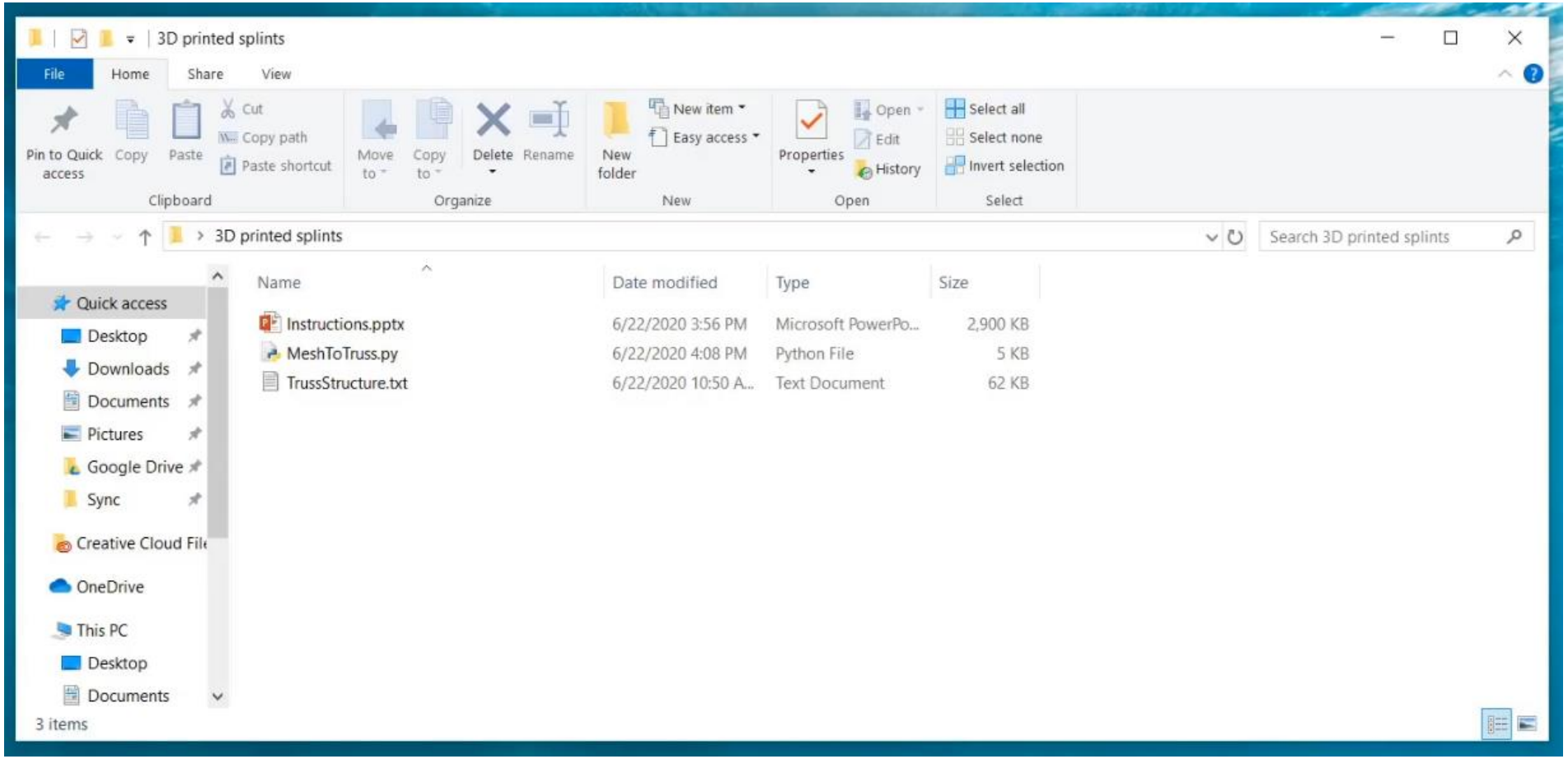
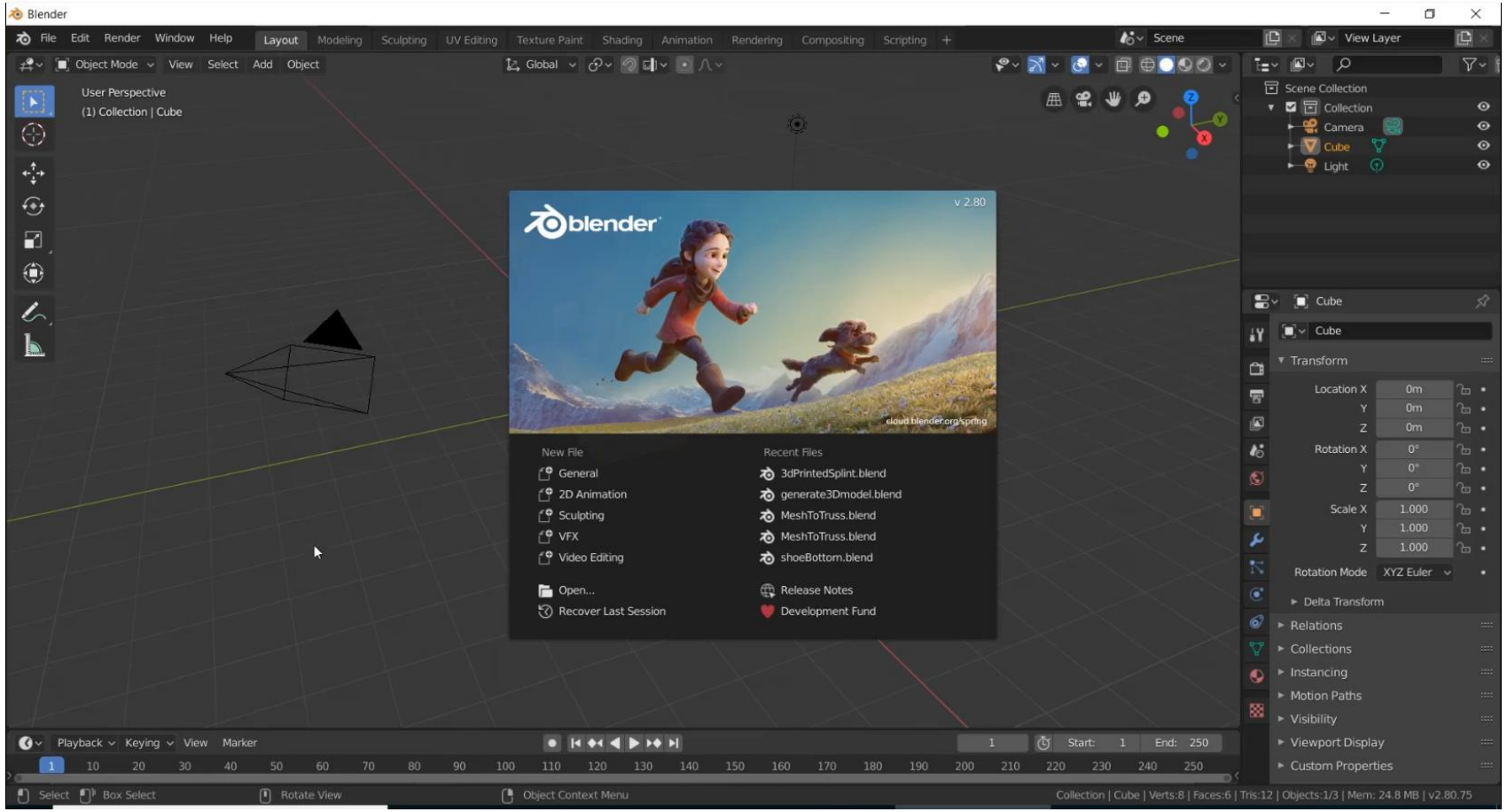
Generate 3D printable model based on the optimized structure information

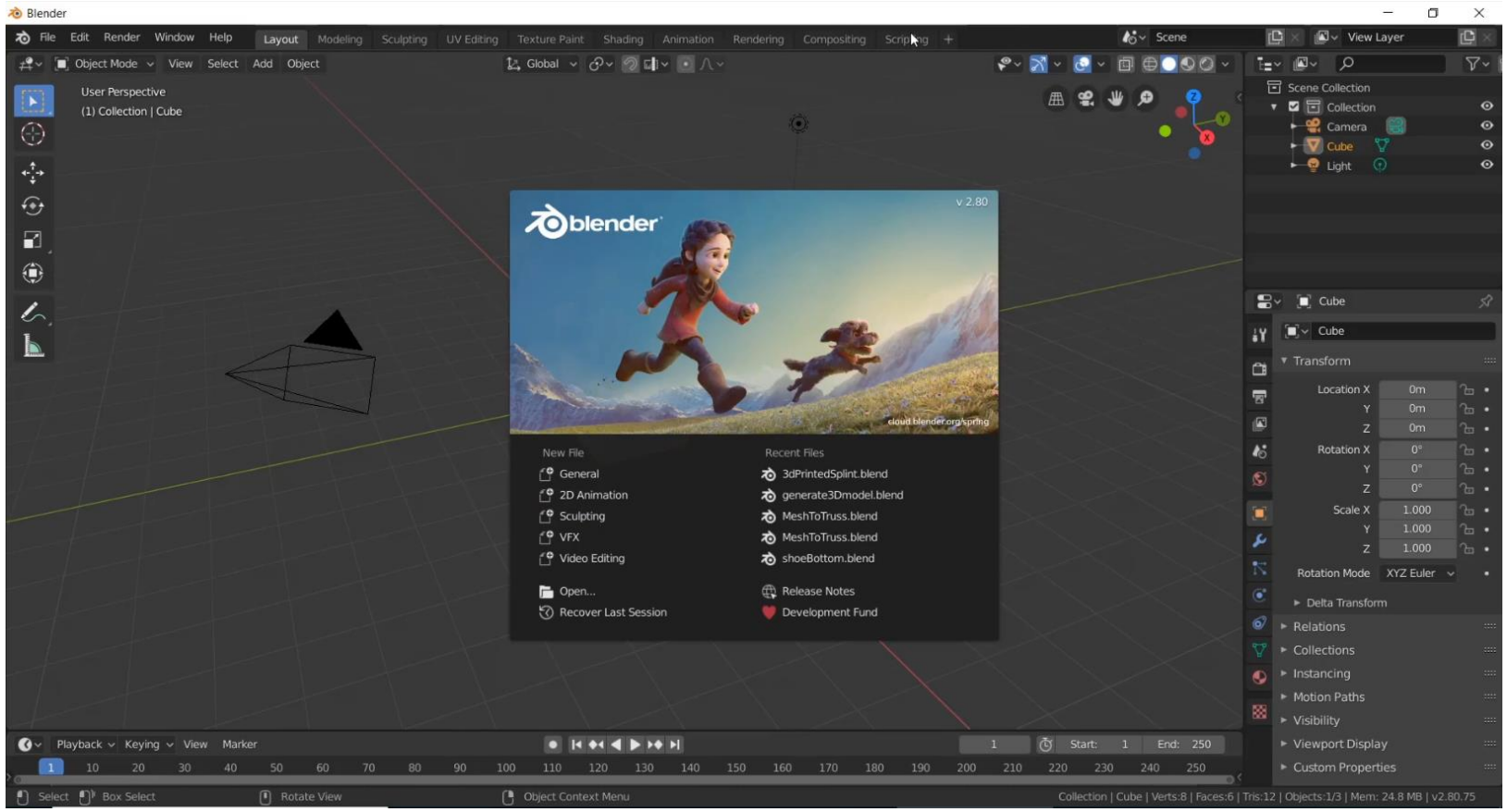
The “TrussStructure.txt” includes the optimized splint structure information



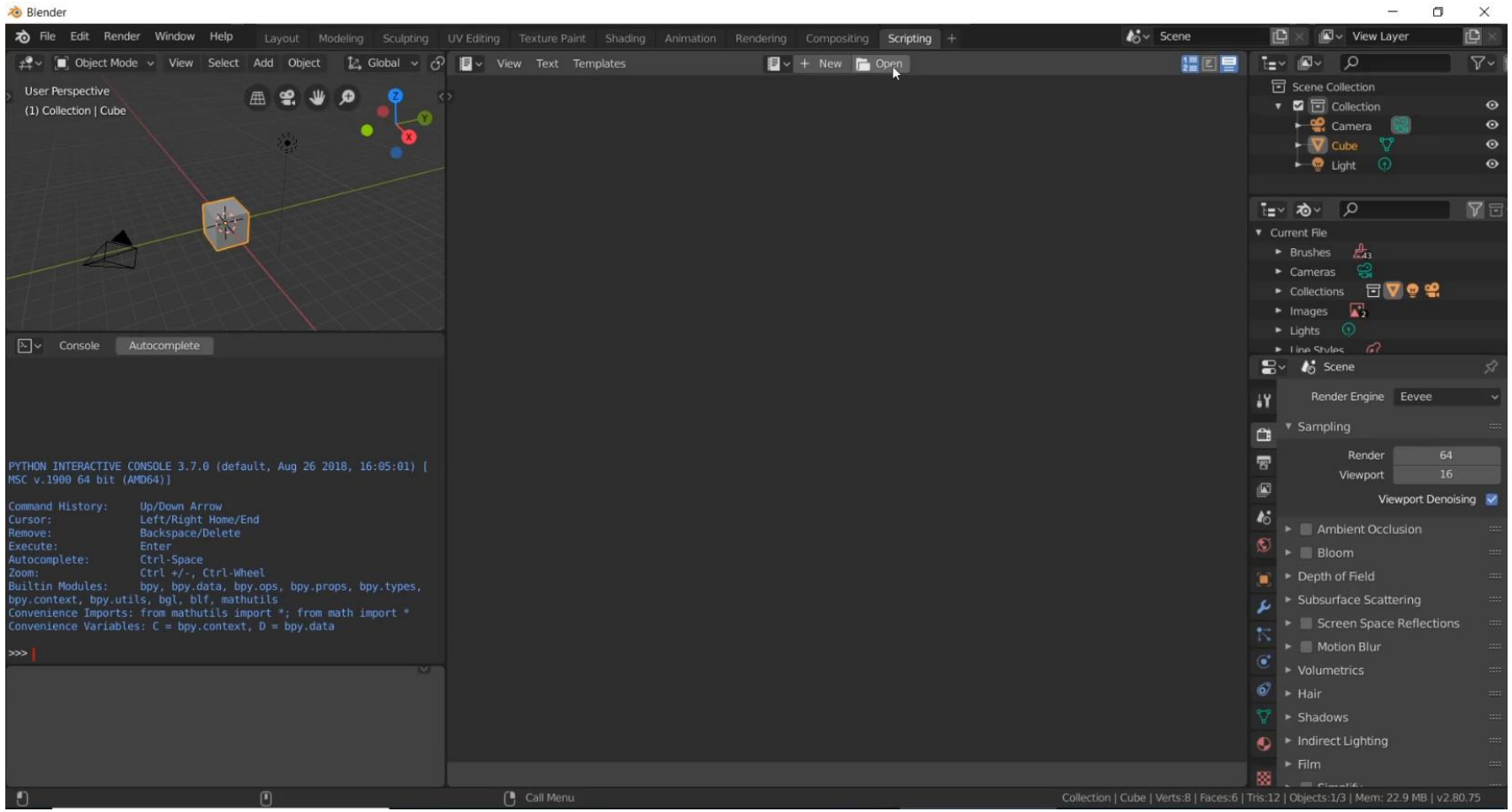
1. Put the “MeshToTruss.py” and “TrussStructure.txt” files in the same folder



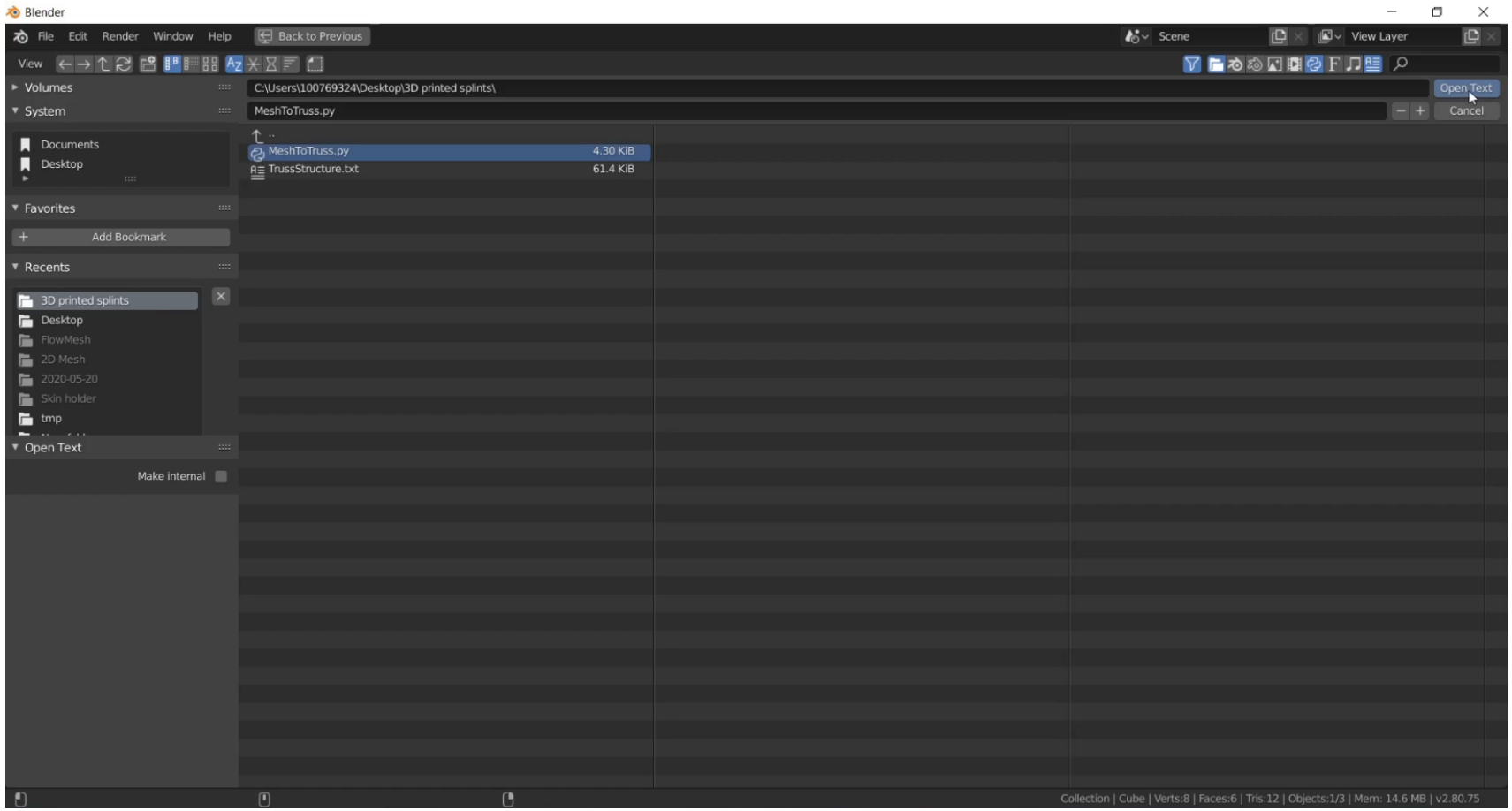
2. Open Blender 2.8



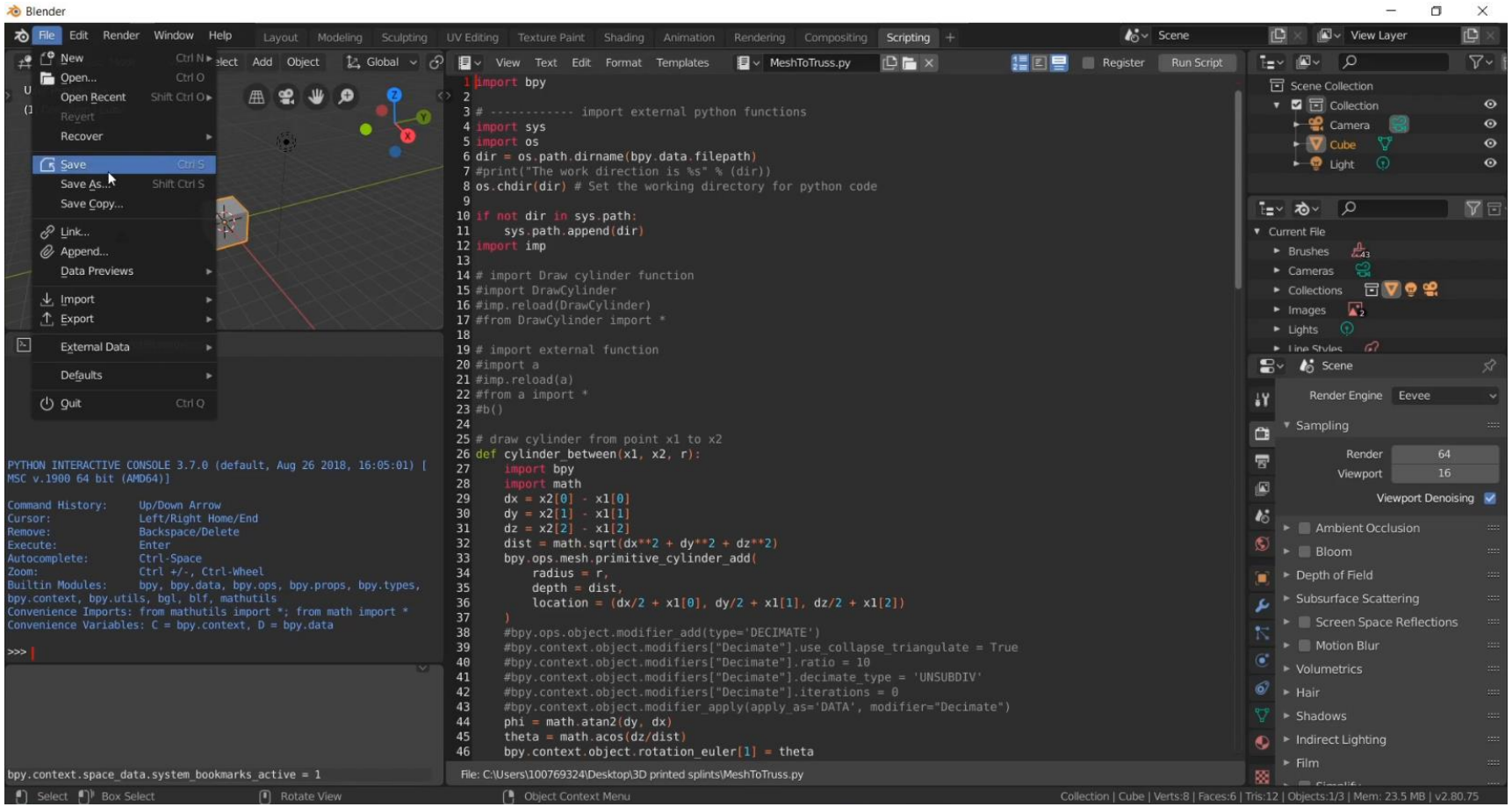
3. Click the “Scripting” button



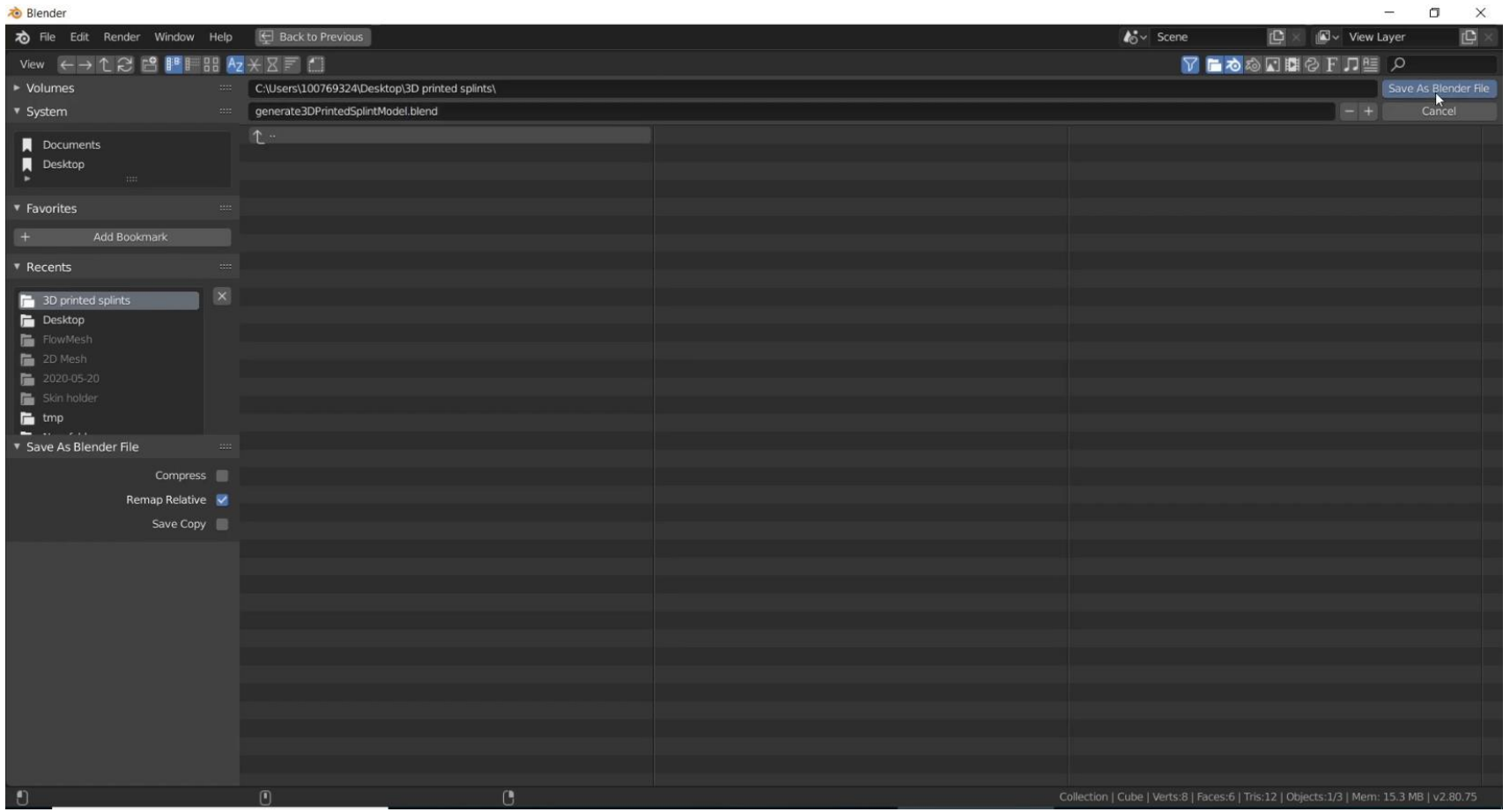
4. Click the “Open” button



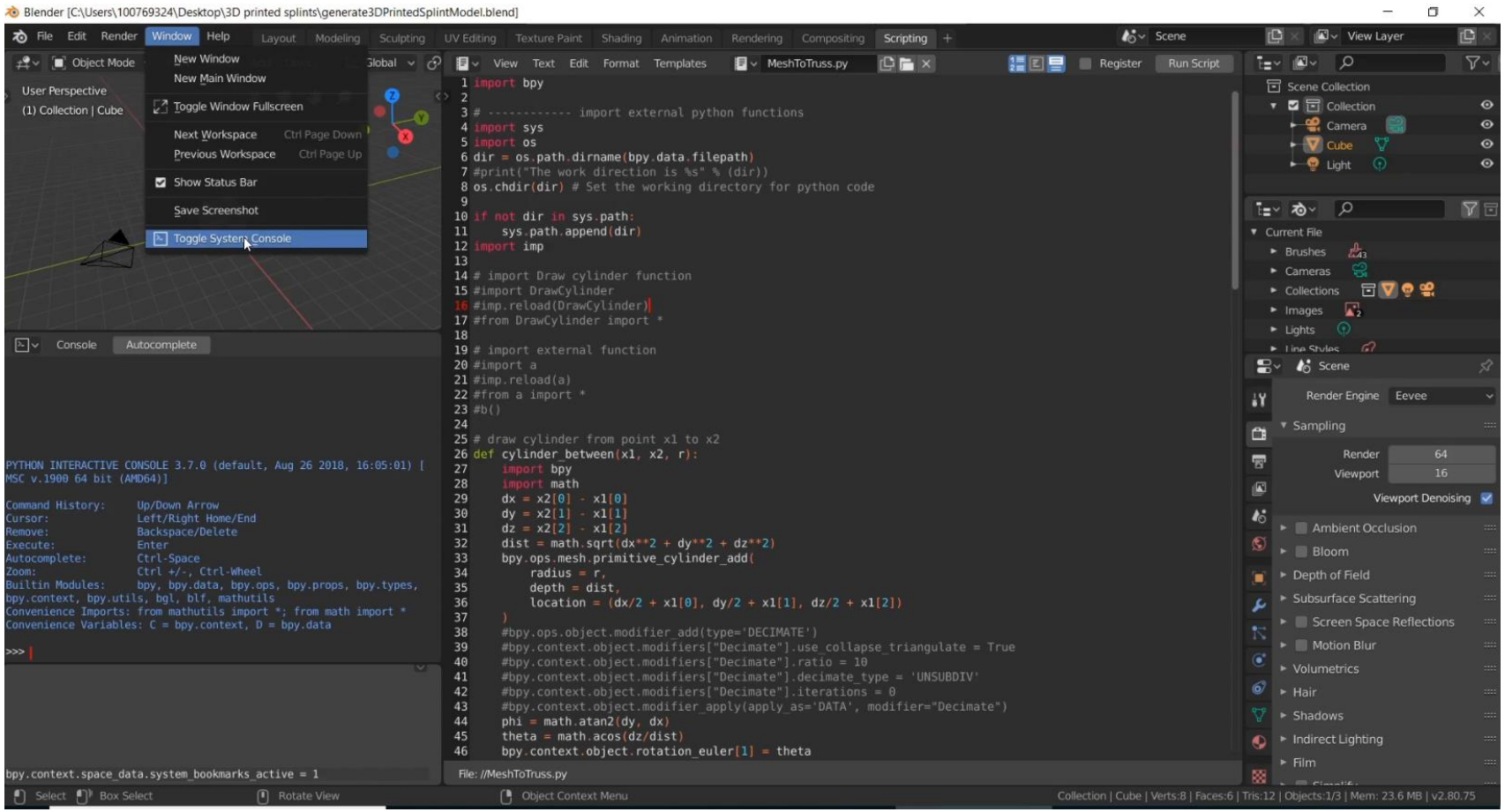
5. Locate the file “MeshToTruss.py” and click the button “Open Text”



