



Mockup Review

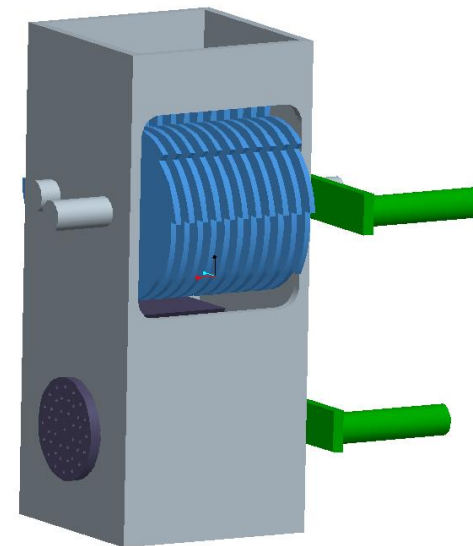
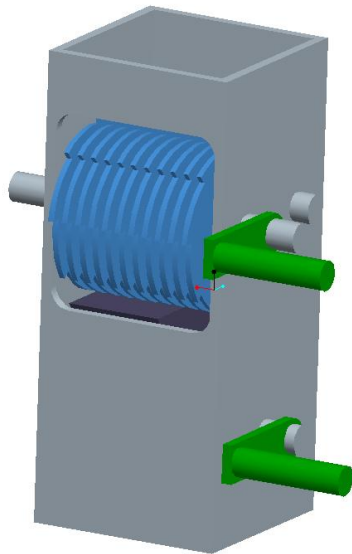
Manioc Grater

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Purpose of Manioc Shredder

- Increase daily productivity of Haitian manioc grating
- Produce food-quality Manioc flour
- Be used on a portable, individual scale





Critical Issues

- Resolved in this mockup:
 - Ability to produce desired particle size
 - Ability to produce flour
- Remaining challenges
 - Increase throughput
 - Decrease cost
 - Address practicality of mechanical design



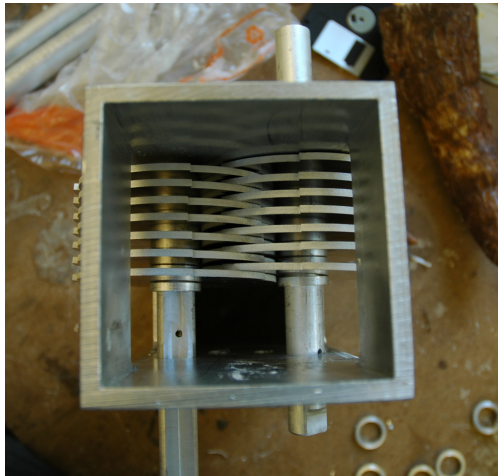
Our Challenge: Small Particle Size

- Purpose of shredding: to rupture cell walls to release starch granules
- Current methods produce strips 1/16"-1/8" thick, 1/4"-1" long
- To test whether particles are small enough to grind and sun-dry manioc, observe the consistency of the flour produced, and compare to output of current processes





Smaller Blade Size 1/8 inch



To achieve smaller particles :

- Decrease blade thickness (0.125")
- Vary teeth height (0.3" , 0.15")
- Increase number of blades (6 → 14)
- Decrease space between spacers and blades to prevent fall through

Single-Axle Design



Advantages :

- Fewer blades / less material required
- One axis of rotation – no gear system needed

Disadvantages:

- The smaller cutting size is more likely to clog or cake with manioc pulp



Second Stage Screw

- Sketch model suggested second stage needed.
- Large manioc pieces are put through second stage cranked screw mechanism



Outcome:

- Production rate: 2.4 kg/hr
- 20% increase over traditional methods





Comparing Final Flour Product



- Manioc grated by the different methods were dried and crushed to compare flour output
- Two-stage method produced flour of comparable size and consistency to old method (although new method seemed to yield smaller particles)





Grater Mockup Analysis

Achievements

- Appropriately small sized grated manioc produced by reasonable mechanical means.

Future Steps

- Speed up process to make product commercially viable.
- Couple first and second stage mechanisms.
- Improve cost efficiency

Lessons

- Shredding cannot achieve desired particle size in single stage with low precision.
- Screw works, but manioc needs preparation stage.
- Need more mechanical advantage to increase output speed.



Conclusion

Must reconsider the manner in which we rasp manioc if we are going to pursue this idea.