

Mastercam X³

QUICK REFERENCE CARD

Function	Keyboard shortcut	Toolbar icon	Function	Keyboard shortcut	Toolbar icon
Gview—Top	Alt + 1		Copy to clipboard	Ctrl + C	
Gview—Front	Alt + 2		Regenerate screen	Shift + Ctrl + R	
Gview—Back	Alt + 3		Paste from clipboard	Ctrl + V	
Gview—Bottom	Alt + 4		Cut to clipboard	Ctrl + X	
Gview—Right	Alt + 5		Redo an event that has been undone	Ctrl + Y	
Gview—Left	Alt + 6		Zoom around target point	Ctrl + F1	
Gview—Isometric	Alt + 7		Zoom with window selection	F1	
AutoSave	Alt + A		Fit geometry to screen	Alt + F1	
Run C-Hook or user app	Alt + C		Unzoom to previous or 50% of original	F2	
Set drafting global options	Alt + D		Unzoom to 80% of original	Alt + F2	
Hide entities	Alt + E		Repaint	F3	
Selection grid options	Alt + G		Analyze entities	F4	
Online help	Alt + H		Exit Mastercam	Alt + F4	
Show/hide Operations Manager pane	Alt + O		Delete	F5	
Previous view	Alt + P		Configure Mastercam	Alt + F8	
Shading on/off	Alt + S		Show/hide coordinate axes	F9	
Show/hide displayed toolpaths	Alt + T		Show/hide all axes (WCS, Cplane, Tplane)	Alt + F9	
Undo the last creation or event	Alt + U, Ctrl + U, Ctrl + Z		Select rotation point for motion controller	Alt + F12	
Mastercam version, SIM serial number	Alt + V		Pan	Arrow keys	
Set main color/level/style/width from entity	Alt + X		Rotate	Alt + Arrow keys	
Level Manager	Alt + Z		Zoom/unzoom by 5%	Page Up, Page Down	
Select all	Ctrl + A				

Customizing Mastercam

► Create your own keyboard shortcuts.

Choose **Settings > Key mapping** from the menu to define your own keyboard shortcuts. Add to or redefine the above list.

- Save sets of shortcuts to different key map files (.KMP) and load them as needed.
- Choose **Reset All** to restore the shortcuts listed above.
- Open .KMP files in any text editor to see the key assignments.

► Change toolbar layouts.

Choose **Settings > Customize** from the menu to customize toolbars. Rearrange icons or add new functions to the toolbars.

- Name sets of toolbars and save them to different toolbar files (.MTB) and load them as needed.
- Choose **Toolbar States** to hide or display toolbars.

Tip: A toolbar *layout* is which buttons are on which toolbar. The toolbar *state* is which toolbars are displayed and where.

► Customize the right-click menu.

Right-click in the graphics window to see a list of commonly used functions. Choose **Settings > Customize** to add your own functions to this menu. The list of functions is saved in your .MTB file.

► Use drop-down menus.

Add drop-down menus to toolbars to present many related functions in a very small space. Choose **Settings > Customize > Drop-downs** tab.

- Add or remove functions from existing drop-down menus, or create your own custom menus.

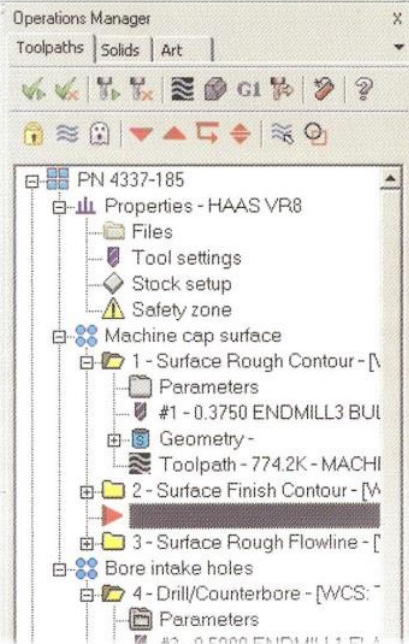


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Toolpath Manager

The **Toolpath**, **Solids**, and **Art Managers** share the pane on the left side of your window. Use them to review, edit, and manage toolpath, solid and Art operations. Drag the right border to resize it, or click and drag the **Operations Manager** title bar to undock it anywhere on your desktop. Press [Alt+O] to hide it completely. Most functions will work on multiple operations if more than one are selected.




