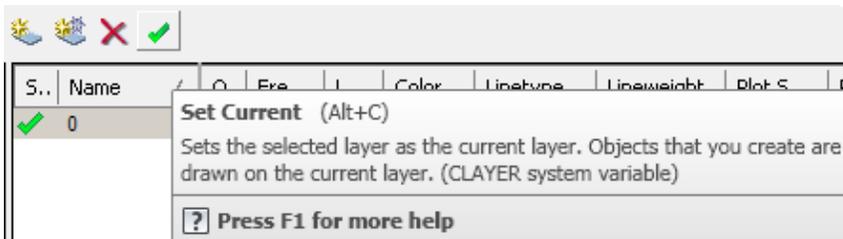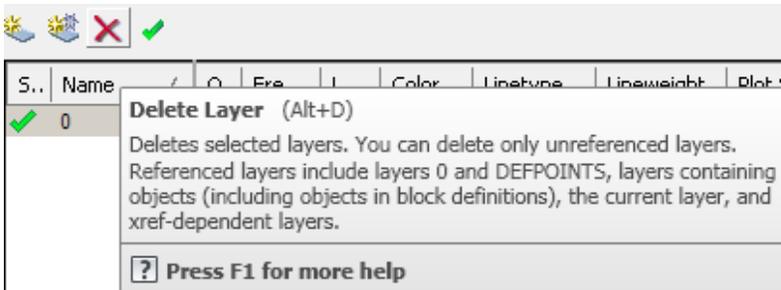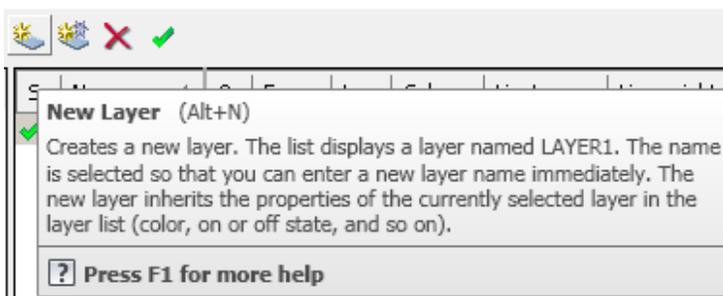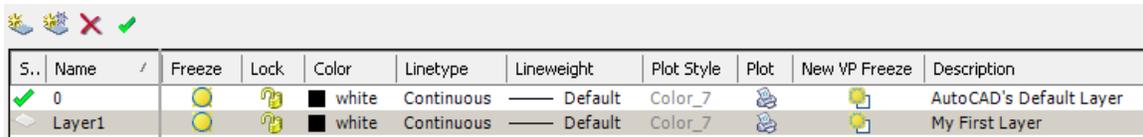# AutoCAD® Layering Help Sheet

By Mark S. Schwendau ©2012

Drawing Layers are like transparencies used to organize parts of a drawing. While there are few standards as to how people Layer drawings, the AIA has attempted to set a suggested standard they encourage architect's to use. Using the example of the architect; An architectural drawing may contain Layers for walls, partitions, fixtures, appliances, dimensions, doors, windows, etc. Layers can even be used to create alternative kitchen and bathroom designs to show a client, "What if?"

The icons in the center of the Layer Properties Manager toolbar are as follows:

New Layer (Alt+N)
Creates a new layer. The list displays a layer named LAYER1. The name is selected so that you can enter a new layer name immediately. The new layer inherits the properties of the currently selected layer in the layer list (color, on or off state, and so on).

? Press F1 for more help

New Layer VP Frozen in All Viewports
Creates a new layer and freezes it in all existing layout viewports. This button is accessible from the Model tab or layout tabs.

? Press F1 for more help

Delete Layer (Alt+D)
Deletes selected layers. You can delete only unreferenced layers. Referenced layers include layers 0 and DEFPOINTS, layers containing objects (including objects in block definitions), the current layer, and xref-dependent layers.

