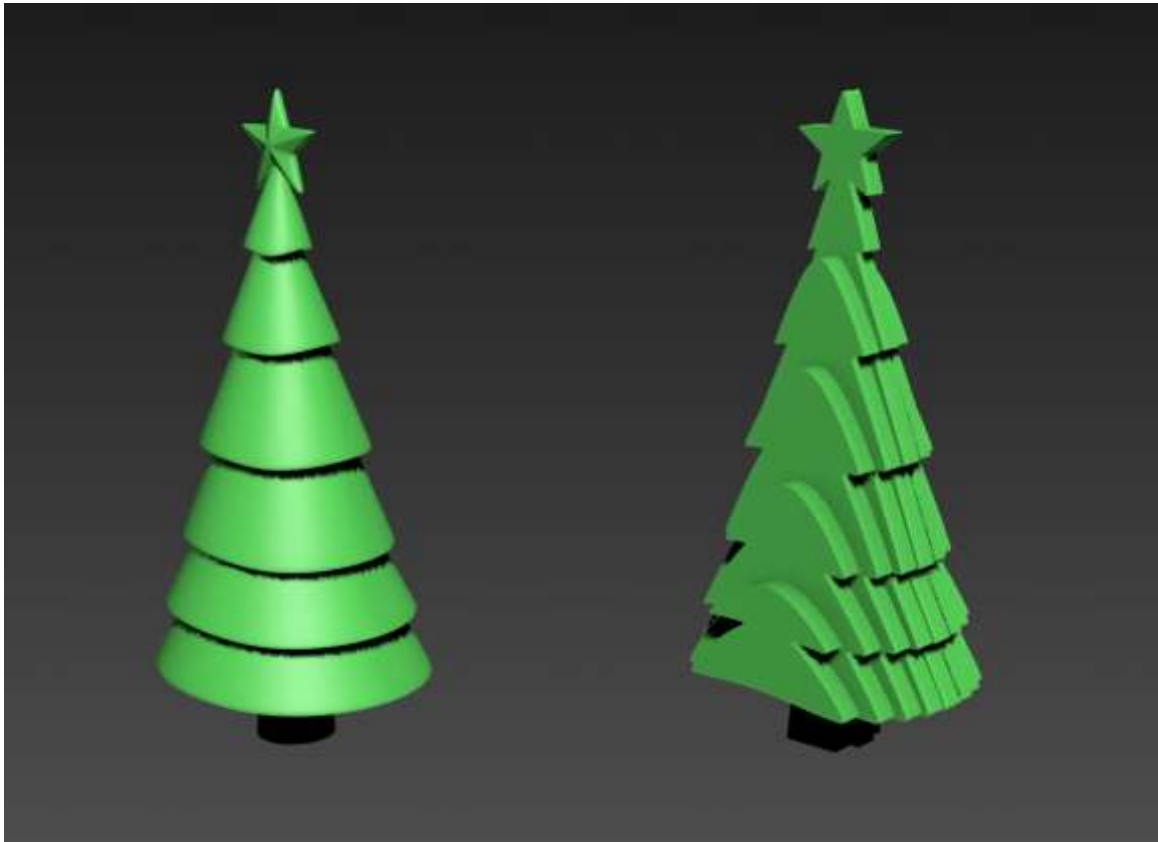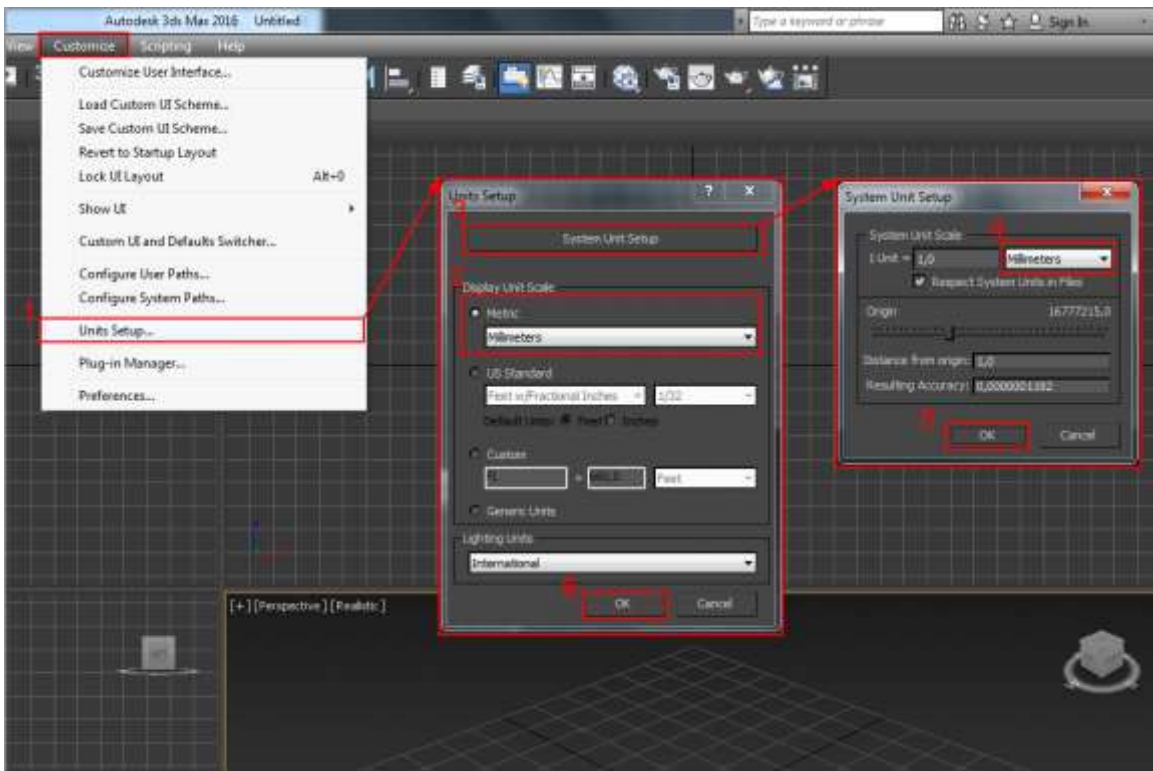# Full guidance how to convert 3D model into slices for laser cutting.

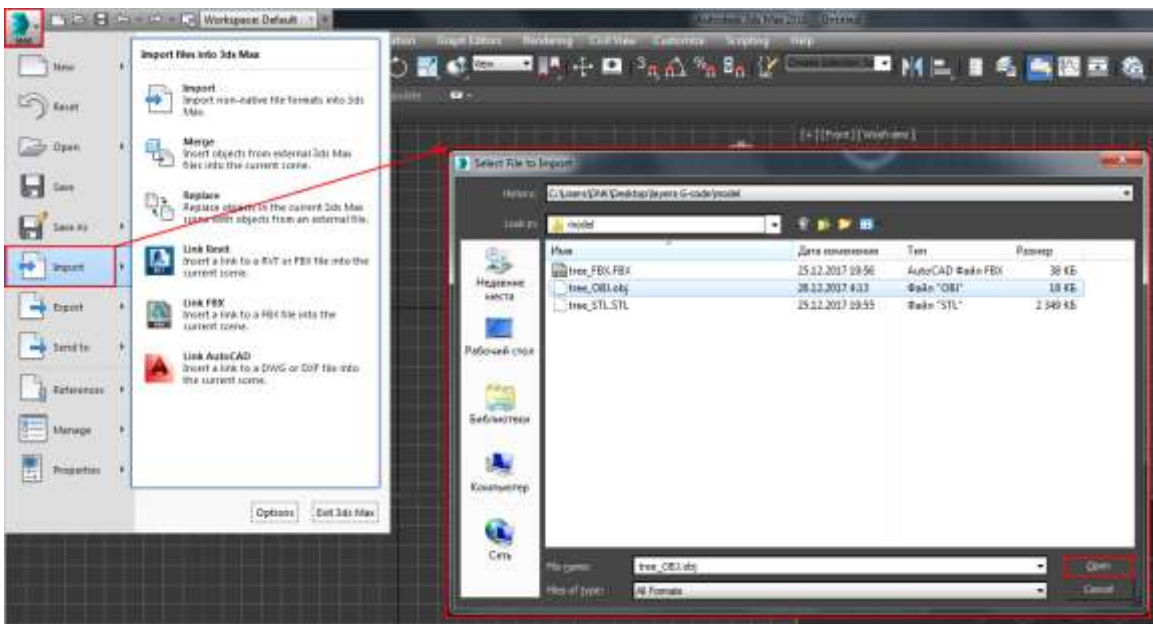## Slicing of the model for CNC machining using a sheet material.
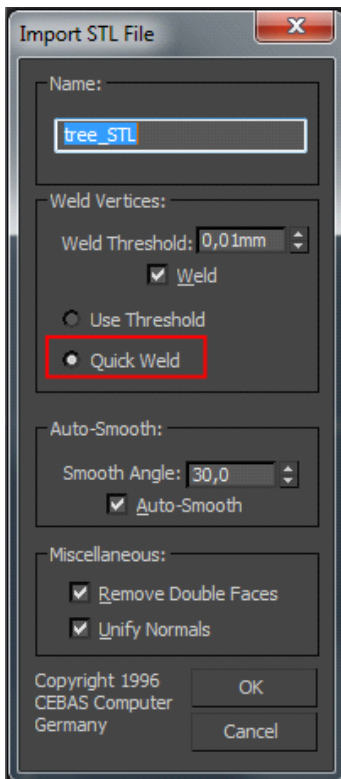

Run 3ds max.