The screenshot shows the 'Operations Manager' window with tabs for 'Toolpaths', 'Solids', and 'Art'. The 'Toolpaths' tab is active, displaying a tree view of operations for 'PN 4337-185'. The tree includes 'Properties - HAAS VR8' (with sub-items: Files, Tool settings, Stock setup, Safety zone), 'Machine cap surface', '1 - Surface Rough Contour - [V]' (with sub-items: Parameters, #1 - 0.3750 ENDMILL3 BUI, Geometry - Toolpath - 774.2K - MACHI), '2 - Surface Finish Contour - [V]', '3 - Surface Rough Flowline - [V]', 'Bore intake holes', and '4 - Drill/Counterbore - [WCS: -]' (with sub-item: Parameters). The '2 - Surface Finish Contour' operation is selected.

On the right, a list of actions is provided, each with a corresponding icon:

- Select all operations.
- Select all invalid operations. These need to be regenerated before posting.
- Regenerate all selected operations.
- Regenerate all invalid operations, whether or not they have been selected.
- Backplot the selected toolpaths. Use Backplot to focus on tool movements and positions. Or click the  icon in the operation list to backplot a single toolpath.
- Verify the selected toolpaths. Use Verify to focus on the stock model.
- Post the selected toolpaths, using the post processor named in the machine definition. Right-click to create batch jobs to post multiple files.
- Highfeed machining. Optimize for machine dynamics and constant chip load.
- New operations list; delete all operations and tools from the part file.
- Lock the operation from changes. Useful when you want to edit geometry but wish to protect the toolpath from changing.
- Toggle whether the selected toolpath displays in the graphics window.
- Disable posting for the selected toolpath.
- Display toolpaths only when they are selected.
- Display only the geometry associated with the selected toolpaths.

Machine groups

Each machine group is associated with a machine definition, which also includes the control definition and post processor:

 Properties - HAAS-VR8

Use the **Properties** sections to perform most job setup work. You can select how to apply tool and operation defaults, create stock models and safety zones, and select a material.


You can also select a different machine, and have Mastercam automatically validate operations against it. Drag toolpaths to a different group to also trigger the automatic validation.





Click on Properties and select **Files** to make job-specific edits to the machine or control definition, or to select a different post. Any changes can be saved only to the part file, and cannot be written to the machine definition on your hard disk.

Toolpath groups

Use toolpath groups as a convenient way to select, move, and post logical sets of operations. Toolpath groups are subgroups of a parent machine group and inherit all of its properties. They can also be nested. Use the right-click menu (**Groups, New Toolpath group**) to create them.

Using the insertion point

The insertion point  shows where the next operation will be placed. It also determines the active machine and control definition.

-   Move the insertion point up or down.
-  Position the insertion point immediately after the currently selected operation.
-  Automatically scroll the Toolpath Manager so that the insertion point is visible. Useful when you have many operations in the list.

TIPS & SHORTCUTS



Use the following hot keys:

- E** Expand or collapse all operations.
- L** Lock or unlock selected operations.
- P** Toggle posting on selected operations.
- T** Toggle toolpath display for selected operations.
- Ctrl+X, Ctrl+C** Cut or copy one or more selected operations to the clipboard.
- Ctrl+V** Paste operations at the insertion point.

Choose **Settings, Configuration, Toolpath Manager** to set naming conventions for machine groups, toolpath groups and NC files.

Working with geometry

Click one of the above icons to edit or reselect the geometry for an operation. You can also add new geometry, reverse the chaining direction, and sort drill points.

-  Toolpath uses wireframe geometry.
-  Toolpath uses solids or surfaces. This icon expands to let you individually select drive/check surfaces, containment boundaries, and start points.

Click a geometry icon and drag it to another toolpath to use it in that toolpath.

Extensive right-click menu lets you:

- Create new machine and toolpath groups.
- Choose **Select** to select operations which match your criteria, such as the same tool.
- Sort or renumber operations and tools.
- Choose **Display options** to customize the labels for operations and properties.
- Recalculate/update feeds and speeds when you change the stock material.
- Import/export operations from a library. Drag geometry icons from current operations to the imported ones.
- Create and run batch jobs to post many operations from multiple part files.
- Create job setup sheets.
- Run collision/gouge check utilities.

Solids Manager

The **Solids Manager** lists all of the solid operations in your Mastercam file. Each solid body is listed separately; expand each one to see the list of solid operations used to create it. Edit or change the settings for an operation or reselect the geometry to make changes to the solid body. Solid operations that have been changed need to be regenerated.

Use this button to quickly regenerate all invalid operations. This is useful when you have made changes that affect many operations.

Click the **Select** button and then select a face or feature of your solid model. Mastercam highlights the solid operation that created it.

Click on an operation to select it. Mastercam highlights the feature in your part model.

- Click **Parameters** to edit the operation settings.
- Click **Geometry** to reselect the geometry.

Mastercam automatically lists all the toolpath operations in the part file that machine the solid body.

Drag the **Stop Op** icon to prevent Mastercam from generating operations which follow it. Use it to preview your solid at different stages, without deleting and recreating operations.

Tip: When you create new solid operations, Mastercam inserts them before the **Stop Op** icon.

Right-click a solid body to change its color or other attributes, check it for errors, or create a duplicate.

Art Manager

The **Art Manager** lists Art operations. Art models (🌀) start with a **base surface** (📐). Apply **organic surfaces**, add texture, transform, edit the model, and create Art-specific toolpaths. Art toolpaths are listed in the Toolpath Manager with your other Mastercam toolpaths.

Hide part geometry. This lets you display only the Art model.

Hide Art model. This lets you display only part geometry.

Toggle opacity on/off.

Toggle reflectivity on/off.

When using multiple viewports, isolate the Art model in one viewport.

Cycle the Art model among the different viewports.

Display the X-Y-Z coordinates of a point on the model.

Display the size and location of the model.

255 Display the Art model resolution.

100 Display the Art model opacity/transparency.

0 Display the Art model reflectivity.

Define shading settings, such as color, opacity, and reflection quality.

Sort and redraw the triangles that make up the Art base surface.

Set the AutoSort threshold for the number of triangles in the base surface.


Unload/Reload the Art model from memory to work more efficiently with other aspects of your part.




Regenerate the Art model after adding or editing operations.



Undo or Redo previous operations.

Move Art surface operation up or down.

Backplotting toolpaths

Use the **Backplot** feature to precisely examine individual tool moves. Click the  button in the Toolpath Manager toolbar to backplot toolpaths.

-  **Play** toolpath continuously, or stop/pause.
-  Advance/rewind toolpath to next conditional stop (see right).
-  Advance/rewind toolpath to next step or move.

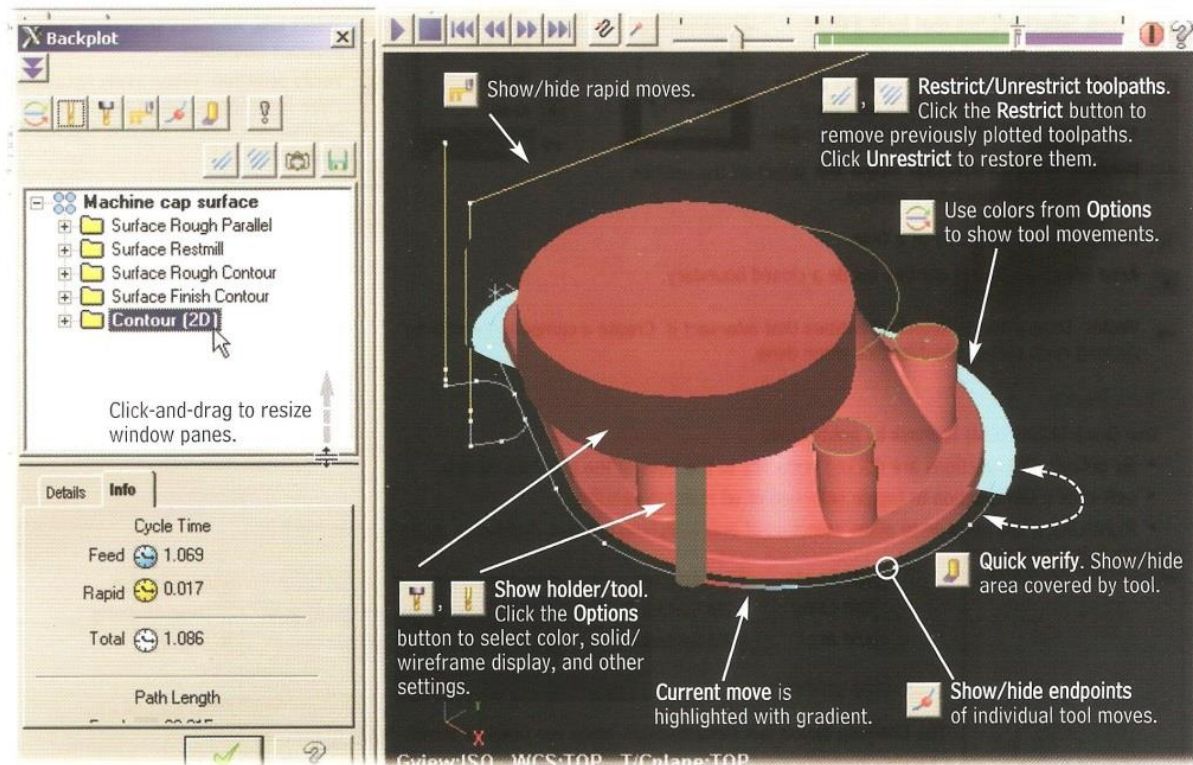
-  Display entire toolpath at once.
-  Display one move at a time.

Drag to control playback speed.

Conditional stops. Tell Mastercam to pause the toolpath at a predetermined step, coordinate position, tool change, or new operation.

Slide the bar to advance the toolpath. Click a location to jump to that tool position. Click the slider to activate the mouse wheel for advance and rewind.


- Colored areas show tool changes.
- White bars indicate new operations.
- Black tic marks indicate conditional stops.



Selecting toolpaths

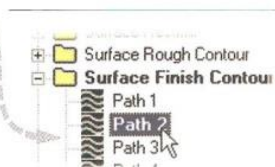
Select multiple toolpaths in the Toolpath Manager to load them. While in the Backplot window:

- Click the group name to backplot all toolpaths in the group.
- Click an individual toolpath to backplot it by itself.
- Open a toolpath to backplot individual toolpath segments.

Click the  button to configure the backplot display. Choose options for multiaxis/rotary axis toolpaths, tool and holder display, toolpath colors, and more.

Hotkeys



- S** Step forward one move at a time.
- B** Move back one move.
- R** Toggle continuous run mode.
- P** Go back to previous stop.
- N** Advance to next stop.



Toolpath information

Details Click this tab to see information about the current toolpath move. See the type of move, coordinates, feed rate, and cutter compensation direction (for comp in control).

Info Click this tab to see cycle time and path length for the toolpaths or segments currently backplotting.

Click the  button to save the displayed toolpath as geometry. Click the  button to save the tool geometry. You will be prompted to select a level, so the backplot entities will be separate from the part geometry.

Selecting geometry

Use the **General Selection** ribbon bar to select or pre-select geometry.

Selection masks. Set selection criteria: Only the entities that match, or **All** matching entities.

Invert selection. Toggle between selected or unselected entities.

Standard selection. Click an entity to select it or drag a selection window. Shift-click to select a chain. Shift-click again to terminate a partial chain. Alt-click to drag a selection vector.

Solid selection. Activates solid selection mode.

Select edges, faces, or solid bodies.

Choose **Select from back** to select hidden edges or faces.



Selecting multiple entities

Chain. Select entities that form a chain.

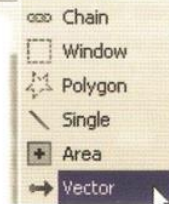
Window. Drag a rectangle to select all the entities inside it. Choose how boundary entities are included.

Polygon. Draw an irregular shape and select all the entities inside it. Choose boundary options.

Single. Select one entity at a time.

Area selection. Select entities inside a closed boundary.

Vector. Drag a line to select all entities that intersect it. Create a compound vector by clicking each corner; double-click when done.



Use the following tools in all selection modes:

Select last. Reselect selections from the previous operation.

Verify selection. When many entities are close together, highlight one after another. Click when the one you want is displayed.

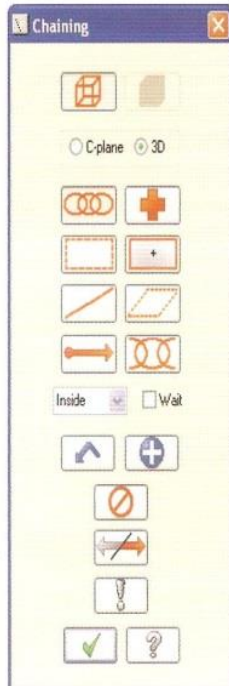
Cancel selection. Unselect all entities.

End selection. Accept selection.

Quick Masks

Use Quick Masks (QM) to mask by entity type:

- By default, QM functions are docked vertically to the right of the graphics window.
- Left-click a QM function to toggle selection of all matching entities.
- Right-click a QM function to allow selection of only matching entities. Right-click again to clear the list.



Chaining geometry

The Chaining dialog box (left) displays when you need to select *chains* of entities.

