

# Structure Tool in Freecad: how to use

## 1 Intro info:

FreeCAD is open-source software that can integrate with Python packages.

Structure Tool is a FreeCAD extension for structural analysis, utilizing the Pynite kernel to perform calculations and display results

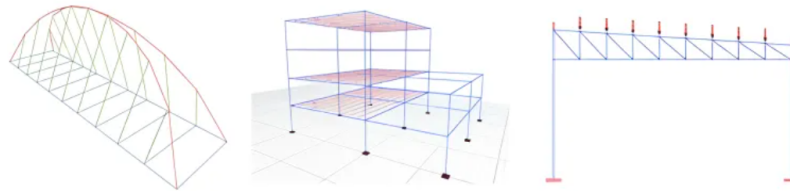


Figure 1:

## 2 How to use:

From Freecad select Structure Tool WB

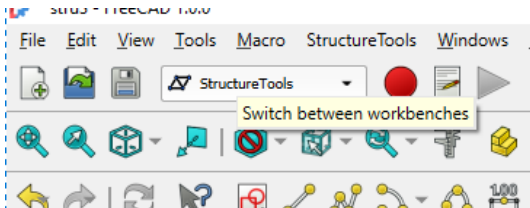


Figure 2:

- \* Click New button to create empty model
- \* Click Line on toolbar to create line for beam/ column structure

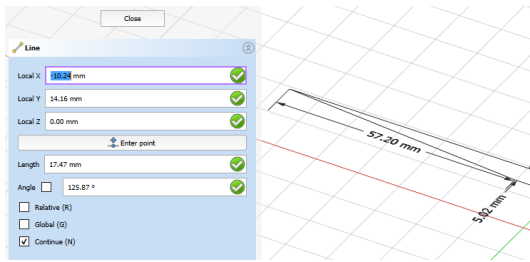


Figure 3:

\* Select endpoint of line then click support button

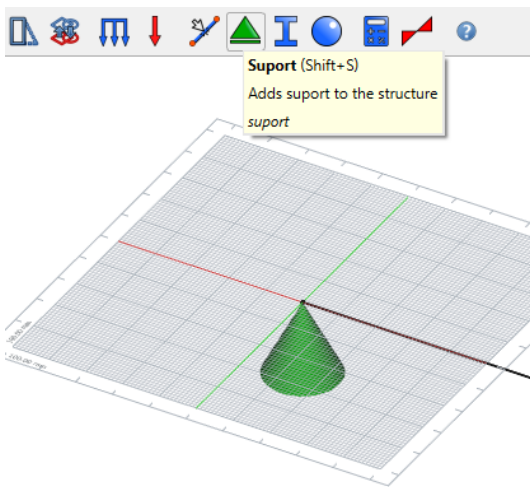


Figure 4:

– in tab of support select restraint required

Base	
Placement	[[0.00 0.00 1.00]; 0.00 °; (0.00 mm 0.00 mm 0.00 mm)]
Label	Support
Object Base	Line [Vertex1]
Draw	
Scale Draw	1.00
Rotation	
Fix Rotation X	✓ true
Fix Rotation Y	true
Fix Rotation Z	true
Translation	
Fix Translation X	true
Fix Translation Y	true
Fix Translation Z	true

Figure 5:

\* Create & assign section  
 – Click sketch button to make a sketch. Sketch will be in plane XY (important note) and try to make sketch in center of (0,0,0)

