AS468504-L

AutoCAD Customization Boot Camp: Automate Workflows and Tasks

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Learning Objectives

- Learn how to record and play back action macros
- Learn how to create and load small AutoLISP programs
- Learn how to deploy AutoLISP programs
- Learn how to manage user settings with profiles

Description

AutoCAD software offers a variety of features that let you automate workflows and reduce repetitive tasks. In this lab, you will create action macros, develop simple AutoLISP programs, learn the basics to deploy AutoLISP files, and manage settings with user profiles. After this lab, you will have a broad understanding of how to implement automation and improve productivity when you return to your office. This session features AutoCAD software, AutoCAD LT software doesn't support AutoLISP programming.

Speaker(s)

Lee Ambrosius is a Principal Learning Experience Designer at Autodesk, Inc., for the AutoCAD® and AutoCAD LT products on Windows and Mac. He works primarily on the customization, developer, and CAD administration documentation along with the user documentation. Lee has presented at Autodesk University for about 15 years on a 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 roaming various AutoCAD community forums, posting articles on his or the AutoCAD blog, or tweeting information regarding the AutoCAD product.

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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 over 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 hands-on lab will provide you with the opportunity to roll-up your sleeves and get some experience with customizing AutoCAD and how to apply the techniques covered to your everyday workflows. While knowing how to program isn't a requirement to customizing AutoCAD, learning how to program does provide you with a greater set of tools to automate everyday 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 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 many frequently preform. 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	Application
• Layers • Annotation styles (text, dimensions, multileaders, and tables) • Blocks • Materials and visual styles • Drawing templates	• Desktop shortcut • Command aliases • Tool palettes • Workspaces • User profiles • Plot styles

Intermediate

Drawing	Application
• Dynamic blocks	• 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

For this hands-on lab, you will need:

- This handout
- Dataset from the Autodesk University website; see exercise *E0 Download and Setup the Dataset Folder and Add it to the AutoCAD's Support File Search Path*
- AutoCAD 2013 and later installed on your workstation
- Notepad

4 Supplemental Content

See the separate *Supplement-AS468504-L-Ambrosius-AU2020.pdf* for the supplemental content in the dataset related to this session.

5 Exercises

This section contains all the exercises that will be covered during this lab or when you get back to the office.

E0 Download and Setup the Dataset Folder and Add it to AutoCAD's Support File Search Path (<2 min)

This exercise explains how to download and setup the dataset folder for this session, and then add that folder to the Support File Search Path setting in the Options dialog box of the AutoCAD program.

These steps explain how to download and extract the contents of this session's dataset:

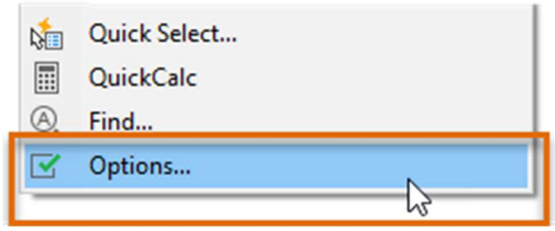
1. Browse to this session's page on the Autodesk University website.

   Go to https://www.autodesk.com/autodesk-university/conference/overview and search on the session ID **AS468504**.
2. In the search results, click the entry for this session.
3. On the session's page, click Downloads and then click Dataset.
4. The dataset is downloaded to your local drive.
5. Once the dataset has been downloaded, extract the contents of the ZIP file to:

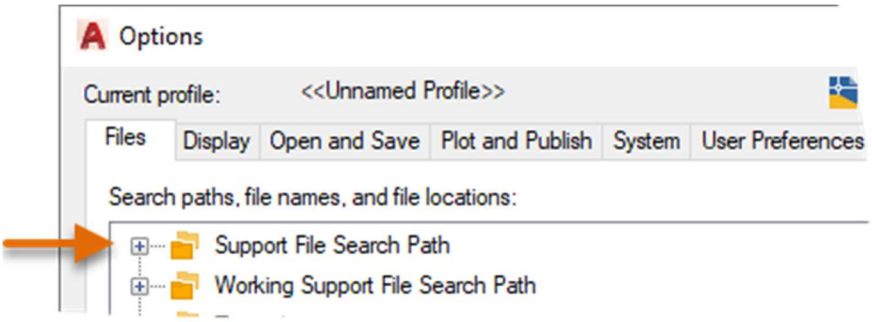
   C:\Dataset\AS468504-L

These steps explain how to add this session's dataset folder to the Support File Search Path setting in the Options dialog box of the AutoCAD program.

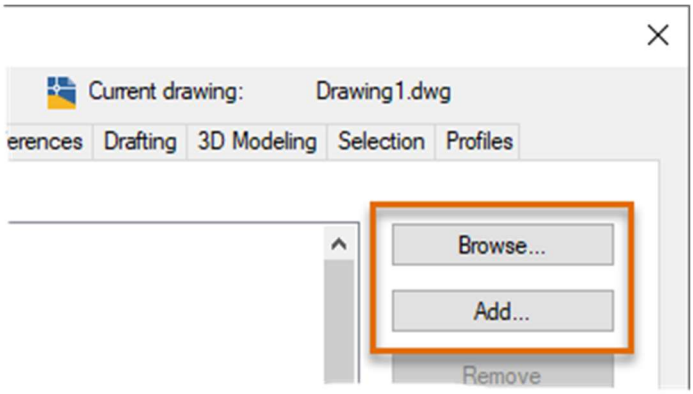
1. Launch AutoCAD and create a new drawing.
2. In the drawing area, right-click and choose Options.



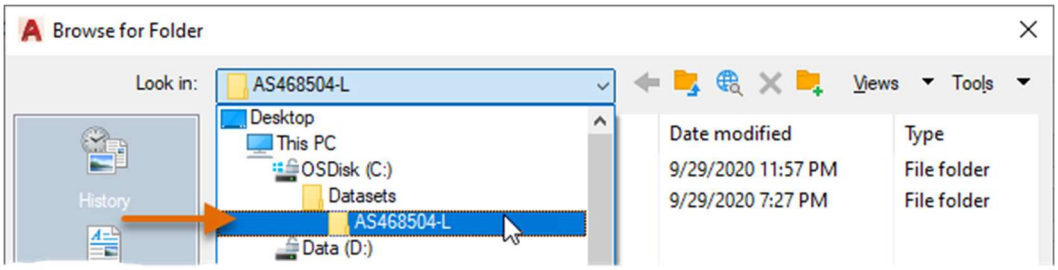
3. In the Options dialog box, Files tab, select the Support File Search Path node.



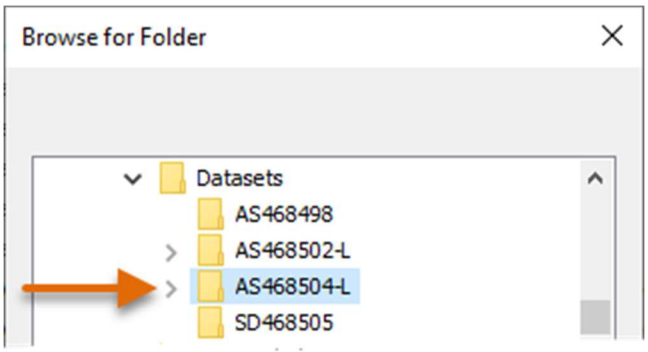
4. On the right side, click Add and then click Browse.



5. Do one of the following:
   - **AutoCAD 2021:** In the Browse for Folder dialog box, browse to and select the folder for this session. Click Open.

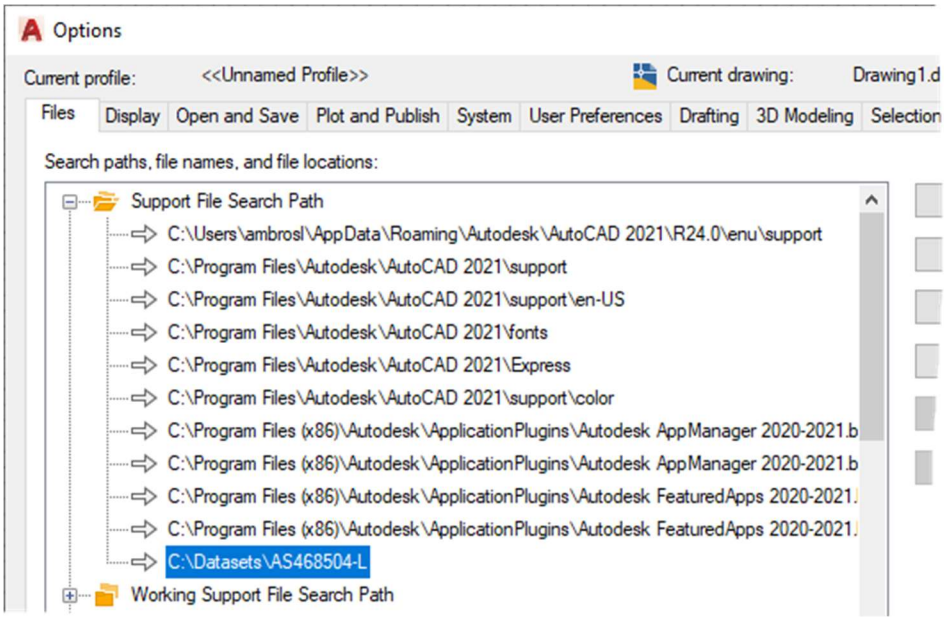


   - **AutoCAD 2020 and earlier:** In the Browse for Folder dialog box, browse to and select the folder for this session. Click OK.



   The location and name of the dataset folder for this session should be

   C:\Datasets\AS468504-L



6. Click OK to exit the Options dialog box and save the path change made.

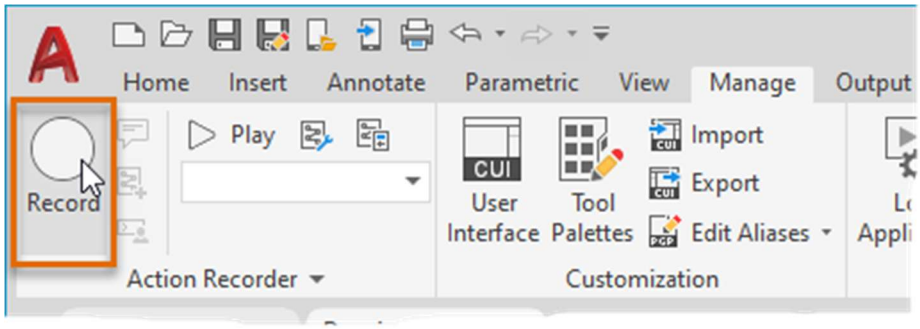
E1.A Record and Playback an Action Macro (4-5 mins)

This exercise explains how to create an action macro that creates a new layer and prompts for the points to define a rectangular revision cloud.

Note: The resulting action macro (ACTM) file created from this exercise can be found in the *Completed* folder of the dataset under the filenames *REC-CLD.actm* (and *REC-CLDPre2021.actm*).

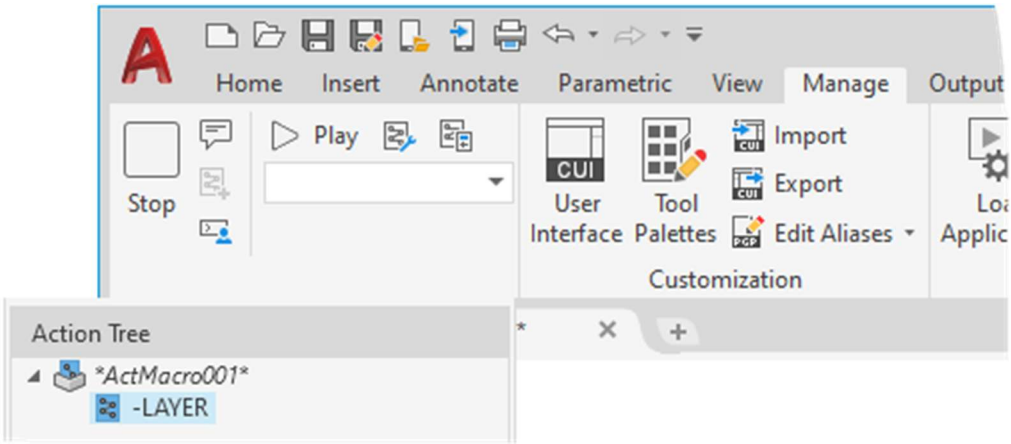
In these steps, you start the recording of an action macro and record the actions related to creating a new layer named A-Anno-RevCloud:

1. In AutoCAD, create a new drawing.
2. On the ribbon, click Manage tab > Action Recorder panel > Record.



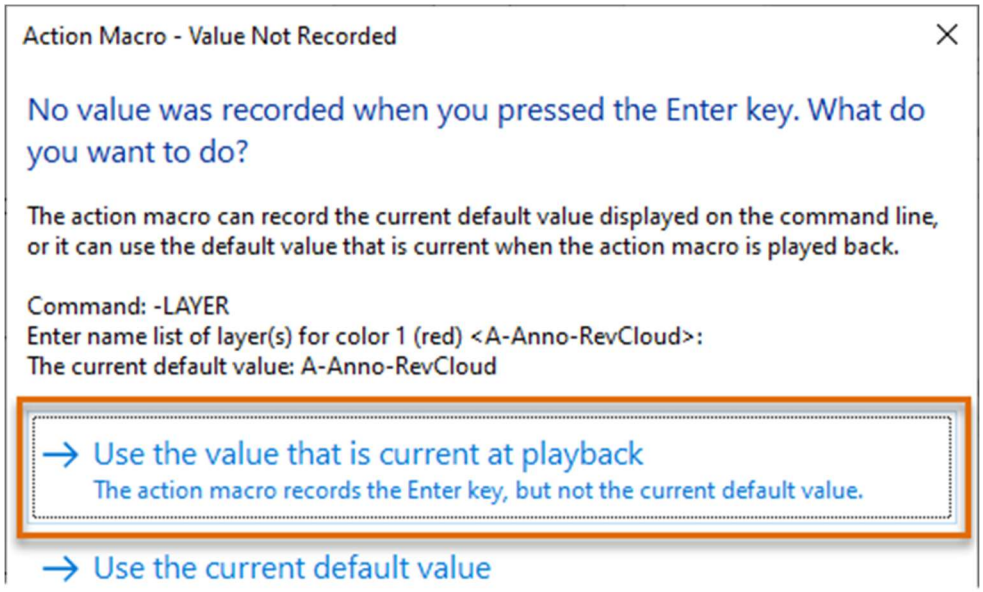
3. At the Command prompt, type **-layer** and press Enter.

   After you press Enter, you should notice that the command is added to the Action Tree.



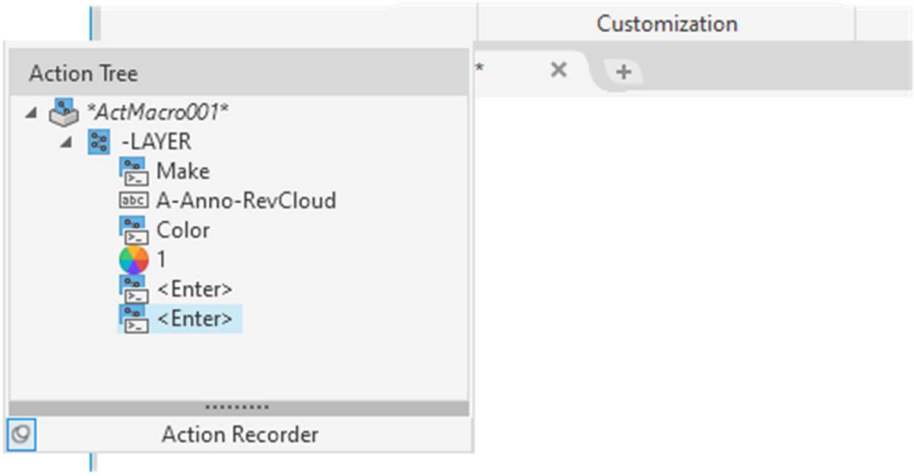
4. At the `Enter an Option` prompt, type **M** and press Enter.
5. At the `Enter name for new layer` prompt, type **A-Anno-RevCloud** and press Enter.
6. At the `Enter an Option` prompt, type **C** and press Enter.
7. At the `New Color [Truecolor/COlorbook]:` prompt, type **1** and press Enter.
8. Press Enter again to assign the color 1 (red) to the A-Anno-RevCloud layer.

9. In the Action Macro – Value Not Recorded dialog box, click Use the Value that is Current at Playback.



10. Press Enter again to end the -LAYER command.

    You are returned to a blank Command prompt, and the new layer is created and set current. The Action Tree should now look like the following image.



In these steps, you create a rectangular revision cloud with the REVCLOUD command:

1. At the Command prompt, type **revcloud** and press Enter.
2. At the `Specify first corner point or [Arc length/Object/Rectangular/Polygonal/Freehand/Style/Modify] <Object>:` prompt, type **S** and press Enter.
3. At the `Select arc style [Normal/Calligraphy] <Normal>:` prompt, type **C** and press Enter.

