Using AutoCAD Layers

Engineering Design Technology
Sacramento City College
Introduction to Layers
Introduction To Layers

- In manual drafting, details of a design are separated by placing them on different sheets.

- This is called overlay or pin drafting
  - Each overlay is perfectly aligned with the others.
  - All of the layers can be reproduced to reflect the entire design.
  - Individual layers may be reproduced to show specific details.
Introduction To Layers

- In AutoCAD, overlays are called layers.
- The use of layers increases productivity.
  - Specific information can be grouped by layer.
  - Drawings can be reproduced by layer or combined in any sequence desired.
  - Each layer can be assigned a different color to improve clarity.
Introduction To Layers

- Each layer can be plotted in a different color or pen width.

- Selected layers can be turned on or off, or frozen to decrease information clutter.

- Changes can be made to a layer promptly.
Mechanical drafting

The following may be placed on separate layers:

- views
- hidden features
- dimensions
- sections
- notes
- symbols
Layers Used by Field

- Architectural Drafting
  - Drawings usually contain over 100 layers
  - Floor plan layer
  - Foundation plan layer
  - Partition layout layer
  - Plumbing layer
  - Electrical layer
  - Structural layer
  - Roof drainage layer
  - HVAC systems layer
Layers Used by Field

- Interior Design Drafting
  - floor plan layer
  - interior partition layer
  - furniture layer
Layers Used by Field

- Electronics Drafting
  - Circuit boards have multiple layers to conduct electricity to different components.
  - Each layer of a circuit board is drawn on a different layer.
Setting Linetype by Layer

- AutoCAD allows you to select a linetype for each layer.
  - Any item drawn on that layer would be assigned that linetype
The “O” Layer

- AutoCAD uses Layer 0 as the default layer.
  - It has a continuous linetype.

- The ZERO layer or “0” layer is a special layer.

- The “0” layer should be kept empty.
- It is reserved for creating BLOCKS.
Create the layer FIRST.

MOVE to that layer.

THEN, draw objects on the new layer.

Do not draw objects on Layer 0.
Naming Layers

Name **Layers** to reflect what is on the **layer**.

Examples of good layer names:

- *1stFL_PLAN*
- *1stFL_ELECTRICAL*
- *1stFL_MECHANICAL*
Naming Layers

- Name **Layers** to reflect what is on the **layer**.

- Examples of poor layer names:
  - LAYER1
  - LAYER2
  - LAYER3
Naming Layers

- Layer names can have up to 31 characters.
- Layer names can include:
  - Letters.
  - Numbers.
  - Special characters.
- Layer names cannot include / \ | * ? ; or :
Access the LAYER command by:

1. Typing LA or LAYER at the Command: prompt.
   - OR
2. Select the Layers button on the Object Properties toolbar.
   - OR
3. Select Layer from the Format pull-down menu.
The only layer present in a new drawing is the 0 Layer.

Add Layers as needed.

To ADD a layer pick the New button
A new layer listing appears using the default name of Layer 1.
This is a screenshot from an earlier version of AutoCAD.
This is a screenshot from an earlier version of AutoCAD
2012 version
LAYER Command

- You can enter several new layers at the same time.

- Entering several layer names at the same time is faster than entering them individually.
You can set a new current layer by

1. Highlighting the layer name in the layer list

OR

2. Double-clicking on the layer.
2012 version
Viewing Layer Status

- The status of each layer is displayed with icons to the right of the layer name.
- ToolTips indicate what each icon represents.
  - Changing layer name.
  - Turning layers on/off.
  - Thawing/freezing layers.
  - Thawing/freezing layers in viewports.
  - Unlocked and locked layers.
  - Layer color.
  - Layer linetype.
This is a screenshot from an earlier version of AutoCAD
### AutoCAD Layers

The Layer Properties Manager window displays a list of layers with various properties. The layers include:

- Arch_Detail_Door
- Arch_Section_Ceiling
- Arch_Section_Handrail
- Arch_Section_Insul
- Arch_Section_Truss
- Arch_Section_VP
- Arch_Section_Wall
- C-241-1
- Center
- DEFFPOINTS
- Dim
- Foundation_Plan_Dim
- L1
- LAYER11A
- LAYER131A
- Layer131B
- LAYER131D

Each layer has properties such as color, linetype, and lineweight. The layers are sorted alphabetically, and the status of each layer is indicated by a check mark or a box.
2012 version
This is a screenshot from an earlier version of AutoCAD.
Selecting Multiple Layers

☐ Several layers can be selected at once in the layer dialog box.

☐ Hold [Shift] to select layers contiguously.

