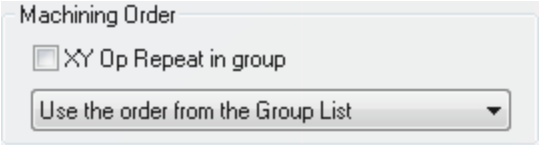
X	Y	B	Definition
AllX	AllY	AllB	At every instance
FirstX	FirstY	FirstB	Only on the first instance
OddX	OddY	OddB	At every odd numbered instance
EvenX	EvenY	EvenB	At every even numbered instance

The Even and Odd filters are useful for adding two operations to the same group, the first one cutting from left to right and the second one from right to left.

Sides

The default value is All. If Custom Sides has been set, the Partial choice is also available. Using the Partial choice allows for more control over where an operation should be performed. If the value for Count is >12, the up and down arrows to the right to scroll to sides labeled 13 and above.

Machining Order



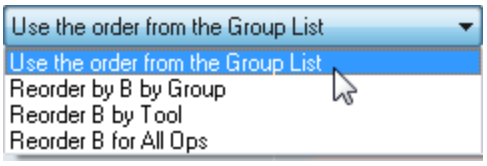
The Machining Order area of the TMS setup dialog defines the sequence in which operations will be performed.

XY Op Repeat in group

When this checkbox is selected, operations will be ordered as specified within the first group, then the second, and so forth. When it is not selected, operations will be ordered as specified without performing all ops in each group before proceeding to the next.

pull-down menu

The following choices are offered:



Use the order from the Group List

Operations will be sequenced by group list number: first group 1, then group 2, and so forth.

Reorder by B by Group

Operations will be sequenced according to the B value of each operation within the group: *minimizes retracts within the group*.

Reorder by B by Tool

Operations will be sequenced according to the B value of each operation for the same tool: *minimizes tool changes*.

Reorder by B for All Ops

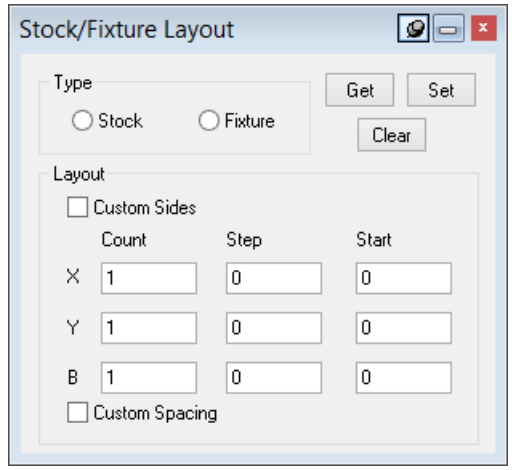
Operations will be sequenced according to the B value of each operation irrespective of group: *minimizes retracts*.

Setup Stock and Fixtures

To open the Stock/Fixture dialog

1. In the DCD, lower section, select the **Multi-Part** tab.
2. In the **Multi-Part** tab, if necessary, set Multi Part Type to TMS
3. Click the Setup Stock and Fixture button.

The Stock/Fixture Layout dialog lets you easily create a matrix of the positions of the duplicate items on the tombstone for Machine Simulation rendering. This item is typically used after the TMS information is complete and ready to be rendered via Machine Simulation. Each stock body or type of fixture must be set individually.



4. With the dialog open, select a body that you want to define as stock or as a fixture and then click Get to populate the dialog with values.

   This body must have attribute properties that define it as one of four types: **Stock**; **Stock - Display Only**, **Fixture**; or **Fixture - Display Only**. (You can view or define body attribute properties by right-clicking the body and, on the context menu, choosing Properties of Selected.)

5. Select the Type of item (Stock or Fixture) that you want the body to represent.

6. Define the Layout for the stock or fixture body; see below for details.

7. Click the Set button to save the data and display a yellow wireframe matrix that shows the item's position.

8. Repeat the last three steps as needed for each stock body or fixture type used.

Get
The Get button is used to load or reload layout data from a model that has already been set up.

Set
The Set button is used once the Type and Layout sections have been filled in. Clicking this button draws yellow wireframe representations of the stock or fixture bodies in the workspace.

Clear
The Clear button removes the layout setting for the currently selected solid body (stock or fixture).

Type
The Type section specifies whether the currently selected body will be defined as stock on the tombstone or as fixtures holding the stock in place.

Layout
The Layout section is where a stock or fixtures position is defined.

Count
Enter the number of instances in X and Y for the given body. The B value represents the number of faces on the tombstone to which this item will be attached.