? Press F1 for more help

Set Current (Alt+C)
Sets the selected layer as the current layer. Objects that you create are drawn on the current layer. (CLAYER system variable)

? Press F1 for more help

The major functions most people use Layers for are to control, line types, color of the lines, and line weight at hard copy output. While drafting's "Alphabet of Lines" governs how lines are used, there are no standards for both color and weight choices but, in general, thin lines are made .30mm, medium lines are made .50mm and thick lines are made .70mm. Using these examples; center and dimension line weights would be .30, object or view lines would be .50, and drawing border and cutting plane lines for section views would be .70. It is to be noted that some versions of AutoCAD require you to load Linetypes before they can be utilized.

S..	Name	/	Freeze	Lock	Color	Linetype	Lineweight	Plot Style	Plot	New VP Freeze	Description
✔	0		○	🔓	■ white	Continuous	—— Default	Color_7	🖶	🌀	AutoCAD's Default Layer
	Layer1		○	🔓	■ white	Continuous	—— Default	Color_7	🖶	🌀	My First Layer

Also to be noted, any Layer that is not frozen, or turned off, is considered to be active however, ONLY ONE LAYER CAN BE CURRENT AT ANY ONE TIME AND YOU CAN ONLY DRAW ON THE CURRENT LAYER CHECKED CURRENT.

Layer Zero "0" and Blocks

Layer Zero is the only Layer that is preset in AutoCAD at startup and cannot be purged from the drawing, ever. It cannot be renamed, either. Layer Zero is a special Layer for when a block (AutoCAD term for symbol) is created on Layer Zero, it will assume the identity to whatever Layer it is inserted on in later use in other drawings. In other words; If a Block is made on Layer Zero, and is inserted on a Layer called say, "Plumbing", it will be an inserted Block on Layer "Plumbing" and will give up its identity with Layer Zero. On the other hand, if a Block were made on a Layer called "Plumbing", and then later inserted into a another drawing not having a Layer called "Plumbing", a new "Plumbing" Layer would be created at Block insertion.

Turning Layers On and Off

Turning a Layer on and off is an older feature used to speed the drawing process when computer processors and operating systems performed slower with CAD. You can turn a Layer off by opening the Layer Property Manager, selecting the Layer and then clicking the yellow light bulb. Once you do so, the Layer disappears from the drawing. However, if you turn on and refresh the Layers, the Layer will reappear.

Freezing or Thawing Layers

To freeze or thaw a Layer, click the sun or snowflake icon immediately to the right of the light bulb icon. When a Layer is frozen, the visible effect is the same as turning a Layer off. However, with a frozen Layer AutoCAD releases it from computer memory. If you refresh a drawing after freezing a Layer, the Layer still won't reappear. If you freeze a Layer with much geometry, instead of turning it off,

you'll see a slight boost in performance because the computer and CAD program no longer has to cycle through all the geometry on that Layer.

Locking Layers

To lock a Layer you click on the padlock. A locked Layer can be seen but cannot be edited. Hence, the difference between freeze, off, and lock, in AutoCAD is that when you freeze a Layer, you will not be able to view that Layer's contents. In the case of locking the AutoCAD Layer, you will be able to view the Layer but you will not be able to edit or change anything.

Viewport Layers

Layers may be selectively displayed by viewport using the options offered to the far right of the Layer Manger when Paper Space layouts are used. For example; If you wanted to do a 2-D drawing takeoff of a 3-D model in multiple views using the MVSETUP command, you would dimension each view by viewport and then freeze out those dimensions in the other viewports. Such Layers might look like this:

    DIMS_FV_30 – front view dimensions, this Layer frozen in other 3 viewports
    DIMS_TV_30 – top view dimensions, this Layer frozen in other 3 viewports
    DIMS_RSV_30 – right side view dimensions, this Layer frozen in other 3 viewports
    DIMS_ISO_30 – isometric view dimensions, this Layer frozen in other 3 viewports

PURGE

Is a command used to eliminate a Layer where no geometry is on the Layer any more.