☐ Hold [Ctrl] to select multiple layers individually, NOT contiguously.
This is a screenshot from an earlier version of AutoCAD.
This is a screenshot from an earlier version of AutoCAD
Setting the Layer Color

- Layers are coded by **name** and **number**
  - 1 red
  - 2 yellow
  - 3 green
  - 4 cyan
  - 5 blue
  - 6 magenta
  - 7 white

- Memorize these numbers/colors.
This is a screenshot from an earlier version of AutoCAD.
AutoCAD Layers 37

2012 version
Setting the Layer Color

- Color settings affect the appearance of plotted drawings.

- Plotter pen widths are associated with drawing color.
  - Color = line width
  - Color = pen weight

- The colors you use must correspond to the proper pen widths.
**Setting the Layer Color**

- For this class, use
  - Thin Lines (text, guidelines) White OR Yellow
  - Object Lines (medium thickness) Cyan OR Green OR Magenta
  - Thick Lines (thickest) Blue OR Red
Setting/Changing Linetype Assignments
Setting the Layer Linetype

- AutoCAD linetypes are listed in the text and include
  - Continuous
  - Phantom
  - Center
  - Hidden
  - Batting
  - Hot water
  - Cold water
  - Natural Gas
  - And many others
Linetypes can be assigned to a layer.

All entities drawn on that layer would be that line type.

- Center
- Hidden
- Continuous
- Phantom
- Etc.

The default linetype assignment is “continuous”.
Setting the Layer Linetype

- To change a linetype for a layer.
  - Pick the layer you want to change
  - Pick its linetype.
This is a screenshot from an earlier version of AutoCAD
AutoCAD Layers 2012 version
Click on the word “Continuous” to select a linetype for this layer.
Changing Linetype Assignments

- The first time you use this dialog box only the Continuous linetype will be displayed.

- You need to load any other linetypes to be used in the drawing.
Loading Linetypes

1. Pick the **Load** button to display the **Load or Reload Linetypes** dialog box.

2. Select the file where the linetypes are stored “ACAD.LIN”.

   - AutoCAD stores line types in the file **ACAD.LIN**

3. Select the linetypes to load

4. Pick OK.

   - You can also double-click on a linetype to select it.
Click on the word “Load” to access other line types.

This is a screenshot from an earlier version of AutoCAD
The first time you use this dialog box only the Continuous linetype will be displayed.
The first time you use this dialog box, only the *Continuous* linetype will be displayed.
This is a screenshot from an earlier version of AutoCAD

<table>
<thead>
<tr>
<th>Linetype</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAD_ISO002W100</td>
<td>ISO dash</td>
</tr>
<tr>
<td>ACAD_ISO003W100</td>
<td>ISO dash space</td>
</tr>
<tr>
<td>ACAD_ISO004W100</td>
<td>ISO long-dash dot</td>
</tr>
<tr>
<td>ACAD_ISO005W100</td>
<td>ISO long-dash double-dot</td>
</tr>
<tr>
<td>ACAD_ISO006W100</td>
<td>ISO long-dash triple-dot</td>
</tr>
<tr>
<td>ACAD_ISO007W100</td>
<td>ISO dot</td>
</tr>
<tr>
<td>ACAD_ISO008W100</td>
<td>ISO long-dash short-dash</td>
</tr>
<tr>
<td>ACAD_ISO009W100</td>
<td>ISO long-dash double-short-dash</td>
</tr>
<tr>
<td>ACAD_ISO010W100</td>
<td>ISO dash dot</td>
</tr>
<tr>
<td>ACAD_ISO011W100</td>
<td>ISO double-dash dot</td>
</tr>
</tbody>
</table>

AutoCAD Layers
## Available Linetypes

<table>
<thead>
<tr>
<th>Linetype</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAD_ISO02W100</td>
<td>ISO dash</td>
</tr>
<tr>
<td>ACAD_ISO03W100</td>
<td>ISO dash space</td>
</tr>
<tr>
<td>ACAD_ISO04W100</td>
<td>ISO long-dash dot</td>
</tr>
<tr>
<td>ACAD_ISO05W100</td>
<td>ISO long-dash double-dot</td>
</tr>
<tr>
<td>ACAD_ISO06W100</td>
<td>ISO long-dash triple-dot</td>
</tr>
<tr>
<td>ACAD_ISO07W100</td>
<td>ISO dot</td>
</tr>
<tr>
<td>ACAD_ISO08W100</td>
<td>ISO long-dash short-dash</td>
</tr>
<tr>
<td>ACAD_ISO09W100</td>
<td>ISO long-dash double-short-dash</td>
</tr>
<tr>
<td>ACAD_ISO10W100</td>
<td>ISO dash dot</td>
</tr>
<tr>
<td>ACAD_ISO11W100</td>
<td>ISO double dot</td>
</tr>
</tbody>
</table>