To avoid the measurement units confusion use millimeters. Go to the **Customize> Units Setup** in the menu. In the **Display Unit Scale** section of the opened **Units Setup** dialog box, select the **Metric** button and choose millimeters from the drop-down list. Click the **System Unit Setup** button. In the opened window select millimeters. Click **Ок.**

Import of the model

Click the application button and select **Import.**

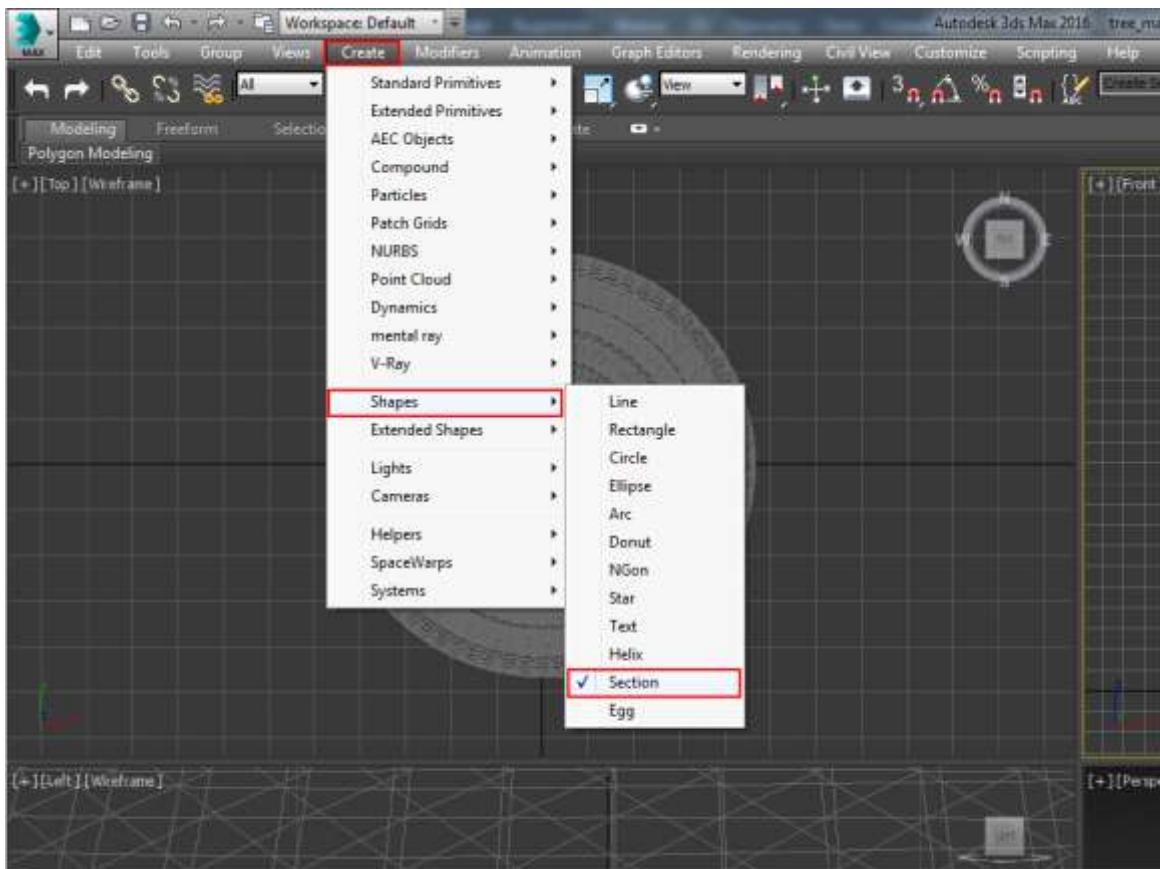Select the necessary file and click **Open.**

Depending on the file extension, a window with settings will appear.

When importing from STL, in the **Import STL File** dialog box in the **Weld Vertices** section, select the **Quick Weld** switch. This will greatly accelerate the import.
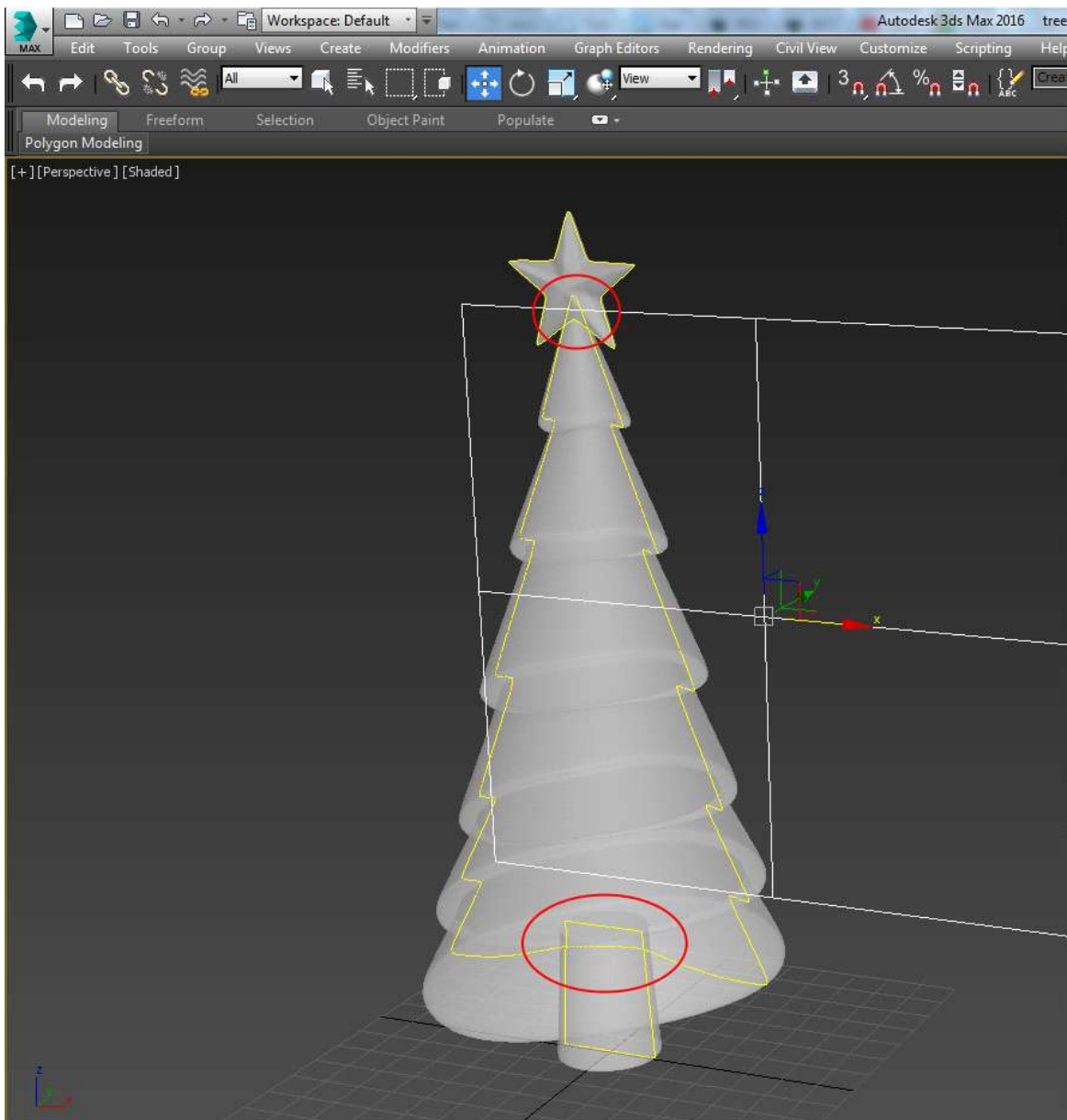
Check the model for the surfaces intersection.

