AS197468-L

AutoCAD Customization Boot Camp: Basic (No Experience Required)

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Learning Objectives

- Learn how to create custom desktop icons
- Learn how to create command aliases
- Discover tools and tool palettes
- Learn how to modify the ribbon and Quick Access toolbar

Description

You can extend AutoCAD software several ways, but many users are unsure of where or how to get started. In this lab, you'll create custom desktop icons, create and modify command aliases that you can use to start commands, define tools and tool palettes, and modify the Quick Access toolbar and ribbon to reduce repetitive drawing tasks. This lab will give you a solid foundation in some of the available customization features that AutoCAD offers to increase your productivity upon your return to the office. This session will feature AutoCAD and AutoCAD LT software.

Speaker(s)

Lee Ambrosius is a Principal Learning Experience Designer at Autodesk, Inc., for the AutoCAD and AutoCAD LT products on Windows and Mac OS. He works primarily on the customization, developer, and CAD administration documentation along with the user documentation. Lee has presented at Autodesk University for almost 15 years on a wide range of topics, from general AutoCAD customization to programming with the ObjectARX technology. He has authored several AutoCAD-related books, with his most recent project being *AutoCAD Platform Customization: User Interface, AutoLISP, VBA, and Beyond*. When Lee isn't writing, you can find him running or cycling and engaging the AutoCAD community via various platforms (forums, AutoCAD related blogs, and Twitter).

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1 Introduction

The AutoCAD software is an extensive 2D drafting and 3D modeling program that has grown in functionality since it was first introduced almost 35 years ago back in 1982. What sets AutoCAD apart from many other CAD programs is its expansive customization and automation capabilities. The customization and programming features of AutoCAD allow individuals and companies to simplify everyday workflows, such as:

- Initial drawing setup; establish drawing units and format, create layers, insert a title block and populate attribute values
- Extraction of design data for use downstream in a bill of materials or order entry system
- Consumption of project information from a data source such as a spreadsheet or database

This lab will provide you with the opportunity to roll-up your sleeves and get some hands-on experience with customizing AutoCAD which will prepare you to apply the techniques covered in your everyday workflows. While knowing how to program isn't a requirement to customize AutoCAD, learning how to program does provide you with a greater set of resources to automate tasks in AutoCAD.

2 Which Customization and Programming Options are Available

Not all customization and programming options are created equally, some options are easy to learn and are well integrated into the AutoCAD program that many don't even realize they are customizing the program. For example, creating new layers and named styles are forms of customization that are performed frequently. There are two types for customization and programming that are available; drawing and application.

The following lists many of the customization and programming options available:

Basic

Drawing

- Layers
- Blocks
- Annotation styles (text, dimensions, multileaders, and tables)
- Materials and visual styles
- Drawing templates

Application

- Desktop shortcut
- Command aliases
- Tool palettes
- Workspaces
- User profiles
- Plot styles

Intermediate

Drawing
- Dynamic blocks

Application
- Scripts
- Action macros
- User interface (CUI Editor)
- DIESEL
- Custom linetypes and hatch patterns
- Custom shapes and text styles

Advanced (Application Only)

- AutoLISP / Visual LISP
- Visual Basic for Applications (VBA)
- ActiveX / COM (VBA, VBScript, VB.NET, C#, C++)
- Database connectivity
- Managed .NET (VB.NET, C#)
- ObjectARX (C++)
- JavaScript
- Sheet Set Manager API
- CAD Standards plug-ins
- Transmittal API
- Connectivity Automation API
- Forge Platform APIs

3 What You Need to Get Started

Many of the customization and programming options available for use within the AutoCAD program are supported through utilities or commands found inside the program, or applications installed with the operating system (Windows or Mac OS). It is when you want to extend the functionality of the AutoCAD program using ActiveX, Managed .NET, or ObjectARX that you will need to purchase, download, and/or install additional software.

4 Desktop Shortcuts

Shortcuts, often found on the Windows desktop/taskbar or Start Menu, are used to open documents and start applications. Application shortcuts are commonly used to start an executable and pass the executable optional parameters, known as *command line switches*, to alter the way the executable runs. For example, when you install an AutoCAD-based toolset, the installer typically creates two shortcuts; one that can be used to start plain AutoCAD and a second that starts the toolset product. These two shortcuts use different command line switches to start the AutoCAD executable in the preferred configuration.

