



HMS Banana

DESIGN & PROTOTYPE

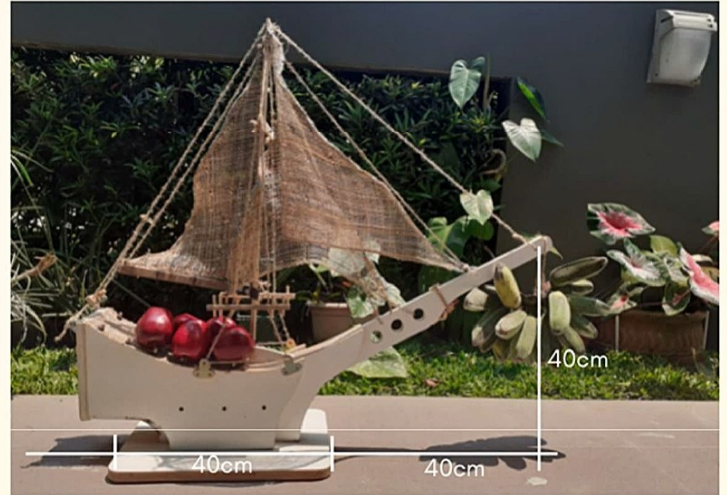
The HMS Banana holder is a tabletop naval feature that holds an entire hand of bananas, weighing a maximum of 3kg, 40cm away and 40cm above, plus a few fruits on its deck.

GINO BALDO ARCH 171 - BELGA

FEATURES

The finished holder weighs a total of 6kgs, and can carry a maximum load of 3kg at the tip of the bowsprit

Once the main structure was finished. It was decorated with true-to-life sailboat accessories complete with a mast, rigging, sails, pins, and a mermaid.



The bananas can be attached either by a clip or a rope. There is no need to do it slowly, the boat remains stable.

The holes on the bowsprit are for decoration and to reduce the contributed load of the bowsprit.

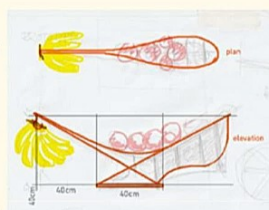
True to the original concept, fruits can be placed on the deck. The fruits can contribute to the counterweight of the bananas, but is not necessary.



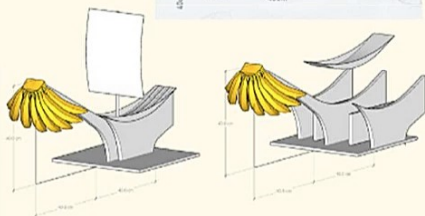
These are fake apples

CONCEPT

Initially, the holder was going to be a raw structure (seen beside) with counterweight and a basin for fruits. During construction, I saw how it resembled a ship, and went in that direction. It was also on the suggestion of my dad, who is an avid sailing enthusiast.

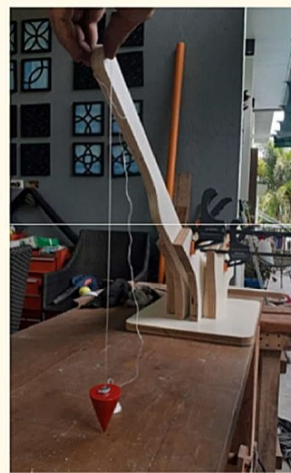


Hull shape cut on paper to be traced on scrap plywood planks.



The bulk of the holder is made of 3 plywood planks and 2 dividers fitted in between them, mimicking a ship hull, and a 30x40cm platform.

The point where the bananas are hooked on to is 40cm above the surface of the table. The point directly below that is 40cm away from the edge of the 30x40 platform.

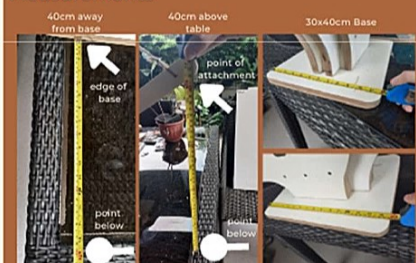


The bananas we had at home was a hand of 21 saba, which were heavier than the regular ones, weighing 2kg.

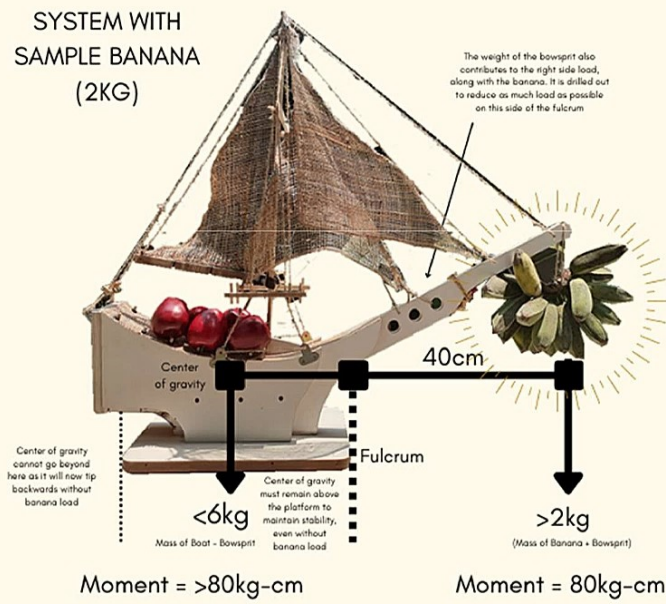


When fixed together with wood glue and screws. The hull of the ship itself is already able to carry all of the load by itself while remaining completely stable. All the ornamentation added afterwards have negligible load and impact to the structure.