Select the model and make it translucent by pressing Alt + x.

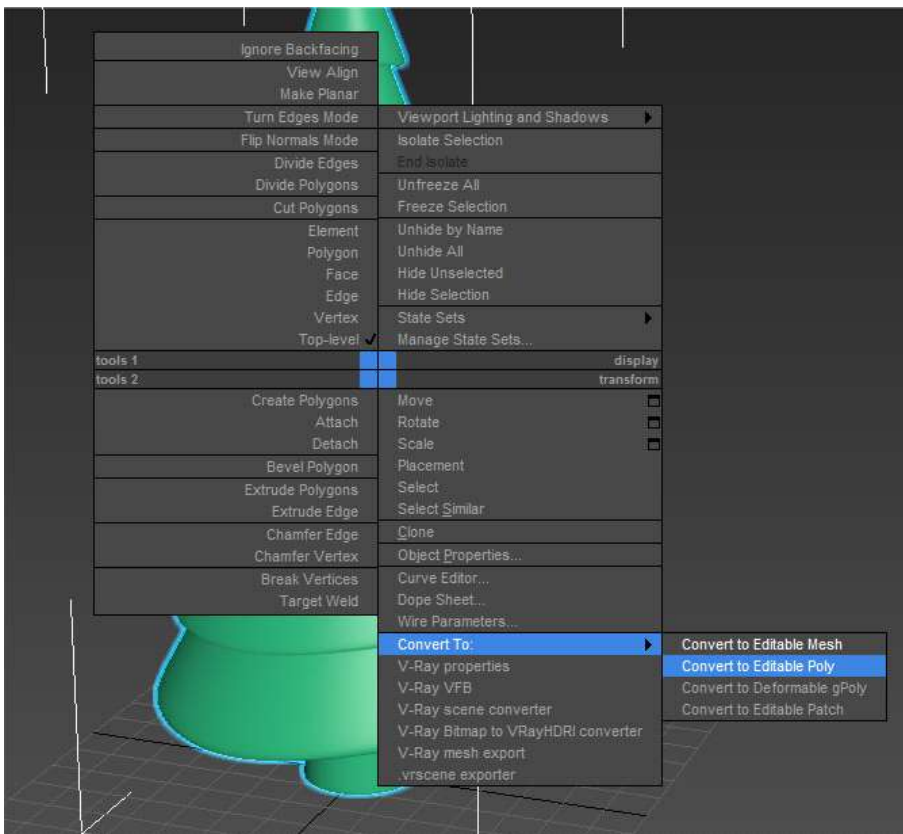On the front view create a section **Create> Shapes> Section**

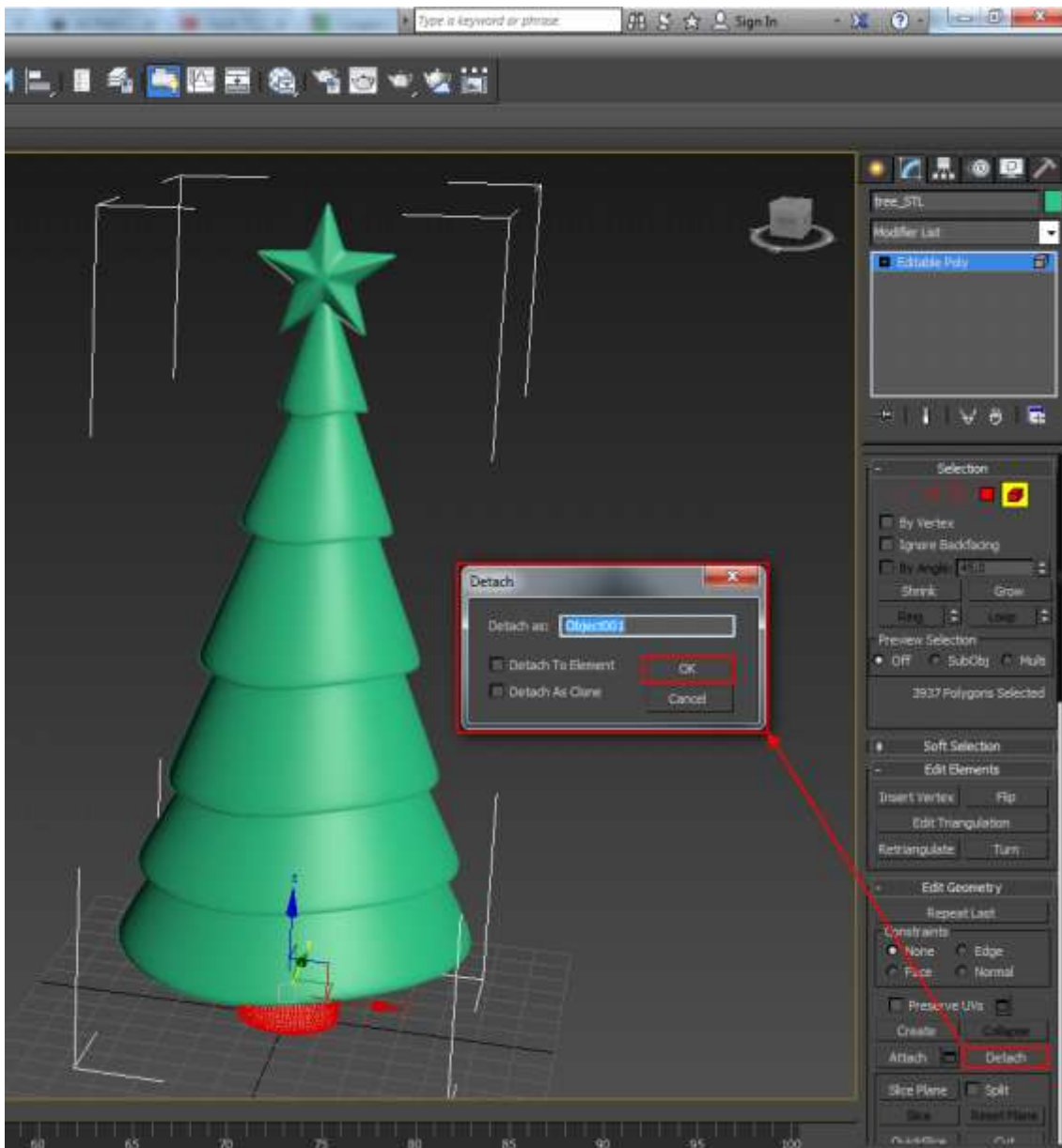The surfaces intersections are well seen now.

