Force Sensor Calibration

With use of a Pulse Hammer

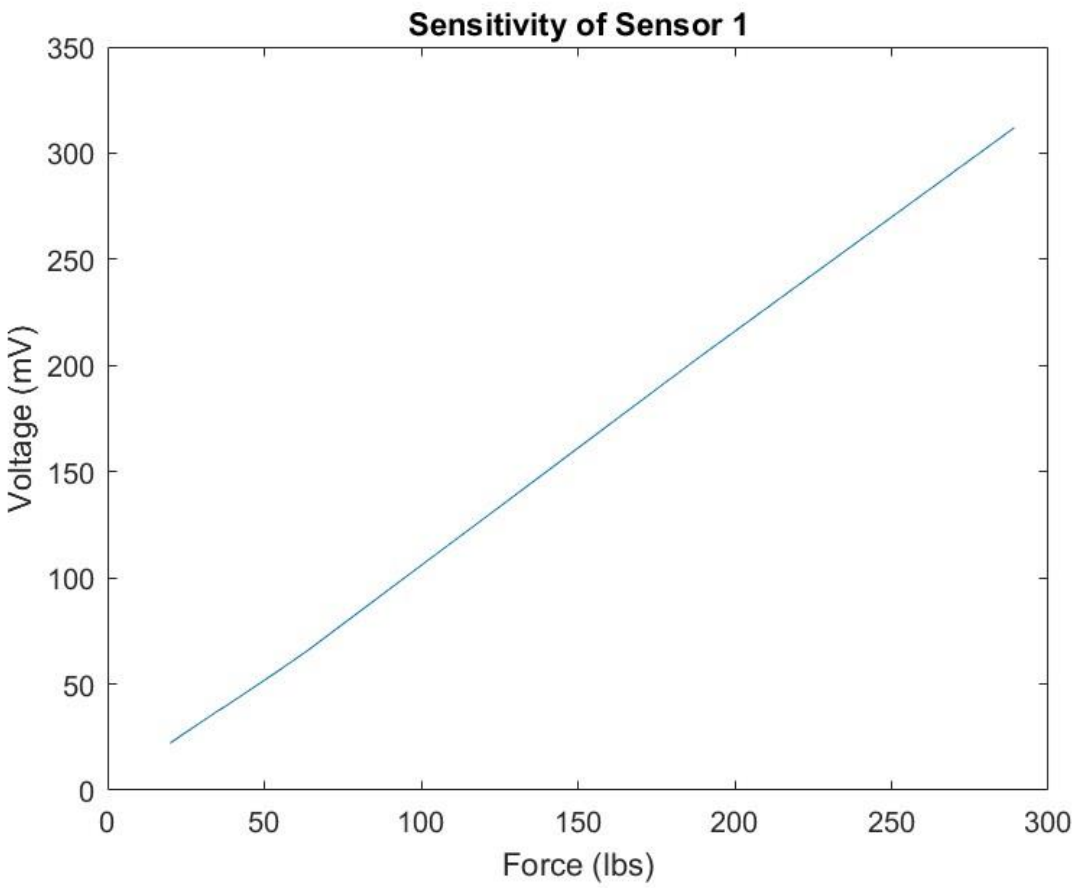
Purpose

