Conceptualizing 3D Design

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Link to this SSA

`https://www.overleaf.com/read/kwdxhxycznfd#d951d0`

Goals

To conceptualize a 3D model for the elevator pitch

Summary

A 3D design was conceptualized. Although nearly everything in the 2D design has been kept the same, one minor change has been made at the top point of the mast of the jib, so as to fulfil the material requirements stated in the RPC list.

0.1 Conclusion

A 3D design was succesfully made after several attempts in effort to abide by the RPC list thoroughly.

1 Elaboration

Conceptualizing a 3D Design

Initially, the concept was to be kept simple as displayed in the image below

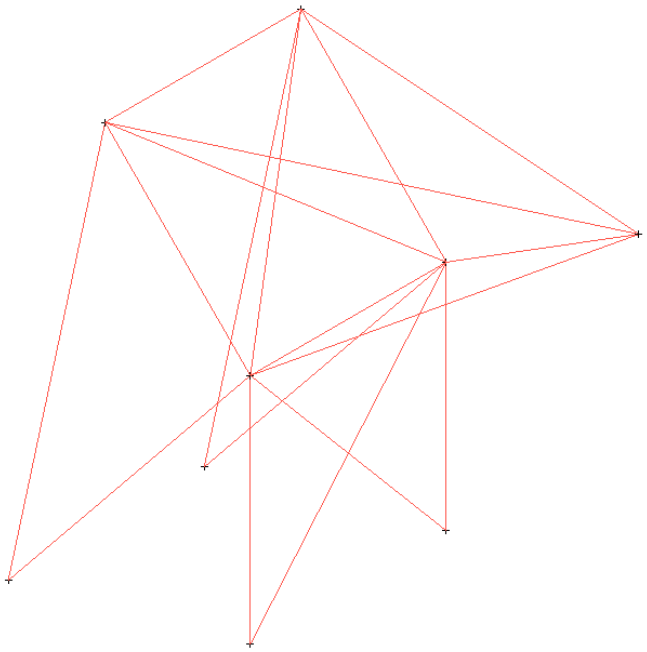

Figure 1: First Concept

However, it was clear that there would be a lack of materials to realize this concept. The solution was found by using 3 anchor points instead of 4, reducing the number of crossbars, changing the position of point 2 to reduce the length of bars 2.4 and 2.5. All of this was realized in the following design below.

(Note that the image below was taken in Marc Mentat after running a simulation with a load of 3.6 kN.)