Delete the intersections.
Select the fur-tree image.
Convert the model to Editable poly by right clicking the view window (**Convert to Editable Poly**).
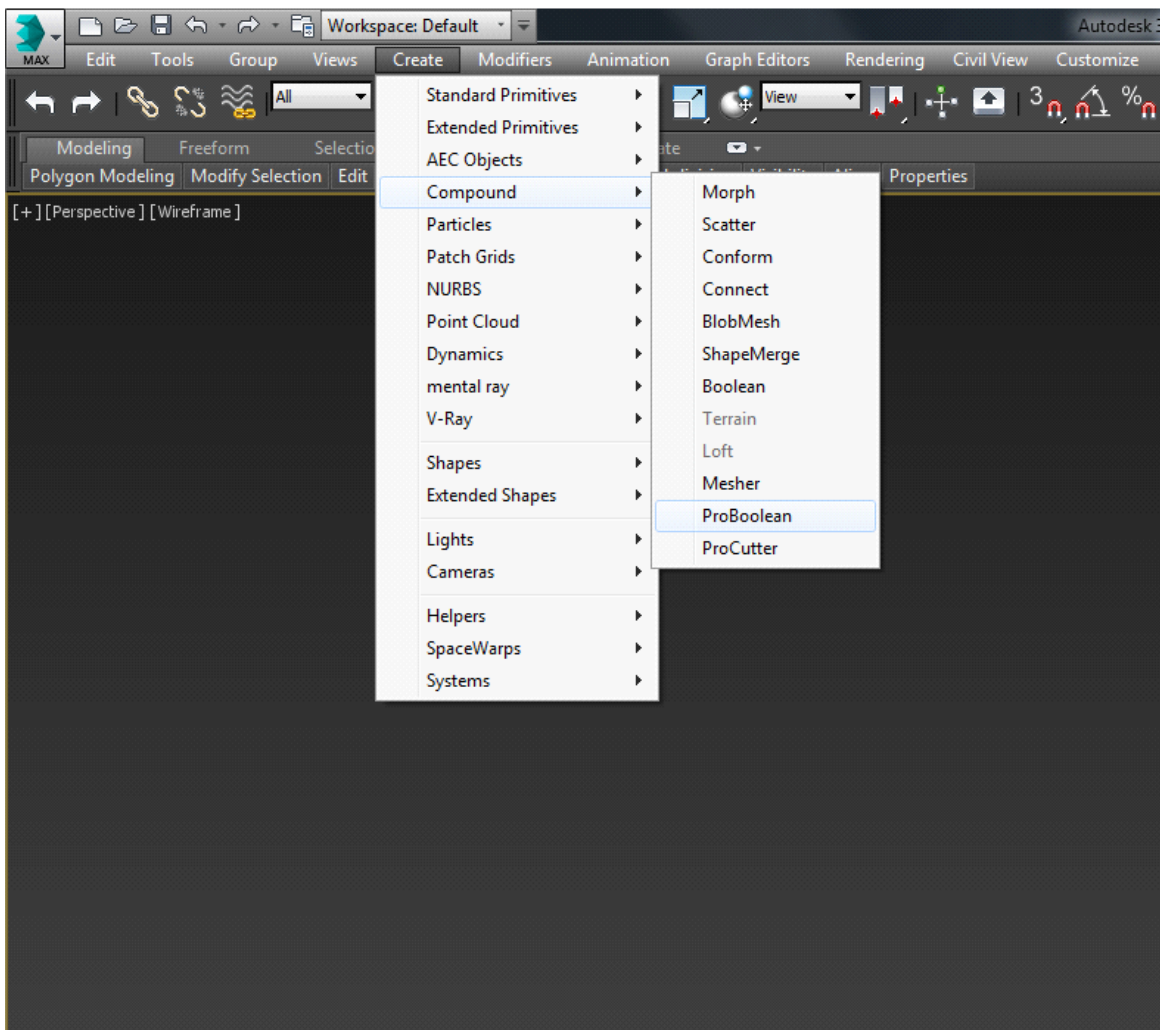
Ignore Backfacing		
View Align		
Make Planar		
Turn Edges Mode	Viewport Lighting and Shadows ▶	
Flip Normals Mode	Isolate Selection	
Divide Edges	End Isolate	
Divide Polygons	Unfreeze All	
Cut Polygons	Freeze Selection	
Element	Unhide by Name	
Polygon	Unhide All	
Face	Hide Unselected	
Edge	Hide Selection	
Vertex	State Sets ▶	
Top-level ✓	Manage State Sets...	

tools 1   display
tools 2   transform

Create Polygons	Move	▫
Attach	Rotate	▫
Detach	Scale	▫
Bevel Polygon	Placement	
Extrude Polygons	Select	
Extrude Edge	Select Similar	
Chamfer Edge	Clone	
Chamfer Vertex	Object Properties...	
Break Vertices	Curve Editor...	
Target Weld	Dope Sheet...	
	Wire Parameters...	
	Convert To: ▶	Convert to Editable Mesh
	V-Ray properties	Convert to Editable Poly
	V-Ray VFB	Convert to Deformable gPoly
	V-Ray scene converter	Convert to Editable Patch
	V-Ray Bitmap to VRayHDRI converter	
	V-Ray mesh export	
	.vrscene exporter	

By clicking the 5 key go to the mode of the elements selecton. Select the trunk of the tree and click **Detach** in the **Edit geometry** toolbar**.**

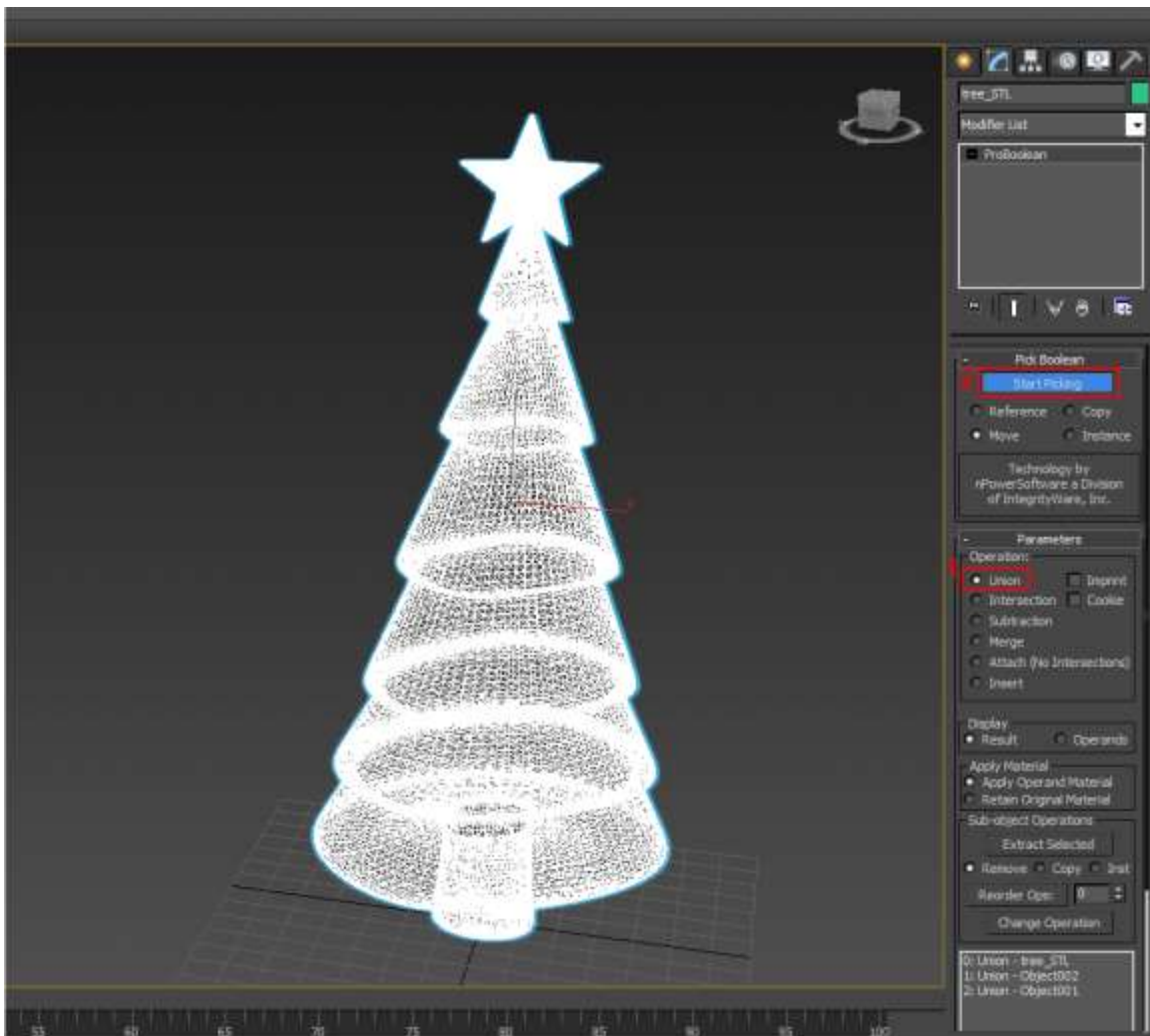Do the same with the star. Now you have three separate objects.