Step

The X and Y values are the distance from part to part. The value may be positive or negative. The B value is the number of degrees between faces on which this item is present. If parts are on opposite sides of a four-sided tombstone the value is “180”.

Start

The X and Y values are the start positions for the items. Typically these values are “0” but if the item being defined is in the middle of three parts an offset equal to the step would be entered. The B value represents the starting angle for the face on which this item is located. If the part is on the second face of a four-sided tombstone the value would be “90”.

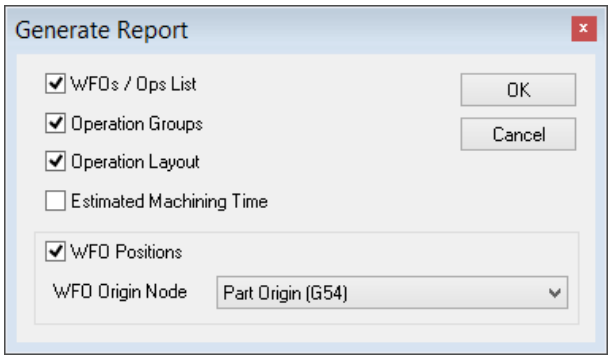
Some points to remember are:

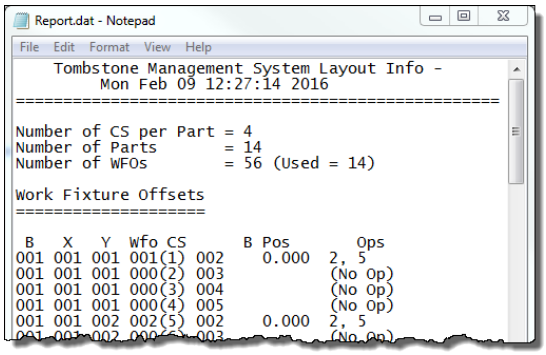
- The CS of the body being laid out is vital. The locations of the parts are determined from the CS the item is aligned to. Normally in GibbsCAM we do not think about the CS a body is aligned to, just the CS we are creating in. If you get unexpected results, look at the Properties of the body. The body should be aligned to the CS that represents the face it will be attached to. If necessary perform a Change CS (XYZ) on the body.
- The wireframe display is a bounding box that encompasses the body. A wireframe shape is displayed so that your computer’s resources are not overly taxed by showing potentially hundreds of bodies. Additionally, the frames have no effect on the current state of the part. Only once Machine Simulation is activated will the full stock and fixture items be displayed.

Using TMS

Info and Reports

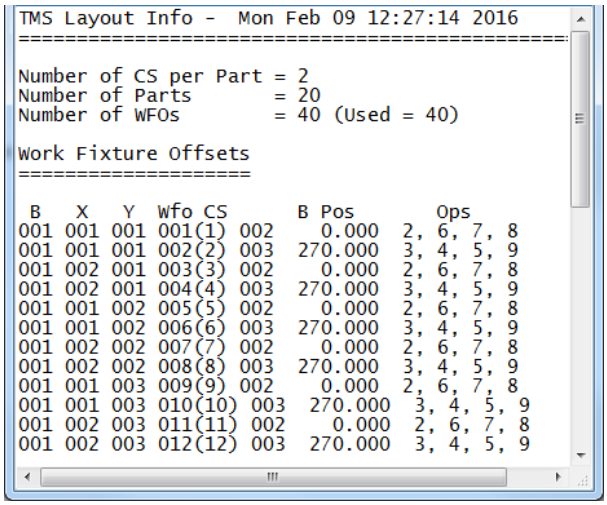
The Generate Report dialog is accessed by clicking the Info button. This dialog provides for creating a variety of reports based on the current setup. Each report provides a summary at the top that includes the number of CSs per part, the total number of parts to be machined and the total number of WFOs. Any combination of the report options may be selected. Clicking OK will produce an editable text file. The report options are presented in the order seen in the Generate Report dialog.





WFOs/Ops List

The report generated by this option will include the work fixture offsets for each operation for each part in the order they are machined. This can produce a long, but comprehensive report.



```
TMS Layout Info -  Mon Feb 09 12:27:14 2016
==============================================

Number of CS per Part = 2
Number of Parts       = 20
Number of WFOs        = 40 (Used = 40)

Work Fixture Offsets
====================

 B   X   Y  Wfo CS      B Pos       Ops
001 001 001 001(1) 002    0.000  2, 6, 7, 8
001 001 001 002(2) 003  270.000  3, 4, 5, 9
001 002 001 003(3) 002    0.000  2, 6, 7, 8
001 002 001 004(4) 003  270.000  3, 4, 5, 9
001 001 002 005(5) 002    0.000  2, 6, 7, 8
001 001 002 006(6) 003  270.000  3, 4, 5, 9
001 002 002 007(7) 002    0.000  2, 6, 7, 8
001 002 002 008(8) 003  270.000  3, 4, 5, 9
001 001 003 009(9) 002    0.000  2, 6, 7, 8
001 001 003 010(10) 003  270.000  3, 4, 5, 9
001 002 003 011(11) 002    0.000  2, 6, 7, 8
001 002 003 012(12) 003  270.000  3, 4, 5, 9
```

The field B Pos indicates the B position (including B shifts defined in the Operation layout) for each WFO.

Lines in a report that include "ERR" indicate that operations using this WFO do not all have the same B position. In this case, check the Operation Layout for those operations; see "CS / Operation Layout" on page 14.

Operation Groups

The output generated by this option creates a report on how operations are grouped. For more information on groups, see "Operation Groups" on page 12.

```
TMS Layout Info -  Mon Feb 09 12:29:06 2016
==============================================

Number of CS per Part = 2
Number of Parts       = 20
Number of WFOs        = 40 (Used = 40)

Operation Groups
================

  Group    Operations
      1     2
      2     3
      3     4,5
```

Operation Layout

The output generated by this report lists all operation filters that have been created in the Operation Layout section of the Tombstone Management System dialog.

```
TMS Layout Info -  Mon Feb 09 12:30:52 2016
===================================================

Number of CS per Part = 2
Number of Parts       = 20
Number of WFOs        = 40 (Used = 40)

Operation Layout
================

  Position   Instance Filters          Operations
 B 0.00                         CS= 2
 B270.00                        CS= 3
```

WFO Positions

This report type creates a listing of the WFO positions. The WFOs used at each B position will be output, including the first operation to use the WFO, the XY position (from the machine's origin or entered Machine Reference), and the Estimated WFO Machine Position.

```
TMS Layout Info -  Mon Feb 09 12:35:46 2016
===================================================

Number of CS per Part = 2
Number of Parts       = 20
Number of WFOs        = 40 (Used = 40)

Work Fixture Offsets Positions
==============================


  WFOs at Angle B = 0.000

  WFO   FirstOp    X          Y      Estimated Wfo Machine Position
  001     2       0.0000    0.0000    X-203.2000 Y82.5500 Z203.2000
  003     2     211.4000    0.0000    X8.2000 Y82.5500 Z203.2000
  005     2       0.0000  150.0000    X-203.2000 Y232.5500 Z203.2000
  007     2     211.4000  150.0000    X8.2000 Y232.5500 Z203.2000
  009     2       0.0000  300.0000    X-203.2000 Y382.5500 Z203.2000
  011     2     211.4000  300.0000    X8.2000 Y382.5500 Z203.2000
  013     2       0.0000  450.0000    X-203.2000 Y532.5500 Z203.2000
  015     2     211.4000  450.0000    X8.2000 Y532.5500 Z203.2000
  017     2       0.0000  600.0000    X-203.2000 Y682.5500 Z203.2000
  019     2     211.4000  600.0000    X8.2000 Y682.5500 Z203.2000

  WFOs at Angle B = 90.000

  WFO   FirstOp    X          Y      Estimated Wfo Machine Position
  022     3       0.0000    0.0000    X-203.2000 Y82.5500 Z203.2000
  024     3     211.4000    0.0000    X8.2000 Y82.5500 Z203.2000
```

