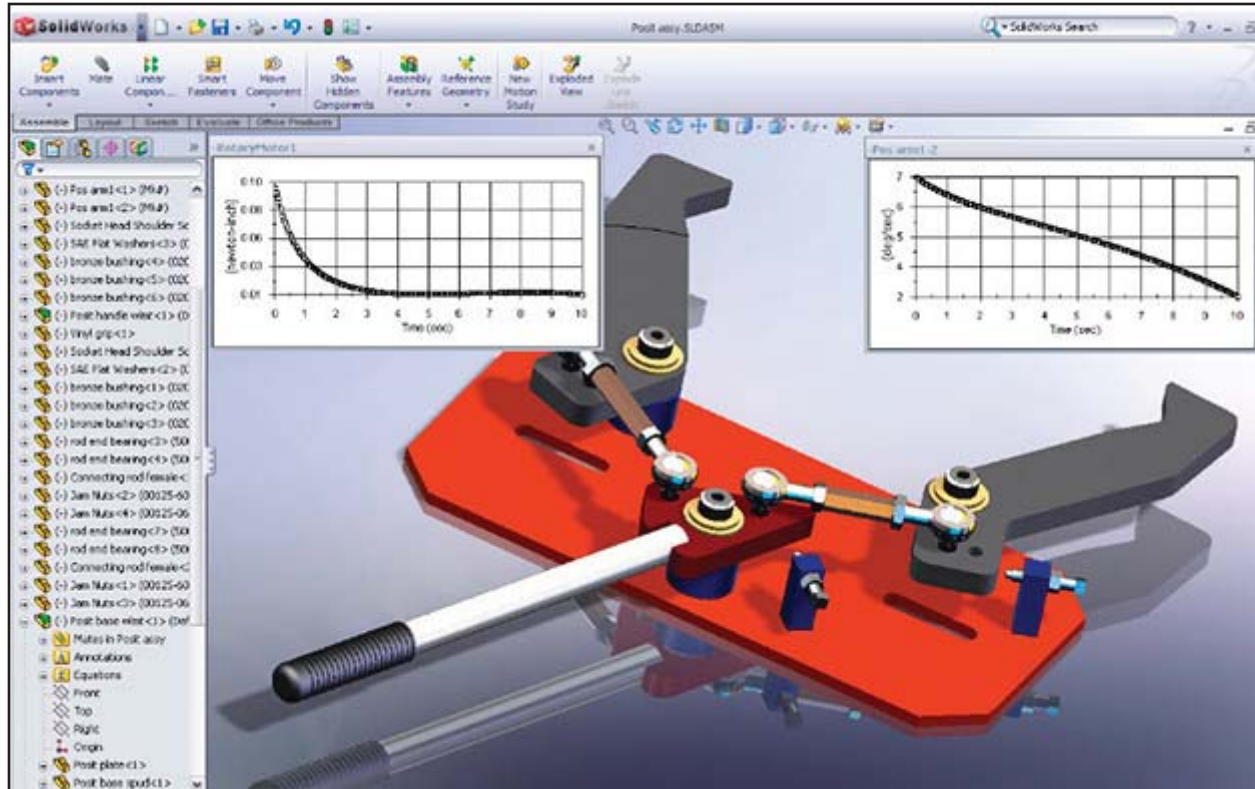


# Section 1-Introduction to Mastercam

## Beginning Mastercam



Computer aided design (CAD) systems enable Designers and Engineers to create entire systems on the personal computer.

Components and assemblies can be viewed in 3D space.

Fit checks, stress analysis and many other functions can be performed in a virtual environment

Computer aided Manufacturing (CAM) systems are able to read in these 3D representations and use the data to manufacture the components in ways that increase efficiency and accuracy in orders of magnitude compared to the methods of the past.

There are many types of CAM. In these lessons we will concern ourselves primarily with CNC Milling in Mastercam



# Introduction Video Quiz questions

## CAD/CAM and Files

CAD systems enable designers and engineers to perform fit checks, stress analysis, and view components and assemblies in 3D  
T/F

Mastercam's CAD system is useful for

- a: creating parametric models.
- b: creating components and fixtures for the machining process.