Combine them using the boolean operation.
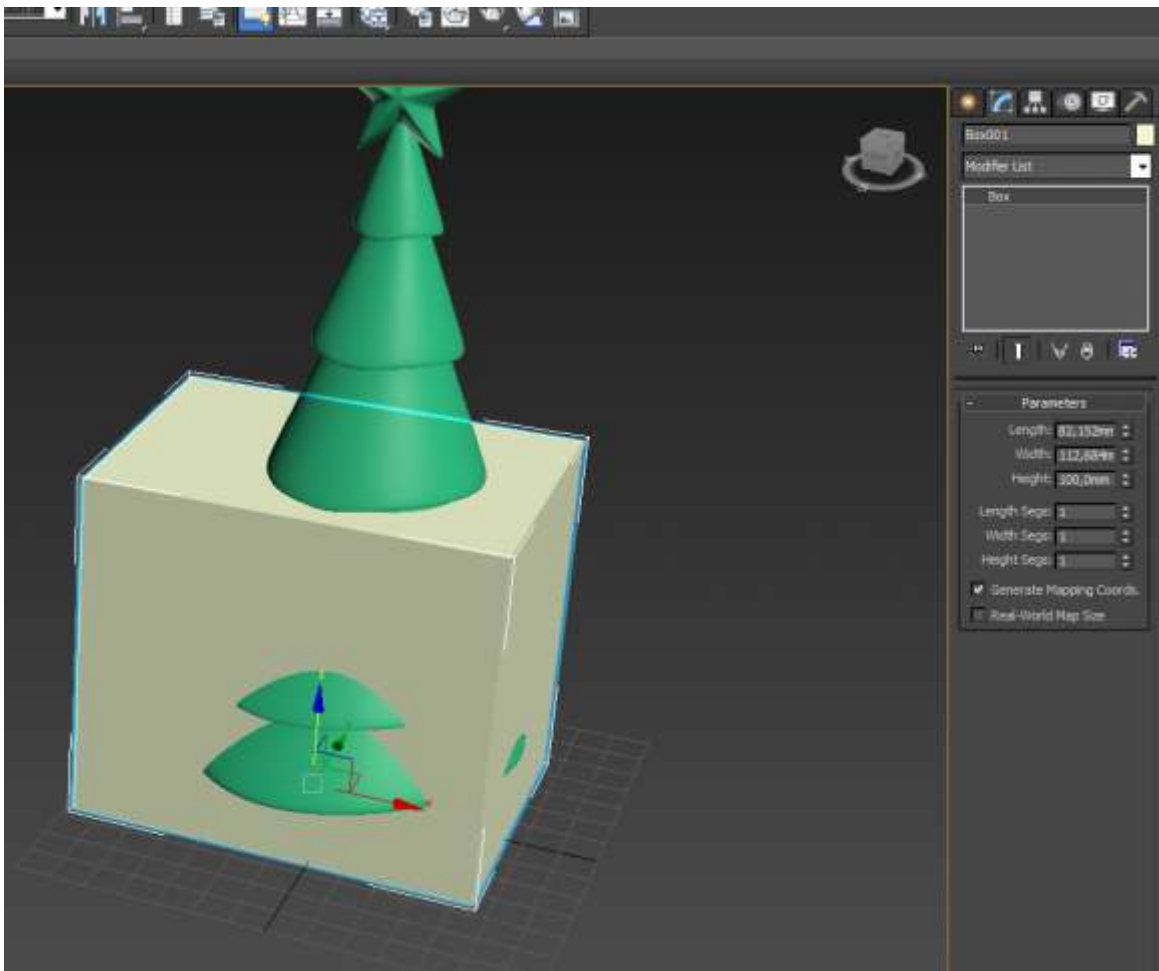Select the fur-tree and **Create> Compound> ProBoolean**

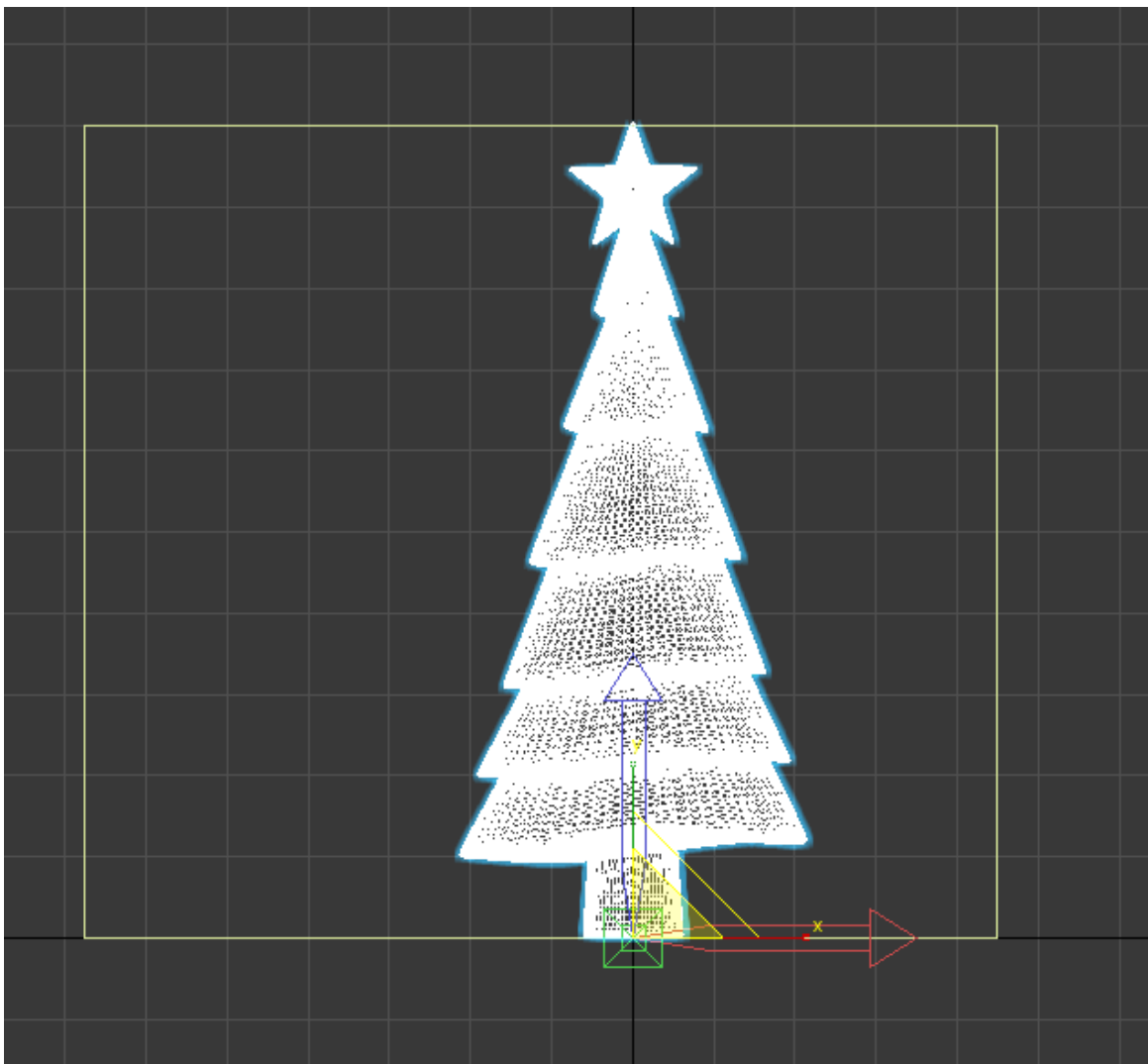In the **Parameters** of the toolbar switch to **Union.**

Click **Start Picking.** Select the star. Once again click **Start Picking** to finish the object selection.

Now the model does not have intersecting surfaces.

Bring the model to the size you need, so that its height becomes 10 cm.
Create a box **Create> Standard primitives> Box**.
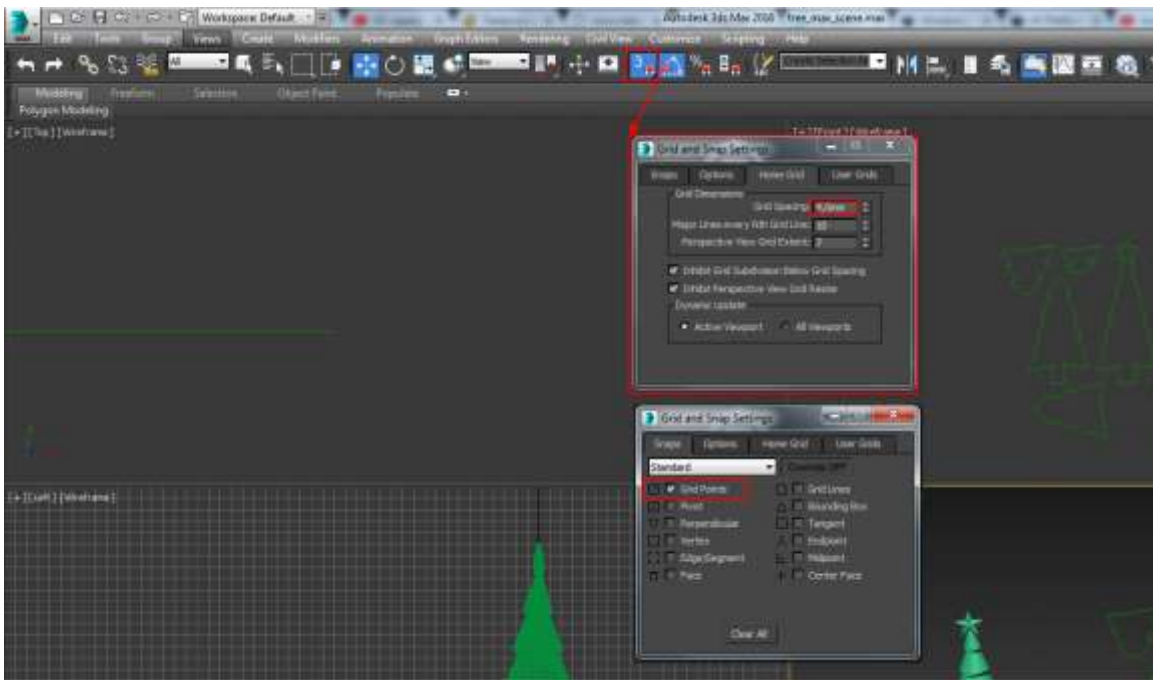In the toolbar **Parameters** set the **Hight** at 100 mm

