AUTODESK UNIVERSITY

CES501051

Customization: If You Can Imagine It, You Can Do It

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Learning Objectives

- Learn about all the possible ways you can customize AutoCAD-based software.
- Begin to customize ribbons, tool palettes, quick access toolbars, personal toolbars, multibutton mice, and much more.
- Learn how to take advantage of already developed custom tools and apps in the Autodesk App Store.
- Learn how to confidently make simple customization a part of your personal and company environment.

Description

The ability to customize has always set AutoCAD-based technology apart from other drafting and design software. But most people either don't know how or are intimidated by unleashing the power of simple customization. This class explains why customization plays a major role in achieving greater productivity and improved quality, ultimately raising you and your company to a higher level of success. We'll introduce you to the basics of all the possible ways you can customize AutoCAD-based software, and show you how to take advantage of previously existing customized apps and tools. You'll leave this class with a better understanding of what's possible, and you'll have greater confidence to take advantage of this unique and powerful feature of the AutoCAD family of products.

Speaker

I've been in the Civil Engineering industry for over 41 years. I have over 37 years experience with AutoCAD and 15 years with Civil 3D. Before Civil 3D I had about 6 years experience with LDT. I also have over 3 years experience working with InfraWorks. As part of my career in Civil Engineering, I have worked on many DOT projects, therefore I have about 18 years experience with Bentley civil products and have a thorough understanding of the difference between the two platforms. For 6 years I was a corporate CADD manager for a company with over 60 users. My passion is Civil infrastructure design and CADD production.

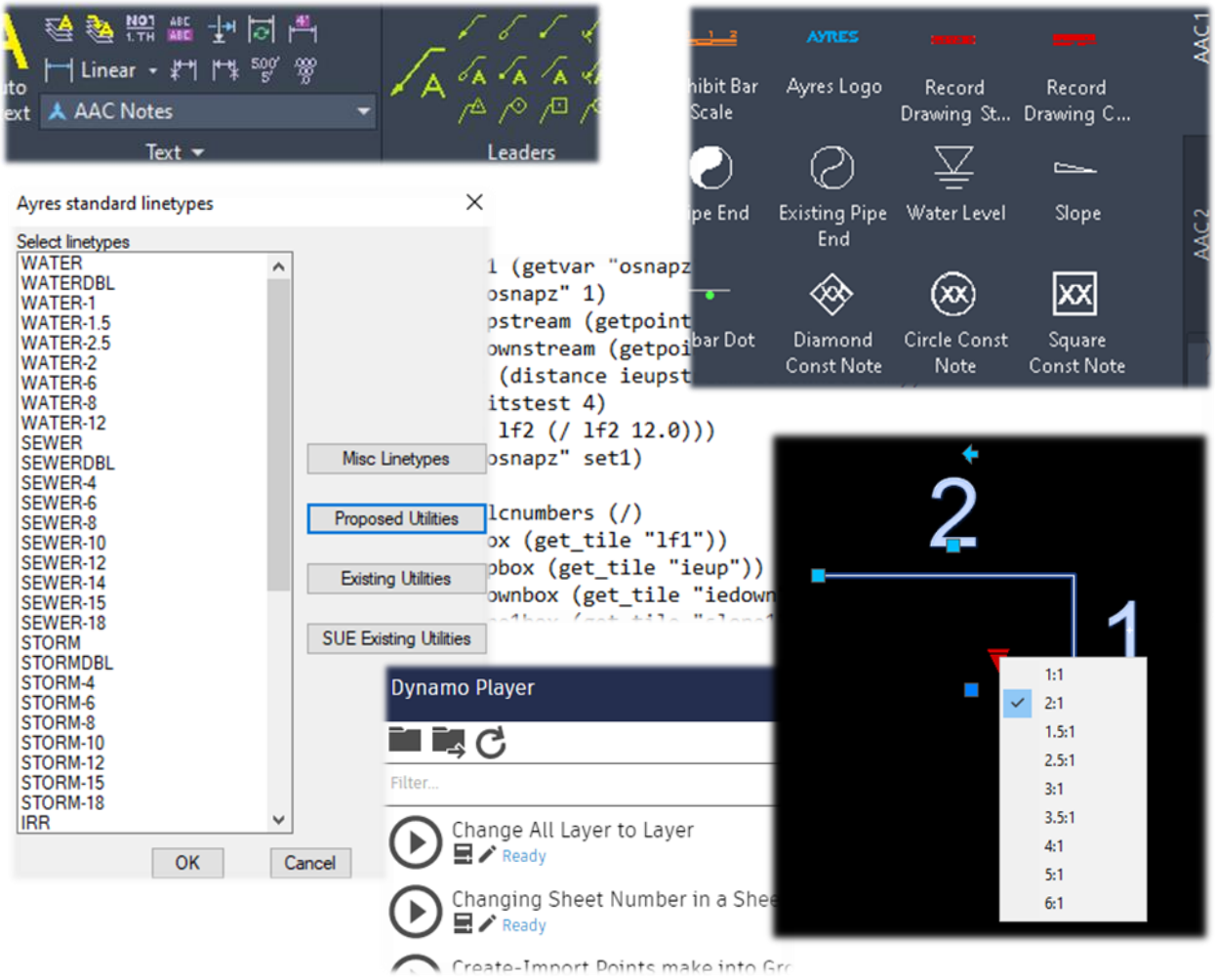
Is There A Better Way

Since the beginning of time there has been an inner drive to come up with a better, faster, easier, more productive way of accomplishing a task. When I was a teenager, my job for several summers was to move sprinkler pipe on large potato and wheat farms in Idaho. I would move pipe morning and evening, sometimes moving as many as 300 pipes per day. It was hard work. But that's how farmers irrigated their crops.

And then someone had the idea to create an automatic way of irrigating fields. These hand moved sprinkler pipes for the most part have been replaced with automatic circular wheel irrigation that runs entirely by itself. It changed everything and saved countless hours and money.

In the world of CADD design, production, and modeling it's the same drive. You ask yourself "Is there a better and faster way of performing a task?" The answer is almost always YES.

One of the big features AutoCAD has always been known for is the ability to customize. It's one of AutoCAD's great hallmarks. There are so many ways to customize. And what you can do is only limited by your imagination. If you can imagine it, you can do it. And by taking advantage of these tools, you are going to increase productivity, quality, and consistency.



So, the question is, why customize? Does it really bring value? The answer is YES! Customization increases productivity, improves quality and consistency, and empowers you to use the technology the way you need it. All of which enhances your success and plays a part in winning more work. Customization also plays a big role in helping your organization successfully follow company CADD standards.

The Possible Ways You Can Customize AutoCAD-Based Software

Here's a list of possible ways to customize AutoCAD and Civil 3D. These are all possible but some require programing experience where others are pretty simple and can be done with some basic training and practice. If a method is green, anyone can do it or at least quickly learn how. If it's blue it will require some training and practice. If it's red it will require extensive training and experience.

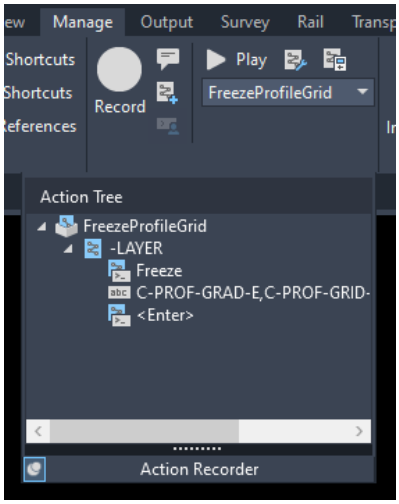
- Action Recorder
- Civil 3D Styles
- Command Aliases (quick keys)
- Dialog Boxes
- Dropdown Menus
- Dynamic Blocks
- Dynamo
- Hatch Patterns
- Infrastructure Parts Editor
- Linetypes
- LISP
- Mouse Buttons
- Property Sets
- Quick Access Tool Bar
- Reference Templates
- Ribbons
- Scripts
- Sub Assembly Composer
- Tool Bars
- Tool Palettes
- Other Programing Languages such as Visual Basic, .Net, Java Script, or ActiveX

Don't worry about that last red bullet, because there are countless tools and apps already written by talented experienced people that you can take advantage of for little or no cost. Later I will introduce you to the Autodesk Apps Store. Now, I have LISP in red because it's a programing language, a pretty powerful one, that has been around for a long time and requires some time invested in learning it. But it isn't that hard to learn, and with a little bit of practice you can begin to create some pretty fun and useful tools yourself that can save you a lot of time and help you with complex tasks.

Customizing AutoCAD and Civil 3D

So this is a big list. We are going to focus only on a few of these, some of which you'll be able to try right away with little training or experience. And some you'll hopefully be motivated to jump in, learn, and go to the next level of utilizing the technology to it's fullest potential, benefiting yourself and your organization.

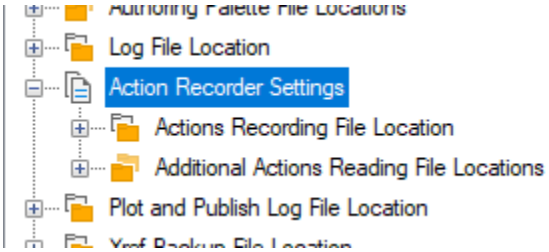
Action Recorder



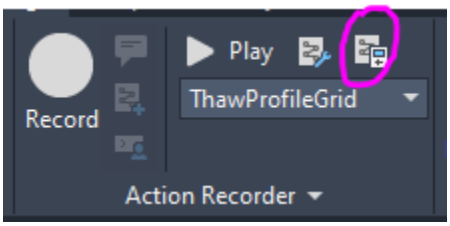
This is one of the simplest yet very powerful ways you can customize AutoCAD to perform tasks that include several steps you need to do over and over again. This tool is found in the Manage tab of the ribbon. It's not a video recorder and it's not time sensitive. It simple records your actions as you do them. There are a few limitations, such as it will not record actions inside of a dialog box or palette, such as creating or modifying a layer in the layer palette.

To use this tool, you simply pick record, go through the steps you want to record, then push stop. You will then be prompted to name your macro for playback later.

These recorder macros can then be saved, stored, and used when ever needed by you and others in your organization. Where these macros are stored can also be customized. Right click anywhere on your screen and go to Options. Pick the Files tab and go about two thirds of the way down and expand "Action Recorder Settings".



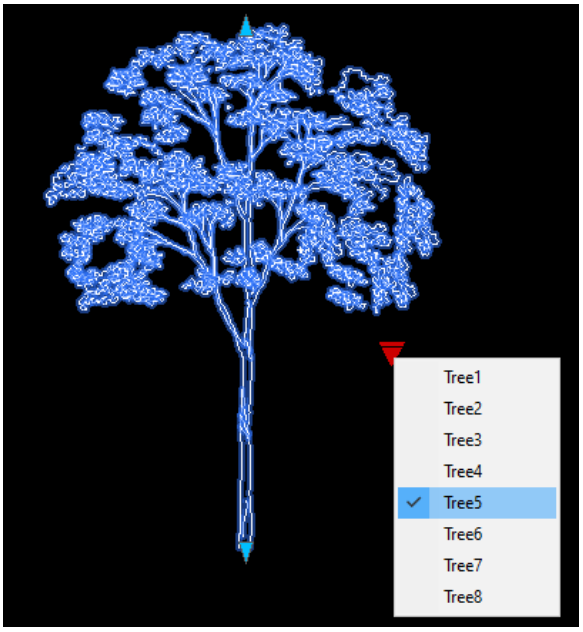
You can also get access to this setting in Options by picking the “Manage Action Macros” button and then picking Options.

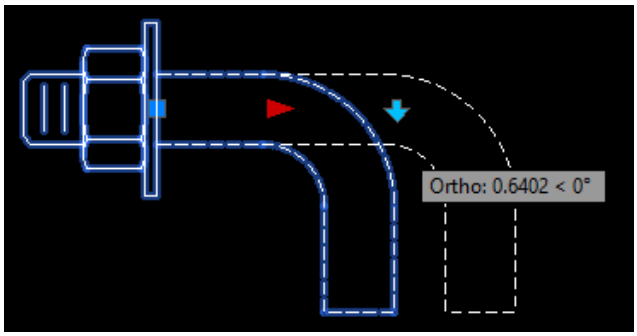


This is a great video that goes into much more detail how to use Action Recorder.

