Incremental Advance Drill Stop

Team Members

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Client

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Motivation and Background

- Dr. Tim O'Connor

  Resident in Orthopedic Surgery at the UW Hospital
- Concerned with tissue damage caused by drilling
- Current method relies on auditory feedback and feel

http://www.orthopedicproductguide.com/bguide/User/

Problem Statement

- Prevent over penetration of orthopedic drilling
- Reduce/eliminate tissue damage behind the bone

Current Devices

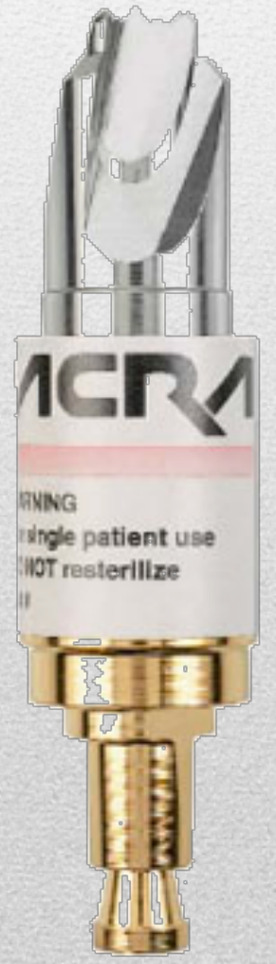
- Drill Sleeve
  -Not adjustable

http://www.alibaba.com/product-free

- Spinal Drill Guide
  -Only adjustable prior to drilling

www.medscape.com

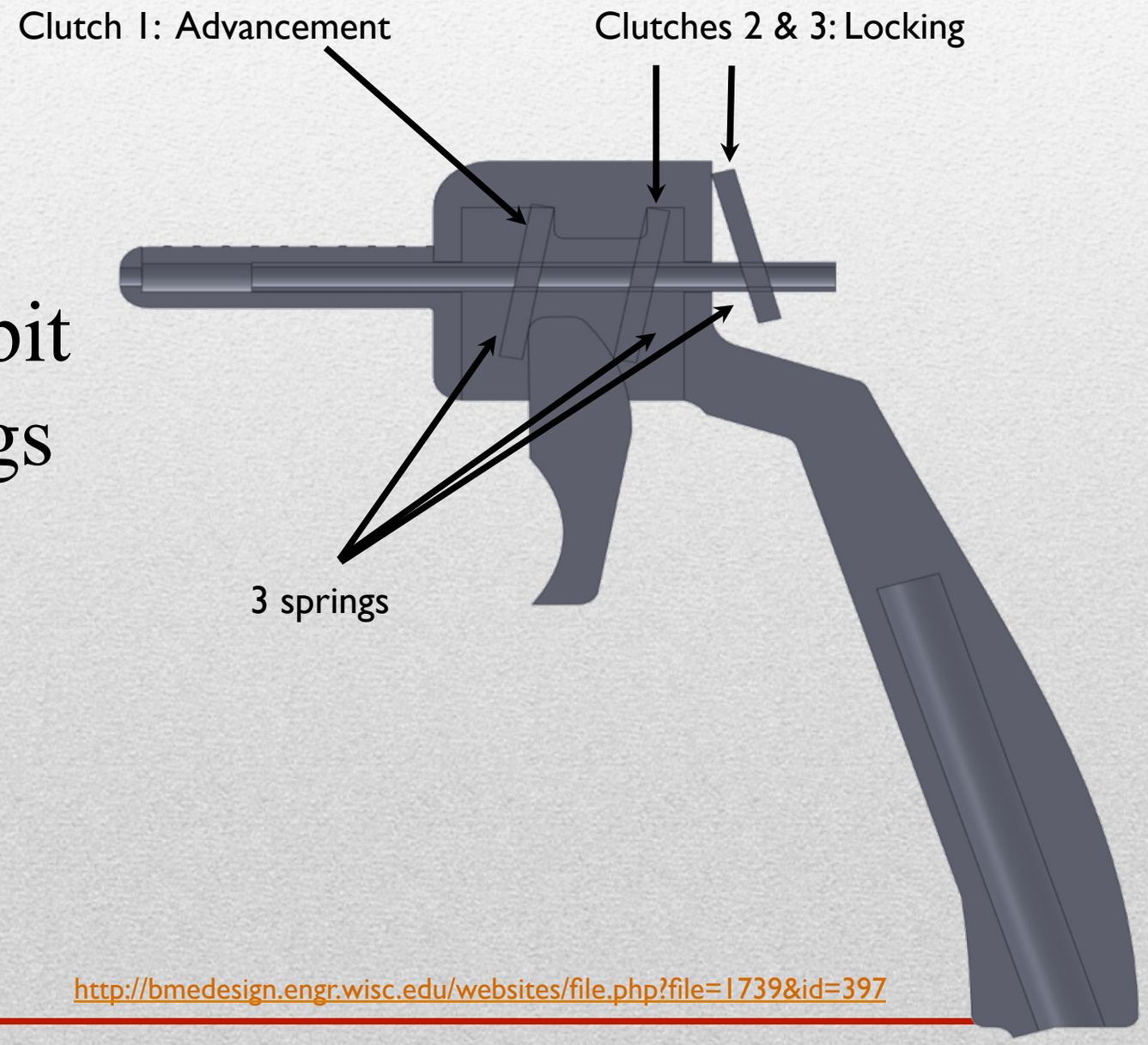
- Neurosurgery Bit
  -Outer and inner bit
  -Pressure on inner bit spins outer bit
  -Prevents tissue damage



http://www.acracut.com/perforators.html

Previous Semester Design

- Trigger Mechanism (caulk gun)
- Metal tube holds drill bit
- Metal plates and springs
- Plates act as clutches
- Friction holds tube in place (in theory)



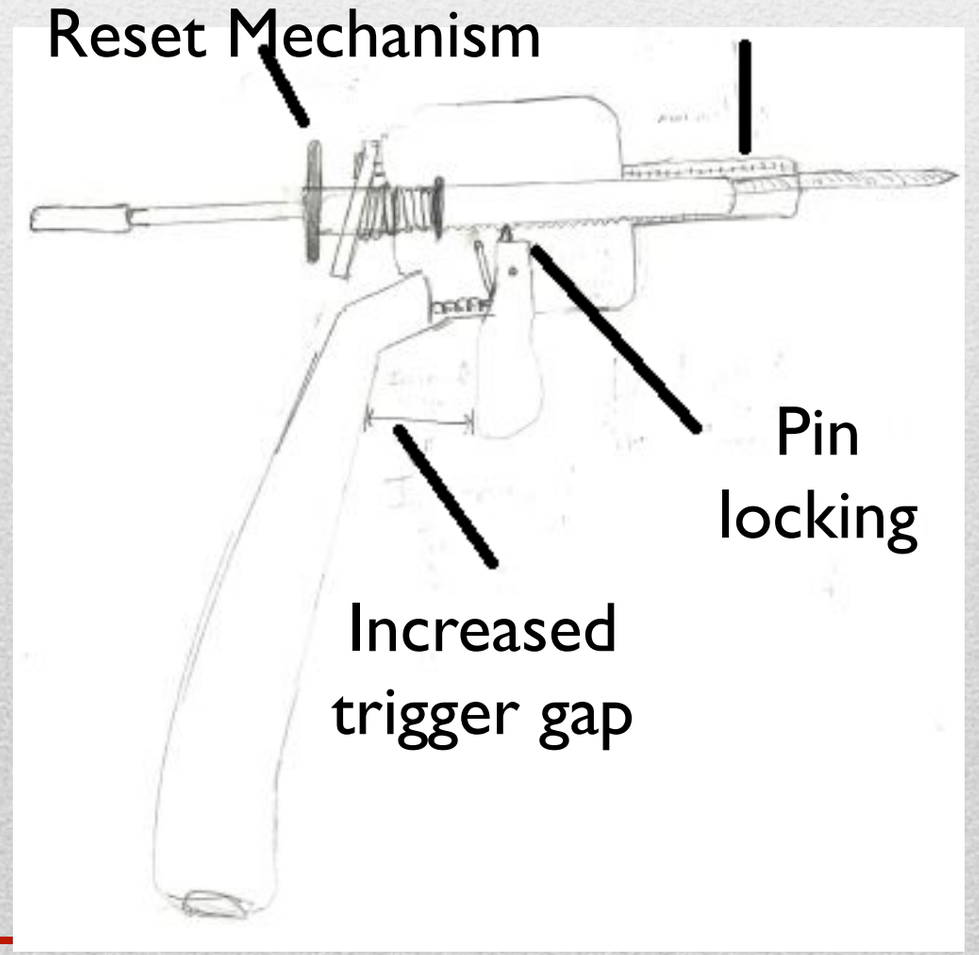
http://bmedesign.engr.wisc.edu/websites/file.php?file=1739&id=397

Client Requirements

- No slippage of tube-prevent all plunging
- Incremental advance of 1-2 mm
- Reduce heat exposure to bone
- Eliminate measuring step during drilling
- Easy reset mechanism
- Ergonomics

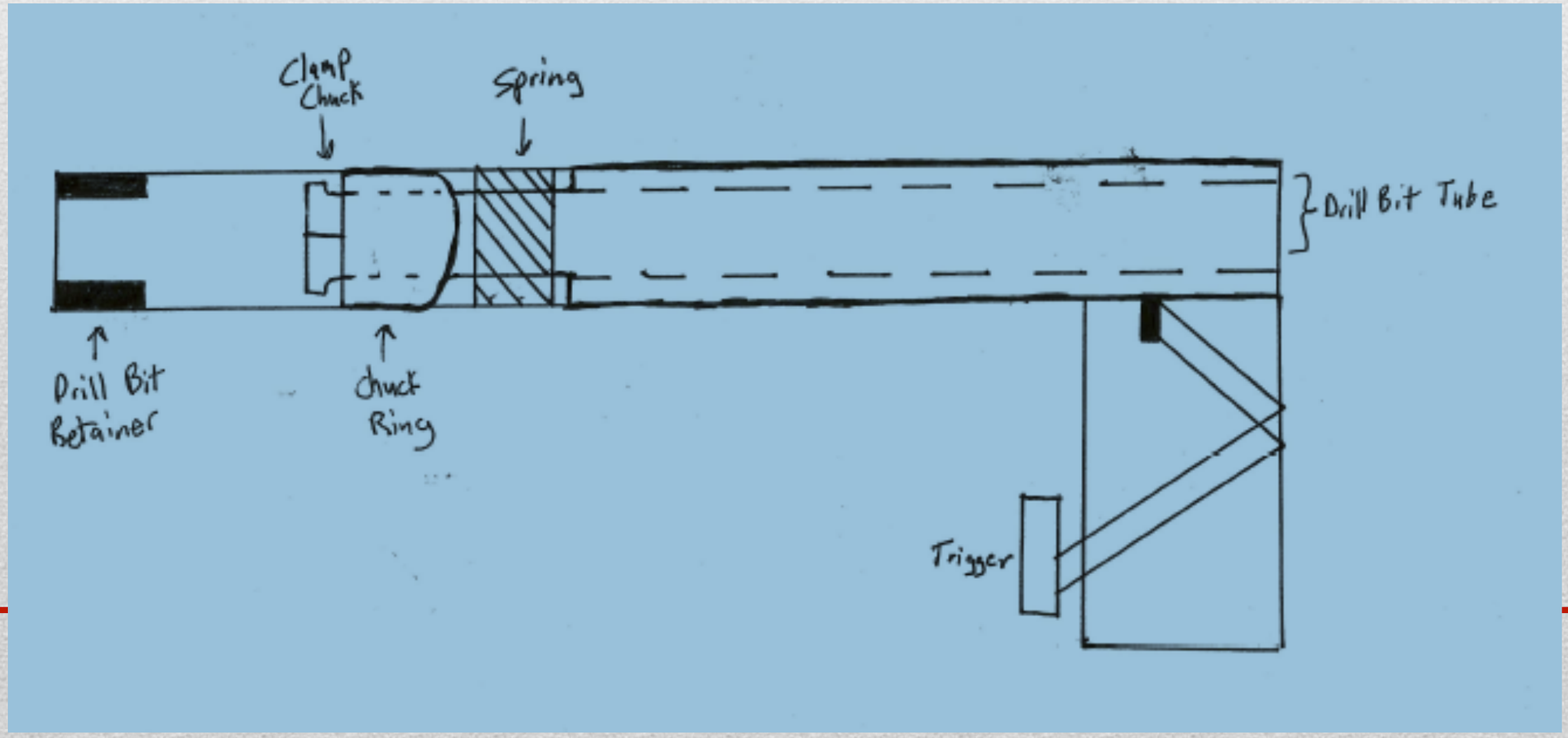
Trigger design modification

- Modifies current design
- Trigger pins and notches
- Easier reset mechanism



Mechanical Pencil Design

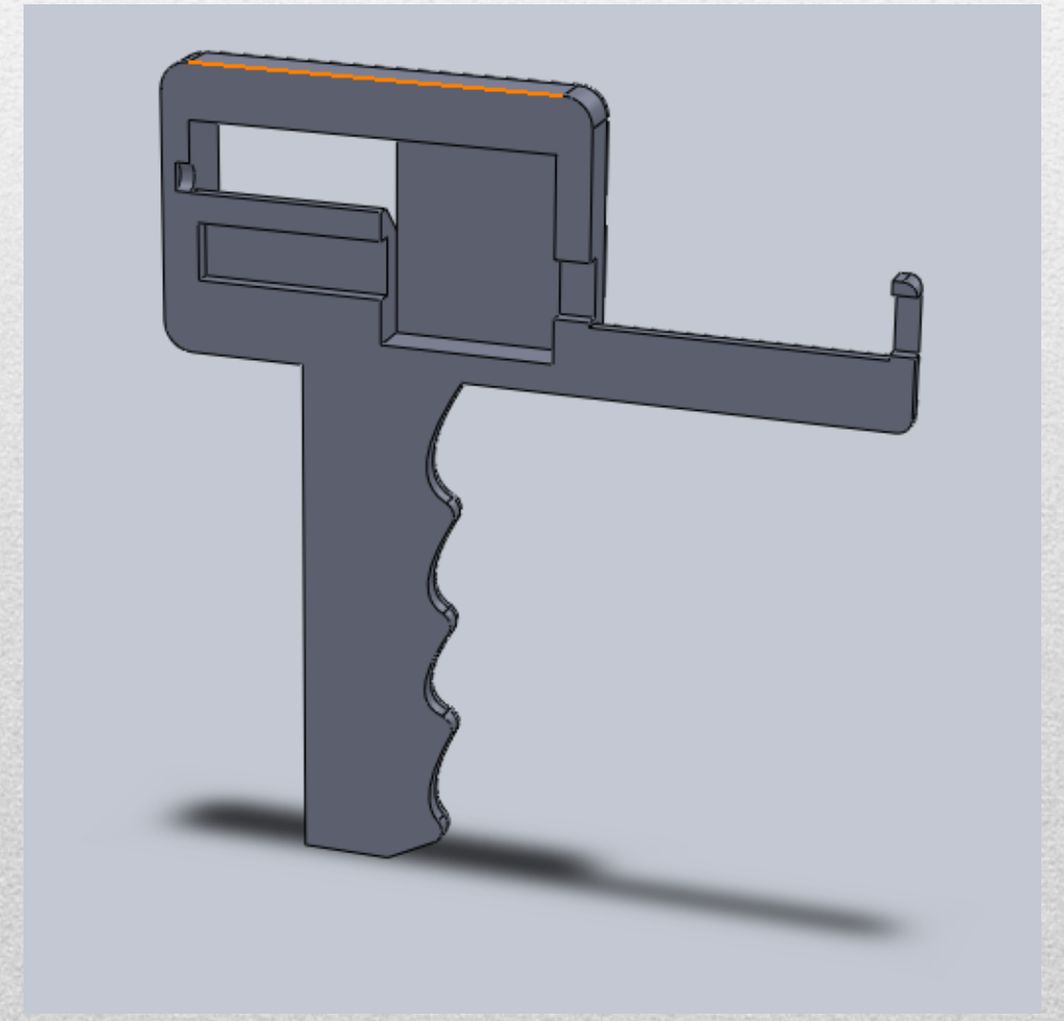
- Clamp chuck and chuck ring
- Trigger propulsion
- Spring return mechanism



Thumbwheel design

- Thumbwheel turns worm gear
- Thumbwheel both advances and retracts tube

http://science.howstuffworks.com/transport/engines-equipment/gear5.htm



Design Matrix

Category (weight)	Current Device	Mechanical Pencil	Worm Gear
Advance in 1-2 mm Increment (3)	5	7	9
Prevention of Slipping(3)	3	5	10
Ease of Reset (2)	3	6	8
Ability to Calibrate (1)	8	9	10
Cost (1)	9	9	5
Total (out of 100)	47	66	**88**

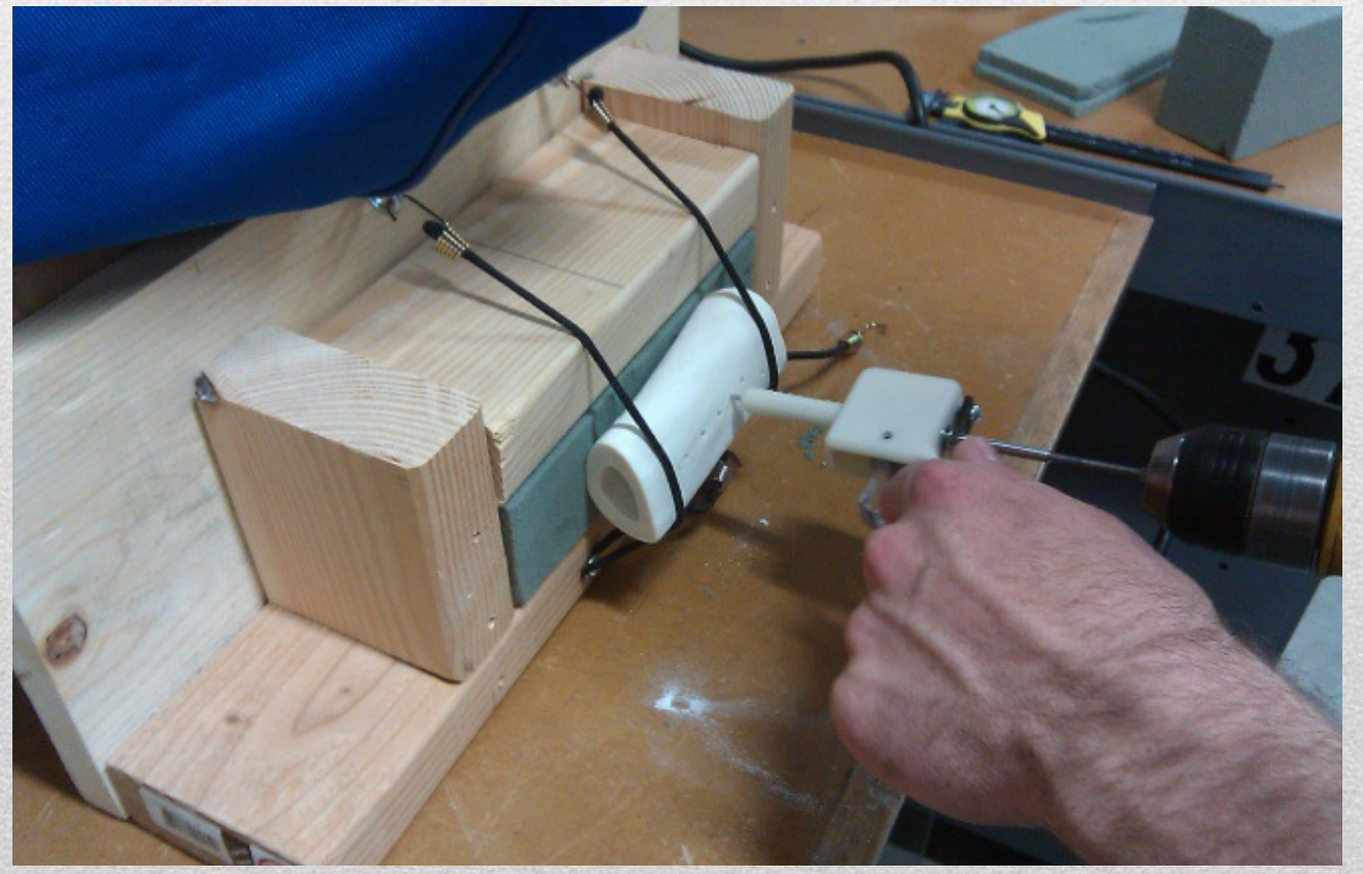
Key Categories

	Current Device	Mechanical Pencil	Worm Gear
Advance in 1-2 mm Increment	5	7	9
Prevention of Slipping	3	5	10

	Current Device	Mechanical Pencil	Worm Gear
Total	47	66	88

Future Work

- Meet with worm gear expert
- Order and fabricate parts
- Create Prototype
- Test



Special Thanks

Dr. Tim O'Connor
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References

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- ACRA-Cut. ACRA-Cut Smart Drill: Oct 17, 2011. http://www.acracut.com/perforators.html

Questions?