Click the R key to select the Scale tool. Adjust the size of the fur-tree so that it touches the upper plane of the box.
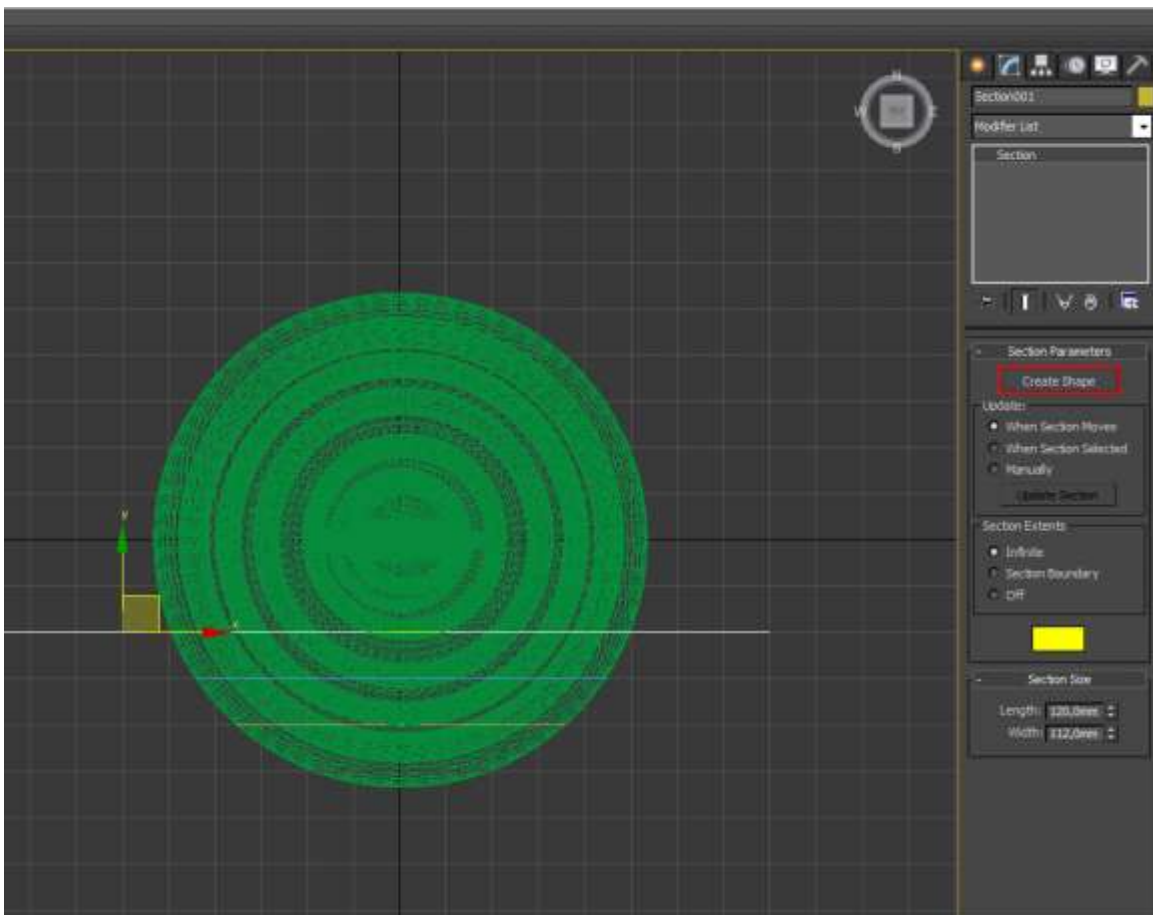
Slice the model.

Set the grid spacing equal to the layer thickness. Right-click the **Snaps toggle** button. In the **Grid and Snap Setting** dialog window find the **Home Grid** tab, and set the **Grid Spacing** at 4mm; In the **Snaps** tab check the **Grid Points** checkbox.

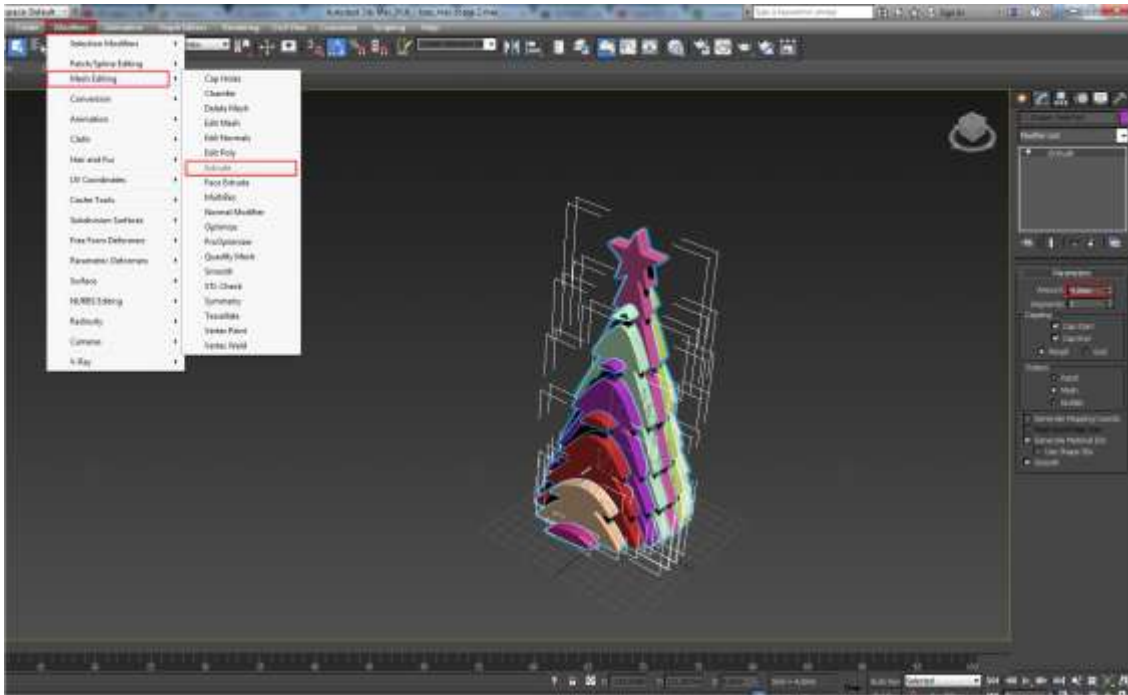To enable bindings, left click the **Snaps toggle** button. The button gleams blue.

Create a section in the front view **Create> Shapes> Section.** On the top view place the section plane in front of the model. Move the plane one square to the model and click the **Create Shape** button. In the **Modify** tab of the toolbar shift the plane one by one square by clicking **Create Shape** until you have done the whole model.