Measurements



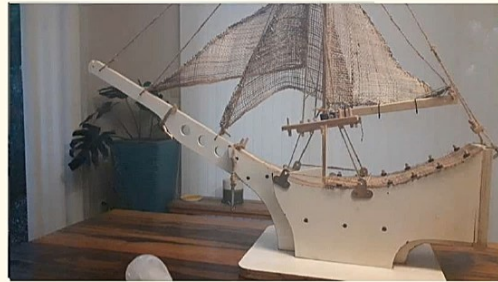
SYSTEM WITH SAMPLE BANANA (2KG)



To safely hold a 2kg hand of bananas, 40x40cm away, would need a significant counterweight on the opposite side of the fulcrum (tipping point). The moment of this counterweight must be always greater than that of the load's ($2\text{kg}\times 40\text{cm} = 80\text{kg}\cdot\text{cm}$)

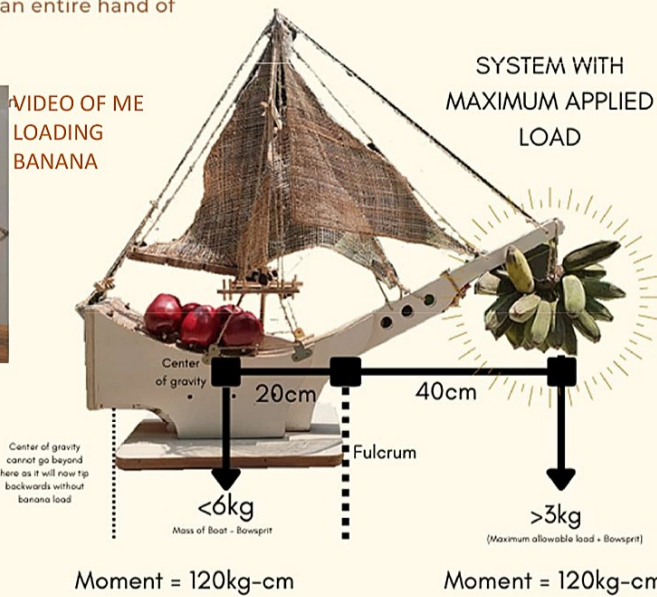
It must also remain above the area of the platform so that it doesn't tip backwards in situations where there is no banana loaded.

Given that the saba is on the heavier side of banana, it can be expected that the holder can very well support an entire hand of most kinds of bananas.



VIDEO OF ME LOADING BANANA

For added information, given a $120\text{kg}\cdot\text{cm}$ moment, the boat's center of gravity is around 20cm to the left of the edge of the platform.



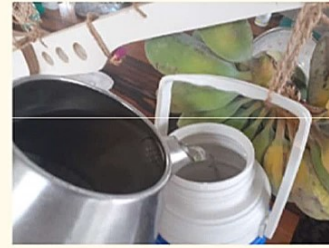
SYSTEM WITH MAXIMUM APPLIED LOAD



MEASURING MAXIMUM LOAD BEFORE TIPPING OVER.

Seen beside is a water jug attached to the bowsprit alongside the 2kg banana. I gradually filled it up with water up until the moment the boat's platform started lifting off the table, and measured the weight of both objects.

Unaided, the maximum load the banana holder can carry before tipping over is 3 kilos. Conveniently, most hands of bananas do not reach that weight.



With a holder that is able to lift a load half its mass at such a distance, I would say that it is quite efficient, but could be improved by setting back the as far away from the fulcrum. That way, the holder's mass is reduced, but moment is retained.

BREAK TEST

The HMS Banana, was constructed from scrap marine plywood planks, and adhered together with wood glue and screws. It is very much one solid carpentry-level object at this point.

For practical and sentimental purposes, I did not subject it anymore to a break/failure test. However, I surmise that the most likely points of failure would be along the bowsprit, specifically the thinnest portions around the drilled holes. The maximum load would just have to be estimated based on the material strength of marine plywood at that thickness.



RECOMMENDATIONS & IMPROVEMENTS

Though I am very satisfied with how my banana holder resulted, any improvements should go to the reduction of weight as much as possible. This can be done by repositioning the center of gravity as further back as possible above the area of platform.

As for the platform, it is recommended to utilize the entire 40cm lengthwise of allowable platform. This allows your fulcrum to be as close to the point load as possible reducing its moment, while also allowing your counterweight's center of gravity to be as far back as possible, in turn reducing the structure's required mass.

