

Mastercam X5 Mill Level 3 Training Course Outline, Duration 4 Days

Day 1: Design, 3D Wireframe & Geometrical Surfaces

Function/Command	Description
Gview, Cplane and Tplane	Explaining the difference between Graphics view , Construction plane and Tool plane .
Standard planes	Learn to set the Cplane and the Z depth of the Cplane using standard views.
Planes by geometry	Learn to create a new view using existing geometry (2 lines, 3 points or a flat entity).
Rotate planes	Learn to create a new view by rotating, with a given angle, the current view about one of the axes.
Planes by normal	Learn to create a new view normal (perpendicular) to an existing line.
Dynamic planes	Learn to create a new view using the interactive gnomon in the graphics window.
Named views	Learn how you can reselect the user defined views.
Create Curve on One Edge	Learn to create a curve on a single surface edge.
Create Curve on All Edge	Learn to create curves on all the edges of the surfaces.
Create curve at Intersection	Learn to create curves at the intersections between two sets of surfaces.
Other Curves	Learn how you can create other type of curves such as: Constant Parameter, Flowline, Dynamic and Slice.
Revolved surface	Learn to create surfaces that are circular in one direction. .
Draft surface	Learn how to create a draft surface knowing the direction the angle and the position where the surface ends.
Extruded surface	Learn how to create extruded surfaces out of a closed chain.
Primitives	Learn to create basic shapes such as a cylinder, a cone, a block, a sphere or a torus.

Day 2: Design, Free Form & Derived Surfaces

Function/Command	Description
Ruled surface	Learn to generate a linear surface between two chains.
Loft surface	Learn to generate a parabolic surface between two chains.
Flat Boundaries	Learn to create flat surfaces within a boundary defined by a closed, flat chain.
Net surface	Learn to create a surface constructed from a network of interesting curves.
Swept surface	Learn how to create a surface by moving (sweeping) a curve down the length of another curve.
Fence surface	Learn to create a surface that originated from a curve lying on a surface, in a direction perpendicular to the surface for a given length.
Offset surface	Learn to offset one or more surfaces by a distance and direction relative to the surface normal direction.
Trim surface	Learn to trim one surface to a set of surface or to trim a set of surfaces to a curve or to a plane.
Fillet surface	Learn to create fillet surfaces between surfaces, between surfaces and a plane or between surfaces and a curve.
Blend surface	Learn to create a surface tangent to two or three surfaces.
Fillet Blend surface	Learn to blend three interesting fillet surfaces by creating one or more surfaces tangent to the original surfaces.
Set/Edit surface normal	Learn about surface normals.

Day 3: 3D Toolpaths

Function/Toolpath	Description
Rough Pocket	Learn how to remove a lot of stock quickly by creating a series of planar cuts (or constant Z).
Rough/Finish Flowline	Learn how to remove the stock material from surfaces that are forming a row, following the surfaces direction and shape.
Rough/Finish Contour	Learn to machine parts that have steep walls. The contour toolpaths allow the tool to step down gradually in the Z axis instead of stepping over in the X and Y axes.
Rough/Finish Parallel	Learn to machine parts using zigzag and one way cutting methods (with multiple constant Z depth for roughing).
Rough/Finish Radial	Learn to machine rounded parts from a center point outward (like the spokes of a wheel).
Rough Plunge	Learn to rough a part quickly with a special tool using a drilling type motion.
Rough Restmill	Learn to remove stock left where the tool did not fit or where the tool could not go.
Finish Blend	Learn how the finish blend toolpath creates motion that is defined by two chains that you create along the drive geometry.
Finish Scallop	Learn to finish the part with a toolpath that creates a consistent scallop height over the whole part regardless of whether the surface becomes steep or shallow.
Finish Leftover	Learn to remove the remaining stock from a previous operation that Mastercam calculates based on the dimensions of the roughing tool.
Finish Pencil	Learn how to clean out material at the edges between surfaces by driving the cutter tangent to two surfaces at a time.
Finish Parallel Steep	Learn how the finish parallel steep removes material from surfaces whose angles are between 30 and 90 degrees.
Finish Shallow	Learn how the finish shallow removes material from fairly flat surfaces that fall between two slope angles.
Compare file to STL	Learn how to check the accuracy of the part model created by Verify against an STL (the 3D surface model) file.
Save stock as STL	Learn how to save an intermediate stock as an STL file.
H S - Core Roughing	Learn to machine cores which can be approached from the outside.

Day 4: 3D Toolpaths

Function/Toolpath	Description
H S - Area Clearance	Learn to rough out cavities, pockets, or other areas that can be most efficiently machined with an inside to outside toolpath.
H S - Rest Roughing	Learn to use a rest roughing toolpath when you want to calculate the cutting passes on only the stock left over from one or more previous roughing operations.
H S – Scallop	Learn how to finish a part maintaining a consistent scallop height and constant stepover across the surface.
H S – Horizontal area	Learn how to machine the flat areas of your surface model.
H S – Waterline	Learn to finish the part by stepping down gradually in the Z axis instead of stepping over in the X and Y axes.
H S – Raster	Learn how to finish a part with a set of parallel passes with a stepover along a line at a set angle. For shallow (almost flat) surfaces, or steeper surfaces that are perpendicular to the angle of the passes.
H S – Radial	Learn to create cutting passes that radiate outwards from a central point.
H S – Pencil	Learn how to clean out material at the edges between surfaces by driving the cutter tangent to two surfaces at a time.
H S – Spiral	Learn to create cutting passes where the tool feeds into the part in a continuous spiral.
H S – OptiRough	Learn to rough the part using a toolpath that supports cutters capable of machining very large depths of cut. This toolpath uses an, intelligent roughing algorithm based on Mastercam’s 2D high speed dynamic milling motion.
H S – Hybrid	Learn to create finishing toolpath that addresses steep and shallow areas utilizing both scallop and constant Z approaches in a single toolpath.
Machine simulation	Learn how to use machine simulation to check the toolpath for collisions.
Certification test	