The preferred method for importing models from leading CAD systems such as Solid-Works and Pro Engineer is

- a: use a translator to create an IGS or STL file.
- b: redraw the part from a detailed drawing supplied by an engineer.
- c: open the file in its native format.

Zip files are often used for

- a: compressing a large file or many small files to send by email.
- b: closing up files.
- c: saving your work periodically.

## Mastercam Directories

What is the default file extension for Mastercam source files?

- a: STL
- b: MCX-(current version number)
- c: PDF
- d: HTML

What is the language called that Mastercam outputs to the machine controller?

- a.G-code
- b.C++
- c.conversational

Information about cutting tool geometry, feeds, and speeds is stored in the

- a: mcx folder
- b: nc folder
- c: tool library

MPmaster, a good, generic machine and control definition can be downloaded from [emastercam.com](http://emastercam.com).

T/F



# Introduction Video Summary

Building file management skills will make you a more effective user of CAD/CAM.

Use the Help Menu, including searching for topics, updating Mastercam, and using emastercam.com to search for answers to your questions and post new questions you may have.

Use “Zip to Go” to send files you’re working on in to technical support that include all the necessary information to help solve the problem.

Use the Reference Guide for quick reference to often used features.

Computer Aided Design, or CAD, is useful today because it allows complex parts and assemblies to be designed and tested on a computer.

Computer Aided Manufacturing, or CAM, is used to make complex parts to exacting tolerances faster and easier as well as make manufacturing more efficient from small batches to large runs of parts.

Mastercam has an effective CAD package but not one that is not likely to be the primary CAD tool in an Engineering firm since it lacks parametric design capabilities.

Mastercam’s main strength is its ability to import files from a variety of sources and apply toolpaths to make parts.

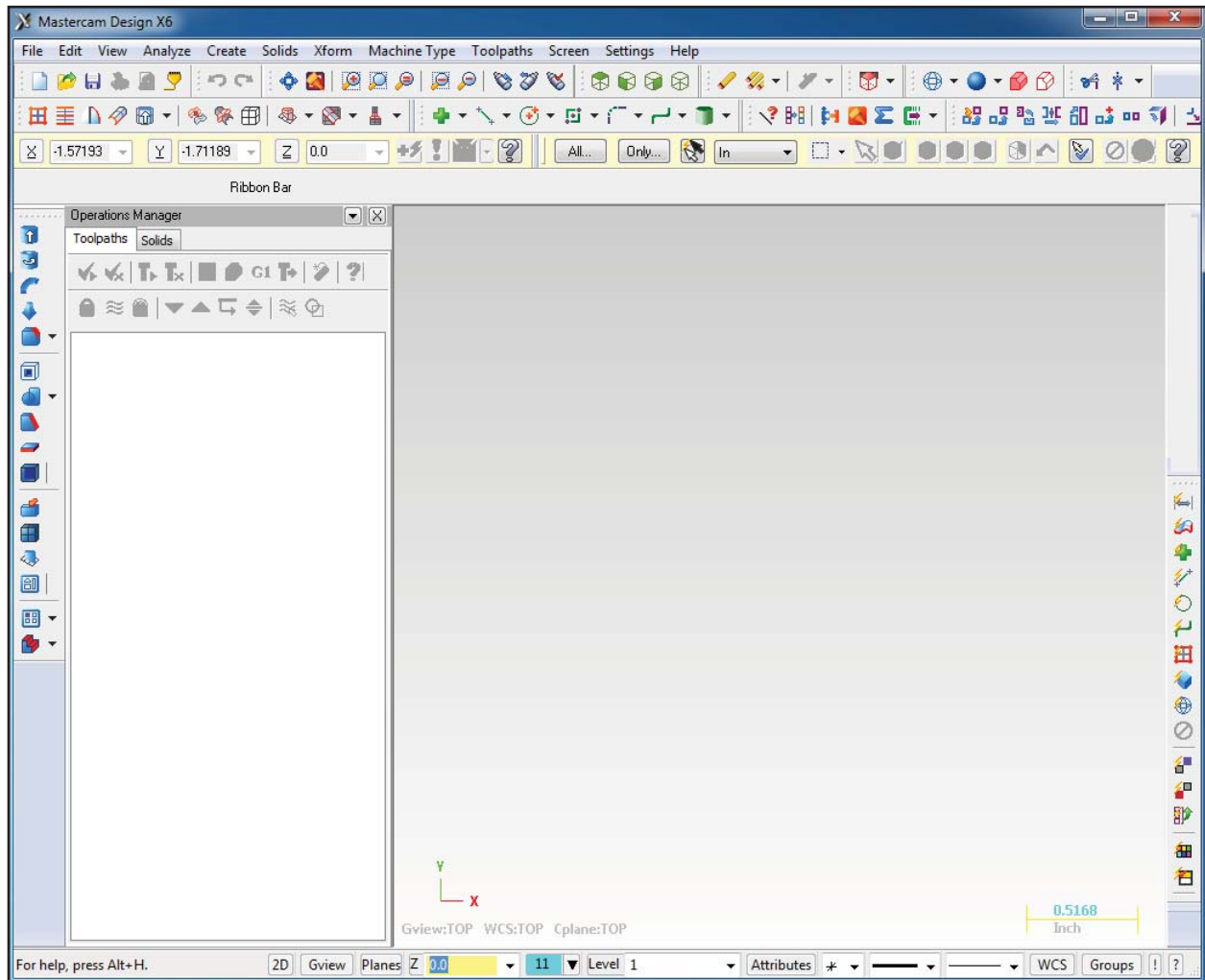
The preferred method for importing part files is in their native format.