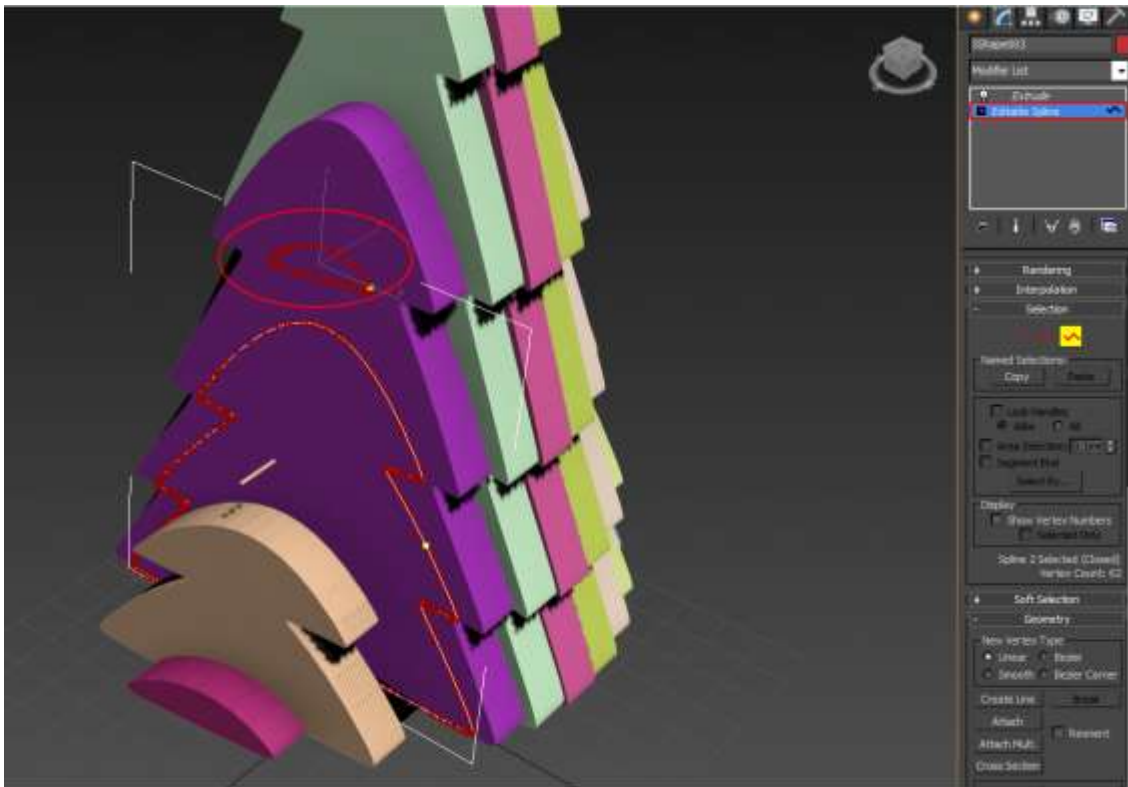You will get something like this:

Hide the fur-tree. Select the resulting curves and apply the **Extrude** modifier to them.
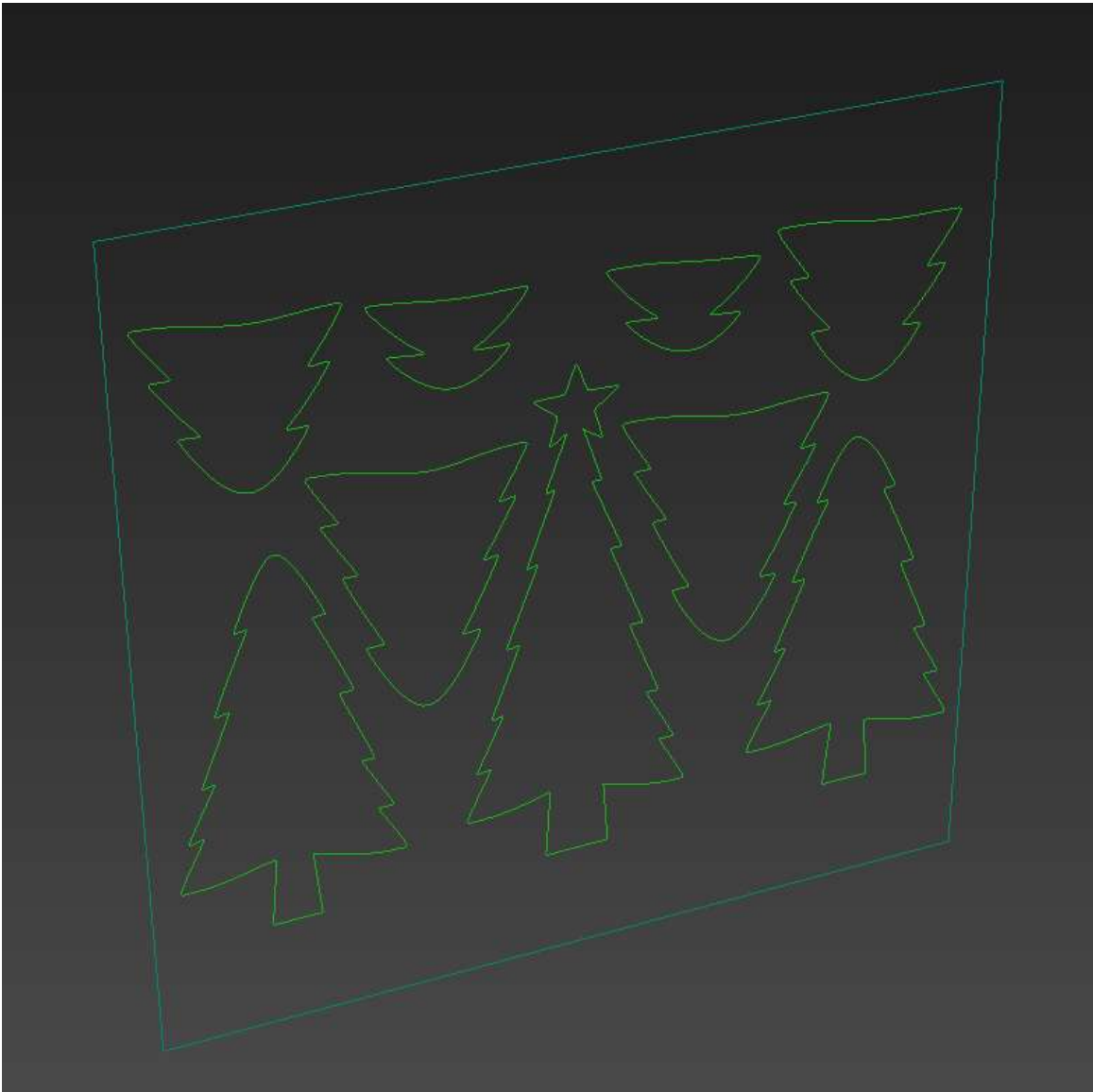
Delete the extra outlines.

Select one layer and click **Editable Spline** in the modifiers. Click the 3 key to shift to the spline selection mode. Delete the extra outlines.
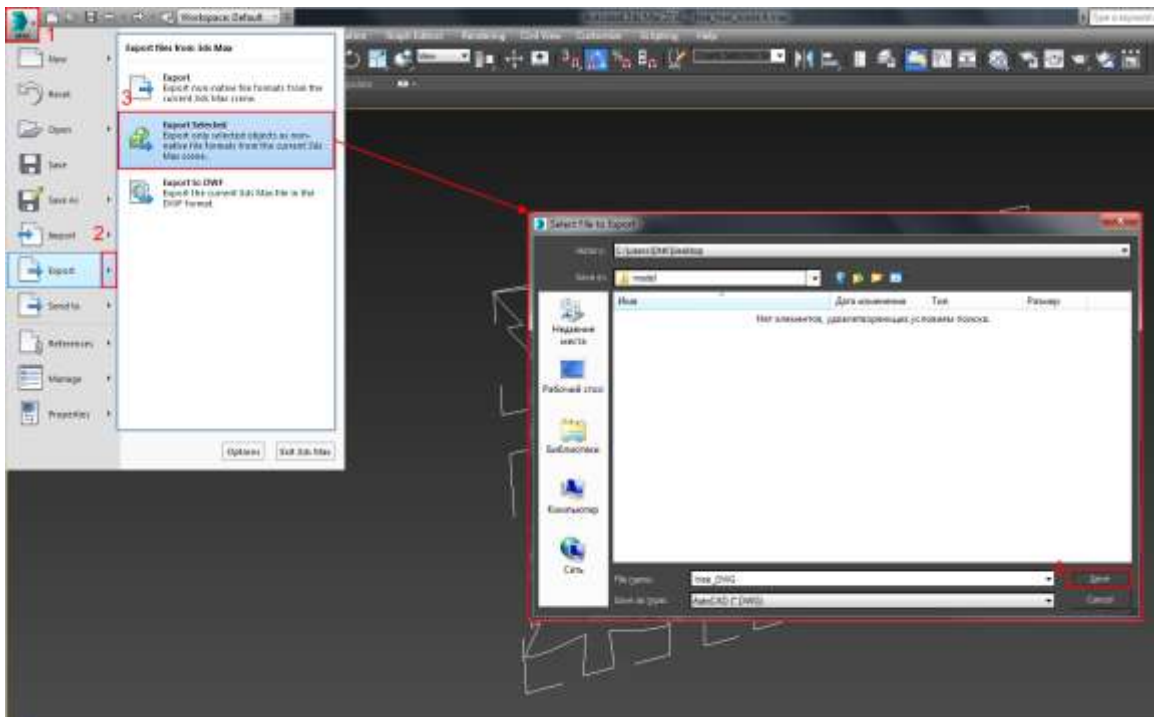

Save the outlines for the G-code generation.

