



# Banana Grabber

Section Red A

Mock-up Review

10/20/05



# Design Concept



**Product Description:** Mechanically-assisted banana harvester

**Intended Customers:** Corporate-owned plantations in Central and South America

**Market:** Harvesting technology

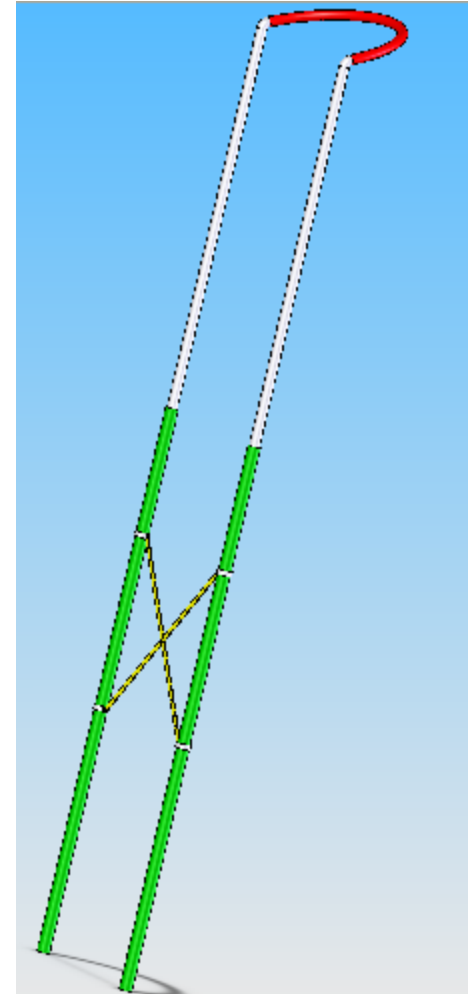
| Customer Need                           | Product Attribute                      | Engineering Specifications  |
|---|--|---|
| Lowers banana bunch                     | Controlled lowering device.            | Pulleys coupled with belaying system capable of supporting 120 lbs.                     |
| Efficient cutting and ease of transport | Must meet current productivity levels. | Collapsible and lightweight tripod design.  |
| Must reach tall plants                  | Adaptable to bunch height.             | Telescoping poles from 8ft – 13ft.  |
| Use on rough terrain                    | Stability.                             | 100 lb. banana bunch will not tip the 15 ft. tripod on uneven terrain as it is lowered. |

# Critical Issue #1: Tripod



Customer interface:

- Telescopes to minimize carrying size
- Easily extends to reach bananas
- Lightweight, yet sturdy



# Tripod Resolution



Lessons learned:

- Need feet for stability
- Faster locking mechanism needed
- Positioning takes practice



# Critical Issue #2: Bag & Pulley System



Customer interface:

- Block and tackle pulley system gives user mechanical advantage

Concept to meet need:

- Belaying system
- 5 pulleys to balance load
- Can support weight of largest bunch - 100lbs.

# Bag & Pulley System Resolution



Lessons learned:

- Bag and ring material must be chosen to accommodate weight
- Current system is intuitive for lowering bananas and raising bag



