Short Introduction to the Interface

The command line is an important part of Rhinos interface; here you can type in commands for nearly every operation in Rhino, and if the command has options you can also set them here.

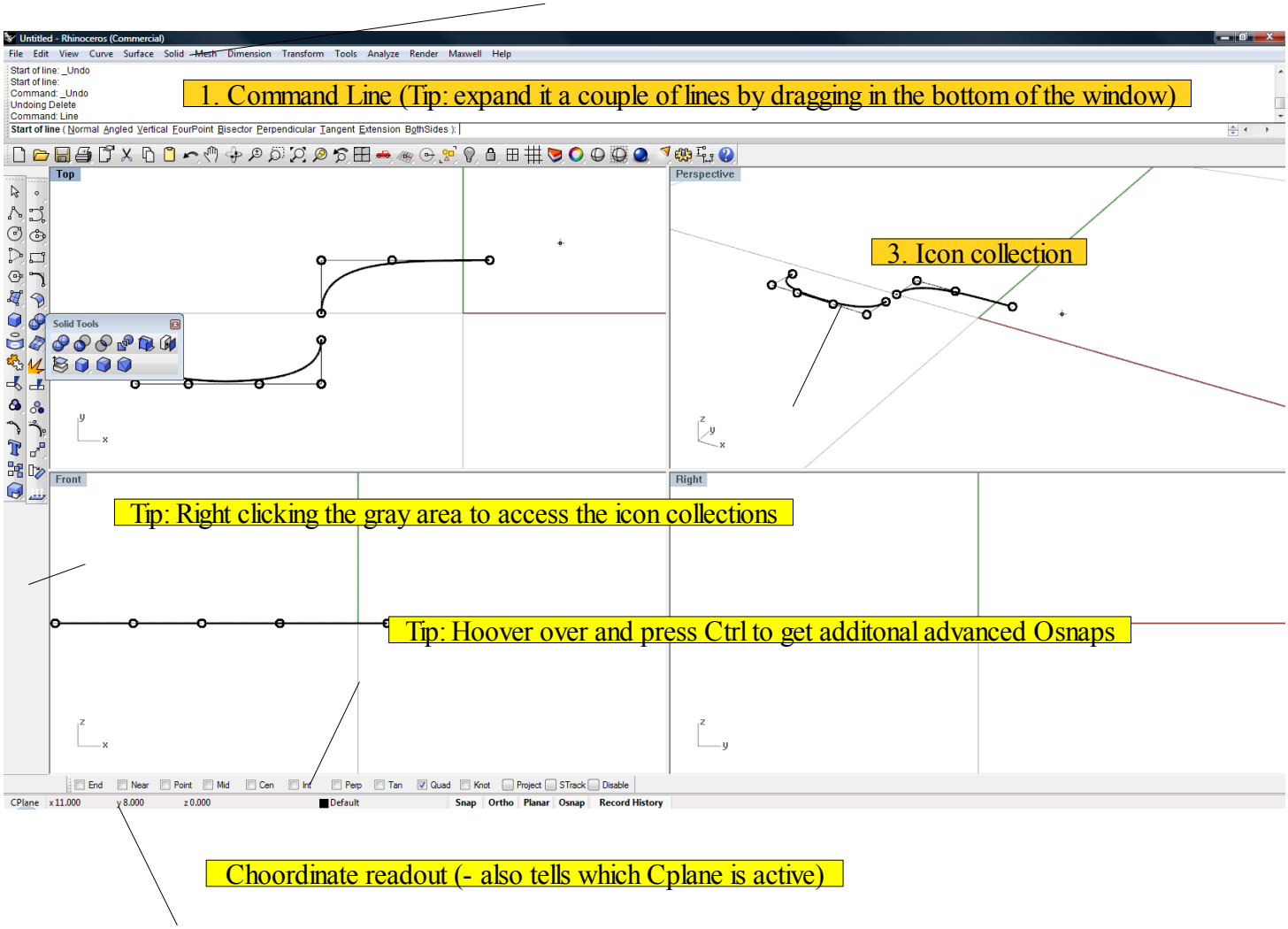
The command line gives feedback like these:
“10 curves added to selection”, or “2 curves joined into one open curve” or “Select open curve to change - pick near end:”
(Notice that in the last example, Rhino asks for some input)

Look on the command line, - you will learn the commands and how to use their options faster.