Chaining modes:

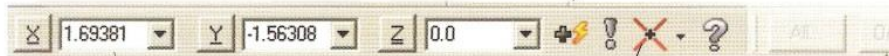
	Enable dynamic start and end point selection.		C-plane. Chain entities in the same plane as first chained entity.		Cancel selection. One chain at a time.
	Chain wireframe geometry.		3D. Manually select when multiple entities share an endpoint.		Reverse chain direction.
	Chain solid edges or faces.				Access advanced options and settings.
	Select all continuous entities.		Chain a single point.		Re-select chain from previous operation.
	Chain all entities inside window.		Chain all entities inside a closed boundary.		End current chain and begin another. (Only used in certain modes.)
	Create a chain from a single entity.		Draw a polygon and chain all entities inside.		
	Chain all entities intersecting a vector (simple or compound).		Partial chaining. Select first and last entity to chain everything in between. Use Wait option to retrace geometry.		

AutoCursor

AutoCursor is automatically activated whenever you need to specify a location in the graphics window. The most common use of AutoCursor is when creating geometry. Use AutoCursor to "snap" to key geometry positions, sketch points in space, or to simply type coordinate positions. Use whichever method is easiest for the current operation.

FastPoint mode. Simply type the coordinate position and hit **Enter**.

AutoCursor settings. Tell Mastercam what kinds of locations you want to snap to.

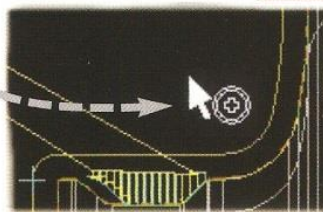
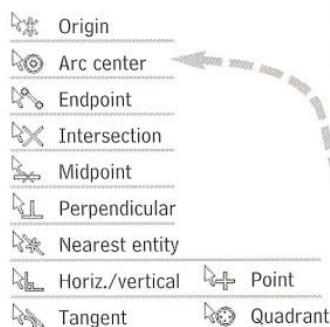
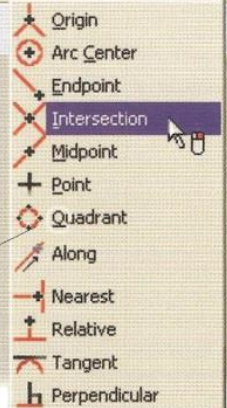


Type X, Y, or Z to enter a single coordinate directly in the field.

- Click the X, Y, or Z button to **lock** the field.
- Click ☒ to select a recently used value.
- Press **[Tab]** to move to another field.

To select a single location based on part geometry, choose the type of location from this list, then click on the entity in the graphics window.

Click **AutoCursor settings** to activate **power key** shortcuts for these selection modes. Deactivate power keys if they interfere with your other work.



AutoCursor tips:

- Press the **[Spacebar]** to enter FastPoint mode.
- Hold the **[Ctrl]** key to temporarily release all snap settings and free-sketch point locations.
- Shift-click a location to enter relative coordinates.
- Right-click a selection option to lock it as the selection mode. Press **[Esc]** to unlock.

Double-click the AutoCursor to undock it, or drag it anywhere in the window. You can close it, and Mastercam will automatically display it again when it is needed.

AutoCursor Visual Cues

When there are many entities close together, it can be difficult to know what points AutoCursor is locking to. AutoCursor uses the icons at left to tell you what kind of location it is snapping to. In this example, the icon tells you that the location is the center point of an arc.

Data entry shortcuts

Use these shortcuts in virtually any numeric data entry field.

► Built-in calculator

Fields that take number values have a built-in calculator. You can enter formulas or mathematical expressions directly in the field and Mastercam will use the result. For example, type **9/32** in a field and Mastercam will display the value **0.28125**.

- You can use common arithmetic (**+**, **-**, **×**, **÷**) and trigonometric functions. Use parentheses to build expressions. Type **#PI** to automatically enter its value.
- If the field takes an integer instead of floating-point number, Mastercam will discard the decimal portion of the result.

► Automatic inch/metric conversion

You can also automatically convert inch/metric values. When working in inch mode, type a metric value followed by **mm**, **cm**, or **m** and Mastercam will automatically convert it. In metric mode, follow an inch measurement with **in** or **ft** to convert it.

► Reading values from geometry

Mastercam can also read dimensions, coordinate positions, and other values directly from geometry in the graphics window. For example, type **x** in a field and press either **[Tab]** or **[Enter]**. Mastercam returns you to the graphics window to select a point or entity location and reads the X coordinate directly into the field.

- Right-click in the field or type **?** to see the complete list of shortcuts.
- Select a shortcut from the menu or type the hot key.

Type this... and get this