4. At the `Specify first corner point or [Arc length/Object/Rectangular/Polygonal/Freehand/Style/Modify] <Object>:` prompt, type **A** and press Enter.
5. Do one of the following:

   AutoCAD 2021:

   - At the `Specify approximate length of arc <4.8033>:` prompt, type **2.5** and press Enter.

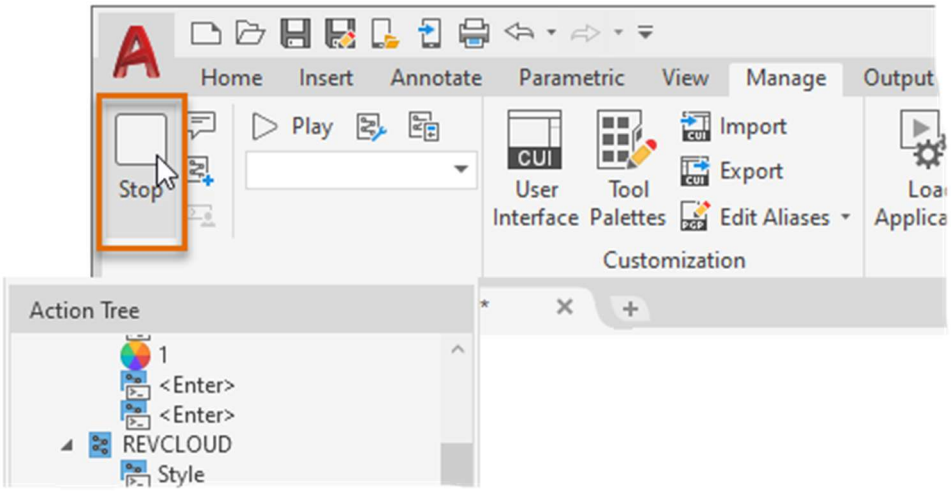
   AutoCAD 2020 and earlier:

   - At the `Specify minimum length of arc <0.5000>:` prompt, type **2.5** and press Enter.
   - At the `Specify maximum length of arc <2.5000>:` prompt, type **2.5** and press Enter.
6. At the `Specify first corner point or [Arc length/Object/Rectangular/Polygonal/Freehand/Style/Modify] <Object>:` prompt, type **R** and press Enter.
7. Specify the two corners of the revision cloud anywhere in the drawing area.

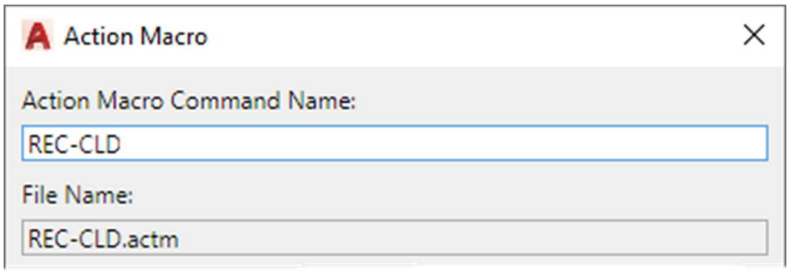
   The revision cloud that you create might look like the following image.

In these steps, you stop recording and save the actions to an action macro named REC-CLD:

1. On the ribbon, click Manage tab > Action Recorder panel > Stop.



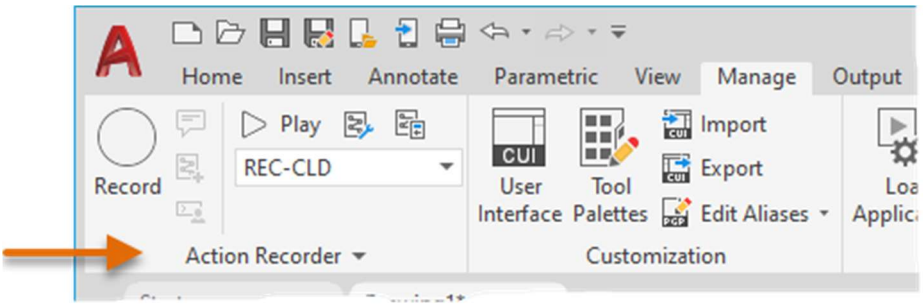
2. In the Action Macro dialog box, Action Macro Command Name text box, type REC-CLD.



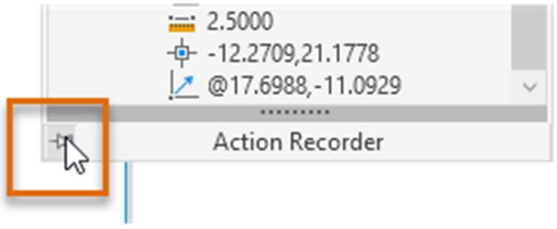
3. Optionally, in the Description text box, type a description for the action macro.
4. Click OK.

In these steps, you modify the action macro, so it prompts for the two opposite corners of the rectangular revision cloud during playback:

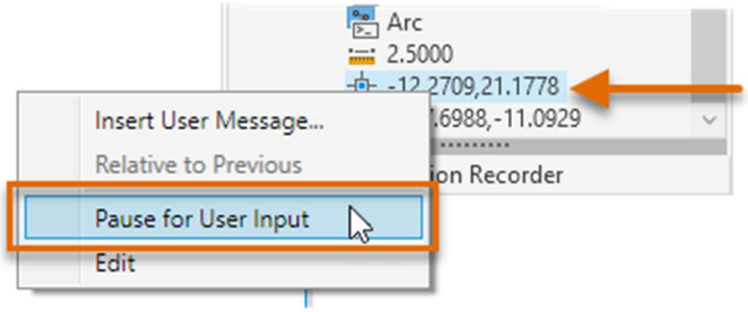
1. On the Action Recorder panel, click the Action Recorder panel's title to expand it if it isn't already expanded.



2. Click the Pin to keep the Action Tree open if it isn't already pinned.

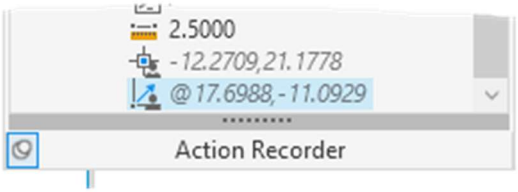


3. In the Action Tree, right-click over the coordinate that represents the first corner of the rectangular revision cloud and choose Pause for User Input.

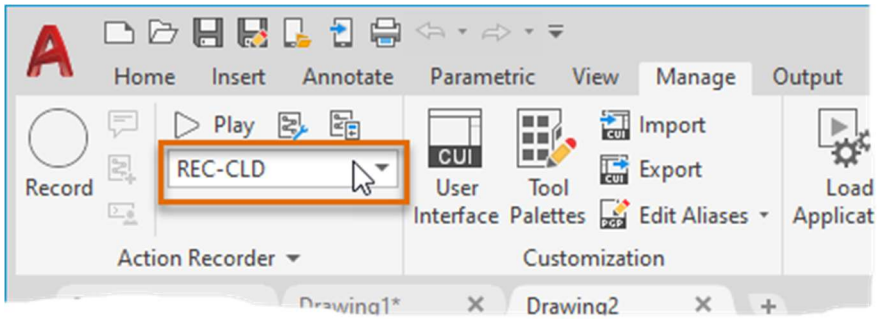


4. Repeat Step 3 for the opposite corner of the rectangular revision cloud.

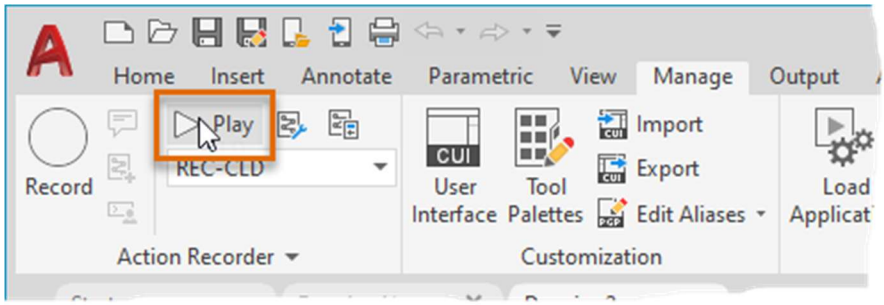
   The icons of the two values should now show a silhouette badge that indicates the user will be prompted for a value during playback.



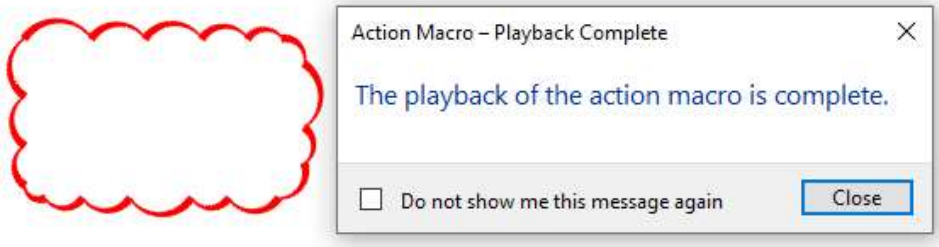
5. Click the Pin again to allow the Action Tree to close.
6. Create a new drawing.
7. On the ribbon, click Manage tab > Action Recorder panel, select **REC-CLD** from the Action Macros drop-down list.



8. Click Play.

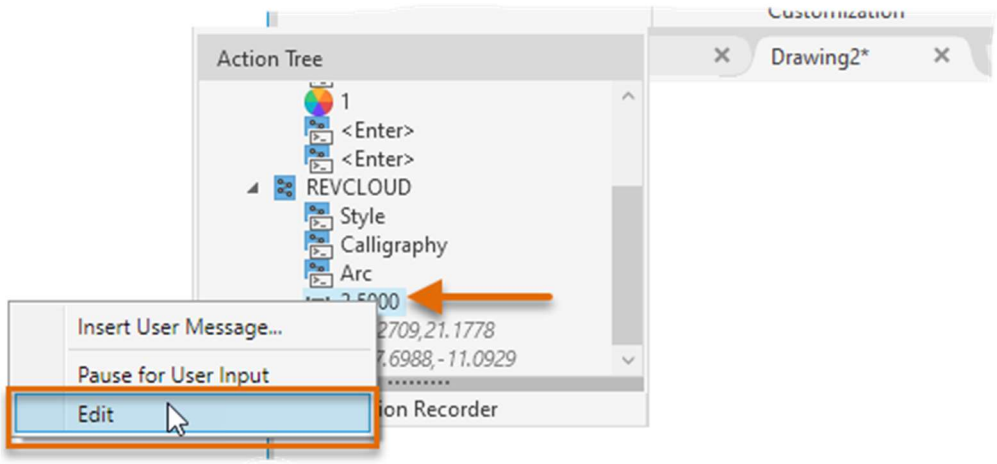


9. After playback of the action macro starts, specify two points in the drawing area.
10. In the Action Macro - Playback Complete message box, click Close.



In these steps, you modify the action macro to use a different minimum and maximum arc length for the revision cloud during playback:

1. On the Action Recorder panel, click the Action Recorder panel's title to expand it.
2. In the Action Tree, right-click over the Distance (arc length) node under the REVCLOUD command and choose Edit. Type **0.75** and press Enter.



3. If you are using AutoCAD 2020 or an earlier release, repeat Step 2 for the second Distance (arc length) node.
4. Playback the REC-CLD action macro again.

   Notice that the arcs are smaller compared to the previous revision cloud created.

5. Close the two new drawings and discard any changes made.

E1.B Insert a Dynamic Block with an Action Macro (4-5 mins)

This exercise explains how to create an action macro that creates a new layer and inserts a dynamic block with a set of predefined property values.

Note: The resulting action macro (ACTM) file created from this exercise can be found in the *Completed* folder of the dataset under the filename *DR36-90.actm*.

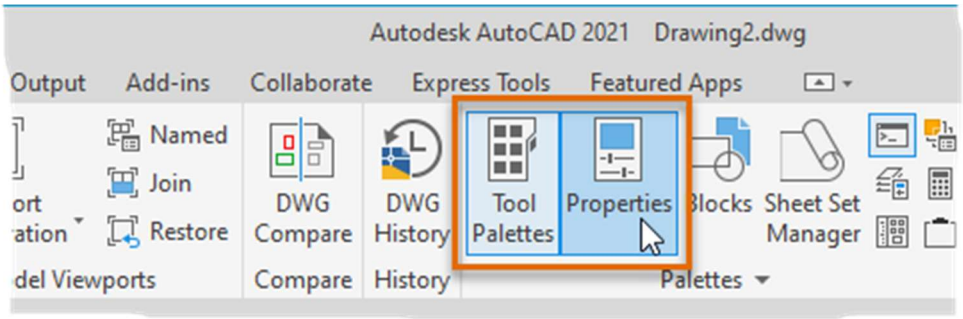
In these steps, you start the recording of an action macro and record the actions related to creating a new layer named A-Doors:

1. In AutoCAD, open the *Sample Drawing.dwg* file from the dataset folder for this session.

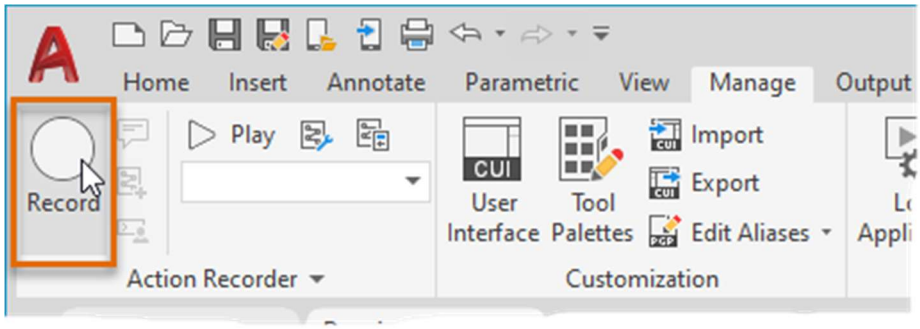
   The location and name of the dataset folder for this session should be

   C:\Datasets\AS468504-L

2. On the ribbon, click View tab > Palettes panel, and then
   a. Click Tool Palettes to display the Tool Palettes window.
   b. Click Properties to display the Properties window.

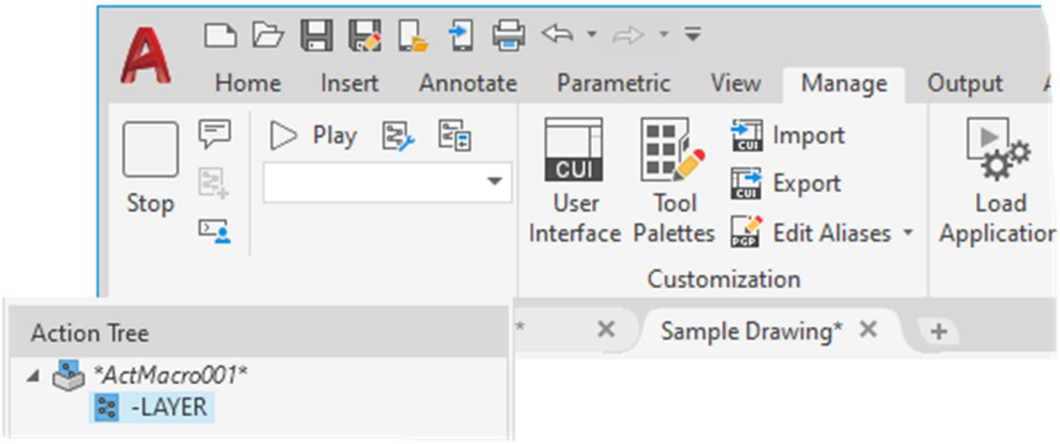


3. On the ribbon, click Manage tab > Action Recorder panel > Record.

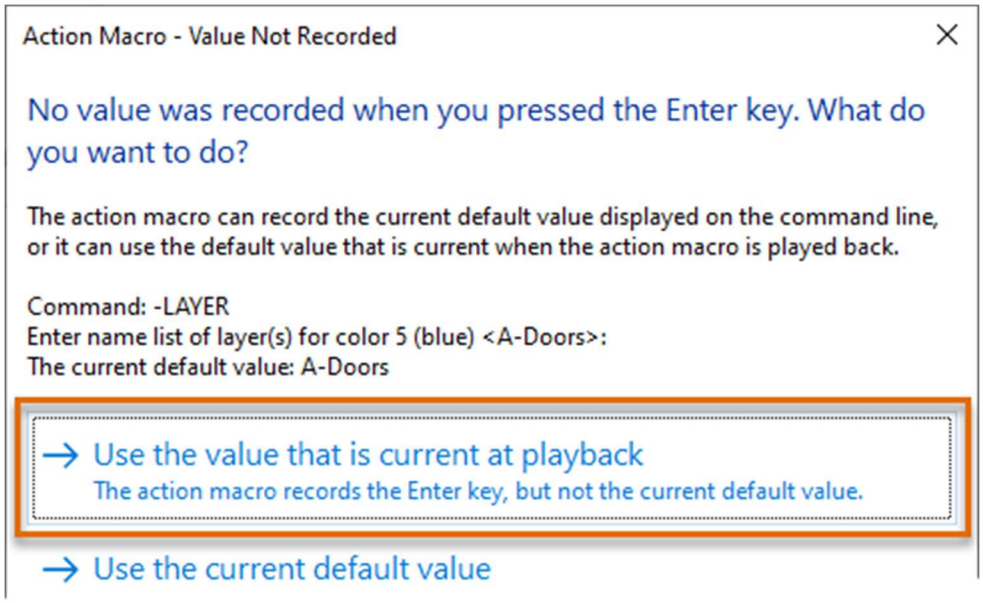


4. At the Command prompt, type **-layer** and press Enter.

   After you press Enter, you should notice that the command is added to the Action tree.