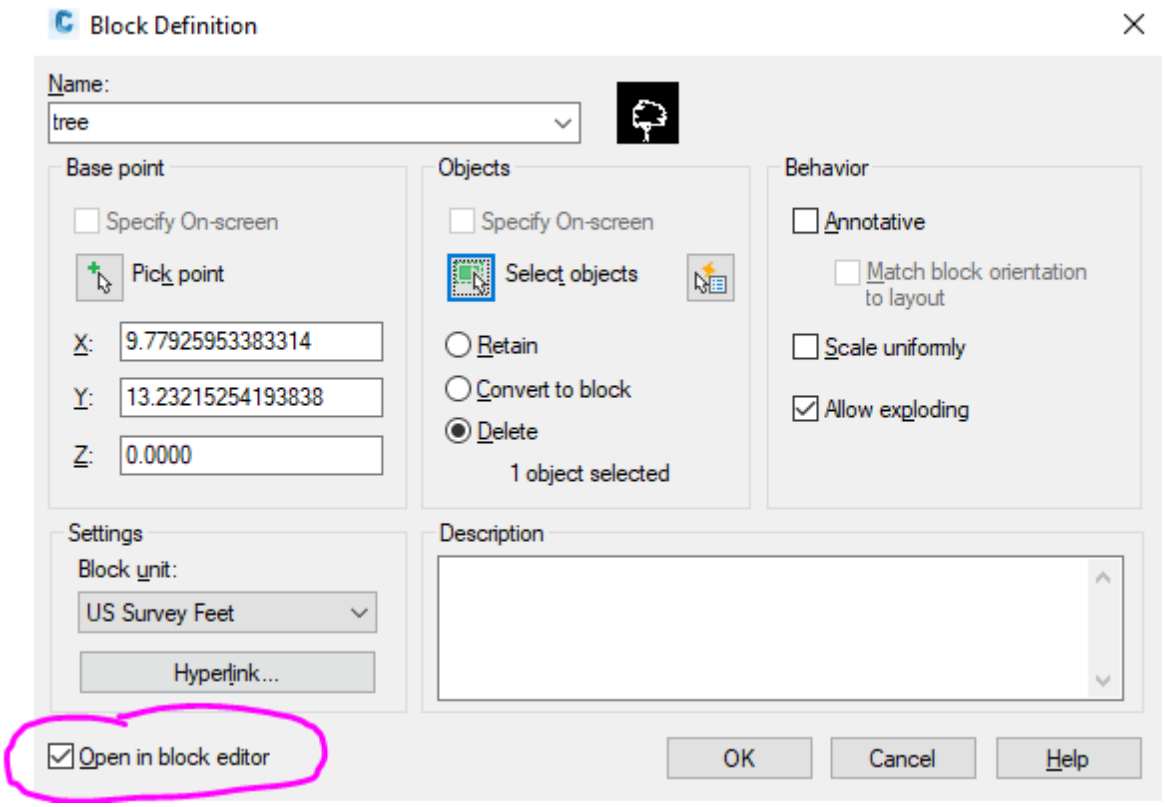
Dynamic Blocks

Dynamic blocks really opened the door to some sophisticated customization that can really save time. And it’s easy to learn and do. A dynamic block is essentially a block with some intelligence. If you have a block and you want to stretch it, mirror a portion of it, flip it a different direction, or rotate a portion of it, make it into a dynamic block. Dynamic blocks can have multiple sizes, such as a door, or multiple views such as a tree block that has different types of trees, all in one block. If you can imagine something you would like to do to a block, it can likely be done.



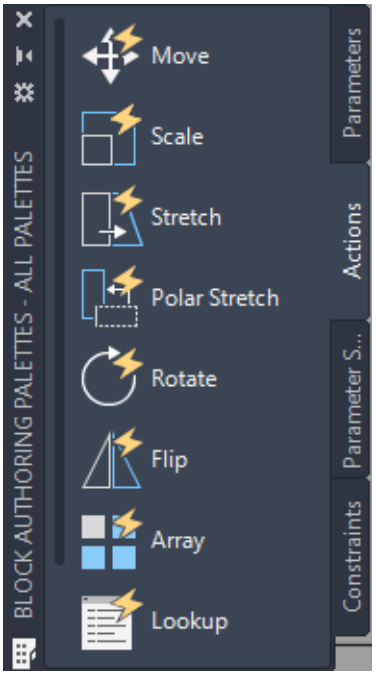


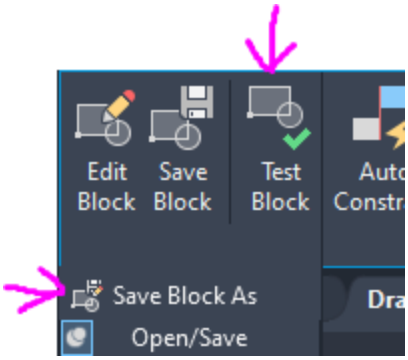
When creating a dynamic block, you must use the BLOCK command not the WBLOCK command. Simply follow the same steps used to create a block, except make sure this switch is turned on before you pick ok:

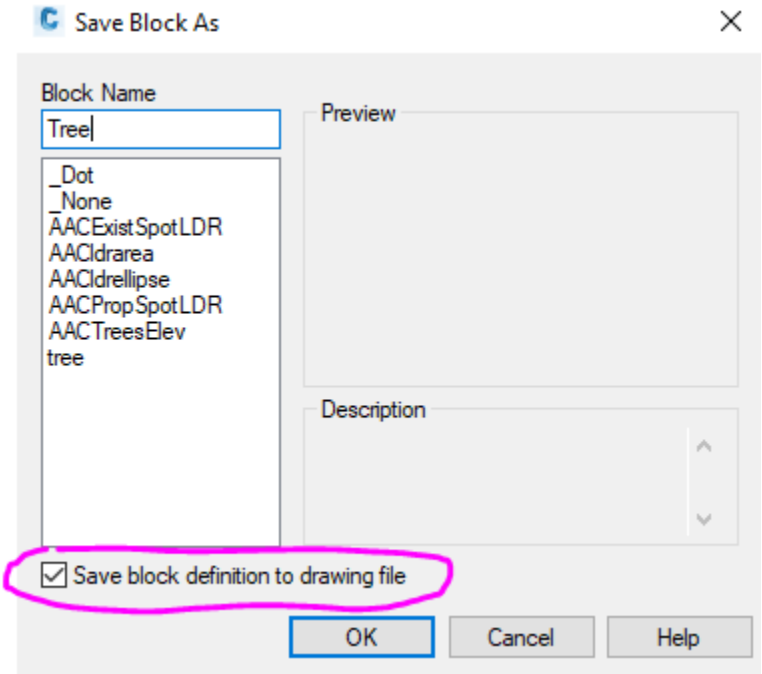


After you have followed all the normal steps to create the block, with this switch on when you pick ok, you will go into the block editor where you will have access to the dynamic block features. Parameters and actions is how you add the intelligent dynamics to the block. The key here is that you first add a parameter then you apply an action to that parameter.

Once you have finished adding the functionality you want, you can test the block while in the block editor before you save it. When ready you can save the block as an external file, similar to a wblock.





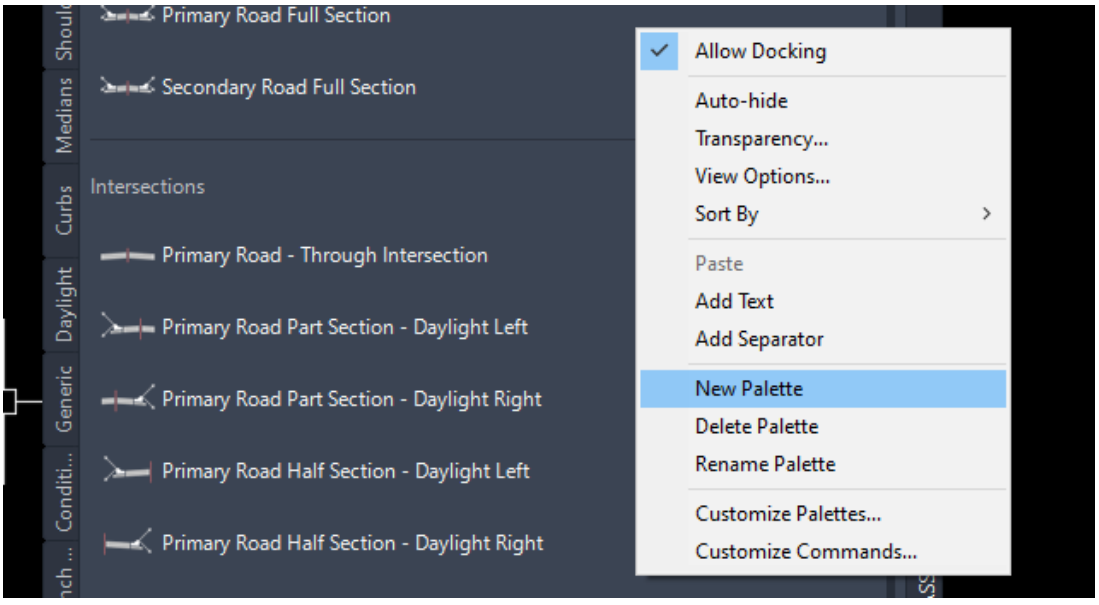


This is a great [Autodesk University] class that will go into more detail on how to create dynamic blocks.

Tool Palettes

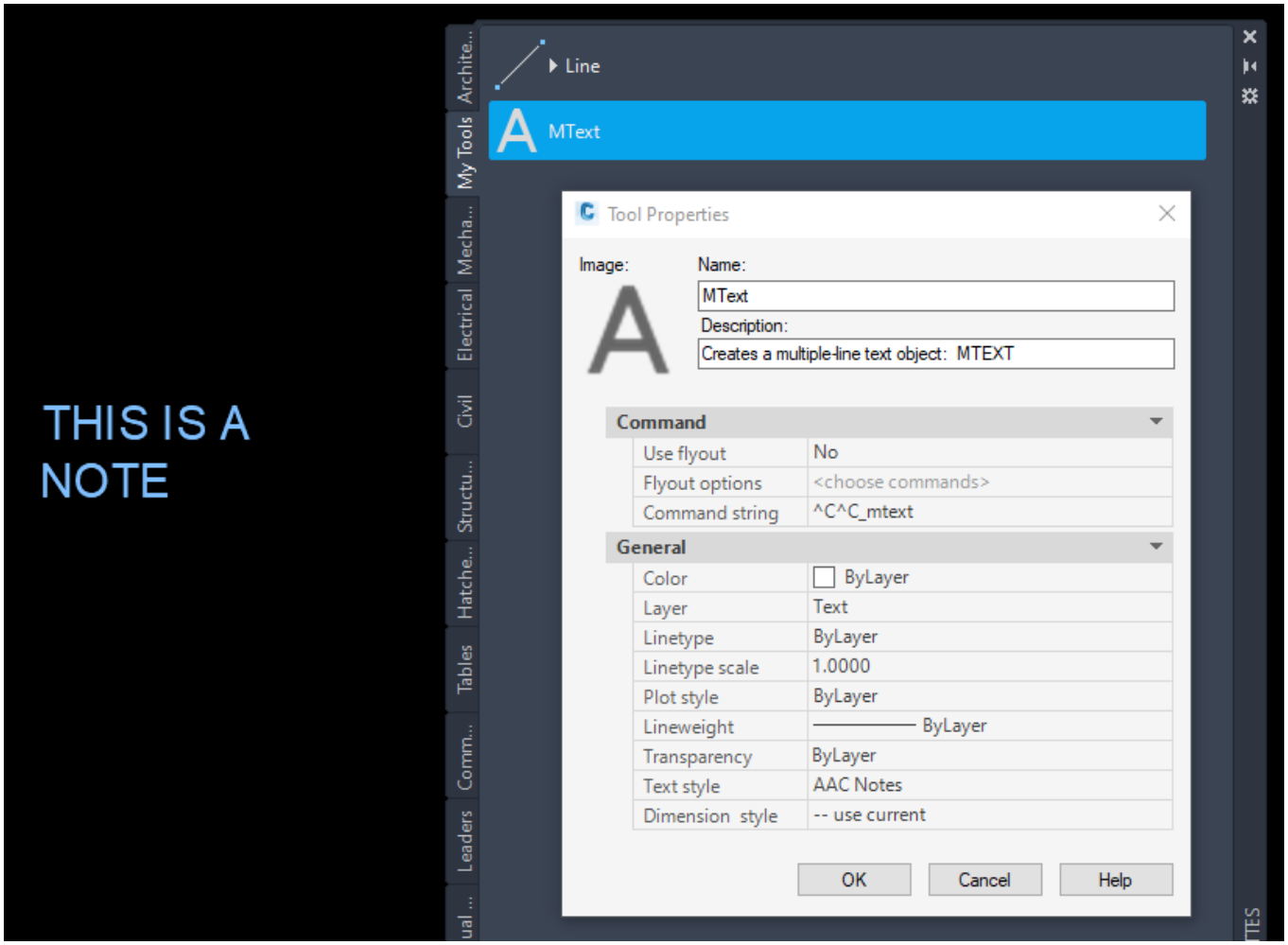
Tool palettes is the first and best place to go for providing access to company CADD standards. You can add symbology, hatch patterns, settings, LISP routines, apps, and tools for setting up sheets all on one or multiple custom tool palettes. And you can export tool palettes and store at a location that gives access to all users, ensuring that all are using the same palettes – you make a change to a tool palette and all see the change.

