

The Company

Team 07: Thread Stretcher

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Background and Objective

- The sponsor's existing automated thread stretcher machine produces thread with inconsistent length and frayed edges.
- Frayed and inconsistent sized threads negatively impact the thread from meeting the tight industrial quality benchmarks.
- The designed solution meets the \$5,000 budget, achieves an 85% production yield, and maintains a cycle time under 20 seconds

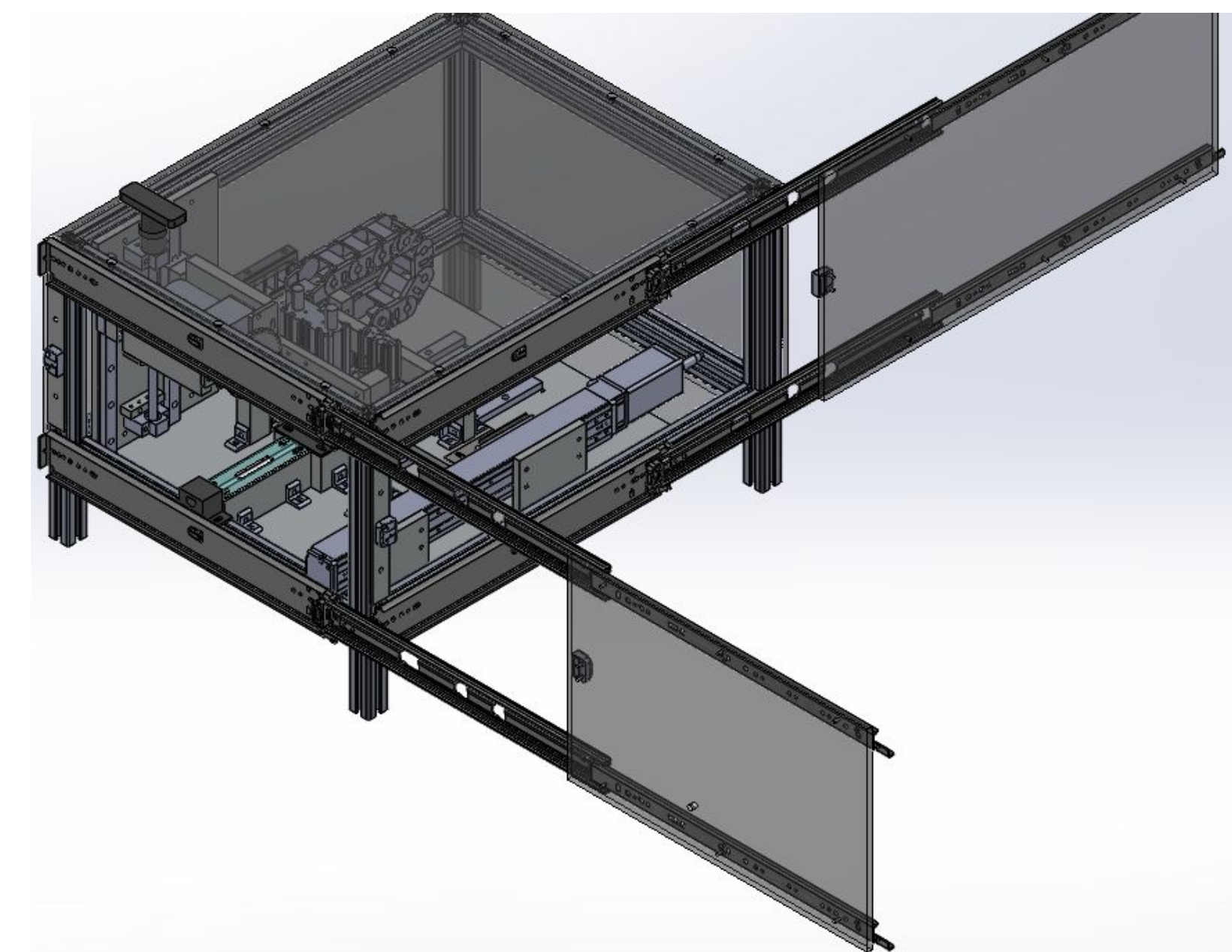
Key Specifications

- Budget : \$5,000 USD Maximum
- Wick Target Length: 5.5 ± 0.25 inches
- Production Yield: 85% Minimum
- Cycle Time: 20 seconds maximum per part
- Safety & Guardian: E-stop motion halt under 2 seconds and interlocked sliding guards.
- Maintainness: Tool-less internal access