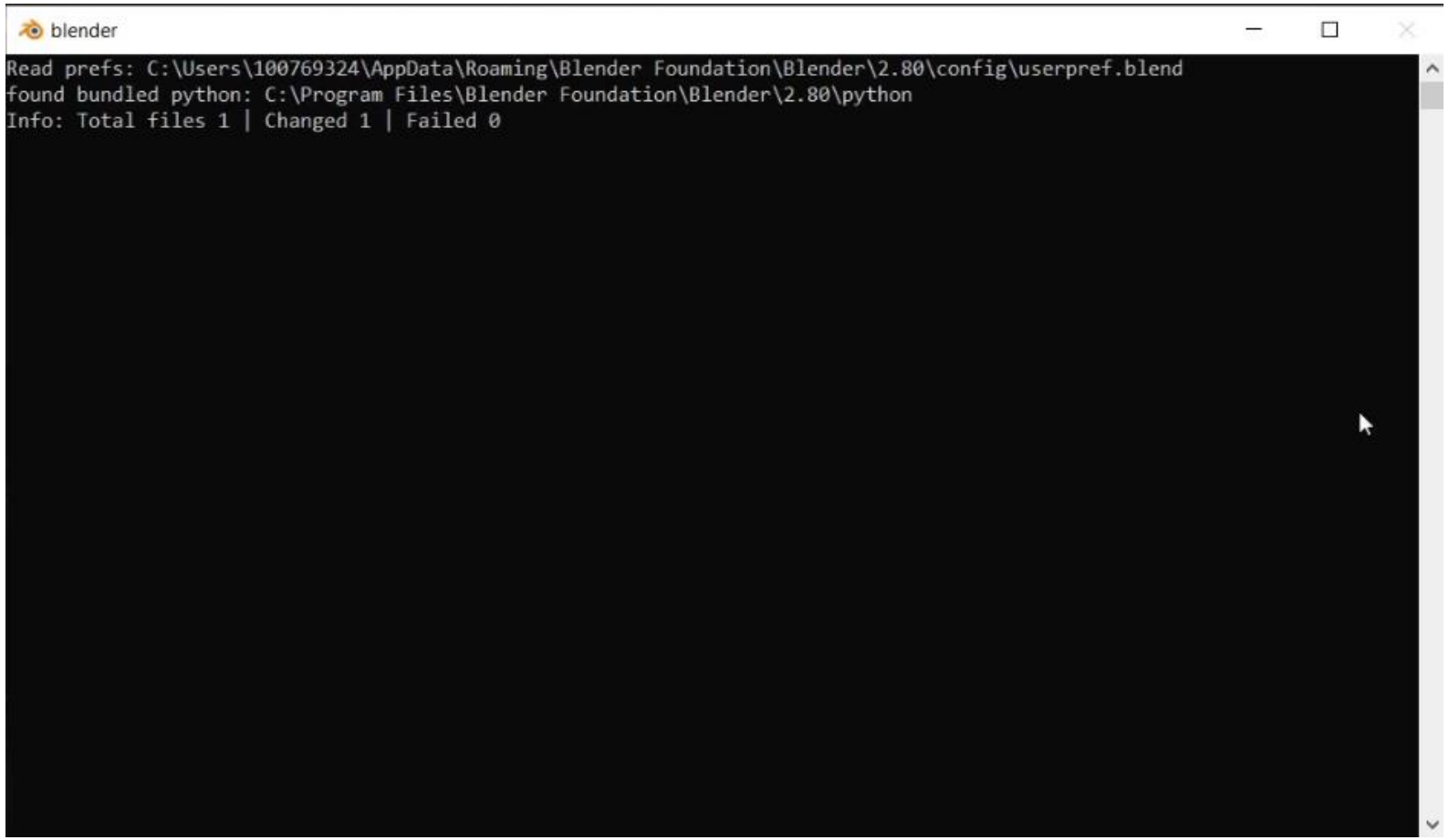
6. Click the “Save” button to save the Blender project.



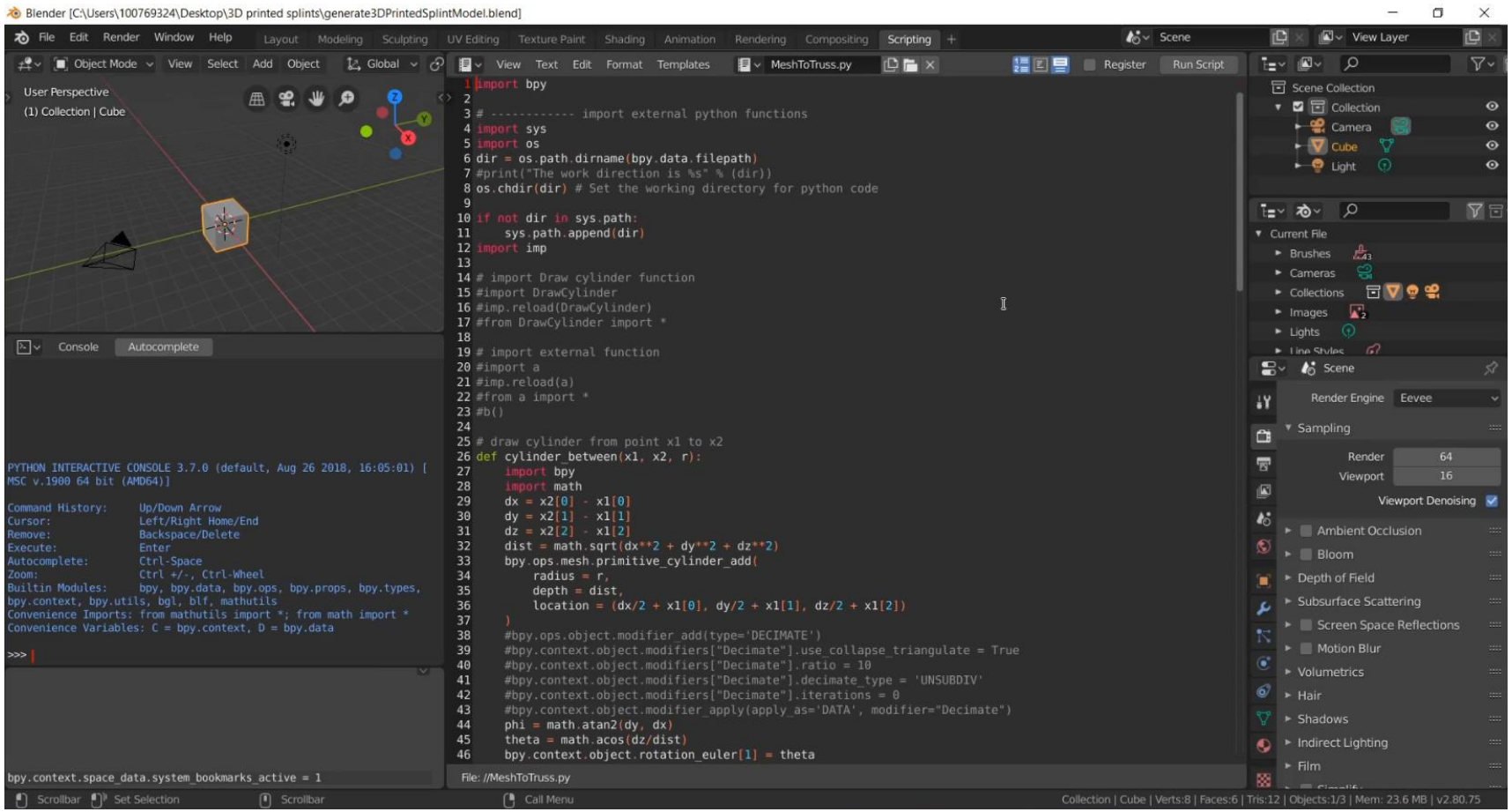
7. Save the Blender project in side the folder where the “MeshToTruss.py” and “TrussStructure.txt” files located. In this instruction, the Blender project was named as “generate3DPrintedSplintModel.blend”



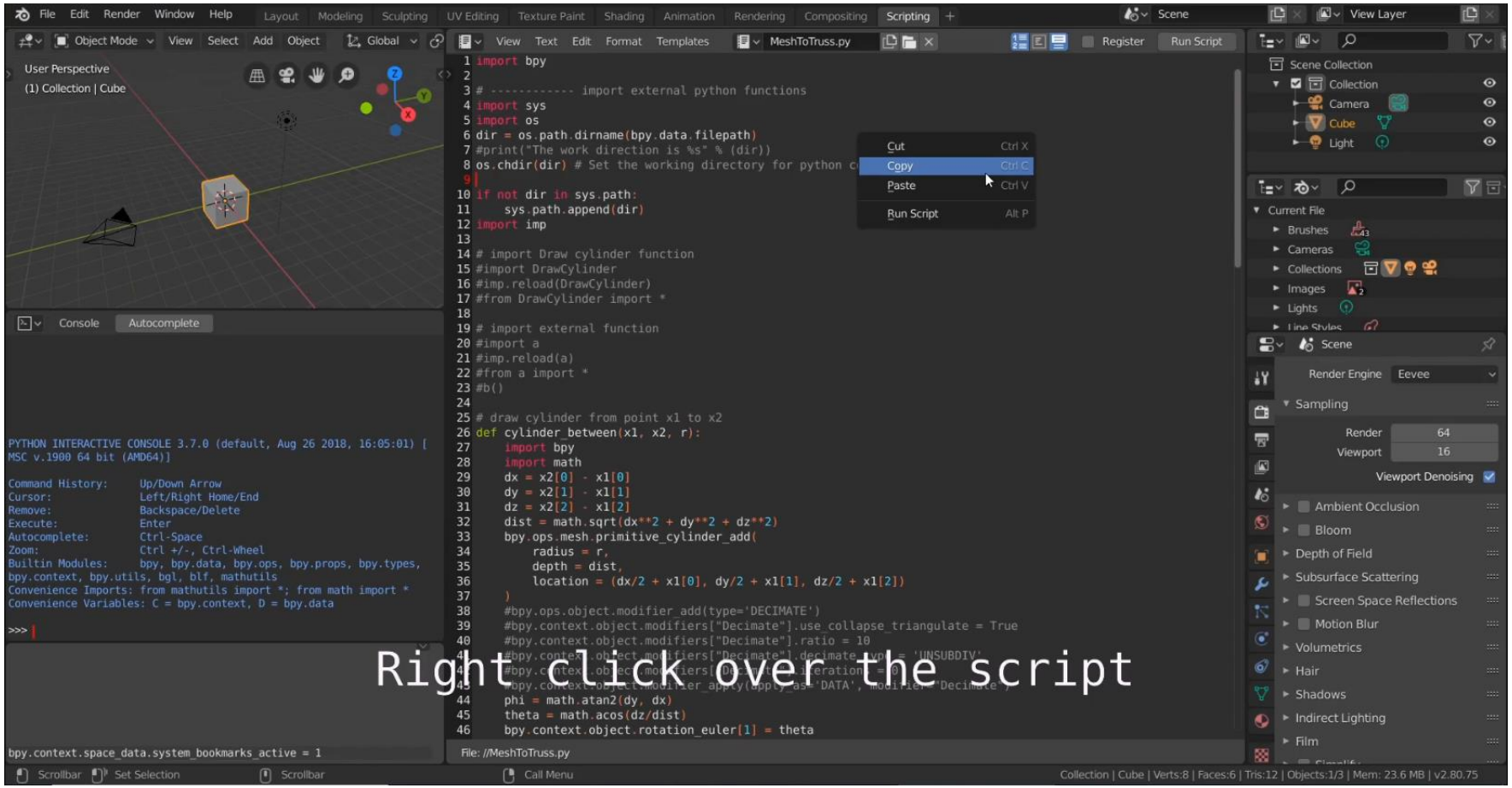
8. Click the “Toggle System Console” button to open a window to monitor the process of creating 3D model. The next slide shows the window.



Toggle System Console window

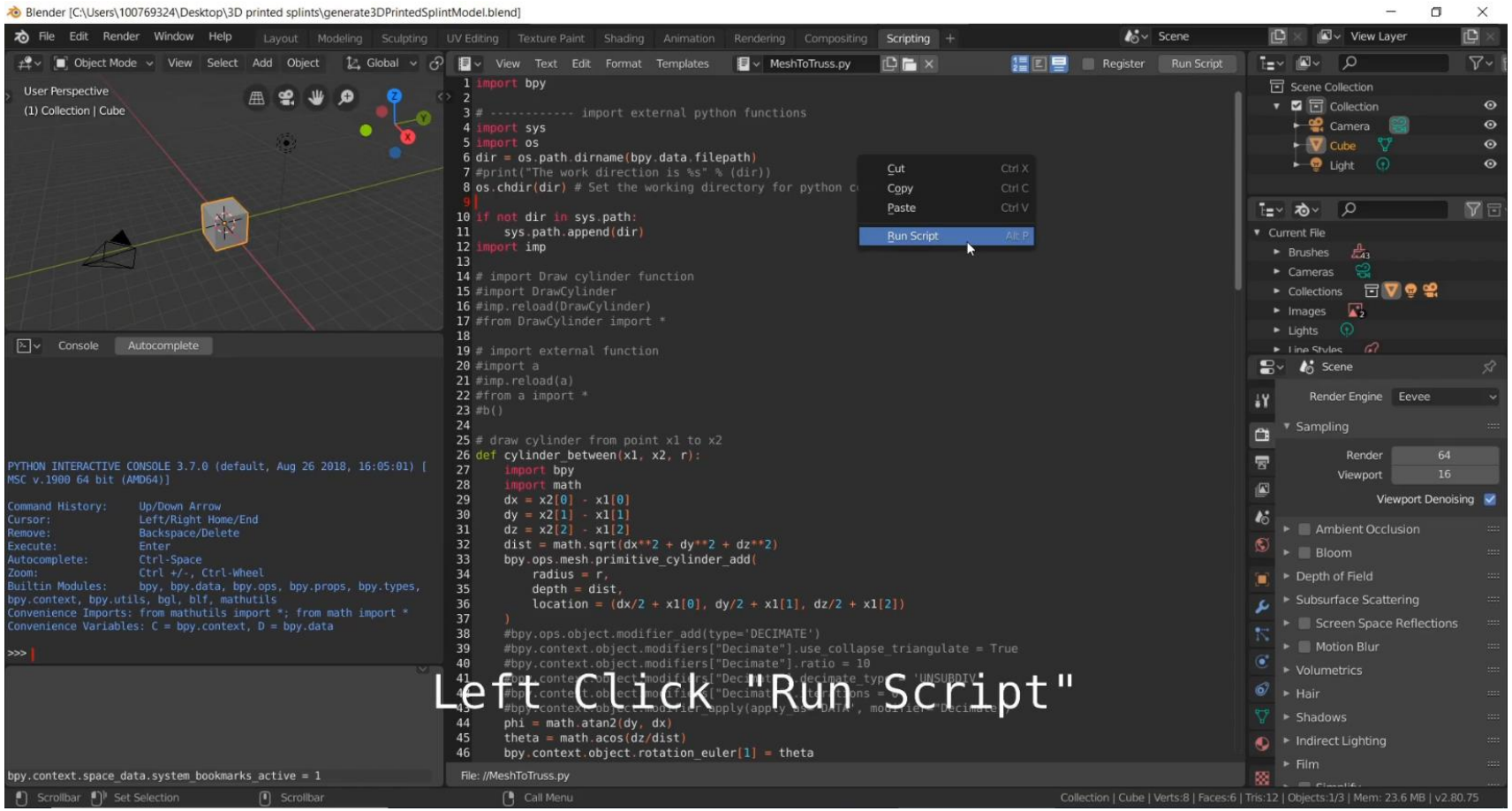


9. Go back to the script and right click over the text of “MeshToTruss.py”. A menu is popped out and shows in the next slide.