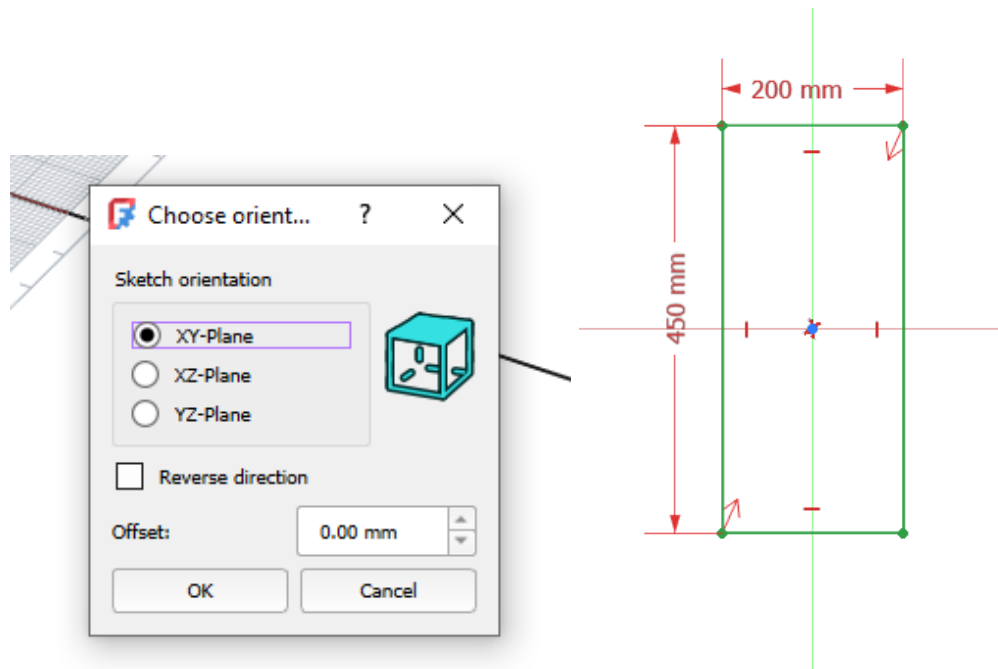


Figure 6:

- Convert sketch to wire

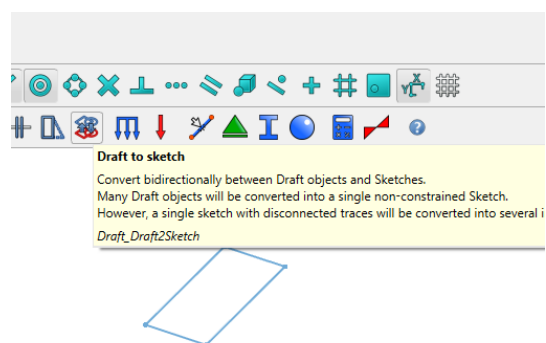


Figure 7:

- from wire created, select make face

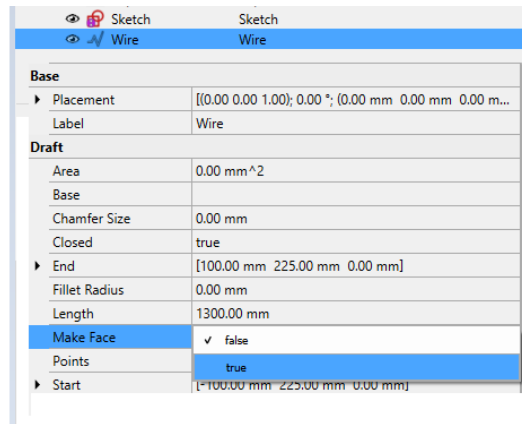


Figure 8:

- put pointer on created face then click section button (important note)

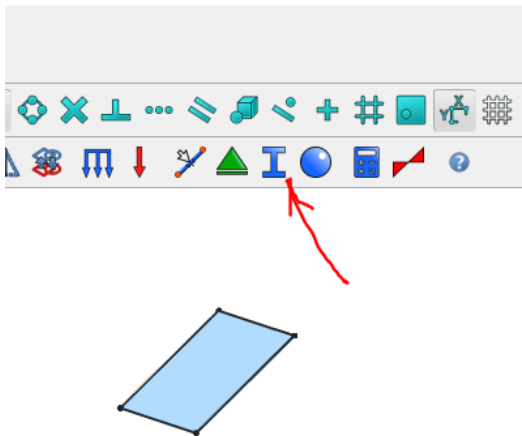


Figure 9:

- section will create with parameter for moment inertia info

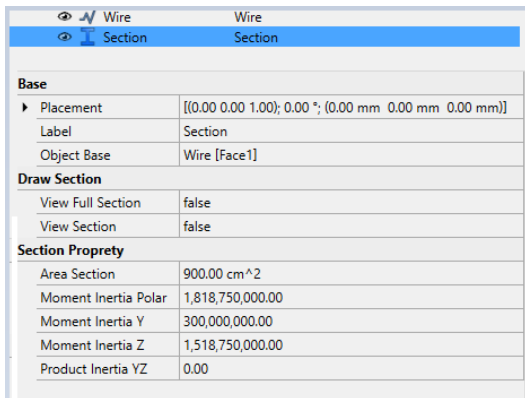


Figure 10:

\* Create material

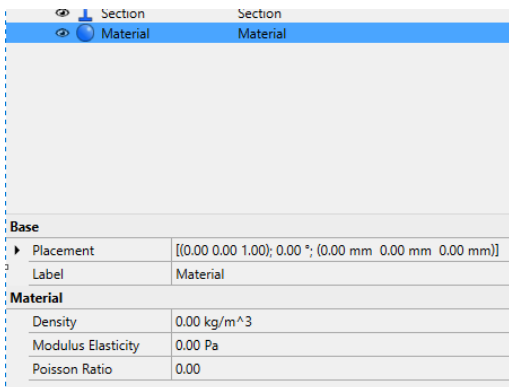


Figure 11:

\* Select line & define section, material

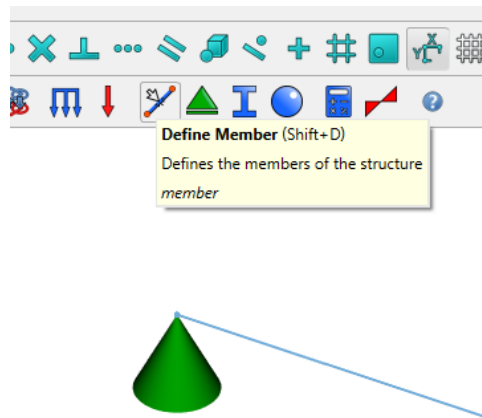


Figure 12:

– in line tab properties will appear Structure info

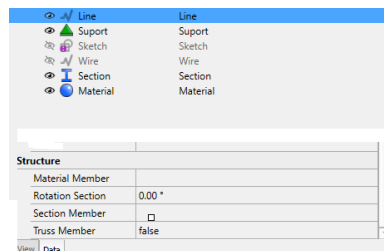


Figure 13:

– click "..." then select material, section already defined in list

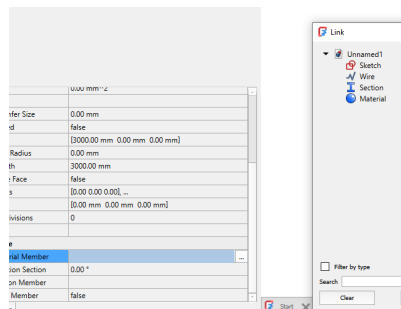


Figure 14:

\* select line structure and apply load

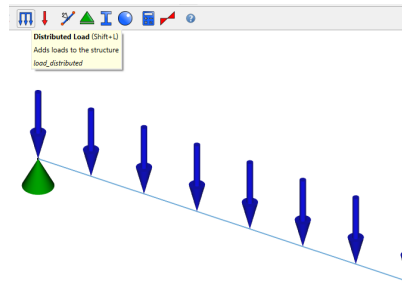


Figure 15:

\* select whole model by box selection (important note)

