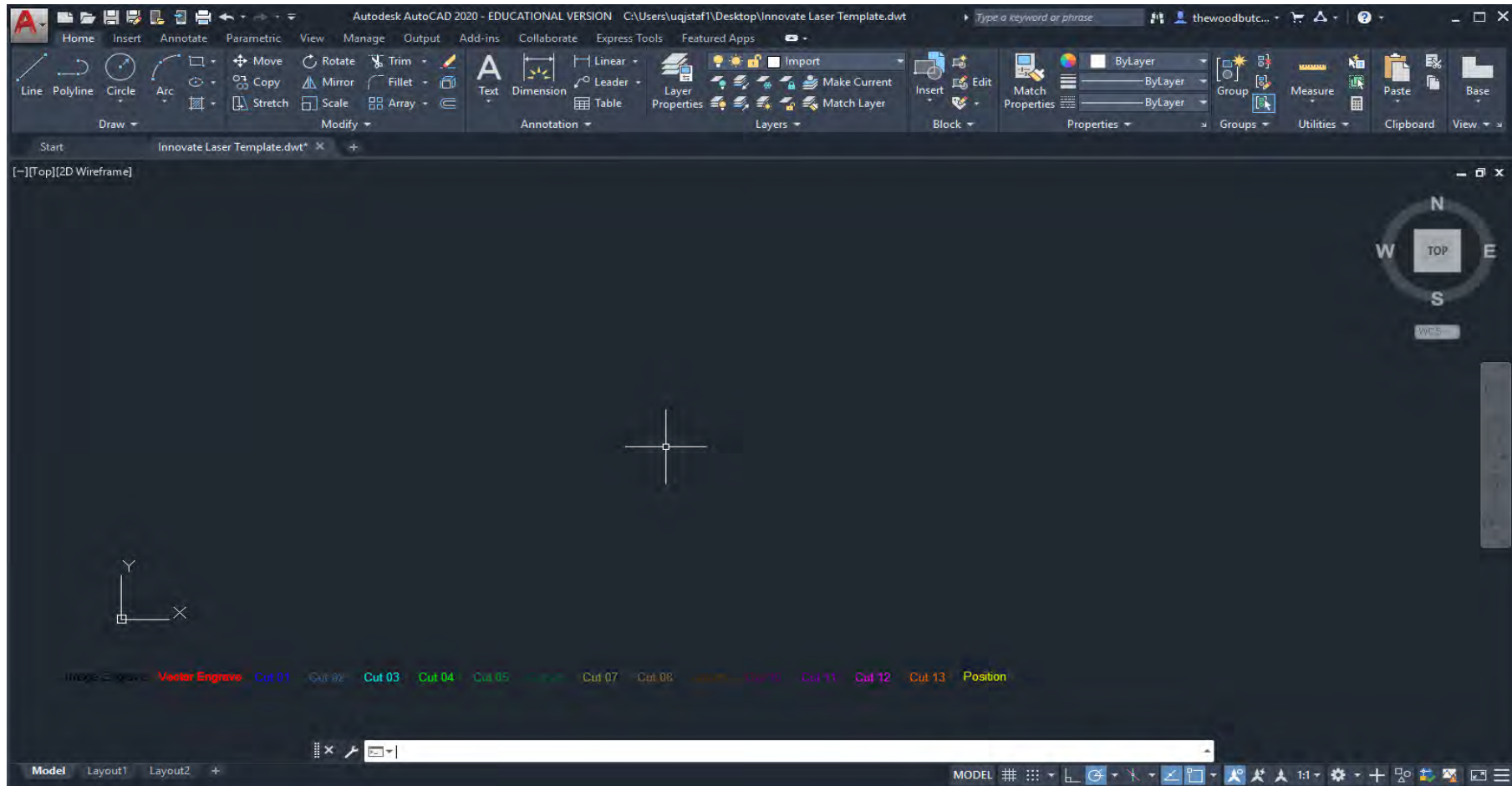
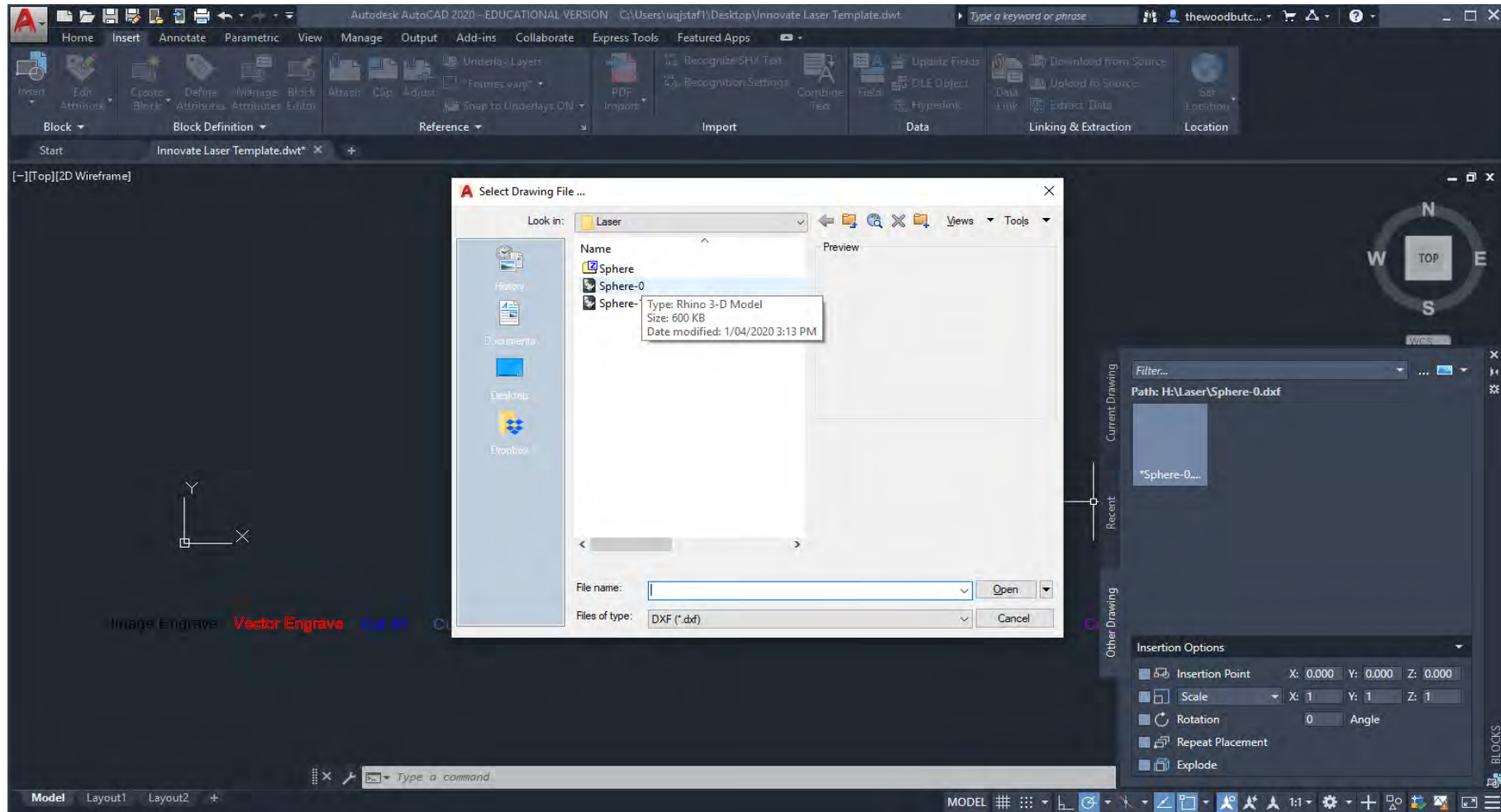


Importing geometry into AutoCAD and preparing files for laser cutting from Slicer.

Open UQ Innovate Laser Cutting Template. When using commands in AutoCAD you can hit F1 for help.

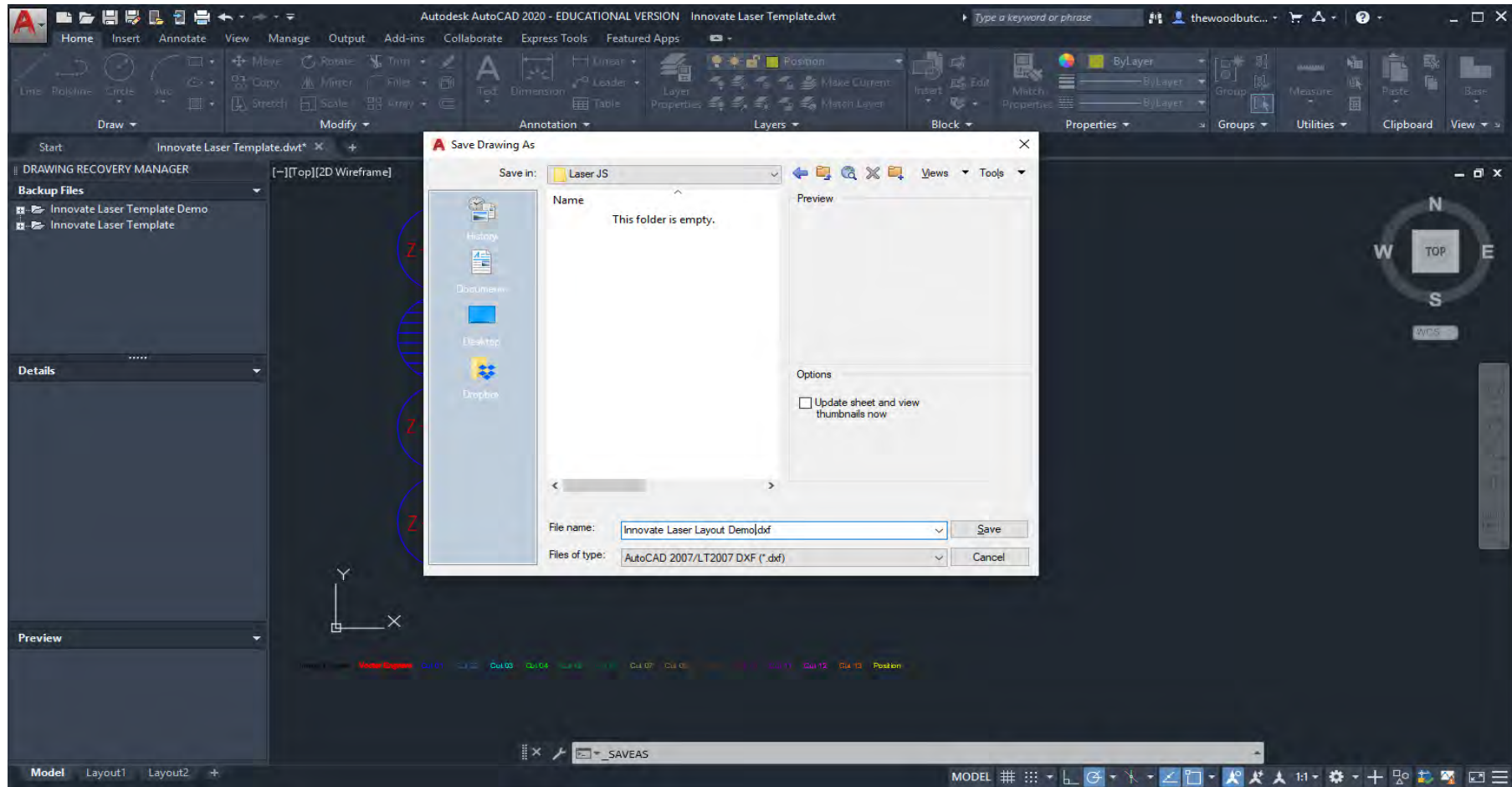


Use the Insert command to import previously saved .dxf files into the template.



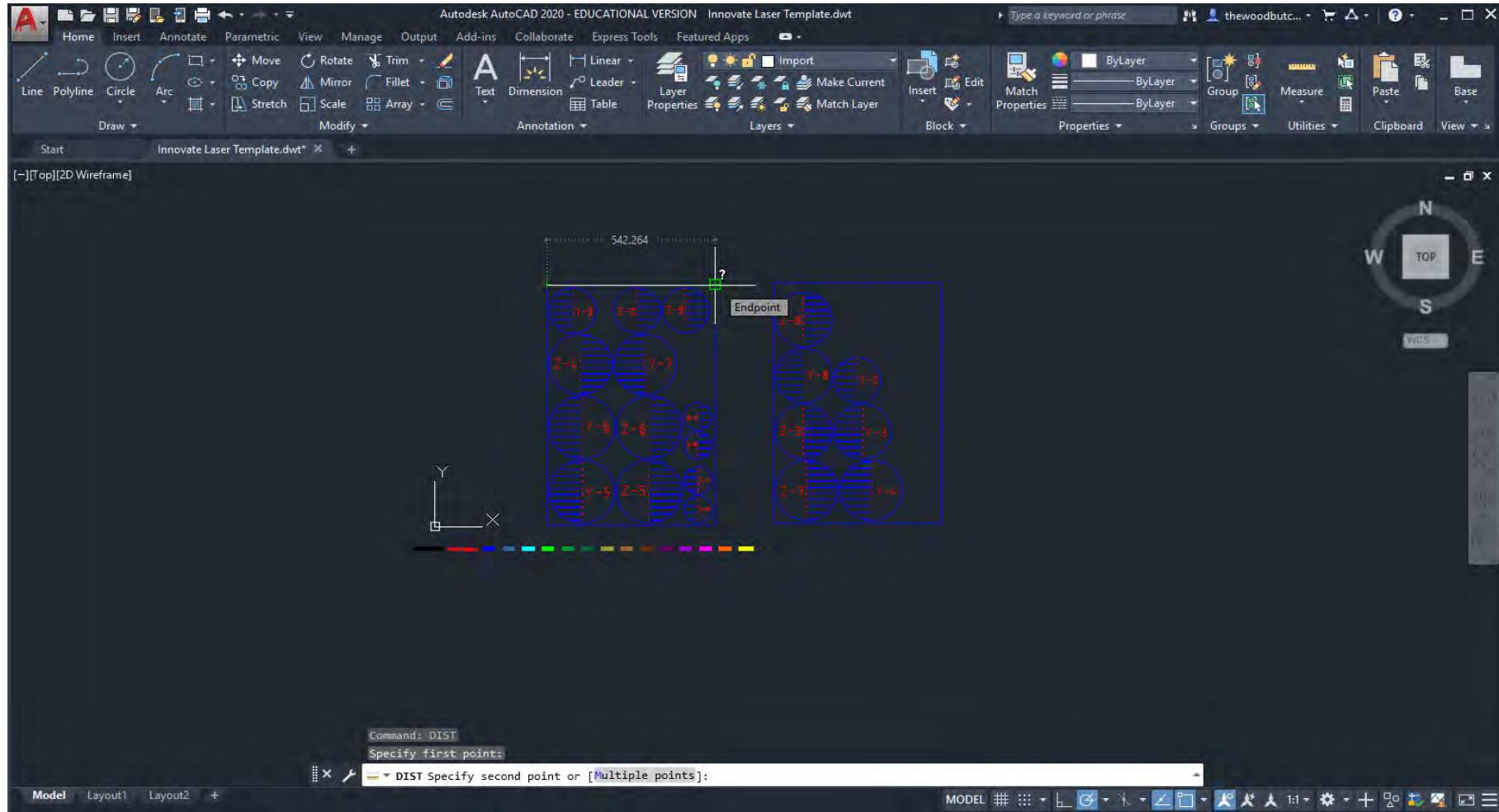
CREATE CHANGE

Around this time, it is a really good idea to use the **SAVEAS** command so that you have a return point if something goes wrong. I didn't do this and am now post rationally inserting this advice as I broke my own rule of CAD non-destructive file management. "Save often, save frequently, save everywhere." Also, note that I have saved an AutoCAD 2007/LT2007 DXF format out of habit as this is the most compatible format for CAM systems.



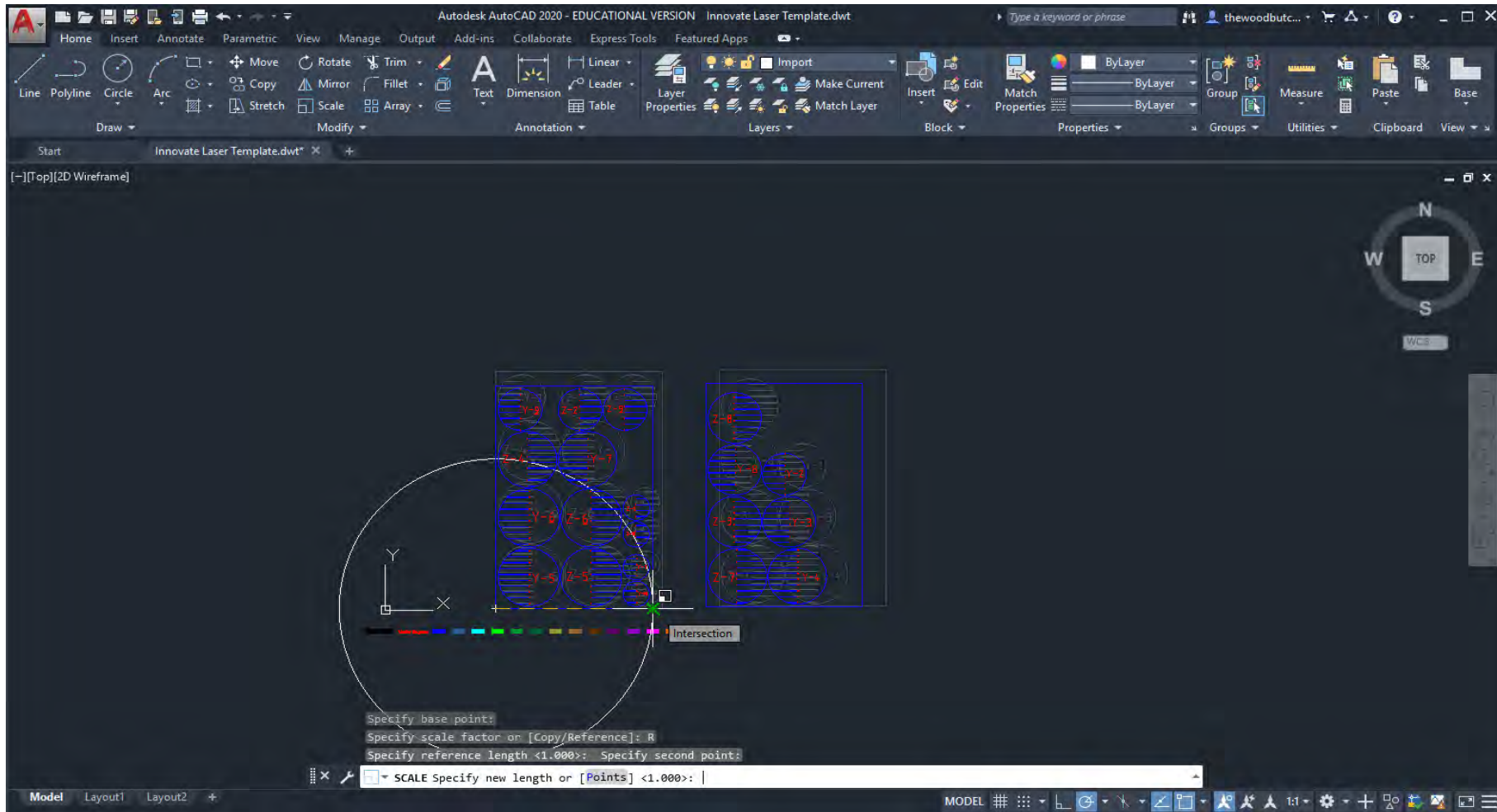
CREATE CHANGE

It's worth checking the size of your file to make sure the scale is correct. Use the **DIST** command on something you know the expected value of.



