DEPARTMENT OF MECHANICAL ENGINEERING

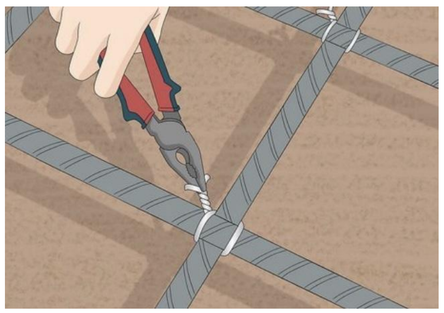
Knot Engineers
Rebar Tying Impact Driver Attachment

Nathan Chandran, Pranav Hemardri, Jihwan Hong, Sokhna Mbacke, Evan Nowaskey, Maria Young

A. James Clark School of Engineering

Design Purpose & Impact

Traditional Method



Source: WikiHow

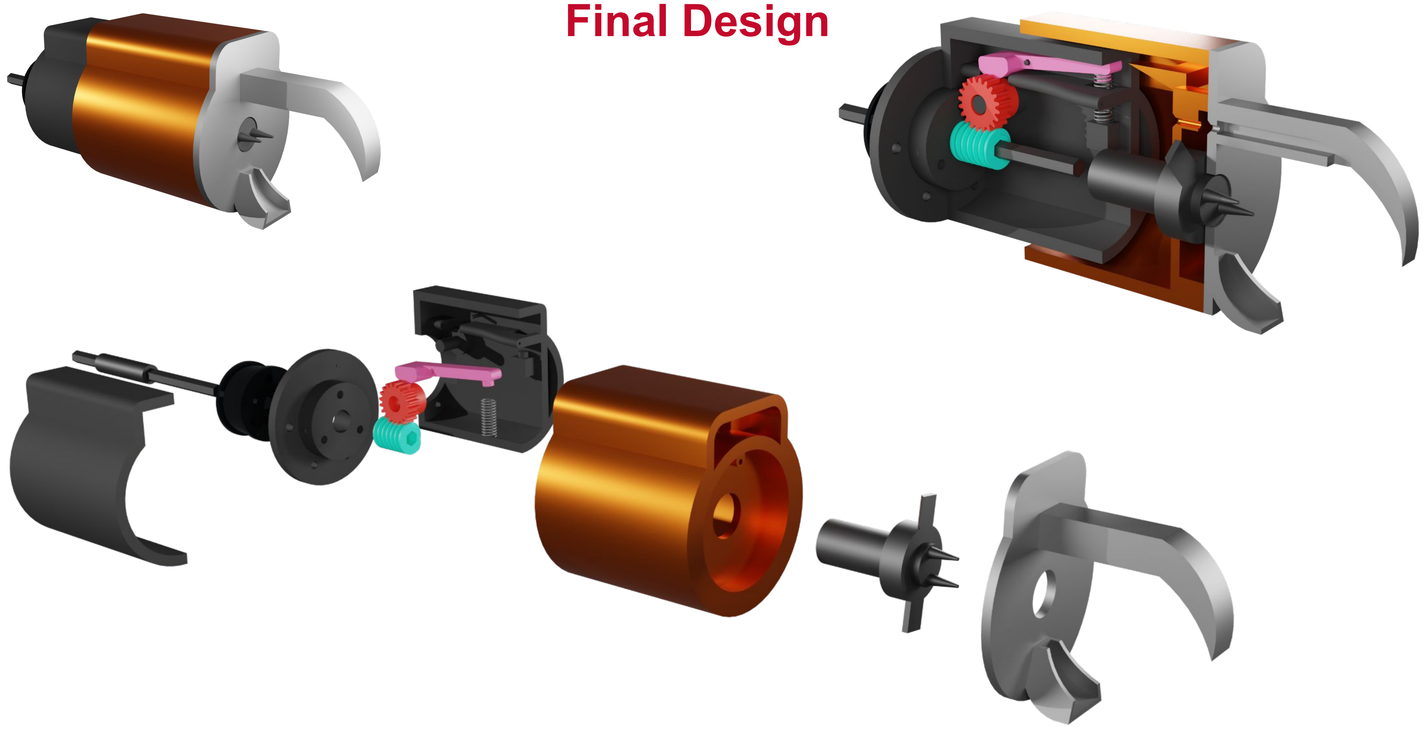
Our Design:

- Reduce fatigue
- Simplify tying
- Fit tight spaces
- Lower cost
- Increase tying speed
- Improve sustainability

Requirements

- Secure Rebar from moving during concrete pouring
- Operate reliably on job sites
- Minmize misalignment and debris contamination
- Lower manufacturing costs than available tools
- No significant strain on the operator

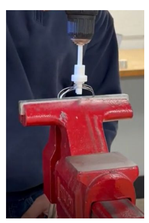
Final Design



Design Decisions

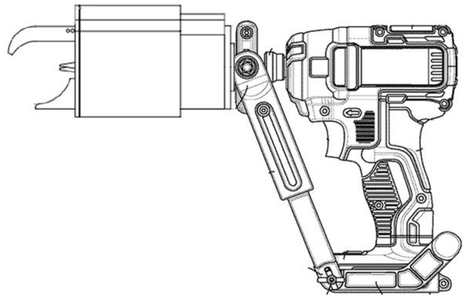
- Fully mechanical operation that uses existing impact driver
- Friction driven wire feeding mechanism for consistent wire advancement
- Optimization claw geometry for reliable wire tying
- Wire compression system that prevents slipping or jamming
- Hard metals to ensure component durability
- Lightweight design in order to improve user experience and reduce fatigue

Prototype & Test Results



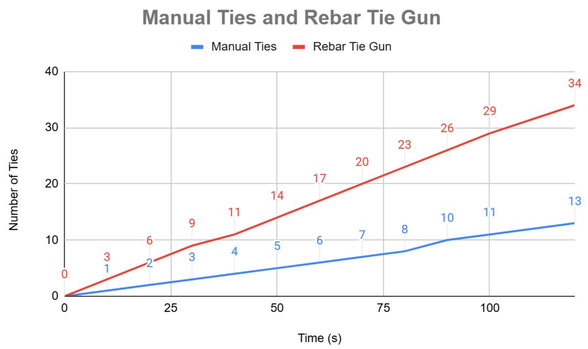
Proof of concept for tying capability.

Proof of concept for extrusion mechanism



Metric	Manual Tying	Rebar Tie Gun
Time per Tie (s)	8-10	3-4
Operator Effort	4/5	1/5
Working Clearance	~7”	~4”
Initial Success Rate	~40%	100%

Comparison Table



Prototype achieves ~2.5–3× more ties within the same time compared to manual tying.