Node workbench in Freecad: how to use

by Kay Tran

In recent years, visual programming workflows have transformed how designs are created and modified.
Tools like Dynamo for Revit and Grasshopper for Rhino have made it possible to automate tasks, create parametric relationships, and explore design options more efficiently, without needing to write complex code. They're getting popular because they empower designers to customize their tools

FreeCAD now offers this capability with the Node Workbench. It's a visual environment that lets you build custom workflows—connecting operations together like building blocks—to automate repetitive tasks, create complex geometry, and ultimately, design smarter and faster. We'll explore how it can simplify your design jobs today
Can explore the project and its source code at:
https://github.com/j8sr0230/Nodes
other useful info & practices at
https://forum.freecad.org/viewtopic.php?t=71651

Thanks to j8sr0230 for his groundbreaking work in 3D design with FreeCAD.

1   Intro info:

This document create to present some demo practices with Node workbench, for install & other requirement can check on Github
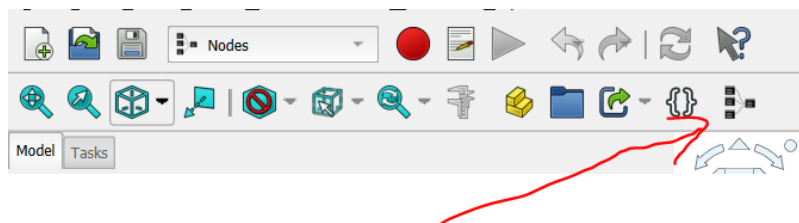

Figure 1:

click button in red arrow to open Node window

2   How to use:

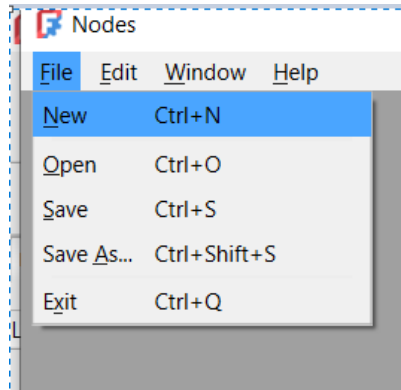Click new to create new workflow file

Figure 2:

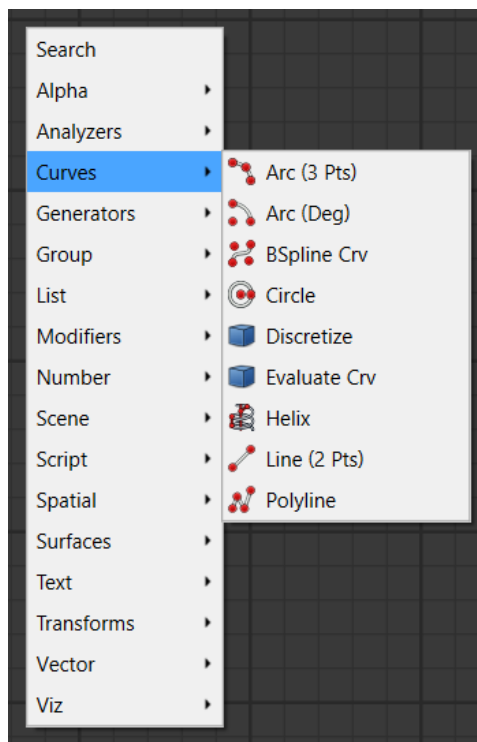Right click then can see list command used for making workflow

Figure 3:

2.1 Basic commands for 3d model :

Those basic commands in "Modifier" submenu of right click menu
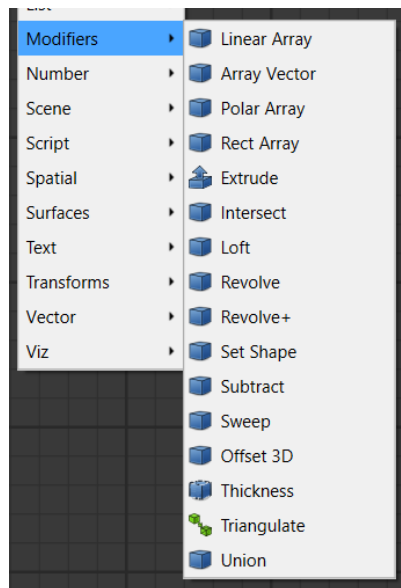Select nodes or links and press 'delete' button for those unwanted
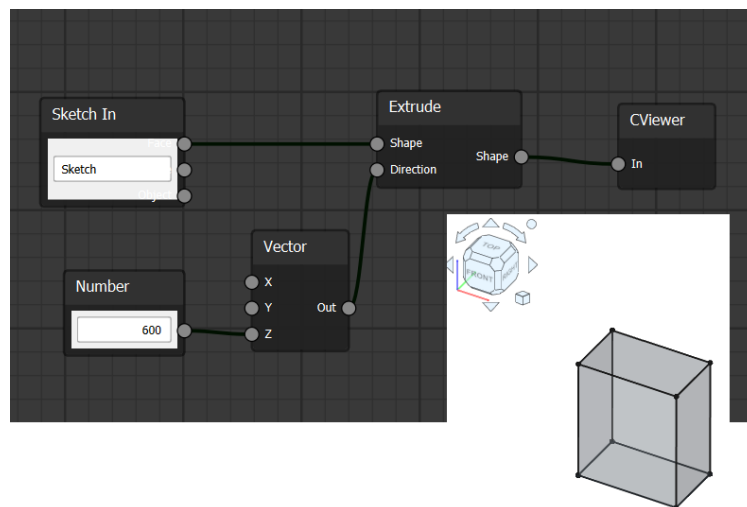
Figure 4:

Extrude:

Figure 5:

Note:
+Extrude command require Vector and value X or Y or Z
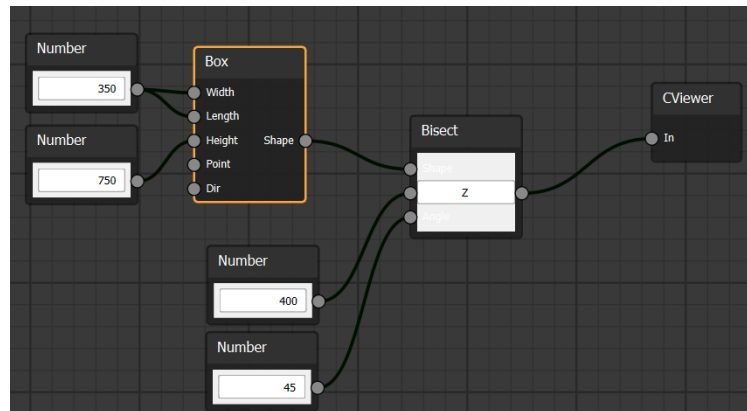
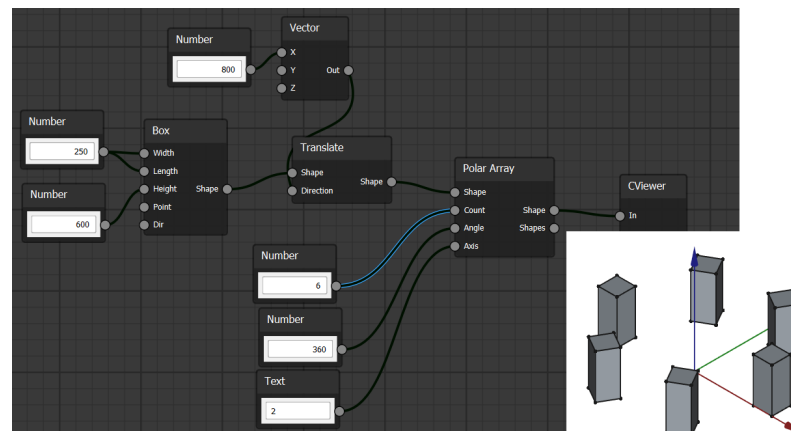**Bisect - cut object in angle:**