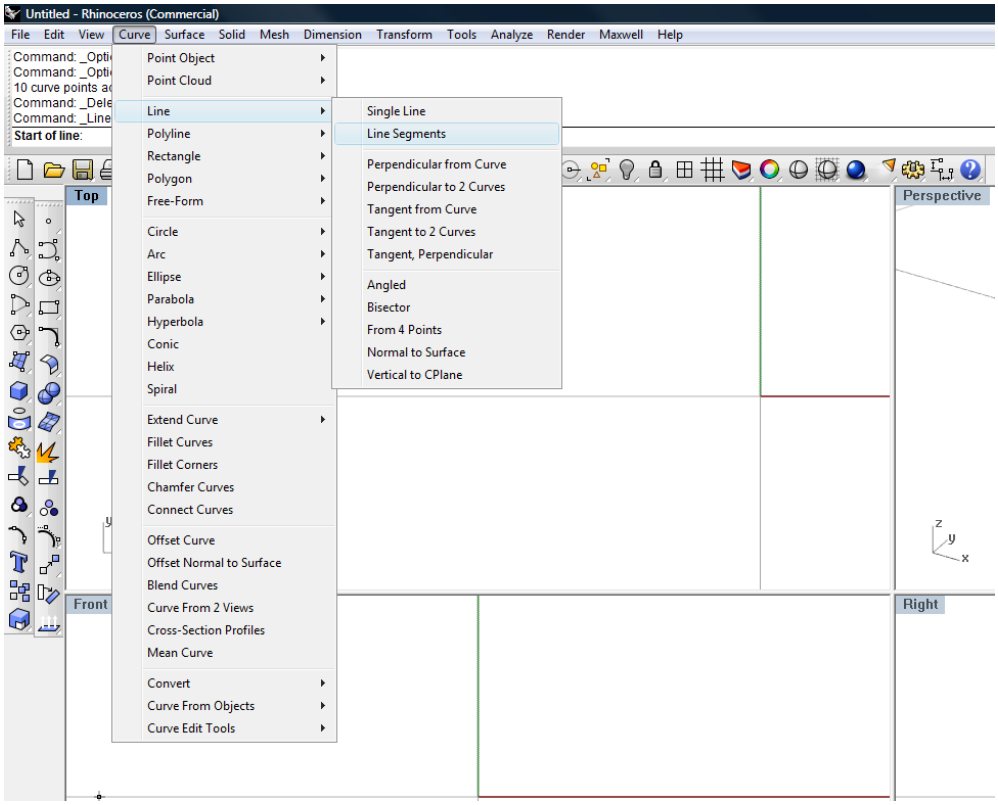
The command line also tells if anything went wrong, like this for example:
“Split failed, objects may not be within tolerance of one another” (Command: _Split).

Right Click To rotate,
Right Click + Shift to pan
Right Click + Ctrl to zoom (or, if available, use the mouse wheel)

Three ways to access commands:



In the list menus you will find almost all the commands. Using the lists are a good of getting a brief overview of them in an organized way.



Remember to use help (F1) if you get stuck.

Rhino Settings

Rhino has a variety of users, from product designers to architects and engineers. For that reason the default settings are not optimal for every specific work flow. Luckily Rhino offers a range of ways to customize and set up your own work flow!

This is information about settings and tips that we find useful as practicing Product Designers. Just don't forget that your specific project might require different settings.

Units

It usually makes most sense to model in actual size, and to set the unit according to your need for fidelity in your modeling. Like millimeters for machine parts, and meters for landscapes.
Rhino normally sets the absolute tolerances at 0.01 or 0.001 units depending on the template you use. You can create your own templates with other tolerances.

Absolute tolerance

Tolerances should be set at the start of the project. You can change the tolerances while you work, but objects modeled previously with lower tolerances will not change if you raise the tolerance.
All surface edges and curve ends have a tiny gap between them, even though you can join them. The absolute tolerance sets the maximum distance apart that surface edges and curve ends are allowed to be while being guaranteed possible to join (curves under 2x the tolerance apart are sometimes still possible to join).

Keep in mind that the edge joining tolerances scale up in the same proportion as the model, so scaling an object larger also scales the gaps between the edges.

0.001 (1/1000 of a millimeter) should be the default for product design, as this will be a tight enough for exporting to most other programs.

