

Program for Modeling – Adding details to your layout

Working with a 3D Modeling Program, 3D Builder

In this article, we will pick up where we left off on the features of the Microsoft 3D Builder program. As noted in prior articles, this is a free program that can be downloaded if not in your initial Microsoft library. It is a program that does not require an engineering background nor a detailed understanding of Computer Aided Design (CAD). For reference **Figure 1** is a screen shot of the program when first launched. I would suggest that before going on with this tutorial, assuming you downloaded the program with the first posting, that you launch the program and follow the text so that way you can see the various commands full scale rather than the small print found in this document.

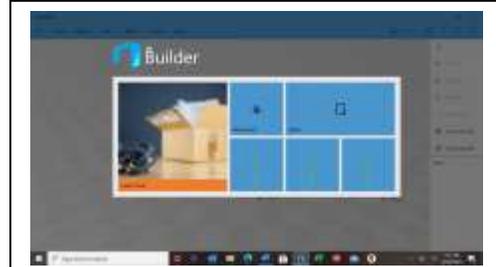


Figure 1
Title page of 3D Builder

Again, as a reference, before delving into the program, we must first visualize the space that we are going to be working in. A 3D model is one that is drawn using X, Y, Z reference frame. X being the position to the left or right of a center point defined as 0, 0, 0 by the program. Y is the position to the front or back of the center reference point (picture a pencil being pushed into the screen or being pulled out of the screen), and Z is the location up or down from the center reference point. Please note that further on, the reference point may change from the 0, 0, 0 center of the initial screen presentation. A minus in front of a number is to the left, into of the page, or below the center point.

As we go through the program, when manipulating an object, you must first move the cursor over the object and click on it.

The menu items shown on the left of the screen in **Figure 2** come up when you select a new scene and are used to manipulate all objects. The topmost command is Group. If two or more objects have been inserted and manipulated to a desire position to create a model or a portion of a model that you want to duplicate, highlighting the Group command will make join these two or more objects as a single object for moving, copying, and pasting. The second command is an Ungroup command. This is useful if you want to make multiple copies of an object but need to modify one of the shapes making duplicates of the object. Selecting the Ungroup command highlights each individual shape in the object.

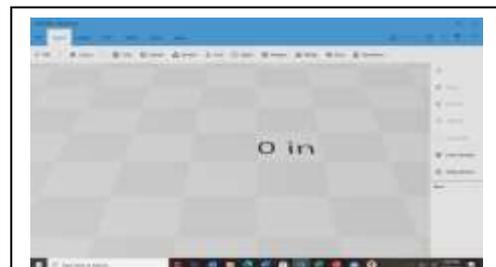


Figure 2
Screen Shot of Opened Program

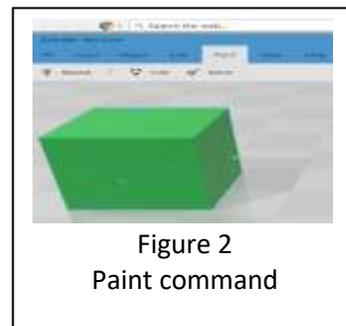
The next command is Select All. This is useful if you have multiple objects in the print envelope and want to make them one object. You select all and then group and all objects have been combined into one model.

This is followed by the Deselect function. I have found this to be one of the more useful commands. If more than one item is highlighted, and you chose to move one of them, they all will move. You must use the Deselect command to only select one object for manipulation.

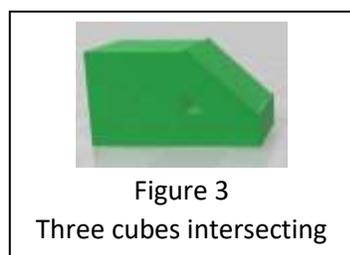
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The next category of commands is the Paint. **Figure 2** shows the screen with the functions of the Paint command highlighted. Note: selecting the Paint option without an object inserted will have the options shadowed and no selectable.