Zip files are commonly attached to emails and are fast becoming the preferred way to transfer files between designer or engineer and machine programmer.

If your machine definition is not available in Mastercam, consider using MPmaster as a good, customizable starting point.

## Notes


# The Mastercam interface



The Mastercam interface videos give you an introduction to the Mastercam Workspace.

Functions for geometry or toolpath creation can all be found in the menus at the top of the screen, or in the toolbar icons around the screen.

Your workspace can also be customized to include different toolbars depending on the work you're doing.

The Ribbon Bar usually contains important options and information for creating geometry and is only available when in a geometry function.

One of the most useful features of Mastercam is the ability to view your part from any angle. However, it is important to learn the distinction between changing views: how you're looking at your part, and changing construction planes: where you're creating geometry on your part.



# Mastercam Interface Quiz questions

## Mastercam Workspace

All Mastercam features can be accessed through the menu bar.

T/F

The graphics screen is

a: the largest part of the screen where geometry is created.

b: the entire window containing Mastercam.

c: the part of the screen where the toolpaths are organized.

## Toolbar and Status Plane, Part 1

Icons on your toolbars can be customized by right clicking in the gray toolbar area and picking groups to be turned on and off.

T/F

Your Mastercam window can be customized to your needs by adding or removing toolbars as well as moving them around the window to handy places.

T/F

## Toolbar and Status Plane, Part 2

Construction planes must be changed in order to create geometry in different planes.

T/F

It is important to know the difference between changing the graphic view plane and the construction plane.

T/F

## Ribbon Bars and Grid Settings

Ribbon bars

a: are only available for the line function.

b: show features specific to the function selected.

c: controls values and relations of entities as they are created.

d: both b and c.

## Graphic Views

How many predefined views does Mastercam have?

a.3

b.7

c.6

# Mastercam Interface Quiz questions continued

Fit screen

- a: fits the Mastercam window to whatever size monitor you have.
- b: allows you to draw a window around geometry you'd like to zoom in on.
- c: resizes the screen to make all geometry visible.

Different views can be accessed

- a: from the views menu at the bottom of the screen.
- b: from the green view icons.
- c: from the view menu.
- d: all of the above.

## Mastercam Interface Summary

The Quickmask menu bar on the right side of the screen, allows you to pick specific entities like lines or points with a single click.

Press F9 to see the origin lines ALT+F9 to see the XYZ axis icon.

The status bar at the bottom of the screen is used to set drawing attributes such as color, line style, width, etc.

