



# COCONUT LATHE

## EFFICIENT PARING IN RURAL PHILIPPINES

HEMA NOOKALA MARIA REUBEN ALDRIN PEREZ CHUZHANG HAN

SUPERVISOR: PROFESSOR AMY BILTON

CLIENT: COCOASENSO

### CHALLENGE

#### CocoAsenso: Empowering Coconut Farmers



#### BACKGROUND

CocoAsenso is a social enterprise producing desiccated coconut in Samar, Philippines. With factories in remote areas, they increase profits and jobs for local farming communities.

The current, manual paring method to remove the skin (testa) of the coconut is strenuous, and was identified as a limiting step to the production process.

#### DESIGN OBJECTIVES



Increase efficiency and output



Increase ease of paring



Increase coconut meat retained



#### Data Collection in the Philippines

Visiting the factory in Samar allowed for direct field research.

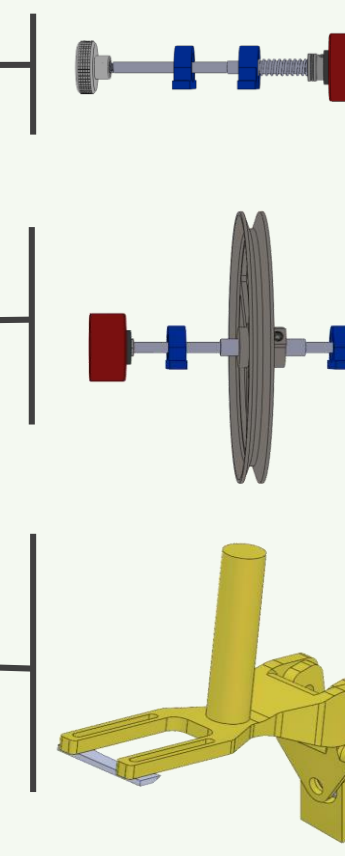
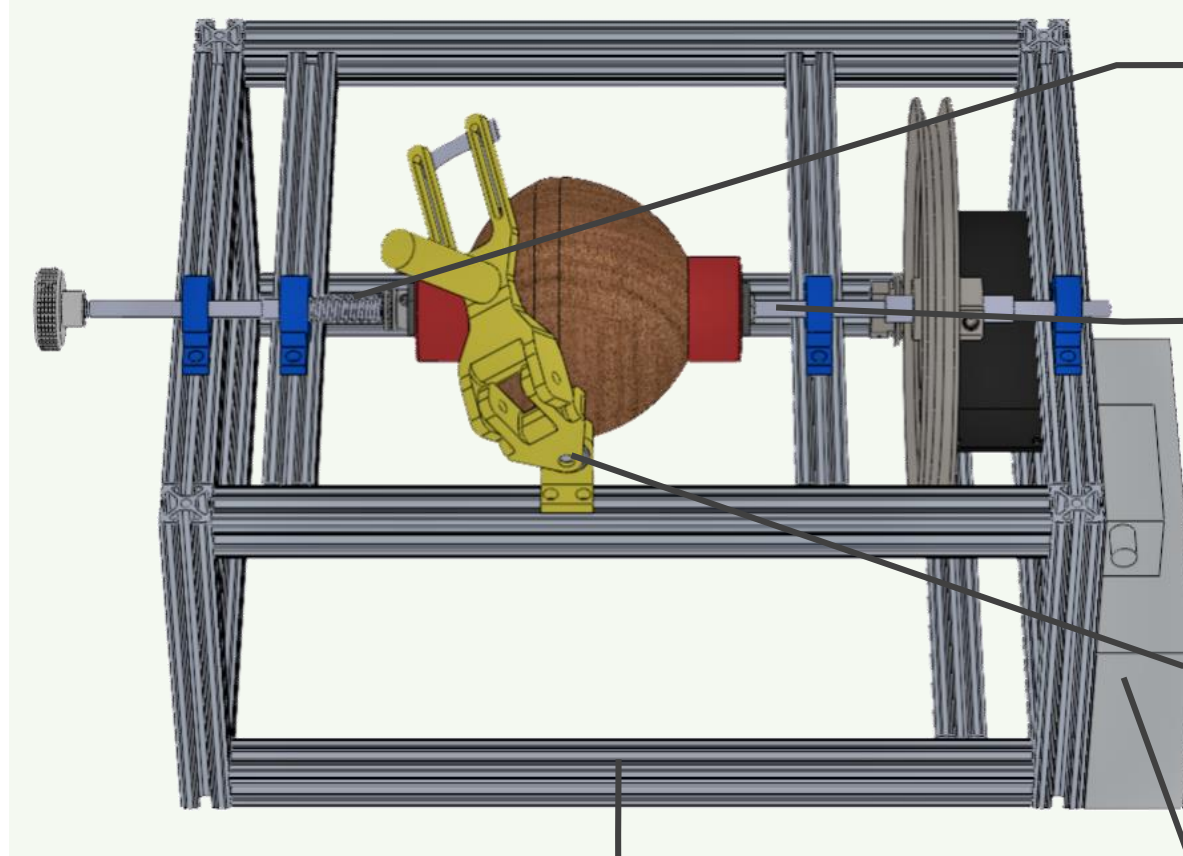