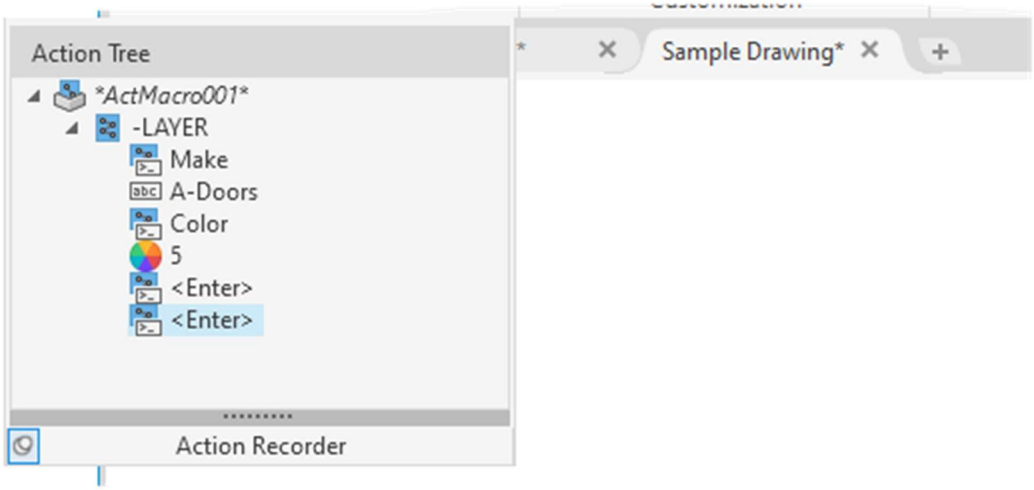


5. At the `Enter an Option` prompt, type **M** and press Enter.
6. At the `Enter name for new layer` prompt, type **A-Doors** and press Enter.
7. At the `Enter an Option` prompt, type **C** and press Enter.
8. At the `New Color [Truecolor/COlorbook]:` prompt, type **5** and press Enter.
9. Press Enter again to assign the color 5 (blue) to the A-Doors layer.
10. In the Action Macro – Value Not Recorded dialog box, click Use the Value that is Current at Playback.



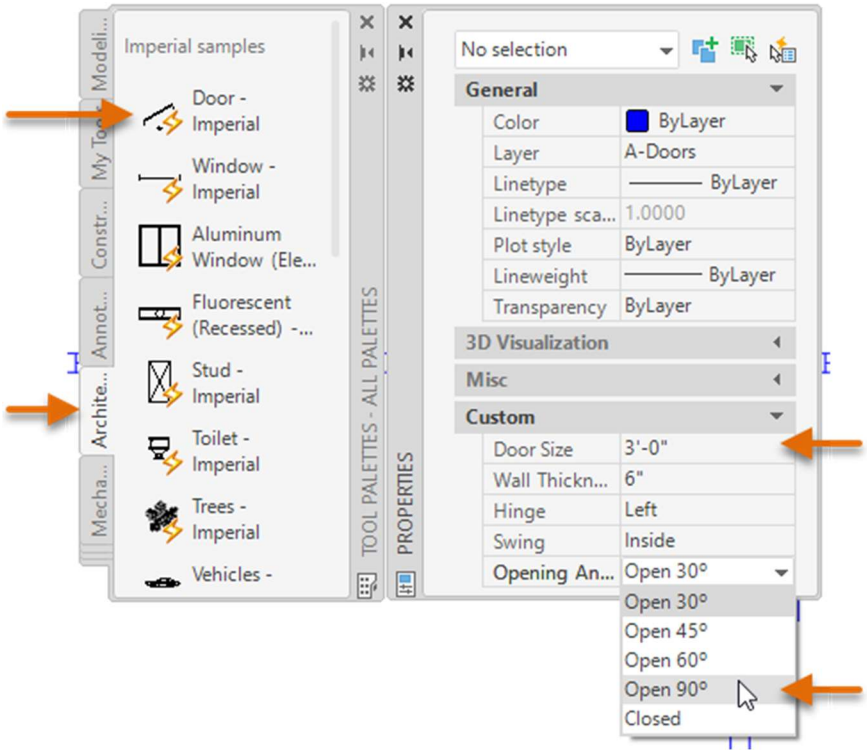
11. Press Enter again to end the -LAYER command.

    You are returned to a blank Command prompt, and the new layer is created and set current. The Action tree should now look like the following image.



In these steps, you record the actions related to inserting a dynamic block:

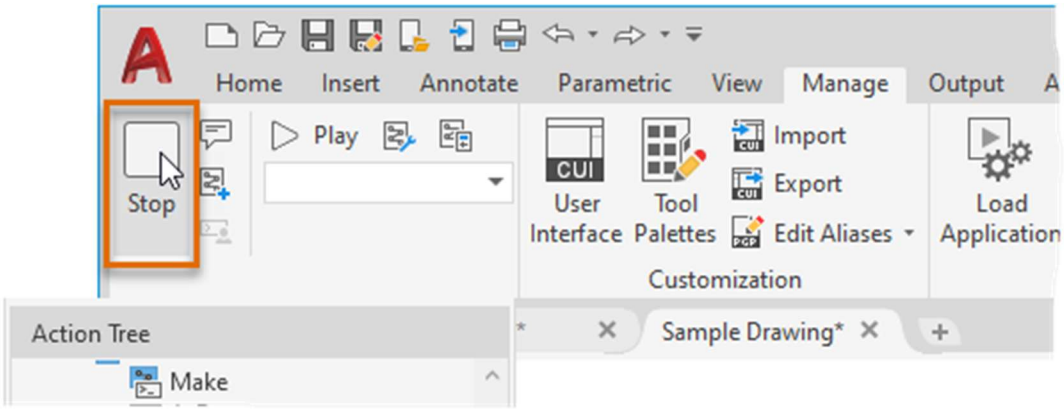
1. On the Tool Palettes window, Architectural tab, click the **Door – Imperial** tool.
2. On the Properties palette, under Custom, select **3'-0"** (or 36.0000) from the Door Size drop-down list and select Open **90°** from the Opening Angle drop-down list.



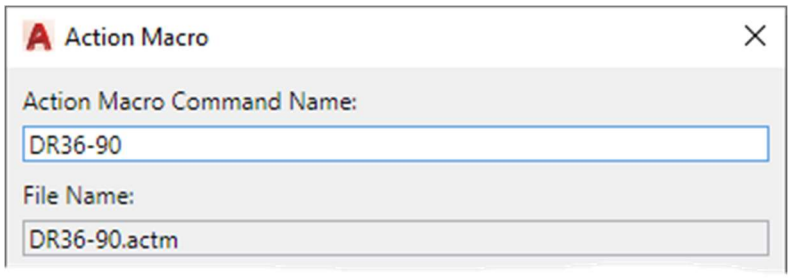
3. In the drawing area, specify a point to insert the door block.

In these steps, you stop recording and save the actions to an action macro named DR36-90:

1. On the ribbon, click Manage tab > Action Recorder panel > Stop.



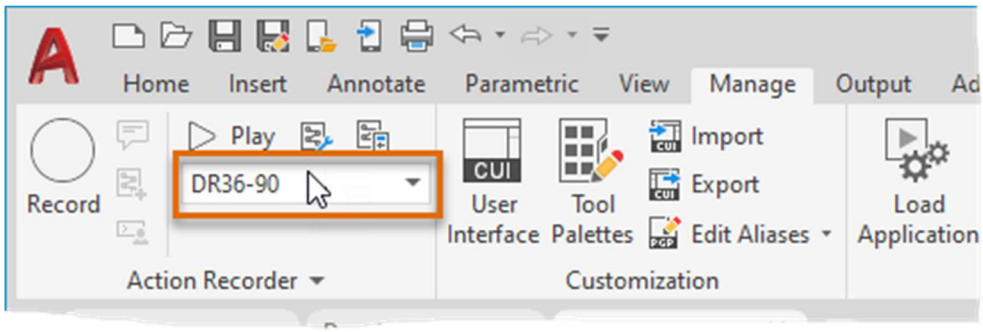
2. In the Action macro dialog box, Action macro Command Name text box, type **DR36-90**.



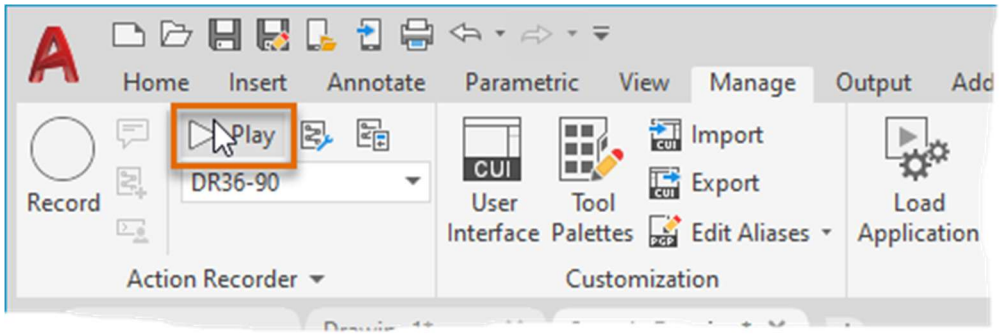
3. Optionally, in the Description text box, type a description for the action macro.
4. Click OK.

In these steps, you modify and test the action macro named DR36-90:

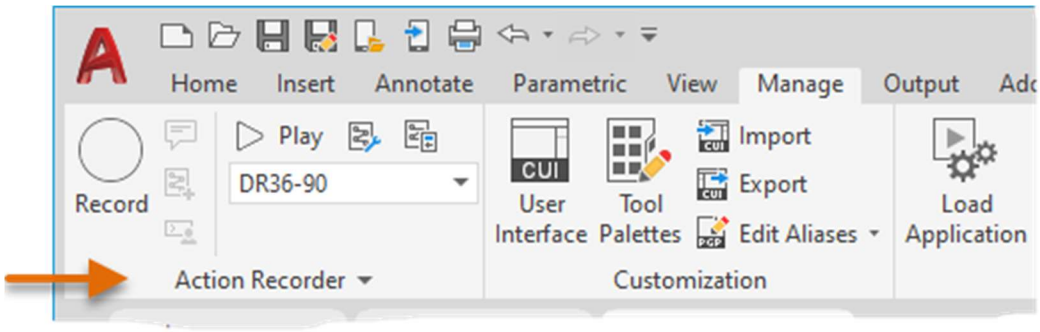
1. Create a new drawing.
2. On the ribbon, click Manage tab > Action Recorder panel, select **DR36-90** from the Action macros drop-down list.



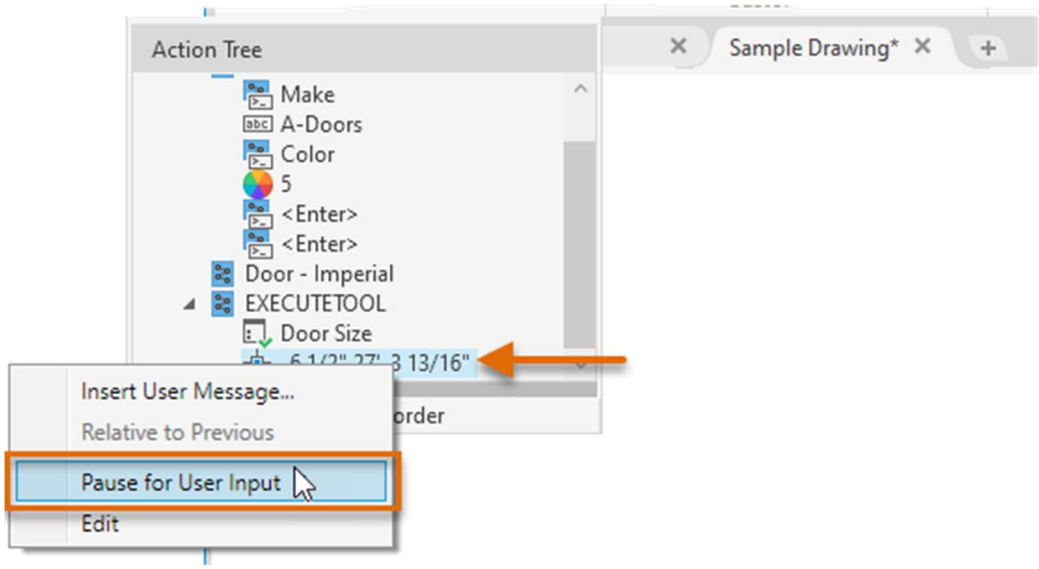
3. Click Play.



4. If the Action Macro – Playback Complete dialog box is displayed, click Close.
5. Use the ZOOM command with the Extents option to zoom to the extents of the drawing.
6. On the Action Recorder panel, click the Action Recorder panel's title to expand it if it isn't already expanded.



7. In the Action Tree, right-click over the coordinate value for the insertion point of the block and choose Pause for User Input.



During playback, you will now be able to specify a unique insertion point.

8. Playback the DR36-90 action macro again and specify a point in the drawing area.

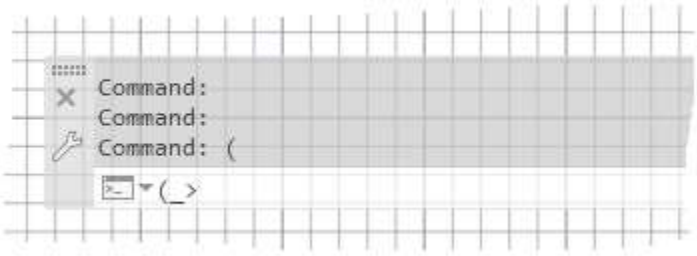
   Tip: While specifying an insertion point, you can specify a different rotation value and change other values using the Properties palette or with the options at the Command prompt.

9. If the Action Macro – Playback Complete dialog box is displayed, click Close.
10. Close the new drawing and discard any changes made.
11. Close the Tool Palettes window and Properties palette.

E2 Enter AutoLISP Expressions at the Command prompt (3-4 mins)

This exercise explains how to apply some basic AutoLISP concepts and enter AutoLISP expressions at the AutoCAD Command prompt.

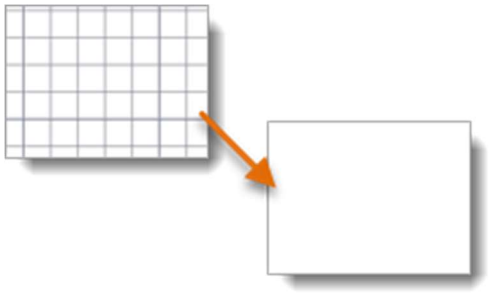
1. In AutoCAD, create a new drawing.
2. At the Command prompt, type `(` and press Enter.



   By entering a `(`, you indicate to AutoCAD that you want to work with AutoLISP. The `(_>` prompt that is displayed lets you know AutoLISP is standing by and waiting for more information along with one or more balancing closing parentheses.

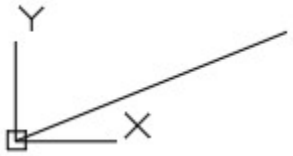
3. Type **`setvar "gridmode" 0)`** and press Enter to complete the AutoLISP expression.

   The GRIDMODE system variable is set to 0, disabling the grid display in the drawing window.



4. Type **`(command "line" "0,0" "5,2" "")`** and press Enter.

5. Zoom to the extents of the drawing to see the new line object drawn from 0,0 to 5,2.



6. Type **!rad** and press Enter.

```
Command: nil
Command: !rad
nil
Type a command
```

The value of `nil` is returned and expected unless the user-defined variable *rad* was previously defined in the drawing. `nil` in AutoLISP means no value or nothing. Press F2 to expand the Command Line window or display the AutoCAD Text Window, and see the Command Line window history.

7. Type **(setq rad 3.5)** and press Enter.

   The user-defined variable *rad* is assigned the value of 3.5.

8. Type **!rad** and press Enter.

   The value of 3.5 is returned to the Command Line window instead of `nil` this time.

```
3.5
Command: !rad
3.5
Type a command
```

9. Type **(setq pt (list 5 2 0))** and press Enter.

   The coordinate value of 5,2,0 is assigned to the user-defined variable *pt*.

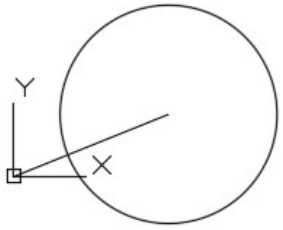
10. Type **circle** and press Enter.