To create a customized tool palette, simply right click and pick “New Palette”.

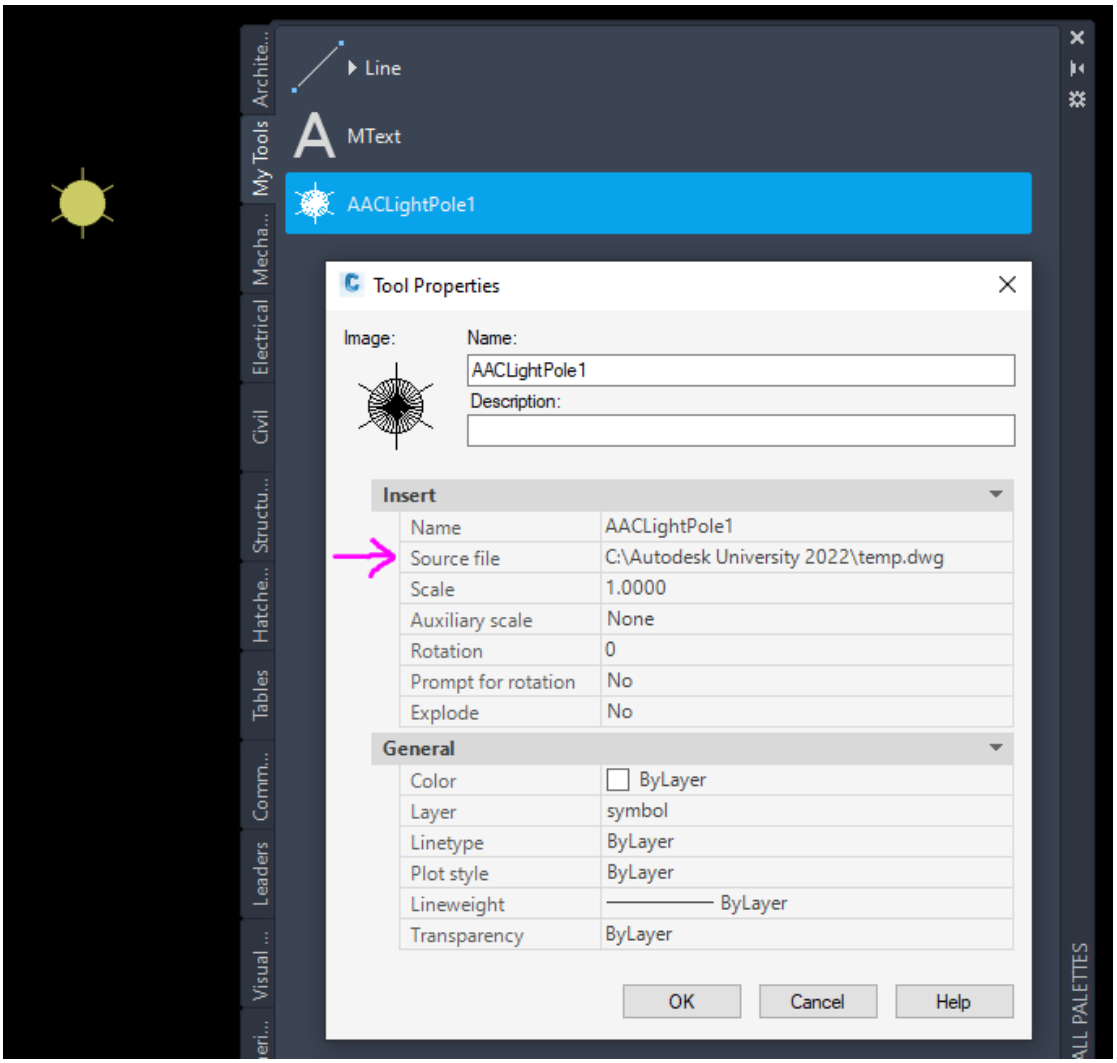


There are three basic ways to add tools to a new palette:

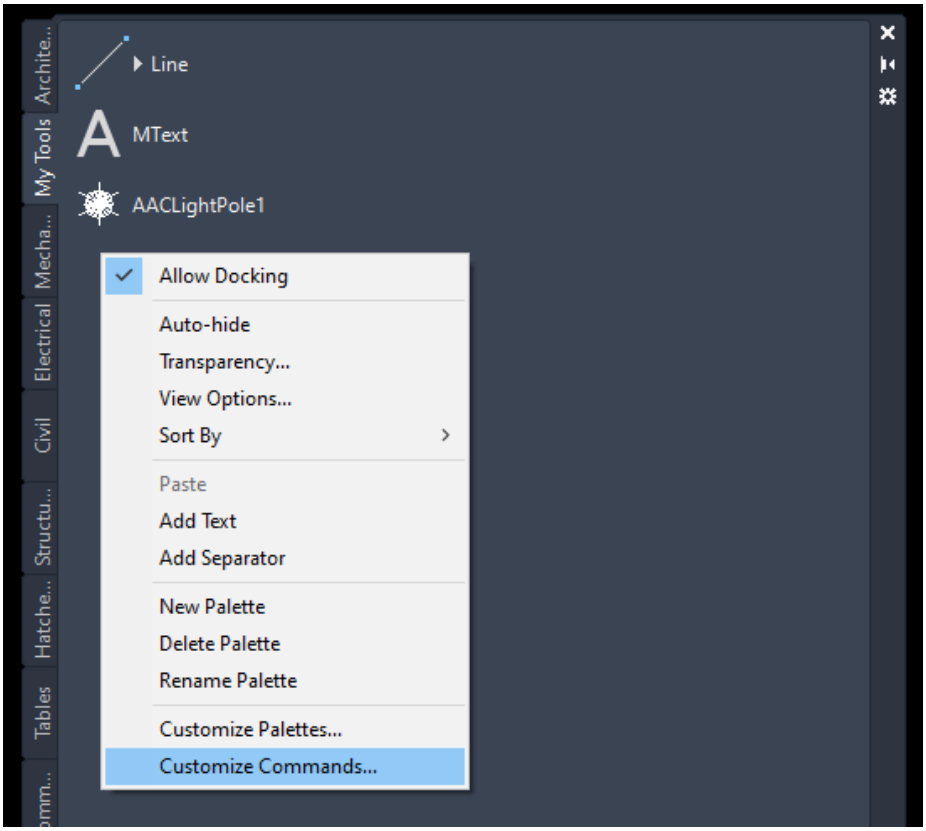
- First, you can drag and drop objects from the drawing. To do this, select the object, hover over the main grip, pick and hold down the right mouse button, and drag to the palette and let go. That object is placed in the palette and the properties of the object are also saved with the tool. You can now use this tool to place that object and it's properties in another drawing. To see what properties are saved with a tool, right click on the tool and pick properties. Any of these fields can be modified as needed.

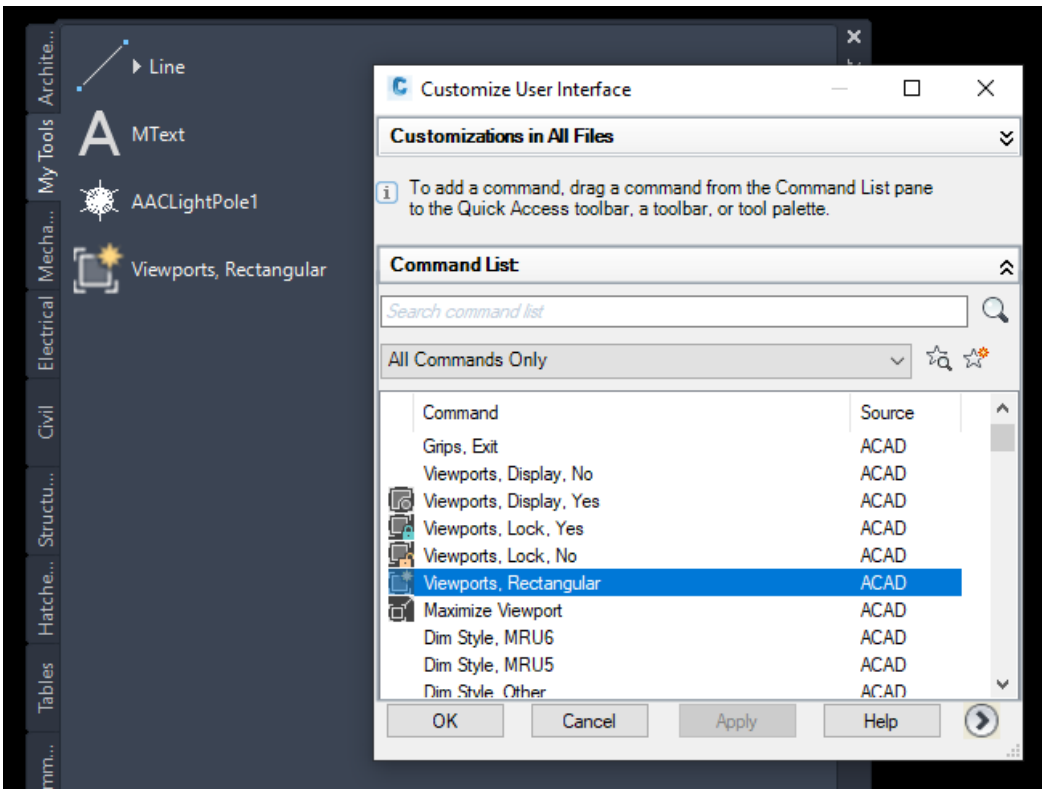


This can be done with any AutoCAD object, such as a line, multileader, or hatch pattern. You can also drag and drop a block to a palette. However, when you do, the drawing that block is in when you drag and drop it becomes part of the properties (see below). Therefore, that drawing containing that block must remain in the folder location and not be renamed. So, one method of using your company standard blocks in a tool palette is to create a "master block drawing" containing all your blocks and storing it with your other standards.