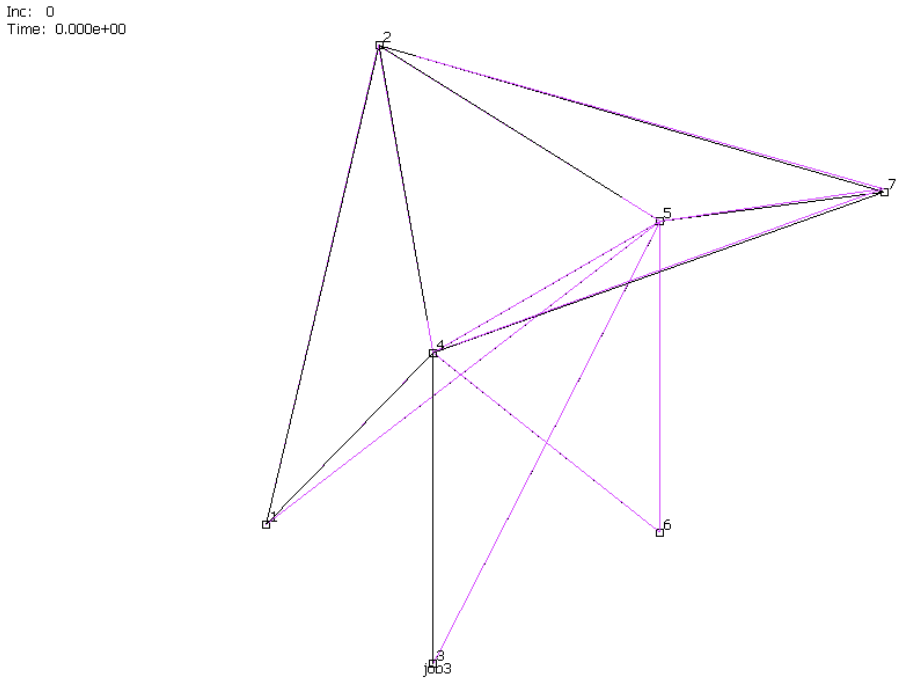

Figure 2: Labelled Figure with points

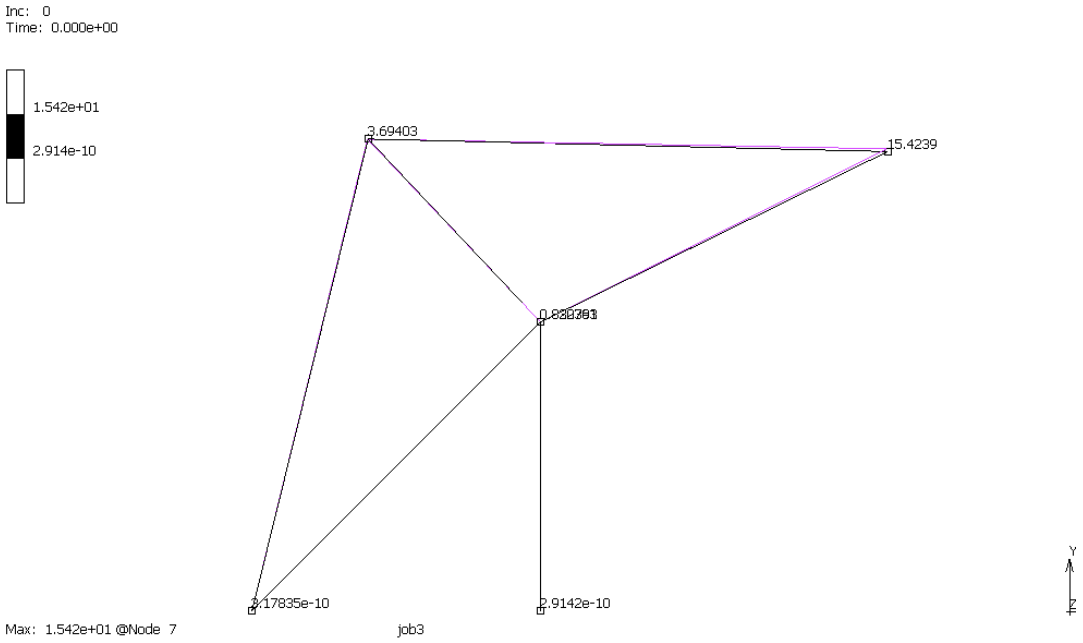

Figure 3: Final Design in Marc Mentat

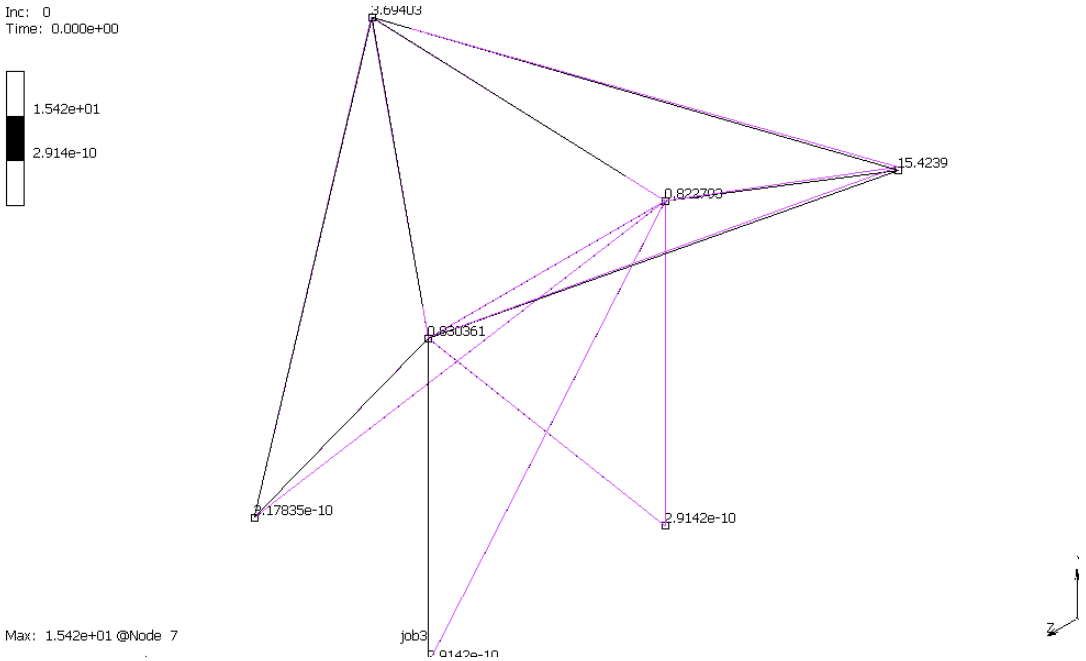

Figure 4: Another perspective of the concept

Unfortunately, the above concept too, required an excess amount of materials. So finally the below concept was designed:

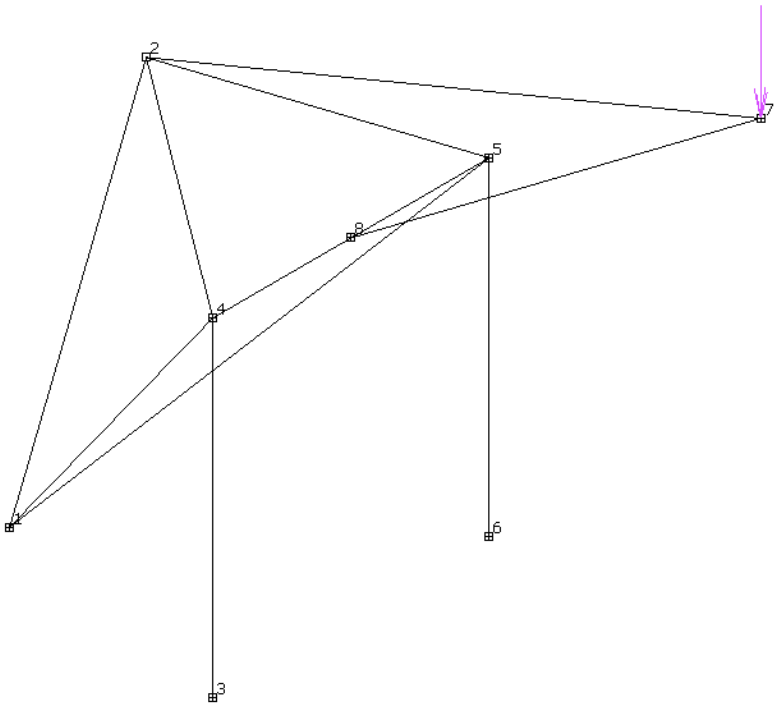

Figure 5: Final Concept

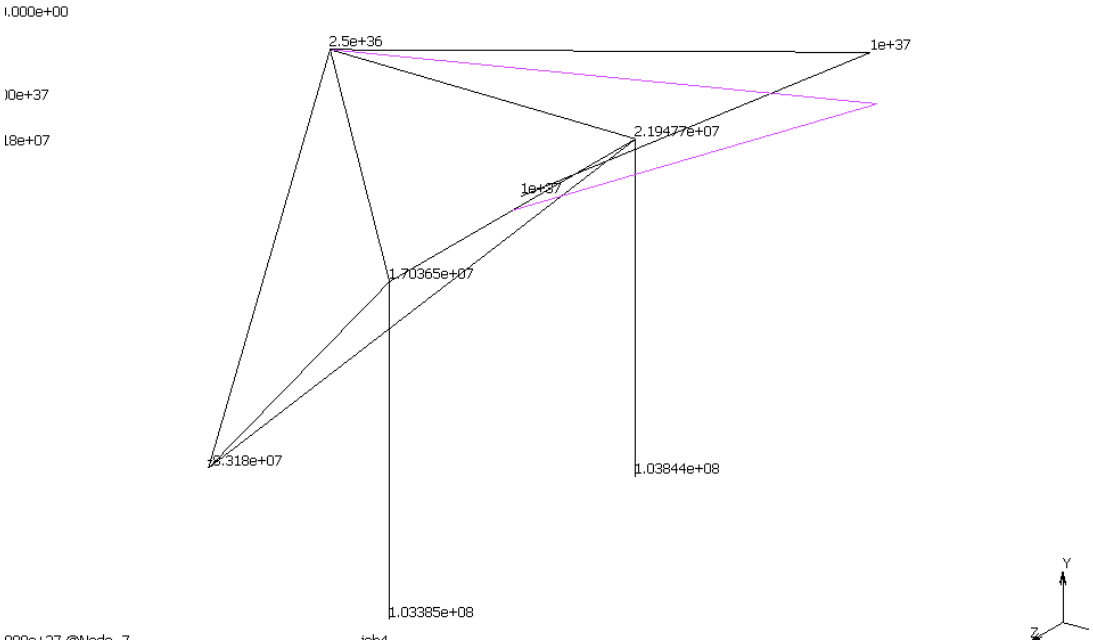

Figure 6: Final Concept Design(In marc mentat)

Material Usage

Firstly, listed below are places/areas where metal strips (3x15mm) were used. For quick reference the material availability is a total of 11m divided into 3 pieces of 3m and one piece of 2m.