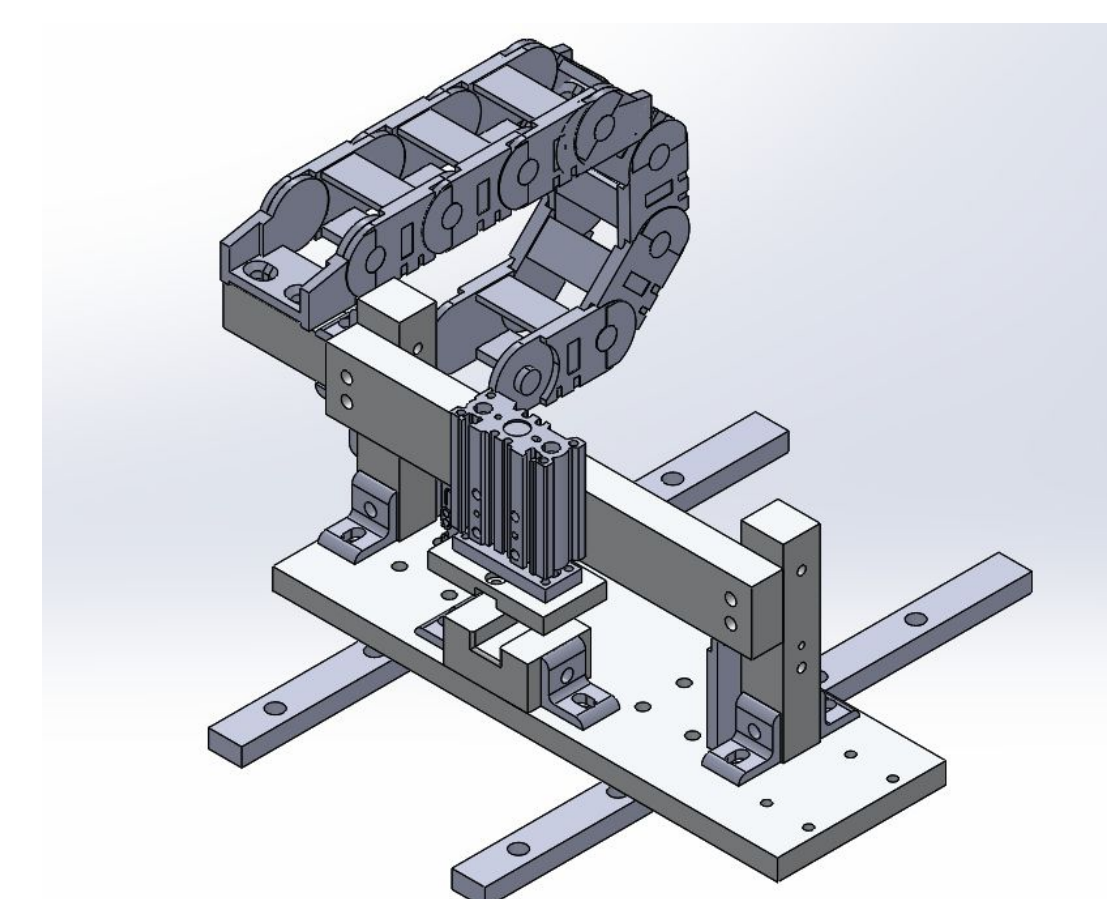
Design Approach

- Integrated salvaged industrial parts (PLC, rails, cylinders) to maintain high performance while strictly adhering to the budget.
- Implemented sliding interlocked plexiglass panels for internal visibility with tool-less maintenance access.
- Optimized proven concepts, like lock-pinch infeed.