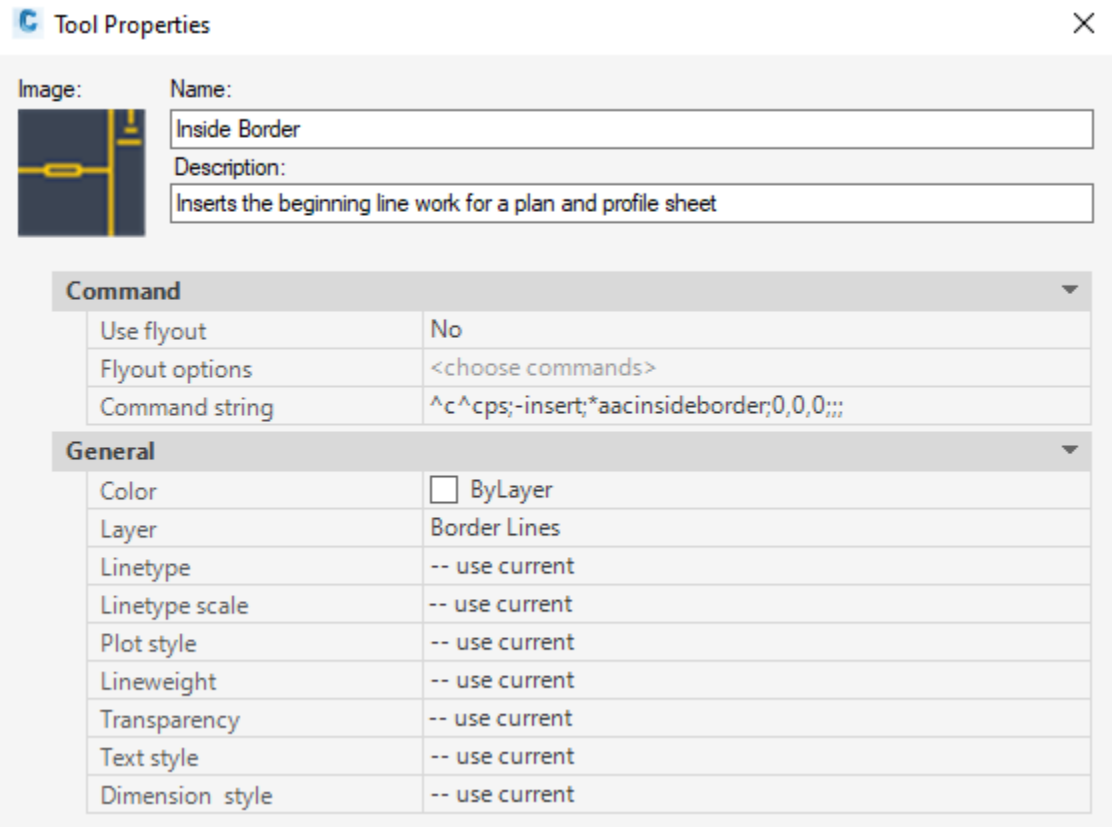


- Second, right click anywhere in the palette and pick “Customize Commands” (see below). This allows you to add any AutoCAD command to your palette by dragging and dropping from the command list. As with other tools you can then right click on this tool and pick “Properties” and modify the properties of this tool as needed.


Line
MText
AACLightPole1
Allow Docking
Auto-hide
Transparency...
View Options...
Sort By
Paste
Add Text
Add Separator
New Palette
Delete Palette
Rename Palette
Customize Palettes...
Customize Commands...

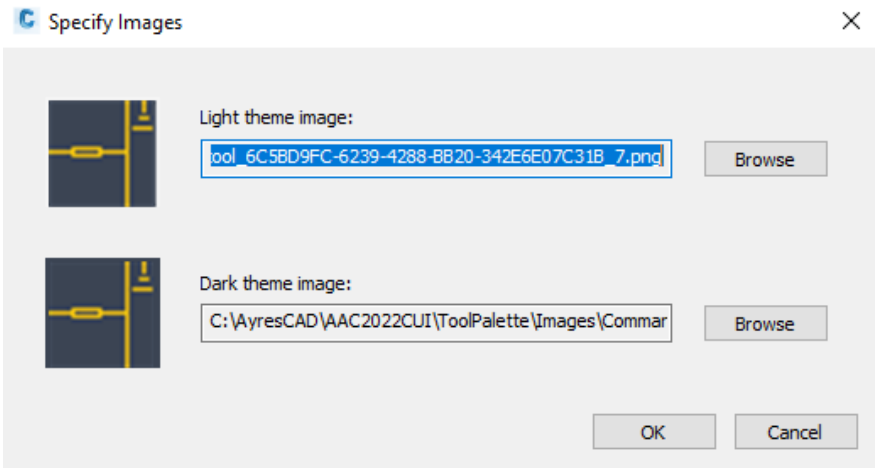

Line
MText
AACLightPole1
Viewports, Rectangular
Customize User Interface
Customizations in All Files
To add a command, drag a command from the Command List pane to the Quick Access toolbar, a toolbar, or tool palette.
Command List
Search command list
All Commands Only
Command
Source
Grips, Exit
ACAD
Viewports, Display, No
ACAD
Viewports, Display, Yes
ACAD
Viewports, Lock, Yes
ACAD
Viewports, Lock, No
ACAD
Viewports, Rectangular
ACAD
Maximize Viewport
ACAD
Dim Style, MRU6
ACAD
Dim Style, MRU5
ACAD
OK
Cancel
Apply
Help

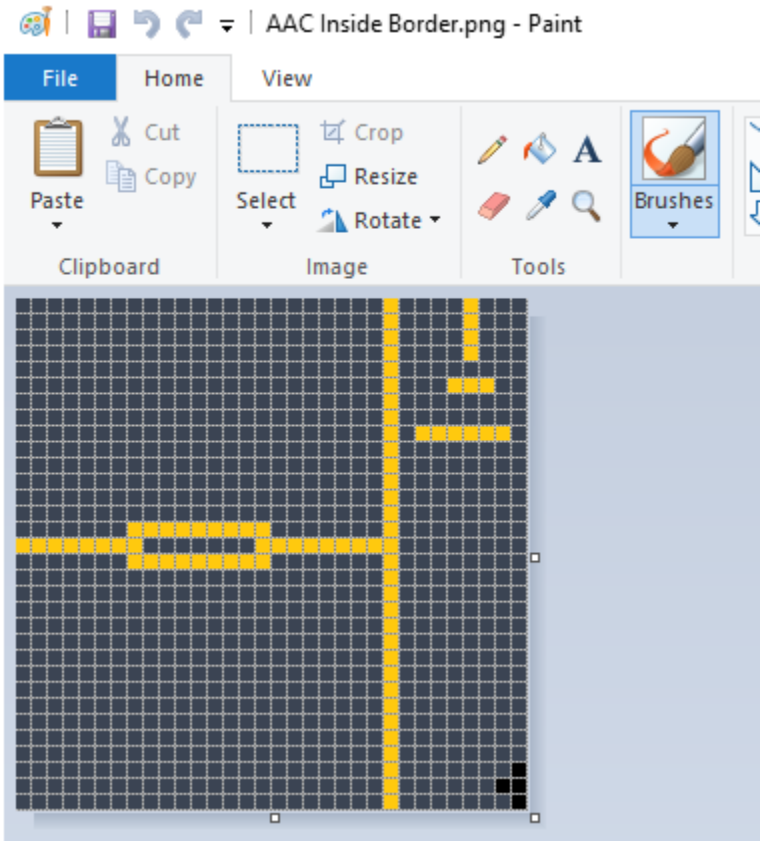
Third, you can create your own tool to do what you want it to. One way to do this is to select an object, other than a block or hatch, such as text, and drag and drop it to your palette, as described above in the first option. This gives you a starting point. You can then right click on this tool, give it a new name and description, and then modify any of the properties. The important field is the command string. This is where you can add any kind of string to perform a function, such as loading a LISP routine, change a setting, or run commands.



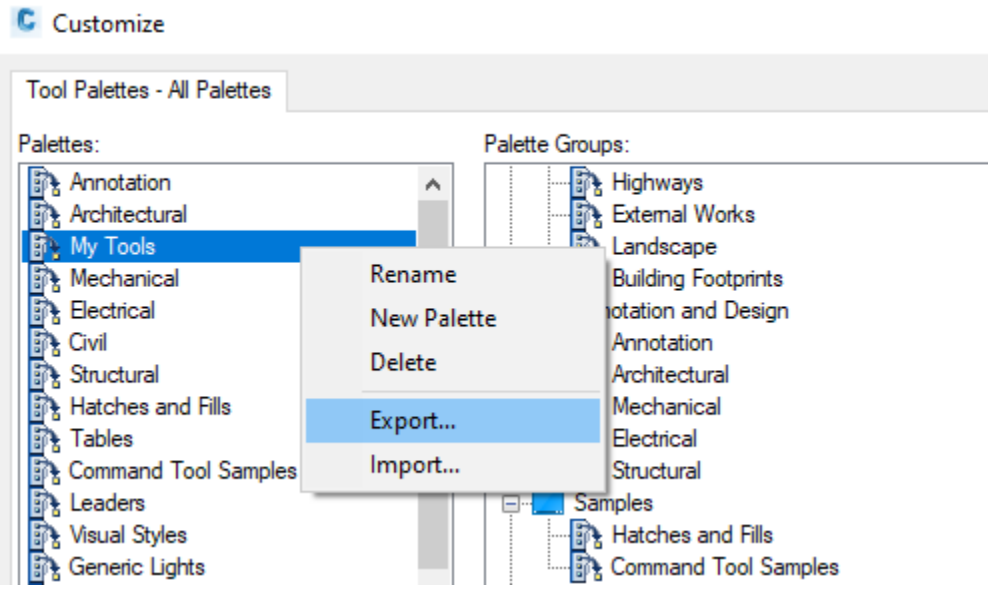
There is a bit of syntax you need to follow in the command string, such as a semicolon or space for a “enter” on the keyboard. Once you create this tool, you can right click on this tool and pick copy. Then right click in the palette and pick paste. This creates a copy of this tool as a starting point to create a new one.

To change the image of these custom tools, right click on the tool and pick “Specify Image”. Here you can browse to a location where you have created a 32x32 bit image (.png files seem to work best) you have created using Microsoft Paint.


Specify Images
Light theme image:
ool_6C5BD9FC-6239-4288-BB20-342E6E07C31B_7.png
Browse
Dark theme image:
C:\AyresCAD\AAC2022CUI\ToolPalette\Images\Commar
Browse
OK
Cancel


AAC Inside Border.png - Paint
File
Home
View
Cut
Copy
Paste
Crop
Resize
Rotate
Select
Brushes
Clipboard
Image
Tools

Once you have created your tool palette, you can right click in the palette, pick “Customize Palette”, then right click on your new palette and pick Export. Save this to a location that allows you to make your new custom palette accessible to others in your office or organization.



There are many great Autodesk University classes that go into more detail on how to create and manage Tool Palettes. Here are a couple:

Tool Palettes: The Power of Standards | Autodesk University
Managing Tool Palettes in a Network Environment | Autodesk University

CUI (Custom User Interface)

The CUI controls and manages workspaces, ribbons, tool bars, quick access tool bar, mouse buttons, and much more. In this class we will focus on creating a custom ribbon, adding tools to your quick access tool bar, and customizing a multibutton mouse, which we will talk about later. Working with the CUI is a full 8 hour class by itself. There is a lot here. So I’ll just be introducing you to these basic steps to get you started.

Inside of AutoCAD you can have more than one CUI loaded. There is a main CUI and then you can load as many Partial CUI’s you need. In fact, when AutoCAD or Civil 3D is installed, several partial CUI’s are loaded, such as Express, AppManager, and ModelDOCs. A CUI file has the extension .cuix. Later we will talk about creating your own CUI.

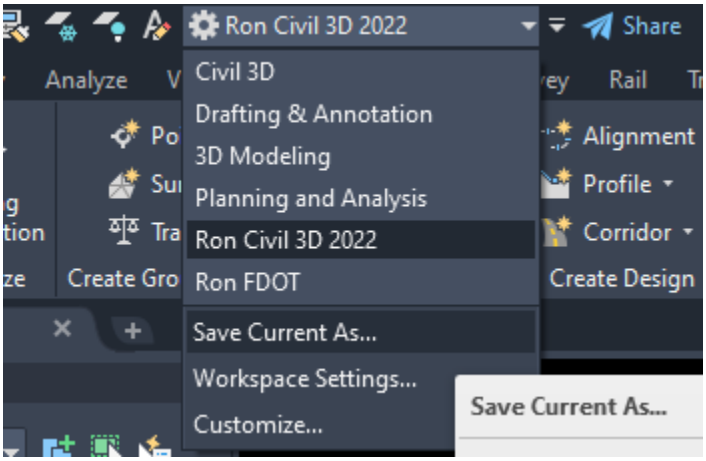
Quick Access Toolbar

The quick access tool bar is the tool bar located at the top of your workspace to the left. It is a tool bar for just that – quick access to tools you constantly use and don't want to find them in the ribbon every time you want to use them. It comes preloaded with common tools, such as print or save. But you can modify and add to this tool bar to meet your needs.

One way to add to this tool bar is to simply pick the little drop-down arrow button. This brings up a preset list of common tools to choose from that you simply turn on or off.