11. At the `Specify center point for circle or [3P/2P/Ttr (tan tan radius)]:` prompt, type **!pt** and press Enter.

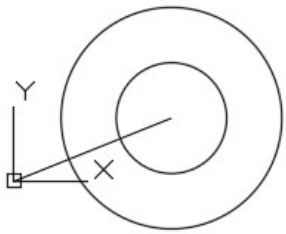
12. At the `Specify radius of circle or [Diameter]:` prompt, type **!rad** and press Enter.

```
(5 2 0)
Specify radius of circle or [Diameter]: !rad
3.5
Type a command
```

13. Zoom out to see the new circle drawn with a center point of 5,2 and a radius of 3.5.



14. Type **`(command "circle" pt (/ rad 2))`** and press Enter.
15. A new circle is drawn inside the previous circle with a radius that is 1/2 the value assigned to the user-defined variable *`rad`*.



E3 Create Custom AutoLISP Functions (2-3 mins)

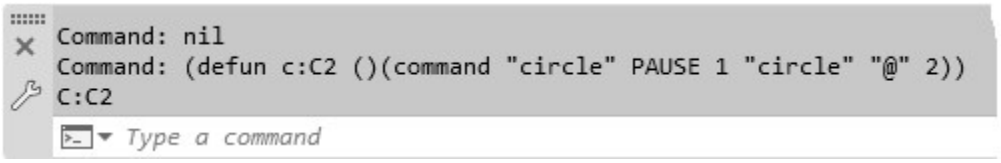
This exercise explains how to create a basic AutoLISP function which can be executed from the AutoCAD Command prompt.

1. In AutoCAD, at the Command prompt, type **C2** and press Enter.

   The text `Unknown command "C2". Press F1 for help.` is displayed in the Command Line window history because no command is defined with the name C2.

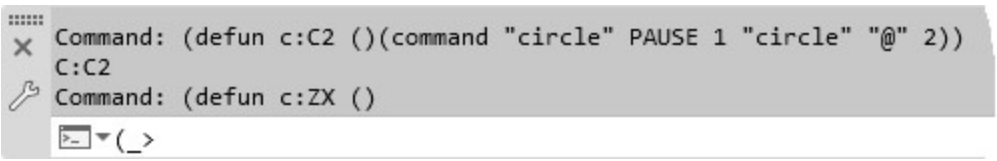
2. Type **`(defun c:C2 ()(command "circle" PAUSE 1 "circle" "@" 2))`** and press Enter.

   AutoCAD responds with `C:C2` letting you know the custom function has been defined.



3. Type **`(defun c:ZX ()`** and press Enter.

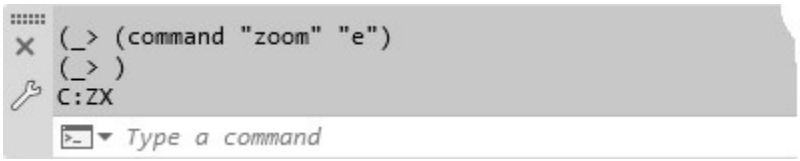
   AutoCAD responds with the prompt `(_>` letting you know you have one or more open AutoLISP expressions.



4. Type **`(command "zoom" "e")`** and press Enter.

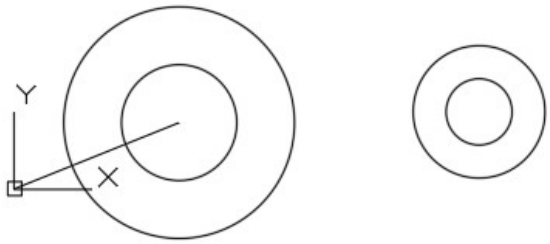
5. Type) and press Enter.

   AutoCAD responds with `C:ZX` letting you know the custom function has been defined.



6. Type **C2** and press Enter.
7. At the `Specify center point for circle or [3P/2P/Ttr (tan tan radius)]:` prompt, specify a point in the drawing area.

   Two concentric circles are drawn at the point specified.



8. Type **ZX** and press Enter.

   The ZOOM command is executed with the Extents option resulting in the drawing being zoomed to the extents of all visible objects.

9. Create a new drawing.
10. Type **C2** and press Enter.

    The text `Unknown command "C2". Press F1 for help.` is displayed in the Command Line window history because no function with the name C2 is defined in the new drawing. Functions defined with AutoLISP are only available in the drawing which they were defined.

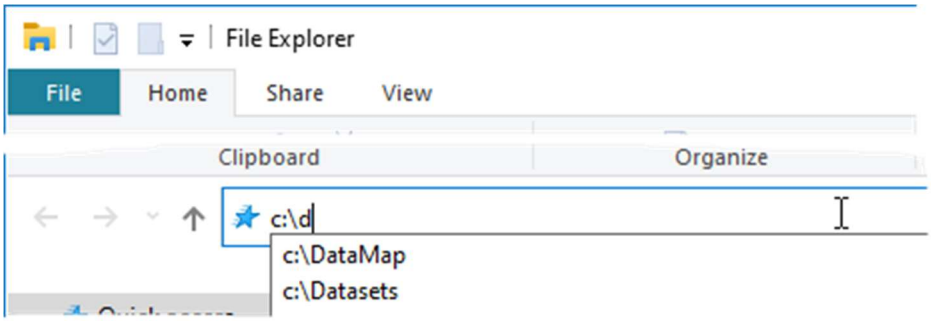
E4 Create and Load an LSP File (6-7 mins)

This exercise explains how to create an LSP file and then load it into the AutoCAD program.

Note: The resulting AutoLISP file created from this exercise can be found in the *Completed* folder of the dataset under the filename *au2020.lsp*.

In these steps, you create a new LSP file from an existing text file that contains several comments and AutoLISP statements:

1. Switch to Windows Explorer or File Explorer, and the dataset folder for this session.
   a. If it isn't open from before, in AutoCAD, at the Command prompt, type **explorer** and press Enter.
   b. In Windows Explorer or File Explorer, in the Address Bar, type **c:\d** and select the Datasets folder and navigate to the dataset folder for this session.

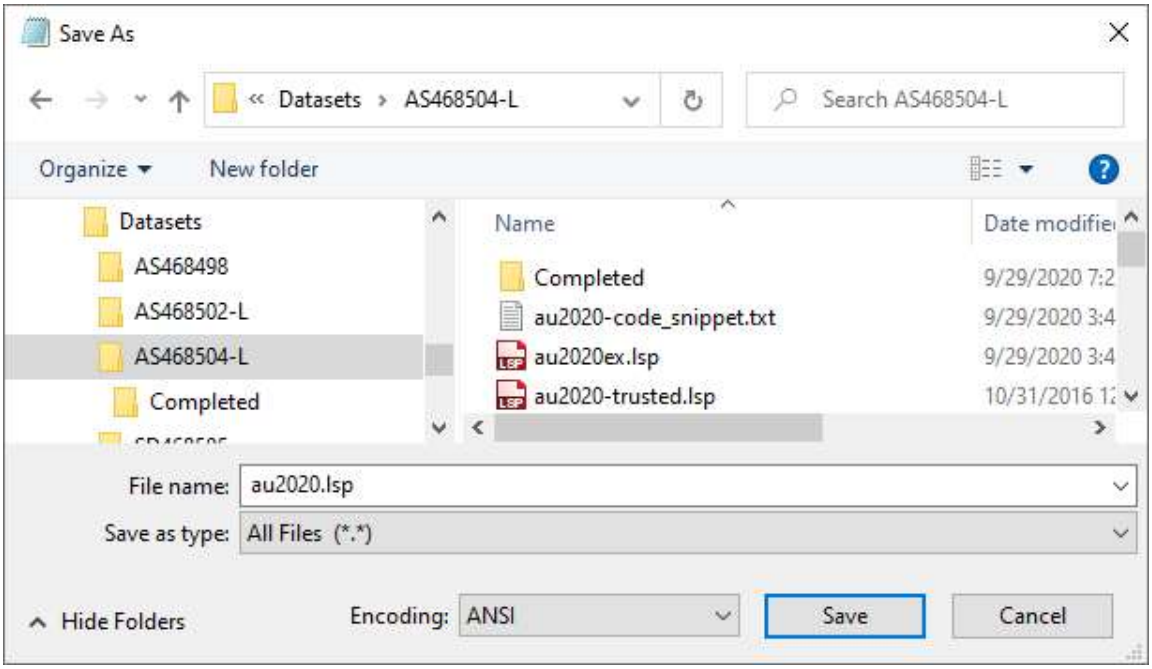


The location and name of the dataset folder for this session should be *C:\Datasets\AS468504-L*

2. In the *AS468504-L* folder, double-click the *au2020-code_snippet.txt* file.

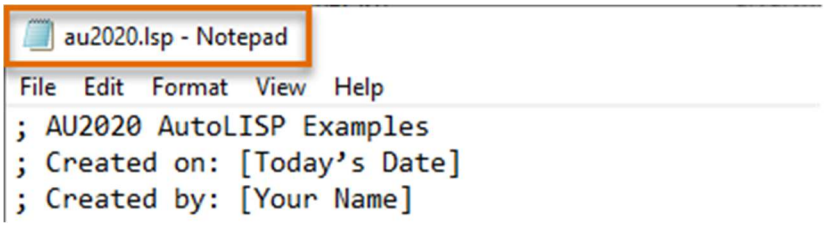
In these steps, you create a new LSP file named *au2020.lsp*:

1. In Notepad, on the menu bar, click File menu > Save As.
2. In the Save As dialog box, File Name text box, clear the text and type *au2020.lsp*.
3. In the Save As Type drop-down list, select All Files (*.*) and click Save.

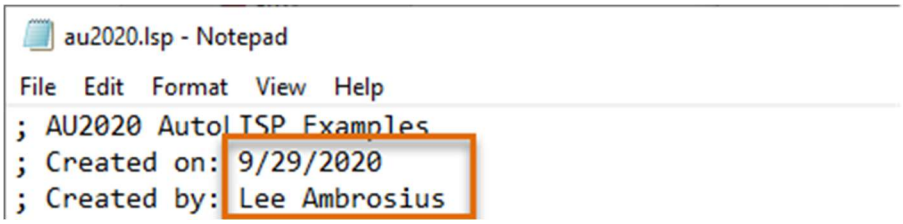


In these steps, you add and define custom functions to the LSP file.

1. In Notepad, make sure the title bar reads *au2020.lsp* – Notepad to ensure you saved the file correct. If not, go back and resave *au2020-code_snippet.txt* to *au2020.lsp*.



2. In the text editor area, replace the text `[Today's Date]` with the current date and replace `[Your Name]` with your name or a value of your choosing.



3. On the menu bar, click File menu > Save.
4. In the text editor area, click after the last statement and press Enter twice to make sure you are on a blank line ready to type.
5. Enter the following text:

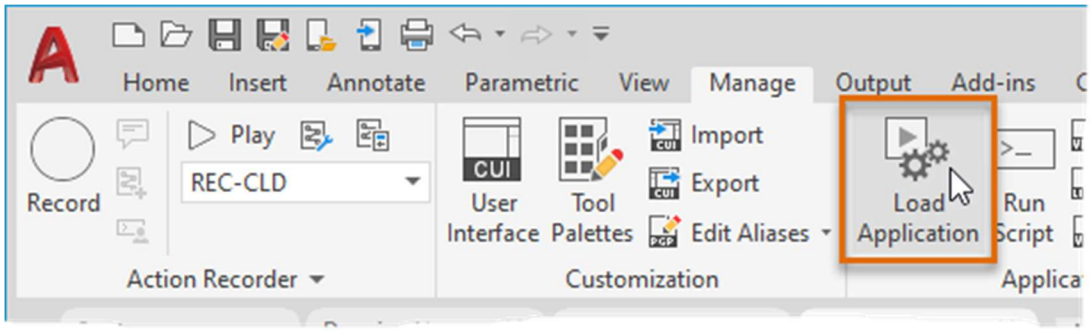
```
; Zoom extents shortcut
(defun c:ZX ()(command "zoom" "e"))

; Draws concentric circles
(defun c:C2 ()(command "circle" PAUSE 1 "circle" "@" 2))
```

   The two functions should look familiar as they are the same ones you entered at the Command prompt earlier along with a comment before each function.

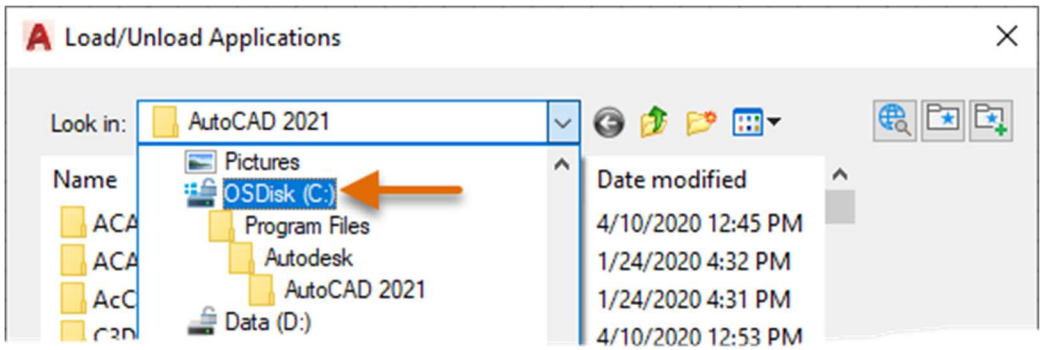
6. On the menu bar, click File menu > Save.

In these steps, you learn how to load the *au2020.lsp* file into AutoCAD:

1. Switch back to AutoCAD and create a new drawing.
2. On the ribbon, click Manage tab > Applications panel > Load Application.



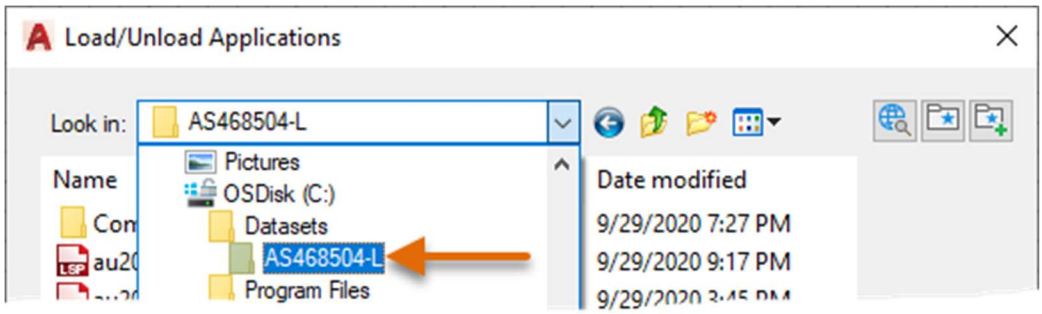
3. In the Load/Unload Applications dialog box, click the Look In drop-down list near the top and select C:.



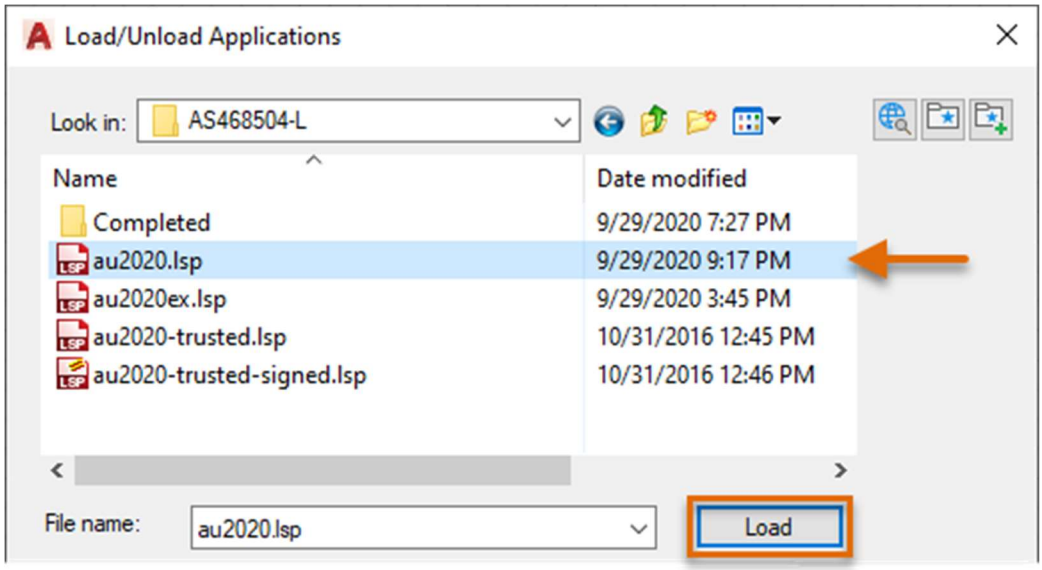
4. Browse to the dataset folder for this session.