Figure 6:

Polar array:

Figure 7:

Note:
+before doing array, need to move object a distance equal radius of polar array (translate node)
+for polar array node, axis need text input, angle variable is angle for all distribution objects - 360 deg meaning for along a circle
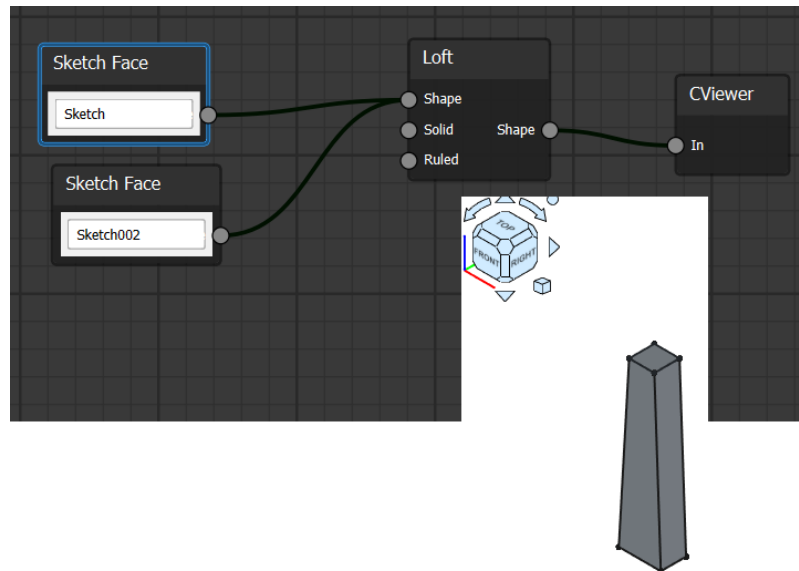
Loft:

Figure 8:

Note:
+before doing loft, need creating 2 sketches in Freecad window and also keep a distance between 2 sketches
+after created sketches must switch to Nodes WB if not it will fail to create 3d object (cview)

Sweep:
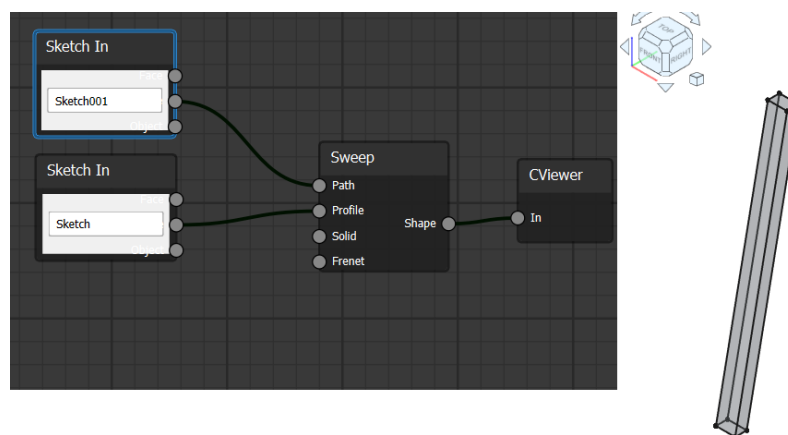

Figure 9:

Note:
+before doing loft, need creating 2 sketches in Freecad window; one for profile, one for path of sweep
+after created sketches must switch to Nodes WB if not it will fail to create 3d object (cview)