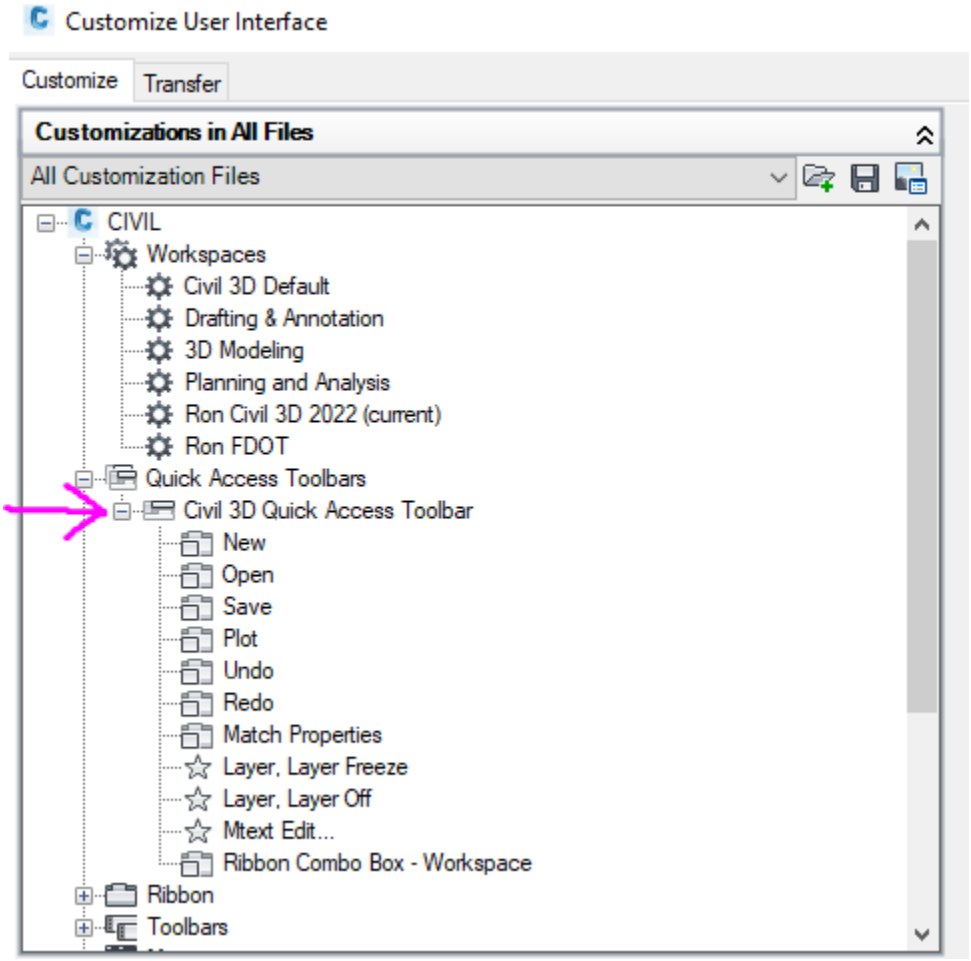
If you want to add more tools, pick the same drop-down button and pick More Commands at the bottom of this list. This gives you access to all the tools available in AutoCAD. You simply drag and drop them from this list to your quick access toolbar. Make sure you then pick Apply and then OK.

The Quick Access Toolbar is part of your workspace, so be sure to save your workspace after you add commands. To do this, pick the Workspace dropdown in the Quick Access Toolbar, or in the settings tray at the bottom or the AutoCAD window, and pick Save Current As.

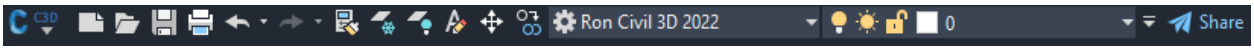


From the list that comes up, pick your workspace you have active (in many cases this will be the default Civil 3D or AutoCAD workspace) and then pick save and replace.

The final way to add commands to your Quick Access Toolbar is through the CUI command. To get to the CUI pick the Manage tab of the ribbon and pick the CUI button (or type CUI and the command line). We will talk more about this CUI palette in a bit. In the first pane expand the Quick Access Toolbar. Here you can rearrange your tools as you wish and you can drag and drop all available AutoCAD and Civil 3D commands form the second pain to your toolbar.



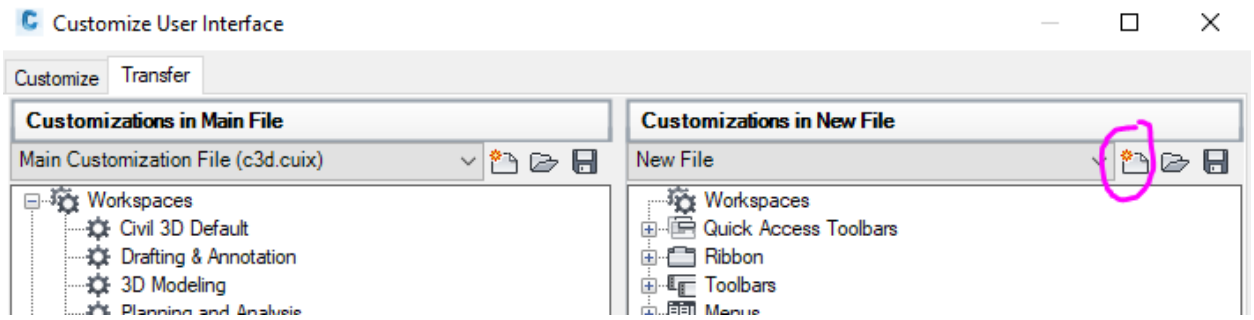
Pick apply and OK then save your workspace. You now have a nice set of tools you frequently use always accessible for quick access.



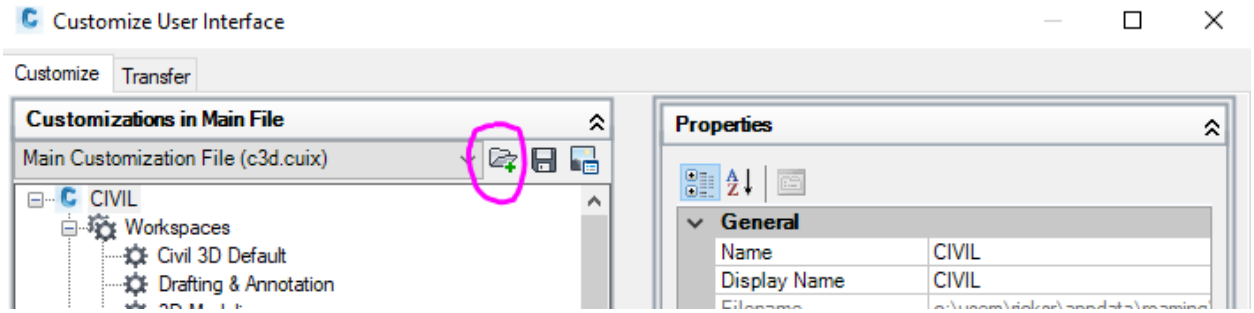
Creating a Custom Ribbon

To create your own custom ribbon you must start with a new CUI. There are a couple of ways to do this. You can open Windows Explorer and browse to: "C:\Users*username*\AppData\Roaming\Autodesk\C3D 2022 (or AutoCAD 2022)\enu\Support" and copy "CUSTOM.CUIX" to a location on your computer or your server, rename it, then load it in the CUI palette. However, the easiest way is to do all of this inside the CUI palette.

Start the CUI command. At the top, pick the Transfer tab. On the right pane pick the "Create a new customization file" button.

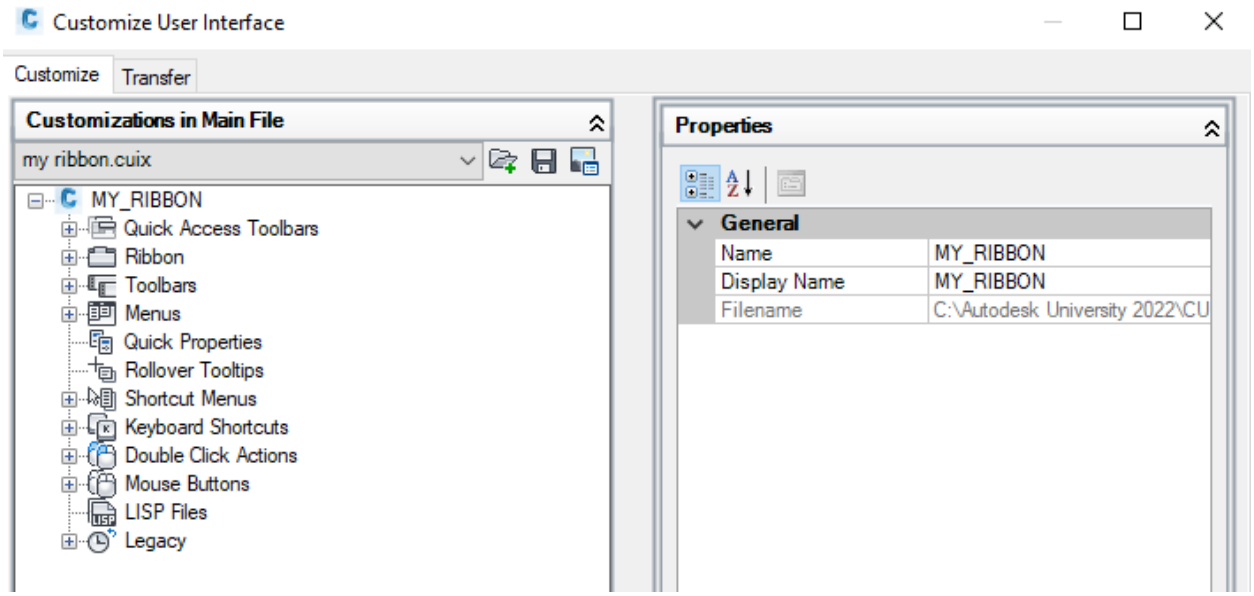


Browse to where you want to store your CUI and give it a name. Next, go back to the Customize tab and pick "Load Partial Customization File". Browse to where you just stored your new CUI file, select it and pick Open.



You now have a blank clean CUI to work with. Let's proceed with creating a custom ribbon.

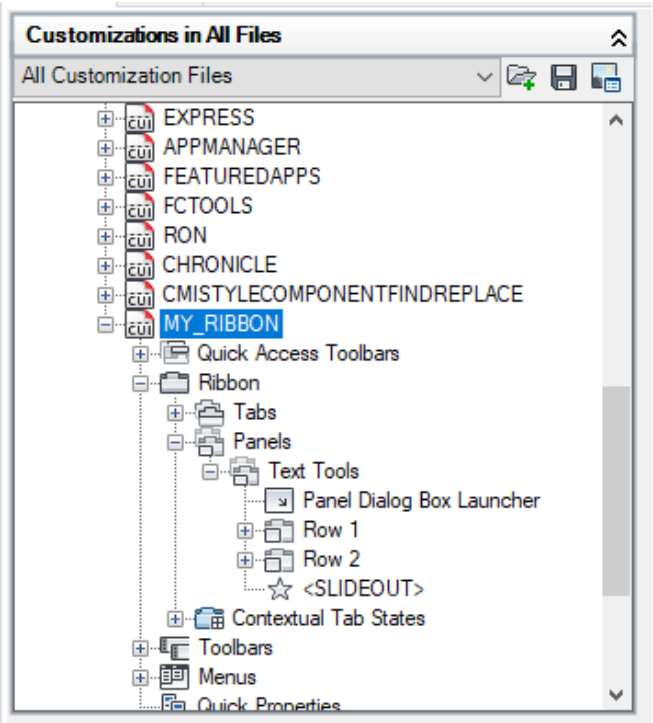
Your CUI palette should look something like this with your new CUI loaded in the left pane:



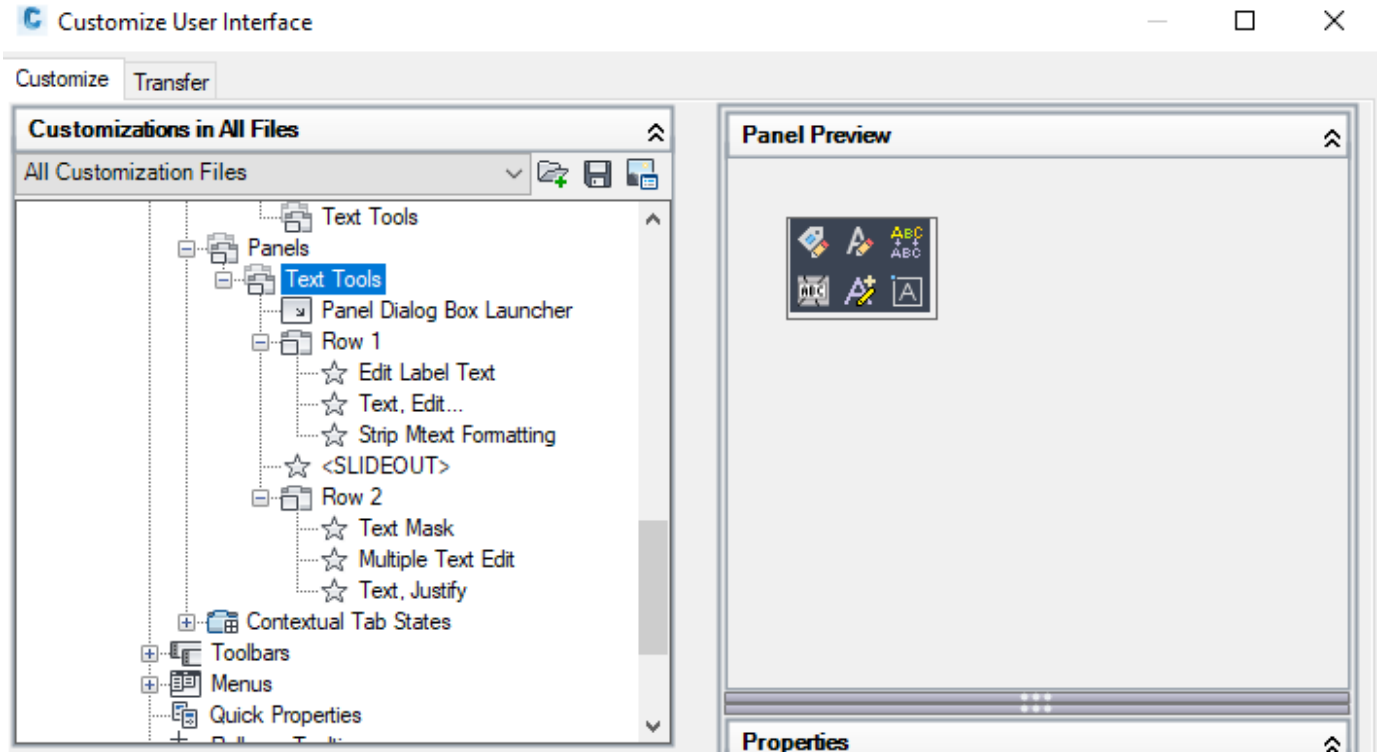
Expand the Ribbon node. Right click on Tabs and pick “New Tab”. Give it a name like “My Tools”. Right click on Panels and pick “New Panel”. Give it a name like “Text Tools”.

A ribbon is made up of Tabs and Panels. Tabs are the different tabs that go across the top of the ribbon and Panels are the different panels inside that tab. You can have multiple tabs and multiple panels in each tab.

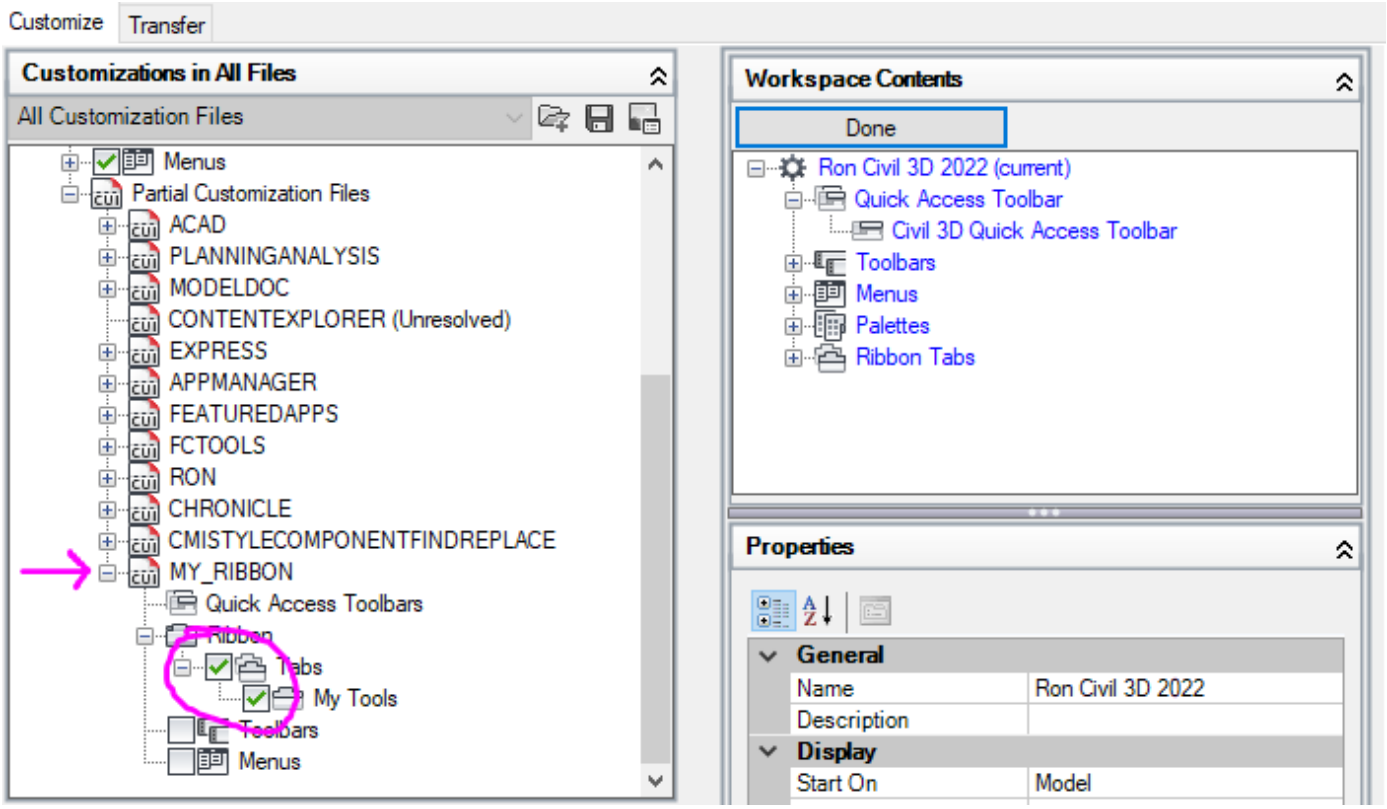
Next, drag the new panel you just created into the new tab you just created. Then expand the new panel. You will see that a panel is made up of rows and slideouts (which is a drop down).



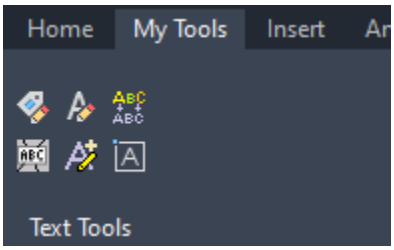
To create another row, right click on your new panel and pick “New Row”. Next, you simply drag and drop commands from the command pane (AutoCAD or Civil 3D commands or new commands you have created) into the row nodes. You will begin to see your panel take shape in the Panel Preview pane



Now go to the top of the left pane and select the current workspace. In the right pane pick “Customize Workspace”. You now have the ability to add your new ribbon tab to your workspace by checking the boxes.



Pick “DONE” then pick “Apply” and “OK” to exit out of the CUI palette. Your new ribbon is now available for use.



There are some great resources to help you get started and go into more detail on creating a custom CUI. Here are some links:

AutoCAD 2022 Developer and ObjectARX Help | To Create and Manage Customization (CUIx) Files | Autodesk

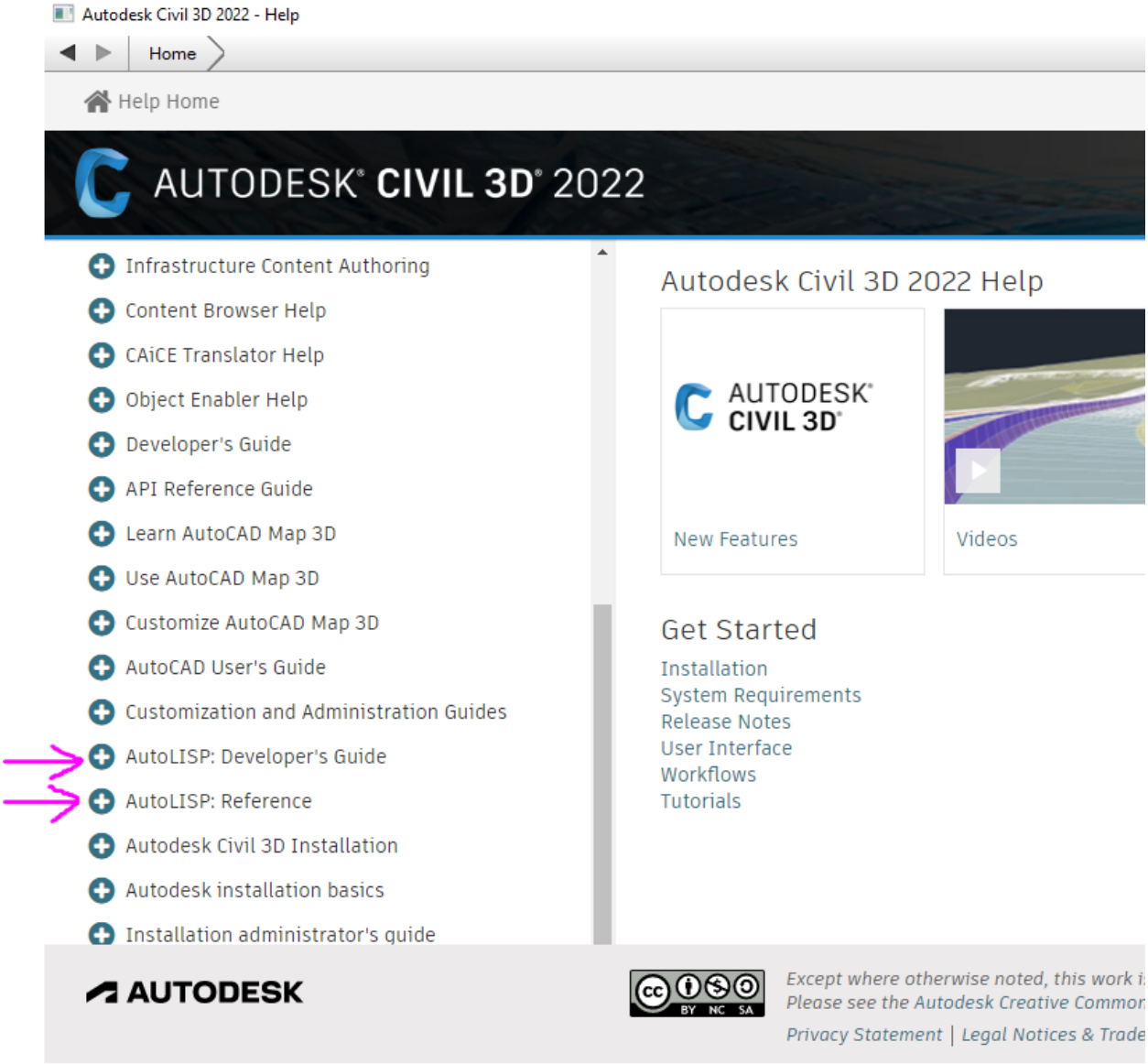
CUIX Zen: Customizing the CUI | Autodesk University

Control Your AutoCAD Interface with the CUI - YouTube

LISP

LISP is a programing language that's been with AutoCAD since the beginning. It has opened the door for first time programmers to create tools and commands that are not part of native AutoCAD that accomplishes exactly what they need. Truly with LISP, if you can imagine it, it can be done. LISP has unlocked the power of AutoCAD and Civil 3D for many years influencing the way this technology is used for virtually everyone who has touched it. Countless LISP routines have been created that turns complex and difficult tasks into simple steps saving hundreds of thousands of hours and enabling unprecedented quality and accuracy. LISP is the inspiration and father of customization.