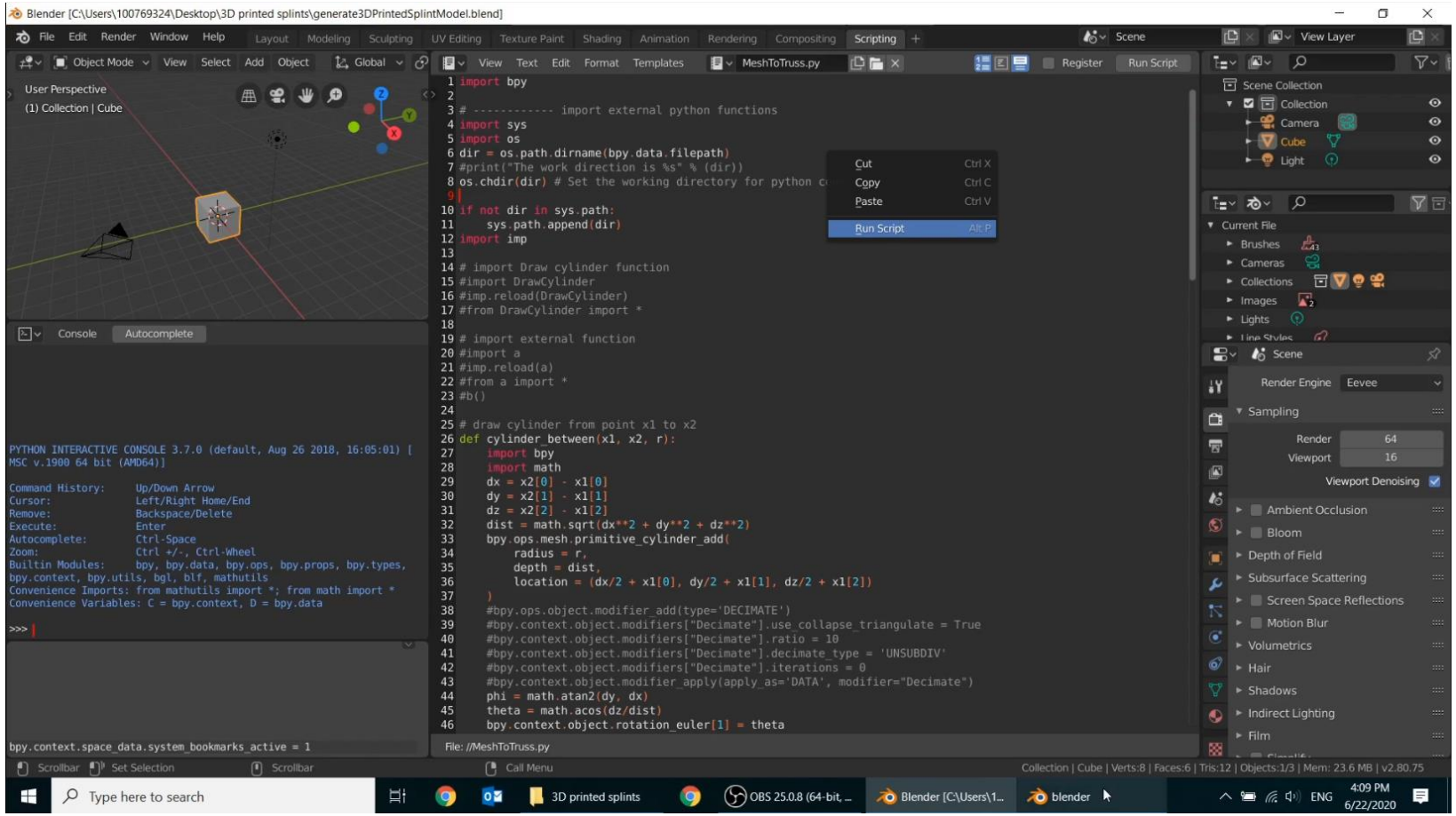



```
import bpy

# ------------ import external python functions
import sys
import os
dir = os.path.dirname(bpy.data.filepath)
#print("The work direction is %s" % (dir))
os.chdir(dir) # Set the working directory for python c

if not dir in sys.path:
    sys.path.append(dir)
import imp

# import Draw cylinder function
#import DrawCylinder
#imp.reload(DrawCylinder)
#from DrawCylinder import *

# import external function
#import a
#imp.reload(a)
#from a import *
#b()

# draw cylinder from point x1 to x2
def cylinder_between(x1, x2, r):
    import bpy
    import math
    dx = x2[0] - x1[0]
    dy = x2[1] - x1[1]
    dz = x2[2] - x1[2]
    dist = math.sqrt(dx**2 + dy**2 + dz**2)
    bpy.ops.mesh.primitive_cylinder_add(
        radius = r,
        depth = dist,
        location = (dx/2 + x1[0], dy/2 + x1[1], dz/2 + x1[2])
    )
    #bpy.ops.object.modifier_add(type='DECIMATE')
    #bpy.context.object.modifiers["Decimate"].use_collapse_triangulate = True
    #bpy.context.object.modifiers["Decimate"].ratio = 10
    #bpy.context.object.modifiers["Decimate"].decimate_type = 'UNSUBDIV'
    #bpy.context.object.modifiers["Decimate"].iterations = 1
    #bpy.context.object.modifier_apply(apply_as='DATA', modifier="Decimate")
    phi = math.atan2(dy, dx)
    theta = math.acos(dz/dist)
    bpy.context.object.rotation_euler[1] = theta
```