   The location and name of the dataset folder for this session should be

   C:\Datasets\AS468504-L

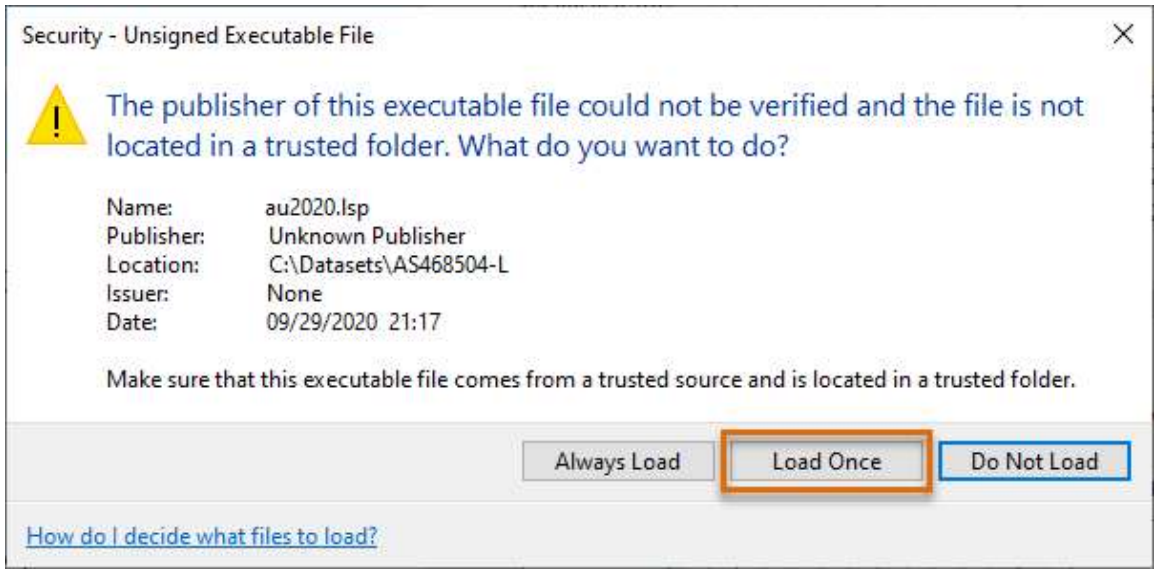


5. In the *AS468504-L* folder, select the *au2020.lsp* file and click Load.

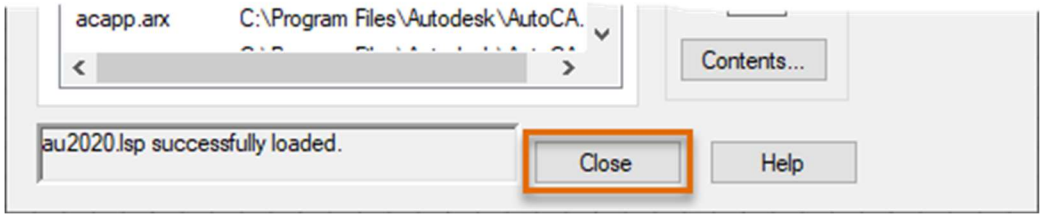


A message near the lower-left corner of the dialog box appears displaying the text "`au2020.lsp successfully loaded.`" which lets you know the file loaded.

6. In the Security – Unsigned Executable File message box, click Load Once.



7. In the Load/Unload Applications dialog box, click Close to exit the dialog box.



8. Press F2.

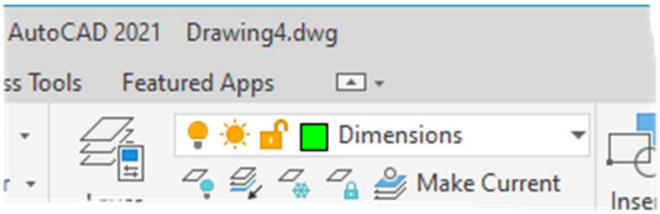
   The message `AU2020 AutoLISP Examples loading...` should appear in the Command Line window, which was added by the following AutoLISP statement in the *au2020.lsp* file.

   ```
   (prompt "\nAU2020 AutoLISP Examples loading...")
   ```

In these steps, you test the functions that were loaded as part of the *au2020.lsp* file:

1. On the ribbon, click the Home tab.
2. At the Command prompt, type **DLI** and press Enter.

   The Dimensions layer is created and set current, which can be seen in the Layers drop-down list on the Layers panel, and then the DIMLINEAR command is started because of the DLI function defined in the *au2020.lsp* file.



3. Specify three points in the drawing area.

   The new linear dimension is placed on the Dimensions layer and appears in green.

4. Try the **C2** and **ZX** functions that you added to the *au2020.lsp* file.
5. Create a new drawing.
6. At the Command prompt, type **C2** and press Enter.

   The text `Unknown command "C2". Press F1 for help.` is displayed in the Command Line window history because no function with the name C2 is defined in the new drawing. You would need to load the *au2020.lsp* file into the new drawing for the function to be available.

7. Type **DLI** and press Enter and then specify three points in the drawing area to place the dimension.

   Notice the standard DLI command alias defined in the *acad.pgp* file is executed which starts the DIMLINEAR command and places the dimension on the current layer rather than the Dimensions layer.

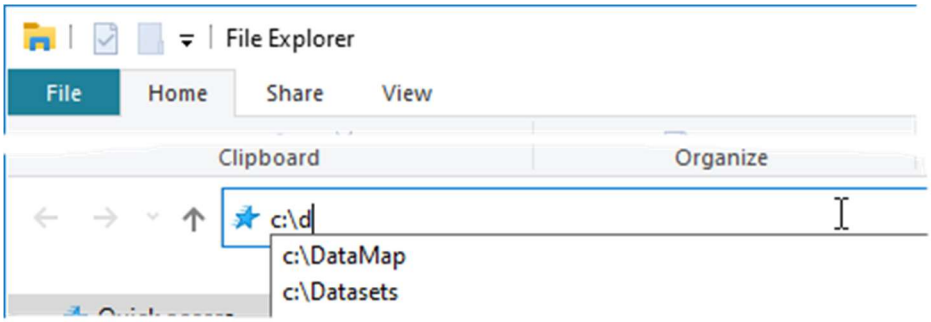
E5 Create a Plug-in Bundle to Load an AutoLISP Program (7-8 mins)

This exercise explains how to load custom LSP files with a custom plug-in bundle.

Note: The plug-in bundle created in this exercise can be found in the *Completed* folder of the dataset with the folder name *AS468504-L-E5 Complete.bundle*.

In these steps, you learn how to create a plug-in bundle named *AS468504-L.bundle*:

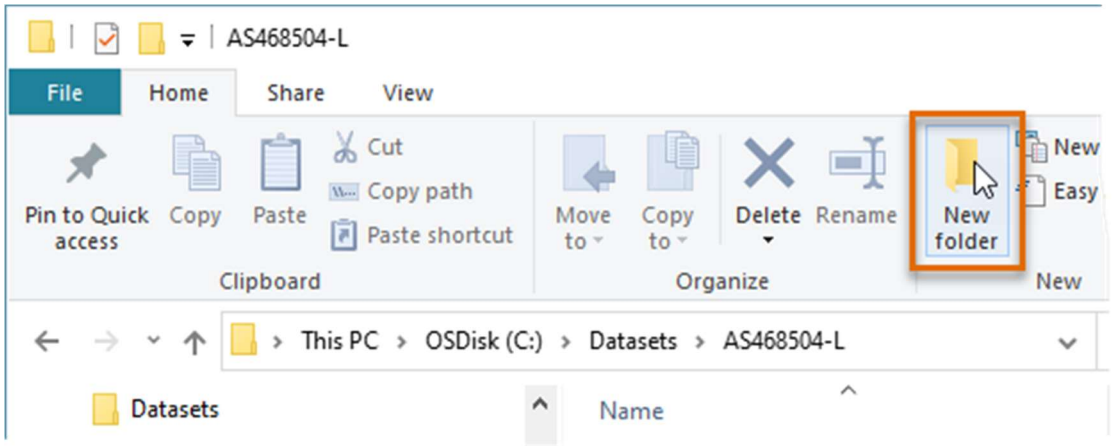
1. Switch to Windows Explorer or File Explorer, and the dataset folder for this session.
   a. If it isn't open from before, in AutoCAD, at the Command prompt, type **explorer** and press Enter.
   b. In Windows Explorer or File Explorer, in the Address Bar, type **c:\d** and select the Datasets folder and navigate to the dataset folder for this session.



   The location and name of the dataset folder for this session should be

   C:\Datasets\AS468504-L

2. In the *AS468504-L* folder, click New Folder.



3. In the in-place editor, type **AS468504-L.bundle** and press Enter.
4. In Windows Explorer or File Explorer, select the *au2020.lsp* file you created earlier.

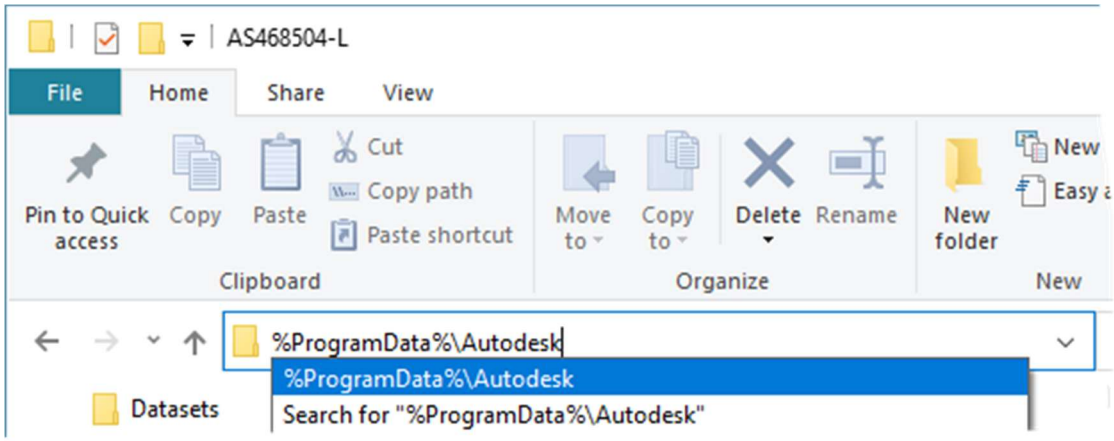
5. Hold down the Ctrl key and select the following files in the *AS468504-L* folder:
    - *au2020ex.lsp*
    - *PackageContents.xml*
6. Right-click over one of the selected files and choose Copy.
7. Double-click the *AS468504-L.bundle* folder.
8. In the empty folder, right-click and choose Paste.

In these steps, you learn how to deploy the plug-in bundle named *AS468504-L.bundle*:

1. In Windows Explorer or Files Explorer, go back (or up) one folder so you are in the dataset folder for this session and not the *AS468504-L.bundle* folder.

    This can be done by doing one of the following:

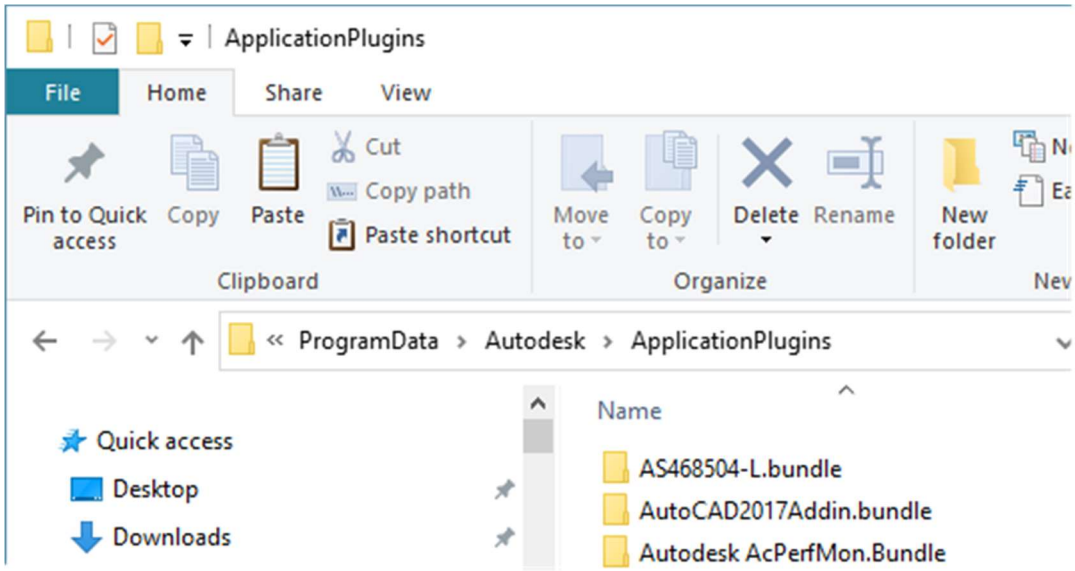
    - Clicking in an empty area of the files list and pressing Backspace
    - Clicking the previous folder name in the Address bar
    - Editing the folder path in the Address bar by removing the text *AS468504-L.bundle* and pressing Enter
2. Right-click over the *AS468504-L.bundle* folder and choose Copy.
3. In Windows Explorer or File Explorer, in the Address bar, type **%ProgramData%\Autodesk** and press Enter.



Note: It is recommended to add plug-in bundles to one of the following locations instead of the *ProgramData* folder:

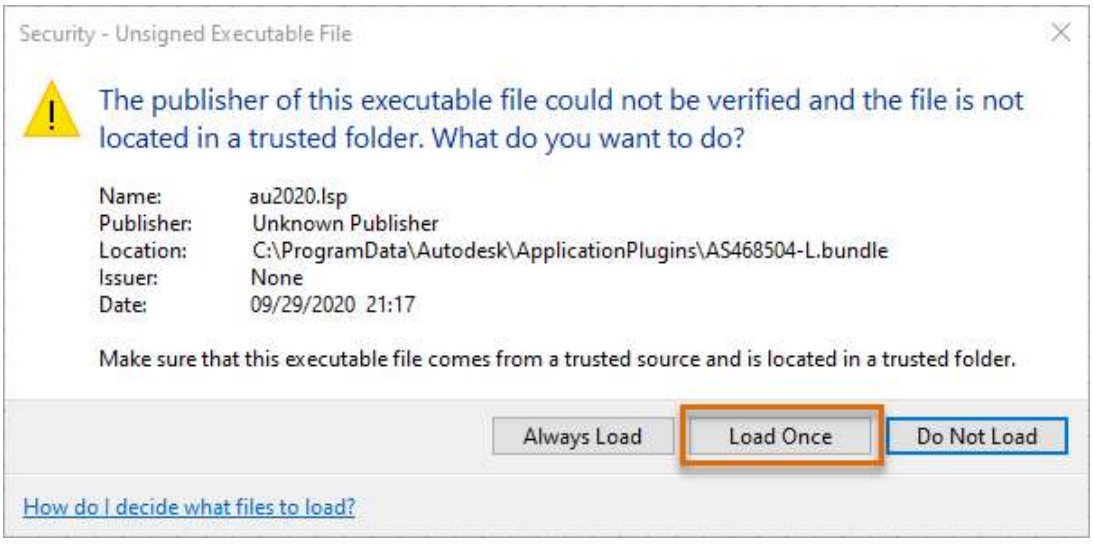
- *%ProgramFiles%\Autodesk*
- *%ProgramFiles(x86)%\Autodesk*

4. Double-click the *ApplicationPlugins* folder, right-click in an empty area, and choose Paste.



Note: The plug-in bundle is now deployed and ready for AutoCAD to load. While the bundle might be recognized by AutoCAD, the LSP files aren't loaded into the current session. For the LSP files to be loaded, the AutoCAD program must be restarted. If your plug-in bundle isn't automatically loaded after restarting the AutoCAD program, check the value of the APPAUTOLOAD system variable as it should be set to 14.

5. Close and restart AutoCAD; discard the changes to all open drawings.
6. After AutoCAD restarts, create a new drawing.
7. In the Security – Unsigned Executable File dialog box, click Load Once.



This dialog box is displayed to let you know that the file hasn't been digitally signed and isn't in a trusted location.

8. At the Command prompt, type **C2** and press Enter. Specify a point in the drawing area.
9. Type **DLI** and press Enter. Specify three points to create the linear dimension.
10. Type **ZX** and press Enter to zoom to the extents of the drawing.

In these steps, you learn how to update the *PackageContents.xml* file for the *AS468504-L.bundle* to load another LSP file:

1. In Windows Explorer or File Explorer, in the *AS468504-L.bundle* folder under *%ProgramData%\Autodesk\ApplicationPlugins*, right-click the *PackageContents.xml* file and choose Open With > Notepad.
2. In Notepad, scroll down to the `Components` element and add the text in bold; you can copy and paste the existing `ComponentEntry` element just above the bold text instead of typing all the text in bold.

```
    <ComponentEntry Description="Your custom file"
       AppName="AU2020Examples"
       Version="1.0"
       ModuleName="./au2020.lsp">
    </ComponentEntry>
    <ComponentEntry Description="Additional examples"
       AppName="AU2020AdditionalExamples"
       Version="1.0"
       ModuleName="./au2020ex.lsp">
    </ComponentEntry>
  </Components>
</ApplicationPackage>
```

3. In Notepad, on the menu bar, click File menu > Save.
4. Close and restart AutoCAD; discard the changes made to the open drawing.
5. In AutoCAD, create a new drawing.
6. Click Load Once for each of the Security – Unsigned Executable File dialog boxes that are displayed.
7. At the Command prompt, type **TB** and press Enter.