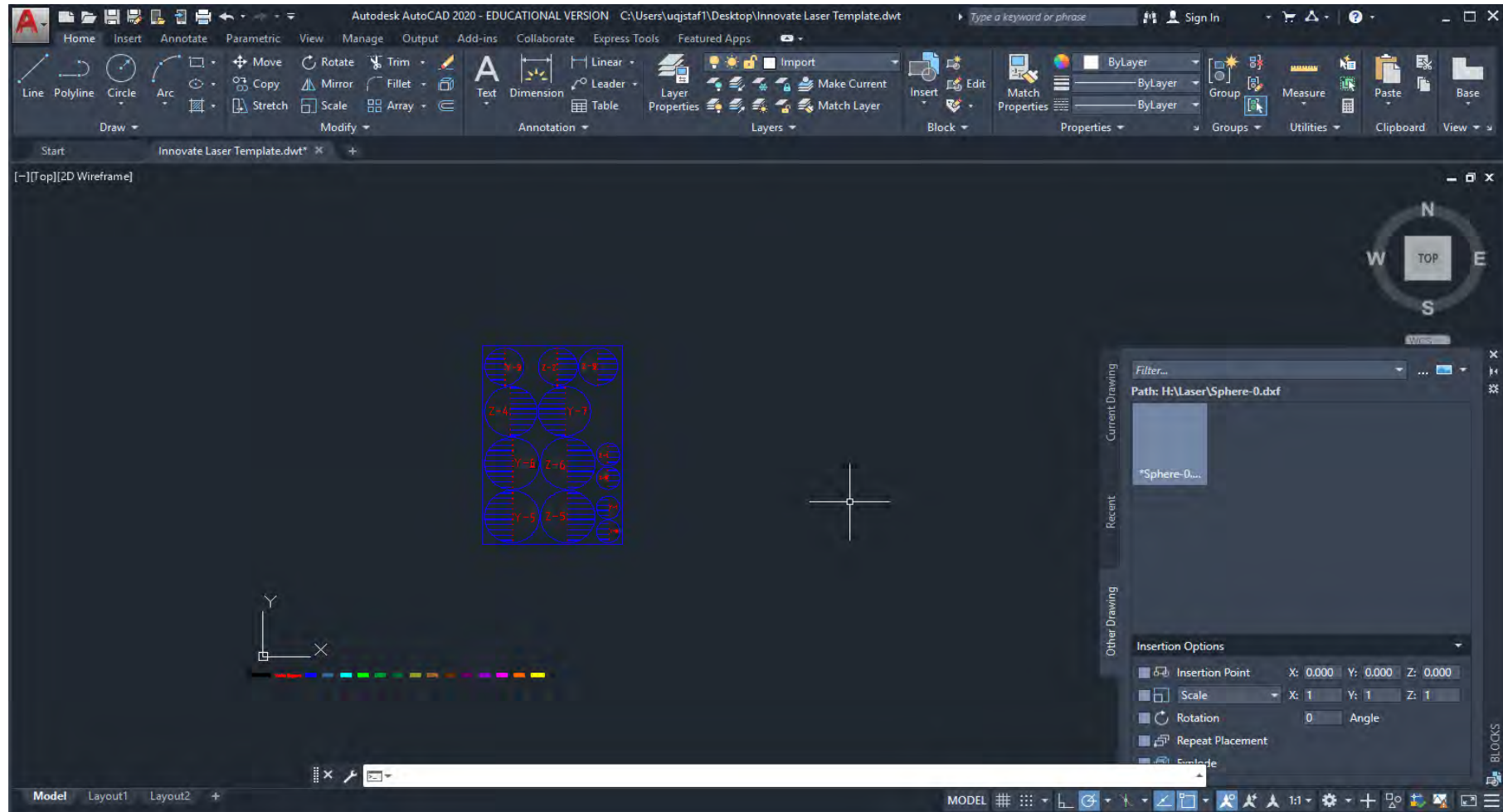
CREATE CHANGE

The Scale is wrong so I will make a **CIRCLE** from a corner of my base point to set the correct distance and then use the Scale Reference command to correct the scale. Once this is done you can Delete the target circle. If you have faith in your CAD file skip to the Laser Cutter Layout section of this document. Otherwise follow on step by step.



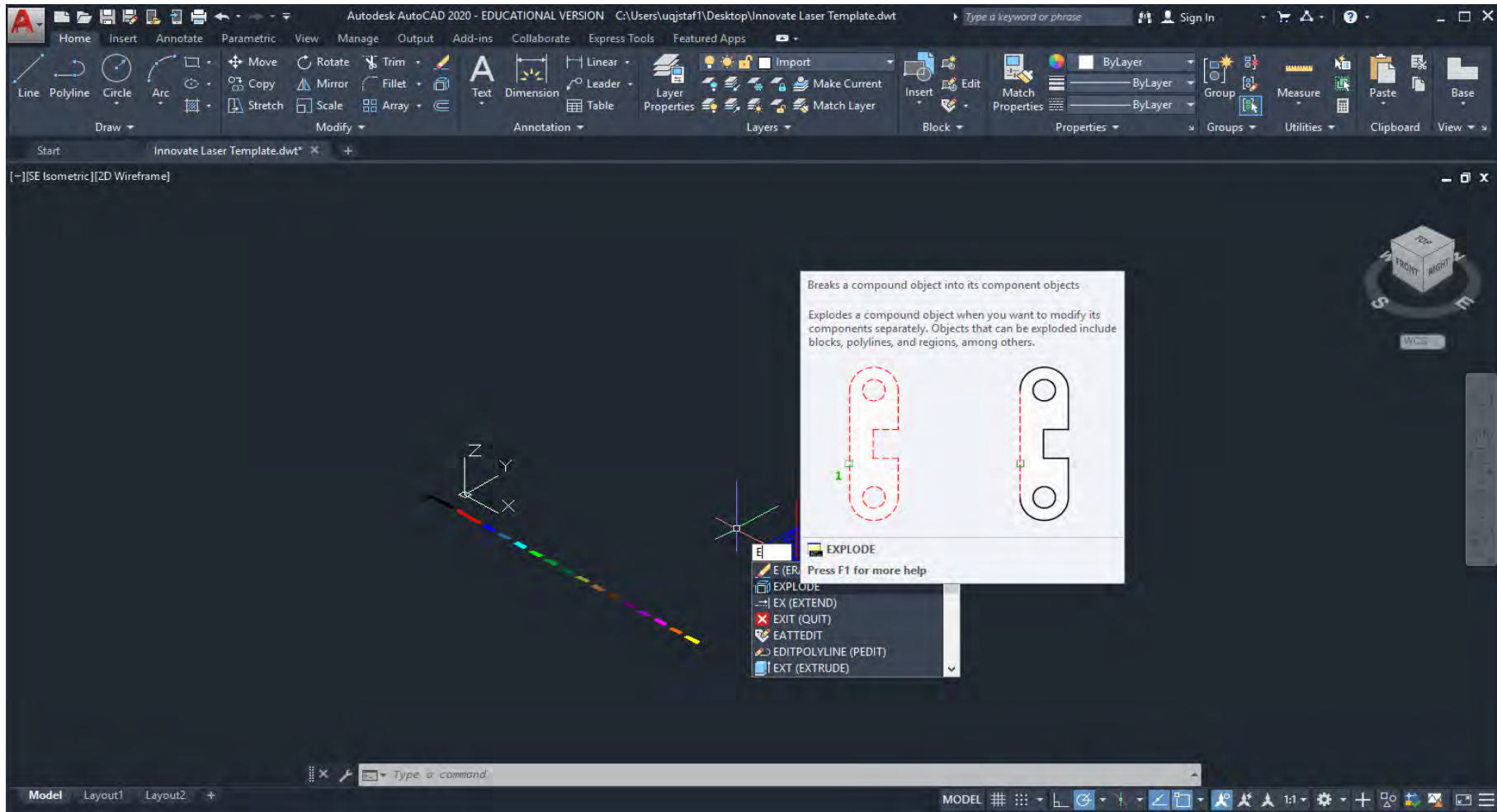
CREATE CHANGE

Once you've imported and scaled your file use the View Cube to inspect what you have imported. You may find that the file you have saved as a .dxf needs some work before it is ready for sending to the laser. This can happen from different CAD environments but don't fret it isn't hard to fix just involved.... This work is all best done before you start your laser cutting session. 😊



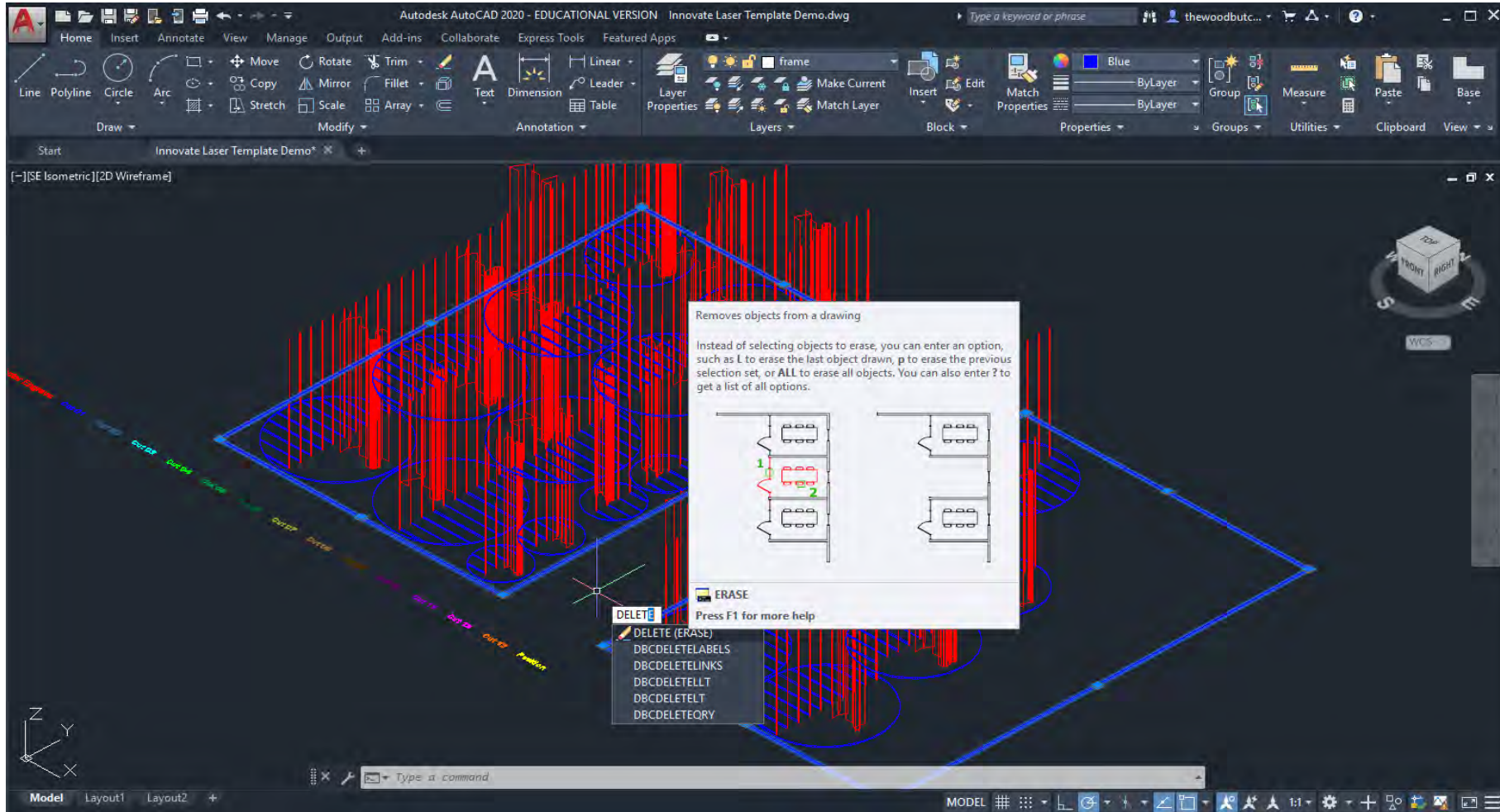
CREATE CHANGE

Let's get to work on fixing this file, use **EXPLODE** to break the block instance of the imported file. You will note I have changed to an isometric view by utilising the **WCS**.

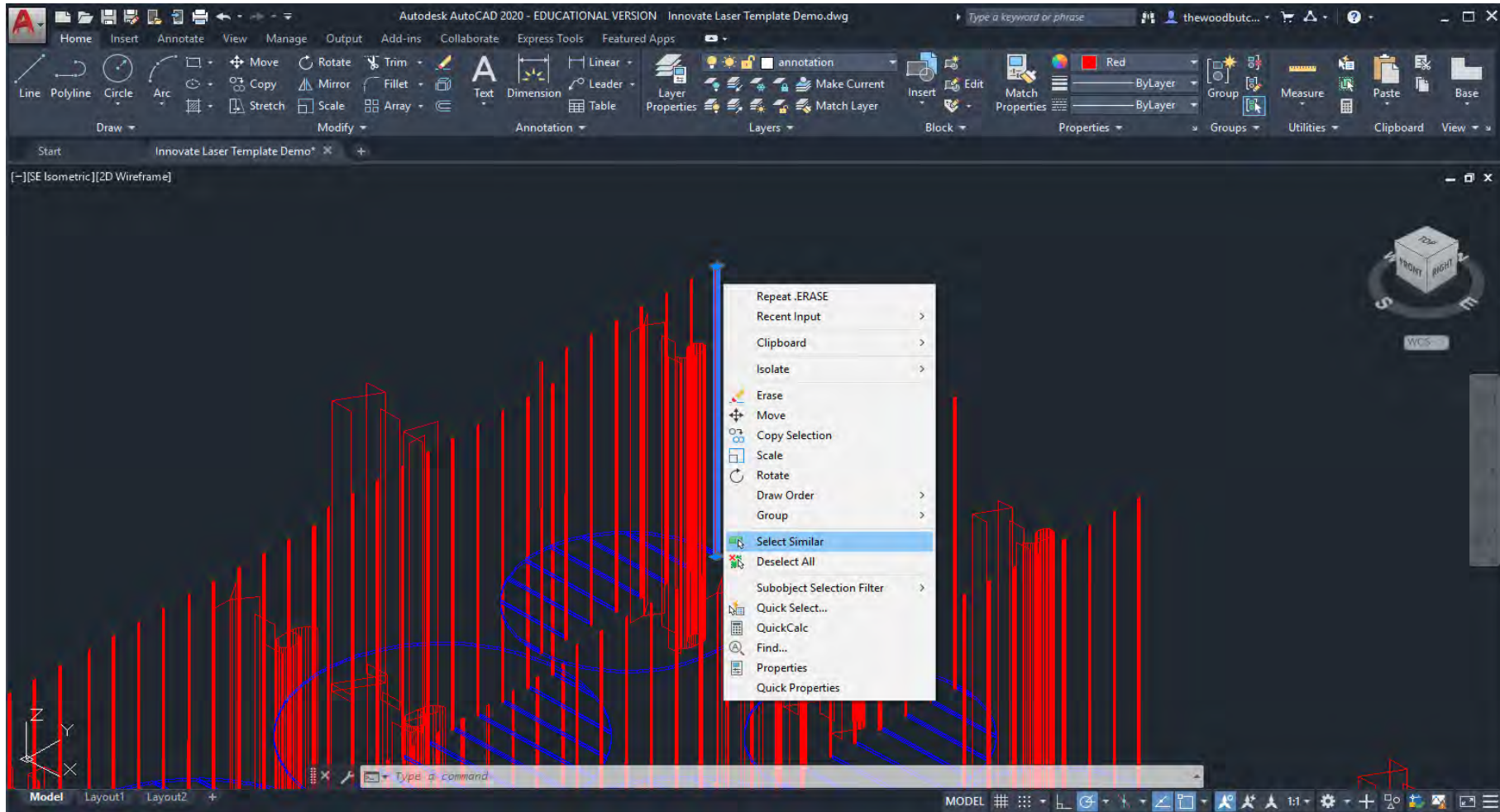


CREATE CHANGE

Looking at what is on screen there is some interesting geometry going on that will need some cleaning up, first Select and Delete what you don't require. Another good time to use **Ctrl+S/QSAVE**.

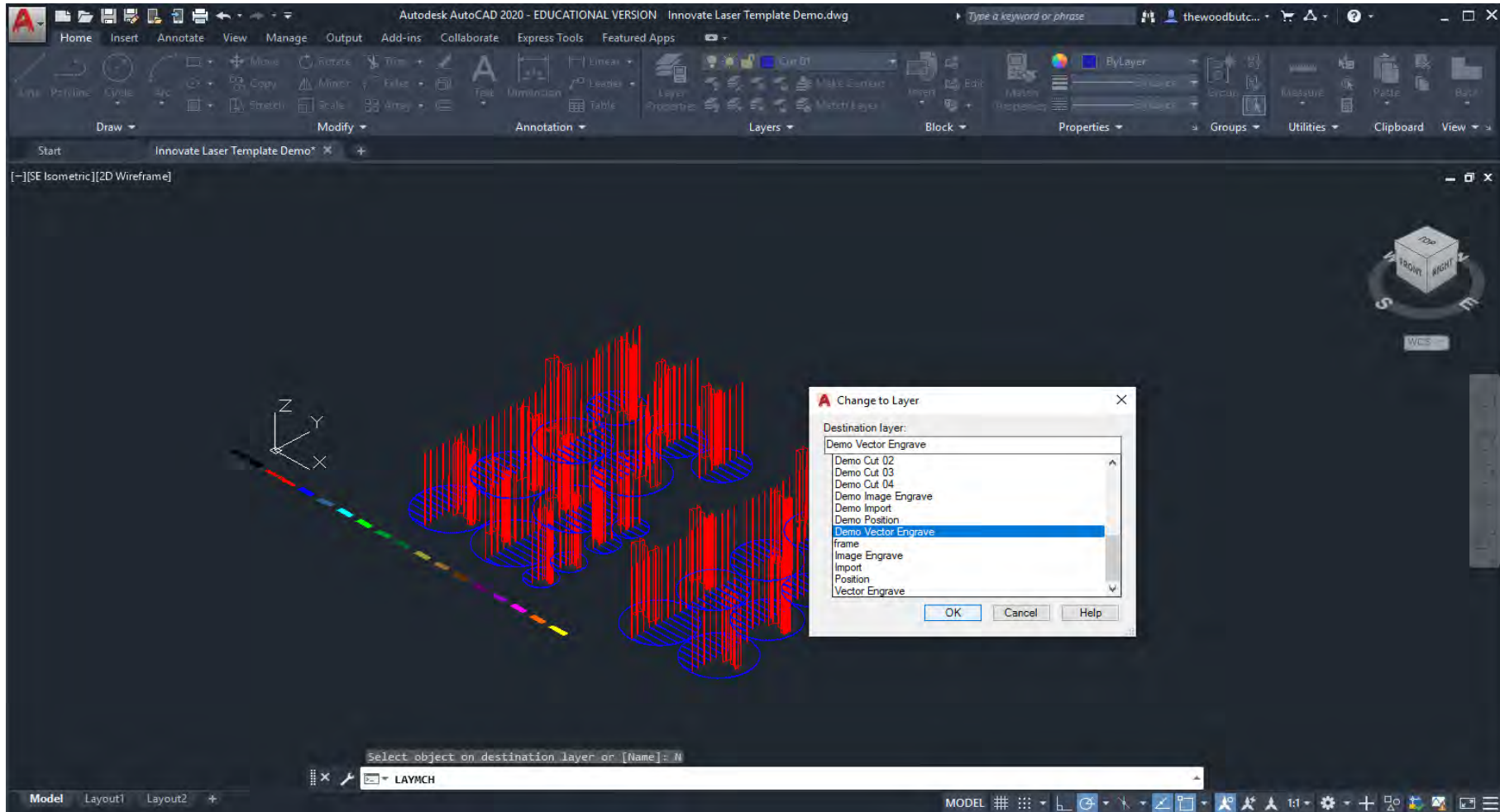


Use Select Similar to select items of a similar nature.