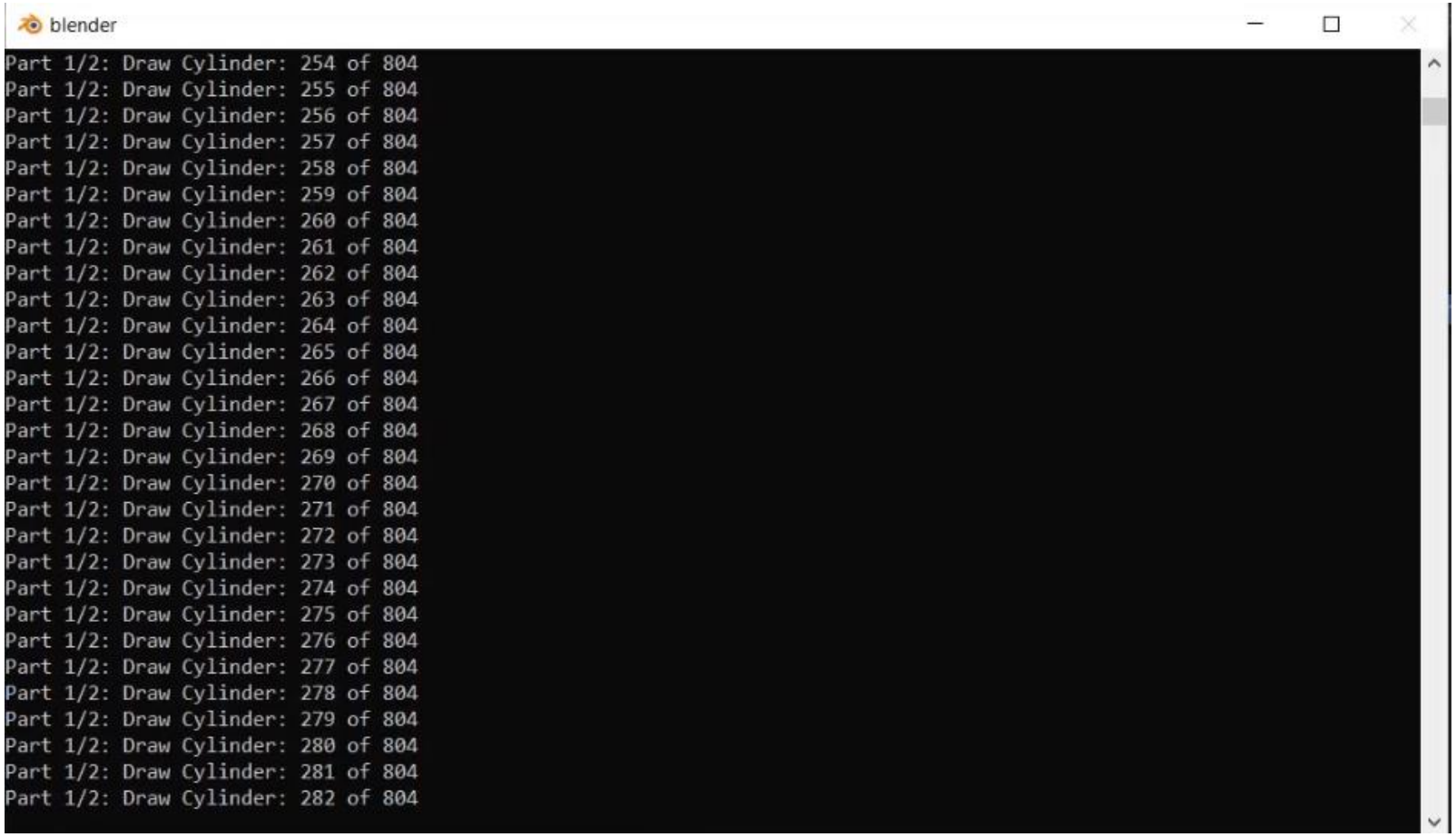
Right click over the script



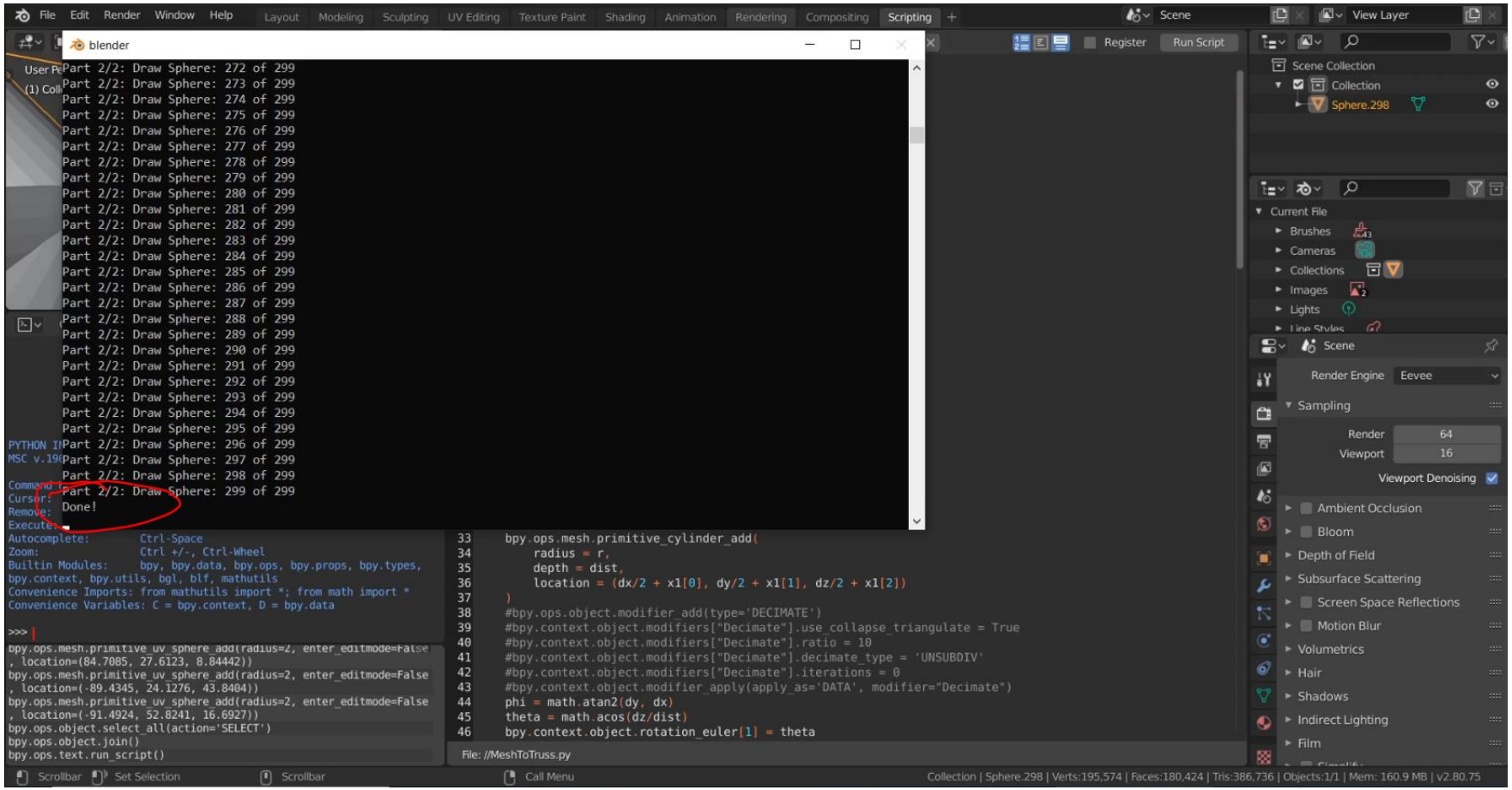
10. Click the “Run Script” button to run the script



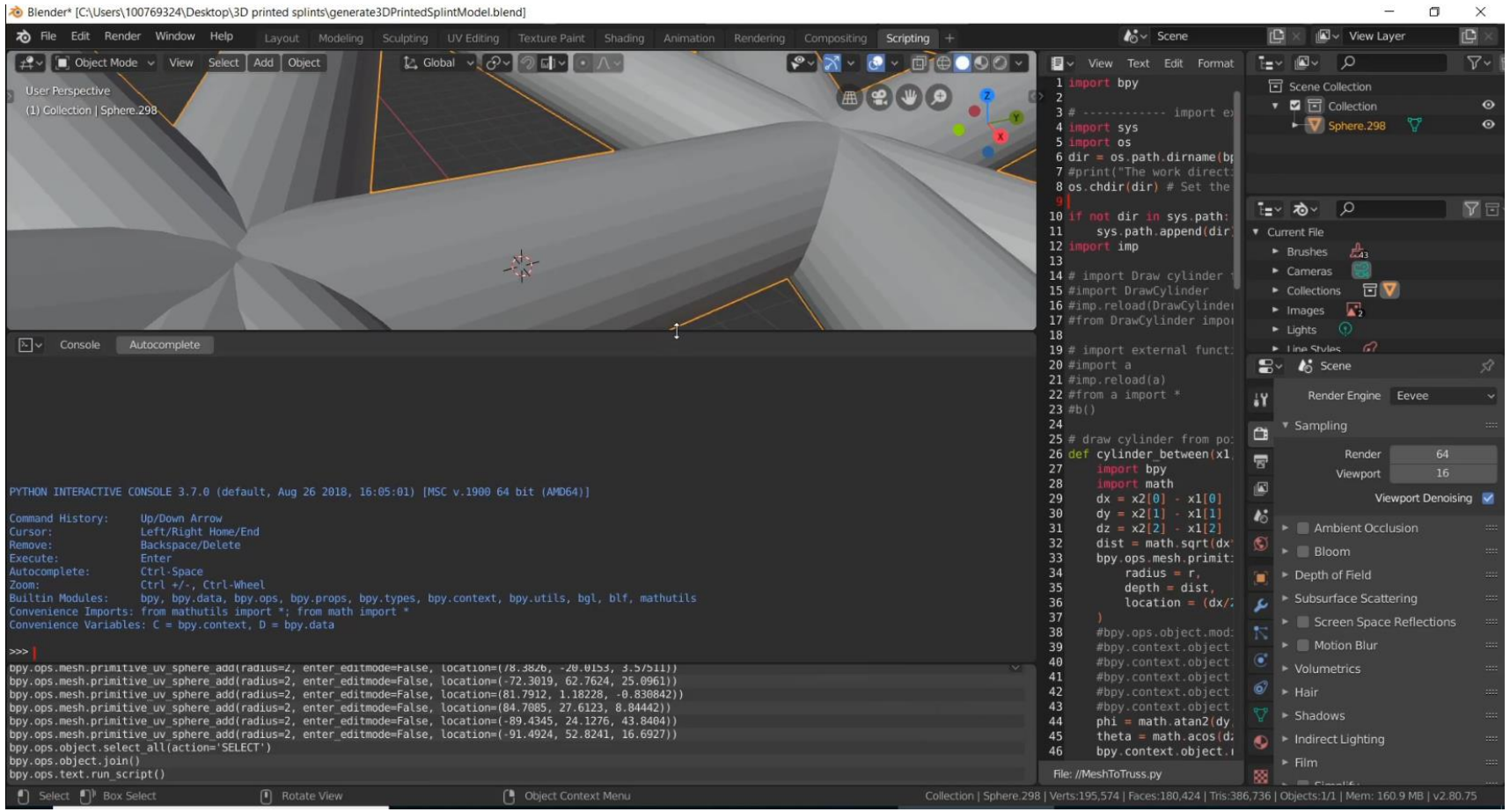
11. Go back the “Toggle System Console window” by click the “blender” table at the bottom