Customizing a shortcut involves changing its Target property and by adding one or more of the 15+ different available command line switches associated with the AutoCAD executable; AutoCAD LT supports less than 15 different command line switches. Command line switches are not case sensitive and more than one command line switch can be used at a time.

The following is the default value of the Target property for the AutoCAD 2019 shortcut:

"C:\Program Files\Autodesk\AutoCAD 2019\acad.exe" /product ACAD /language "en-US"

The following table lists some of the most frequently used command line switches available for use with the AutoCAD executable.

Command Line Switch	Description
`/product`	Specifies the AutoCAD-based product to launch when AutoCAD is installed side-by-side with an AutoCAD-based toolset. *`/product ACAD`* *`/product ACA`*
`/language`	Specifies which installed language pack to use. *`/language "en-us"`*
`/nologo`	Hides the splash screen at startup. *`/nologo`*
`/p`	Sets a named user profile current that is defined in the product or loads a previously exported profile (ARG) file. *`/p "<<Unnamed Profile>>"`*
`/t`	Specifies the drawing template to use for the default drawing. *`/t "mytemplate.dwt"`*
`/w`	Sets a named workspace current if it is defined in the main CUIx file. *`/w "2D Drafting"`*
`/safemode`	Prevents the loading and execution of all executable file types in the current session. (Introduced with AutoCAD 2014 and replaces `/nolisp` which was introduced with AutoCAD 2013 SP1.) *`/safemode`*

Note: When specifying a folder or file that contains spaces in the Target property, you must surround the path and file name with double quotation marks. Without the double quotation marks, the AutoCAD program interprets each space as the start of a new parameter. For example, *C:\Program Files\Autodesk\AutoCAD 2019\acad.exe* would need to be entered as *"C:\Program Files\Autodesk\AutoCAD 2019\acad.exe"*.

Multiple command line switches can be used together, simply add a space before each command line switch and its associated value; some switches do not require an associated value. The following example shows the use of multiple command line switches:

"C:\Program Files\Autodesk\AutoCAD 2019\acad.exe" ***/product*** *ACAD* ***/language*** *"en-US"* ***/nologo /t*** *"C:\Datasets\Lee Ambrosius\AS197468-L\C-size.dwt"* ***/w*** *"3D Basics"*

- **/product** controls whether the AutoCAD program or an AutoCAD toolset is started when one or more AutoCAD-based products are installed; in the previous example, the AutoCAD program is started
- **/language** specifies which language pack to use when one or more language packs are installed; in the previous example, the English language pack is used

- **/nologo** suppress the program's splash screen during startup
- **/t** specifies the drawing template in which to use for the creation of the default drawing; in the previous example, the drawing template used is named *C-size.dwt*
- **/w** specifies the workspace to be set current; in the previous example, the 3D Basics workspace is set current

Additional Information

You can find additional information on command line switches with these topics in the AutoCAD Online Help system:

- About Customizing Startup
- Command Line Switch Reference

E1 Create a Desktop Shortcut

This exercise explains how to create a custom desktop shortcut to launch AutoCAD, create the default drawing based on a specific drawing template file, and set the '3D Basic' workspace current.

See the Exercises section in the lab handout.

5 Command Aliases

Commands are the heart and soul of the AutoCAD program, but they take time to type or locate in the user interface. While there have been many improvements to the AutoCAD user interface since its first release, the Command prompt remains the fastest and most efficient way to execute a command. Command aliases are an alternative to typing a command and they have been consistent over the past 16+ releases. Because of their efficiency and consistency, many AutoCAD veterans prefer to use them to start commonly used commands.

Command aliases are stored in a Program Parameters (PGP) file named *acad.pgp* (or *acadlt.pgp* for AutoCAD LT users) which can be edited using a plain text editor, such as Notepad on Windows or TextEdit on Mac. Two separate pieces of information are required when defining a command alias; an abbreviation or the text to be entered at the Command prompt and the name of the AutoCAD command to be started by the command alias.

Each defined command alias must follow this syntax:

```
abbreviation, *command
```

Here are some examples of commonly used command aliases:

```
C, *CIRCLE
E, *ERASE
L, *LINE
P, *PAN
Z, *ZOOM
```

When defining new command aliases, it is recommended to place them at the bottom of the PGP file to make it easier to identify which command aliases need to be migrated after upgrading to a newer release. If you add a command alias that has the same abbreviation as another command alias in the PGP file, the latest definition of the command alias is the one defined in memory and accessible from the Command prompt.