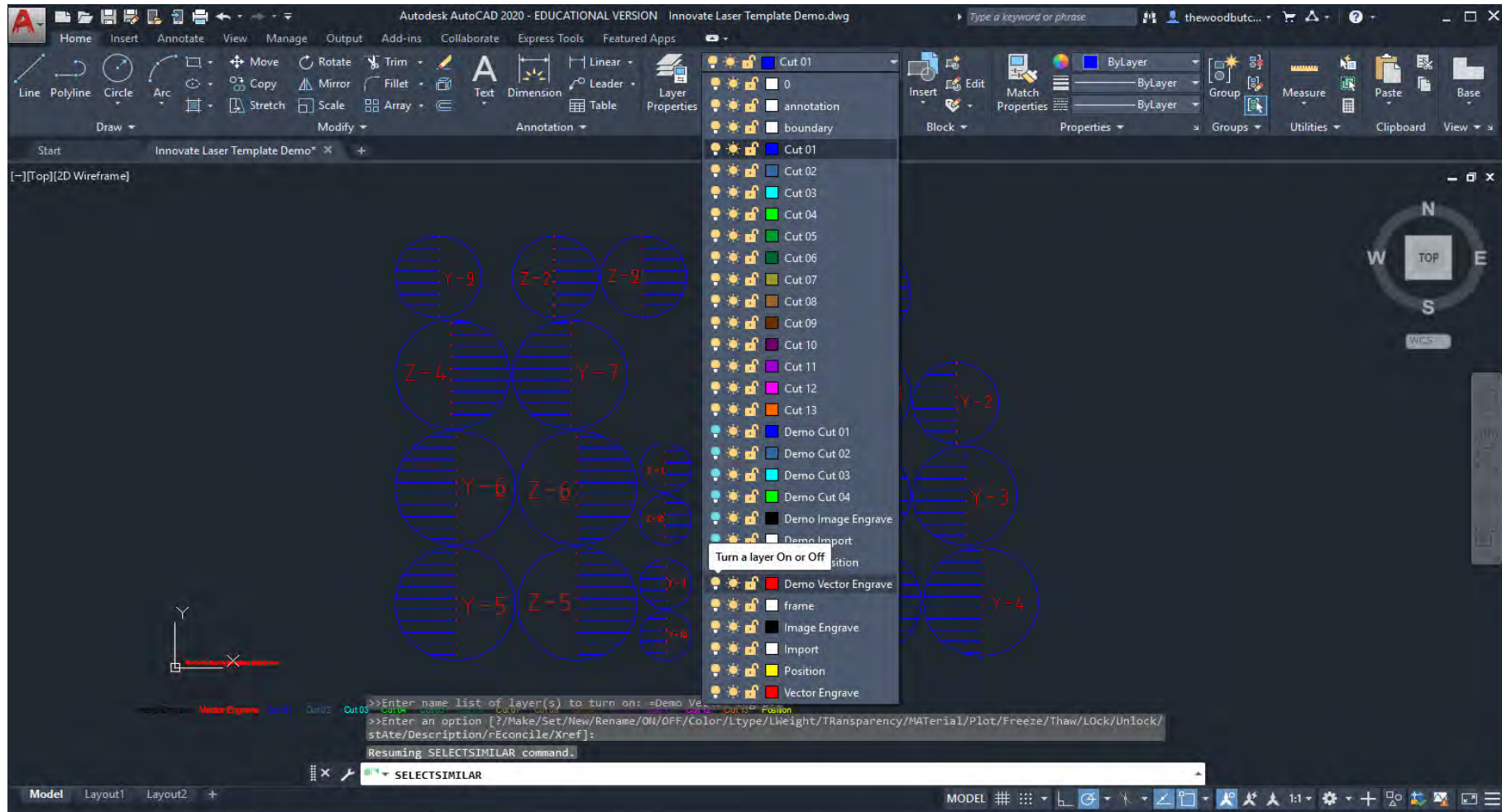
CREATE CHANGE

Then to move items to another layer using the **LAYMCH** command to change the selected items layer. Or **MATCHPROP**



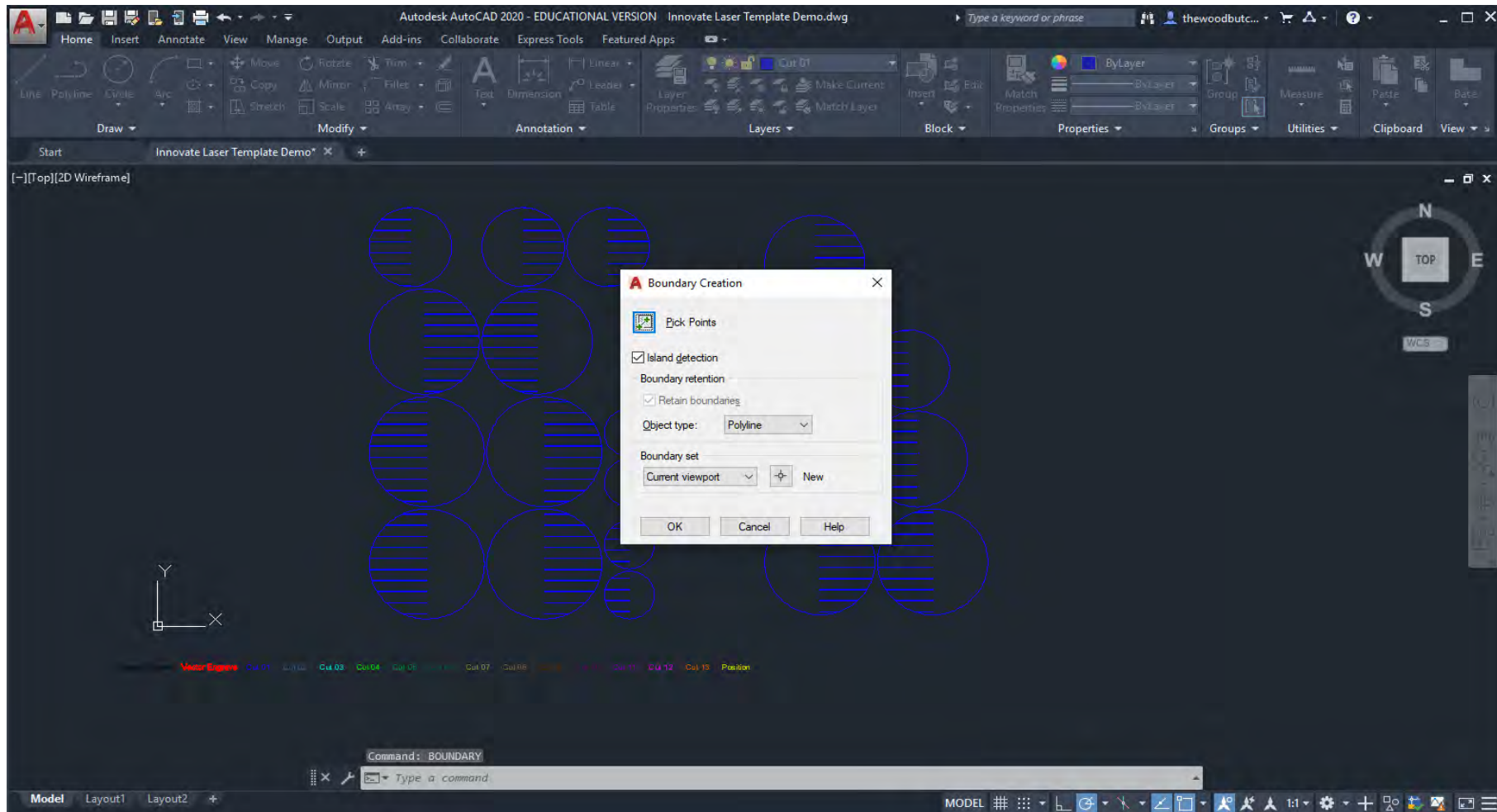
CREATE CHANGE

Now switch it off using the lightbulb tab in LAYER. Layers are a very useful tool for organising and controlling our drawings in CAD.



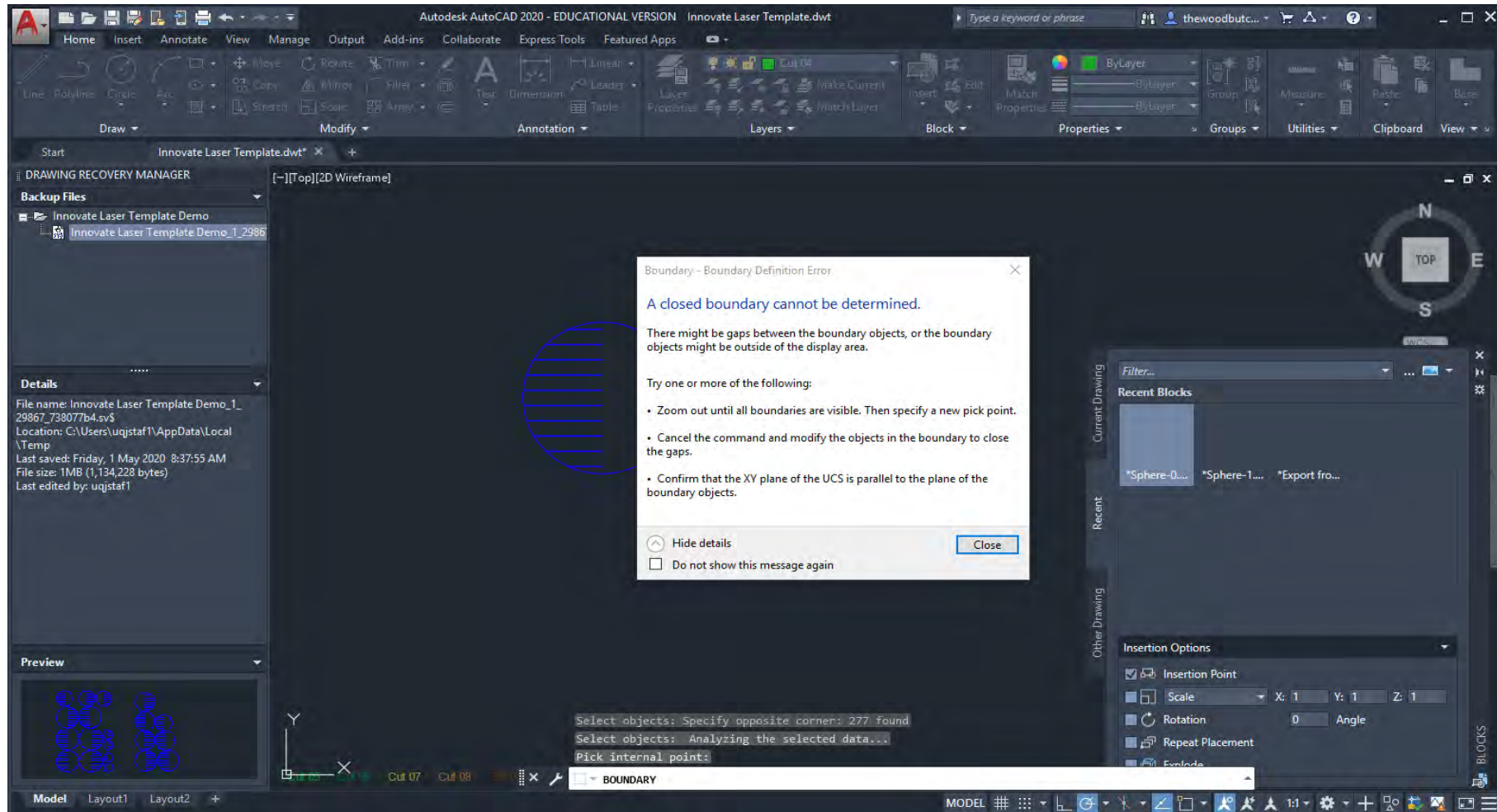
CREATE CHANGE

Changing the active Layer to Cut01 use the **BOUNDARY** command to turn the convoluted geometry into a nice simple polyline. This is a good method for creating closed geometry that can also be very useful when using CAM.



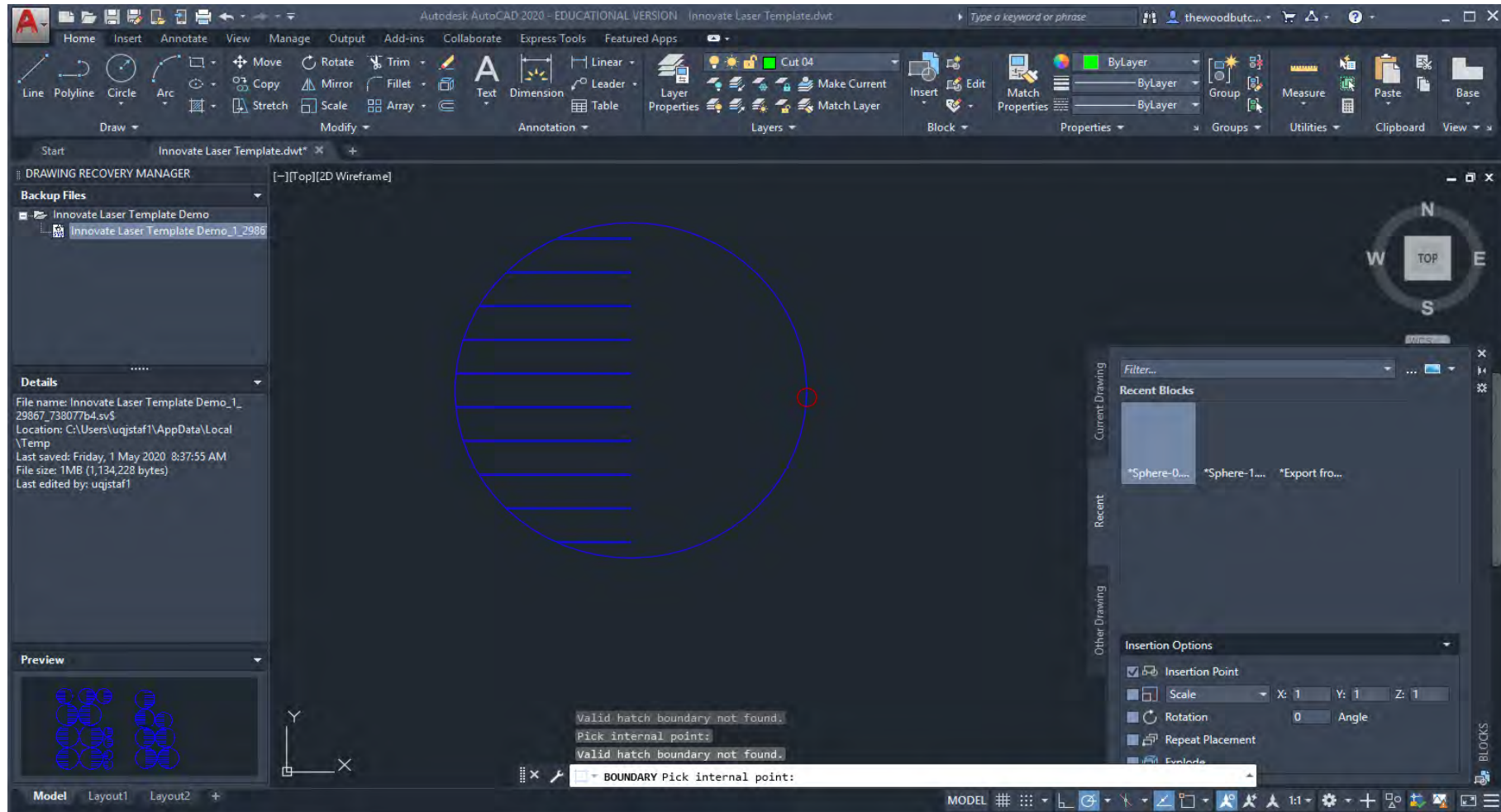
CREATE CHANGE

If AutoCAD is unable to apply Boundary don't panic normally it's because there is a gap in geometry or it's not on the XY plane, let's investigate further.



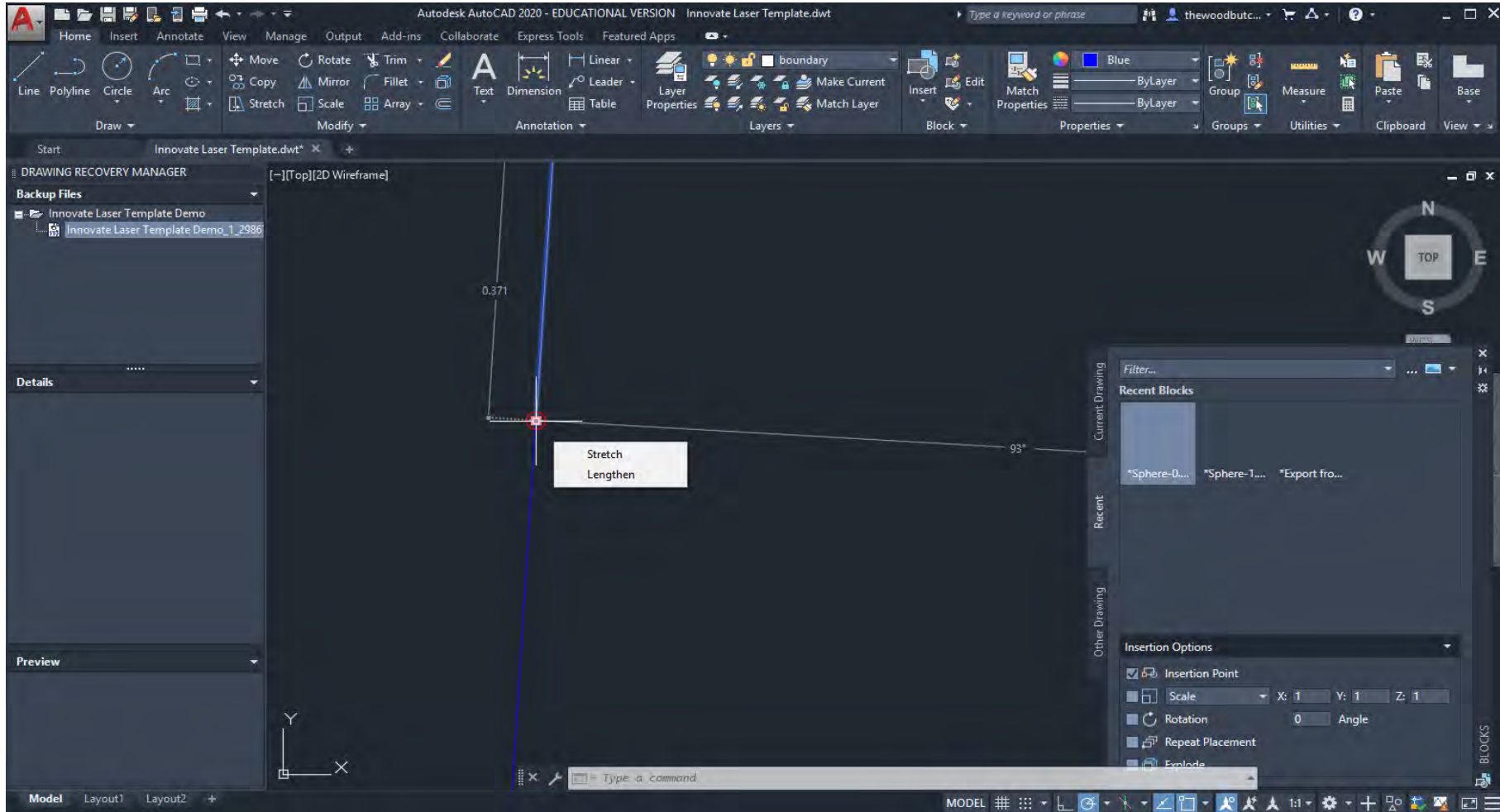
CREATE CHANGE

If you Zoom in and out after a failed Boundary it should highlight the gap with a red circle.

