



No Contact Gap Measurement

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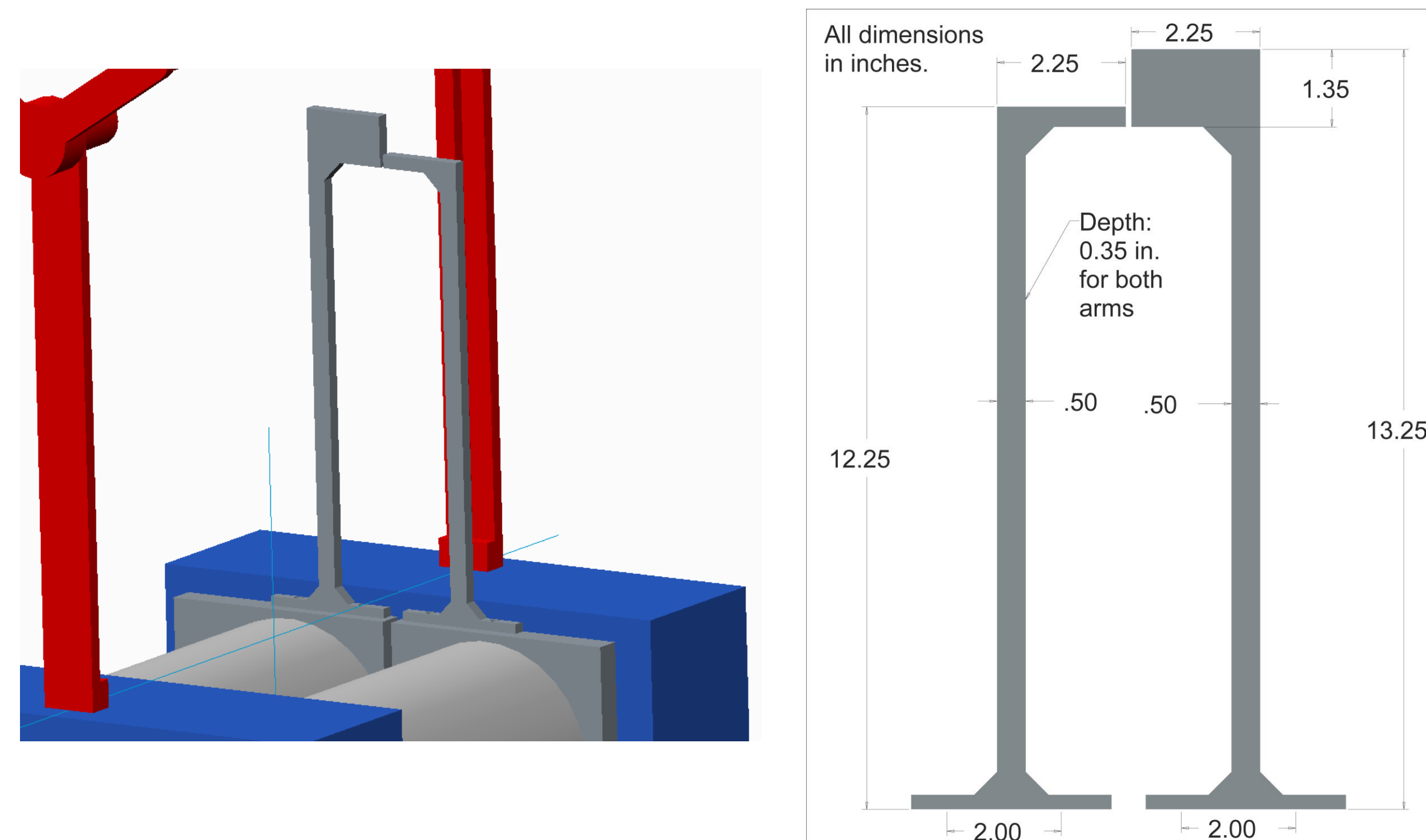
Sponsor: General Capacitors, Dr. Jim P. Zheng



Summary

- General Capacitor currently gaps their hot rolling machine using feeler gages that scratch or dent the expensive rollers.
- Lasers and high resolution optics designs were too expensive and non practical
- Final Design involves rigidly mounting arms to the roller positioning blocks and measuring the representative gap with inductance sensors.

Final Design Schematic



Microcontroller

Arduino UNO R3

- 14 digital input output pins
- 16 MHz crystal oscillator



Inputs:

- Roller temperature through keypad
- Inductance sensors (2)

Outputs:

- Left and right gap measurements
- Calculated distance of center gap



Constraints

- 80 – 200 micron gap
- 2 micron resolution
- \$2,000 budget provided by sponsor
- Non-contact
- Gap length of 30 cm

Future Plans

- Orders placed for sensors, microcontroller, and aluminum
- Assemble parts into working prototype and begin collecting data to calibrate gap measurement
- Expected difficulties include thermal expansion and stabilization

Background

- Battery materials are pushed through the rollers and are used for different calculations and experiments.
- Finite gap needed to determine the capacitance of the certain material.

Inductance Sensor

- Keyence EX-422V inductance displacement sensor
- Resolution of 2 μm
- Working distance of 0-10 mm.
- 20 displays per second



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