

## BACKGROUND AND REQUIREMENTS

- The team's sponsor is a small bicycle company that specializes in composite bicycle frames made of wood and carbon fiber. This company is Celilo bikes founded by Scott Campbell. To ensure the quality of these bicycles a repeatable method of testing their frames must be designed.

### Requirements:

- Apply 1200 newtons to pedals (one at a time)
- Apply force at a frequency between 1-3 hz
- Minimize system weight
- Minimize power requirements
- Minimize costs of parts (<\$300)
- Accommodate various frame sizes

### Team Members:

- Jordon Carnahan
- Henry Goodwin
- Mansour Al-Khaldi
- Daniel Melendez
- Connor Matrisciano

# BIKE FRAME TESTING MACHINE

Goal: Test bicycle frames made by our sponsor, Celilo Cycles to see if they meet ASTM/ISO standards.

## Concept

The concept shown to the right was chosen for the final product with some minor changes.

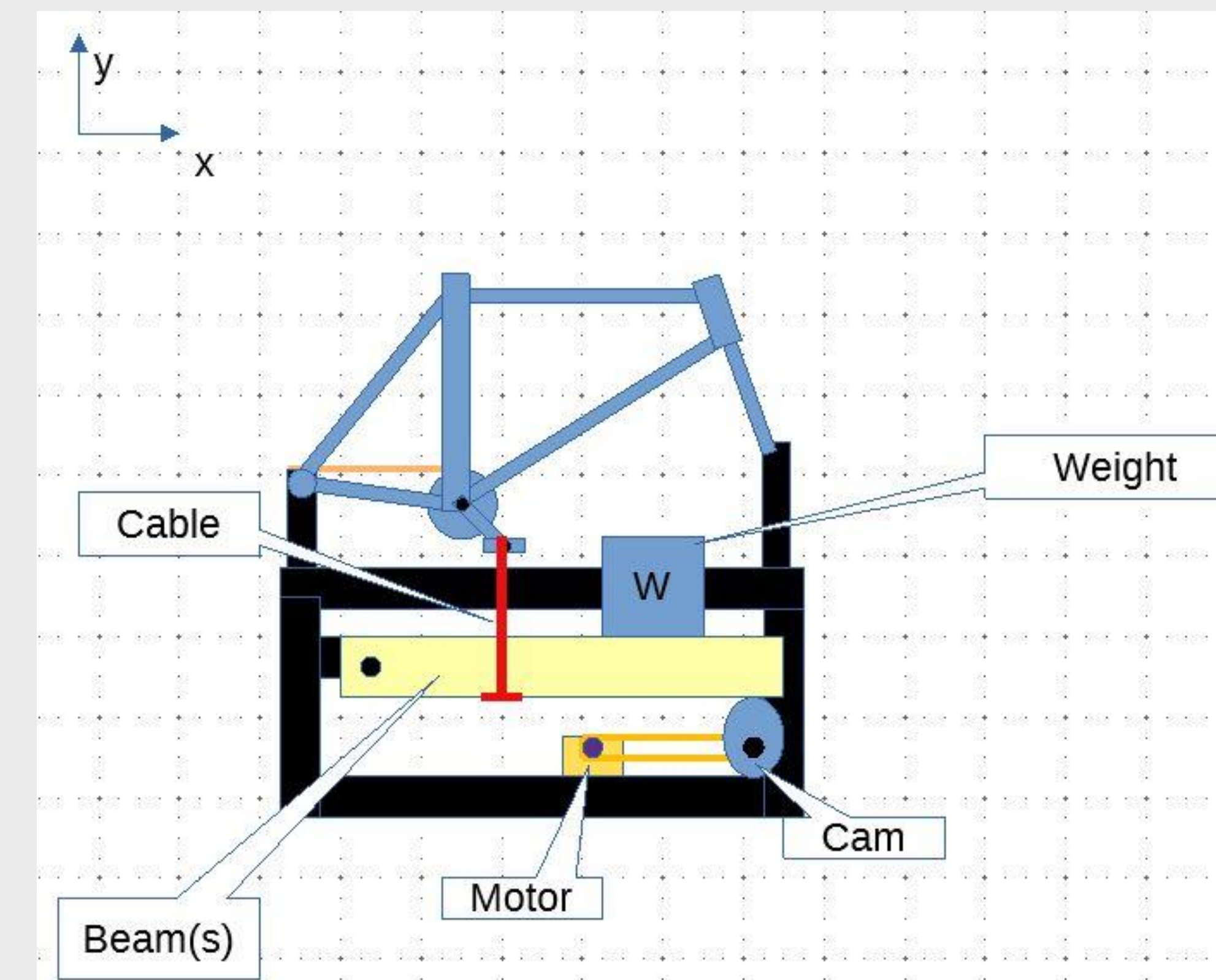
The bicycle is mounted to the frame via the front fork and the rear dropout. A beam is used to apply the forces to the pedal through a steel cable.