The following shows an example of redefining the C command alias to start the COPY command rather than the CIRCLE command:

```
C, *CIRCLE
E, *ERASE
C, *COPY
```

Tip: If you are using AutoCAD, not AutoCAD LT, you can use the Alias Editor (ALIASEDIT command) that is part of the Express Tools to define and modify the command aliases in the *acad.pgp* file. The Alias Editor is not available in AutoCAD for Mac.

Command aliases can only be used to start a command, and not start a command with a specific sequence of options or provide values to a command. A command can be executed with a specific set of options and values by writing a script, recording an action macro, or defining a custom function with AutoLISP. You can find out more about scripts, action macros, and AutoLISP in the AutoCAD Help system or refer to the companion session "AS197432-L - AutoCAD Customization Boot Camp—Beyond the Basics."

The AutoCAD (not AutoCAD LT) PGP file can also contain special command aliases known as *external command aliases*. An external command alias can be used to start an installed application, which you might normally launch from the desktop. External command aliases are not as commonly used these days since it is much easier to launch an application from the Windows user interface (UI), as opposed to shelling out to a MS DOS prompt.

The following is an example of an external command alias defined with the name EXPLORER and is used to start Windows Explorer or File Explorer based on the Windows release installed:

```
EXPLORER, START EXPLORER, 1,,
```

For more information about external command aliases, see the comments at the beginning of the AutoCAD PGP file.

Additional Information

You can find additional information on command aliases with these topics in the AutoCAD Online Help system:

- About Command Aliases
- About Creating Command Aliases
- About Defining External Commands

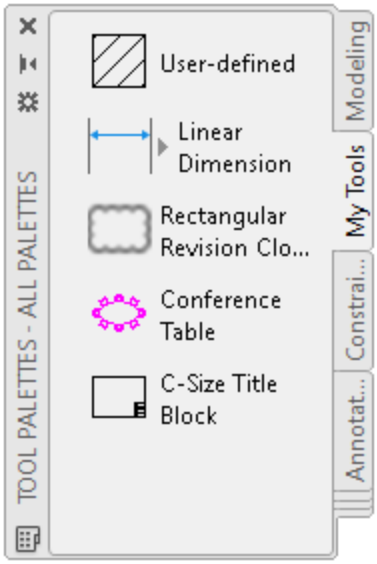
E2 Define Custom Command Aliases

This exercise explains how to define a command alias to start the REVCLOUD command, override the C command alias to start the COPY command rather than the CIRCLE command, and create a new alias for the CIRCLE command.

See the Exercises section in the lab handout.

6 Tool Palettes

Tool palettes allow for visual access to commonly used commands, drafting and annotation objects, reference files, hatch pattern and gradient fills among other types of tools. First introduced with AutoCAD 2004, tool palettes have been expanded to support new object types and named styles in later releases.