Displays the linetypes available to load. To select linetypes on the list, right-click and choose Select.
## Available Linetypes

<table>
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<td>ISO long-dash double-short-dash</td>
</tr>
<tr>
<td>ACAD_ISO10w100</td>
<td>ISO dash dot</td>
</tr>
<tr>
<td>ACAD_ISO11w100</td>
<td>ISO double-dash dot</td>
</tr>
<tr>
<td>ACAD_ISO12w100</td>
<td>ISO double-dash double-dot</td>
</tr>
</tbody>
</table>

The selected linetype is `acad.lin`.
Assigning Lineweights
Assigning Lineweights

- AutoCAD lineweights can also be assigned to:
  - A layer
  - To individual drawing entities.

- However, lineweight is almost always represented by COLOR.
  - Using individual lineweights adds a layer of needless complexity to the drawing.
  - Most firms do NOT use lineweights.
Changing Layers
Quickly Setting a Layer Current

- Use the **Layer Control** drop-down list located in **Object Properties** to quickly change to another layer.

- Pick the **name of the layer** and that layer is set current.

- The dialog box automatically closes.

- You can also use **CLAYER** command
AutoCAD Layers
AutoCAD Layers
Making Object’s Layer Current
You can select an object on the drawing and have the layer of that object become the current layer.
Making Object’s Layer Current

1. Select **Make Object’s Layer Current** in the Object Properties toolbar.

2. Select the object.
   - AutoCAD then displays a prompt “PLUMBING is now the current layer” giving the name of the layer on which the object you selected was on.
Make Object’s Layer Current
Sets the current layer to that of a selected object

You can change the current layer by selecting an object on that layer. This is a convenient alternative to specifying the layer name in the Layer Properties Manager.

Press F1 for more help

Command: la
COMMAND: LAYER

Command:
Changing Object Layers
Easy Way
Changing Object Layers

- Always draw objects on appropriate layers first.
  - Select the CORRECT layer first.
  - THEN, draw the object.

- If objects are drawn on the wrong layer, they can be:
  - Moved from one layer to another.
Changing Object Layers

To change object from one layer to another:

1. Select the object
2. Select the desired Layer from the Layers button in the Object Properties toolbar

The object is moved to the selected layer.
Changing Object Layers
The Hard Time Consuming Way -

The DDMODIFY Command
Changing Object Layers

- **DDMODIFY**
  - Tells you EVERYTHING about a particular drawing entity.
  - Often it is TOO MUCH information.

- Has a SMALL close box.

- Cumbersome to use.
Changing Object Layers

- **DDMODIFY** can be used to change object from one layer to another
  
  1. Select the **Properties** button in the **Object Properties** toolbar
  
  OR

  2. Select **Properties** from the **Modify pull-down menu**
  
  OR

  3. Type “**DDMODIFY**” or “**MO**”

  2. Select the object.

  A dialog box appears that relates to the specific object you selected.
AutoCAD 2000 - [1st floor architectural]
<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>ByLayer</td>
</tr>
<tr>
<td>Layer</td>
<td>0</td>
</tr>
<tr>
<td>Linetype</td>
<td>ByLayer</td>
</tr>
<tr>
<td>Linetype scale</td>
<td>1.0000</td>
</tr>
<tr>
<td>Lineweight</td>
<td>ByLayer</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plot style</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot style</td>
<td>ByLayer</td>
</tr>
<tr>
<td>Plot style table</td>
<td>Sample Floor Plan_Architectural</td>
</tr>
<tr>
<td>Plot table attached to</td>
<td>Model</td>
</tr>
<tr>
<td>Plot table type</td>
<td>Named without translation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>View</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Center X</td>
<td>55.3331</td>
</tr>
<tr>
<td>Center Y</td>
<td>40.2620</td>
</tr>
<tr>
<td>Center Z</td>
<td>0.0000</td>
</tr>
<tr>
<td>Height</td>
<td>70.2188</td>
</tr>
<tr>
<td>Width</td>
<td>117.7574</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Misc</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS icon On</td>
<td>Yes</td>
</tr>
<tr>
<td>UCS icon at origin</td>
<td>Yes</td>
</tr>
<tr>
<td>UCS per viewport</td>
<td>Yes</td>
</tr>
<tr>
<td>UCS Name</td>
<td></td>
</tr>
</tbody>
</table>
Overriding Layer Settings
Overriding Layer Settings

❑ Color and linetype settings reference layer settings by default.

❑ The “BYLAYER” setting on the Object Properties toolbar.
When you create a layer, you also establish a color and a linetype to go with that layer, the ByLayer setting.

ANY SETTING except BYLAYER is an override.
AutoCAD offers the user tremendous flexibility.

- You can make any object any color
- You can make any layer any color
- You can make any object any linetype
- You can make any layer any linetype
Overriding Layer Settings

- You can override the current object color.

- All objects created will be drawn with the color of the override setting.

- Layer settings will have NO effect.

- THIS IS NOT RECOMMENDED!
Overriding Layer Settings

Example:

1. When BYLAYER setting is selected:
   - Layer Setting: RED
   - Object Appearance: RED
   - Layer Setting: CONTINUOUS
   - Object Appearance: CONTINUOUS

2. When Override setting is selected:
   - Overrides set to Color = GREEN; Linetype = HIDDEN
   - Layer Setting: RED
   - Object Appearance: GREEN
   - Layer Setting: CONTINUOUS
   - Object Appearance: HIDDEN
Overriding the Current Object Color

- Select the **Color Control** drop-down list from the **Object Properties** toolbar.
- Select the color you wish.
Overriding the Current Object Color

- Once an absolute color is specified,
  - An OVERRIDE is established.
  - All objects created are drawn in the specified color
  - REGARDLESS of the current layer settings.
The CECOLOR Variable
Overriding the Current Object Color

- The system variable that controls color is `CEColor`.
- `CEColor` stands for “current entity color”.

- Setting the `CEColor` variable from the Command: prompt
  - Command: CECOLOR
  - New value for CECOLOR <“BYLAYER”>: (enter new color value)

- THIS IS NOT RECOMMENDED!
Overriding the Current Object Color

☐ This is the same as choosing the color from the color drop-down menu on the Object Properties toolbar.
You can override the current object linetype.

All objects created will be drawn with the linetype of the override setting.

Layer settings will have no effect.

This is similar to setting the color different from the layer settings.
Overriding the Current Object Linetype

- The variable that controls linetype is CELType.
- CELType stands for current entity linetype.

- Setting the CELType variable from the Command: prompt
  1. Command: CELType
  2. New value for CELTYPE <“BYLAYER”>: (enter new linetype value).
  3. Select the linetype you wish.
Overriding the Current Object Linetype

- Once an absolute linetype is specified, all objects created are drawn in the specified linetype, REGARDLESS of the current layer settings.

- THIS IS NOT RECOMMENDED!
Overriding the Current Object Color

This is the same as choosing the linetype from the linetype drop-down menu on the Object Properties toolbar.
Layers

- New layer
  - Creates a new layer
  - Default name Layer1
    - If existing layer name is highlighted when you make a new layer, the highlighted layer’s properties (color, linetype, lineweight, and plot style) are used as a template for the new layer.
You can create many new names for new layers quickly by typing the first layer name, then typing a comma before other names.

A comma forces a new “blank” layer name to appear.
Layer – New Layer VP

Use this option to create a new layer that is frozen in all viewports.
Layers

- Delete

- Allows you to delete layers
- Only layers with no geometry can be deleted.
- You cannot delete
  - a layer that has objects on it
  - Layer 0.
  - The current layer.
  - Layers that are part of Xref drawings.
**Layers**

- **ON**
  - If a layer is ON, it is VISIBLE.
  - Objects on visible layers can be
    - Edited
    - Plotted

- **Layers that are OFF are not visible**
  - Objects on layers that are OFF
    - Will not plot
    - Cannot be edited
      - Unless the ALL selection option is used
      - Example Erase, ALL

**It is not advisable to turn the current layer OFF.**
Layers

- Freeze/Thaw
  - Override ON and OFF
  - Freeze
    - Is a *more protected state* than OFF.
- Frozen layers
  - Are not visible
  - Objects cannot be edited or plotted
  - Objects cannot be accidentally erased with the ALL option.
  - Are not regenerated.
    - Speeds up computing time when working with large and complex drawings.
Layers

- Freeze/Thaw
  - Thawing
    - Reverses the Freezing state
    - Layers can be Thawed and turned OFF.
  - Frozen layers are not visible even though the light bulb icon is turned on.
Layers

- Lock/Unlock
  - Lock
    - Protects layers from being edited
    - Layers are still visible
    - Layers can be plotted.
  - Locking a layer prevents its objects from being changed even though they are visible.
    - Objects on Locked layers cannot be selected with the ALL
    - Layers can be Locked and OFF.