Layers in 3-D Modeling

A good practice is to use extra Layers in 3-D modeling as 3-D models become so much more complex than 2-D drawings. As an example, the SOLPROF command is used to make a 2-D drawing takeoff, automatically, from a 3-D model. The command makes its own Layers starting with a PH or PV for "hidden" or "visible".   You can freeze selected Layers for a desired visibility.

Layers may also be used to control the display of tessellation lines in 3-D models as sometimes those are undesirable in views. AutoCAD 2010 and above enables you to choose different assignment of Layers to 3-D elements that belong on different Layers. In the past, boundaries and tessellations were generated to one Layer. This newer feature eliminates the need to explode model blocks in order to assign parts to different Layers. Some people move tessellation lines to the DEFPOINTS Layer so they show on the screen but not on hard copy output.
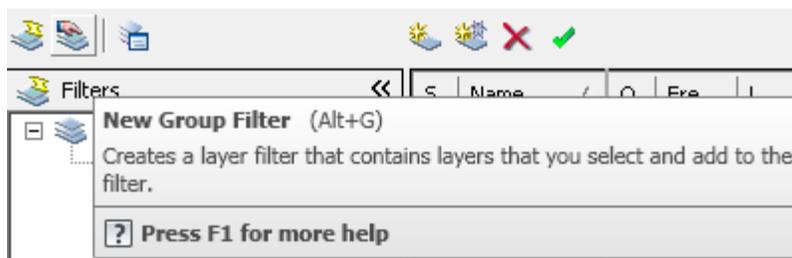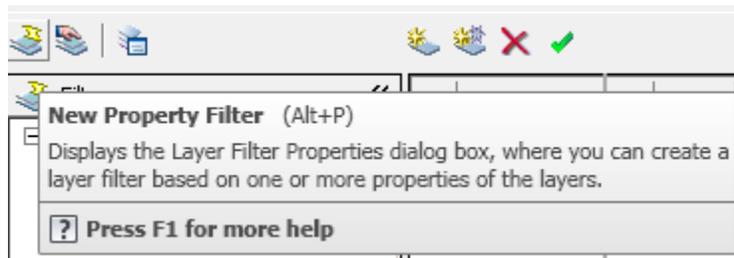
Defpoints Layer

The Defpoints Layer (definition points) is created the moment the first dimension is added to a drawing. It consists of small points in a drawing indicating the first and second points of a dimension. While the points are detectable under the ends of the extension lines if the dimension is exploded and erased, the points on this Layer are do not show up in hard copy output regardless of whether the dimension is present or exploded and deleted without its Defpoints. Nothing plots to hard copy on this Layer.
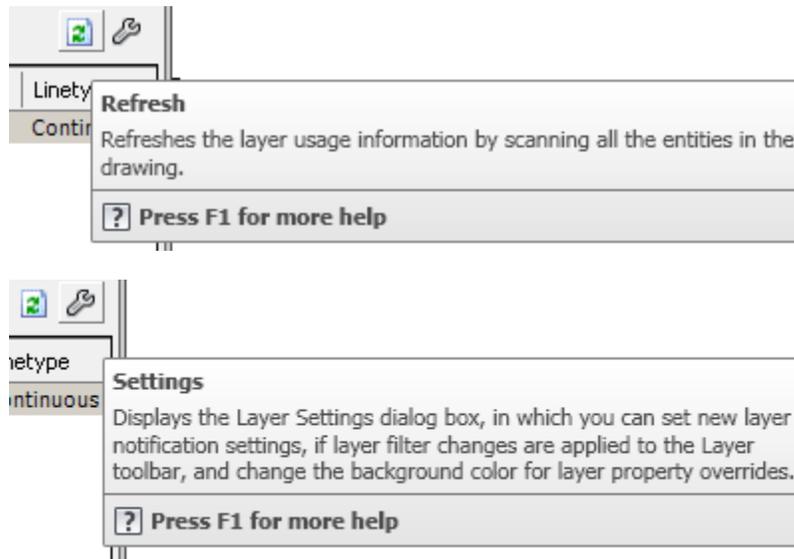
Layer Filtering

AutoCAD offers the capability to sift through drawing data by Layer filtering. This is very helpful when trying to be selective with geometry in large drawings having many Layers. There are three icons in the upper right hand corner of the Layer Manager popup window as followings:

The icons in the upper right hand corner of the Layer Properties Manager are for (L to R) making New Property filters, New Group filters and Layer States Manager.
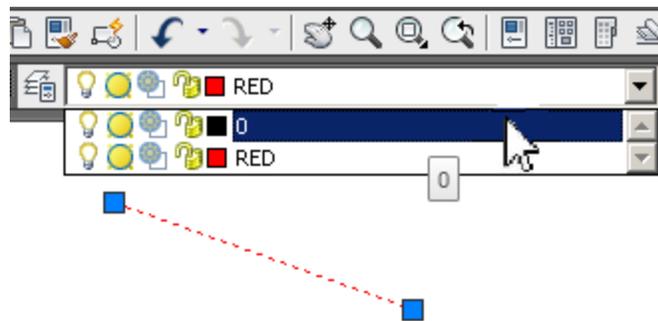
The two icons located to the far right of the Layer Properties Manger window are as follows:

Changing Geometry From One Layer to Another

One of the most common mistakes in CAD drawing is forgetting to change to the proper Layer before starting different geometry. There are three fast ways to correct this mistake without erasing the existing geometry on the wrong Layer and starting over. One easy way is to touch the geometry that is wrong and then go touch the Layer it should have been drawn on in the Layer Properties Manager pull down box. Shown below is changing a line from RED to 0 (Zero) Layer.

Another way is to open the Properties Manager box from the Modify pull down menu and perform the same operation through there.

A last option is to use the Match Properties command in the Modify pull down menu and pick geometry representing where the mistaken geometry should have been drawn and then select the mistaken geometry to move the mistaken child geometry to the parent geometry Layer (pick the good and then pick the bad to make it good).

Layer Commands of AutoCAD Express Tools

Layer Express Tools commands integrated into AutoCAD as of 2008:

- CTRL+C – to copy Layer list after highlighting in Popup window (Page 2)
- EATTEXT – Enhanced Extraction Wizard Editor to inventory Layors in XLS
- LAYER and –LAYER – popup window or command line options
- COPYTOLAYER and –COPYTOLAYER - copies objects to another Layer, leaving the original objects intact
- LAYCUR - moves selected objects to the current Layer
- LAYDEL and –LAYDEL - deletes objects from specified Layer and purges the Layer from the drawing
- LAYFRZ - freezes the Layer of selected objects
- LAYISO - isolates the Layer of a selected object
- LAYLCK - locks the Layer of a selected object
- LAYLOCKFADECTL – controls fade amount of locked Layers
- LAYMCH and –LAYMCH - changes the Layer(s) of selected objects to match the Layer of a selected destination object
- LAYMCUR - makes a Layer current based on selection of object on that Layer
- LAYMRG and –LAYMRG - moves all objects from the first selected Layer to the second selected Layer and deletes the first Layer
- LAYOFF - turns off the Layer of the selected object(s)
- LAYON - turns on all Layers
- LAYTHW - thaws all Layers
- LAYULK - unlocks the Layer of a selected object
- LAYUNISO - turns on Layers that were turned off with the LAYISO command
- LAYWALK - dynamically displays objects on selected Layers

These commands are typed in as they appear at the Command: prompt. Express Tools are an optional add on option of AutoCAD not supported by Autodesk.

Layer I and Layer II Toobars

There are two toolbars in AutoCAD for those using the AutoCAD Classic interface.

Layer Dialog Box Rather than Palette

There are two ways to use the Layer Manager dialog box rather than the Palette. Use the CLASSICLAYER command or change LAYERDLGMODE variable to 0.

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