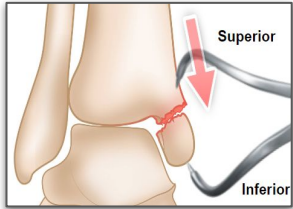


Fracture Reduction Forceps for Medial Malleolus Repair

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Need



10% of all fractures in the U.S. involve the ankle joint, a third of these cases include the **medial malleolus**. Dr. Thomas Sherman needs a clamp that can properly reduce the fracture while providing **compression, fracture stability**, and a **locking mechanism**.

Constraints & Requirements



Device Length ≥ 6.8 inches



Functional Range of Arms
 $\geq 90^\circ$



Fixation Method Compatibility

Compression Force	130 \pm 56 N
Pinching Force	55 N
Compression Lock	130 \pm 56 N
Stability	Constant Force

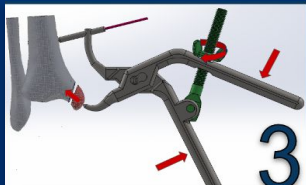
Solution Design & Build



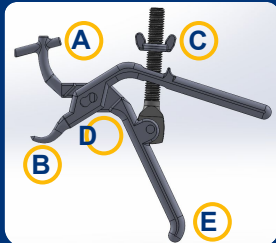
Insert K-wire



Slot device over K-wire



Compress fracture & lock device

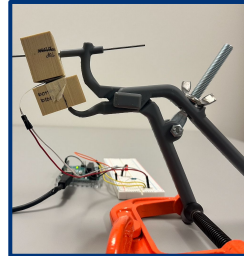


Build Components

- A. K-wire Fixation Slot
- B. Pointed Distal Jaw
- C. Speed Lock Mechanism
- D. Adjustable Fulcrum
- E. Ergonomic Handle

Verification

Test	Result	Pass or Fail
1. Compression Test	118 N	Pass
2. Compression Lock	120 N over 10 mins	Pass
3. Stability	Before: 120 N; After: 120 N	Pass



Conclusion

Future Work

- Verification and validation testing with **stainless steel** forceps
- **User case study** to collect feedback from orthopedic surgeons

Impact

- Forceps **minimize slippage** of superior arm, reducing operation time
- **Autonomous compression** allow freedom of two hands to perform surgery and can improve precision of remaining surgical steps