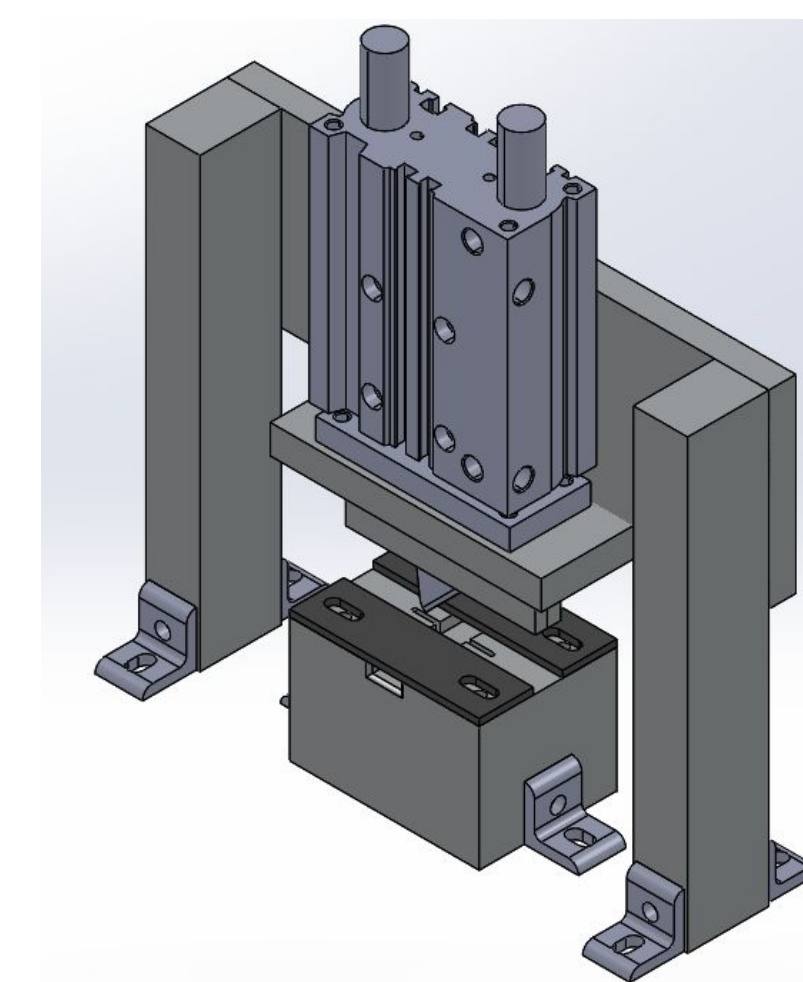
Key Machine Subsystem



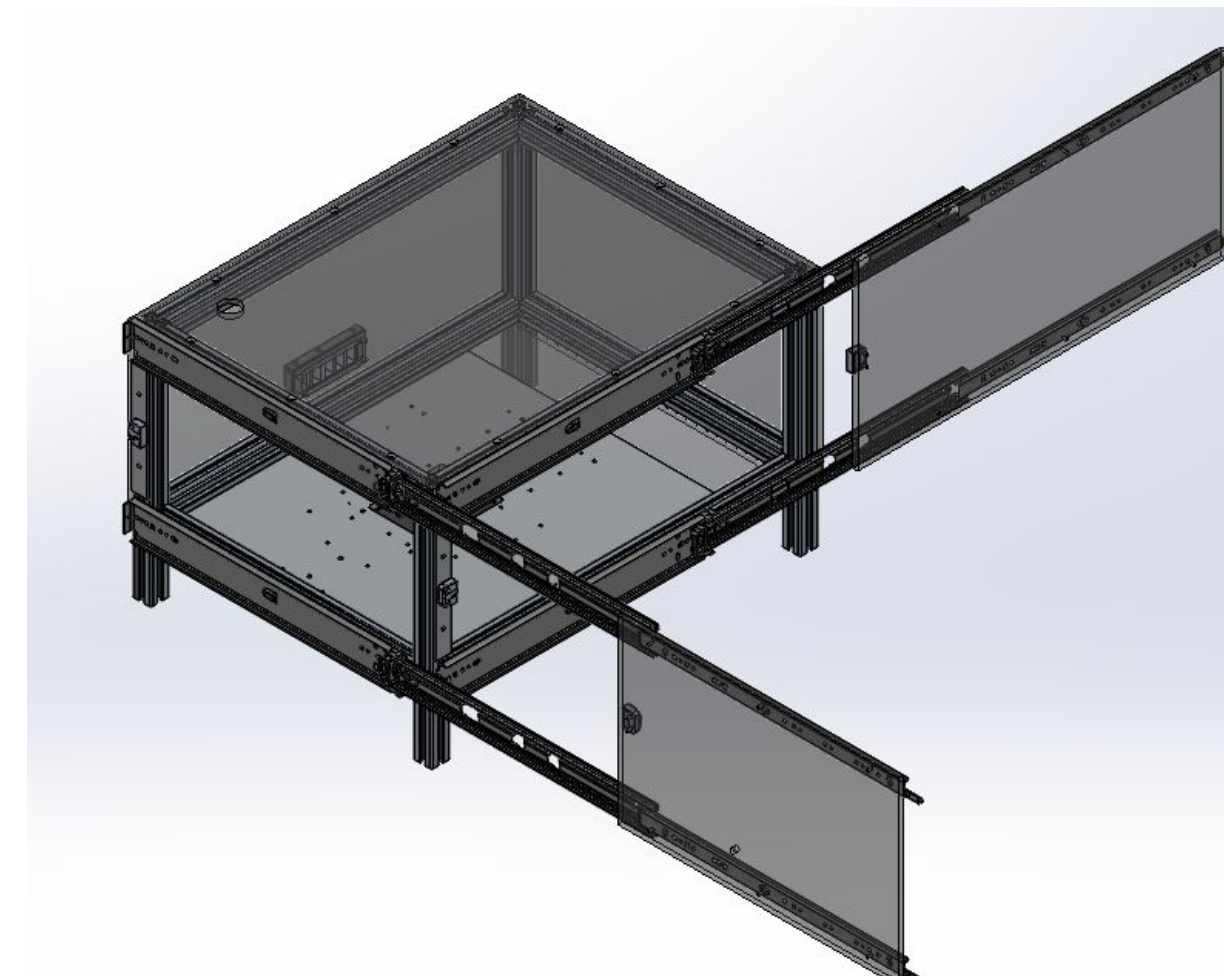
Full Assembly Overview



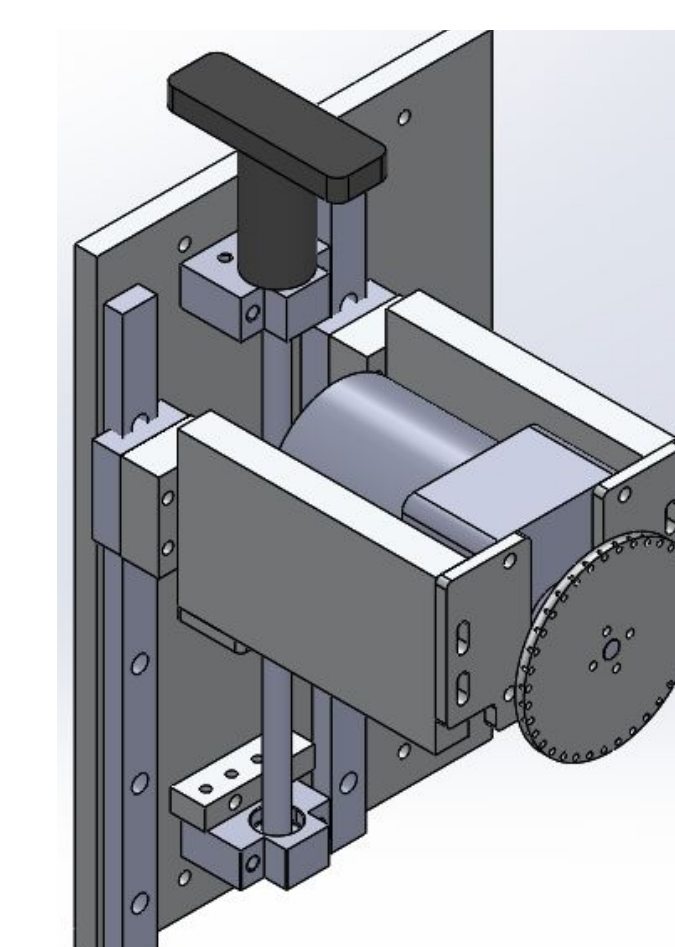