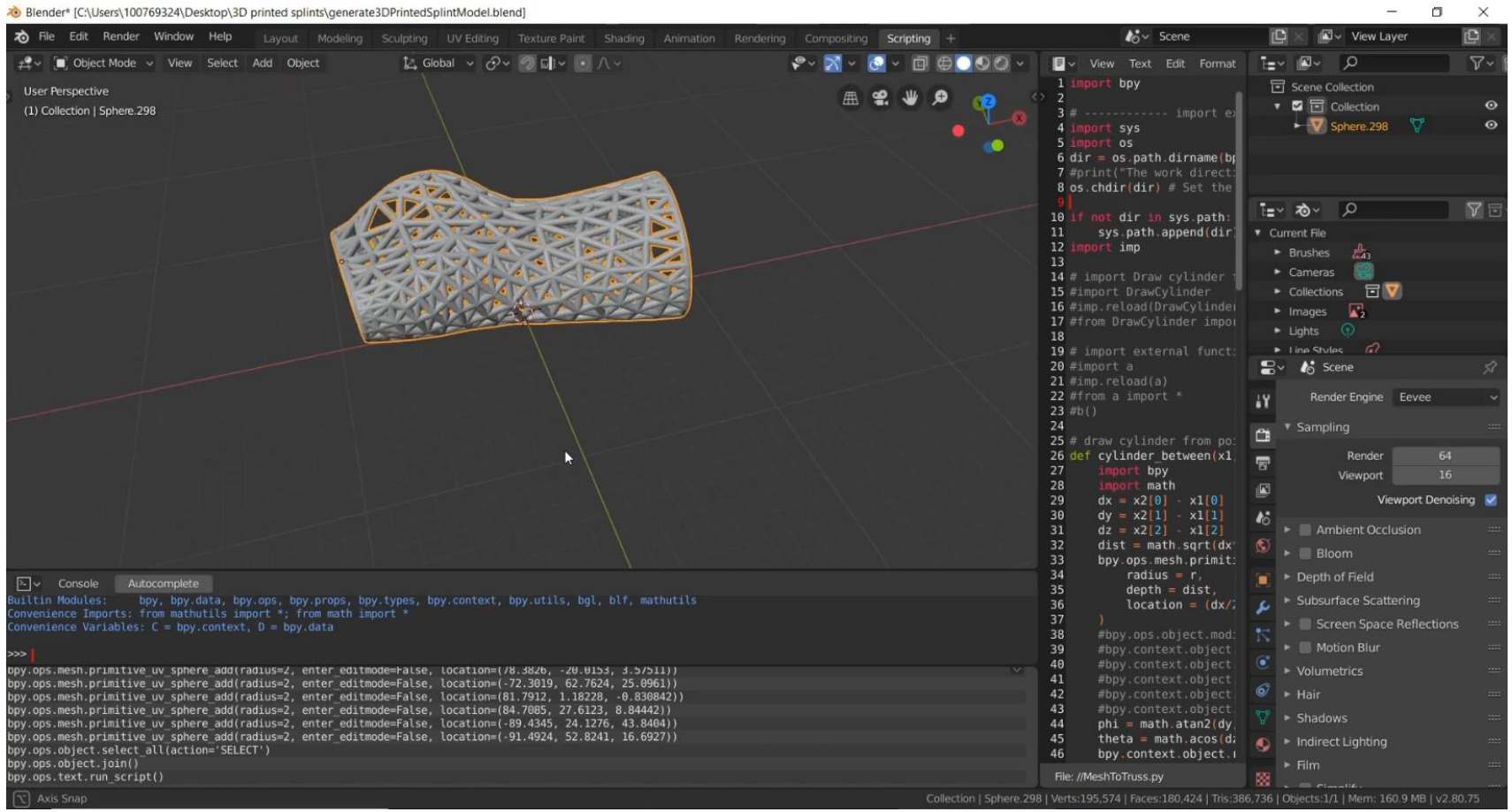
Toggle System Console window



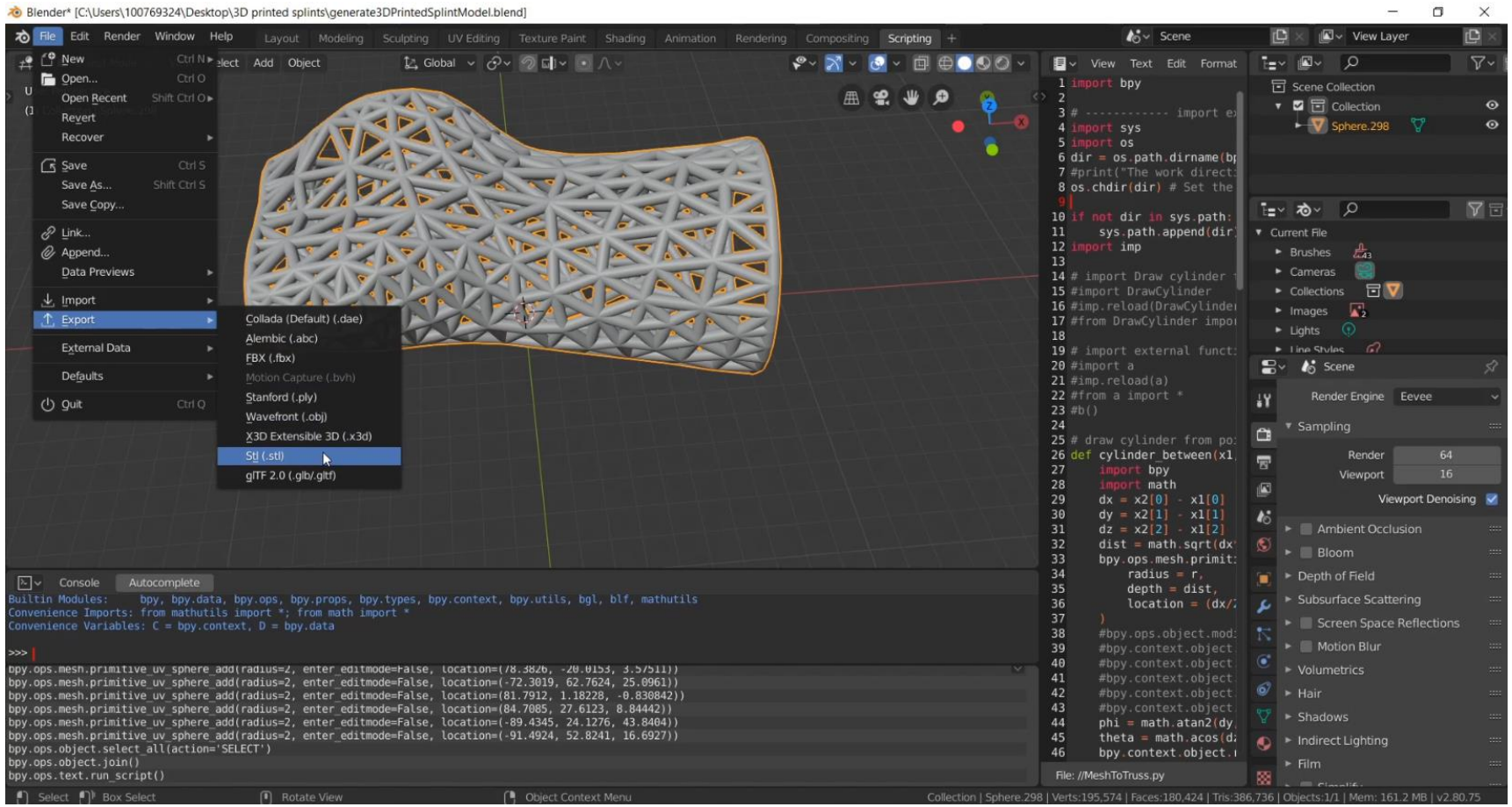
12. Wait until the “Toggle System Console window” showing “Done”. The 3D model is created. The whole process takes a few minutes depending on the configuration of a computer.



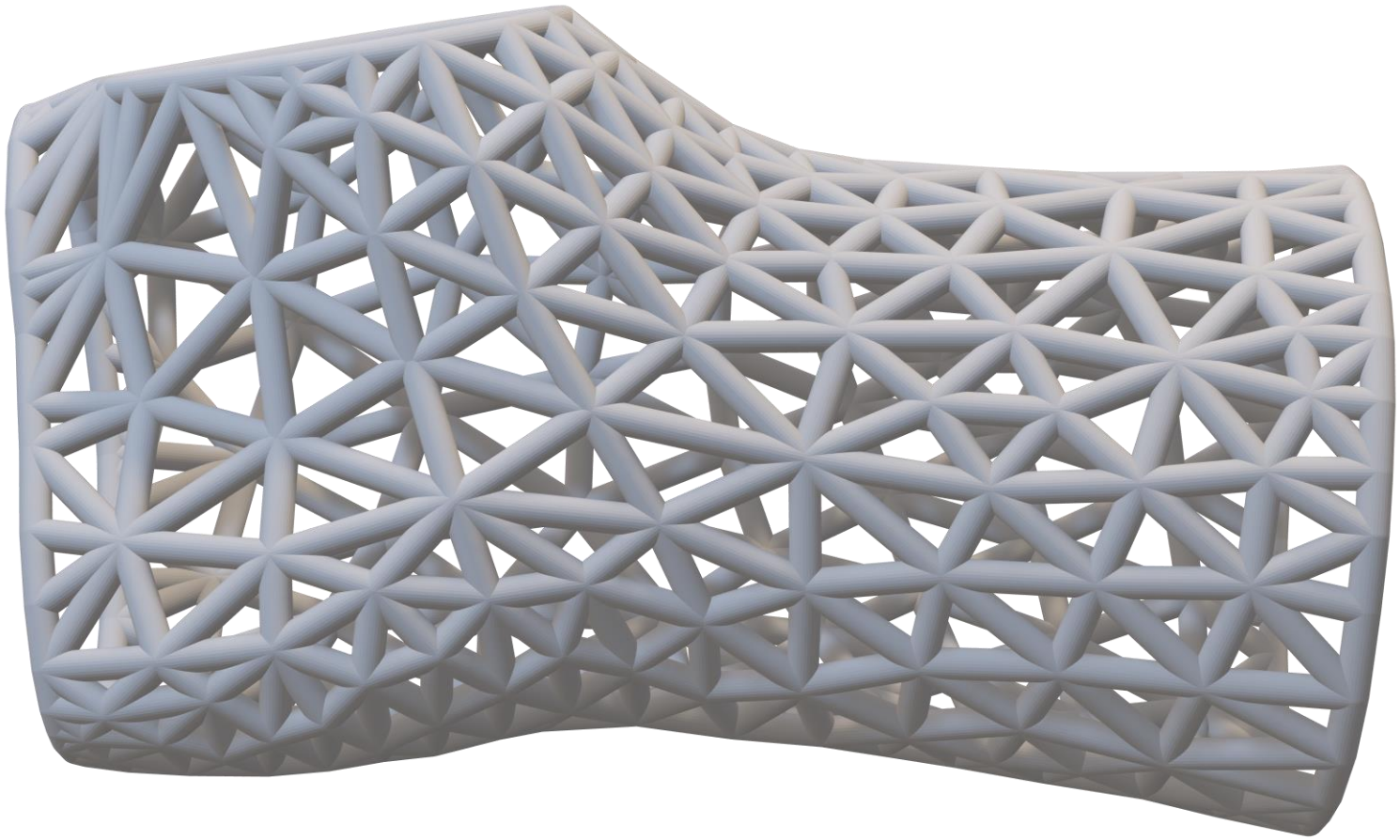
13. Drag the two boarders to enlarge the windows showing the 3D model.



Here is the 3D model of the splint. Note the splint model is not separated yet.



14. You can export the model as “Stl” file by clicking the “Stl(.stl)” button under the File menu.



This is view of the exported stl file of the splint