2D allows you to set a Z height to create geometry. 3D mode allows you to create geometry at any Z height.

The green view icons only change the view. The red construction plane icons change the plane in which the geometry is created.

There are many zoom options, but the most frequent are zooming in and out using the mouse wheel, drawing a window around a specific spot, and fit screen (Alt F1) to make the entire drawing visible on the screen.

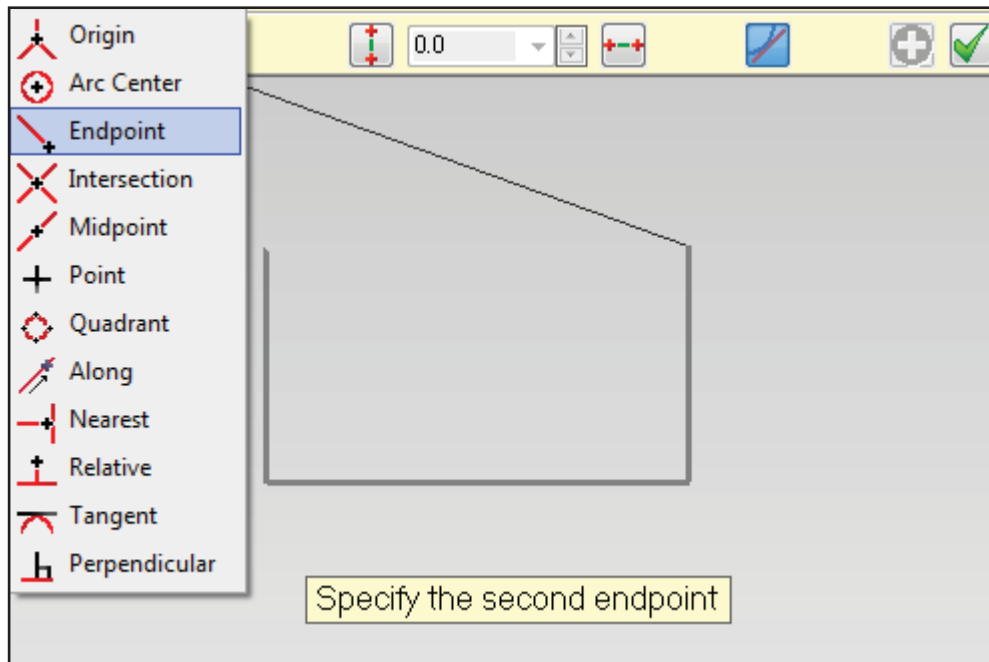
Holding the mouse wheel down will spin the model or pan, depending on your settings.

Repainting the screen is used to clean the screen of any deleted geometry or graphics that don't properly update.

It is best to view parts in Isometric view, as this often lets you see the most features, but you'll also need to be comfortable spinning the geometry and zooming in and out to find hard to see features.

Hover over an icon to see the pop up description.

## Creating lines and Autocursor



Creating lines is one of the most basic and frequently used CAD functions in Mastercam.

Once you've familiarized yourself with the options available in the line function such as using the Fast Point method of value entry or using the Ribbon Bar to define length and angles, you'll notice a lot of these options are available when creating other geometry such as circles and rectangles.

It's also important to know the difference between live and fixed entities and how to manipulate live entities to achieve your desired results.

Another important feature introduced is the AutoCursor. When using the AutoCursor you can automatically snap geometry to commonly used points such as end points, mid points, and even draw tangent lines on circles.

This is a powerful tool and will make creating geometry fast and easy once you learn what it does and how to make it work.



Launch the DVD and watch the line and Autocursor Videos

- Create Line Part One
- Create Line Part Two
- Create Line Part Three
- Auto Cursor and Value Entry



# Line and Autocursor Summary

Live entities can be still be edited for length, diameter, angle, etc. and are usually colored blue on the screen.

Click the blue apply button to fix the entity and remain in the function or the green ok button to fix the entity and exit the function.

Turning on your origin cross hairs helps to keep you oriented when creating geometry and applying toolpaths to your parts.

Use the X, Y, and Z drop down boxes on the Ribbon bar or the Fast Point method when in a function to enter coordinates when creating geometry.

