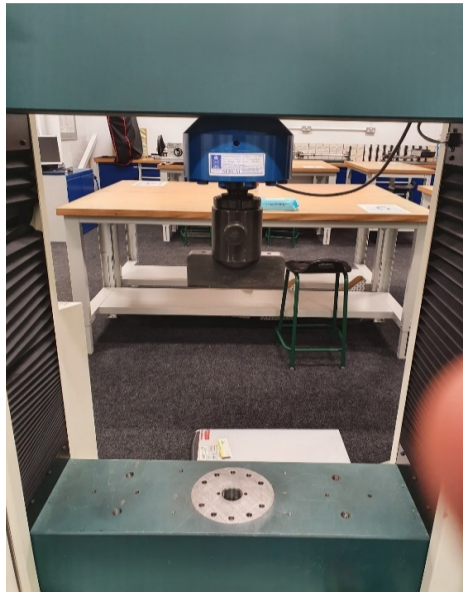


### Attachment for Testing Struts in The Tensile Testing Machine

#### Background:

The university has created a new activity in the manufacturing principles unit, which replaces the old tower activity with a strut design exercise. Once the students have created these strut towers, they must be tested in the Tinius Olsen Machine. However, there is currently no attachment for the Tinius Olsen that could be used to assist in holding the towers securely in place, whilst the testing process is being conducted.

#### Tinius Olsen Machine



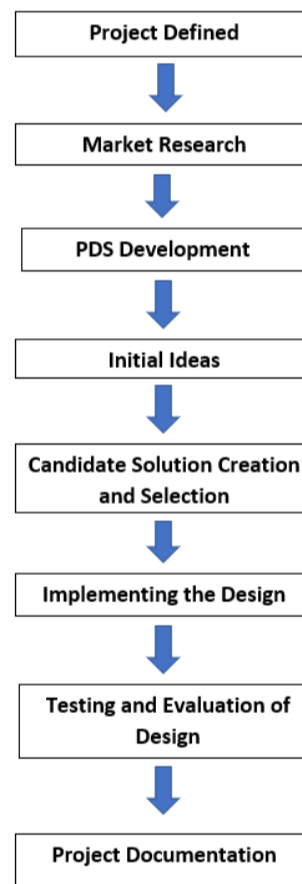
#### Introduction:

This project is focused on the development of a suitable attachment for the Tinius Olsen, that will be able to keep the students fabricated strut towers securely in place, whilst a buckling test is conducted, to receive the most accurate maximum load recordings possible.

#### The Aims and Objectives:

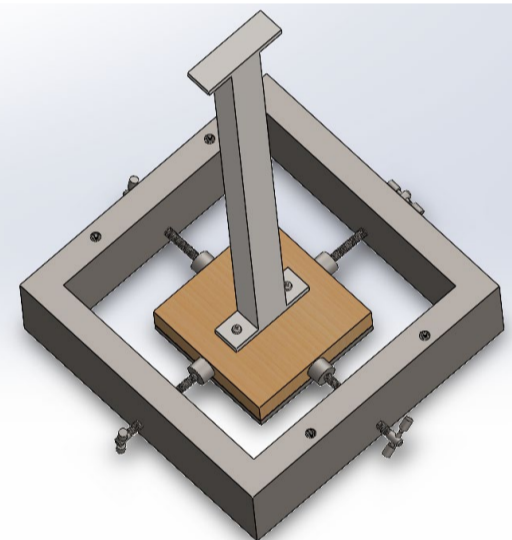
- To take measurements of the Tinius Olsen machine as well as an analysis to gauge where an attachment would be best suited.
- To use Solidworks to conceptually design the attachment.
- To investigate how the attachment will be fitted for use in the Tinius Olsen machine.
- To investigate and choose which materials will be best suited for the attachment.
- To outline how the attachment would be manufactured and produce a prototype or component to test the effectiveness of the design.

#### The Method:



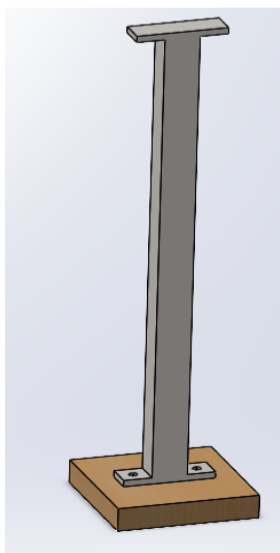
#### The Design:

The final design incorporates the use of four clamping mechanisms, that are designed to be fastened in order to prevent the strut towers from having any major displacement. It also has four mounting holes so it can be fixed directly onto the Tinius Olsen machine top.



#### The Testing Instrument:

Due to the impact of Covid-19 the effectiveness of the final solution was assessed using FEA Analysis in Solidworks rather, than the prototype mentioned in the objectives. To test the effectiveness of the design a tower was created based on the strongest tower, fabricated for this year's tower buckling test experiment.



#### The Results:

An FEA analysis was run with a loading force of being applied evenly onto the top of the tower to emulate the buckling force applied from the Tinius Olsen machine, with the clamping mechanism being fixed to the wooden base. The result from this FEA Analysis showed that there was no displacement shown on the wooden base. This would therefore indicate that in terms of creating an attachment to securely hold the struts in place the project was a success.

#### Conclusion:

In conclusion the project was a success with an appropriate design being created and tested, as well as an in-depth manufacturing plan. It can be said that the end result of the project process was able to meet all the required aims and objectives, apart from the objective of creating a prototype or component. This, however, was not met as a result of the project supervisor agreeing that due to the implications of COVID-19, the products effectiveness could be assessed entirely through FEA Analysis.