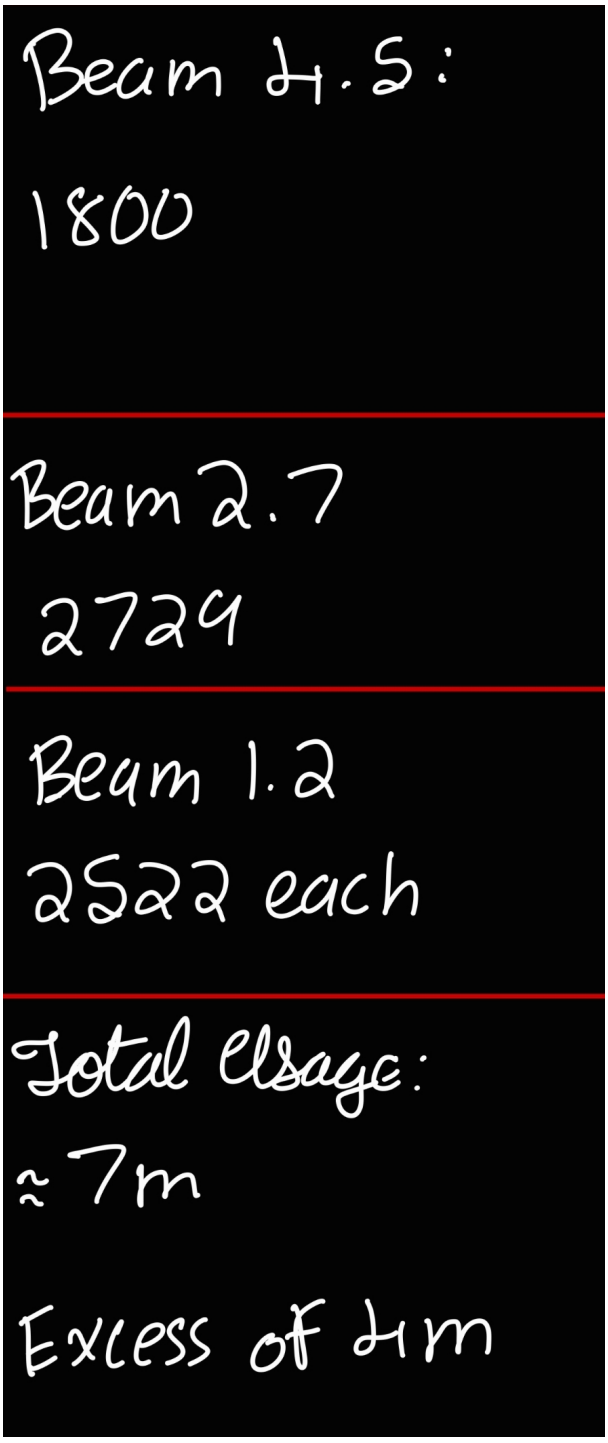

Figure 7: Usage of Metal Strips

Following is the calculations for material usage of the Corner Profiles(3x15x15mm). For quick reference the material availability is a total of 7m divided into 2 pieces of 3m and one piece of 1m