Use regular numbers (for example, 2.1), fractions (1/2), or complex equations ((2-(5/2))x4) to enter numbers in the fields.

Many value fields within functions are lockable by clicking the icon next to the field, which will be highlighted red when locked.

The AutoCursor is a useful tool to locate and snap to commonly used geometry points like end points, mid points, arc center points, and the origin.

It can be customized to specific features in the settings page or quickly set to just one feature using the Override Menu on the Ribbon Bar.

Fast Point is one of the easiest ways to enter coordinates into Mastercam. Start a function, start typing values, and Mastercam will place the geometry exactly where you specify.

It's important to have a good understanding of the Cartesian coordinate system to help avoid errors while creating geometry and applying toolpaths.

Use Autocursor to control your snap to geometry options.

## Notes


# Line and Autocursor Quiz questions

## Create Line, Part 1

Pressing F9 will turn your origin crosshairs on and off.  
T/F

Live entities

- a: Are usually colored blue.
- b: can be edited until you click the blue apply button or exit the function.
- c: both a and b.
- d: neither a nor b.

## Create Line, Part 2

To enter exact coordinates for the start or end point of a line

- a: Use the X, Y, and Z boxes in the Ribbon Bar.
- b: Use the Fast Point button or space bar and separate the values with commas.
- c: Click near where you want the line and hope for the best.
- d: Both a and b.

Line end points can be edited by using the Point 1 or Point 2 buttons on the Ribbon Bar.  
T/F

Line length and angle

- a: Can be locked using the icons next to the value fields.
- b: Can not be changed once you pick your end points.
- c: Can be edited as long as the line is still blue.
- c: Both a and c.

## Auto Cursor and Value Entry

Your AutoCursor can be set up to snap to different features of geometry automatically or have an override applied to snap to just one kind of feature.  
T/F

When entering X, Y, or Z values in Mastercam, you can use fractions, decimals, or even long equations to have Mastercam compute the result.  
T/F

The undo function is useful

- a: Erasing all your geometry and starting over.
- b: Deleting files.
- c: For correcting mistakes.



# 2D geometry Quiz questions

## 2D Geometry, Part 2

Levels in Mastercam can be thought of like pages in a book and are especially useful for large part files.

T/F

Geometry can be moved between levels to aid in organization.

T/F

The Bounding Box function is often used

- a: To contain different parts of a drawing.
- b: To define material for stock.
- c: To find the overall shape of a complex object.
- d: Both b and c.

## 2D Geometry, Part 3

Drafting notes can be used to help explain setup instructions.

T/F

Smart Dimension allows you to dimension a piece of geometry with a single click.

T/F

## 2D Geometry, Part 4

To pick a chain of geometry with one click

- a: You can't. You have to pick each piece of a chain separately.
- b: Hold down shift and pick one point on the chain.
- c: Hold down alt and pick one point on the chain.

The mask function makes it easy and fast to only pick a certain kind of geometry such as lines or arcs. T/F

## Notes






## Configuration Quiz questions

For beginning users of Mastercam, C-plane should be set in your configuration settings as the default chaining mode for geometry selection.

T/F

Autosave is a valuable feature that periodically saves your work in case something happens before you save it yourself.

T/F

MCX backup allows you to

- a: automatically save different stages of a file.
- b: back up your files at specific intervals.
- c: both a and b.

The most important box to check in verification settings is “stop on collision.”

T/F

Processing time for verifying toolpaths can be shortened by reducing the quality.

T/F

## Configuration-The essential settings

Setting your system to English or metric is at the bottom of the configuration screen.

CAD settings: uncheck the boxes that say:

- Update Cplane and Tplane when changing Gview
- Reset Cplane to Top in Iso view
- Display arc center points

Chaining: Default chaining mode-Cplane

Autosave should be activated to ensure files are not lost.

Use Free mode in dynamic spin

Use group settings to name toolpath groups and G-code files.

Converters-change the STL export coordinates to **World**



Launch the DVD and watch the Assignment 1 videos then complete re-create the drawings in mastercam.

Open a new mastercam file for each drawing.