One of the things that makes LISP so powerful and popular is that it is easy to learn and begin creating tools. Start with something small and build from there. The best resource for understanding and learning LISP is the AutoCAD On-line help. This is where you will find every LISP function and how to use it, complete with syntax, examples, and clear explanations. To get there, inside of AutoCAD press the F1 key to take you to the Autodesk AutoCAD or Civil 3D on-line help. Go to the main page if not there already. Then go to the AutoLISP: Developers Guide and AutoLISP: Reference.



This tutorial may also be helpful with getting started with LISP.

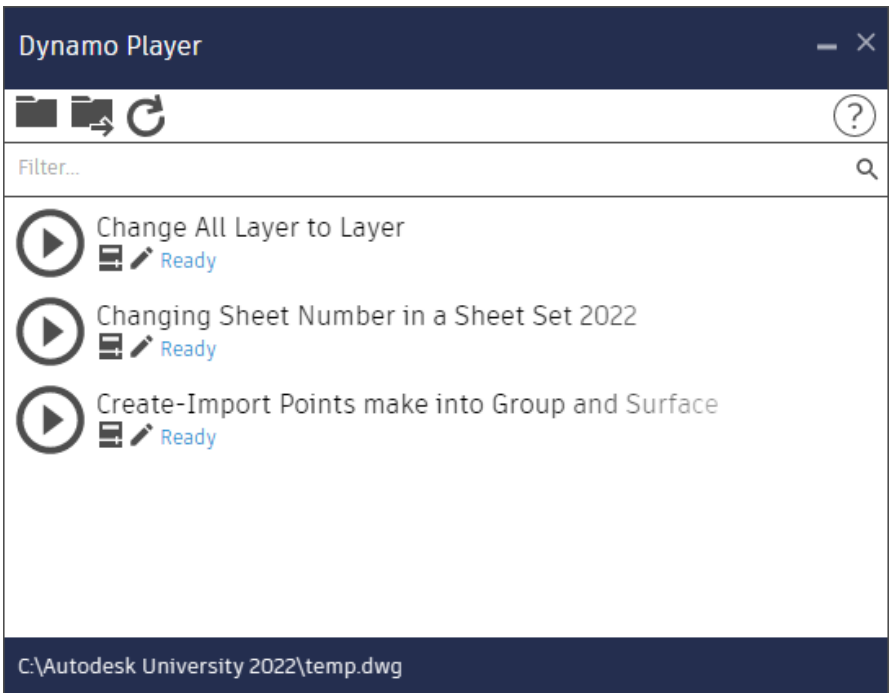
https://help.autodesk.com/view/OARX/2022/ENU/?guid=GUID-C64046FA-CD9E-4B38-9967-A501119E4A62

Dynamo

Dynamo is a powerhouse in the world of customization and automation. And Autodesk is continuing to make Dynamo more robust. Literally, using Dynamo you can accomplish almost anything you can imagine in customization. You can use Dynamo to accomplish AutoCAD tasks as well as Civil 3D tasks. I used to create a script that automatically renumbers sheet in a sheet set. You could use it to automate a simple or complex AutoCAD drafting task or a Civil 3D design task, such as create a surface or place trees along an alignment at a given station increment and offset. The sky is the limit.

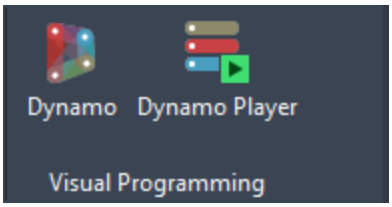
You use Dynamo to create scripts "to process data and generate geometry. With Dynamo, you can generate code without having to know code" (from the Getting Started).

Dynamo Player is a simple interface for running Dynamo scripts you have created.



You can store these scripts in a location and then configure Dynamo Player to point to that location, giving all in your office or company access to the scripts.

To get access to Dynamo and Dynamo Player, go to the Manage Tab of the ribbon.



These are some very good resources for helping you get started and learn how to utilize this powerful tool and its immense potential.

About | The Dynamo Primer (dynamobim.org)

Learn - Dynamo BIM

Bringing Dynamo Down to Earth: Bring ultra-efficiency to your Civil Firm | Autodesk University

Mundane Civil 3D Tasks to Automate with Dynamo for Civil 3D | Autodesk University

Getting Started with Dynamo for Civil 3D: A Beginner's Guide | Autodesk University

NOTE: Dynamo Studio was discontinued as a standalone product as of January 2022. The following statement is from Autodesk:

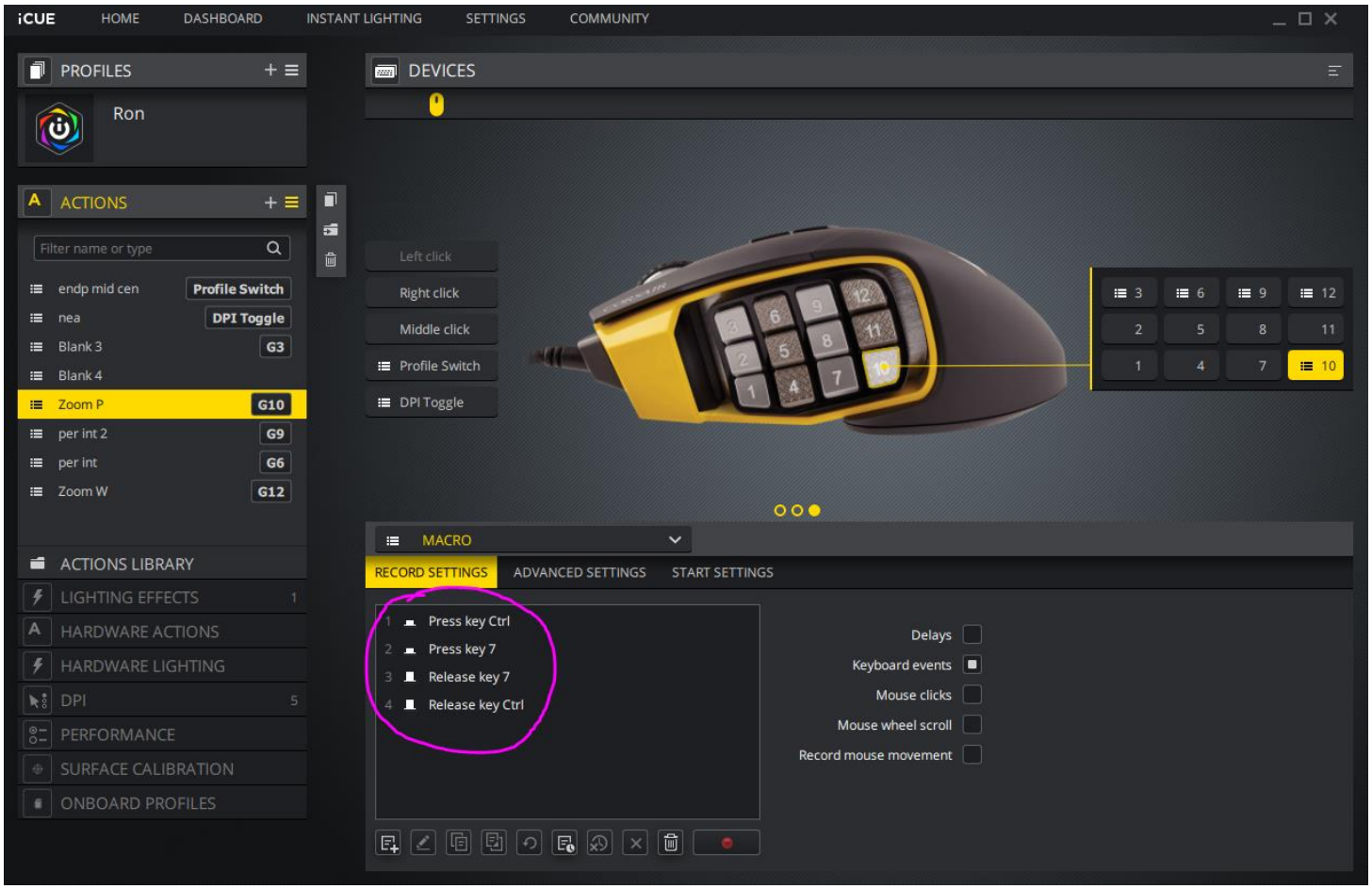
"Since Dynamo Studio was introduced in 2015, the landscape of process automation and visual scripting has expanded and improved. We've extended Dynamo capabilities to several tools you're already using including Revit, Civil 3D, Robot Structural Analysis Professional, FormIt Pro, Advance Steel, and Alias, and expressed in Dynamo Sandbox. With more widespread availability of Dynamo capabilities across Autodesk software and tools, we're simplifying our product offerings and focusing our efforts on making Dynamo capabilities in our existing products more robust."

Multi Buttom Mouse

Most people don't even know there are multi-button mice you can purchase, let alone customizing them.

The key to customizing your mouse buttons is to link the action assignments in your mouse driver software to the keyboard shortcuts in the AutoCAD CUI. For example, in your driver software you might assign one of your mouse buttons the key stroke shift+ctrl+J. Then in the AutoCAD CUI you assign the keyboard short cut shift+ctrl+J to run a certain command. Hence, when you push that button on your mouse it runs that command. Therefore, your mouse driver software and the AutoCAD CUI work together. Here's how it works.

First open you mouse driver software. In my case I am using a Corsair mouse as shown above.

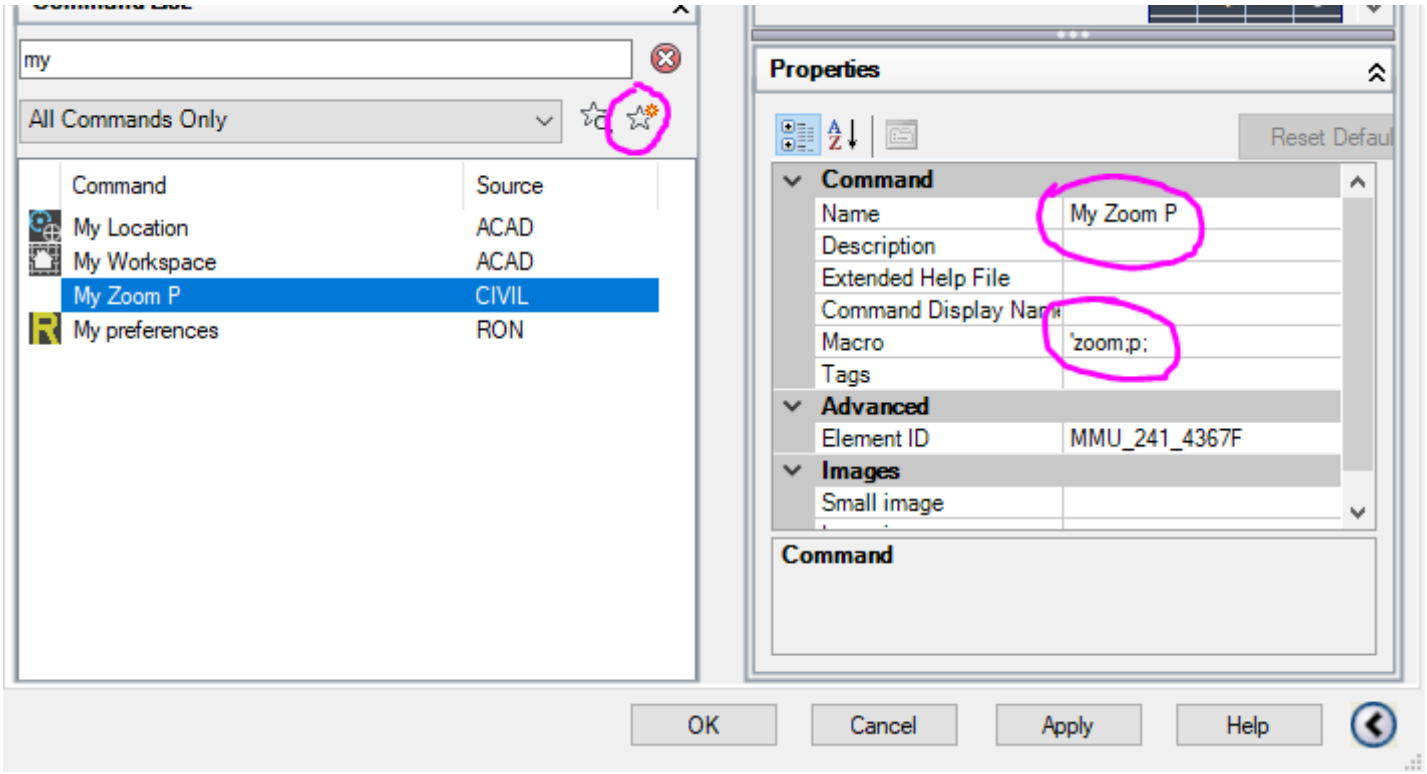


As you can see I have assigned the action Ctrl+7 to button 10. I named this action similar to what the command will be in AutoCAD just to make it easy to manage, in this case Zoom P.