Gripper



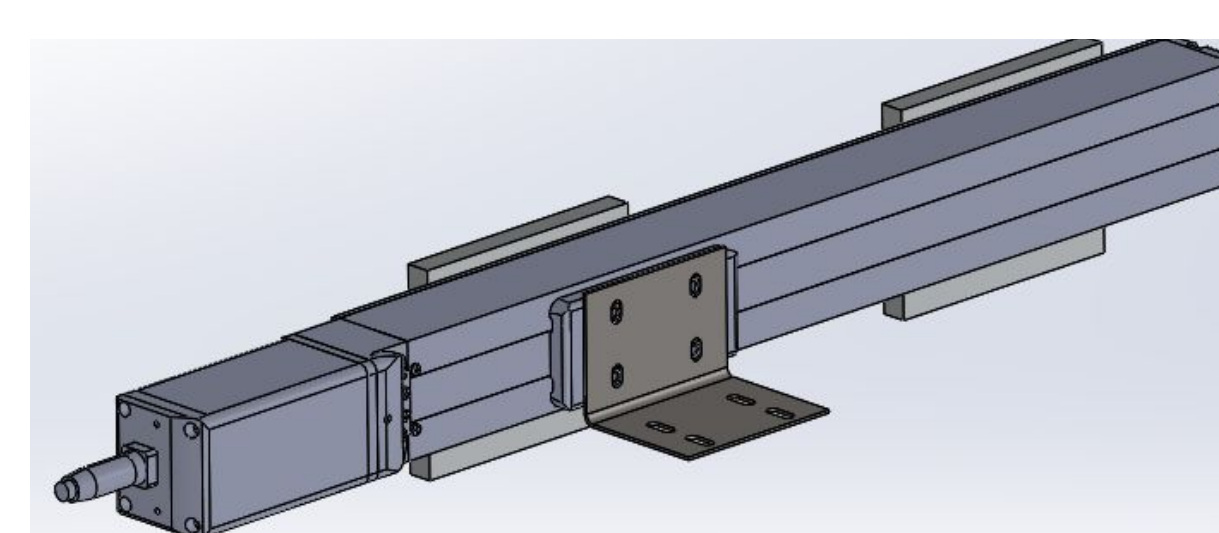
Cutting



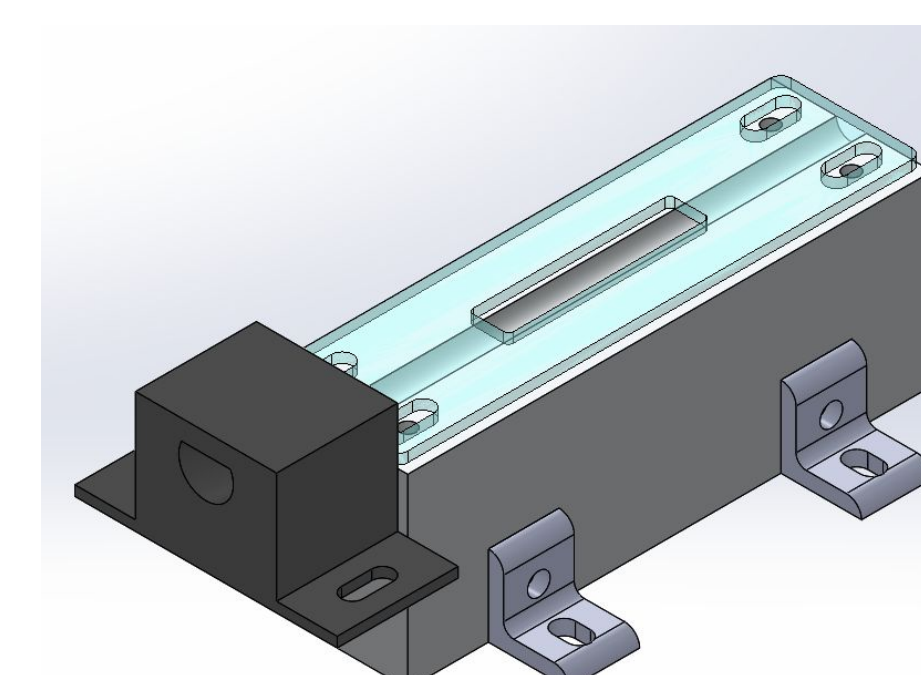
Enclosure



Feed