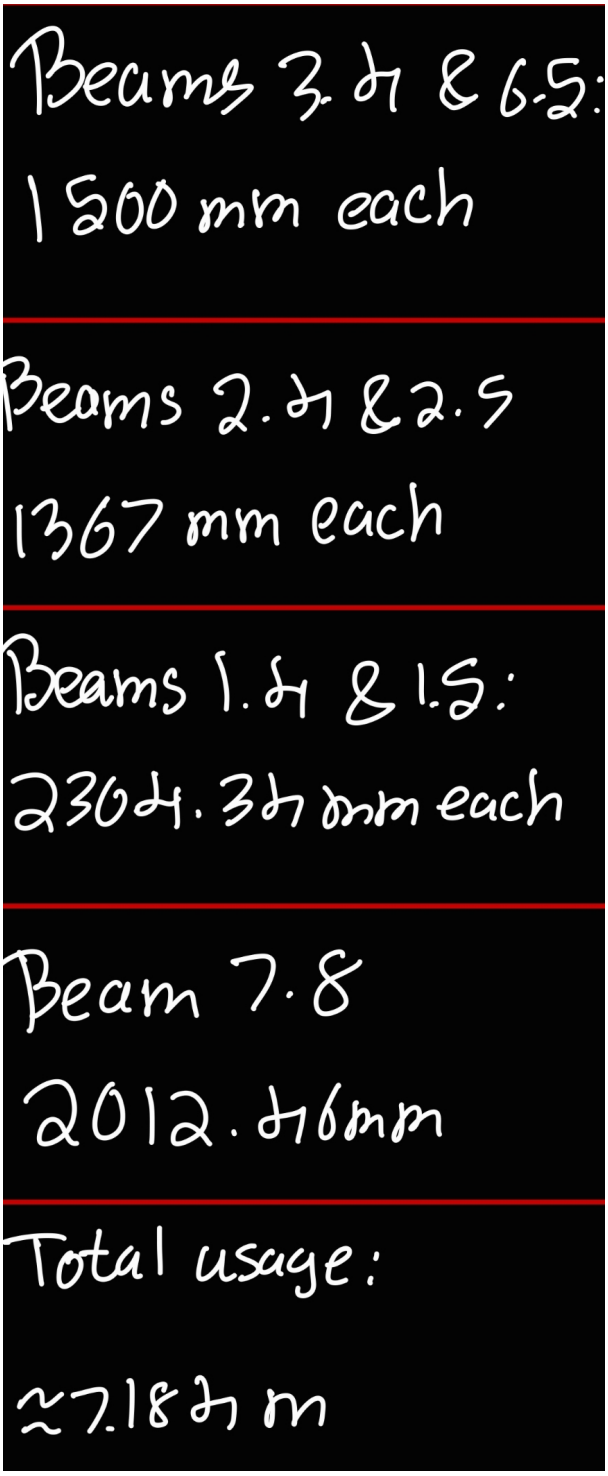

Figure 8: Usage of Corner Profiles

It is important to note that this calculation is made from the assumption that no anchor plates or conplates are used. Using the conplates and anchor plates will reduce this number.

it is also important to note that the excess of metal strips can be used to make makeshift L beams which can be used to strengthen the jib and prevent it from buckling.

All distance/length calculations were made with the help of a website [1]

References

[1] *Distance Calculator*. URL: https://www.calculator.net/distance-calculator.html?x21=-1500&y21=0&z21=-900&x22=-900&y22=2450&z22=-900&type=2&x=Calculate#threed. Accessed on 21/09/2024.