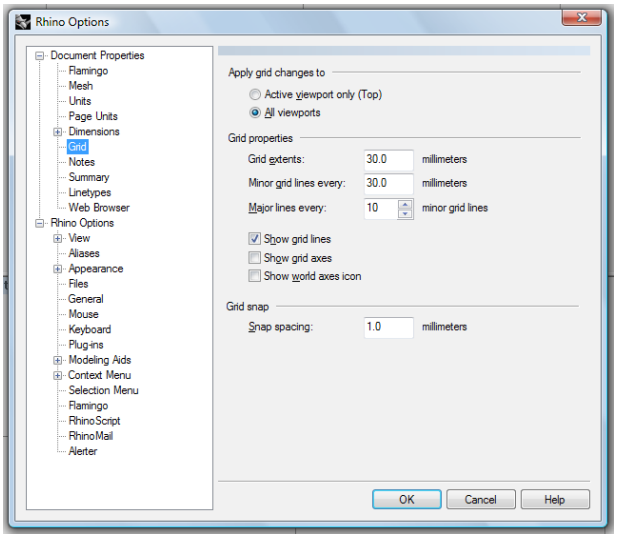
There is normally never a need to use absolute tolerance smaller than 0.0001. Going lower than this is not necessary, and is likely slow down your computer, and lead to bigger files because of the extra amount of control points needed to keep the tolerance.

In architecture, it can usually be less tight than for product design. It ultimately depends on the total size of the project and what the file is intended for.
If you are modeling in meters and you set your tolerance to 0.0001 then your absolute tolerance is at 0.1 millimeter. This would be sensible for very large sites, 1000 meters in diameter or more.

A good practice is to continuously check your work by joining surfaces and curves as you model. If they join, you are within the tolerance limits, if they don't, you need to fix it at once. This will avoid ending up with a finished model with inaccuracies that are difficult to fix at a late stage.
Remember to use Object snaps when modeling as this makes being precise much easier.

Grid

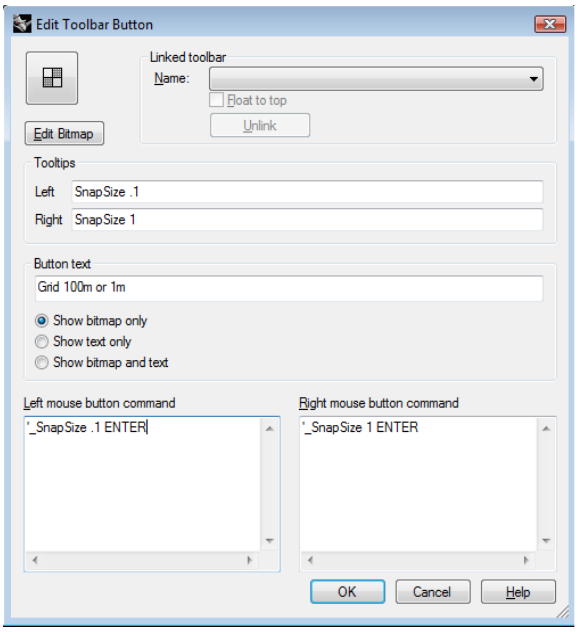
Modeling on a grid is one of the keys to modeling efficiently and precisely. You can save templates with custom grid and unit settings.



A tip is to make your own button to easily change between two levels of fidelity in your grid:
If you hoover over a button and ctrl+drag, you can make a duplicate. If you Shift+click it, you will get a dialog where you can insert a macro or script in the icons left and right click options. Click on Edit Bitmap and make your own icon picture for it too.

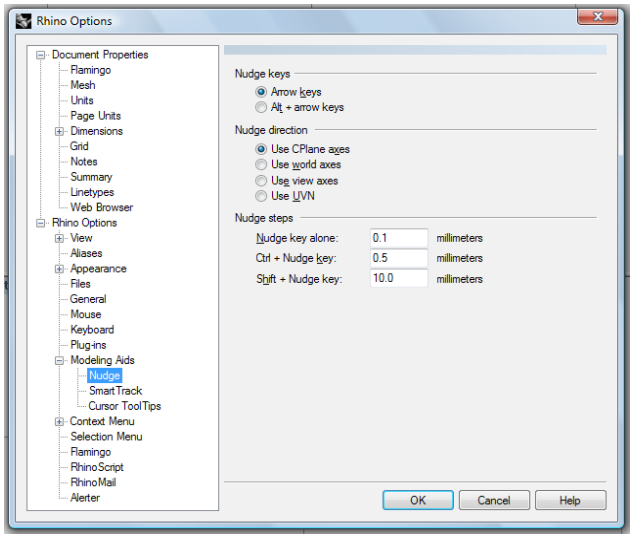
The SnapSize command sets Rhinos snap fidelity:

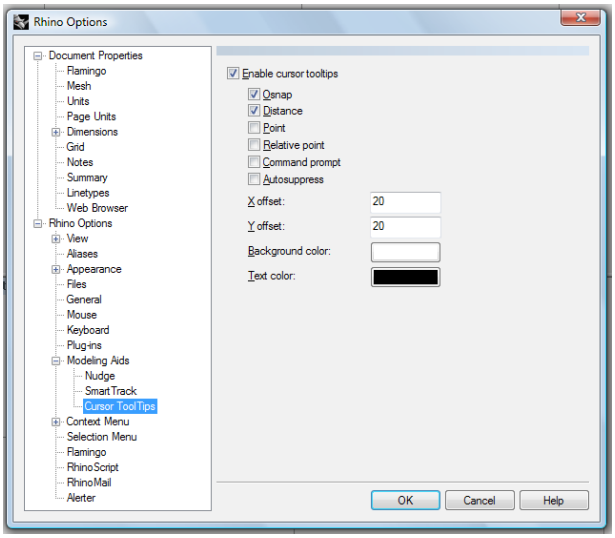
1 unit fidelity: '_SnapSize 1 ENTER
0,1 unit fidelity: '_SnapSize .1 ENTER



Modeling Aids

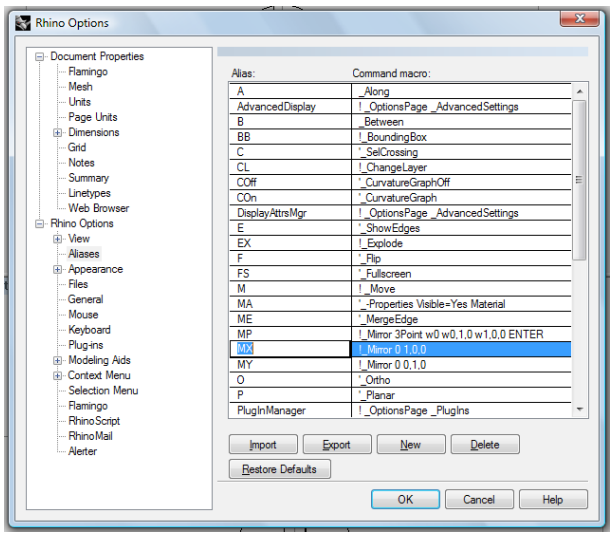
Two aids that are useful to customize are shown below.





Aliases

You can type command aliases in place of Rhino commands for things you do often, they are just like shortcuts to the commands. You can also put macros on the aliases.



Macros

Macros are series of commands that are executed in sequence. They are very effective, and simple to make. Rhino records command history which is pretty similar to what you need make a macro. Hit F2 to get the command history up.

This script for example, mirrors an object around the world CPlane: !_Mirror 3Point 0 w0,1,0 w1,0,0

MacroEditor command and test the macros there. Macros can be placed on buttons and in aliases. To place them on a button, hold in shift and hoover over a button, click on it when the tool tip "Edit" shows up. You have right and left click, and tool tip options.

Here are a few special symbols that you will often see in macros:

! (exclamation mark) at the beginning of a macro cancels any previous command. At other locations, it cancels the macro. The exclamation mark can also be used at the end of the script.

(Space) is the same as typing ENTER.

_(under score) Means English command name, and ensures that scripts written in English will work on all computers.

- (Hyphen) Suppresses the dialog box so we can script their options via the command-line. All commands are scriptable at the command line, also the commands that have dialog boxes.
' (apostrophe) means "The next command is a nestable"
View and construction plane manipulation and object snaps are nestable.

w (World coordinates) Tells Rhino to use world coordinates rather than construction plane coordinates.

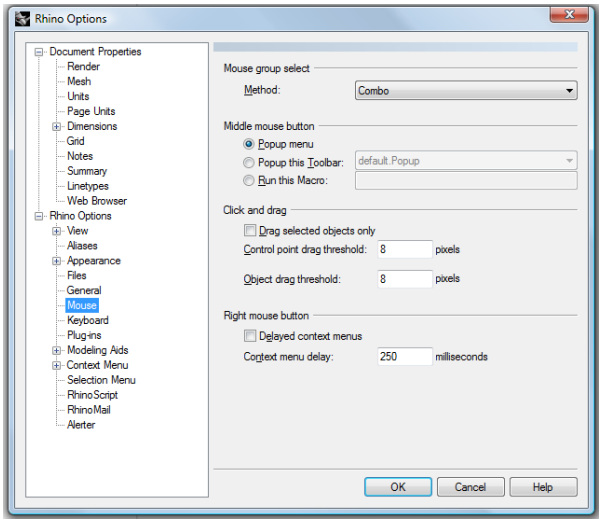
r (Relative Coordinates)
To input coordinates relative to the current x,y,z (absolute) position.