DATA COLLECTION METHOD	CONCLUSIONS
Paring time	2340 coconuts pared per day
Testa thickness	87% coconut meat retention
Parer interviews for feedback on current process	Process should be easy to learn and reduce shoulder strain

### SOLUTION

#### Proof-of-Concept Prototype

Prototype parameters were systematically selected and tested using the Taguchi method.



#### SUPPORT SHAFT ASSEMBLY

Spring applies compressive force on coconut

#### DRIVE SHAFT ASSEMBLY

16:1 pulley ratio delivers required torque  
Hole saw teeth secure coconut during rotation

#### PARING KNIFE ARMATURE

2 DOF pares different sized coconuts  
Traces geometry to minimize meat wasted

#### 80/20 EXTRUSION FRAME

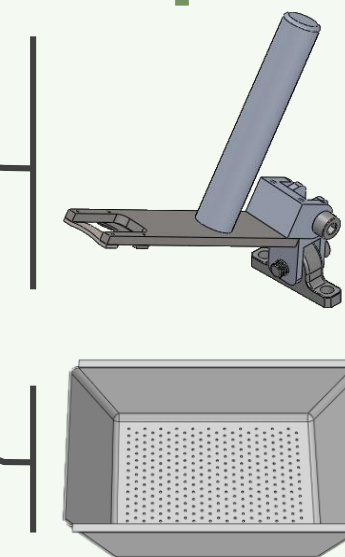
Provides modularity of components and rigidity of structure

#### MOTOR AND CONTROLLER

PWM speed controller provides reliable and adjustable rotational motion



#### Implementation in the Philippines



#### CURVED PARING BLADE

Added coverage and designed for minimal milling

#### TESTA COLLECTION TRAY

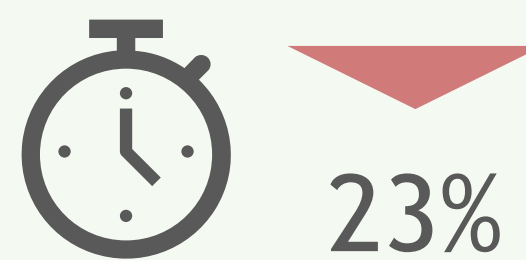
Slides out for easy testa collection and cleaning

#### HEIGHT-ADJUSTABLE LEGS

Ergonomically designed frame using locally-sourced steel

### IMPACTS

#### Process Impacts



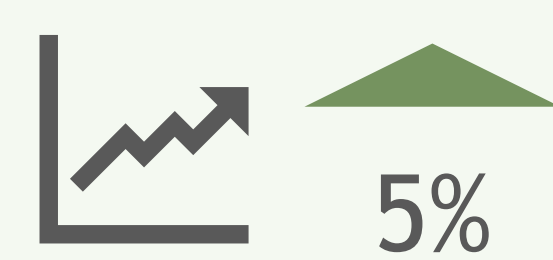
23%

Pares 1804 coconuts per day, but is expected to improve in future iterations



76%

Replaces 76% of manual paring to decrease physical strain and training required



5%

Removing thinner testa retains 92% of coconut meat and increases profits

#### Community-Level Impact

Potential to increase output and process scalability  
• Can eventually lead to increased wages



Reduces training time to allow rotating work-shift  
• Increases job prospects for local community



#### Future Work

- Sophisticated and flexible paring blades
- Knife armature sleeving
- Additional auditory and visual cues
- Emergency shut-off
- Tapered thrust bearings

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