Problem Statement
To enable a unilateral, transradial amputee to operate agricultural machinery.

Need for Project
The US agricultural industry has a high incidence of traumatic amputation. Available prosthetic solutions are often insufficiently functional and durable for agricultural tasks.

Biomechanical Constraints
Transradial amputees are challenged with:
• No forearm rotation
• No wrist joint
• No tactile sensation
Compensatory torso and shoulder movements are fatiguing and dangerous.

Design Requirements
• Transmit force
• Allow quick transitions
• Disengage easily in emergency
• Adapt to different controls
• Endure impact, wear, corrosion, and cyclic fatigue
• Fit all users universally
• Operate within safe postures
• Function intuitively

User control interface: Mating surfaces’ interface between terminal device and adapter

Tractor control connection: Off-the-shelf hardware used to connect adapters to tractor controls

Field Testing
• Purpose: Prove concept, evaluate and iterate design.
• Method: Test mating surface prototype on a modified hand.
• Results: Selected terminus angle and adapter angular tolerance.

Design for Manufacturability
Body: Machined from 6061 aluminum
Terminus: Machined from 6Al-4V titanium, design unchanged

Design Validation
• Purpose: Verify system functionality and acquire feedback from a target user.
• Method: Install prototype system in amputee’s tractor.
• Results: Validated design and logged user preference on adapter depth, terminus angle, and knob position.

Design Features
- Planar force transmission
- Sensory Feedback
- Self-Correction
- Angular Deviation Tolerance

Field Testing
- Purpose: Prove concept, evaluate and iterate design.
- Method: Test mating surface prototype on a modified hand.
- Results: Selected terminus angle and adapter angular tolerance.

Design for Manufacturability
- Body: Injection molded UHMW-PE
- Terminus angle adjustment

Design Validation
- Purpose: Verify system functionality and acquire feedback from a target user.
- Method: Install prototype system in amputee’s tractor.
- Results: Validated design and logged user preference on adapter depth, terminus angle, and knob position.

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