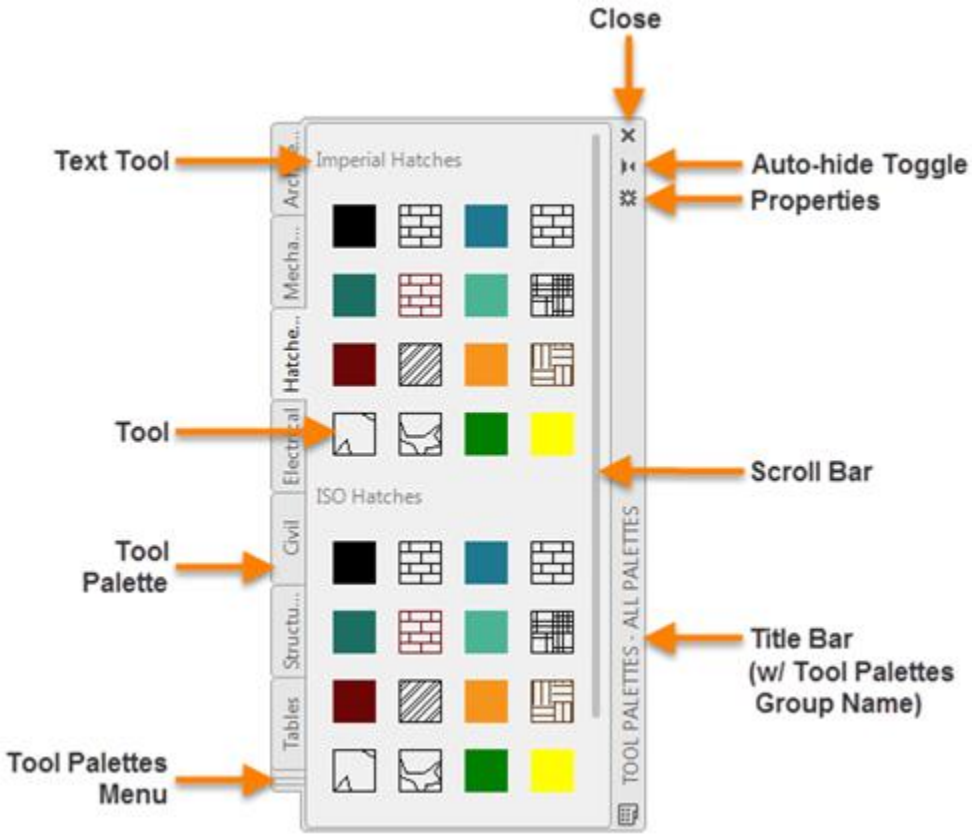


Tool palettes are organized and displayed on the Tool Palettes window. The Tool Palettes window can be displayed using one of the following methods:

- On the ribbon, click View tab ➢ Palettes panel ➢ Tool Palettes
- At the Command prompt, enter TOOLPALETTES or TP
- Press Ctrl+3

The basic framework of the Tool Palettes window is like other palettes in the AutoCAD user interface, but it also contains some unique controls which are related to the organization of tools.

The following illustration identifies the controls and elements of the Tool Palettes window.



1. **Close** – Closes the window.
2. **Scroll Bar** – Indicates additional tools are available; clicking or dragging the scroll bar moves other tools into the current view. The user can also click and hold the mouse button over an empty space of the content area, and drag to scroll the listing of tools.
3. **Title Bar** – Displays the window's title along with the current tool palette group's name.
4. **Auto-hide Toggle** – Sets the window's display state for when focus is lost.
5. **Properties** – Displays the window's shortcut menu.
6. **Text (Comment) Tool** – Displays information about the tools on the current tool palette.
7. **Tool** – Command or specialty tool that performs an action when clicked or dragged and dropped into the drawing area.
8. **Tool Palette** – Displays the tools associated with the tool palette in the window.
9. **Tool Palettes Menu** – Displays a listing of all tool palettes available in the current tool palette group; choose a tool palette from the list to make it current. A tool palette group can be set current by clicking the Properties control on the window.

Tools and Tool Palettes

A tool is the smallest component of a tool palette that is displayed as part of the Tool Palettes window. Tools can be one of the following types:

- Basic geometry (lines, arcs, circles, polylines, …)
- Annotation (dimensions, text, tables, multileaders, …)
- External references (xrefs, raster images, underlays, …)
- Hatch pattern and gradient fills
- Blocks (static and dynamic)
- Visual styles
- Materials
- Lights
- Cameras
- Commands and command sequences

Create and Modify Tools

New tools can be added to a tool palette using one of these methods:

- Drag an object from the drawing area onto a tool palette; based on the type of object being added to the tool palette, the source drawing might need to be saved first
- Drag a command from the Commands List pane in the Customize User Interface (CUI) Editor onto a tool palette
- Drag a supported file from Windows Explorer or File Explorer (DWG, PNG, JPG, PDF, DGN, …) onto a tool palette
- Use DesignCenter to add xrefs, blocks, raster images, and hatch patterns

An existing tool on a tool palette can be copied and removed by right-clicking over the tool and choosing Copy or Delete respectfully. If you copy a tool, it can be pasted as a duplicate of the original tool on the same tool palette or it can be pasted on a different tool palette.

Warning: Removing a tool from a tool palette can't be undone.

Once a tool has been created, its properties can be modified using the Tool Properties dialog box. The Tool Properties dialog box is displayed by right-clicking over a tool and choosing Properties. Each tool contains two different types of properties; those that are common to most tools and those that are tool specific. The properties that are common to most tools are known as *general properties*. The general properties control these object characteristics:

- Color
- Layer name
- Linetype
- Plot Style
- Lineweight
- Transparency

Tool Palettes

Tools are easy to create, and as a result can be hard to find without some planning and organization. Tool palettes are used to not only control which tools are displayed, but they are used to group and order tools. In addition to using tool palettes to group tools, you can also add elements to a tool palette that allow you to identify and group tools on a tool palette. The elements that can be used to identify and group tools on a tool palette are separators and text.