Select all the layers and delete the **Extrude** modifier. To do it right click in the modifier stack and choose **Delete** in the context menu.

Position all the outlines in one plane, get them together and enclose in a frame 160x160 mm.
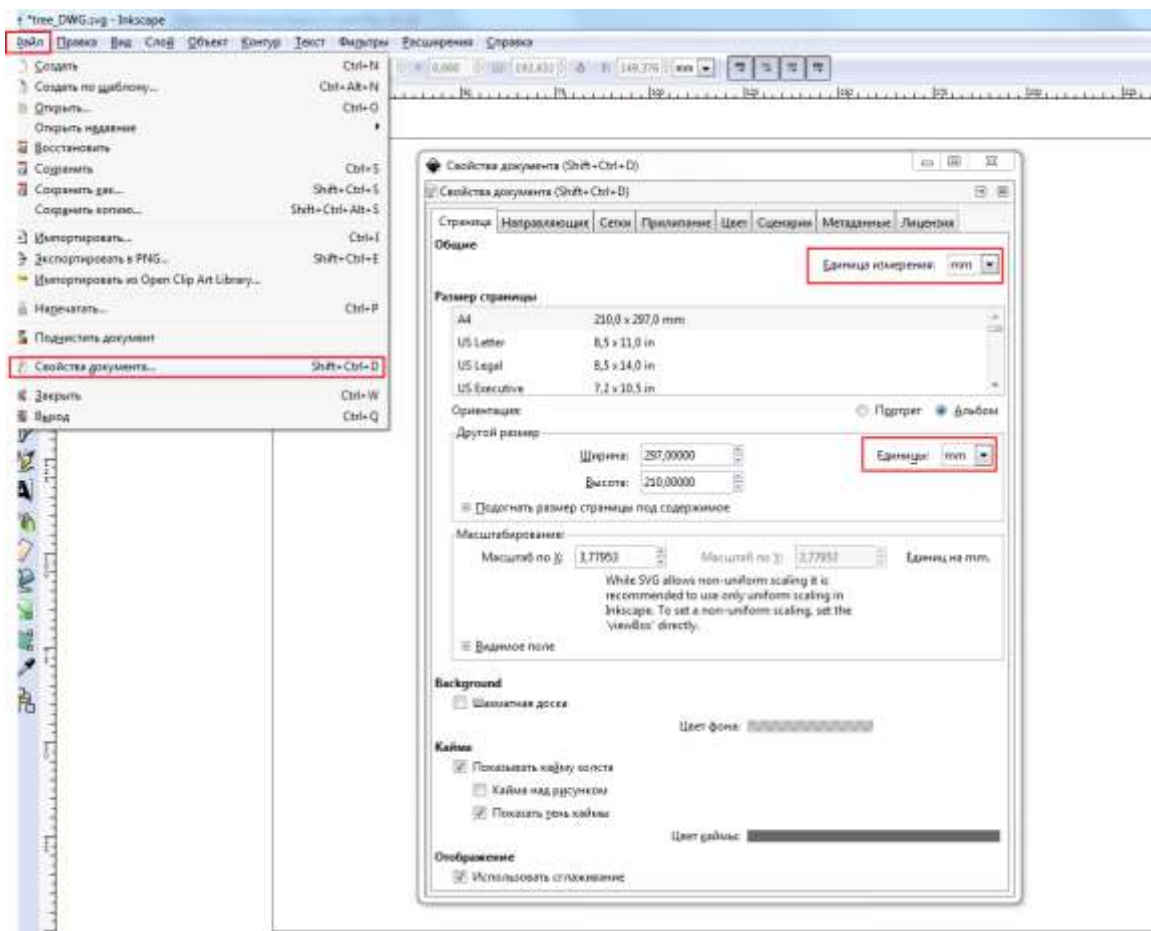
Export the outlines to DXF.
Select all the outlines and click the application button> Export> Export Selected. In the **Save as type** choose **AutoCAD (*.DXF)**. The export parameters leave as default.

For G-code generation use Inkscape (https://inkscape.org/ru/download/)
and JTP Laser Tool. (https://jtechphotonics.com/?page_id=1980)
As Inkscape doesn't support DXF, convert it to SVG using the free online service
https://www.dxfconverter.org
Run Inkscape. Set mm as measurement units.

Import your outlines.
It is possible to drag the SVG file to the Inkscape canvas. To see the outlines set their thickness greater than 0, at 0,1 mm for example.

To bring the size of the outlines to the real ones create a rectangle similar in size to the frame around the outlines, i.e 160x160mm. Now scale the frame with the outlines so that the frame coincides with the rectangle. Remove the frame and the rectangle.
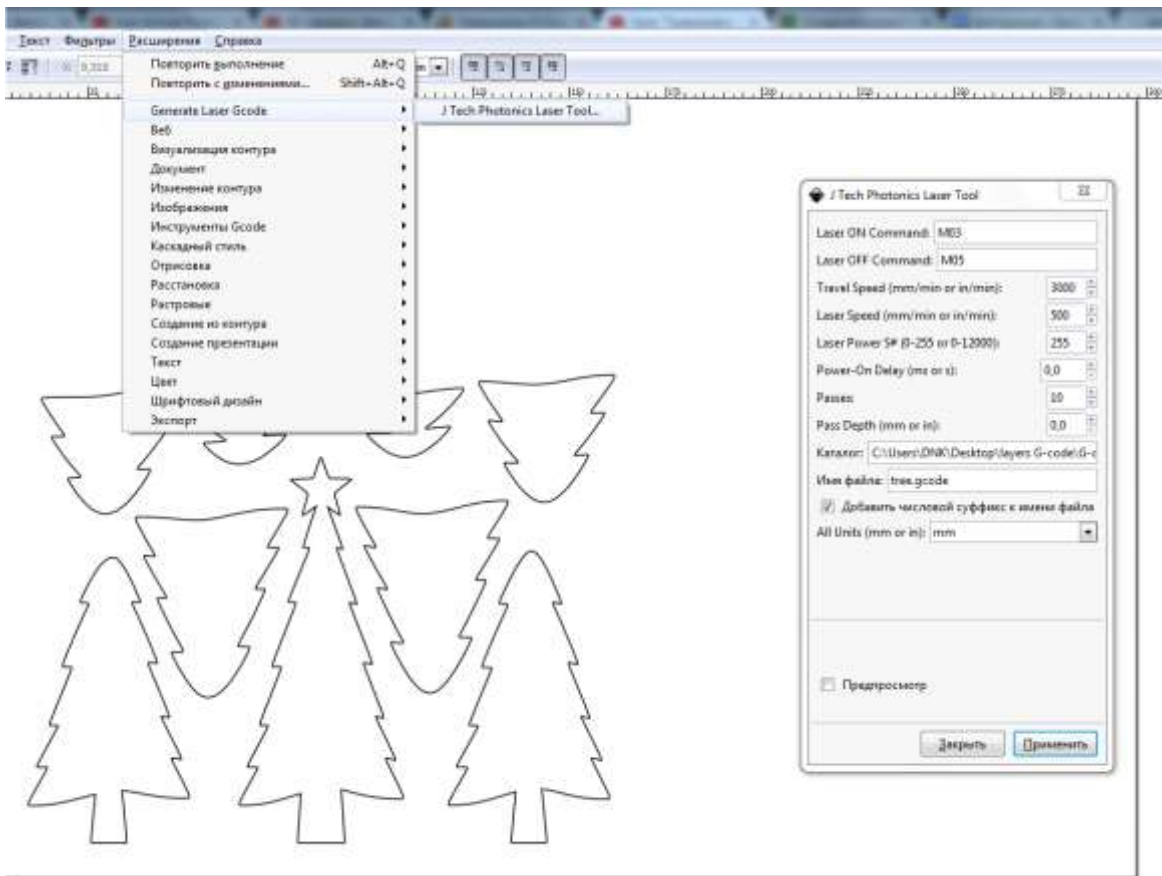
Now generate the G-code.
Go to **Extensions> Generate Laser Gcode> JTech Photonics> Laser Tool.**
Laser ON Command, Laser OFF Command; **Travel Speed** is the speed with the laser off; **Laser Speed** is the speed with the laser on; **Laser Power** (255 corresponds to 100% of the power); **Power On Delay** is the delay of the laser start; **Passes** is the number of the laser passes; **Pass Depth** is the laser downshifting after each pass.
Specify in the **Catalogue** where to save the G-code to.
To start the G-code generation click **Apply**. Shortly you will see the G-code file there.

Enjoy laser cutting with Endurance!