   The title block *t-blk* is inserted into the current space. The path of the block was setup as part of the exercise *E0 Download and Setup the Dataset Folder and Add it to the AutoCAD's Support File Search Path*.
8. Type **ZX** and press Enter.
9. Type **ZP** and press Enter.

   The previous view is restored.
10. Type **TAGBUBBLE** and press Enter. Type **C** and press Enter for the circle bubble and then press Enter to accept the default text height of 3. Specify the center of the bubble and the endpoint of the leader line.

E6 Digitally Sign an LSP File (4-5 mins)

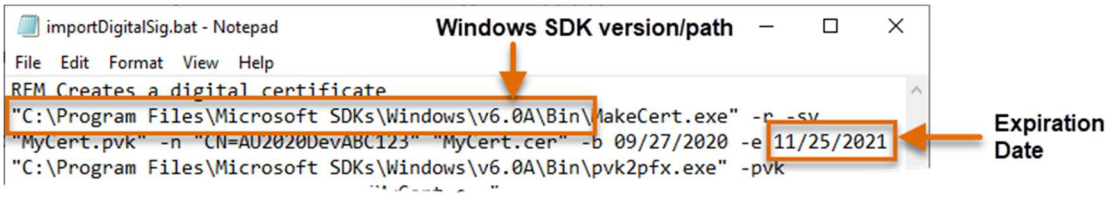
This exercise explains how to digitally sign an LSP file to help prevent the intrusion and execution of malware into your custom programs and drawing environment. While a digital signature alone can't help protect you from malware, it does provide another layer of protection.

Note: Commonly, a digital certificate is obtained from a certificate authority, this allows individuals that use your AutoLISP files to authenticate the digital signature of stamped files.

Note: The plug-in bundle created from this exercise can be found in the *Completed* folder of the dataset with the folder name *AS468504-L-E6 Signed.bundle*.

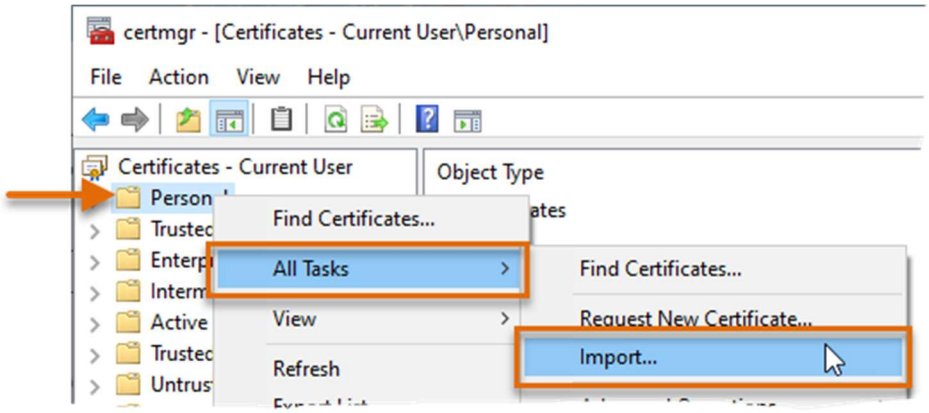
The files used in this section to digitally sign LSP files might need to be updated because of an expiration date, if you are using the dataset after November 2021, you will need to update the files. To update the digital certificate files, you will need:

- A version of the Windows SDK; Windows 7 is what I choose to use - https://www.microsoft.com/en-us/download/details.aspx?id=8279
- Update the *importDigitalSig.bat* file in the dataset based on the version of the Windows SDK you install and a new expiration date:



In these steps, you import a digital certificate file:

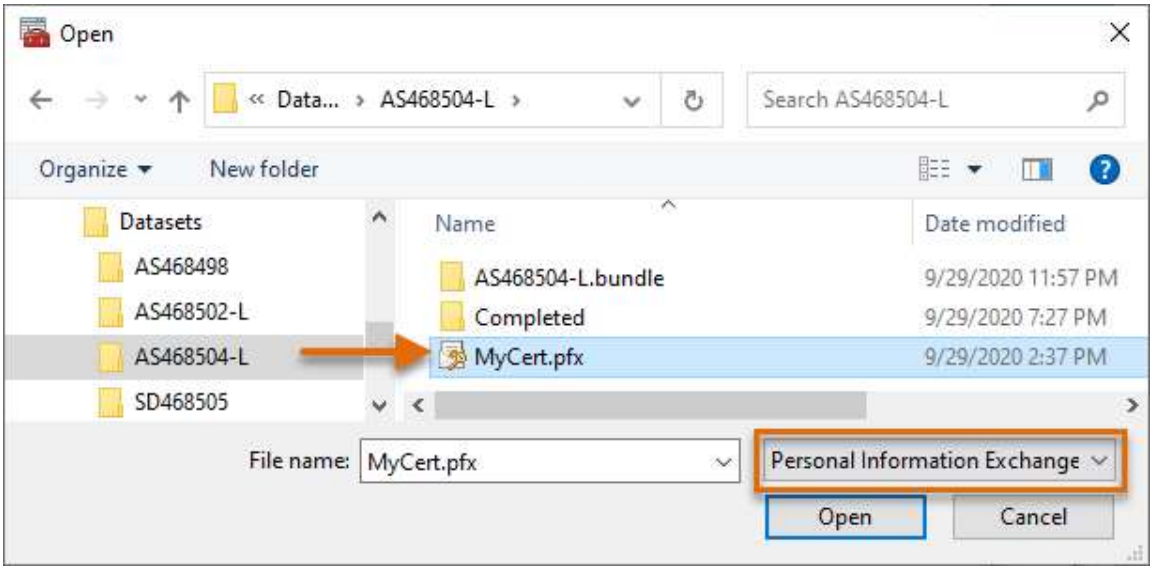
1. Do one of the following:
   - On the Windows 8 or Windows 10 Start Screen, under the Windows System category, click Run.
   - On the Windows 7 taskbar, click the Start button > All Programs > Windows System > Run.
2. In the Run dialog box, Open text box, type **certmgr.msc** and press Enter.
3. In the Certificate Manager, right-click over the Personal node and choose All Tasks > Import.



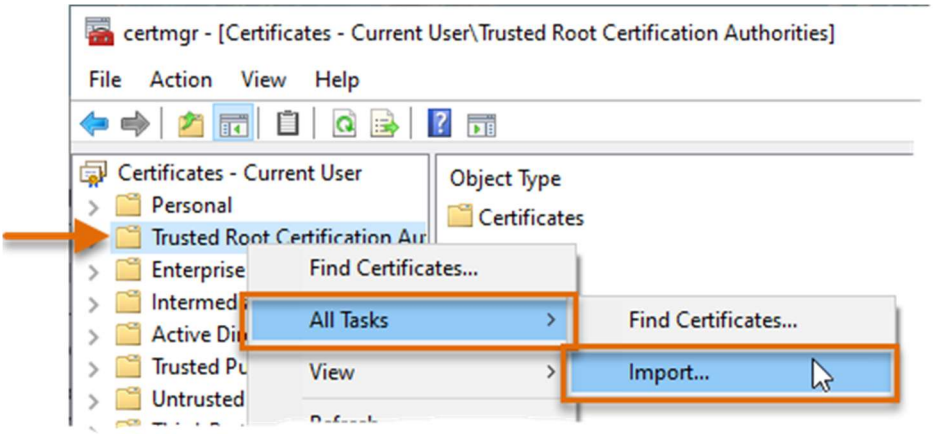
4. In the Certificate Import Wizard, click Next and then click Browse.
5. In the Open dialog box, browse to the dataset folder for this session.

   The name of the dataset folder for this session should be

   C:\Datasets\AS468504-L
6. In the Files of Type drop-down list, choose Personal Information Exchange (*.pfx; *.p12).
7. Select the *MyCert.pfx* file and click Open.



8. In the Certificate Import Wizard, click Next.
9. On the Private Key Protection page, in the Password text box, type **password** and click Next twice to accept the specified store.
10. Click Finish and then OK to complete the importing of the digital certificate.
11. Right-click over the Trusted Root Certification Authorities node and choose All Tasks > Import.

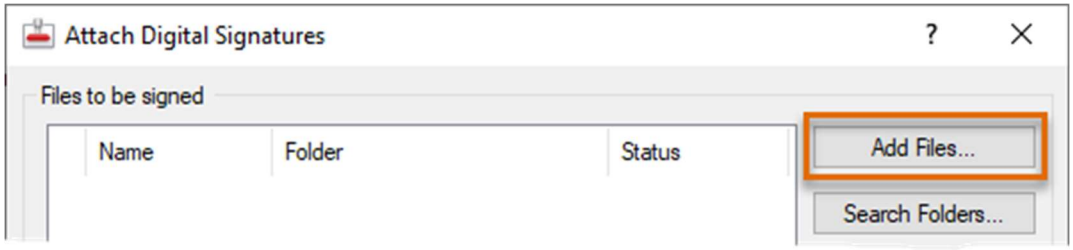


12. Repeat Steps 4-10. If a Security Warning message is displayed related to Windows not being able to validate the certificate, click Yes and then click OK.
13. Close the Certificates Manager.

In these steps, you will digitally sign an LSP file:

1. Do one of the following:
   - On the Windows 8 or Windows 10 Start Screen, under the AutoCAD <release> - English category, click Attach Digital Signatures.
   - On the Windows 7 taskbar, click the Start button > All Programs > Autodesk > AutoCAD <release> - English > Attach Digital Signatures.

2. In the Attach Digital Signatures dialog box, under Files to be Signed, click Add Files.



3. In the Select File dialog box, browse to the *AS468504-L.bundle* folder and hold down the Ctrl key while selecting the *au2020.lsp* and *au2020ex.lsp* files. Click Open.

   The location of the plug-in bundle folder should be

   C:\ProgramData\Autodesk\ApplicationPlugins\AS468504-L.bundle

4. Under the Select a Digital ID (Certificate), choose AU2020DevABC123.

5. Click Sign Files.
6. In the Signing Complete message box, click OK.

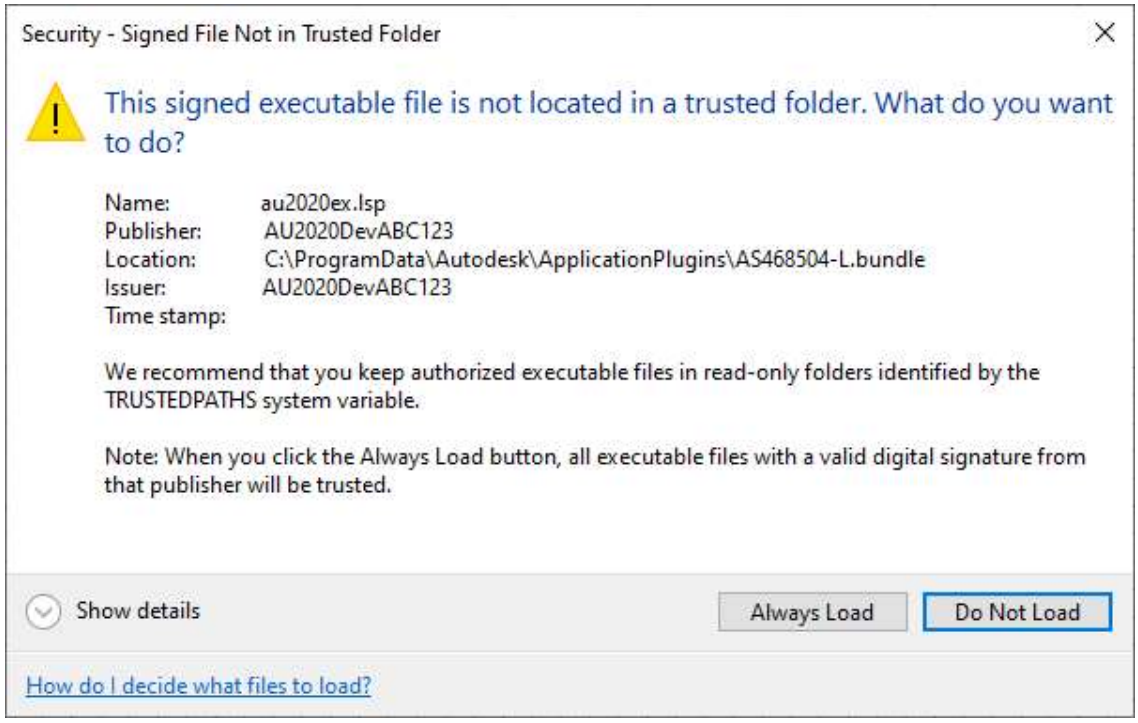
   This message box informs you of the number of files that have been digitally signed.

7. In the Attach Digital Signatures dialog box, click Close.

   When the file is viewed in Windows Explorer or File Explorer, a small badge appears on the LSP icon to indicate it has been digitally signed.

8. Close and restart AutoCAD; discard the changes made to the open drawing.
9. In AutoCAD, create a new drawing.
10. In the Security – Signed File Not in Trusted Folder dialog box, click Do Not Load twice.

    Always Load will load all LSP files that are signed by the AU2020DevABC123 publisher.



You can also verify that the file has been signed in Windows Explorer or File Explorer by doing the following:

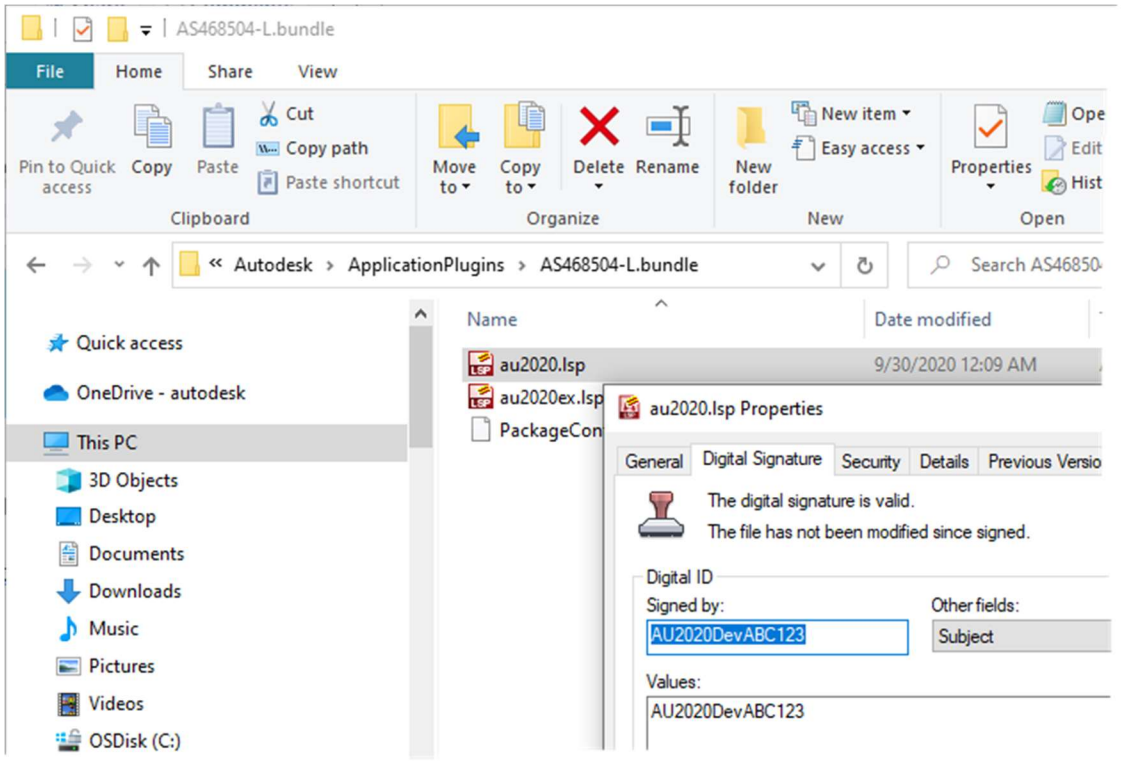
1. Open Windows Explorer or File Explorer and browse to the *AS468504-L*.bundle folder.

   The location of the plug-in bundle folder should be

   C:\ProgramData\Autodesk\ApplicationPlugins\AS468504-L.bundle
2. In Windows Explorer or File Explorer, right-click over the *au2020.lsp* file and choose Properties.

   Notice the file icon has changed slightly to indicate it has been signed.

3. In the Properties dialog box, click the Digital Signature tab to view the Digital ID properties of the file.



4. Click OK or Cancel to close the Properties dialog box.

E7 Create and Modify a New Profile (7-8 mins)

This exercise explains how to add trusted locations, create and set a new user profile current, and make changes to the new user profile. Trusted locations are an important part to deploying AutoLISP (LSP) files as they let AutoCAD know from which folders executable files can be trusted. User profiles are used to specify trusted locations and other settings that affect where AutoCAD searches for support files along with how the application behaves and looks.

In these steps, you load LSP files outside of a trusted location:

1. In AutoCAD, at the Command prompt, type **`(load "au2020-trusted.lsp")`** and press Enter.
2. In the Security – Unsigned Executable File message box, click Load Once.

   The message box informs you that the custom program file being loaded isn't located in a trusted location and it hasn't been previously digitally signed.

   Note: It isn't recommended to load custom programs from a location that hasn't been previously trusted.

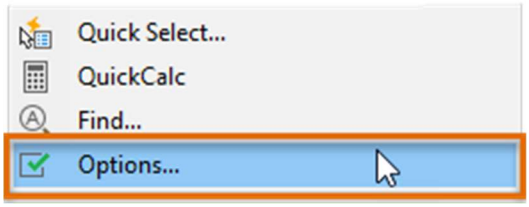
   Upon the loading of the LSP file, an AutoCAD message box is displayed with the `alert` function.
3. In the AutoCAD message box, click OK.

4. At the Command prompt, type `(load "au2020-trusted-signed.lsp")` and press Enter.
5. If the Security – Signed File Not in Trusted Folder message box is displayed, click Do Not Load.

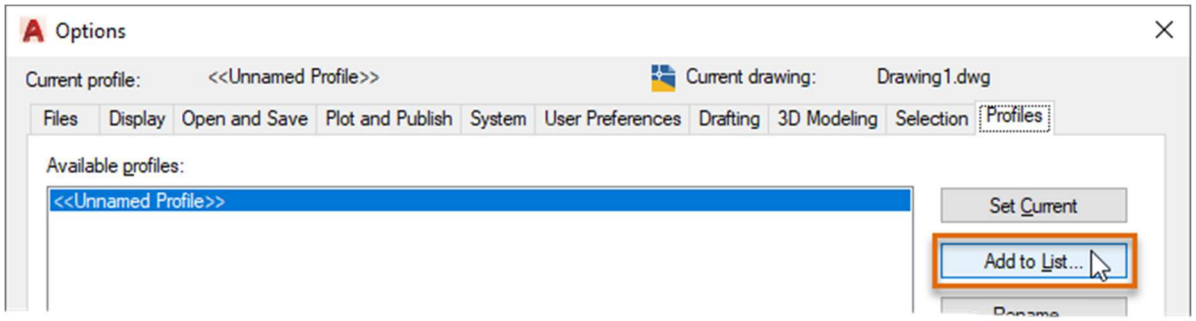
   The message box informs you that the custom program file has been digitally signed but isn't being loaded from a trusted folder. Even when digitally signed, you must be careful to know who is sending you the file as clicking Always Load will automatically trust all files signed by the same publisher.

In these steps, you create a new profile and set it current:

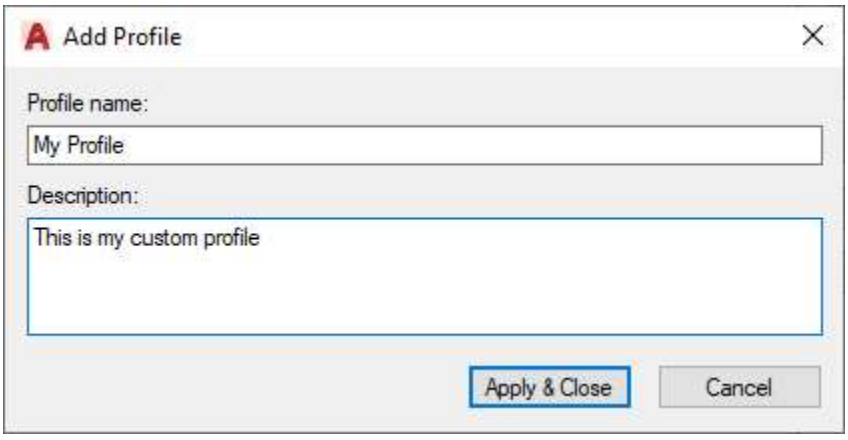
1. Right-click in the drawing area and choose Options.



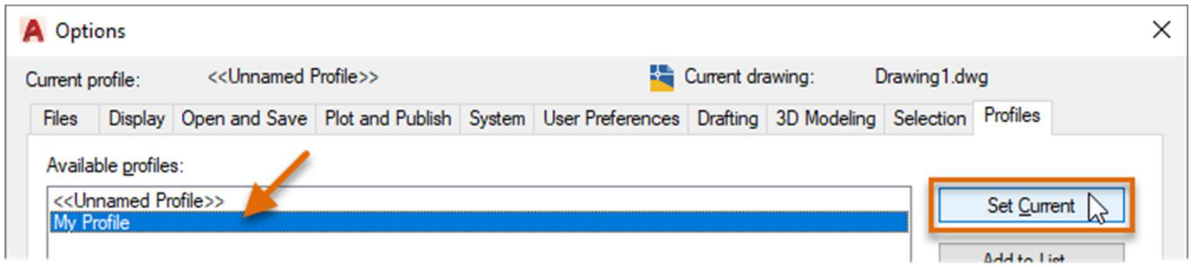
2. In the Options dialog box, on the Profiles tab, click Add to List.



3. In the Add Profile dialog box,
   - Profile Name text box, type **My Profile**
   - Description text box, type **This is my custom profile**



4. Click Apply & Close.
5. From the Available Profiles list, select My Profile and click Set Current.



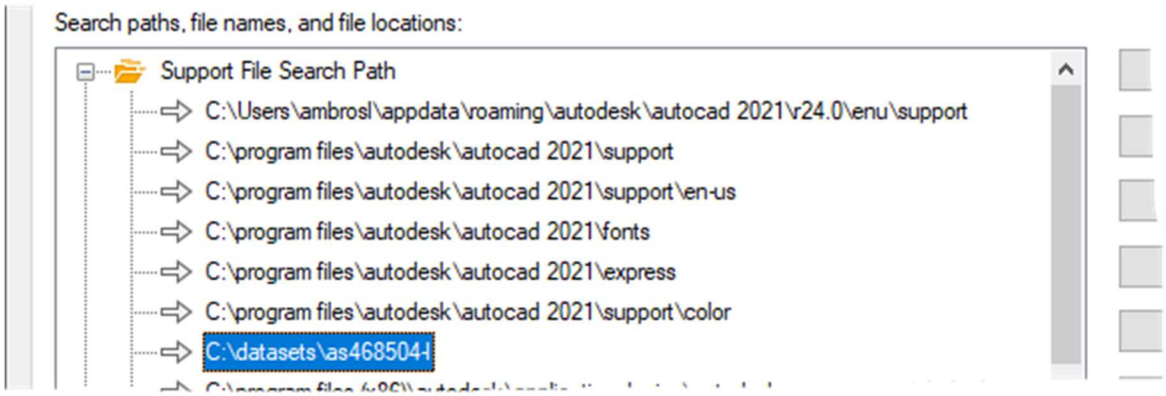
Tip: The `/p` command line switch can be used to set a profile current when AutoCAD is started from a desktop shortcut. For more information on the `/p` command line switch, search on the keywords “command line switch” in the AutoCAD Online Help system.

In these steps, you modify a profile and add this session’s folder to the AutoCAD search support path and as a trusted location:

1. In the Options dialog box, on the Files tab, expand the Support File Search Path node and verify that the dataset folder for this session is listed.

   The name of the dataset folder for this session should be

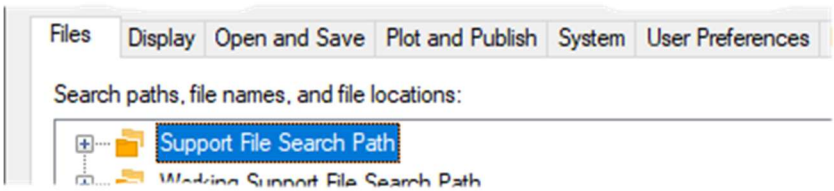
   C:\Datasets\AS468504-L



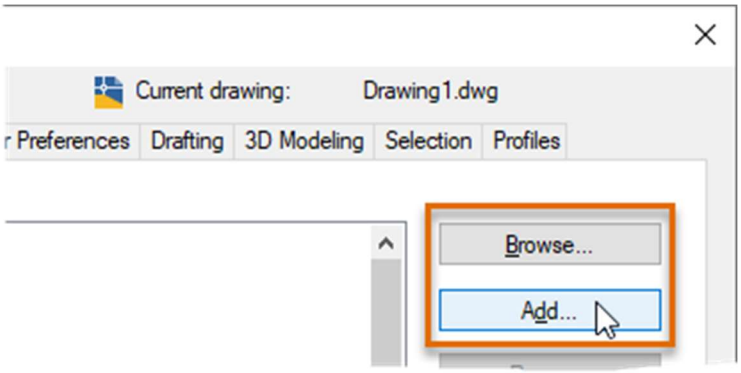
   The folder should have been inherited from the current user profile that you originally added the path to as part of the exercise named *E0 Download and Setup the Dataset Folder and Add it to the AutoCAD’s Support File Search Path*.

2. If the folder mentioned and shown in the previous step is missing, do the following otherwise go to Step 3:

   a. Select the Support File Search Path node.

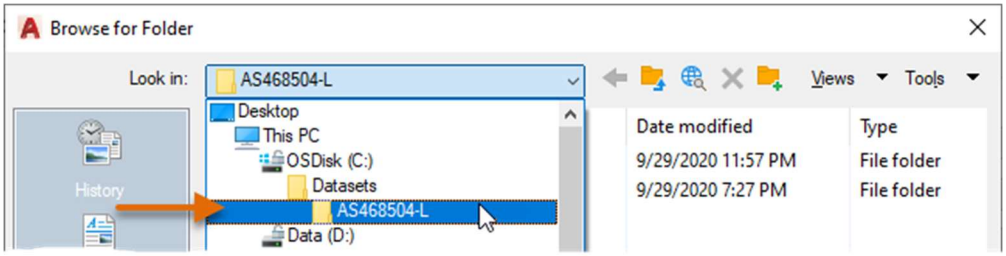


b. On the right side of the dialog box, click Add and then click Browse.

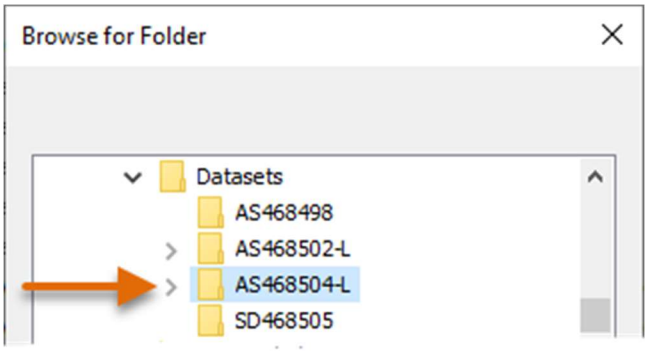


c. Do one of the following:

- **AutoCAD 2021:** In the Browse for Folder dialog box, browse to and select the folder for this session. Click Open.



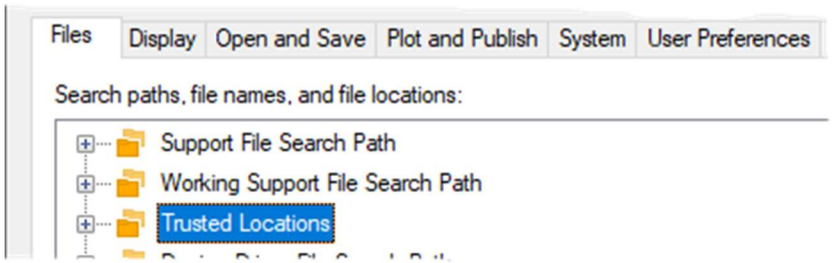
- **AutoCAD 2020 and earlier:** In the Browse for Folder dialog box, browse to and select the folder for this session. Click OK.



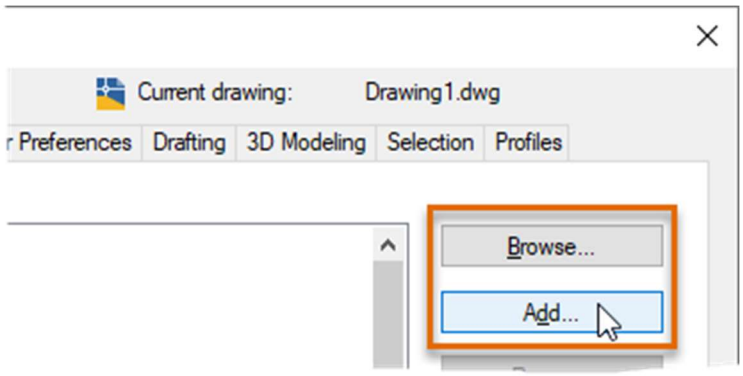
The name of the dataset folder for this session should be

C:\Datasets\AS468504-L

3. On the Files tab, select the Trusted Locations node.

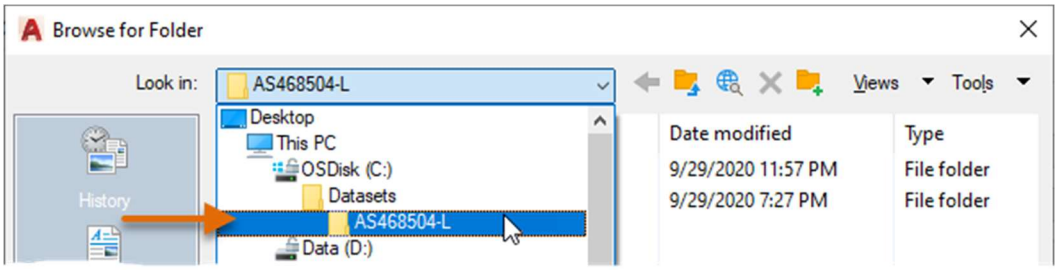


4. On the right side of the dialog box, click Add and then click Browse.

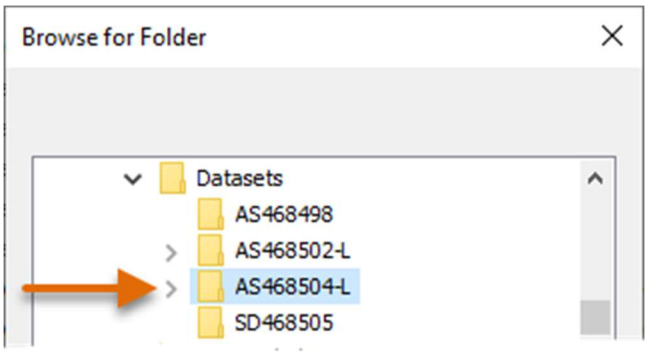


5. Do one of the following:

   - **AutoCAD 2021:** In the Browse for Folder dialog box, browse to and select the folder for this session. Click Open.



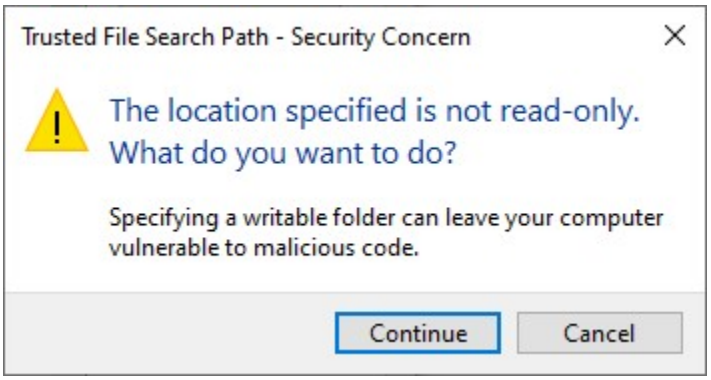
   - **AutoCAD 2020 and earlier:** In the Browse for Folder dialog box, browse to and select the folder for this session. Click OK.



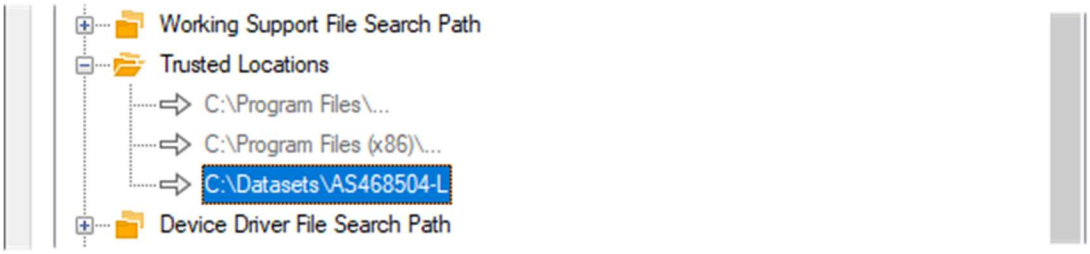
The name of the dataset folder for this session should be

C:\Datasets\AS468504-L

6. In the Trusted File Search Path - Security Concern dialog box, click Continue.

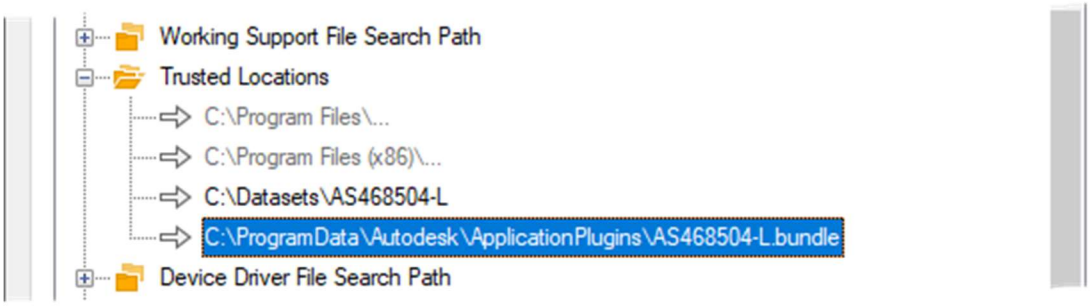


The folders you specify as trusted locations should be read-only to avoid potential problems with programs modifying the custom files in that location.



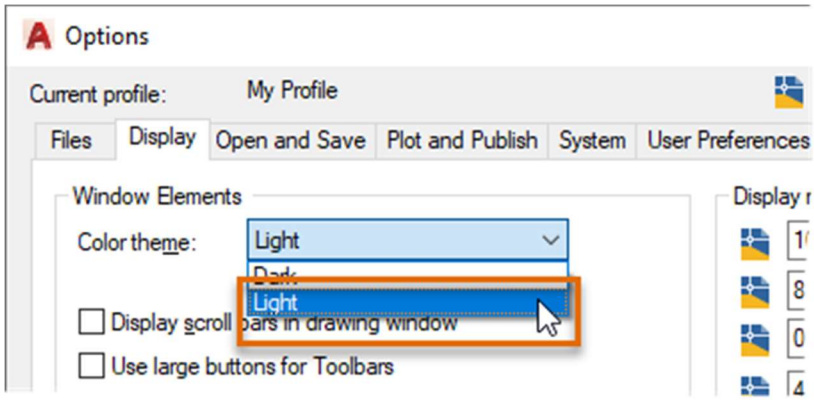
7. Repeat steps 4 through 6, and add the following folder to the trusted locations:

C:\ProgramData\Autodesk\ApplicationPlugins\AS468504-L.bundle

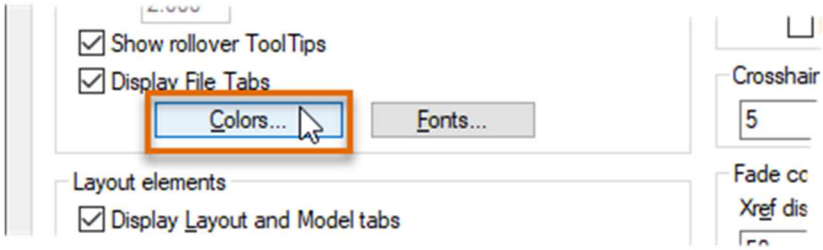


Note: It is recommended to digitally sign files in a plug-in bundle rather than trusting all files in that location since anyone can make changes to the files there.

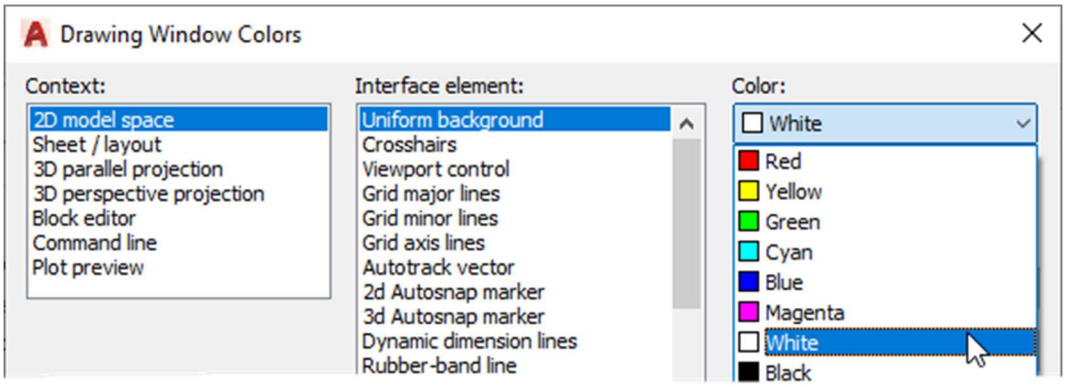
8. On the Display tab, in the Window Elements section, click the Color Theme drop-down list and select **Light**.



9. Click the Colors button.



10. In the Drawing Window Colors dialog box, do the following:
    a. In the Context list box, select **2D Model Space**.
    b. In the Interface Element list box, select **Uniform Background**.
    c. Click the Color drop-down list and select **White**.



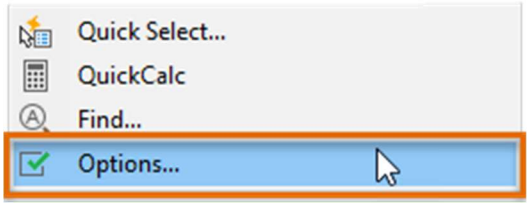
11. Click Apply & Close and then click OK to close the Options dialog box.

In these steps, you test the changes to the profile's trusted paths:

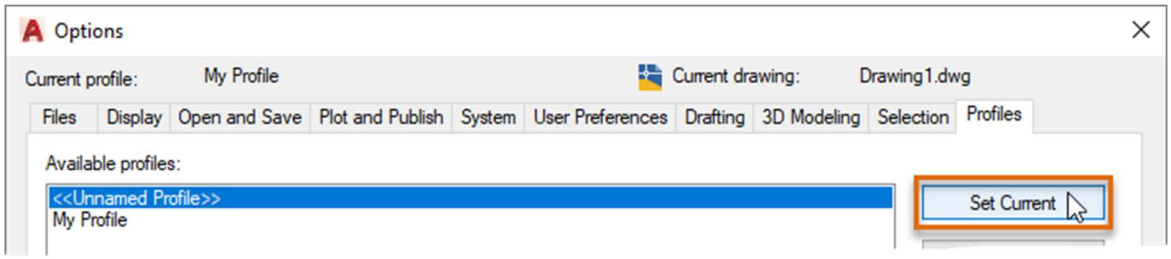
1. Close and restart AutoCAD; discard any changes to the open drawing.
2. In AutoCAD, create a new drawing.

3. At the Command prompt, type `(load "au2020-trusted.lsp")` and press Enter.
4. Click OK to dismiss the message box.

   Notice unlike earlier, the Security – Unsigned Executable File dialog box isn't displayed this time when the *au2020-trusted.lsp* file is loaded. If the message box is displayed, verify that you added the correct dataset folder for this session to the Trusted Locations node in the Options dialog box.
5. Right-click in the drawing area and choose Options.



6. In the Options dialog box, Profiles tab, from the Available Profiles list box, select <<Unnamed Profile>> and click Set Current. Click OK.



7. Close and restart AutoCAD.
8. In AutoCAD, create a new drawing.
9. Click Do Not Load each time the Security - Signed File Not in Trusted Folder dialog box is displayed.

   The Security - Signed File Not in Trusted Folder dialog box is displayed once again because the trusted location for this session and plug-in bundle is no longer specified.
10. At the Command prompt, type `(load "au2020-trusted.lsp")` and press Enter.

    The Security – Unsigned Executable File dialog box is displayed once again.
11. In the Security – Unsigned Executable File dialog box, click Load Once.
12. Click OK to dismiss the message box.

Restore the AutoCAD Environment (<3 min)

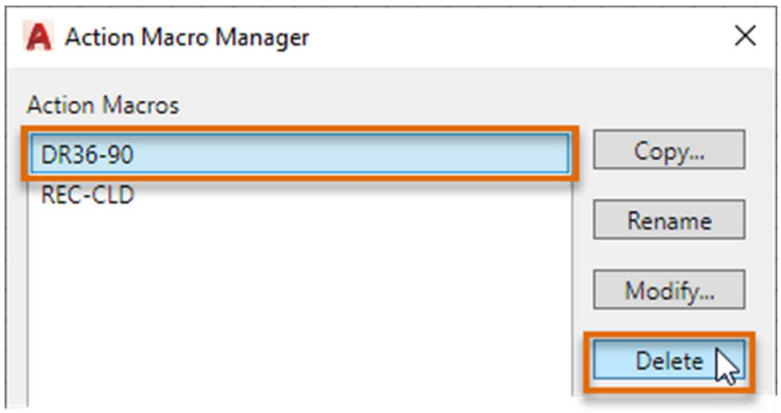
Typically, you would be working on a lab computer on-site during AU but since you most likely are using your AutoCAD environment at work that might already customized, care should be taken on backing out any changes you don't to leave behind. The following steps explain how to back out the various changes that you might have made during this handout.

In these steps, you remove the My Profile and remove the support path for this data set from the default user profile:

1. In AutoCAD, display the Options dialog box (OPTIONS command).
2. In the Options dialog box, Profiles tab, select <<Unnamed Profile>> or another profile other than in My Profile in the list of available user profiles.
3. Click Set Current.
4. In the list of available user profiles, select My Profile and click Delete. Click Yes.
5. Click the Files tab.
6. On the Files tab, expand Support File Search Path and select the *C:\Datasets\AS468504-L* path. Click Remove.
7. Click OK to save the changes to the Options dialog box.

In these steps, you remove the action macro (ACTM) files created:

1. In AutoCAD, on the ribbon, click Manage Tab > Action Recorder panel > Manage Action Macros (ACTMANAGER command).
2. In the Action Macro Manager, Action Macros list, select the REC-CLD (or DR36-90) action macro and click Delete.



3. In the Action Macro – Confirm Delete dialog box, click Delete.

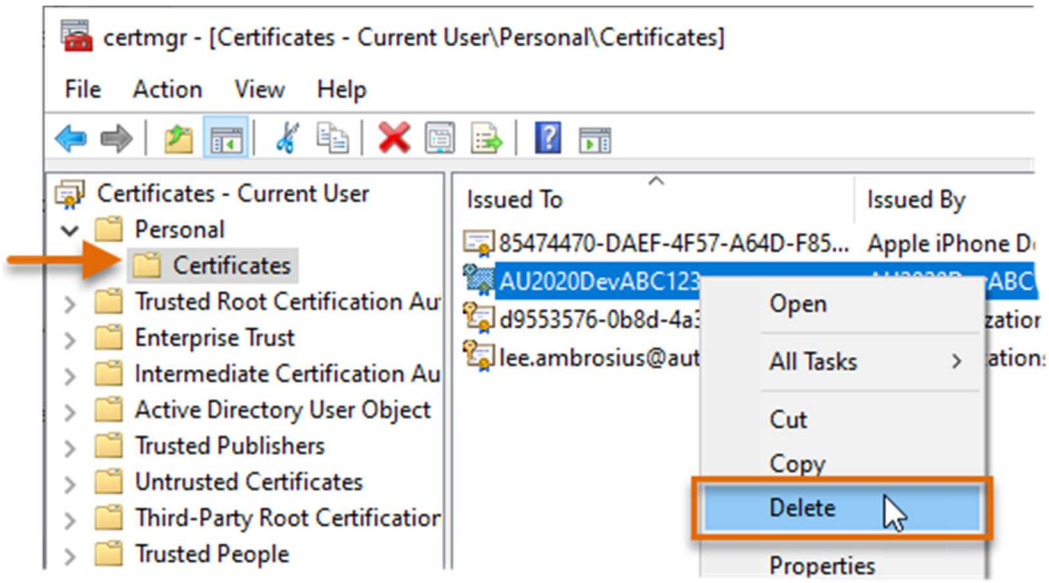
   Note: The deleted ACTM file is set to the Windows Recycle Bin.
4. Repeat Steps 3 and 4 for the other action macro (ACTM) file you might have created earlier as part of the first exercise.
5. Click Close to exit the Action Macro Manager.

In these steps, you remove the plug-in bundle from the *ProgramData* folder:

1. On the keyboard, press the key combination +E, or launch Windows Explorer or File Explorer using a different method.
2. In Windows Explorer or File Explorer, in the Address bar, type **%ProgramData%\Autodesk** and press Enter.
3. Double-click the *ApplicationPlugins* folder.
4. Select the *AS468504-L.bundle* folder and press Delete.

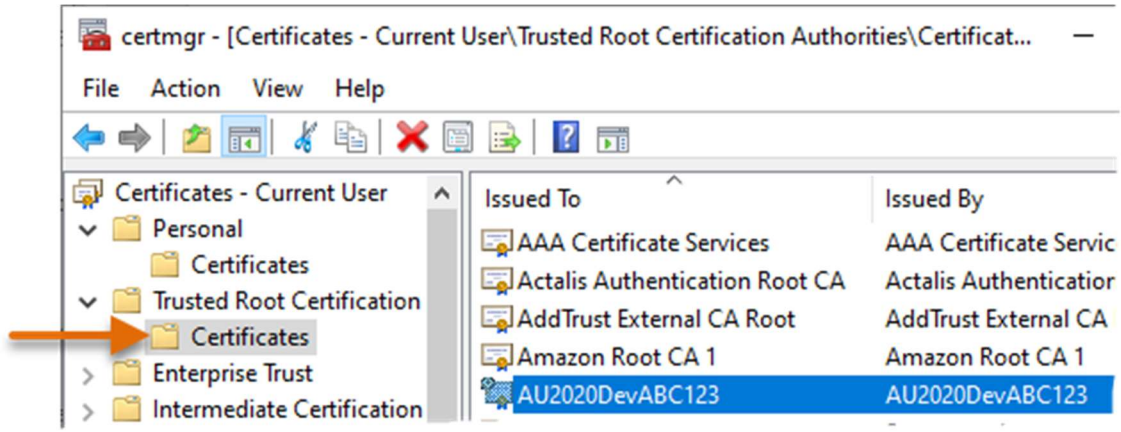
In these steps, you remove the digital signature from the Windows Certificate Manager:

1. Do one of the following:
   - On the Windows 8 or Windows 10 Start Screen, under the Windows System category, click Run.
   - On the Windows 7 taskbar, click the Start button > All Programs > Windows System > Run.
2. In the Run dialog box, Open text box, type **certmgr.msc** and press Enter.
3. In the Certificate Manager, expand Personal and click Certificates.
4. In the Certificates list, right-click over the AU2020DevABC123 certificate and choose Delete.



5. Click Yes to delete the certificate.

6. Expand Trusted Root Certification Authorities and click Certificates.



7. In the Certificates list, right-click over the AU2020DevABC123 certificate and choose Delete.
8. Click Yes twice.
9. Close the Certificate Manager.

Reset the AutoCAD Environment (<1 min)

The steps under this section explain how to reset AutoCAD to its default install state. You will also have to remove the plug-in bundle and digital certificates as explained under *Restore the AutoCAD Environment*.

Warning!: This will result in the removal of any customization that was done prior to the exercises in this handout, so proceed with caution. The steps outlined in *Restore the AutoCAD Environment* should be enough to restore the previous state of AutoCAD prior to completing the steps in this handout.

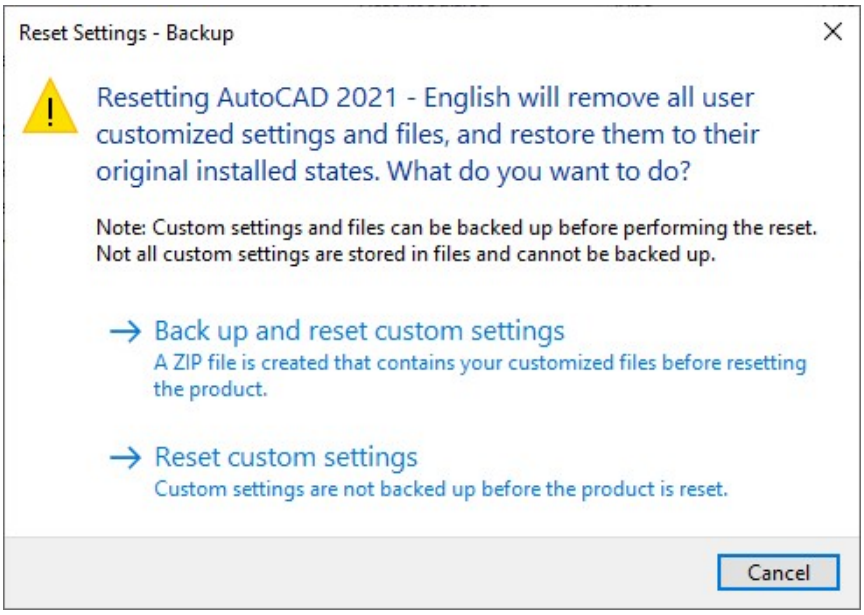
In these steps, you reset the AutoCAD program:

1. Close all instances of AutoCAD.
2. Do one of the following:
   - On the Windows 8 or Windows 10 Start Screen, under the AutoCAD *<release>* - English category, click Reset Settings to Default.
   - On the Windows 7 taskbar, click the Start button > All Programs > Autodesk > AutoCAD *<release>* - English > Reset Settings to Default.

   Note: If Reset Settings to Default is missing from the Windows Start screen or menu, right-click the AutoCAD *<release>* - English shortcut in one of the mentioned locations above and choose More > Open File Location. Then double-click Reset Settings to Default.

3. In the Reset Settings - Backup dialog box, click Reset Custom Settings.

   Click Back Up and Reset Custom Settings to back up your custom files and settings to a ZIP file which can later be imported to restore your custom files and settings.



4. When the Reset Settings - Confirmation message box is displayed, click OK.