2.2   Some demo examples:
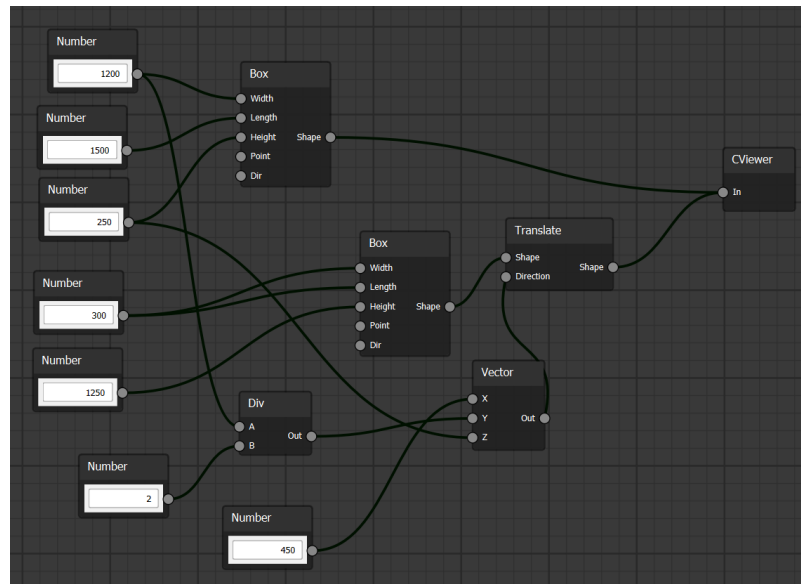
Simple footing:

Figure 10: Workflow make simple footing

Concept practice is simple: to call 2 boxes, one defined base, one defined for plinth
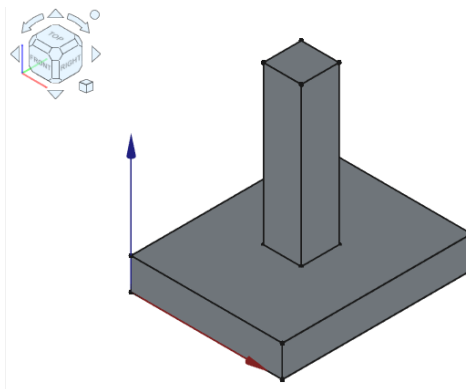Moving the plinth on top of base & to center of base

Figure 11: Result

Note:
To translate plinth onto top of base will be in sequence:
Value of X,Y,Z in number box input node → Vector node → Translate node

If doing model for single footing then may not much different with making on Part workbench
Both way can change dimension footing block as will (see fig 10)

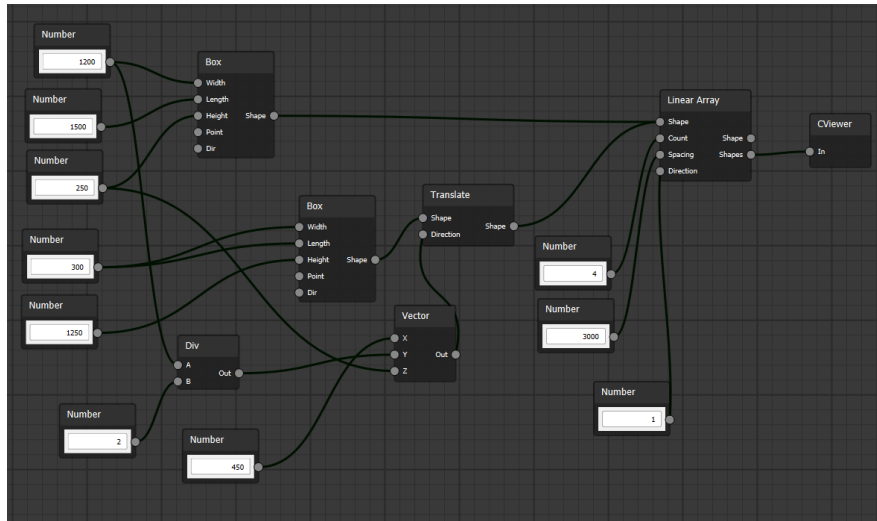**Footing layout - with numerous footings:**

Figure 12: Workflow for linear footing group

With this case, if normal practice will do several steps: make footing blocks, switch to Draft workbench for array With Node WB, those steps in same window & easy update if got changing, the design work is reliable now