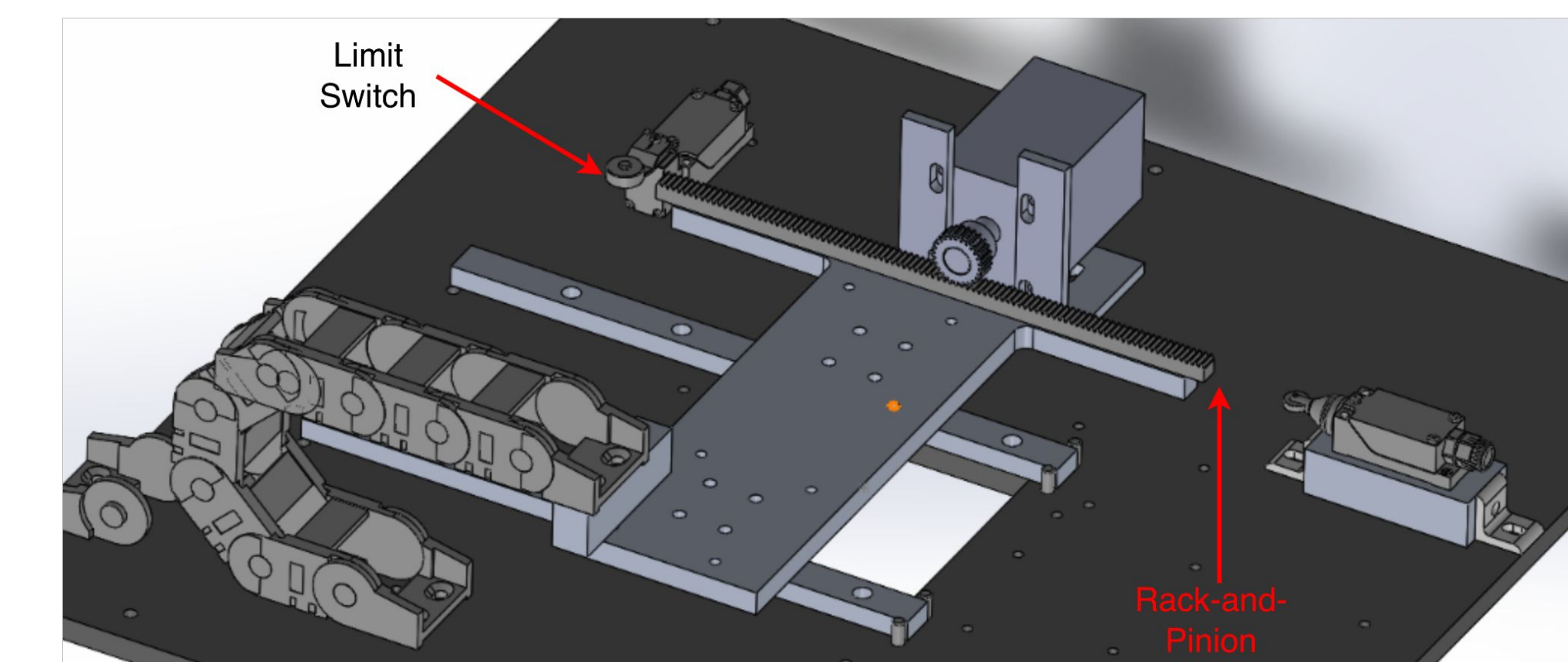


Stretching



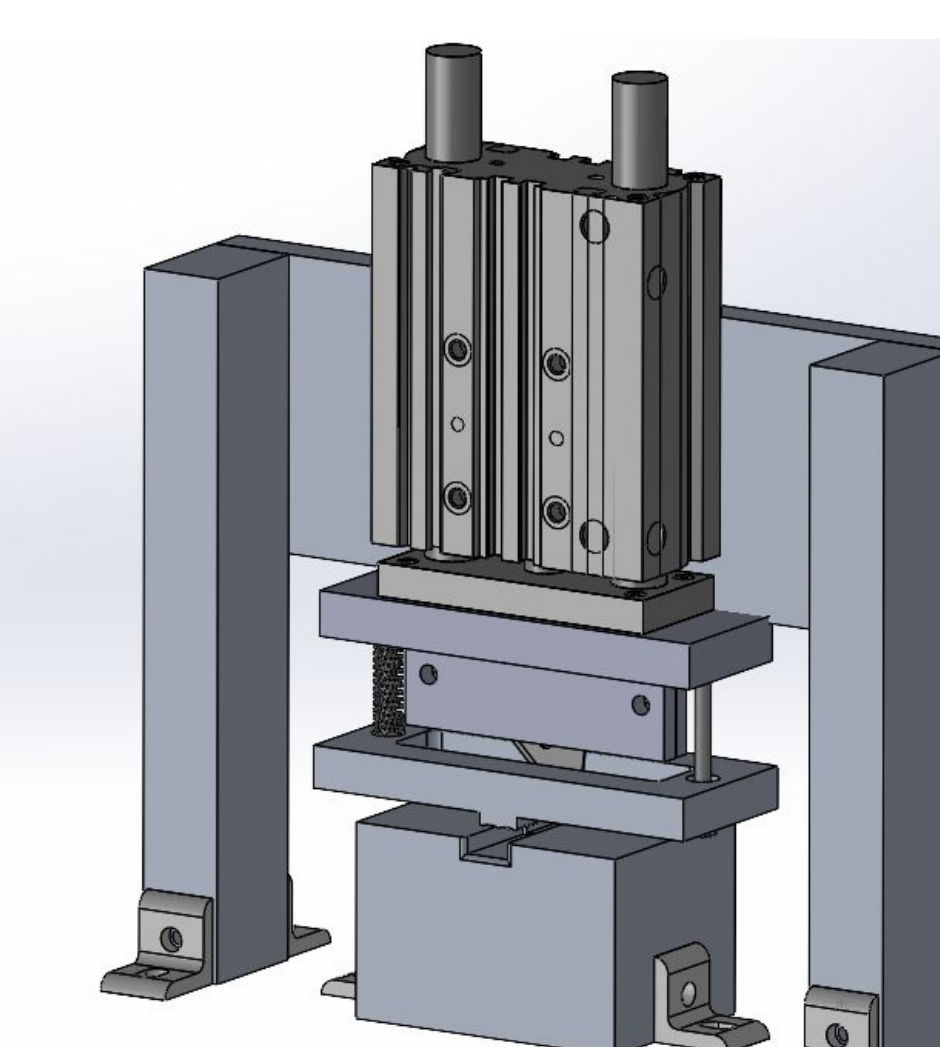
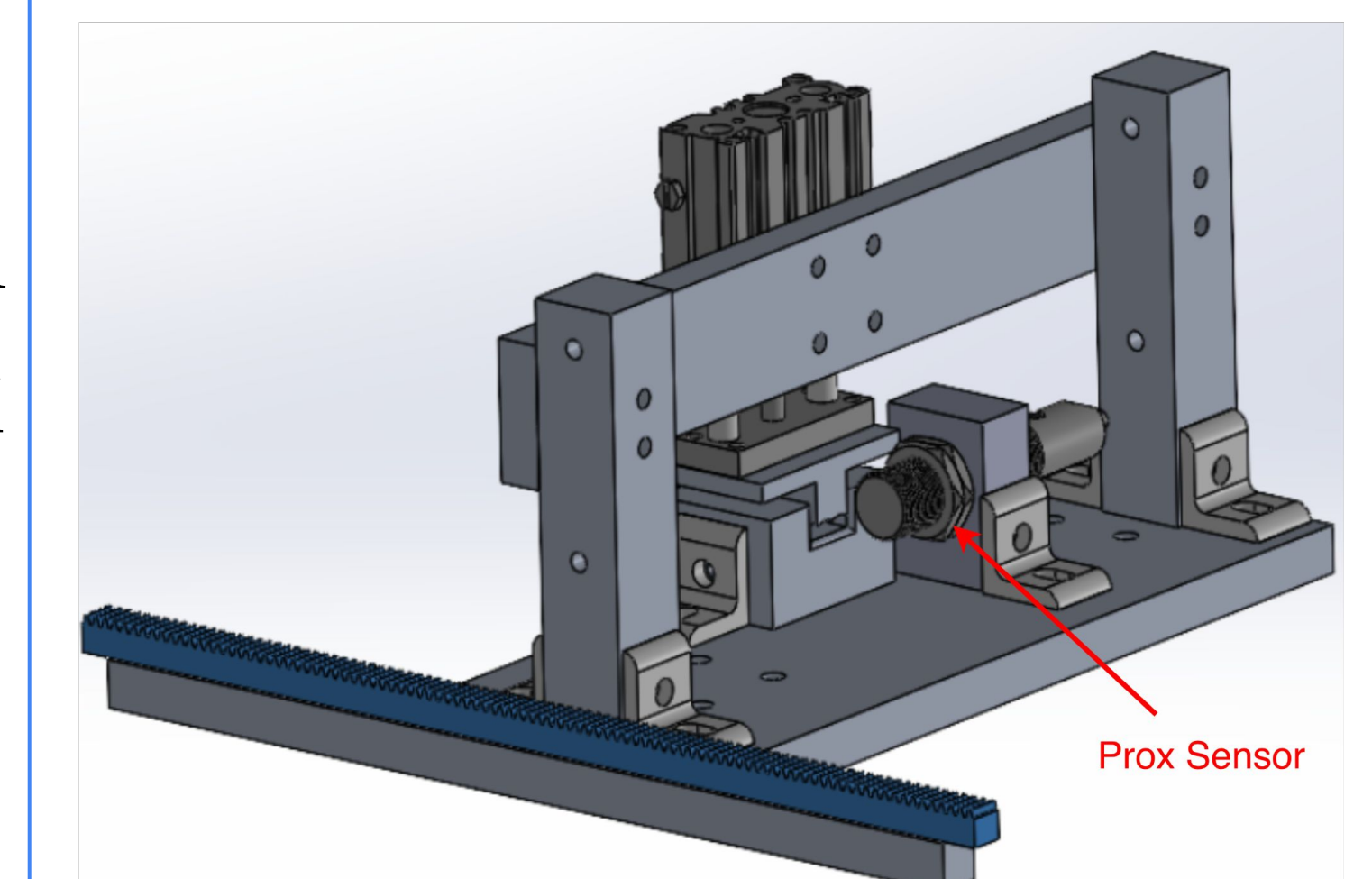
Wick Channel

Design Prototype



Stretching: Servo-driven rack-and-pinion moves along linear rails to 5.5 inches, and uses limit switches for homing and overtravel protection.

Gripper: Pneumatic knurled clamp uses an integrated beam break sensor to detect wick position and secure tension



Cutting: Features a spring-loaded 45° guillotine blade actuated downward to deliver clean, non-frayed edges.

Special Thanks:

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The Company — Sponsor