Integrated Design Project 1B – 2020—2021 Assignment 1 Group design and computational model project: Group 26

University of Birmingham Assessment and Feedback Student Template:

Section One Reflecting on the feedback that you have received on previous assessments, the following issues/topics have been identified as areas for improvement:

1. Think about the logistics of the design. Would it be suitable in real life? Are all the dimensions correct and presented correctly?
2. Try to be more original or creative in the project.
3. Make sure we are presenting our work well so that others can see what we have done clearly.

Section Two In this assignment, I have attempted to act on previous feedback in the following ways:

1. We thought about how the design would work in the lab so took care when deigning with the proportions and overall structure. Took extra care when drawing dimensions for smaller details.
2. We tried to come up with an original design that would suit the task at hand, but was also unique.
3. We laid out our work clearly and took care with drawings and annotations etc so people can follow our project and how we have gone about it.

Section Three Feedback on the following aspects of this assignment (i.e. content/style/approach) would be particularly helpful to me:

1. Was the description of the model under load adequate? Was there enough detail or anything missing? Did we do the Solidwoks simulation as expected of us?
2. Feedback on the design. Was it suitable for the task? Was there anything we could have done differently to make it better or more efficient? Would it work in real life?
3. Were the drawings in the correct format and were they detailed enough?

Group Statements: Group 26

Aryan Parkeh: 2158333

I was very active from the beginning of the project. I was held back by issues from my PC but I did my most to overcome them. I designed many concepts for the design and had calculated the cost for each of them. After deliberating with my group, I chose to take up the Solidworks part of the project. I was integral to deciding on the final design and while creating the design I realized that some parts of it would not be practical and would not follow the design specifications, so I had to update it accordingly. I sketched multiple alternate methods for how the bridge will be joint and constructed. I was also the main one in charge of the communication between the group, as I scheduled and ran zoom calls regularly.

Hussein Khalil: 2247680

I was heavily involved with the creation and selecting of a design for the truss structure. I designed my own structure, however, as a group we decided to build one of the other structures which better fit the design specifications. I was then quite involved in splitting up the tasks in order to remain efficient and undertook a fair share of the written work. I contributed in writing the statement, description as well as the feedback form.

James Bird: 2212304

Firstly, I was involved in the selection of our final design. I displayed my thoughts on each of the three designs submitted and contributed in picking the final design. Knowing my strength with Solidworks I chose to be more involved with the design aspect of the project. I helped design the screws after some of my group members struggled to do so and I was in charge of the simulation. I was also the person to collate all the individual work into one single pdf document and format and display it, so it was presentable.