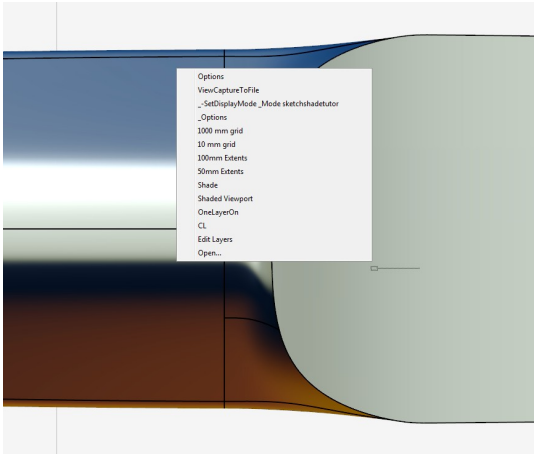
< (Angle Input)

This was a small introduction, read more about macros in Rhinos help file.

Mouse

The **Mid mouse button** sat to **Popup Menu** gives you a very handy list of previous commands when clicking the mid mouse button:





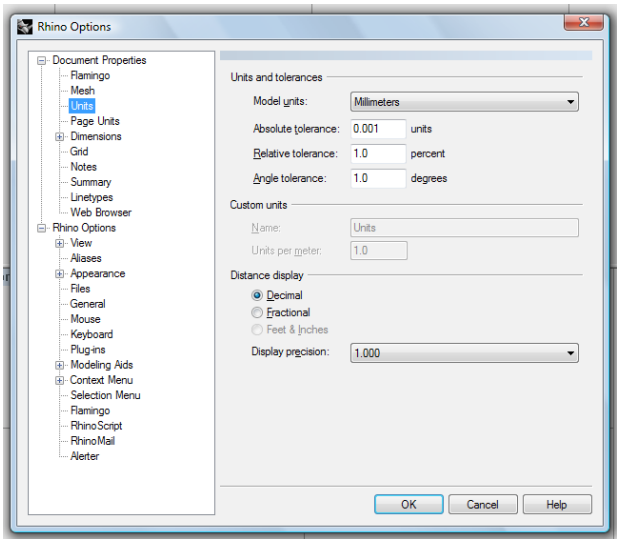
PS. You can also access this list by Right-clicking in the command window.

Mesh

Although the geometry is NURBS defined, everything you see on screen is displayed via a polygon mesh. Polygon meshes are xyz vertices with two-dimensional planes between them, and light reflection is calculated from these flat planes. The normal shading in Rhino makes these surfaces appear smooth even though they consist of flat surfaces. If you turn on the flat shading mode, you can see the actual planes.
The same meshing is used for analysis meshes (CurvatureAnalysis, Zebra, Emap etc) and by the Mesh command. You can however adjust meshes individually for each object. Therefore it is good to know some ways to adjust these meshes, both for increasing display accuracy and for avoiding slow performance.

- Settings values to zero makes Rhino either not use the option or use the default values

In the setting below we mainly use the “Maximum distance edge to surface” to control the mesh. It ensures the is no further away from the surface than the specified value, in current file units.



Maximum distance edge to surface results in fewer polygons in lower detail areas and more polygons in higher detail areas, resulting in a more efficient mesh. Smaller values result in more accurate meshes and higher polygon count, but be careful as this also slows down rendering. If the computer seems to slow down when rotating the object, you should set a higher distance.

Maximum aspect ratio will ensure that we don't get very long thin polygons which can create problems. Usually it can be left at 6.

Minimum initial grid quads is another useful option when doing surface analysis commands.
If meshes look jagged, this setting will make sure the flat areas have enough polygons to look smooth. It forces in a minimum number of polygons. Usually you can keep settings ranging from 2000 to 6000. Don't use more than you need, if it looks good then it is good.

Maximum angle dictates the maximum allowable change between the surface normal at any point and the mesh vertex.
The default value for this option is 20 degrees, if you have models with small radii, setting this value lower will make these radii's more densely meshed. Try settings between 10 and 20, depending on your needs. The setting is scale independent.