Note:
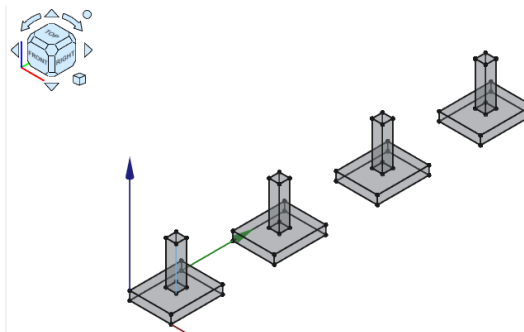+value X, Y will be $(length_{base} - b_{colum})/2$ and $(width_{base} - b_{colum})/2$

Figure 13:

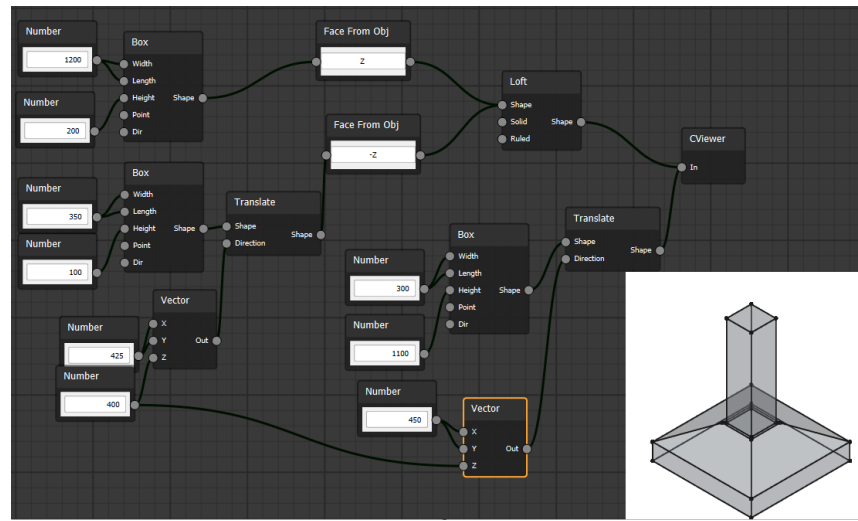+can using text equation node to key in formula

Slope footing:
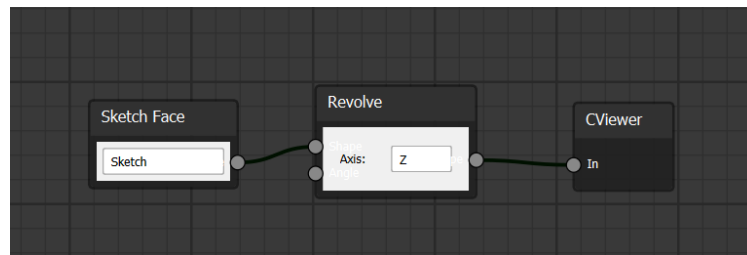
Figure 14:

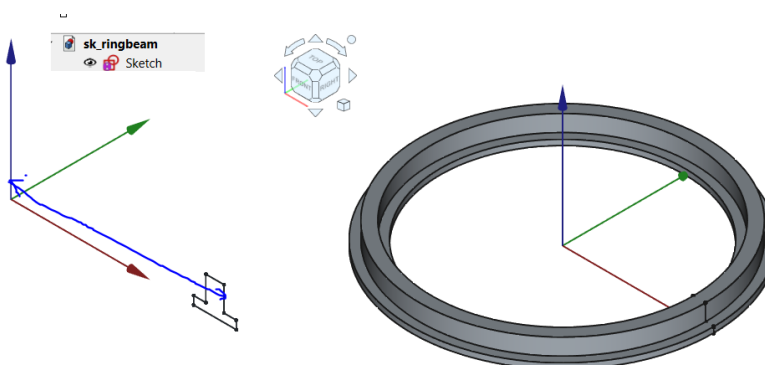**Ring foundation:**

Figure 15:

Figure 16:

Note:
+Make sketch in Freecad environment first then in Node window make workflow like fig.15,. Node WB will link to sketch do that revolve job

Sketch must be move away 0,0 (center point) to distance equal radius R before revolve
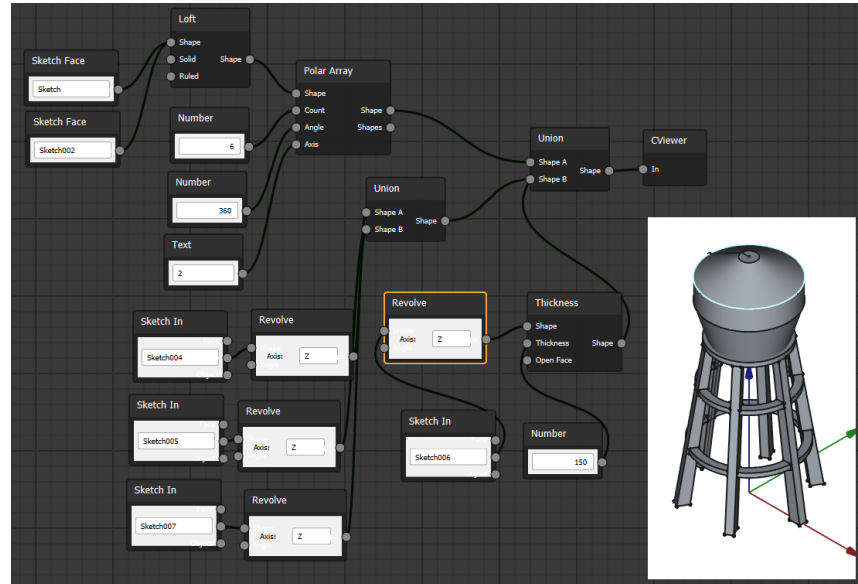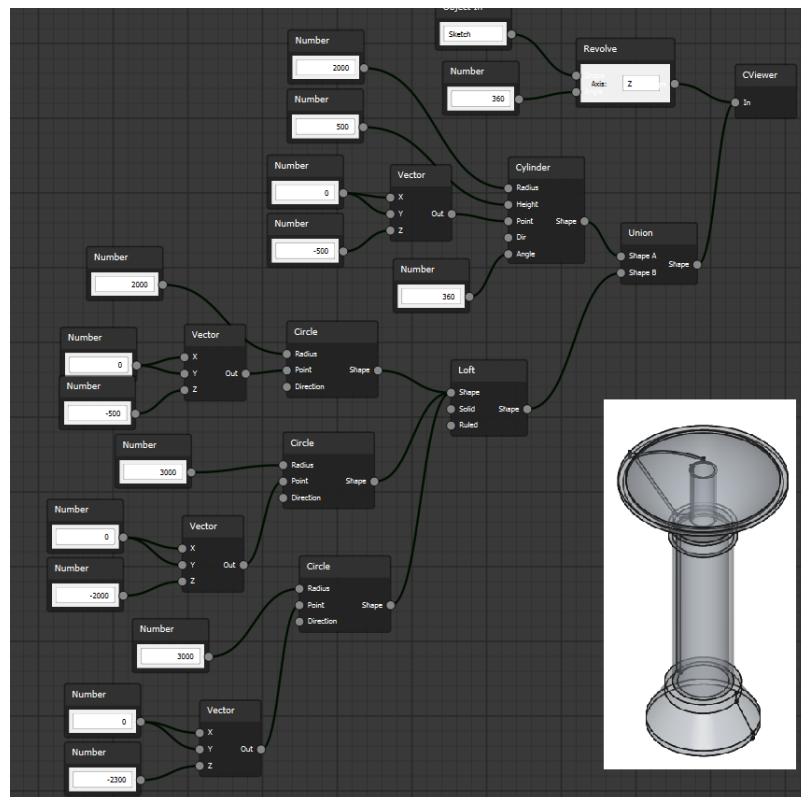
Water tank:

Figure 17:

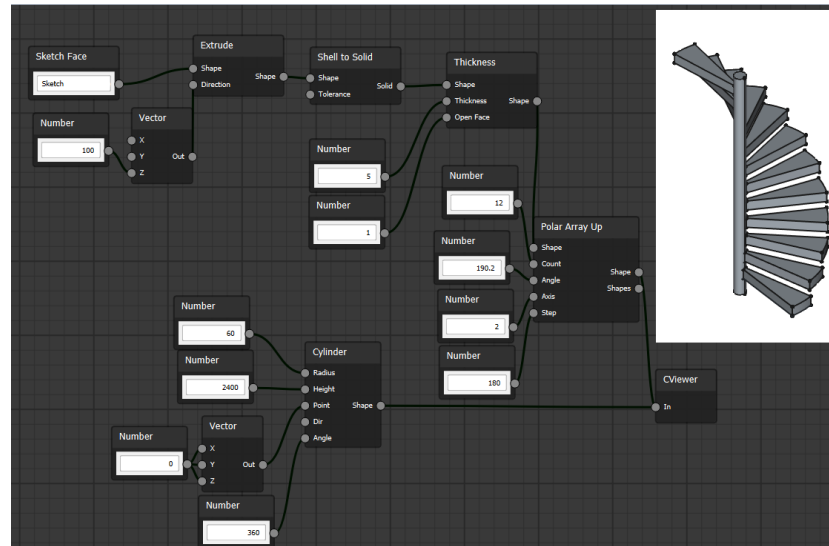Figure 18:

Spiral staircase:
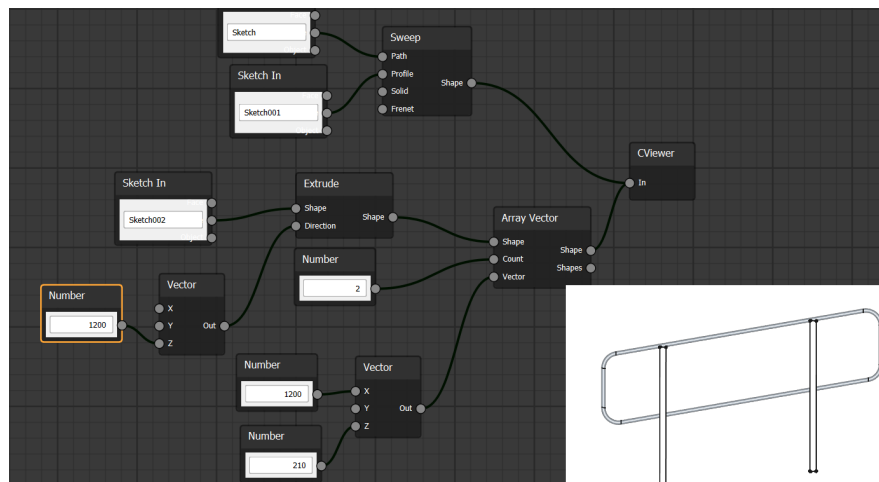

Figure 19:

Handrail:

Figure 20:

3   Summary:

Node Workbench empowers you to automate design tasks, transforming the way you work. Traditionally, achieving this level of automation required complex scripting or reliance on external tools. Node WB offers a visual, intuitive alternative – allowing you to build workflows without coding. This translates to a faster design process, reduced errors, and the ability to quickly iterate on designs. Beyond individual projects, Node WB truly shines in its ability to create reusable libraries.

Imagine building a workflow for a specific structural system – a truss, a foundation, or a complex facade. Once created, this workflow can be easily applied to similar projects, ensuring consistency and significantly reducing design time. This is in contrast to manually rebuilding those elements each time, or needing to adapt scripts from other software