A weight is added to the beam to ensure the correct force is applied to the pedal

Each of the 2 beams are lifted and lowered via 2 cam lobes, that are 180 degrees out of phase.

The camshaft is driven by a motor through a series of pulleys used to increase the effective torque of the motor.

## Current Design



## Future Progress

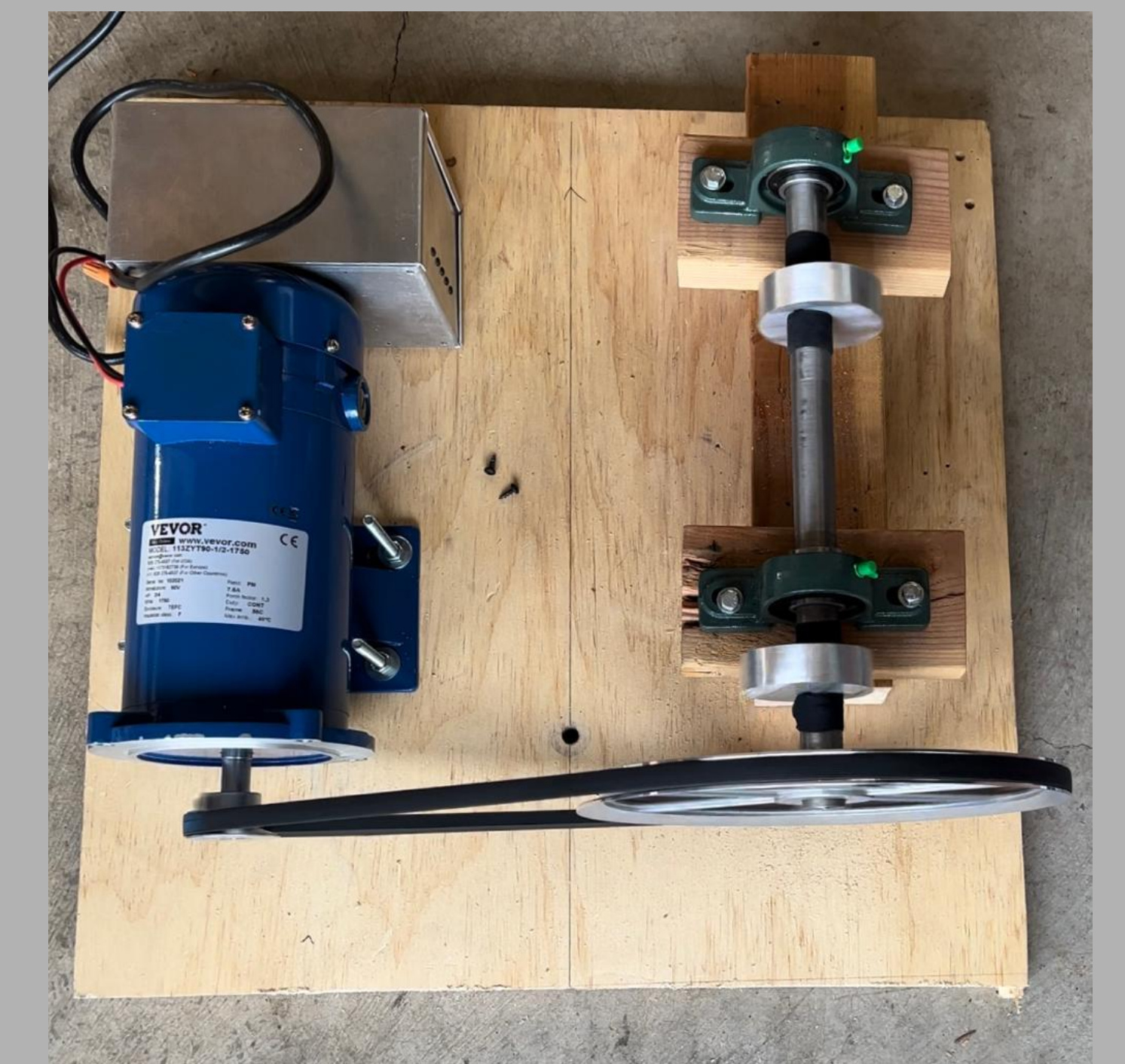
- Creating extra supports for future stresses
- Creating slotted connections to support different sizes of bikes

## Testing the Machine

Continuous tests will be done with multiple bike frames to ensure loads are steady even with changing factors like bike size and strengths.

## Subsystem: Motor and Camshaft

Lifting a beam to the required height was one of the largest difficulties we had to overcome. To do this we created a pulley system with a cam shaft attached that repeatedly lifts and lowers the beam system.



## Subsystem: Force Sensor

In order to ensure the correct force is applied to the pedals a force sensor is used to measure the weight on the pedal during loading.

Using an arduino, a Hx711 load sensor amplifier, and the force sensor we can read force data shown below.