Estimated Machining Time

This report type creates a listing of each BXY position, tool, operation number, and op, followed by an estimate of the total machining time.

```
TMS Layout Info -  Mon Feb 09 12:41:08 2016
===================================================

Number of CS per Part = 2
Number of Parts       = 20
Number of WFOs        = 40 (Used = 40)

Operation Layout
================

 B  X  Y  Tl
 0  0  0   1 Op  2 BXY     0.00     0.00     0.00 Ret   335.00 Shift 0.00 0.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  0  1   1 Op  2 BXY     0.00     0.00   150.00 Ret   100.00 Shift 0.00 150.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  0  2   1 Op  2 BXY     0.00     0.00   300.00 Ret   100.00 Shift 0.00 300.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  0  3   1 Op  2 BXY     0.00     0.00   450.00 Ret   100.00 Shift 0.00 450.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  0  4   1 Op  2 BXY     0.00     0.00   600.00 Ret   100.00 Shift 0.00 600.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  1  4   1 Op  2 BXY     0.00   211.40   600.00 Ret   100.00 Shift 211.40 600.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  1  3   1 Op  2 BXY     0.00   211.40   450.00 Ret   100.00 Shift 211.40 450.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  1  2   1 Op  2 BXY     0.00   211.40   300.00 Ret   100.00 Shift 211.40 300.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  1  1   1 Op  2 BXY     0.00   211.40   150.00 Ret   100.00 Shift 211.40 150.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 0  1  0   1 Op  2 BXY     0.00   211.40     0.00 Ret   100.00 Shift 211.40 0.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
 1  0  0   1 Op  2 BXY   180.00     0.00     0.00 Ret   335.00 Shift 0.00 0.00 0.00 Dec 0.00 0.00 0.00 0.00 0.00 0.00
```

```
 1  0  4   4 Op  9 BXY    90.00     0.00   600.00 Ret   100.00 Shift 0.00 600.00 0.00 Dec 0.00 0.00 0.00 0.00 270.00 0.00
 1  1  4   4 Op  9 BXY    90.00   211.40   600.00 Ret   100.00 Shift 211.40 600.00 0.00 Dec 0.00 0.00 0.00 0.00 270.00 0.00
 1  1  3   4 Op  9 BXY    90.00   211.40   450.00 Ret   100.00 Shift 211.40 450.00 0.00 Dec 0.00 0.00 0.00 0.00 270.00 0.00
 1  1  2   4 Op  9 BXY    90.00   211.40   300.00 Ret   100.00 Shift 211.40 300.00 0.00 Dec 0.00 0.00 0.00 0.00 270.00 0.00
 1  1  1   4 Op  9 BXY    90.00   211.40   150.00 Ret   100.00 Shift 211.40 150.00 0.00 Dec 0.00 0.00 0.00 0.00 270.00 0.00
 1  1  0   4 Op  9 BXY    90.00   211.40     0.00 Ret   100.00 Shift 211.40 0.00 0.00 Dec 0.00 0.00 0.00 0.00 270.00 0.00

Estimated Machining Time
========================

0 days, 01 hours, 36 minutes, 02 seconds
```

Machine

This is the name and location of the machine file used to determine the WFO positions. Click the Change button to locate and choose the file to be used.

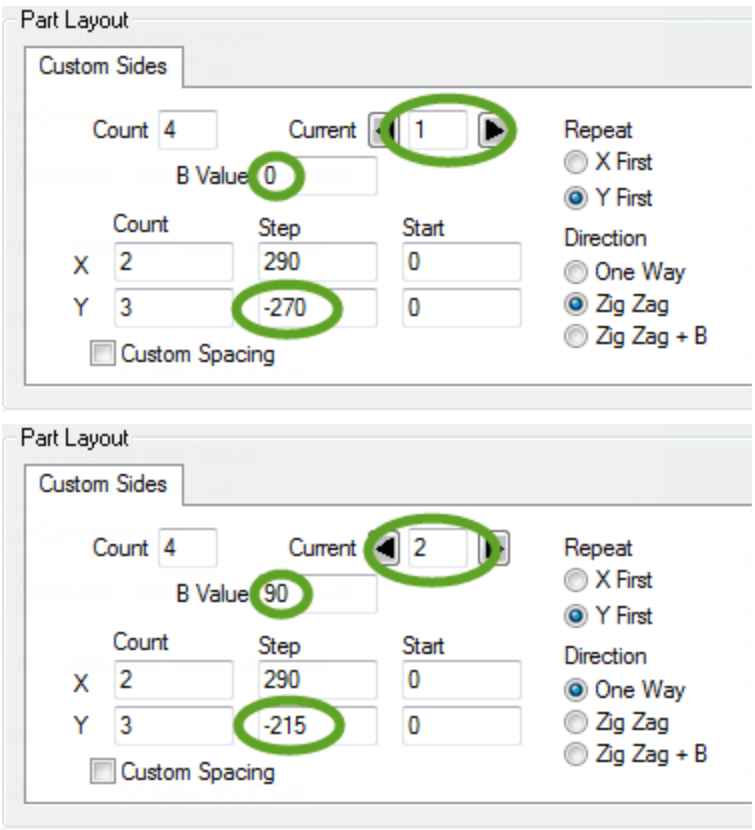
Machine Reference

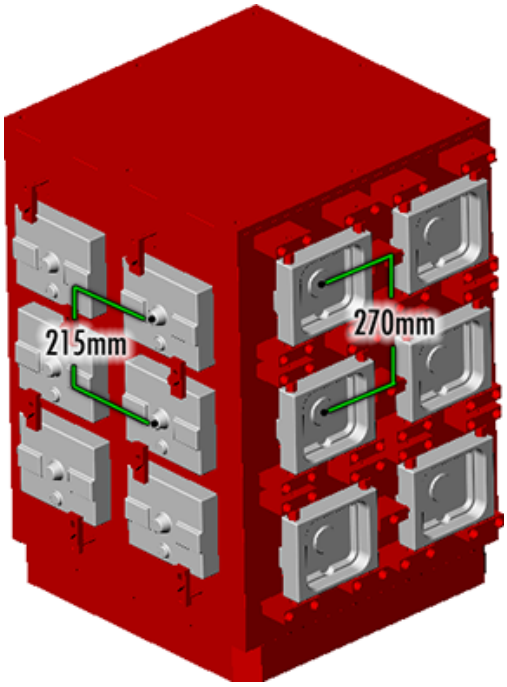
This is the XYZ position of the table origin. The value is normally automatically loaded from a machine file, but it can be entered manually.

Custom Sides Layout

It is very convenient to use the Custom Sides option when defining a part with different parts on different sides of the tombstone. It is vital that the steps and counts are properly set for each side to ensure the proper output.

The following example is typical of a custom setup. The front and back of the same part are being cut on different sides of the tombstone. In this case the X Step is identical, but the Y Step is different. The Y spacing on side 1 and 3 (B0 and B180) is 270mm, and the spacing on sides 2 and 4 (B90 and B270) is 215mm.



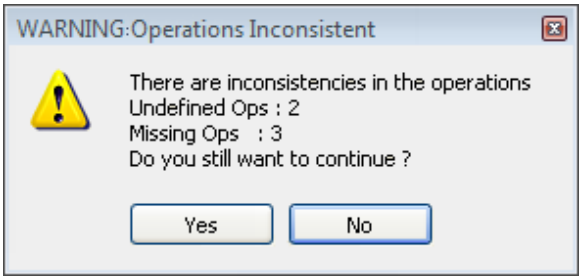


Example of a Custom Sides setup

Program Error Check

When you click the Program Error Checker button in the Main Palette, the system tests the current `*.vnc` file for errors and incompatibilities, and displays any problems found.

TMS problems typically yield an error similar to the one seen to the right.



The operations listed on the Undefined Ops line correspond to operations listed in the operation groups but not defined as an operation tile. The operations listed on the Missing Ops line correspond to operations defined as an operation tile but do not show up in any group.

After you have made any necessary corrections, repeat until the Program Error Checker displays the "All Checks Passed" message.

Conventions

GibbsCAM documentation uses two special fonts to represent screen text and `keystrokes or mouse actions`. Other conventions in text and graphics are used to allow quick skimming, to suppress irrelevancy, or to indicate links.

Text

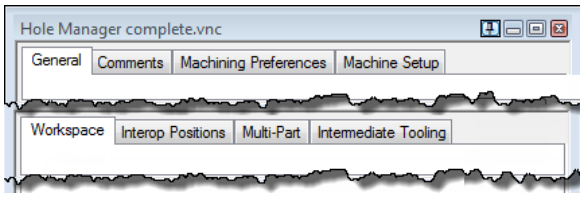
Screen text. Text with this appearance indicates text that appears in GibbsCAM or on your monitor. Typically this is a button or text for a dialog.

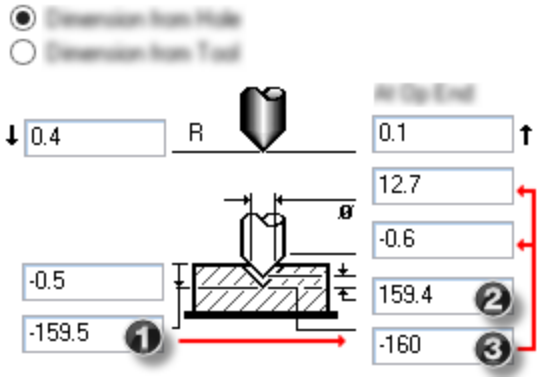
`Keystroke/Mouse`. Text with `this appearance` indicates a keystroke or mouse action, such as `Ctrl+C` or `right-click`.

`Code`. Text with `this appearance` indicates computer code, such as lines in a macro or a block of G-code.

Graphics

Some graphics are altered so as to de-emphasize irrelevant information. A "torn" edge signifies an intentional omission. Portions of a graphic might be blurred or dimmed to highlight the item being discussed. For example:





Annotations on a graphic are usually numbered callouts (as seen above), and sometimes include green circles, arrows, or tie-lines to focus attention on a particular portion of the graphic.

Links to Online Resources

Please contact your reseller for support.

Link	URL	Action / Description
Go	http://www.GibbsCAM.com	Opens the main website for GibbsCAM.
Go	https://online.gibbscam.com	Opens Gibbs Online page to download GibbsCAM and all supported material.

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