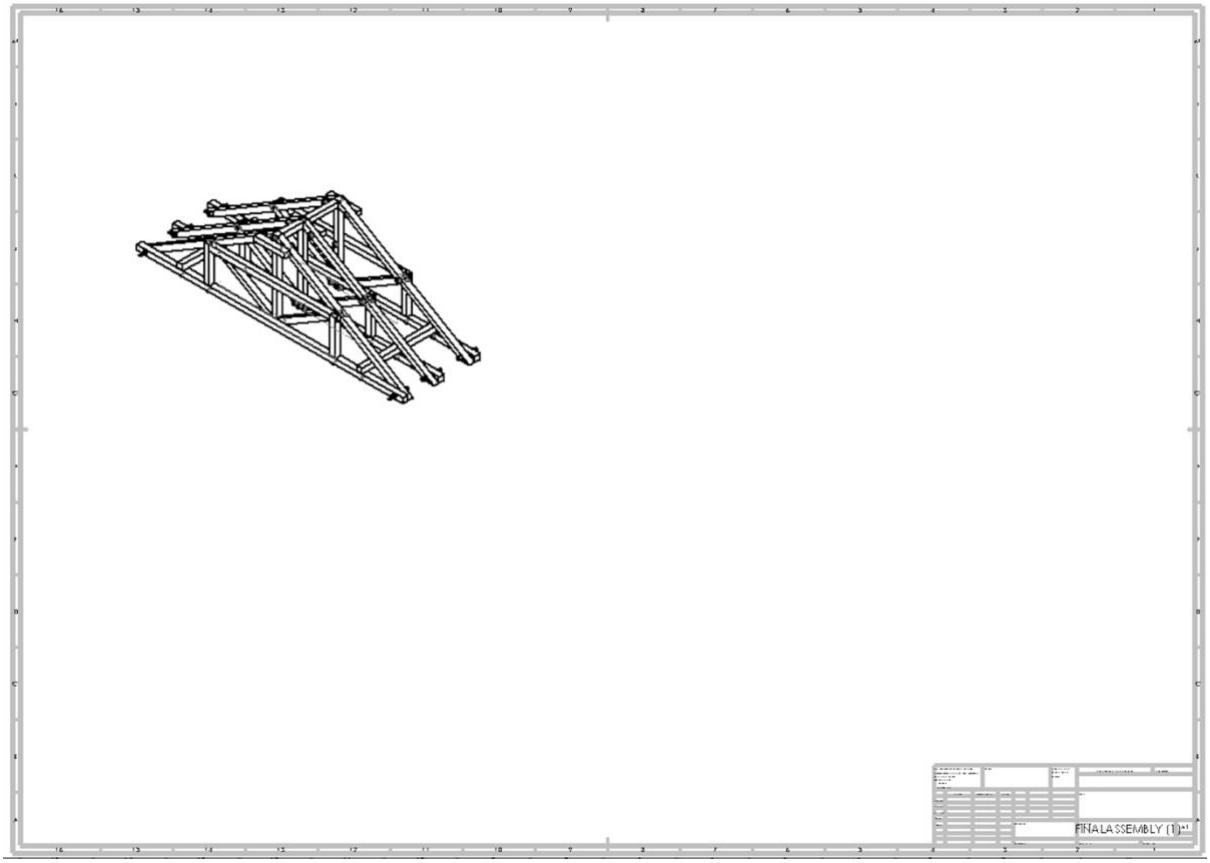
Seth Richold: 2156822

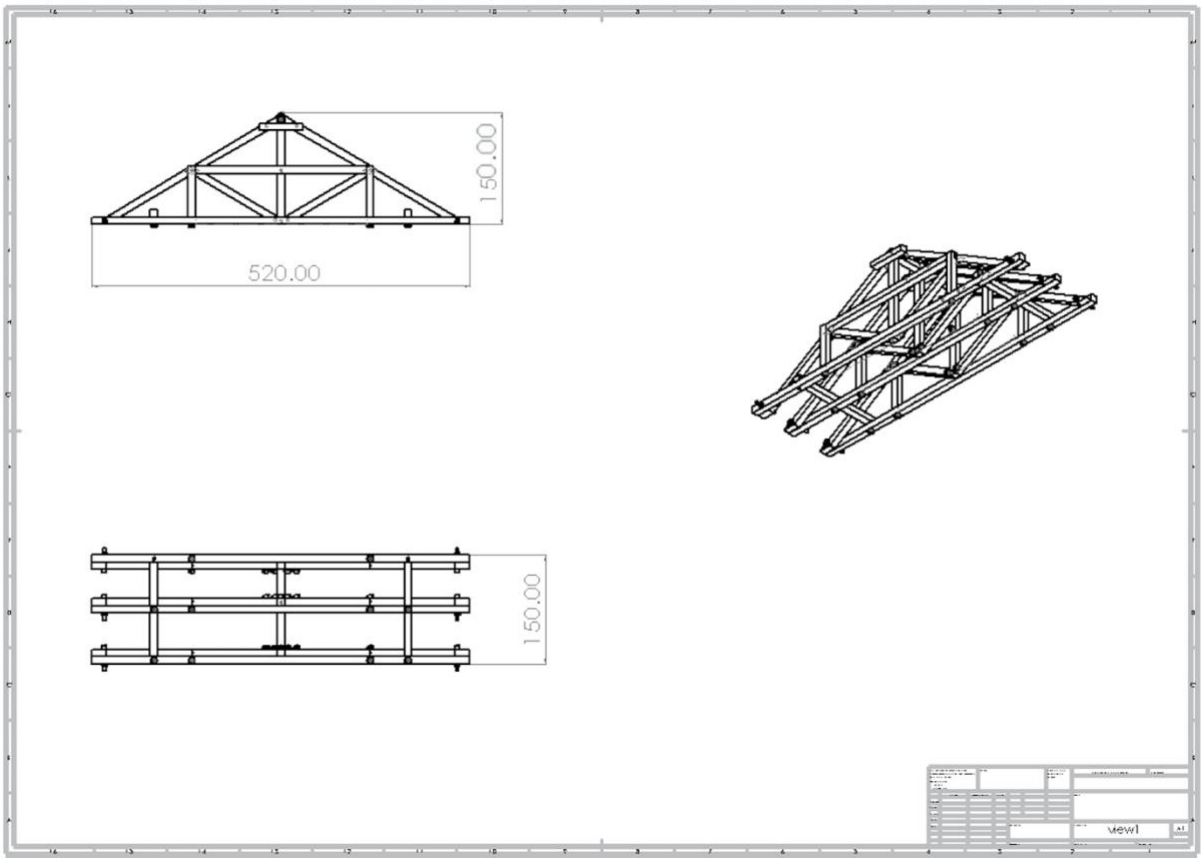
I worked a lot on the initial design ideas and concepts as well as paper and pen designs. I submitted a full design to the group which was then incorporated into our final design of the structure. I did a lot of the organizing and discussed the division of tasks as well as lots of the admin side of the project. I took up most of the written work. I worked on the full model description and the UOB assessment and feedback sheet. Furthermore, I did the full list of materials and costs.