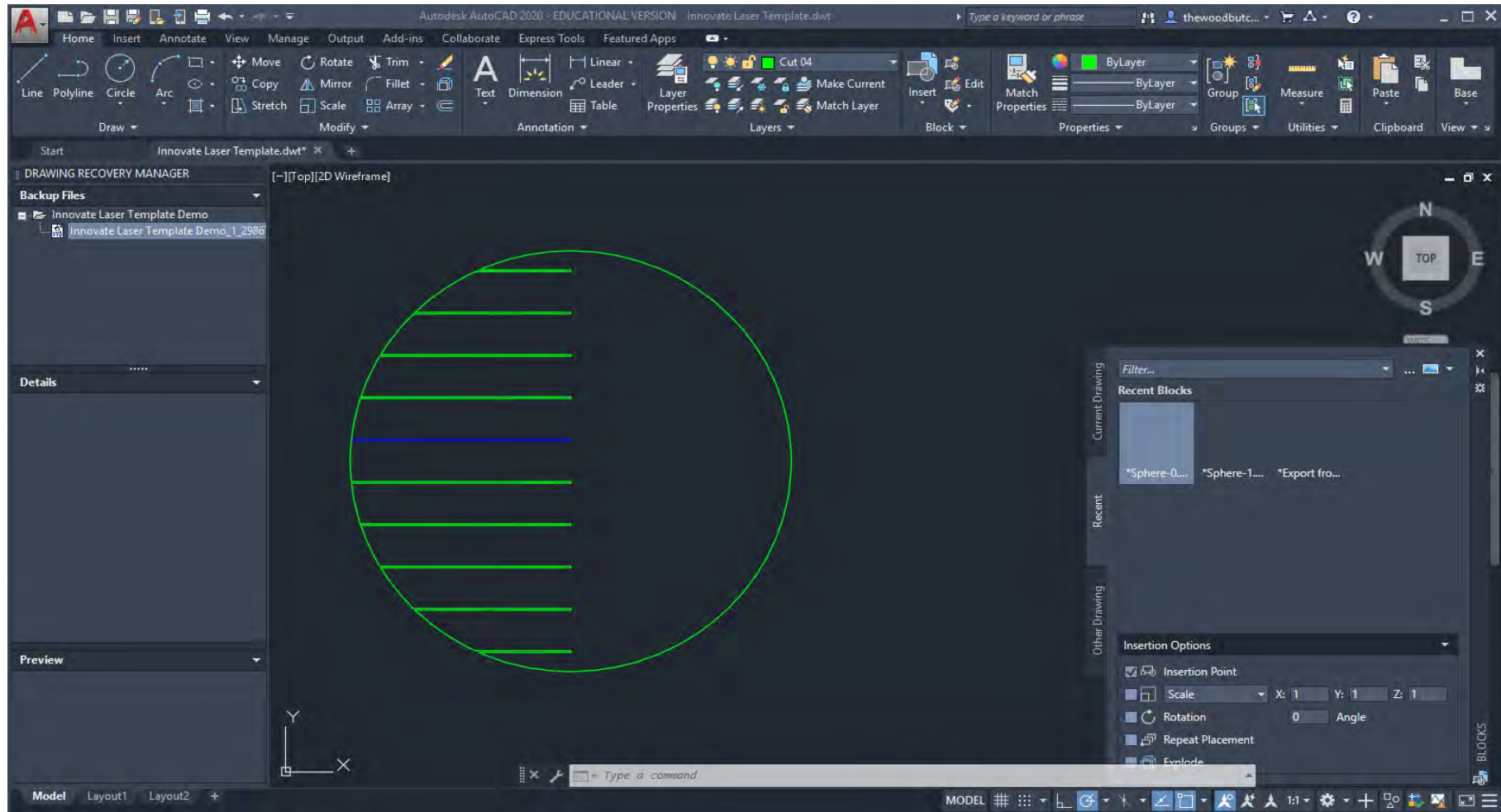


CREATE CHANGE

By clicking on one of the **Objects** either side of the red circle and hovering on a blue square control point we can Lengthen it. By doing this to both sides we can ensure an overlap so that we can apply the Boundary command successfully.

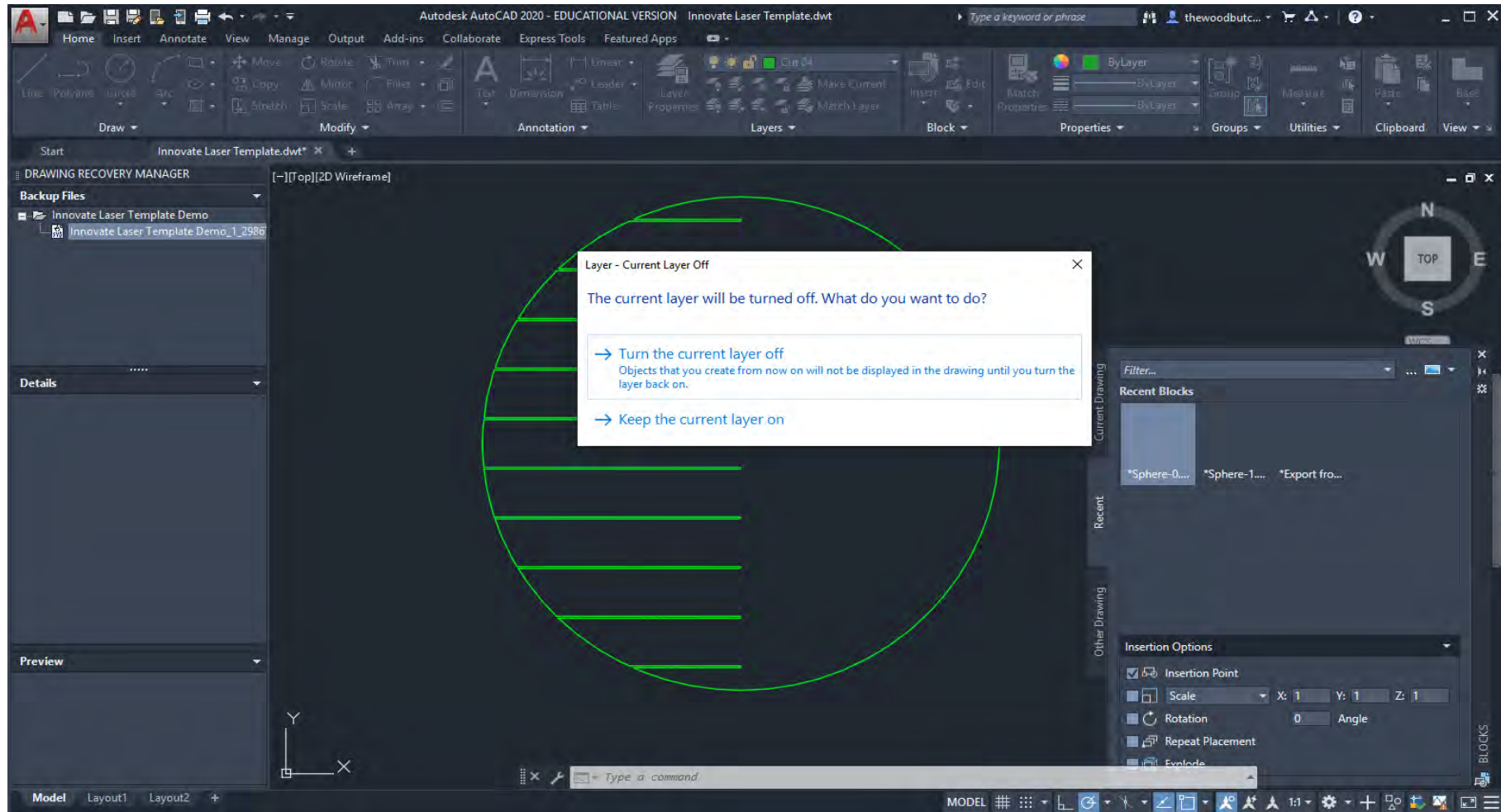


Oops, looks like I need to **Ctrl+Z/UNDO** and Lengthen some other objects....



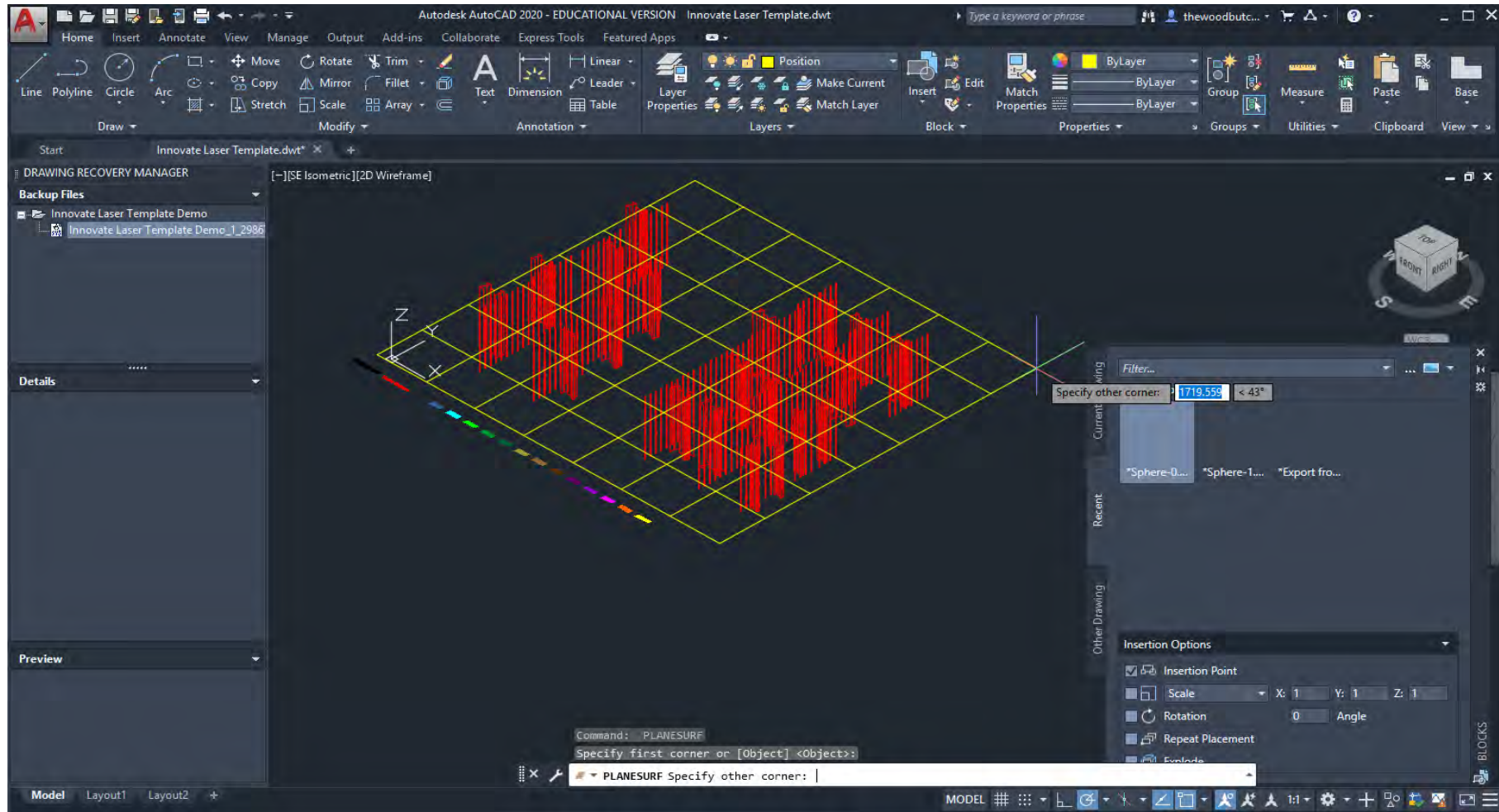
CREATE CHANGE

Once your perseverance has paid off; switch off the **Layers** you have created the new geometry on, then **Delete** the originals.



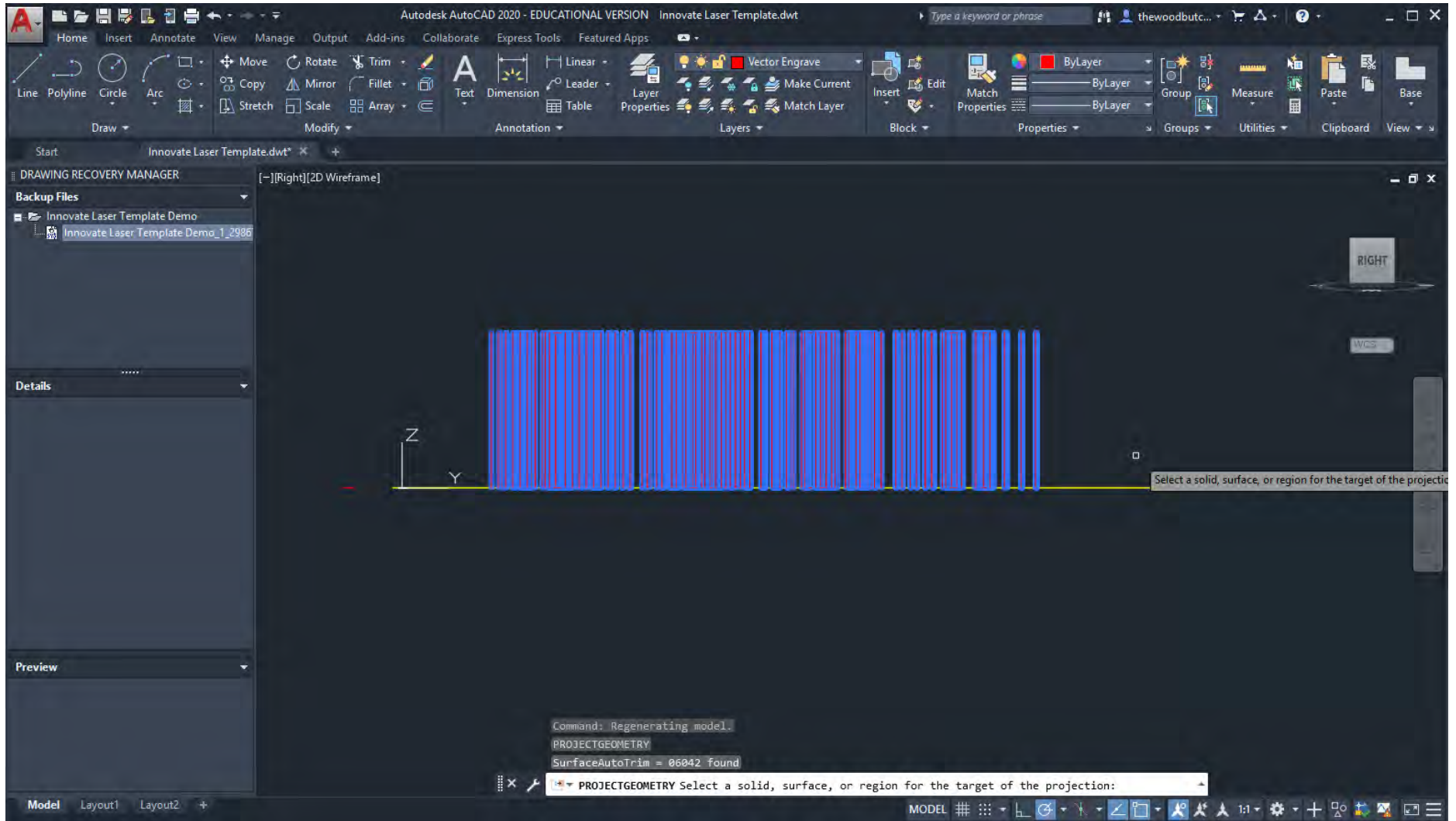
CREATE CHANGE

Let's use a different method for our annotative geometry as sometimes we need to fix open geometry. Start by creating a Planar Surface using the **PLANESURF** command.(this command is also useful if your geometry has non-conformity on the Z axis.)



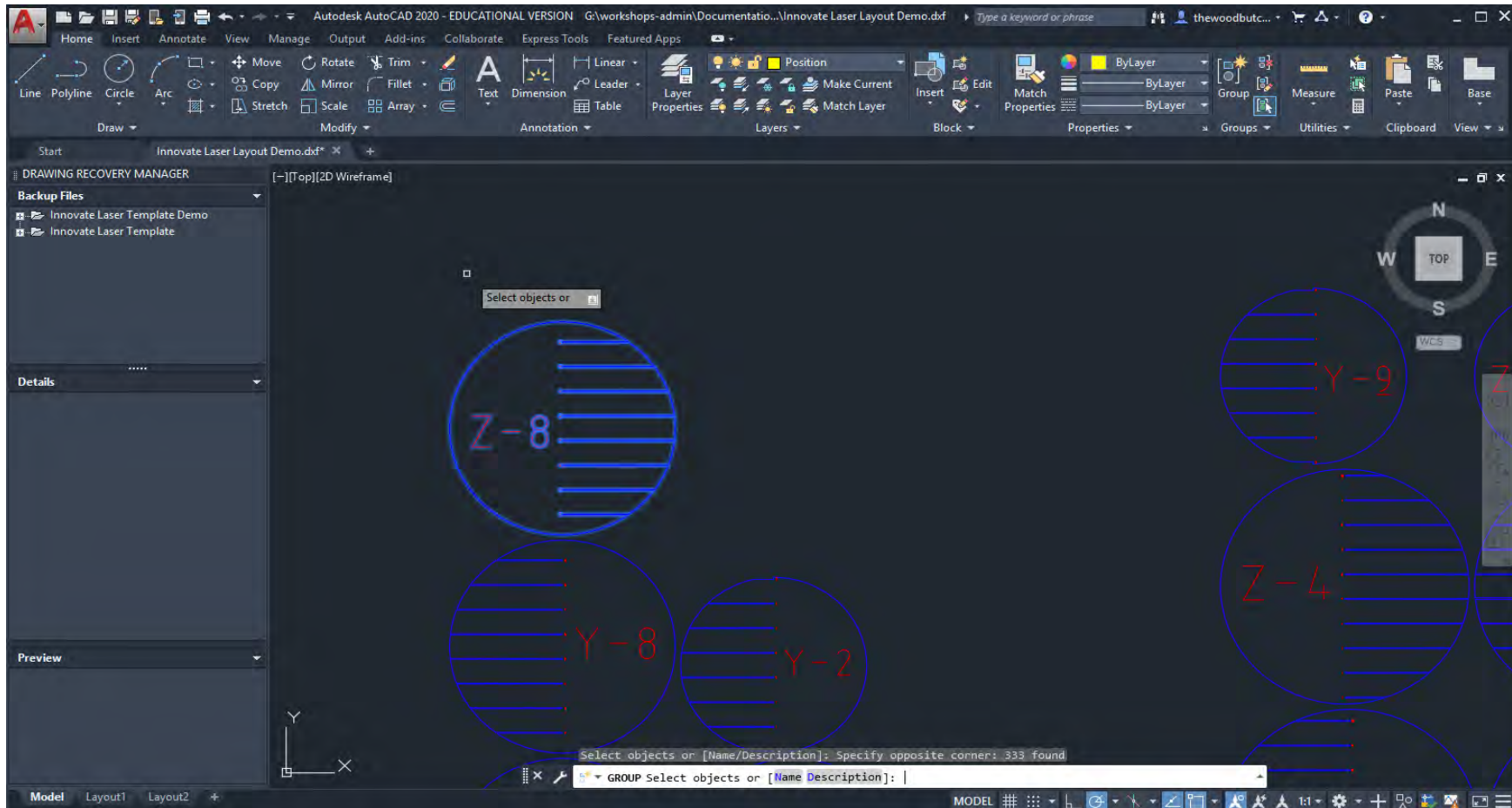
CREATE CHANGE

Use the PROJECTGEOMETRY command to create a projection of the top view of the lines onto the newly created surface.



