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# The Long Term Deformation of Acetylated Timber



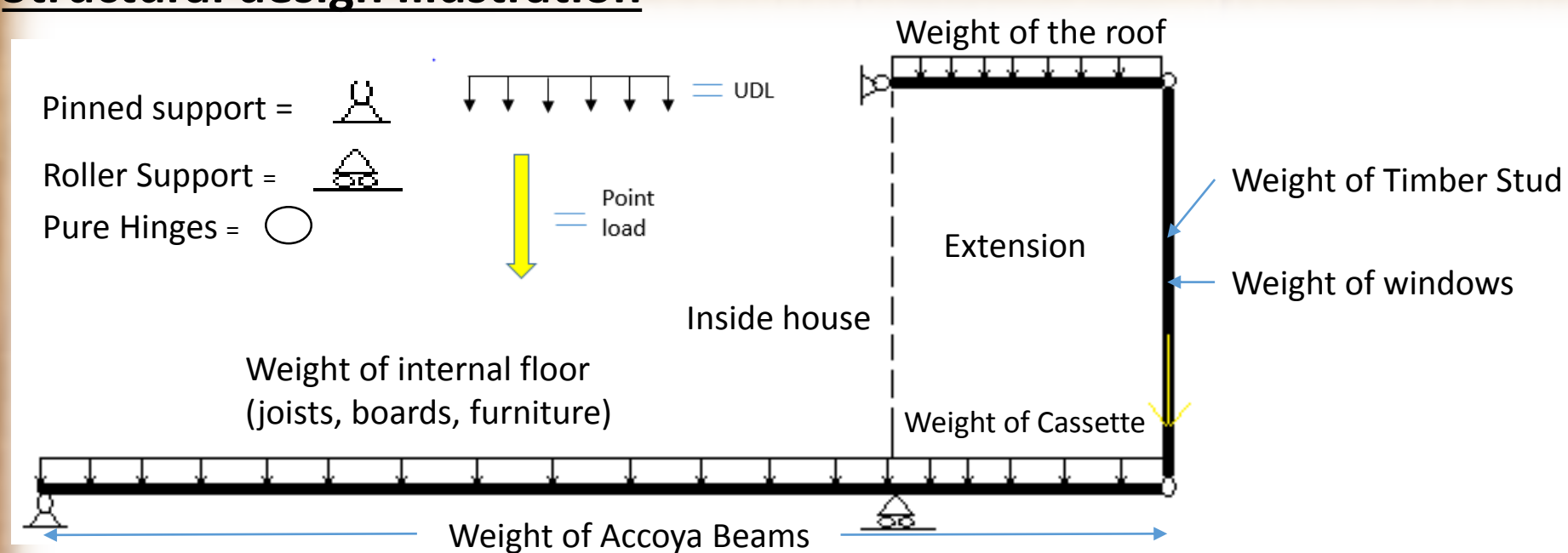
## Background

- Accoya Timber is a new and innovative type of modified timber, hypothetically with great potential as a construction material of the future.
- To form Accoya, timber is treated by the process of Acetylation, replacing the hydroxyl ions with acetyl, altering the timber at cellular level enhancing the timbers resistance against water.
- Accoya Timbers main use to date is mostly for non-structural purposes due to the affect Acetylation has on the structural properties of the wood.
- Therefore when used for structural purpose made into Glue Laminated Beams (Glulam).
- Creep and the factors affecting it.
- There is little or no previous research based on a real life project for the long-term deformation of Accoya Glulam beams.

## Project description

This project is based on a box cantilever extension on the side of a house. The cantilever structure is made of six Accoya Glulam timber beams running under the floorboards. By measuring the deflection over a 4 month period and calculating the stresses within the beams it will be possible to look at the phenomenon of creep.

## Structural design Illustration



## Future Work

- Complete all data collection needed for analysis.
- Use the structural programme Robot (Autodesk) and complete necessary structural analysis for project.



Picture of Live Project

## Objectives of the Dissertation

### Characterisation of the Deformational Behaviour of Accoya Glulam Beams

- Deflection over Time
- Load history over Time
- Stress over time
- Relative humidity over time , Temperature over Time. (in small detail )
- The analysis of the above areas and discuss the correlation between them.

### Provide Recommendations for the use of Accoya in Residential Projects

- Analyse the problems of real life structure and discuss possible areas of concern.
- Look at the serviceability limit state.

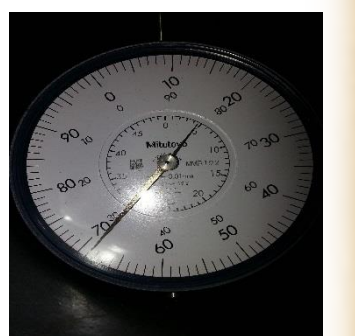
## Methodology and Tools

### Monitoring the Structure Under Investigation

- Six Accoya Glulam timber beams make up the base frame for the house extension.
- Six 0.001 mm deflection gauges are set up to record weekly deflection measurements.
- A USB Moisture reader is set up to measure the relative humidity and temperature daily.
- Accurate measurements of the structure are being taken on site.
- Data collection in a an excel spreadsheet help to keep readings in organised and well collated manner.



Accoya beam & USB Temp



Deflection Dial Gauge

### Structural Analysis

Autodesk Robot will be use to determine the stresses, bending moments and shear forces exerted.

A 2D model made in Robot will be as similar to the real life Timber frame as possible so that the stress levels are as accurate as possible, for creep analysis

Accurate loading, connection, properties and specification assumptions. The 2D model will be designed as a Frame instead of a simple beam to allow for a more technically accurate analysis.