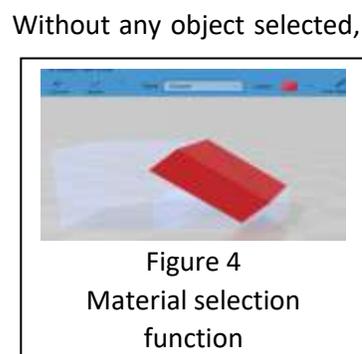


Paint command is especially useful when manipulating multiples of the same object. For this example, we will use three cubes in various positions that are being combined into one item (**Figure 3**). In my program, all cubes when inserted are green as shown. When I intersect three different cubes,



it is hard to see where the intersections are.

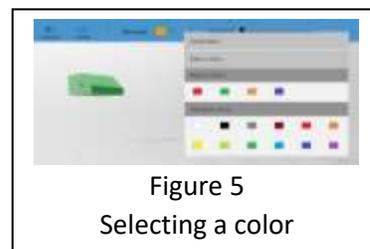
The first option is the material command. Without any object selected, highlight the material command, and then click on the furthest right select material command. An eyedropper will appear. Move that over that object you want to select and click. Clicking on the color will bring up multiple colors to choose from. Selecting one will change the color of the selected object from green to red in this example (**Figure 4**). Then click apply.



Note: Changing the color is only useful when drawing and printing in two dimensional. Unless you have filament of the color chosen, the object will print out in the color of the filament.

The other tab is Type. Selecting this tab changes the way the color is applied to the object. Again, it is for visualization purposes only and does not affect the final printing.

Moving from material to Paint, you again get three choices to work with plus a slider. The first is Cancel which can be used if you select the wrong color or object and want to go back to the color you started with. Moving over to Color and selecting it, you get the palette of colors as shown in **Figure 5**. In this drop-down menu you can select an eyedropper to apply a chosen color instead of a paint can that is the default applicator. The next tab on the menu brings up another menu with three sliders as shown in **Figure 6**.



The first is the primary colors available for mixing and producing your own unique color, the second is the density of the color when applied to an object, and the third is the brightness of the color when applied. The small box in the upper left corner shows the color you have generated with a number corresponding to the color that can be used to reproduce this color if used in multiple designs. The next tab keeps track of recently used colors which makes it easy to track colors you are using in a particular design project. And finally, there is a palette of standard colors that you can choose from.



Moving the eyedropper or the paint can over the selected object will turn it to the chosen color. The slider can be used to determine if only part of the object is to be

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color (slider at 0 end), or the whole object is colored (slider at the 100 end). Once you are satisfied with the color selection, click on the color tab next to cancel and the object will be colored. Remember, if you decide you want to go back to the original color, you can always use the arrows on the upper right to undo the last action.

The next function tab on the top bar is View. Clicking this tab brings up the screen in **Figure 7**. The secondary tab is Center view. Clicking this tab will move the object to the center of the screen. This is useful if you have been manipulating the object and have move it off center, even off screen! Hitting the center view will bring it back into the center of the screen.

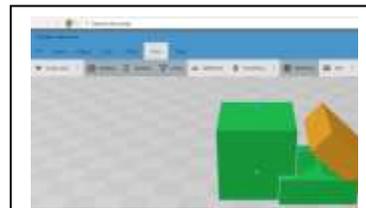


Figure 7
View Functions

The shading tab will lighten the colors on the screen and enable the shadow function. These can be observed in **Figure 7**. The color tab will remove all color from the object and reduce it to all grays. The next tab over is the reflection tab and again darkens or lightens the color of the object. It only has an effect when the shading tab has been selected. It brightens up the colors but retains the shadow affect.

The smoothing function changes how surfaces are generated. I have not found a need to use this function in any of the projects I have done.

The Wire frame tab makes the geometry shapes used to generate the object. Allows the designer to get a feel for the number of internal shapes it takes to make up the object. The more of these, the smoother the final surface.

In all the views in these tutorials, the background has looked like a checkerboard. These are grid lines that may be manipulated using the Grid tab. There is a 0/0 coordinate labeling when you first start the program. If you do not want to use these labels, you may turn these on or off with the last of the commands in the Tab function.

The last tab the X-ray view. Selecting a component within an object and then highlighting the X-ray tab will turn all other components of the object translucent. This is useful in generating mating holes when a final object is to consist of several small ones with tabs to insert into one another.



Figure 8
X-Ray view

The last function tab is the Help tab. When selected, there are three functions you can select.

The first tab is Getting started and it shows a library of items that may be downloaded and printed. This is a good way to get a feel for how to load and manipulate objects. It also has a short power point on ways to get items printed if you do not have a printer of your own. This is one way to get started with 3D printing without a printer, but it can be expensive. The next tab opens a web page that is updated by Microsoft periodically. It shows a list of printers that 3D Builder can interface with. Moving forward with this series, we will be using the Prussia series of printers. This is not to select one over any of the others, it is just the one that I have had the most success with. I do have experience with others on this list.

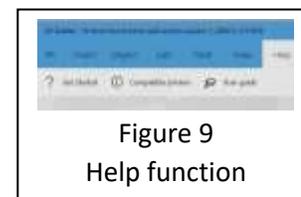


Figure 9
Help function

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Finally, we have the User's Guide tab. Clicking on this tab brings up an abbreviated user manual. I believe it is abbreviated as it presents commands and a minor description but does not show any examples or list any other reference material. In this series on 3D, we have assumed that you are designing an item for your layout. As noted in the User's manual you can use a camera to generate objects or import a jpeg or other two-dimensional object and then manipulate it. For these basic series, we are going to ignore these functions and concentrate on drawing an item. We will go back in a later article and review these functions.

On the very top of screen on the right-hand side there are two rows of icons. The top row is standard in that you can close the open program (x) making sure to save what you have done first. The next one over reduces the active screen size or enlarges to default size as in any other program. And the third one closes the viewing screen but keeps the program open. It is reopened from the bottom row of icons. These are all basic Microsoft commands from any of their programs.

On the next row, the first two arrows going clockwise or counterclockwise either takes you back to a previous view should you want to undo the most recent change to an object. If you have gone backwards to a prior view and decide you really want to keep the changes you made, using the clockwise arrow results in redoing your last change. You can go back many steps, so be careful that you don't lose a step that you have invested a lot of time and effort to create. Compare that against continuing to go backwards and having to redo a portion that you really want in your model.

The next icon will save the current status of your design. Note that this program does not have an automatic save, so if you close the program without saving, you will lose all your work. The last icon when selected opens a page that gives you options for printing using an external source. One feature of this page is that when opened, it can provide you with the estimated cost of your design.

With just a cube on the screen I have selected the print icon and had the screen in **Figure 10** open.

On the far-left side there are 4 options available. These are:

1. Printer
2. Material
3. Layout
4. About

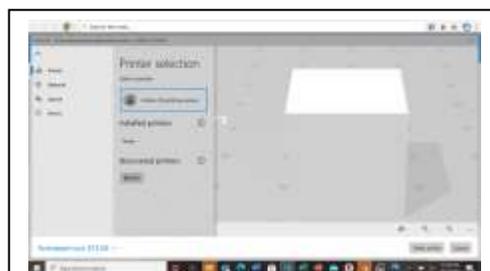


Figure 10
Print Options

When printer is selected, you may choose online printing where you will order it from an outside source. If you have a printer that has a cable connection to your computer, if previously loaded, it will show up here. I have two printers that must be connected to the computer to download the print file. Please note that some printers when getting downloads from the computer will require that the computer be on the whole time that the object is being printed. If you have not loaded any printers but have them connected to your computer, the second command will search for available printers and load them for you.

The material tab will bring up a series of materials and color and finishes. I have ignored this tab as my printers have the material selection as part of their slicing function.

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The Layout function allows you to change the unit measurement and the x, y, z dimensions as well as orientation on the screen. I have used this function when the object as designed does not fit on the print bed. By rotating it, I have been able to print objects on the diagonal rather than at right angles to the edge of the print bed. Thus, for instance, I have printed out some roof caps that were 9 inches long on a print bed that is 8 inches by 8 inches.

The About function exposes any third-party software used in the 3D Builder program and provides the licenses for use of this software. The data in this section may vary depending on the version of 3D Builder you have on your computer. The three icons to the right in the view of the object have a rotation function for a camera which we will address in a future article while the other two increase the view size or reduce it.

At the lower right bottom is the tab to order a print online. Selecting this tab takes you to a screen where you are asked to agree to some activities and once you have answered these questions, you will be directed to a third-party provider. The cancel button will cancel out the print online activity.

Finally, there are a set of commands on the left side of the screen when in the drawing mode (**Figure 11**). The three dots at the top will condense this dialog box providing more screen to work with while drawing.

With the dialog box open, the first option is new scene. If you are done with one design and want to start another, the new scene will open a new page. However, **it will remove all objects from the current drawing unless you have saved them before going to a new scene.** The next command will allow you to open saved files, both of your own design and from designs on the web that you might want to print. I would recommend that you pick a simple design from the web and load it to start learning how to go from your drawing to your printer. You can safely assume that the design from the web is ready for printing so you will be gaining experience with your printer options only.



Figure 11
Left hand side
options

The next command is the Save command. Whenever you have reached a level of significant design activity, I recommend that you hit save. That way if you make a mistake you do not have to start over, only from the last save point. At this point you need to decide what you are going to name your new design. Whatever you name it, it is recommended that you add to the name a version number. I find that if you make a mistake on the first print, you try to determine what the error was, go back and correct it and then Save as and up the version number.

When you Select save as, it will give you several options for file types. The default one is 3mf. When saved with this format, 3D Builder can always reopen the file for review or modification. However, this file format may not be compatible for your printer. For the Prussia printers that I am using, I need to save it also as an STL file, the next format below the 3mf format. Your printer may require one of the other file formats. In this window, you can select a place to save the file. We will talk about file saving in the next article in greater detail.

The next command is 3D Print. It does the same as the other 3D print icon that we discussed on the upper right-hand side of the screen.

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The Order online print again sends you out to the web to find a third-party printer that you can order your design to be printed by.

The Print on paper command is good to print your design in 2D for record keeping and if a contest piece, a description for the judges to read on what and how you designed your object.

The About this model brings up a series of boxes that allows you to record data about the design for future reference.

Finally at the bottom are three icons that provide feedback to Microsoft on your experience with this program, the second allows you to make setting changes and the third allows you to write a review of this program.

I assume that you already have a computer to access the BTO web page and these articles. I have used two different computers in generating my objects and feel the following are important considerations if you are going to evaluate your existing computer versus purchasing a new one.

1. Purchase one with the largest screen or monitor possible. The larger screen will allow the development and placement of smaller parts as you go through integration of different components into your design.
2. Touch screen monitor or laptop. There are keyboard strokes to move objects around on the screen and position them relative to other objects you are working with, but I find the touch screen very useful.
3. A good graphics card if that is an option is very helpful.
4. If purchasing a camera to do importing with should have the highest resolution possible to get the best results.

It is a short list, as most other functions of any computer are not applicable to the design process.

Note: If you have questions or comments about this article, please email me direct at cbartel@roadrunner.com. Hopefully, this will shorten the total time needed to get an answer to your question(s) and incorporate any comments in future document regarding 3D printing. Questions that have universal appeal to 3D printing will be posted along with the answer, but the person submitting the question will not be listed.