CREATE CHANGE

Either **Delete** or switch off the **Layers** that have the original geometry and working surfaces so that you have just the geometry you wish to cut. If you have text that is to be on parts you are cutting out I find it useful to Group them using the Group command so that they stick together when moved around at the layout stage. You can use the spacebar (AKA Enter in AutoCAD) to repeat a previous command this will make things easier.



Laser Cutter Layout

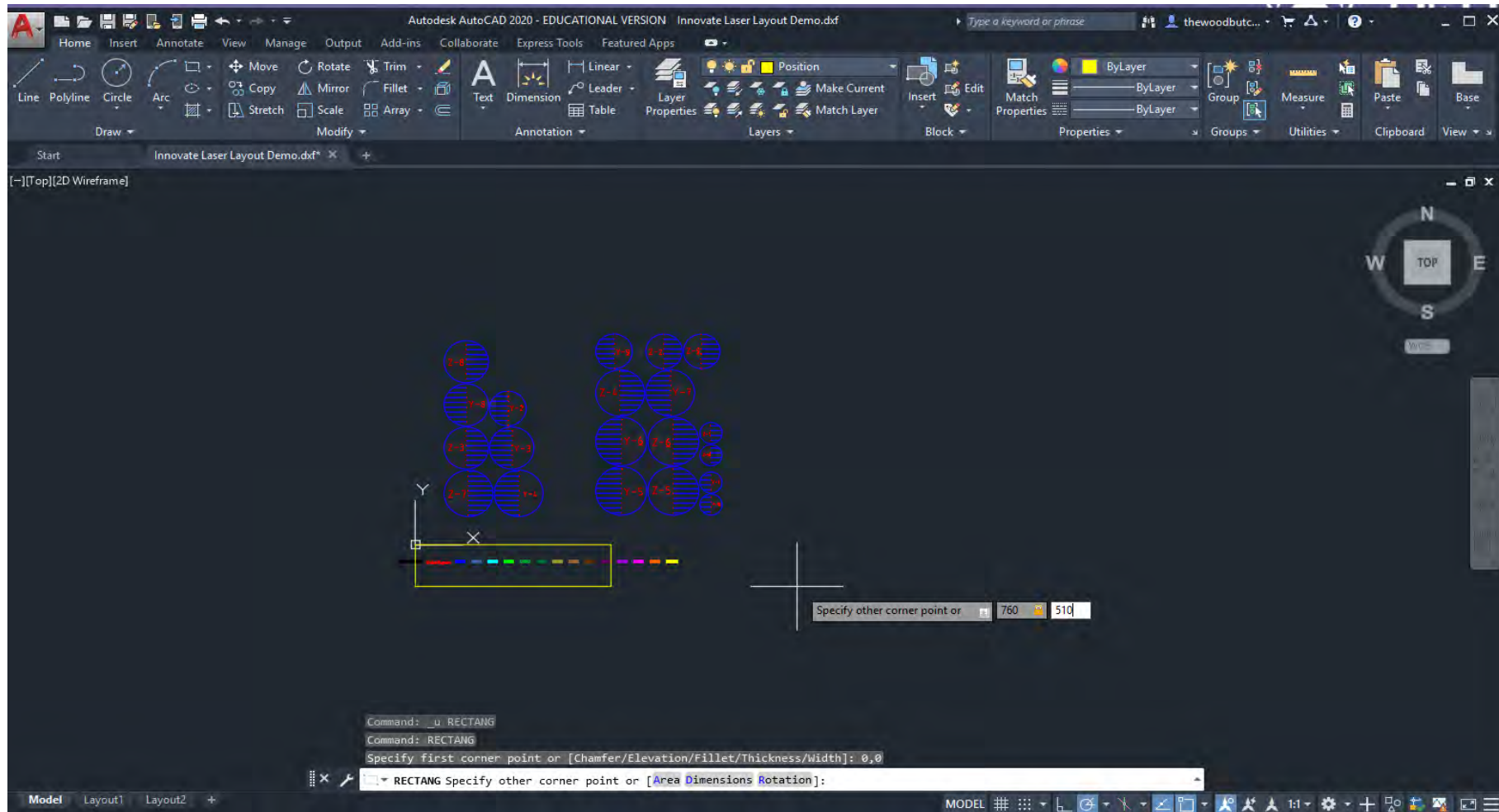
Layout of files for Laser Cutting can be confusing due to the many different Layers we have at our disposal in the **Innovate Laser Template**. It is important to always use the most up to date template as this file can be subject to change. The colours are important as these tell Job Control which setting is appropriate for the layer, line weights are also important as this is how Job Control differentiates between a Vector and a Bit Map. Try not to get too hung up on using all the layers in fact the less you use the easier and quicker your job will be. The layers are all switched on and have been listed out below the origin so that they can be targeted when using **Match Properties\MATCHPROP** or **Match Layer\LAYMCH**

- “Image Engrave” is used for greyscale (black and white) engraving of images\bit maps (R=0 G=0 B=0).
- “Vector Engrave” is used for the tracing of figures, single line text & images (finest line weight) please use in preference to “Image Engrave” as this is more efficient (R=255 G=0 B=0).
- “Cut01” used for the innermost contours of through cutting (finest line weight) (R=0 G=0 B=255).
- “Cut02” used for the next order of contours (finest line weight) (R=51 G=102 B=153).
- “Cut03” used for the next order of contours (finest line weight) (R=0 G=255 B=255).
- “Cut04” used for the next order of contours (finest line weight) (R=0 G=255 B=0).
- “Cut05” used for the next order of contours (finest line weight) (R=0 G=153 B=51).
- “Cut06” used for the next order of contours (finest line weight) (R=0 G=102 B=51).
- “Cut07” used for the next order of contours (finest line weight) (R=153 G=153 B=51).
- “Cut08” used for the next order of contours (finest line weight) (R=153 G=102 B=51).
- “Cut09” used for the next order of contours (finest line weight) (R=102 G=51 B=0).
- “Cut10” used for the next order of contours (finest line weight) (R=102 G=0 B=102).
- “Cut11” used for the next order of contours (finest line weight) (R=153 G=0 B=204).
- “Cut12” used for the next order of contours (finest line weight) (R=255 G=0 B=255).
- “Cut13” used for the next order of contours (finest line weight) (R=255 G=102 B=0).
- “Position” used for setting the outer border of your material plate and other non-process markings (R=255 G=255 B=0).

If you feel more confident using another CAD package the above RGB colour settings will assist you in creating a file that will be able to print directly to Job Control. Please keep in mind that UQ Innovate staff may not be able to assist you as readily when it comes to problem solving.

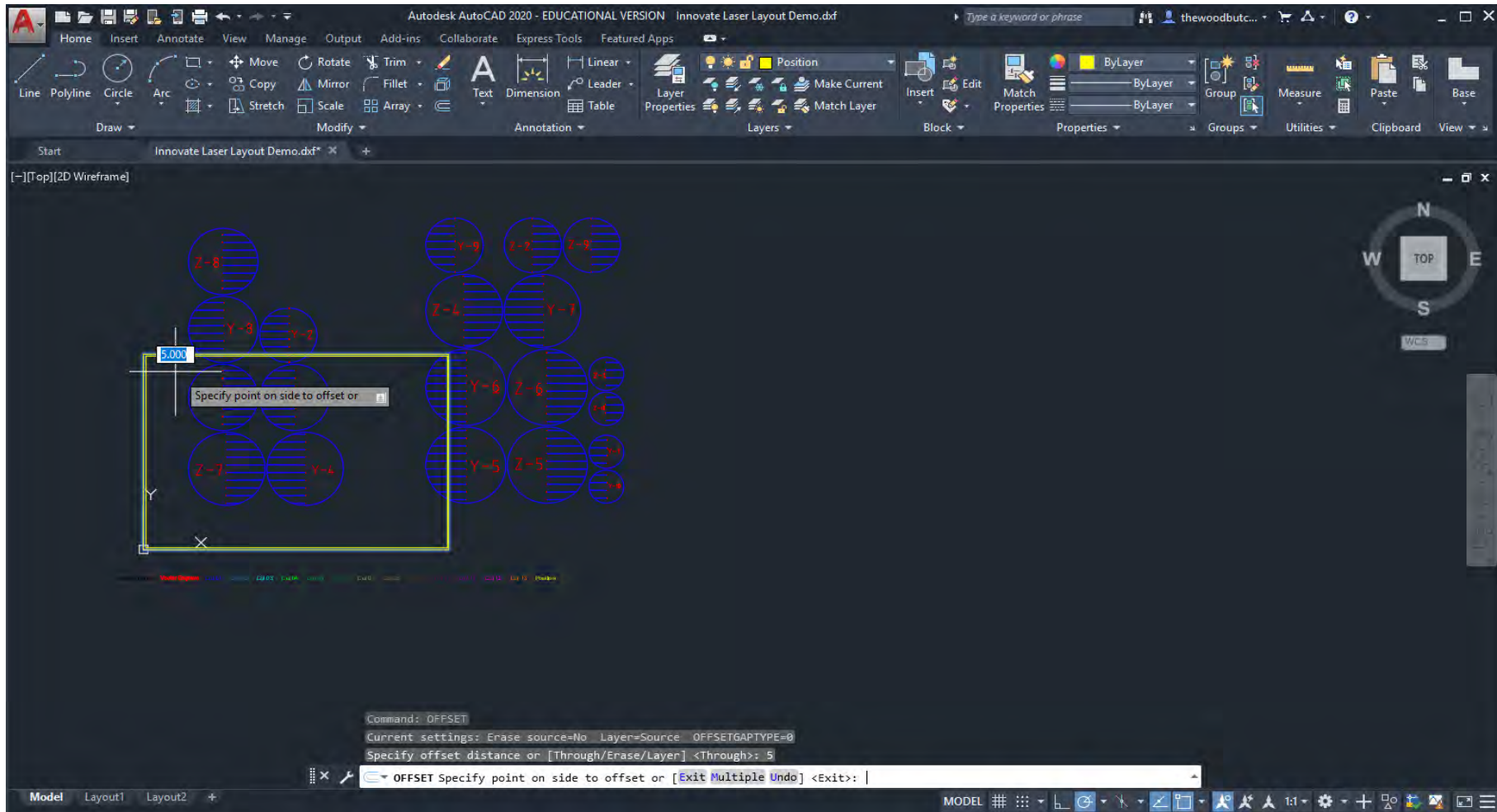
CREATE CHANGE

Create a rectangle using the **RECTANG** command that represents the boundary of your material size. My personal preference is to put the first one directly on the origin ($x=0, y=0, z=0$) if you need more just Copy them across to the right (again personal preference) also notice that I have made the longest side in the x direction not my preference this is the way the machine is laid out (always in landscape).



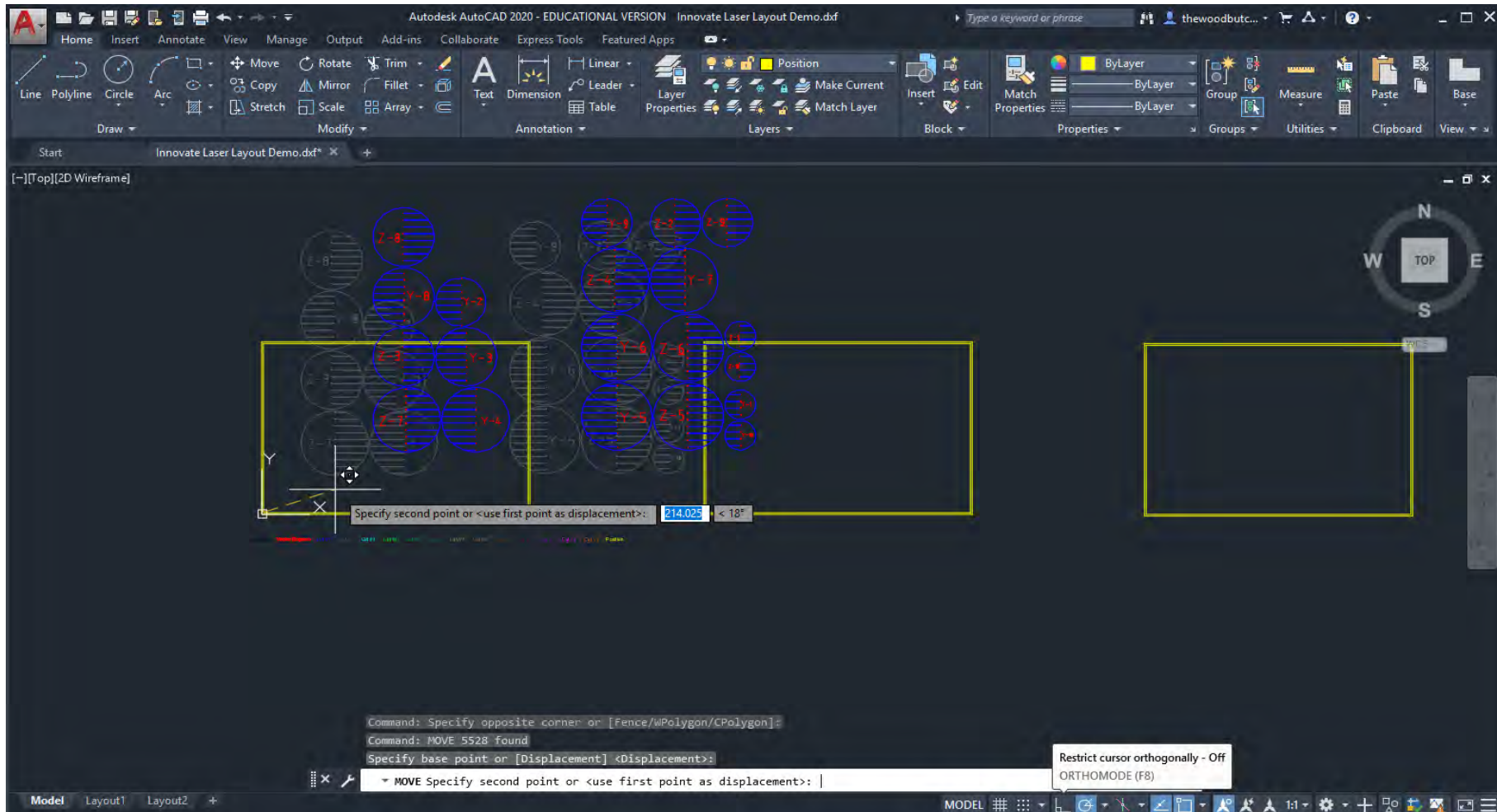
CREATE CHANGE

Use the **OFFSET** command to create a margin around your material outline this is to allow for an 1\8" border from AutoCAD Print properties but also to allow for the alignment of your material with the laser.



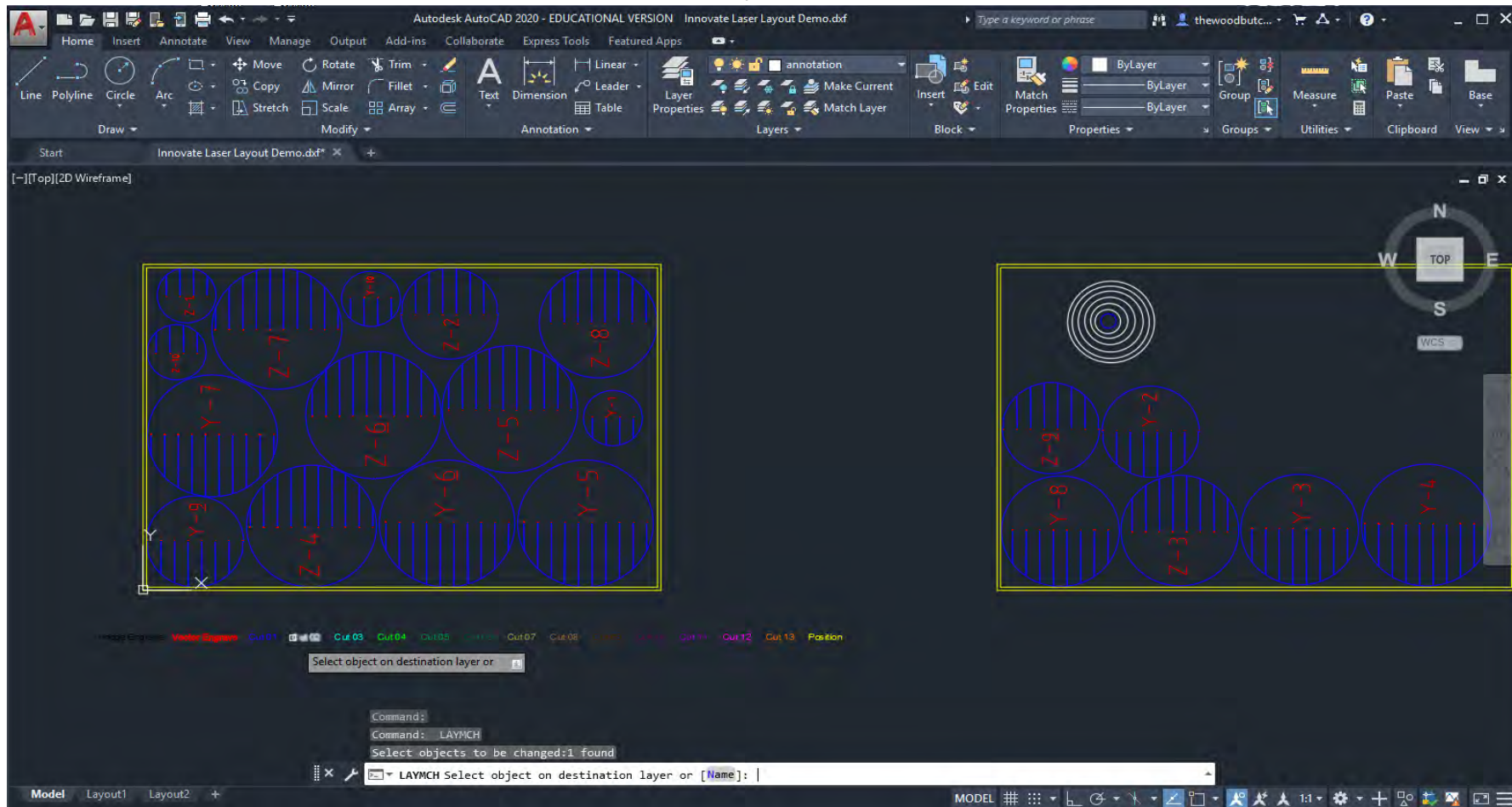
CREATE CHANGE

I like to Move all my objects out of the way and then nest them inside the material outline one by one. It is important to leave at least ~2mm between geometries to reduce the risk of fire. This is also why we try to not cut anything smaller than 2mm as it will most likely go up in flames. When doing tasks like this I find things work better with OSNAP\F3) Off.