Yuk Lee: 2209850

I was involved with the group from the beginning and set up communication. However, due to time zone differences it was hard for me to be involved in many discussions. I did my best to contribute to the choosing of the concept and used my Solidworks skills to bring the concept to life. It took up many hours but I was able to help with my part in the final design.

Assembly Drawings in 3rd Angle and Isometric View





List of materials and Total Cost

Material	Quantity	cost	Total cost
Jelutong wood	11	£0.20	£2.20
Screw self tapping wood screw	39	£0.05	£1.95
Screw & nut	6	£0.10	£0.60

This overall gives a total structure cost of **£4.75**, which is in the budget set of £5.00.

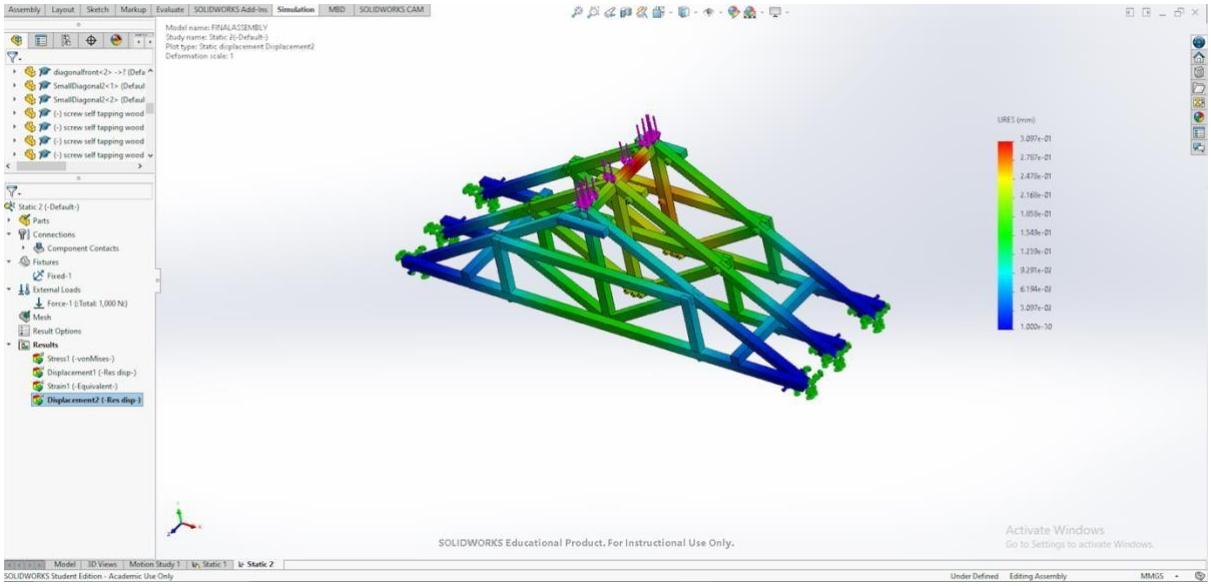
Description of Model and Description Under Load

The structure we made consists of 3 identical faces, a rectangular shape fixed to a pole which is connected to a triangular structure, repeating which have all been fixed together by three long pieces of wood. Overall 11 pieces of wood were used, and 43 screws were used which brought up the cost to £4.75. The choice to have the top surface be flat and have a small area was so that it can withstand the load by having the center of gravity applied directly under the load. The top beam is supported by three smaller pieces of wood placed perpendicularly in order to support it against the load.

Our model was loaded with a perpendicular force of magnitude 1000N, acting against the top plain of our structure (parallel to the y axis). This resulted in the top beam located in the centre of the structure taking the load. The model deforms under the force applied to the top, centre beam. Most of the deformation occurs towards the top of the structure closer to the applied force. For example, along the top beam the deformation is in a range of about $1x10^{-1}$mm to $3x10^{-1}$mm with the largest deformation taking place just over half way along the beam, whereas at the bottom of the y axis part of the structure the displacement ranges from roughly $1x10^{-1}$mm to $2.5x10^{-1}$mm. There is also more deformation in the middle of the structure along the same axis as the top, centre beam, as opposed to the outside of the structure where there is less deformation. This is due to the way the supporting forces are at the edges and the load force is in the middle. For example, along the x axis at the edges of the structure the displacement is around $1x10^{-30}$mm, which is pretty much nothing. A quarter of the way along the displacement is about $9.3x10^{-2}$mm and at the centre the displacement is ranges from roughly $1.5x10^{-1}$mm $2.5x10^{-1}$mm.

Simulation Model Pictures Under Load and Deformation

Under Load:



Deformation: