DEPARTMENT OF MECHANICAL ENGINEERING

Coping Saw-lutions
Powered Coping Saw

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Motivation, Goal, Impact

Motivation
- Saves time making cuts more quickly
- Increases efficiency and precision
- Improves ease of use and reduces strain on user
- Cleaner cuts with less tear

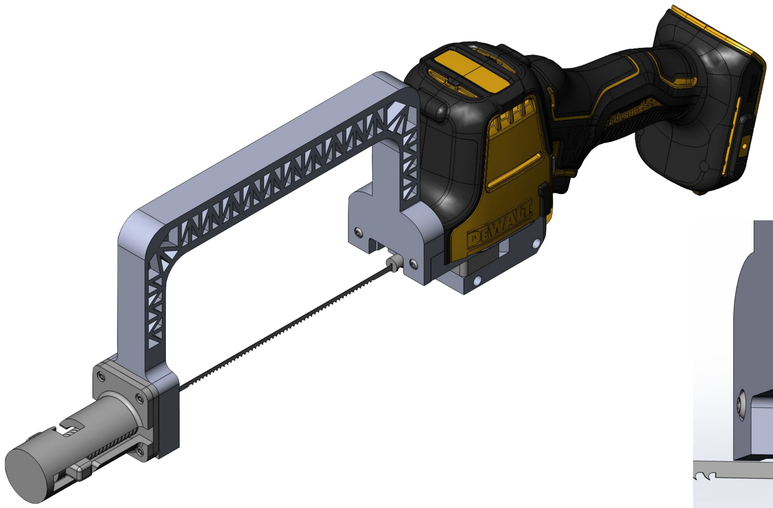
Goal
- Create a fully automated coping saw

Impact
- Allows contractors to complete jobs at a faster rate and for a cheaper price

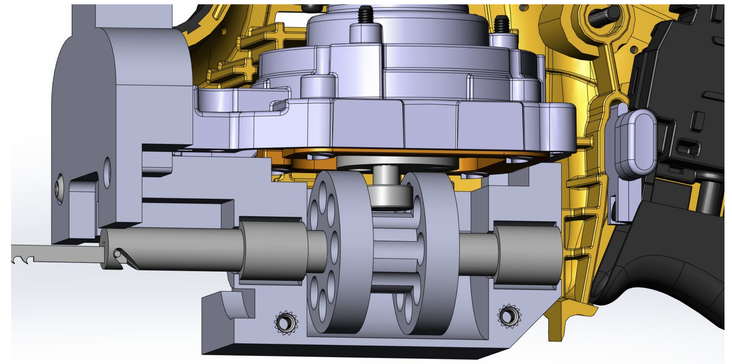
Requirements

Customer Requirements
1. Easily exchangeable blades
   - Standard blade compatibility
2. Battery powered (DeWalt 20V battery)
3. Center of gravity close to wrist
4. Short stroke length
5. Low vibrations

Final Design



Scotch Yoke Assembly



Design Calculations & Decisions

Tension Calculations

$$Tension = k * x$$

State 1 - Front of Stroke	State 2 - Back of Stroke
T = 15 * 1.9 = 28.50 lbs	T = 15 * 1.51 = 22.59 lbs

Torque Calculations

$$\frac{\tau}{r} * sin(\Theta) = F_y$$ *Fy lowest at top of Stroke - sin(90)

$$\tau_{required} = F_y * r$$

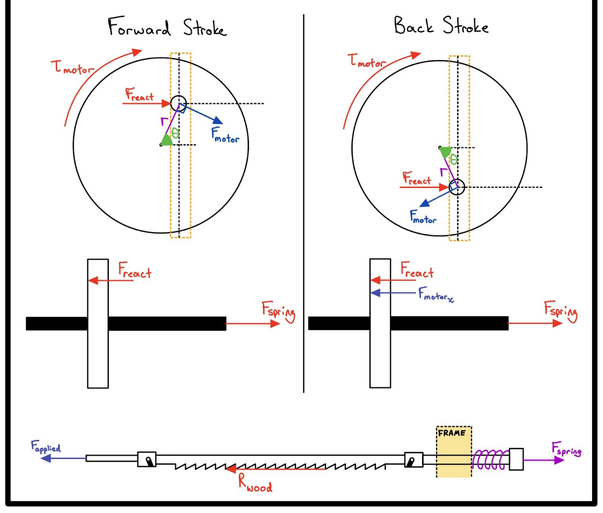
$$F_{required-max} = F_{react} + F_{spring} = F_y$$

$$F_y = 50\ lbs$$

$$\tau_{required} = 50 * 0.2$$

$$\tau_{required} = 10\ lb - in$$

FBD



Constants

$$F_{react-max} = 12\ lb \quad Stroke\ Length = 0.393\ in$$

$$k = 15\ lb/in \quad r = 0.5 * Stroke\ Length$$

Prototype & Test Results