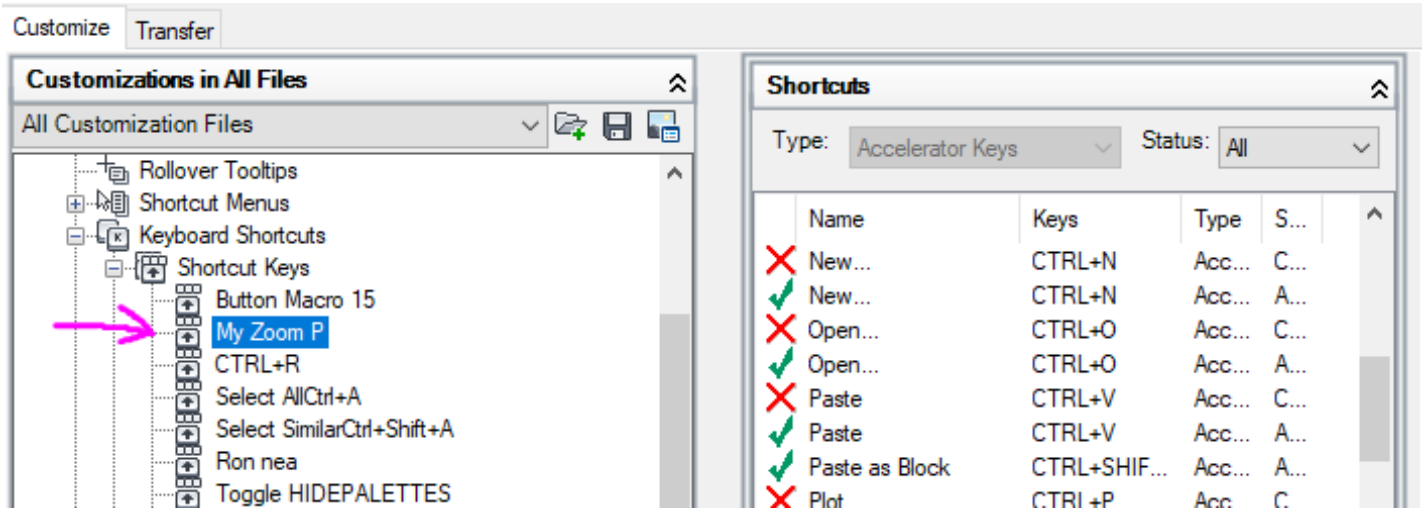
Now, in AutoCAD open the CUI. Select the Keyboard Shortcuts node in the upper left pane. When you do, all the keyboard shortcut assignments will appear in the upper right pane. Sort by the Keys simply by picking the key column name. This column shows all the keyboard

shortcuts already assigned to a command. You want to avoid using these keyboard shortcuts when assigning shortcuts to your buttons, unless you want to assign these commands to a button.

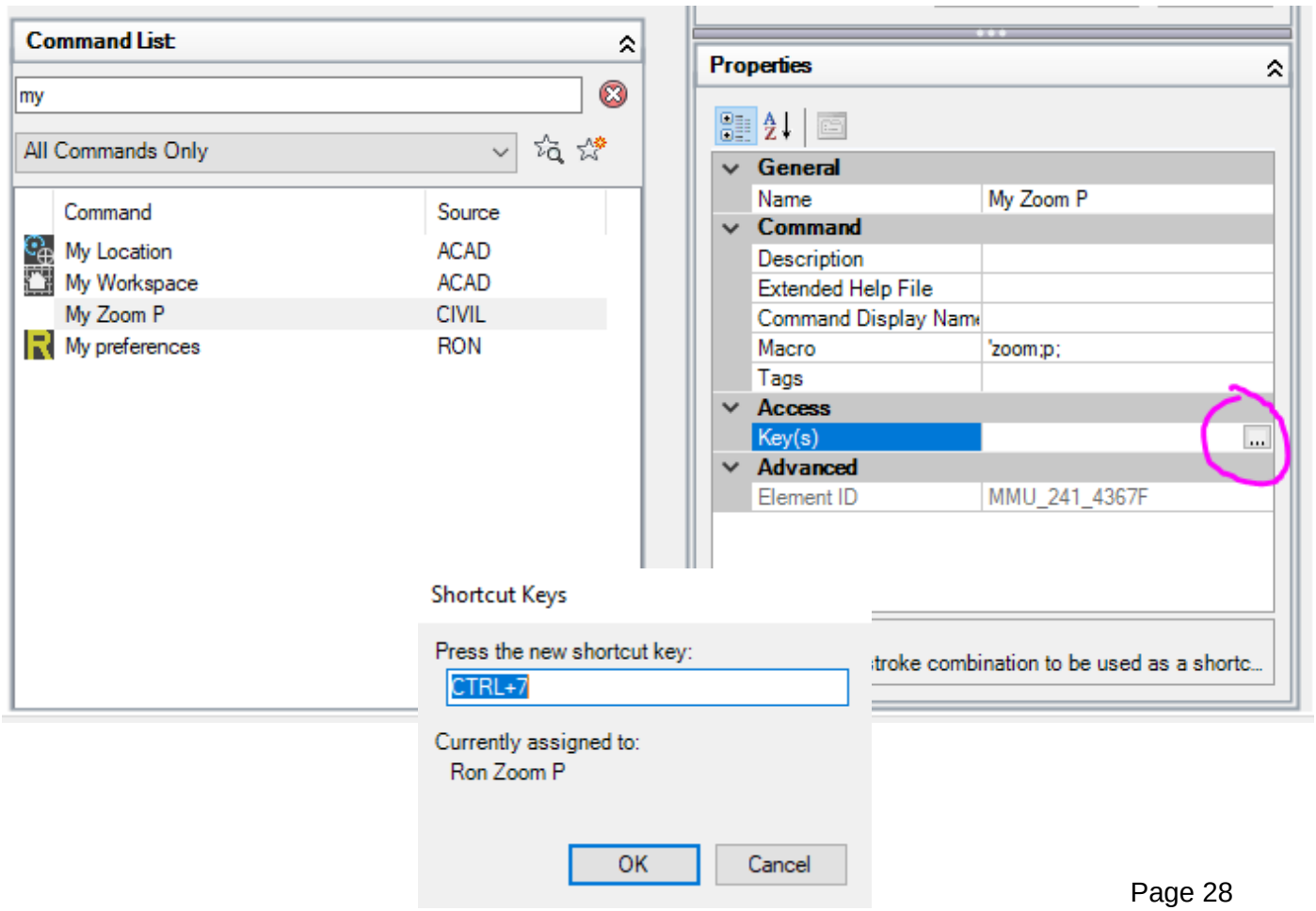
In the lower left pane pick the “Create new command button” and create a new command. Give it a name and add what you want the macro to be. In this case I want this command to be Zoom Previous.



Now drag and drop this command into the Keyboard Shortcut node in the upper right pane.



Once you do that you can now assign a keyboard shortcut to that command. This is in the lower right pane. Pick the ellipsis button then just enter the keys on your keyboard and pick ok.



Because we assigned CTRL+7 to button 10 in the mouse driver, button 10 on your mouse now executes the zoom previous command.

This is a great video the shows the process of assigning commands to your mouse buttons:

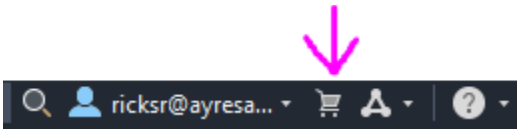
Assigning AutoCAD Commands to Mouse Buttons - YouTube

The Autodesk App Store

When you think about customization you are doing so because you are thinking there is a better or easier way to perform a task. The Autodesk App Store is where you should first look. This is a powerful and very comprehensive resource for advanced tools and apps for all Autodesk products that have been created by talented people with experience in more complex programing languages. There is a chance you will find what you need here.

It's required that you have an Autodesk account for this to work. Purchase of these apps are tied to your account.

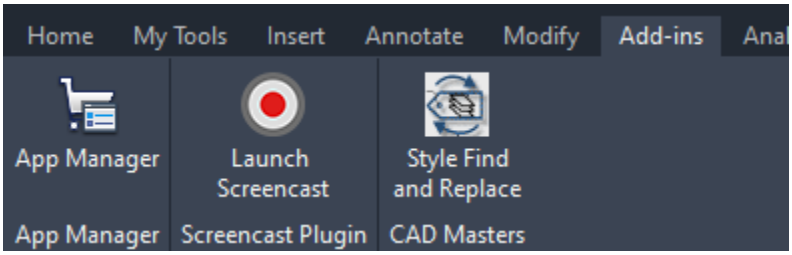
To get access to the Autodesk App Store, pick this button in the upper right corner of AutoCAD/Civil 3D:



Or go to this link:

https://apps.autodesk.com/en

Utilize the Search Apps bar to help you find what you are looking for. For example, if you type in LAYER in the search, it will list many tools related to layers. Once you download and install the app, it will appear in the Add-Ins tab of the ribbon.



There is a class at this years (2022) Autodesk University that you could take a look at after the conference. It's called:

SD502140 | There's an App for That?! Get to Know the Autodesk App Store Community

Another source on the Autodesk App Store:

The Top 10 Under-$100 AutoCAD Apps from the Autodesk App Store | Autodesk University

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Make Simple Customization a Part of Your Personal and Company Environment

What do I mean about Personal and Company environment? As you have seen in this class, many things can be customized to accomplish what you personally need in your day to day tasks and workflows, making you more successful. On the other hand, the real power of customization is that it can benefit your entire organization by helping everyone be more successful, follow CADD standards, reduce steps to perform complex tasks, accomplish a standard workflow, and ultimately improve quality, consistency, and productivity. Every customization method we have talked about in this class, including a custom ribbon, tool palettes, Dynamo scripts, dynamic blocks, and the others we did not covered that are listed on page 5, can be utilized to make others and your company more successful.

Making Customization Enterprise

There are several ways to make your customizations enterprise, that is; giving access to all in your office or company to the same tools, and when you make a change or add a tool, all see the change automatically. The following is what has worked really well for me for many years. It's called "replication".

Assuming you are the CADD manager, the idea is for you to have access to a location on your server to store and manage all customization. Only you, and others as appropriate, would have permissions to read and write to this location, just to keep it safe and clean. At this location you would have one or two folders (maybe called "CompanyCADDCUI" and "CompanyCADDTools) and then inside those folders have them organized into a folder structure that's simple and makes sense. These main folders, and all their contents, would then be replicated (or copied) to all CADD user's computers c: drive via the app ROBOCOPY. ROBOCOPY checks to see if each file exists or is out of date and then copies it, or overwrites if the file is out of date, maintaining an exact replica of what exists at the server location.

To accomplish this, you would simply create a batch (.bat) file that would look something like this:

```
@echo off

robocopy "\\ayres\aacad\AAC2022CUI" "C:\AyresCAD\AAC2022CUI" /MIR

robocopy "\\ayres\aacad\AACCADD" "C:\AyresCAD\AACCADD" /MIR
```

You would work with your IT staff to have this batch file run automatically when users log into their computer. This would ensure that all have the latest and greatest customized company environment and tools.

If you have any questions, please feel free to email me at ricksr@ayresassociates.com.