Once a tool palette has been created, you can rename or remove it by right-clicking over its associated tab along the side of the Tool Palettes window and choosing the appropriate action.

Warning: Removing a tool palette cannot be undone.

Tool Palette Groups

Tool palette groups are used to control which tool palettes are displayed on the Tool Palettes window. The All Palettes tool palette group displays all loaded tool palettes on the Tool Palettes window; whereas, for example the Architectural tool palette group shows only a single tool palette with examples of architectural dynamic blocks. Tool palette groups are managed with the Customize dialog box (CUSTOMIZE command).

A tool palette group can be set current by right-clicking the title bar of the Tool Palettes window and choosing the tool palette group to set current from the bottom of the menu.

Sharing Tool Palettes

Tool Palettes can be shared between multiple users by exporting a tool palette from one workstation and then importing it on another workstation. The exporting and importing of tool palettes is handled through the Customize dialog box (CUSTOMIZE command).

If your company has a network, it is possible to create tool palettes in a network folder and then shared them from that folder. After the tool palettes to be shared have been created in a network folder, you list that location under the Tool Palettes File Locations node on the Files tab of the Options dialog box (OPTIONS command).

Additional Information

You can find additional information on tool palettes with these topics in the AutoCAD Online Help system:

- About Tool Palettes
- About Creating Tool Palettes
- About Changing Tool Palette Settings
- About Sharing Tool Palettes and Tool Palette Groups

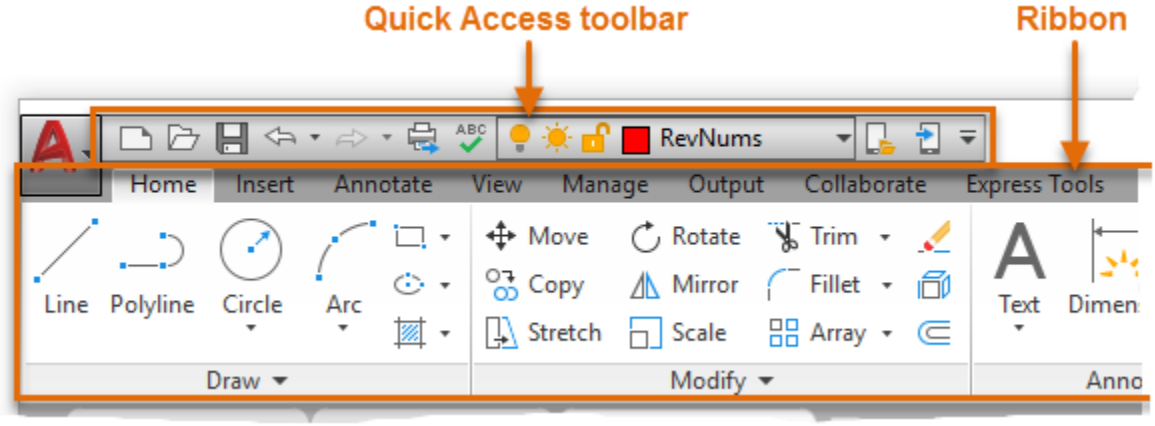
E3 Create a Tool Palette and Tools

This exercise explains how to create a new tool palette with tools based on existing geometry in a drawing and a command tool defined in the *acad.cuix* file.

See the Exercises section in the lab handout.

7 User Interface (Quick Access toolbar (QAT), Ribbon, and Workspaces)

The AutoCAD user interface (UI) contains many features that are used to execute a command, change a current setting, and be customized to better align with your company's workflows. The main UI features of the AutoCAD user interface are the Quick Access toolbar (QAT) and ribbon.



Quick Access Toolbar (QAT)

The QAT is displayed by default in the upper-left corner of the AutoCAD application window above the ribbon. Most of the tools on the QAT are related to drawing file management tasks; creating, opening, saving, and plotting/publishing.

Customizing the QAT can be performed from either the application window or the Customize User Interface (Editor). From the application window, you can use the Customize button located on the right side of the QAT to:

- Toggle the display of select commands
- Adjust the position of the QAT above or below the ribbon

The Customize User Interface (CUI) Editor can be used to:

- Create new QATs that can be assigned to different workspaces
- Add and remove commands/controls to/from a QAT
- Adjust the position of the QAT above or below the ribbon

Additional Information

You can find additional information on Quick Access toolbar (QAT) customization with these topics in the AutoCAD Online Help system:

- About User Interface Customization
- About Command Customization
- About Customizing Quick Access Toolbars

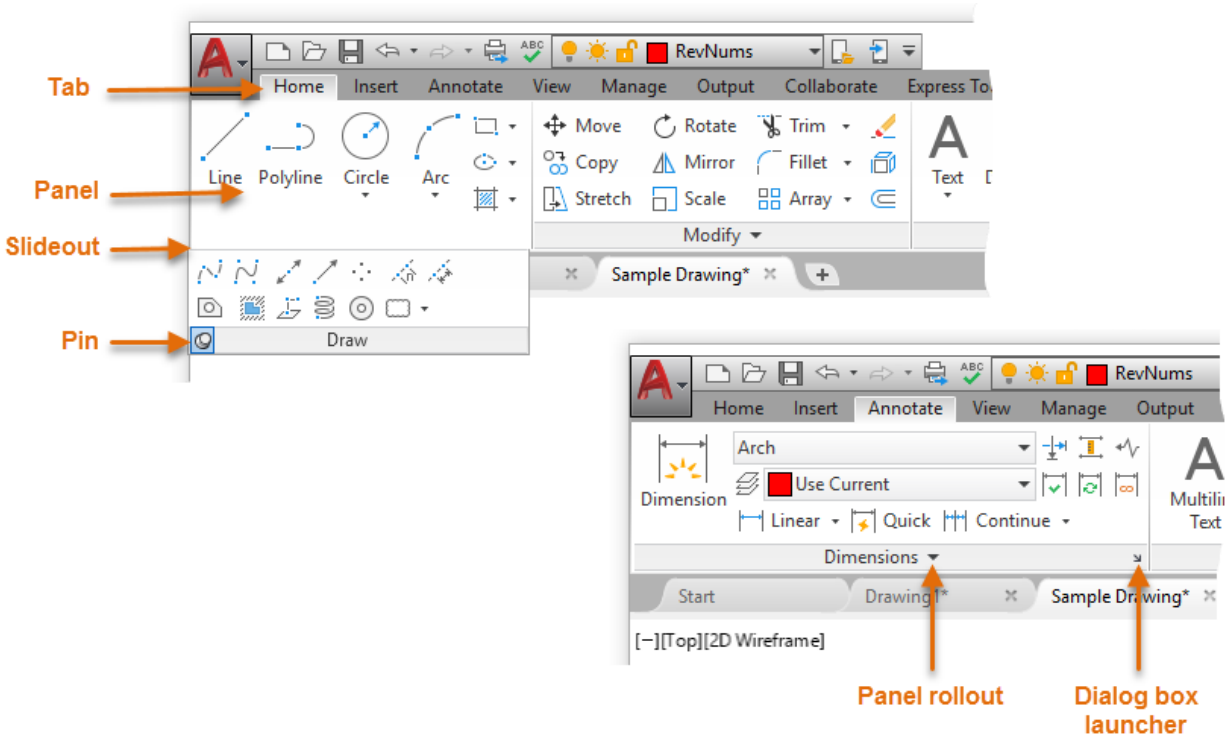
E4 Create a Quick Access Toolbar (QAT)

This exercise explains how to create a new Quick Access toolbar (QAT) and assign it to a workspace.

See the Exercises section in the lab handout.

Ribbon

The ribbon utilizes tabs and panels to group commands and controls by tasks.



1. **Tab** – Organizes panels by task; draw, annotate, and output among others.
2. **Panel** – Groups related commands and controls by feature/task; draw, modify, layers, and dimensions among others.

3. **Control** – Executes a command macro or changes an environment setting.
4. **Panel rollout/Panel title bar** – Displays the name of the panel and indicates whether the panel can be expanded (rolled out) to display additional controls that are below the panel's slideout.
5. **Pin** – Keeps the panel rollout expanded until the panel tab loses focus.
6. **Dialog box launcher** – Starts a command macro, commonly displays a dialog box or palette.

Like the QAT, the ribbon can be customized directly from the application window and the Customize User Interface (CUI) Editor. While limited, the ribbon can be customized from the application window by allow you to:

- Minimize the display of the ribbon
- Toggle the display of panels and tabs assigned to the current workspace
- Dock and undock panels
- Reorder panels on a tab
- Assign a tool palette group to be displayed when a tab is set current

While some customization of the ribbon can be performed directly in the application window, most customization of the ribbon is handled from the CUI Editor. The CUI Editor allows you to create ribbon panels and assign those ribbon panels to a ribbon tab which is displayed using a workspace.