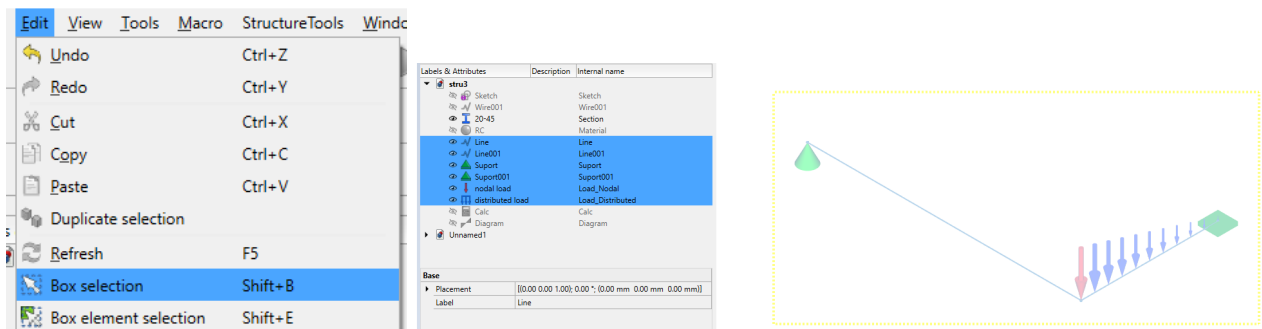


Figure 16:

– click Calc button to run analysis

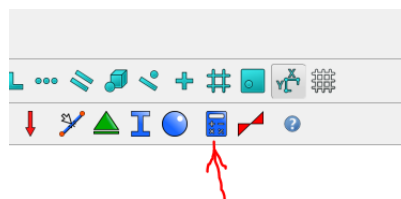


Figure 17:

– Calc will appear in tab properties with values moment, shear, deflection



Calc	Calc
Diagram	Diagram
Num Points Deflection	4
Num Points Moment	5
Num Points Shear	4
Num Points Torque	3
<b>Result Axial</b>	
Axial Force	[0.0,0.0,0.0,0.0,0.0,0.0]
<b>Result Deflection</b>	
Deflection Y	[0.0,-0.00015188954245395927,-0.00029240320163...
Deflection Z	[0.0,0.0,0.0,0.0,0.0,0.0,0.0]
Max Deflection Y	[0.00,-0.00]
Max Deflection Z	[0.00,0.00]
Min Deflection Y	[-0.00,-0.00]
Min Deflection Z	[0.00,0.00]
<b>Result Moment</b>	
Max Moment Y	[0.00,0.00]
Max Moment Z	[-0.00,22.23]
Min Moment Y	[0.00,0.00]

Figure 18:

\* click diagram to see BD or SD



Figure 19:

— on tab properties of diagram, select "true" to show value on beam

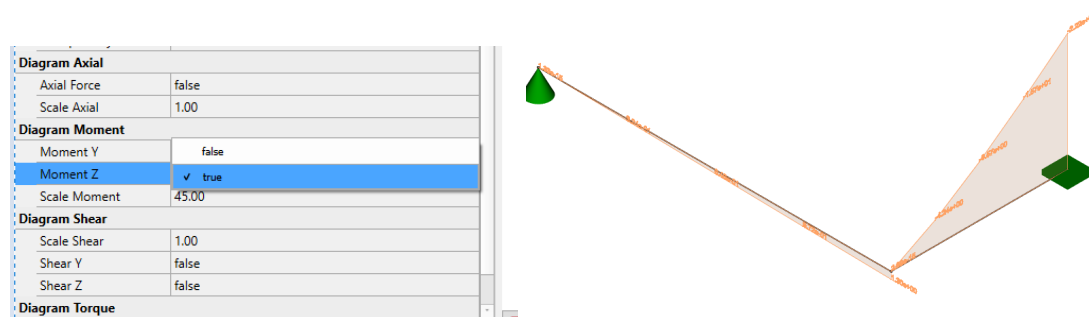


Figure 20:

### 3 Summary:

We gratefully acknowledge Maykow Menezes for his development of Structure Tools. This extension provides a user-friendly way to visualize and interpret Pynite results within FreeCAD, significantly





reducing the need for direct Pynite coding expertise. You can explore the project and its source code at: <https://github.com/maykowsm/StructureTools>.

We extend special thanks to Yorik Van Havre for developing Freecad Platform

## 4 Appendix: Testing result

### 4.1 Example 1:

\* Simple beam under uniform load & bending diagram

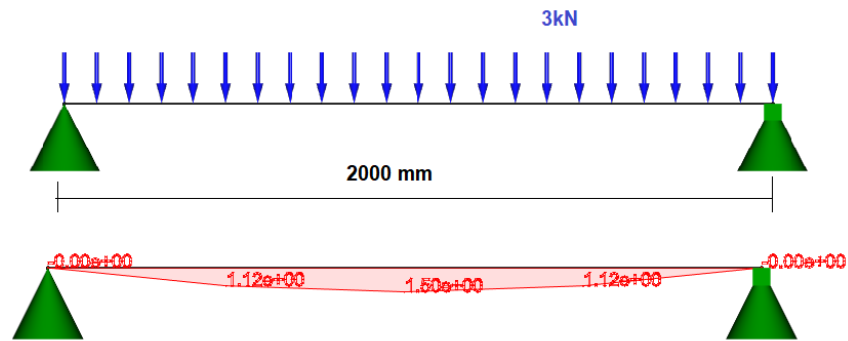


Figure 21:

\* Result by anatruct - Python package

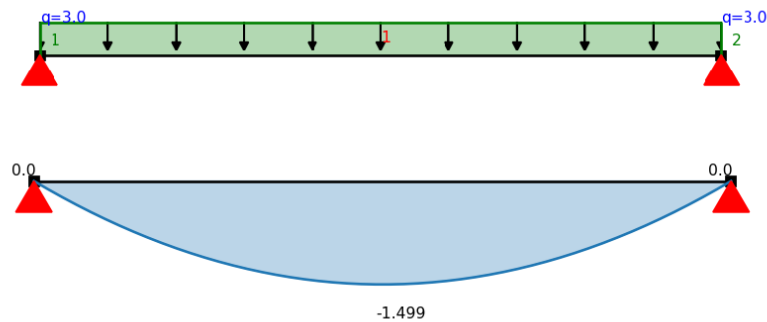


Figure 22:

### 4.2 Example 2:

\* Simple beam under uniform load, point load & bending diagram

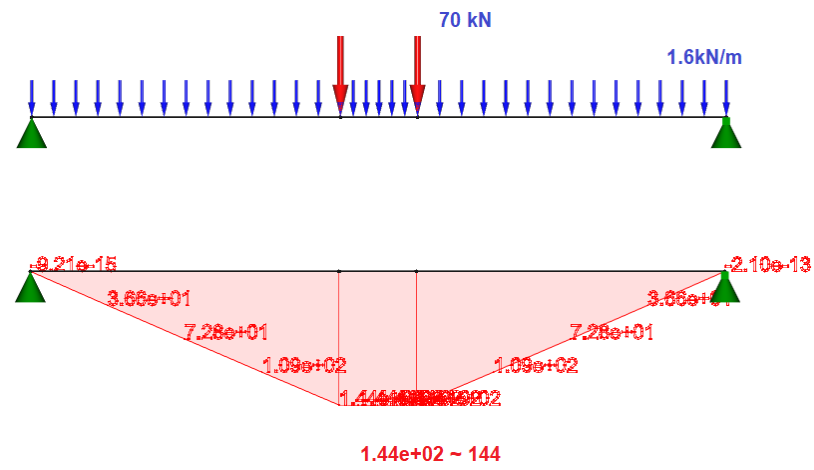


Figure 23:

\* Result by anatruct - Python package

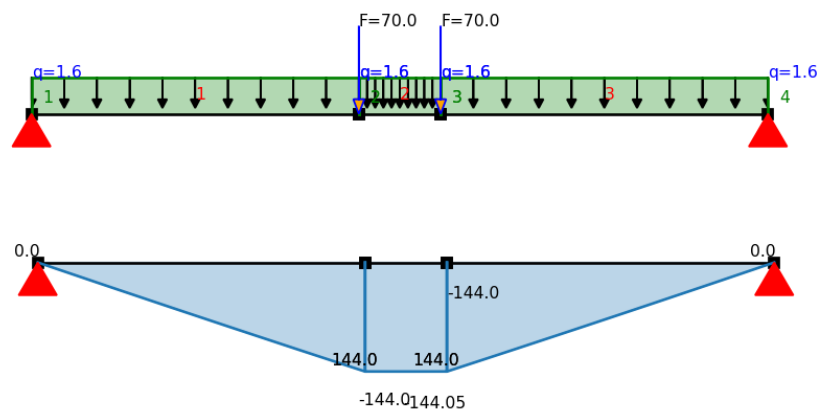


Figure 24:

\* Result by Ftool

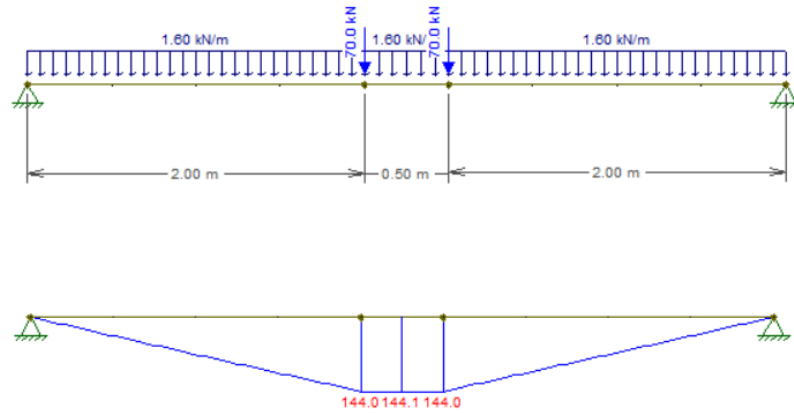


Figure 25:

### 4.3 Example 3:

\* Simple beam under uniform load, point load & bending diagram

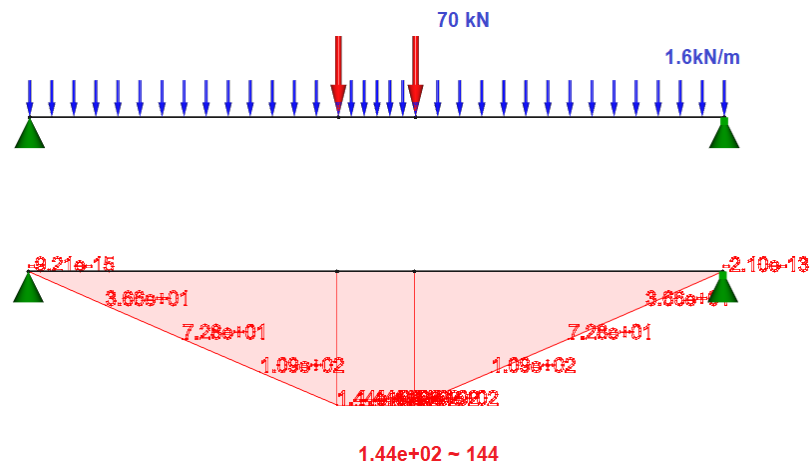


Figure 26:

\* Result by anatruct - Python package

The good point, Structure tool can do analysis 3d model which other free package, software be limited