

To: Dr. Trevas

CC: GTA

From: Rural Food Processing Capstone Team (19F16)

Date: 7 February 2020

RE: Hardware Review Memo

Introduction

The capstone team has successfully remained on target for completion of the final product to be delivered to the client. Since the end of last semester, the team has determined a new dispensing system that allows easier flow of cocoyam while simultaneously speeding up the dispensing process. The rolling portion of the project has remained relatively unchanged, with some improvements currently being implemented. The dispensing system has been updated to feature a caulking gun as the main method for dispensing. Hardware for both subsystems was reviewed with Dr. Trevas at the team staff meeting on Thursday, February 6th.

Dispensing system

The team has decided to use a caulking gun as the dispenser instead of the original box dispenser that struggled to dispense the thick cocoyam. The cocoyam paste does not flow easily or with gravity causing the original dispenser to clog and only dispense when a lot of forced was used. To fix this problem the team decided to use a caulking gun to dispense the paste. Caulking guns are designed to dispense paste much thicker than cocoyam, making dispensing cocoyam very easy.



Figure 1: the gun dispenser that will dispense the cocoyam

The new dispenser can be seen in Figure 1. It is simple to use due to the 12:1 mechanical advantage ratio the caulking gun has. This style of dispenser is easy to clean with its ability to be quickly broken down into several smaller pieces as seen in Figure 2.



Figure 2: The gun dispenser disassembled

The ability to disassemble it allows the device to meet the sanitation requirements previously set. Along with meeting the sanitation requirements the removable nozzle allows the user to customize the amount of cocoyam being dispensed. The device currently has a 5mm diameter opening in the white nozzle that replicates the amount that was dispensed when we watched it being made in Phoenix. The main portions of the device are made from metal and heavy-duty plastic allowing it to be durable and withstand many cycles. Removable tubes have also been ordered to allow user to buy a lower cost caulking gun and still have the same style dispensing system.

Roller system

The team modified the roller system from last semester to improve performance. The team switched the order in which the base of the roller, the side rails, and the end bracket were assembled. This change reduces the distance between the roller bar and the base in order to create a tighter overall roll. Upon making this change, it was also determined that it would be beneficial to change thru holes into slots in order to account for tolerancing of the system and reduce the need for tight tolerances. This has also led to the addition of washers in the system in terms of additional hardware that was not in the original CAD package.

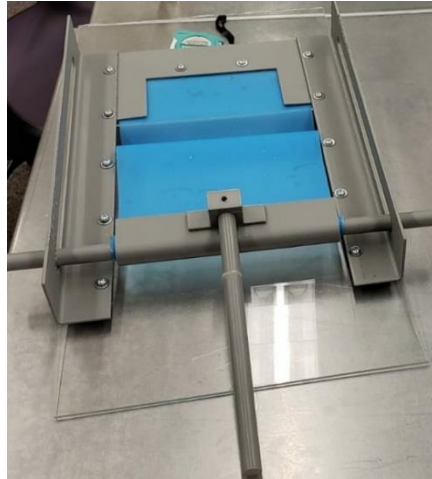


Figure 3: The roller the team will use

The team will also be altering the handle on the roller device from an extended dowel rod as seen in Figure 3 to a C-shaped handle that will sit above the roller bar. This change is intended to minimize the space the roller requires to operate as well as provide an easier grip that will help with the rolling process. The number of fasteners will also be reduced to simplify the design. Other than these small changes, the roller will remain unchanged unless the team determines a need to change the design further.

Team Effort

The team worked efficiently last semester to produce a functional prototype that assisted with current success in this hardware review this semester. The team evenly distributes work on assignments and manufacturing, so each member has a chance to be involved. Specifically, Nygel and Musab primarily worked on processing the base materials into the dimensions required for the design. Samantha and Humoud focused mainly on finishing processes and assembly of the device.

Future Work

The team will incorporate the changes outlined and highlighted by the hardware review. The team is on track for completing the final product according to the deadlines set for the class. The client has also requested that a prototype be made from wood, which the team is currently researching as to the best way to fulfill this request. Testing with the roller and dispenser will begin, starting with testing in Phoenix with Jacky Nwana, who is familiar with the traditional way of rolling Ekwang. Ultimately, the team has been successful transitioning from ME 476C into ME 486C and has made strides to improve upon the design and hardware of the state of the design last semester.