The creation and customization of a ribbon panel is very similar to a QAT, the main difference is that you can create multiple rows of commands and controls on a ribbon panel instead of a single row, and you can specify which commands and controls on a panel should be displayed by default and those that are available only when the panel is expanded. The placement of commands and controls in relationship to the <SLIDEOUT> item determine which commands and controls are displayed by default and those that are displayed only when the panel is expanded after the panel's title bar has been clicked.

Additional Information

You can find additional information on ribbon customization with these topics in the AutoCAD Online Help system:

- About User Interface Customization
- About Command Customization
- About Customizing Ribbon Panels
- About Customizing Ribbon Tabs
- About Customizing Ribbon Contextual Tab States

E5 Create a Ribbon Panel and Tab

This exercise explains how to create and add commands to a new ribbon panel, create a new ribbon tab to display a ribbon panel, and control the display of a ribbon tab with a workspace.

See the Exercises section in the lab handout.

Workspaces

Workspaces play an important role in the AutoCAD user interface as they control the display and placement of many user interface elements in the application and drawing windows. AutoCAD comes with several pre-defined workspaces that help you switch between the tools used for 2D drafting and 3D modeling. The Drafting and Annotation workspace is the default workspace that is used when AutoCAD is started the first time.

The user interface elements controlled by a workspace are:

- Quick Access toolbar (QAT)
- 'Classic' toolbars
- Pull-down menus
- Palettes
- Ribbon tabs

Workspaces can also be used to:

- Set the Model tab or last used layout current when a drawing is opened
- Control the display of the
  - menu bar,
  - application status bar,
  - navigation bar,
  - drawing window model/layout tabs,
  - and scroll bars in the drawing window.

The display and placement of supported user interface elements can be modified directly in the application window, or with the Customize User Interface (CUI) Editor. After manipulating user interface elements in the application window, changes can be saved to a new or existing workspace with the WSSAVE command.

Additional Information

You can find additional information on workspace customization with these topics in the AutoCAD Online Help system:

- About User Interface Customization
- About Workspace Customization
- About Using Task-Based Workspaces

E6 Modify a Workspace

This exercise explains how to modify a workspace directly in the user interface and save the changes to the current workspace.

See the Exercises section in the lab handout.

8 Where to Get More Information

When you first start to learn a new skill, there will no doubt be questions but where to get answers to those questions might be unclear. The following list of resources can be helpful in locating answers to the questions you might have along with where to go to further learn about AutoCAD customization:

- **Help System** – The Customization Guide in the AutoCAD Online Help system contains a lot of information on customizing many of the options mentioned in this session.

  To access the online help, go to: https://help.autodesk.com/view/ACD/2019/ENU/
- **Autodesk Discussion Forums** – The Autodesk discussion forums provide a place to ask a question about anything AutoCAD related and get a response from a fellow user or Autodesk employee. To access the Autodesk discussion forums, go to https://forums.autodesk.com, click Browse By Product near the upper-right of the page and then click AutoCAD. Click the appropriate subgroup link.
- **AUGI Forums** – The AUGI forums provide peer-to-peer networking where you can ask questions about virtually anything in AutoCAD and get a response from a fellow user. Visit AUGI at https://www.augi.com/ for more information.
- **Industry Events and Classes** – Industry events such as Autodesk University and BIM Workshops can be great venues to learn about features in an Autodesk product and industry trends. Along with industry events, you might also be able to find classes at a local technical college/university or an Autodesk Authorized Training Center (ATC) that can help you extend your skill set.
- **Internet** – There are tutorials on the Internet that can be helpful to learn many of the customization and programming options supported in the AutoCAD program. Use your favorite search engine, such as Google or Bing and search on the topic of interest.
- **Books** – There are many general and specialized books that cover AutoCAD customization and programming. To find a book, use amazon.com or barnesandnoble.com to locate a book online or visit your local Barnes and Noble store. My latest book, *AutoCAD Platform Customization: User Interface, AutoLISP, VBA, and Beyond*, covers all the customization options mentioned in this session and many more.

9 Exercises

See the separate *AS197468-L-Ambrosius-AU2018.pdf* for the exercises associated with this session.