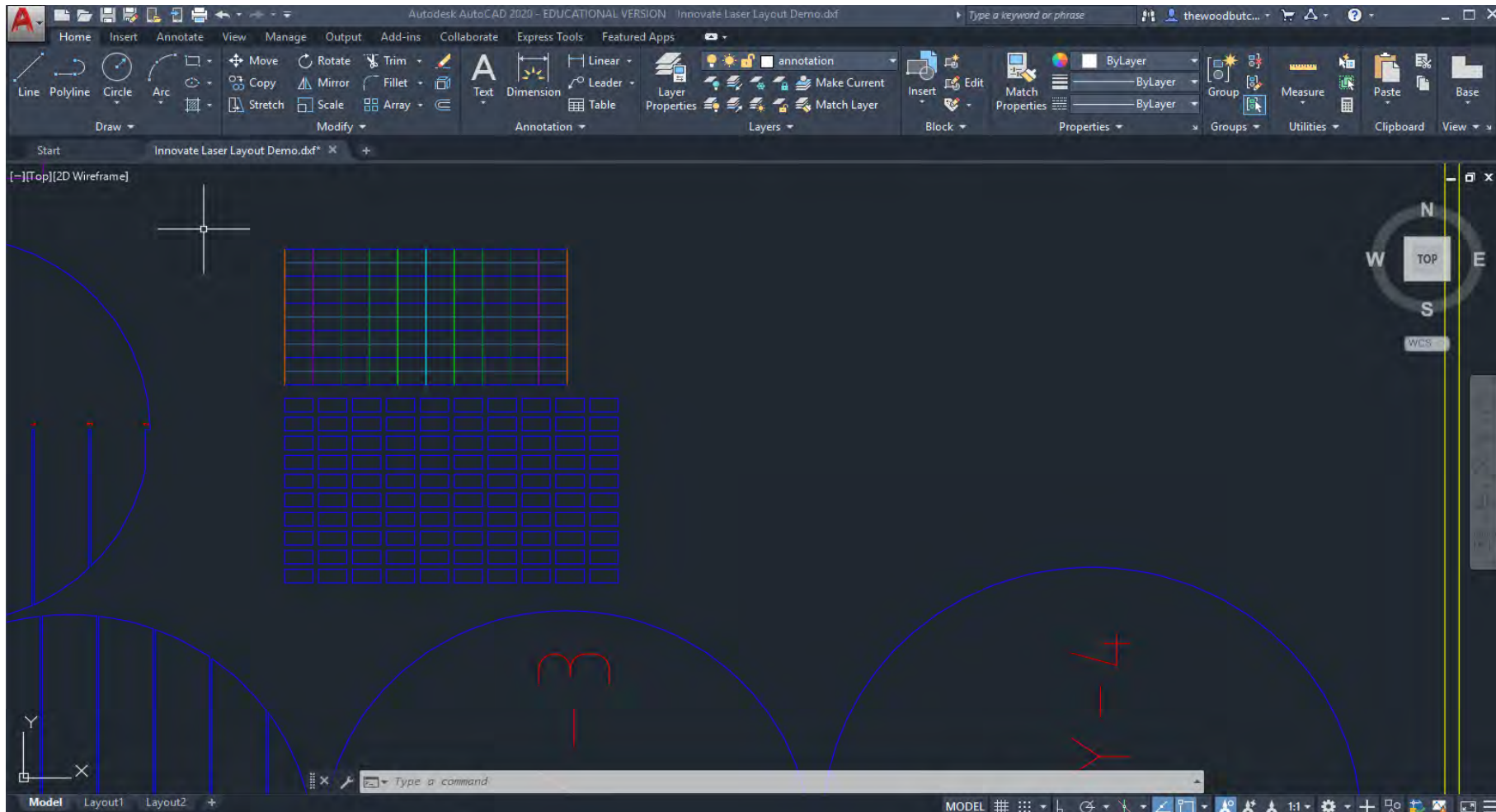
Order of Cutting

If you have concentric geometries, it's a good idea to cut the innermost ones first as the air assist on the laser can blow pieces out of place before the file has finished cutting. This would be a good reason to use the extra layers. Just use the **Match Layer\LAYMCH** command to order your cuts.



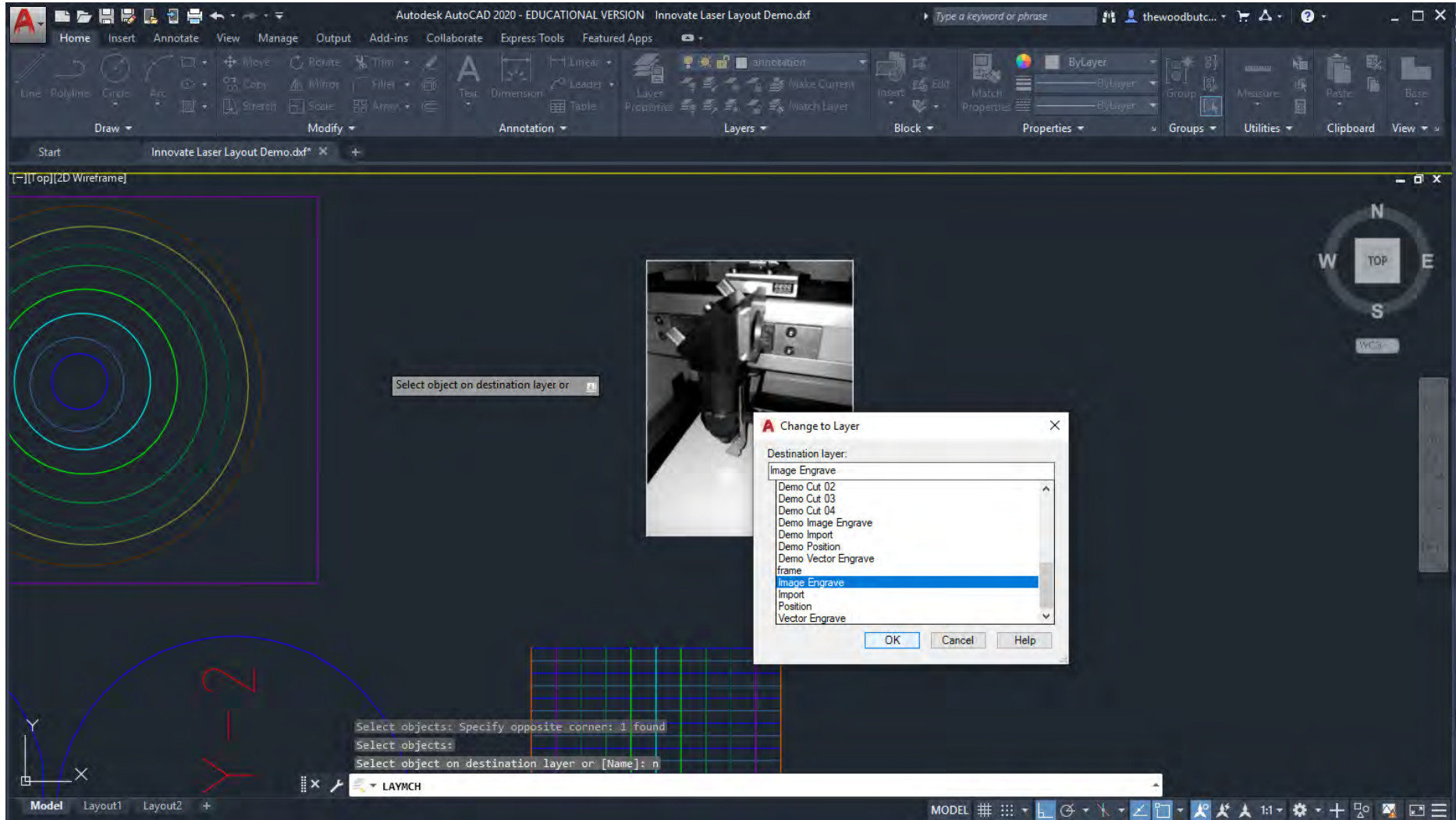
CREATE CHANGE

If you want a series of rectangles you could cut them out with 2mm spaces or do them as a grid of straight lines....I know which one I would choose. 😊 Using the layers means you can control which cut happens first giving you not only the ability of when things get cut but also by spreading heat evenly through your material. This is very important with acrylic.



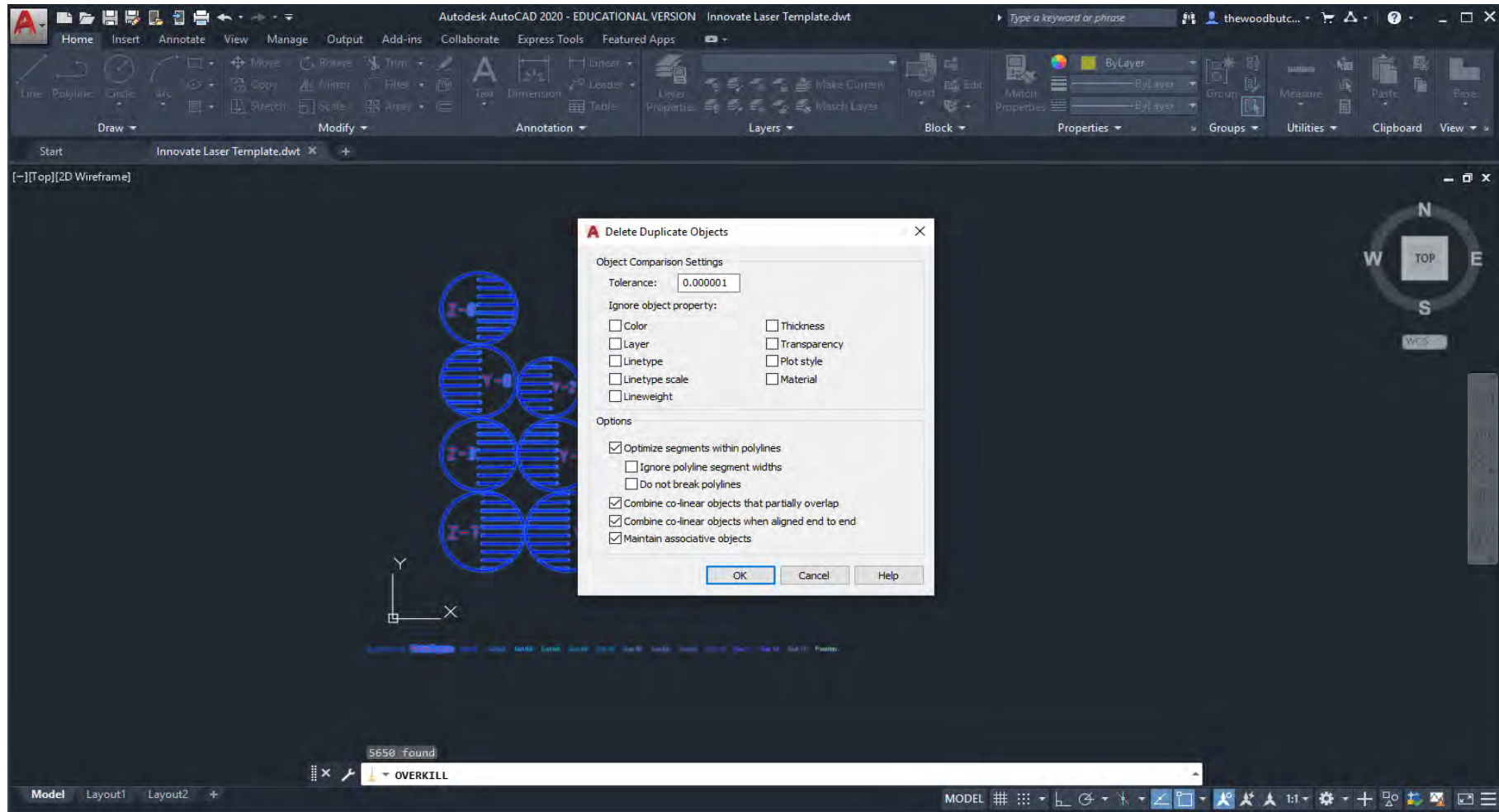
CREATE CHANGE

Putting Images in a drawing is easy just drag and drop the image and then assign it to the Image Engrave layer using either Match Properties\MATCHPROP or Match Layer\LAYMCH commands.



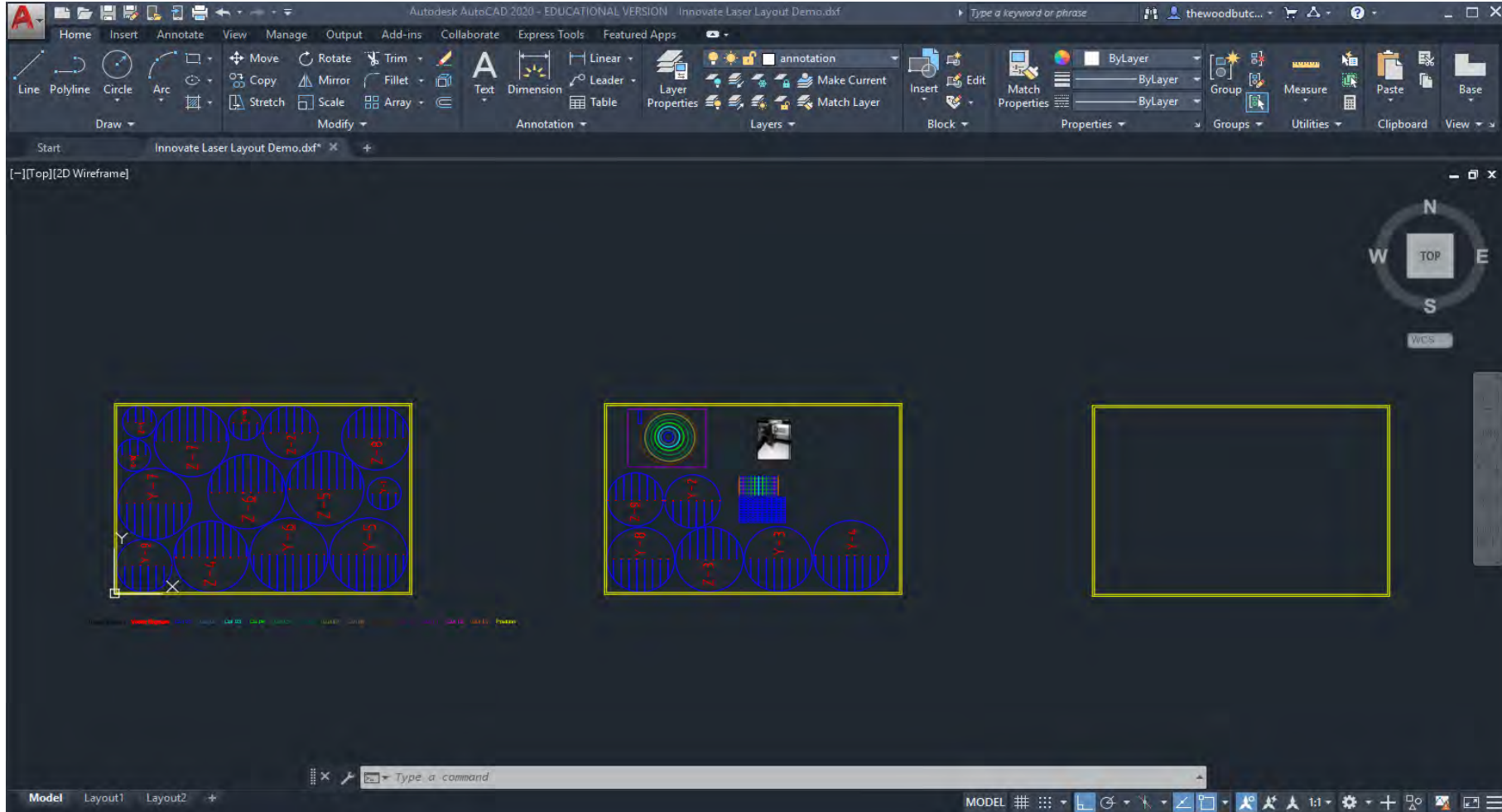
CREATE CHANGE

Before we go to print our file the last thing to do is run the **OVERKILL** command. We really don't want to be cutting over lines more than once as this can pose a fire hazard.

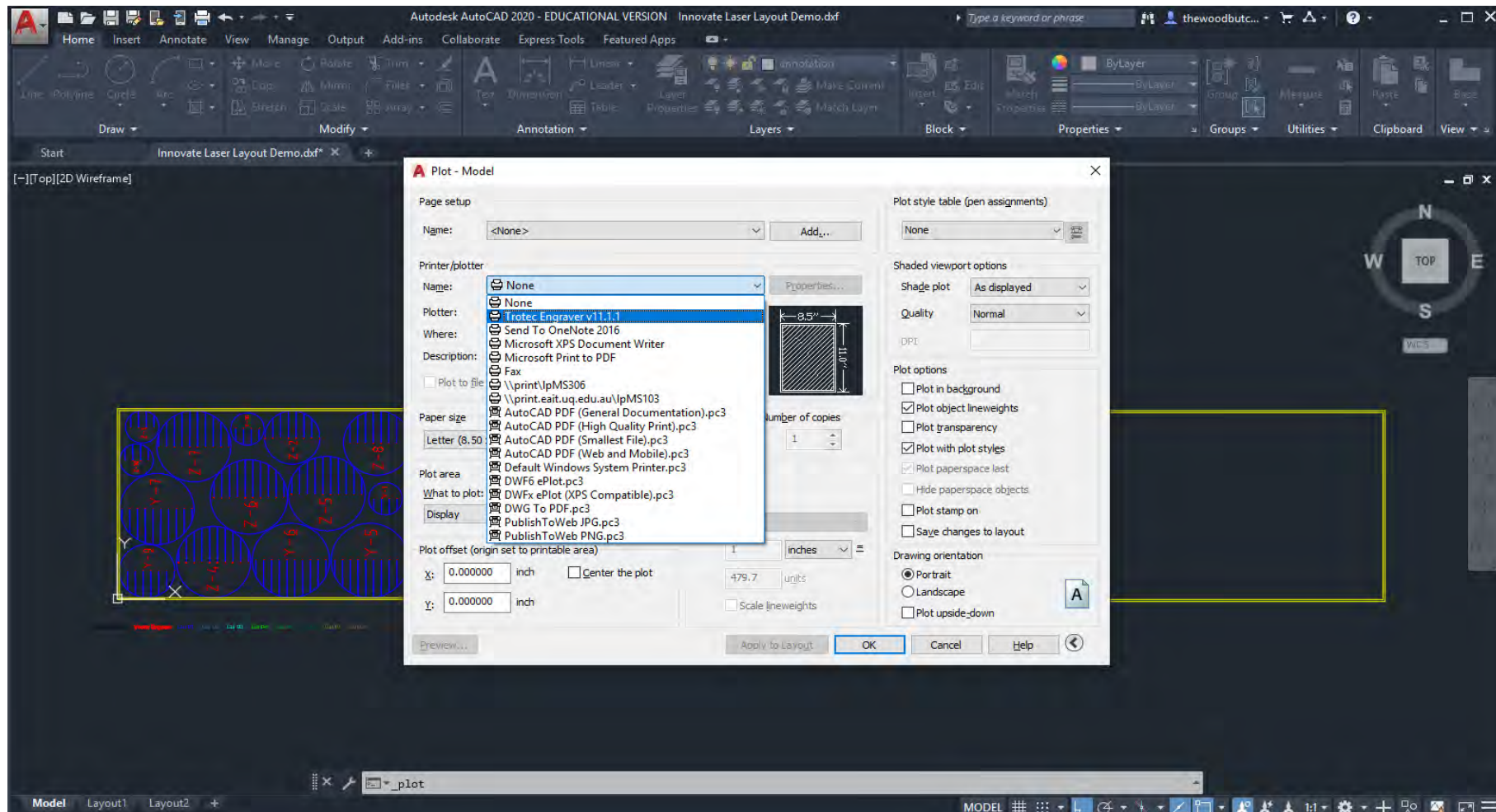


Plotting to Trotec Job Control

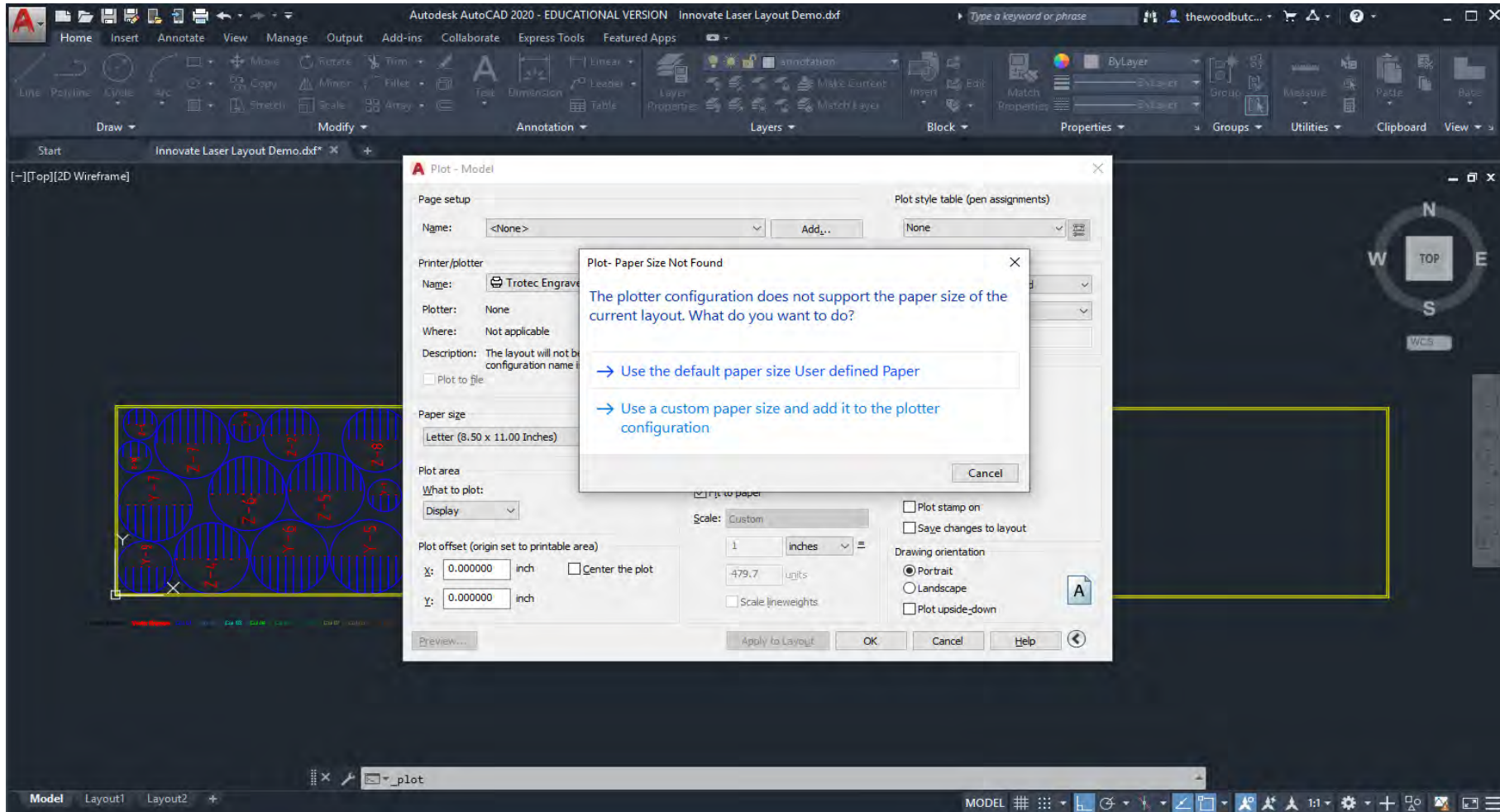
We are now ready to print just use **Ctrl+P** from model space.



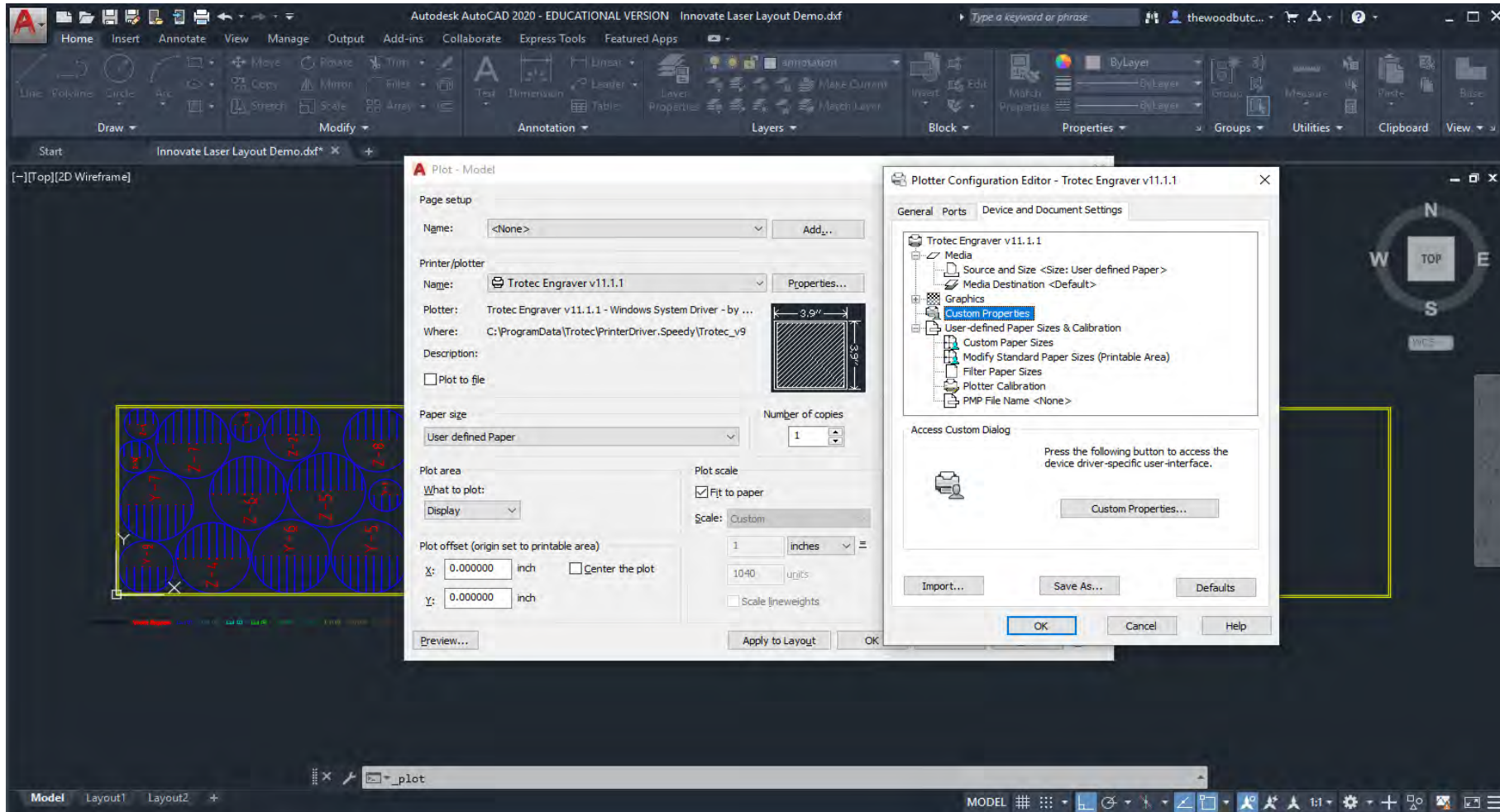
Under Printer/Plotter select “Trotec Engraver v11.1.1”.



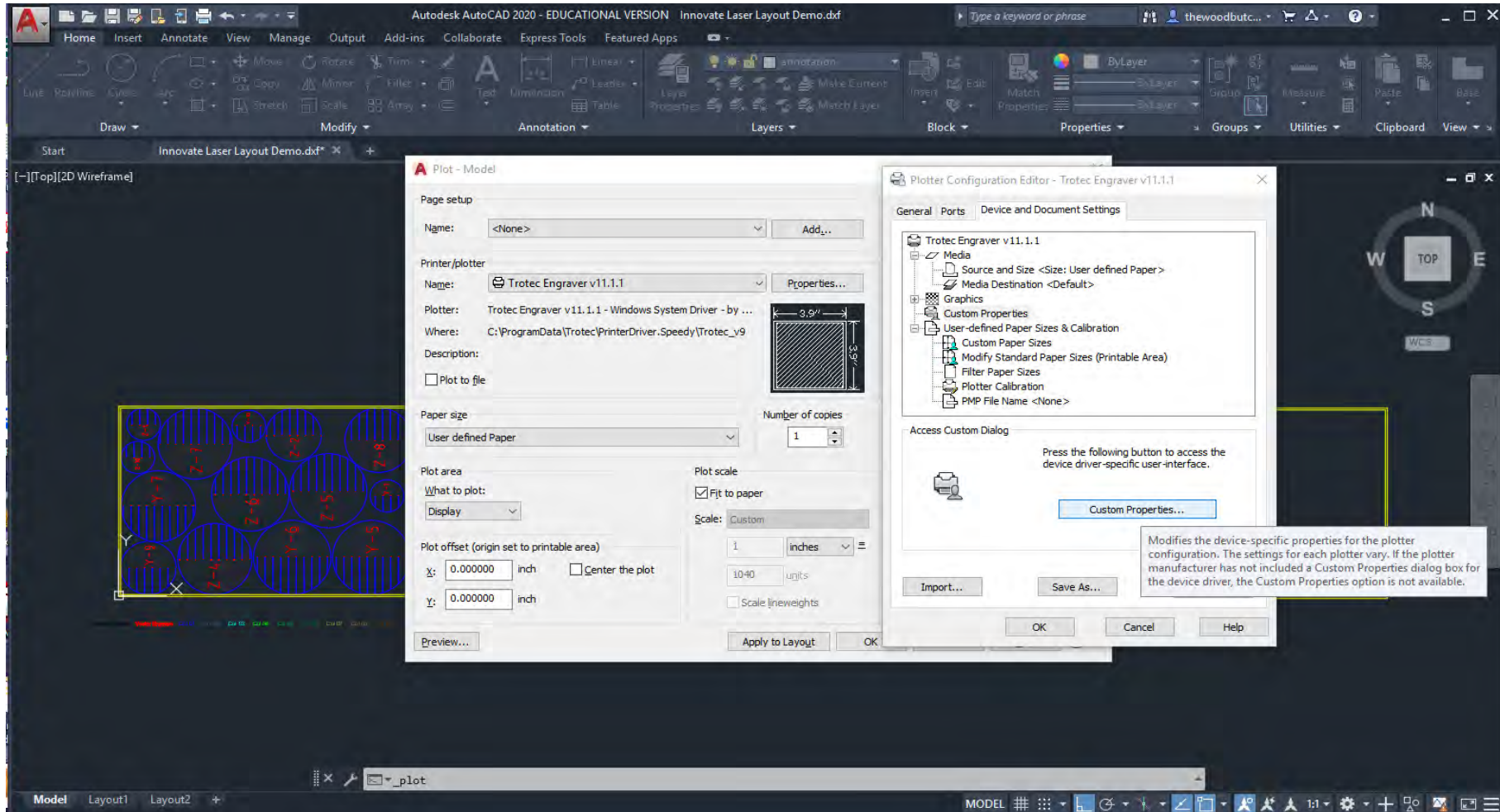
When prompted select “Use the default paper size User defined Paper”.



Click the "Properties" button.

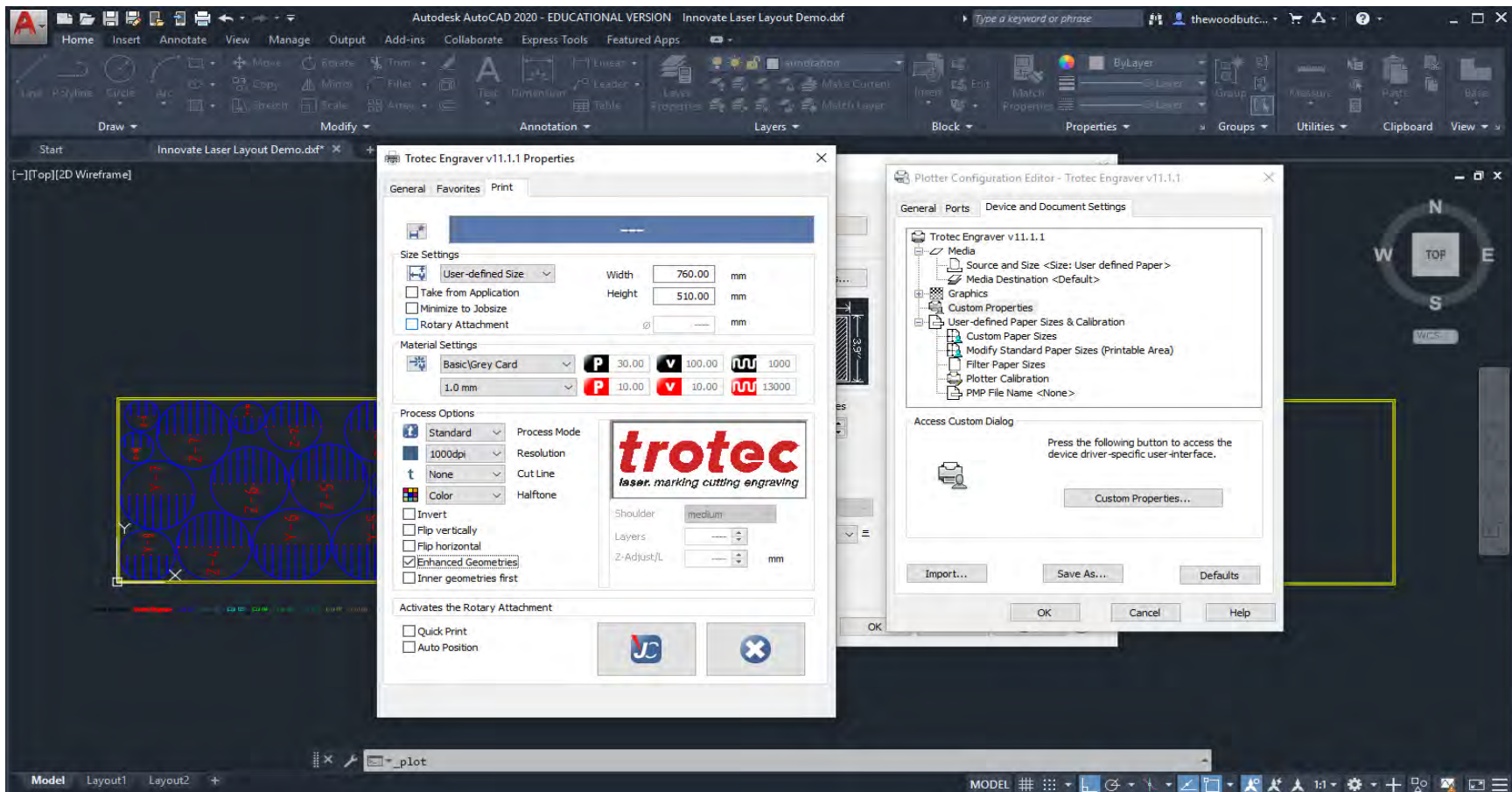


In the “Access Custom Dialog” window click the “Custom Properties” Button.



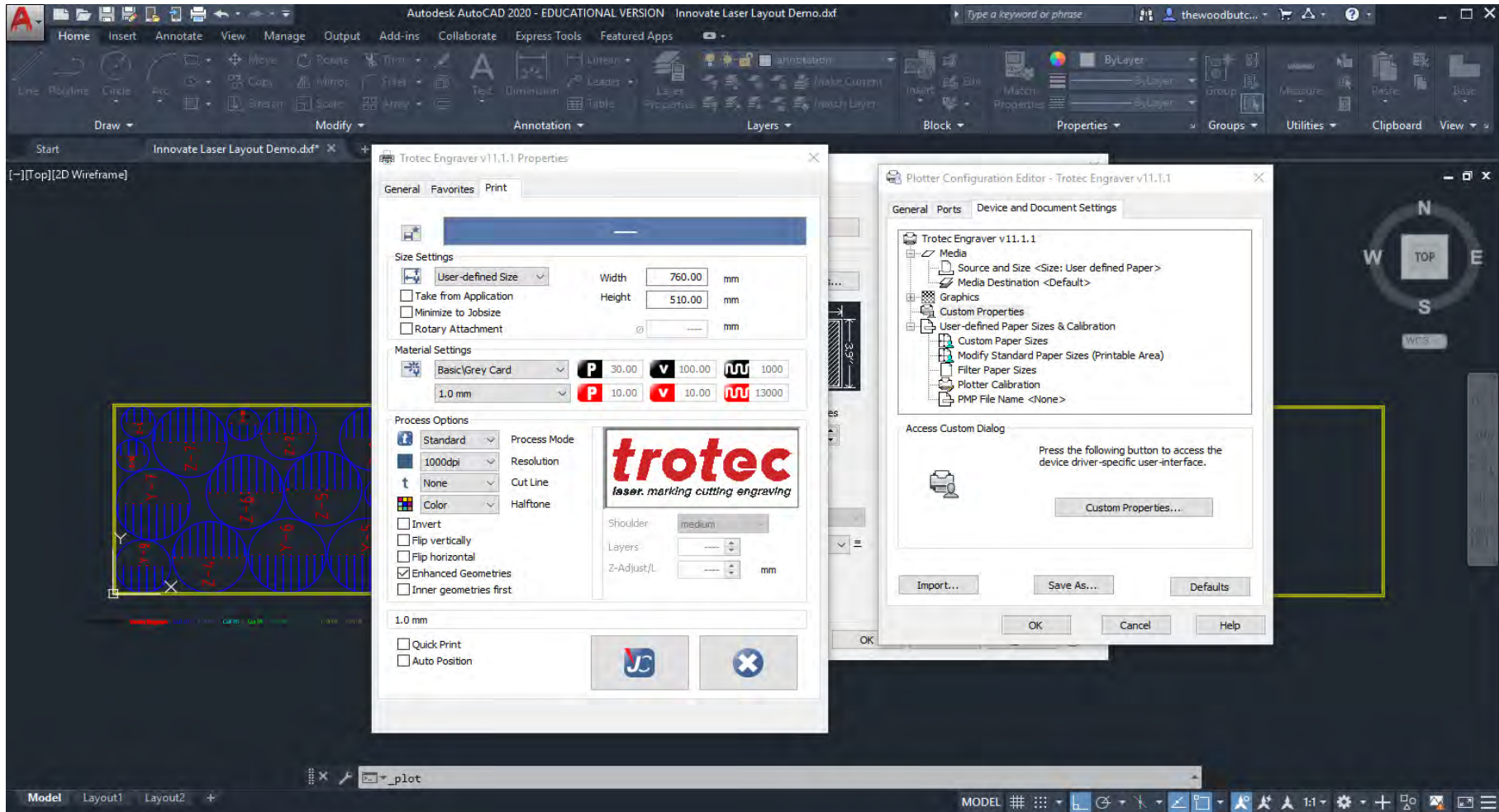
CREATE CHANGE

Under “Size Setting” match the Width and Height to your desired materials dimensions this should match the outer yellow rectangle you created earlier (landscape). Select your desired “Material Settings” I have chosen Basic\Grey Card 1.0 mm. Under “Process Options” make sure that Process Mode=Standard, Resolution=1000dpi, Cut Line=None and that Halftone=Color also ensure that only Enhanced Geometries is ticked ✓ IFF you need your geometries flipped or inverted it would be preferred that this is done in CAD using the **MIRROR** command to prevent the next person using the laser being inconvenienced.



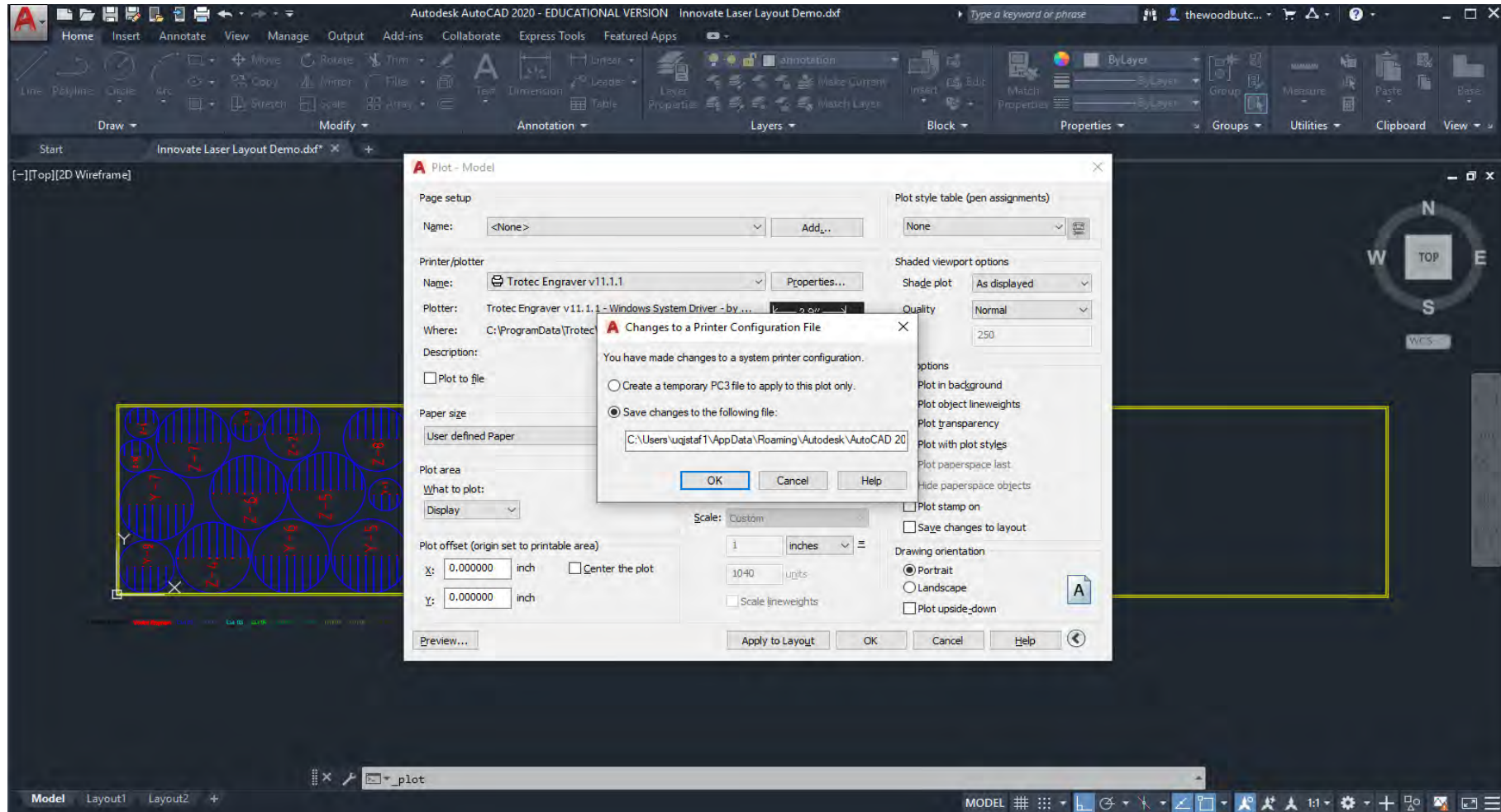
CREATE CHANGE

Now click the “JC” button in the Trotec menu and “OK” in the Plotter Configuration Editor.

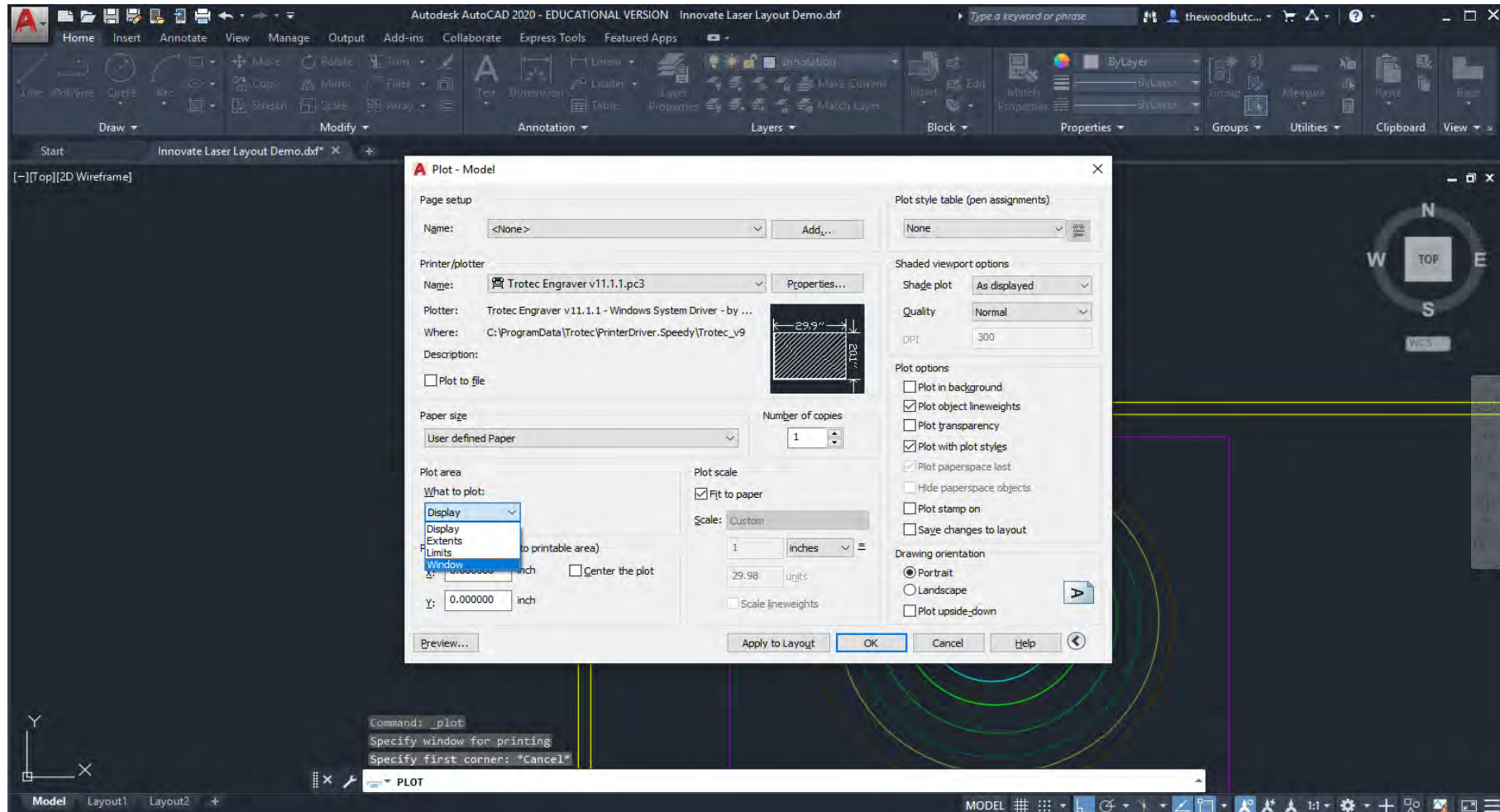


CREATE CHANGE

A window will open prompting you to save changes, please select the bottom option “Save changes to the following file:” leave the branch unchanged and click “OK”

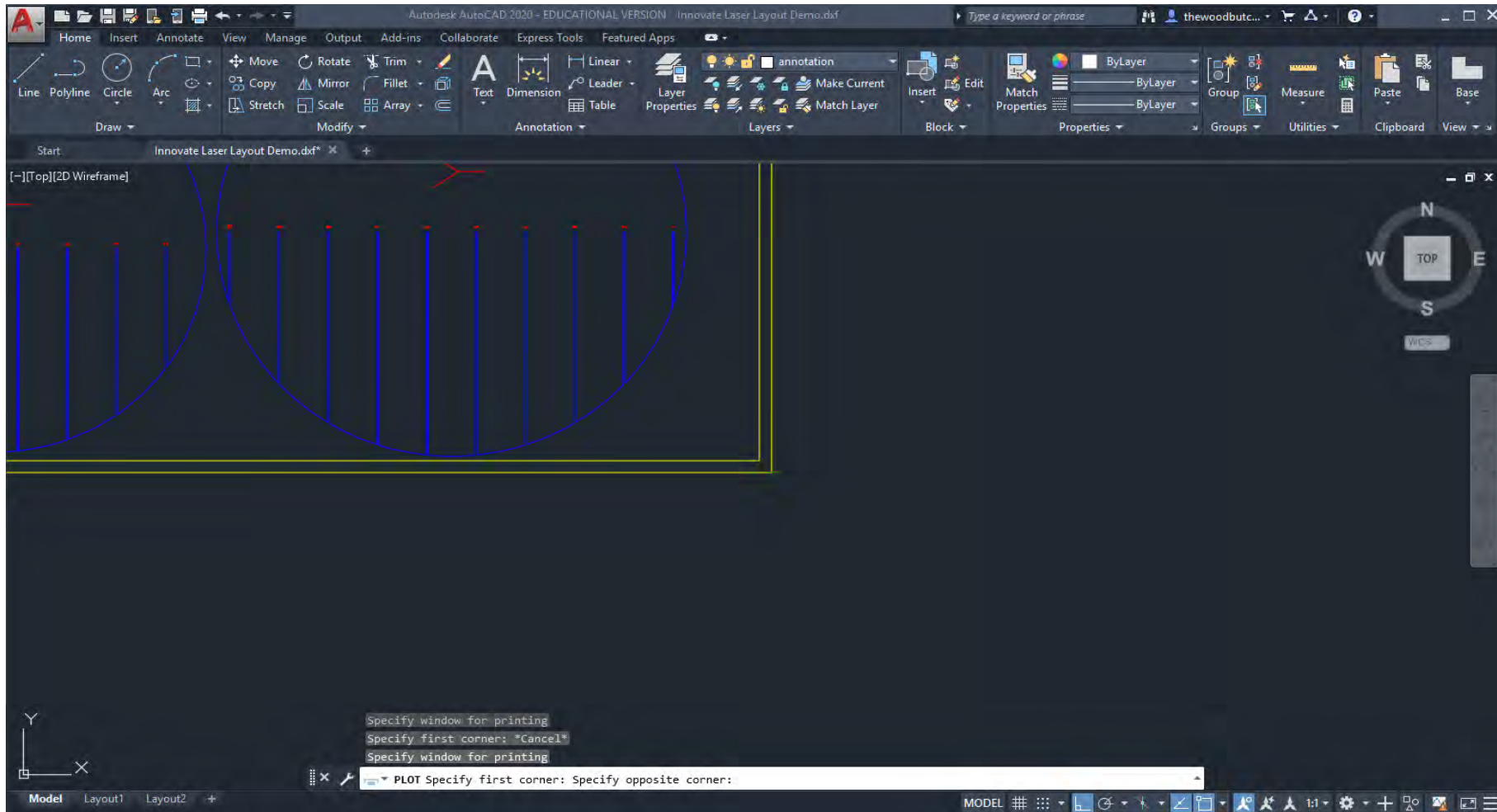


Under Plot Area select "Window"

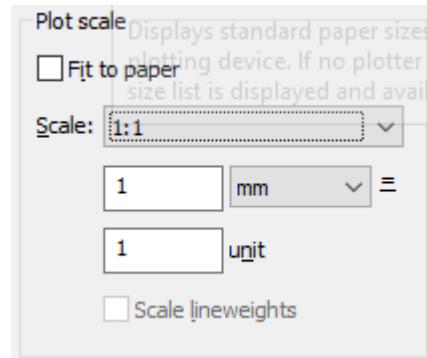


CREATE CHANGE

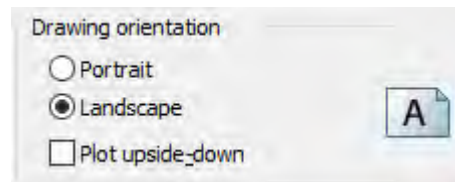
This will bring you back to model space so that you can select the material boundary yellow rectangle that you wish to send to the laser. This means you can use the one file to print many different material sheets from.



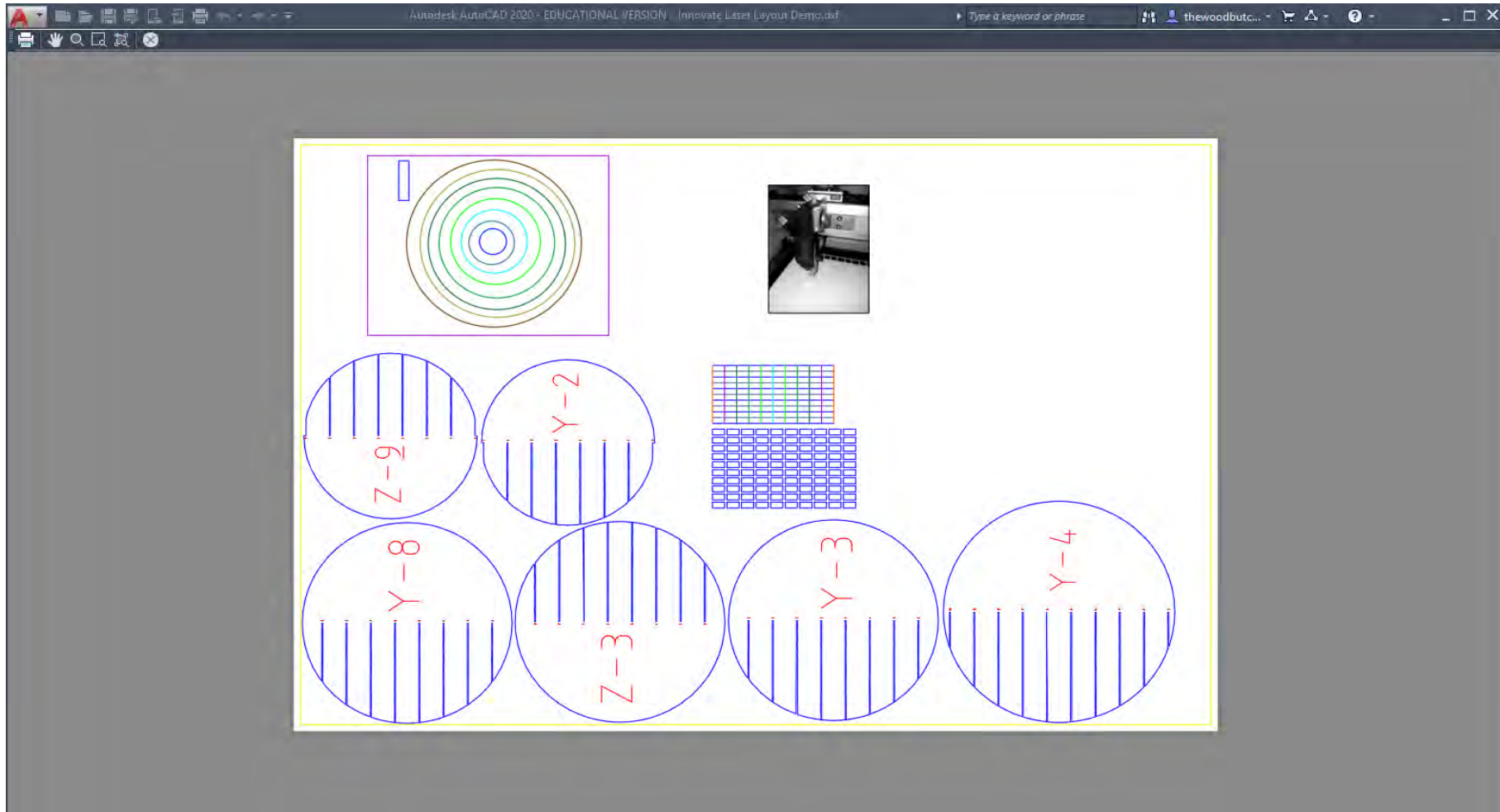
Ensure Plot Scale is 1:1 and in millimetres.



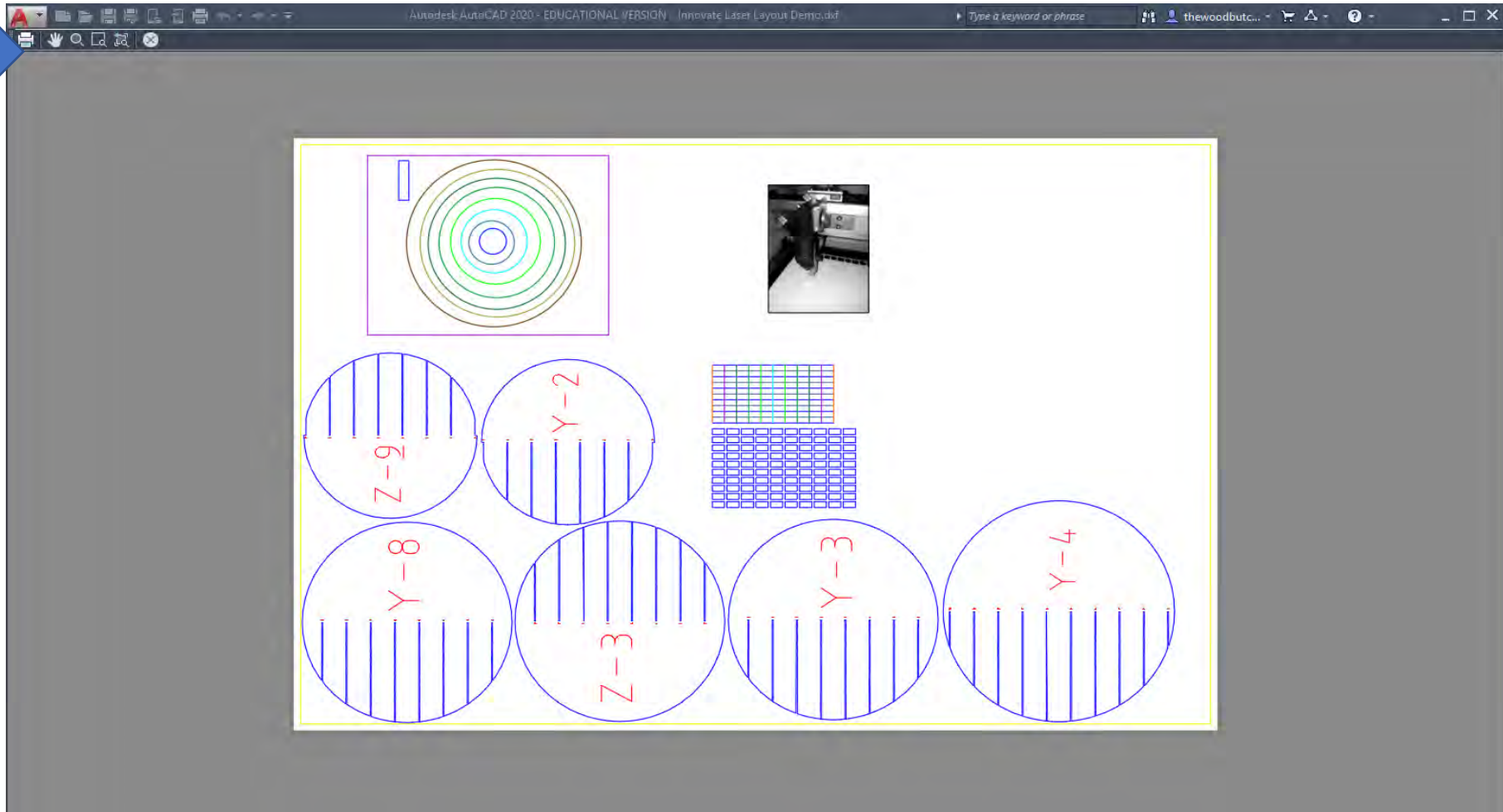
Change Drawing Orientation to match your material (landscape).




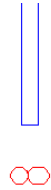
Always check plot preview before confirming the print just to check everything is correct, believe me it's worth it.



When you're happy with the preview click the Plot button.



Once your file has turned up in the Job Control que you can drag it onto the work plate and click the eyeball button () to inspect the file. Check that your vector geometry has come through correctly and not as a bit map.



Vector Geometry with correct line weights



Vector Geometry with incorrect line weights.



Bit maps should be the only pixelated images.

CREATE CHANGE

If you click the “Update” button you will get an estimation of laser time, if the time is excessively long you may want to rethink the complexity of what you are sending to the laser.

Congratulations you are now ready to use the laser.

