Previous Designs of Cranes

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Link to this SSA

`https://www.overleaf.com/read/cjmcygnzdmyy#91e154`

Goals

To design a 2D model and carry out calculations for the forces in each member of the design.

Problems

In limited time, the calculations were tough to do.

Summary

For the required design, the material performs better in tension than in compression states. A design draft has been made and calculations that make its case. The tension in each member is:

1. 0 kN
2. 4.32 kN
3. -7.92 kN
4. -8.949 kN
5. 7.103 kN
6. -7.366 kN

1 Elaboration

Design

After sketching a few flavors of designs, the final design is pictured below. Initial designs were run on simulators and it was found that they wuld fail.

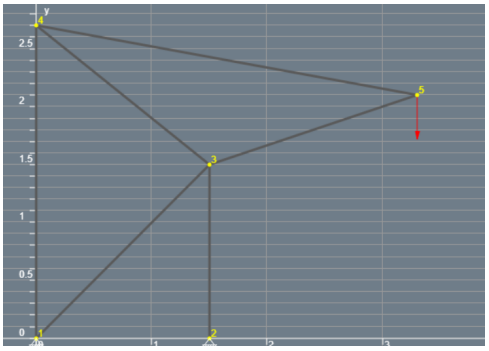
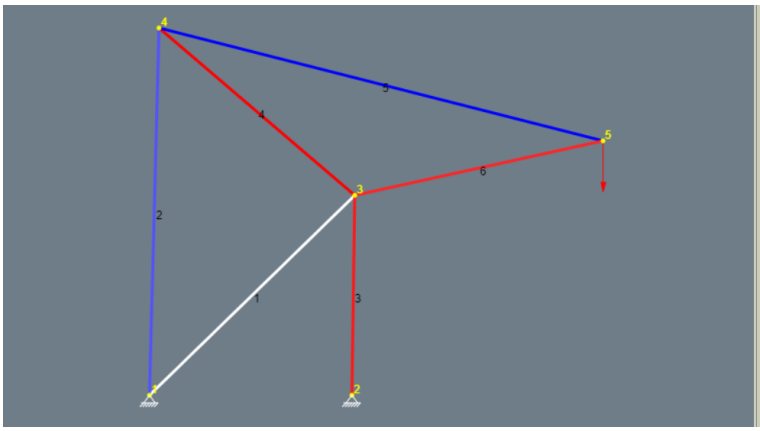


Figure 1: Design

Calculations

The calculations were done on an online truss simulator [1] as well as marc mentat. The results are in images below.



i	N_i	σ_i
1	0.000	0.000
2	4320	1440
3	-7920	-2640
4	-8949	-2983
5	7103	2368
6	-7366	-2455

Reaction Forces

i	F_{ix}	F_{iy}
1	0.000	-4320
2	0.000	7920

Displacements

i	u_{ix}	u_{iy}
1	0.000	0.000
2	0.000	0.000
3	18.86	-18.86
4	83.70	18.51
5	73.03	-251.5

Figure 2: Truss simulator

References

[1] *2-D Truss Calculator Online*. URL: `https://valdivia.staff.jade-hs.de/fachwerk_en.html`. (accessed: 08.09.2024).