# Critical Issue #3: Cutter

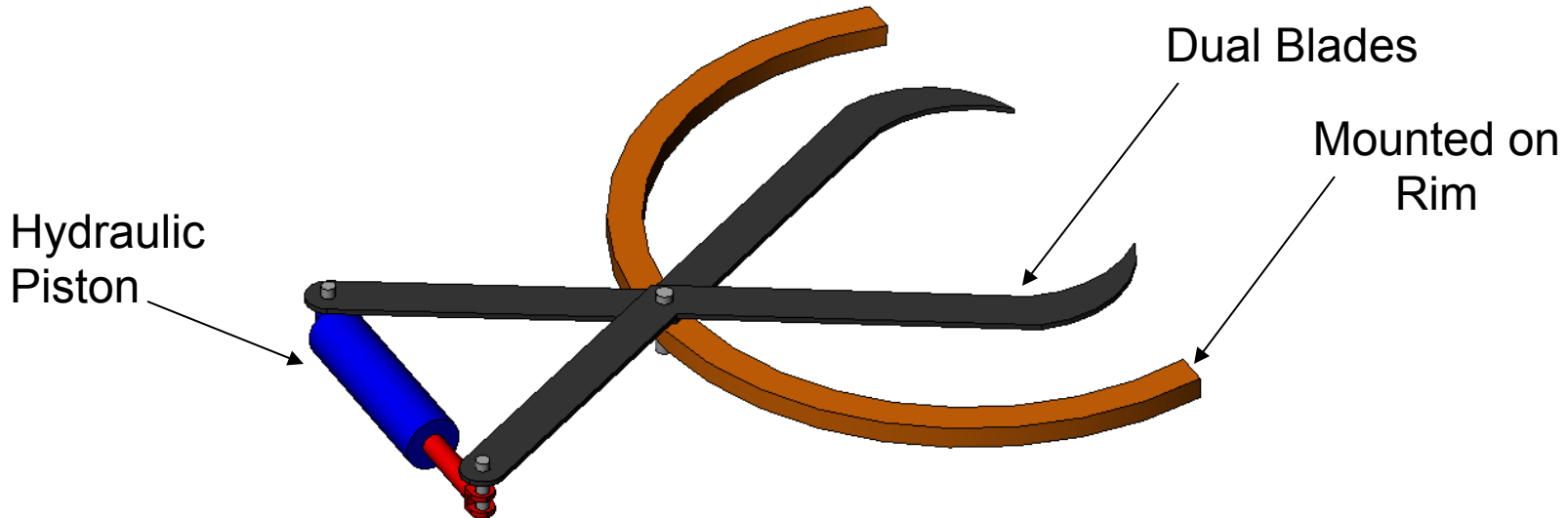


Customer interface:

- User-friendly and safe
- Increase mechanical advantage

Concept to meet need:

- Dual blades mounted to rim
- Powered by hydraulic cylinder



# Cutter Experimentation



- Cut various diameters of stalk and measured force to make initial and final cut
- Created a linear regression to predict upper bound of the force required to cut stalk



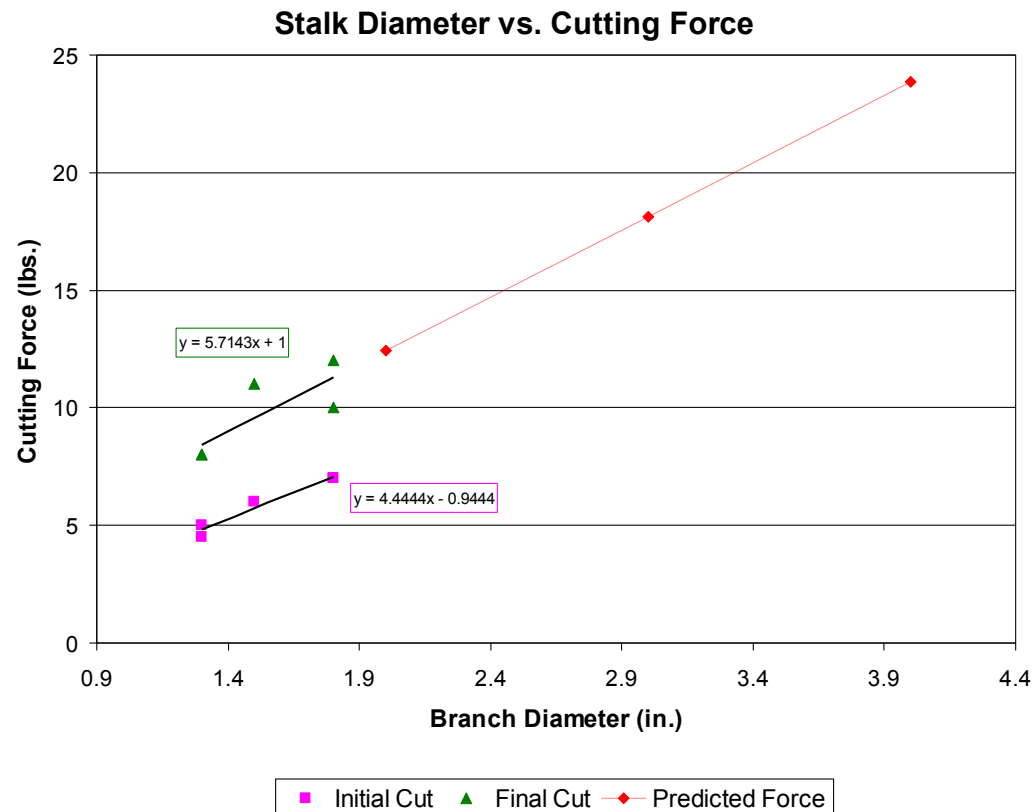


# Cutter Resolution



## Lessons Learned:

- Force to cut 4" stalk estimated to be 24 lbs.
- Attainable with existing hydraulic cutters



# Conclusion and Summary



- Research shows that a market for the banana picker exists:
  - To increase productivity
  - To promote worker safety
- Mock-up proves feasibility but points to areas needing refinement

# Questions Likely to be Asked

- Percentage of bananas bruised?
- Height of banana trees? – **15 ft with bananas hanging below that**
- How would a hydraulic cutter be powered? - **Pump pressure up by hand, release to cut (similar pruners exist)**
- Aren't workers expendable?
- Injuries per year per workers?
- Rate bananas are harvested now per worker?
- Monetary loss due to spoiled fruit?
- Have you talked to any customers? – **Called a number of**