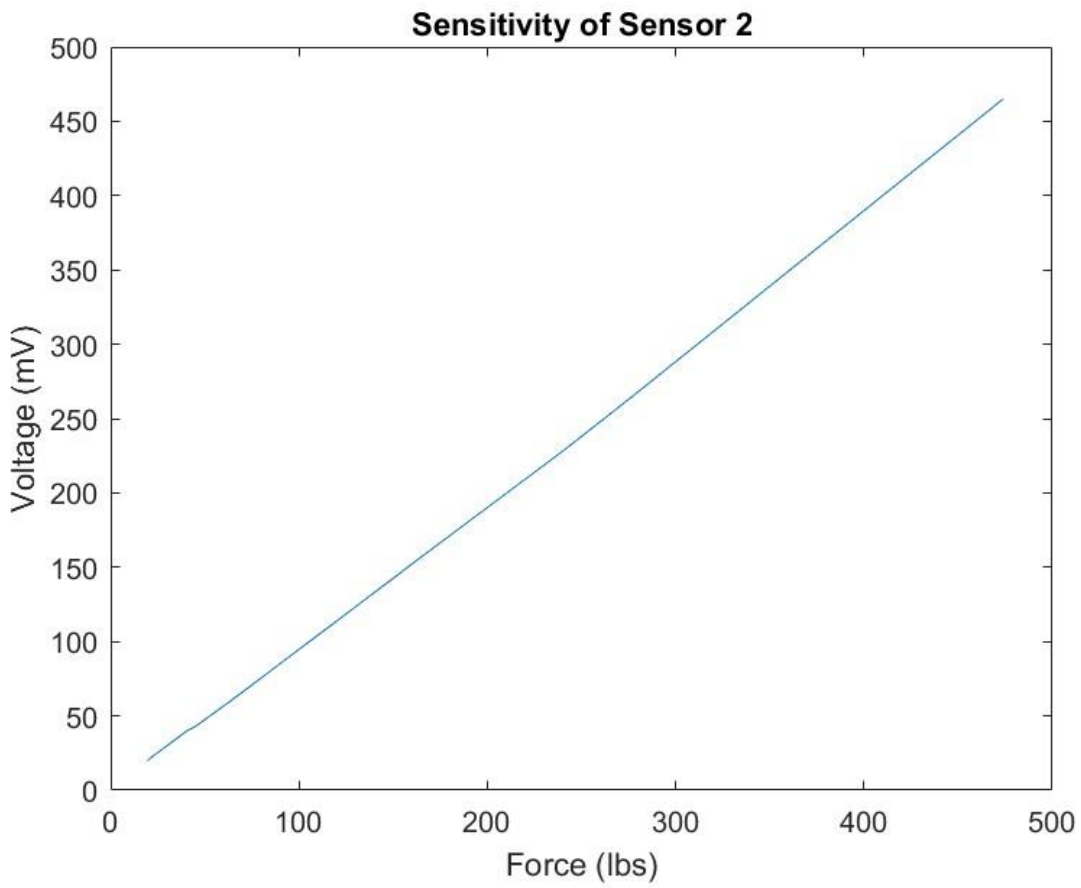
- Old calibration of Force Sensors
- A calibrated Pulse Hammer with a known sensitivity

Dynamic Photo-Mechanics Laboratory

Sensitivity of Sensors

THE UNIVERSITY OF RHODE ISLAND COLLEGE OF ENGINEERING





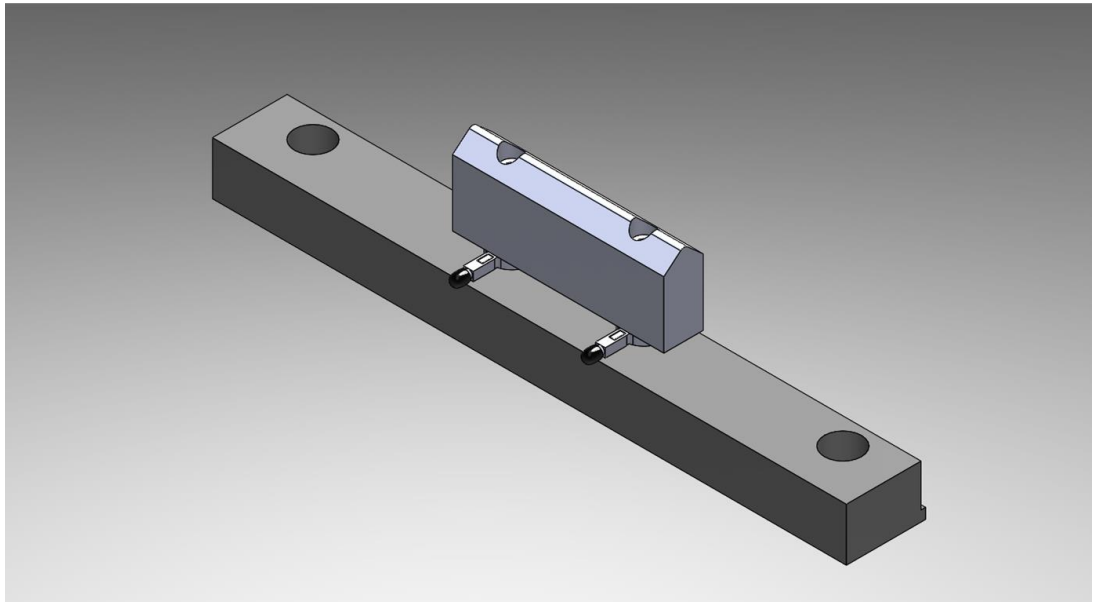
Sensitivity: 1.0838 mV/lb

Sensitivity: 0.9735 mV/lb

Sensor-Support Calibration

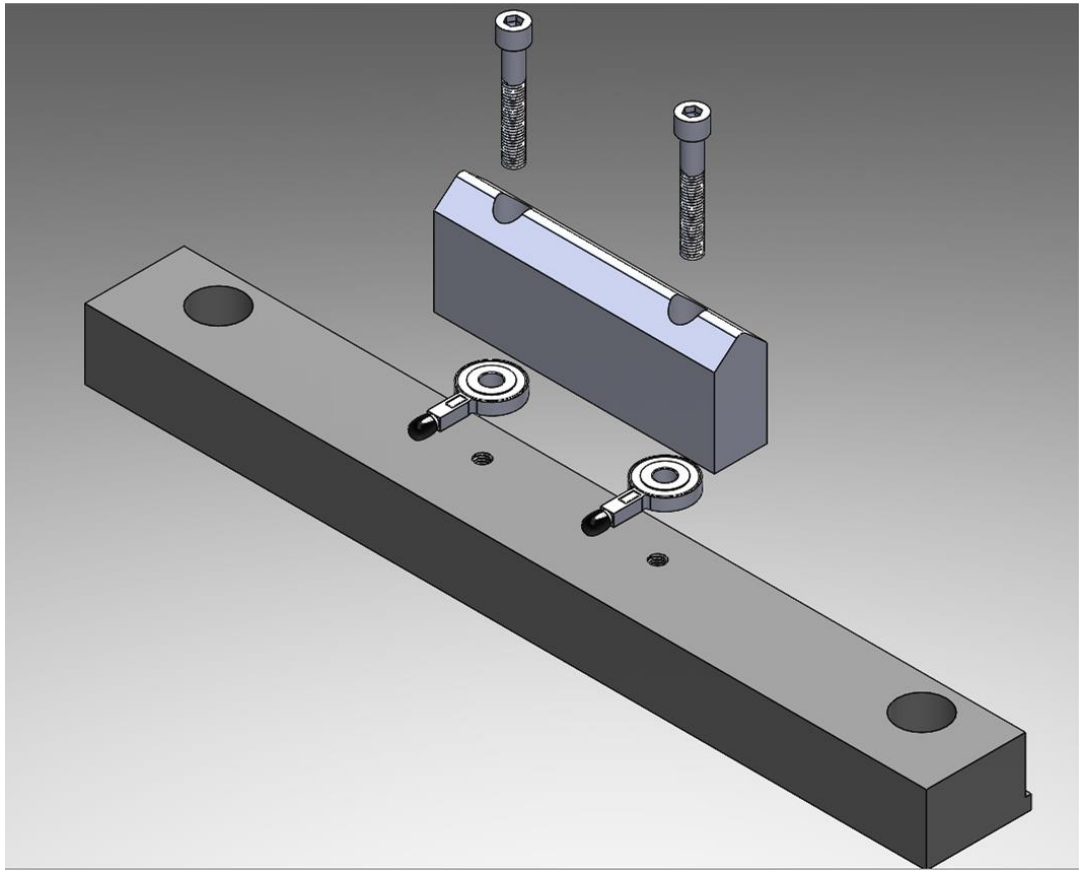
With use of a Pulse Hammer

5/25/23



Dual Sensor Supports

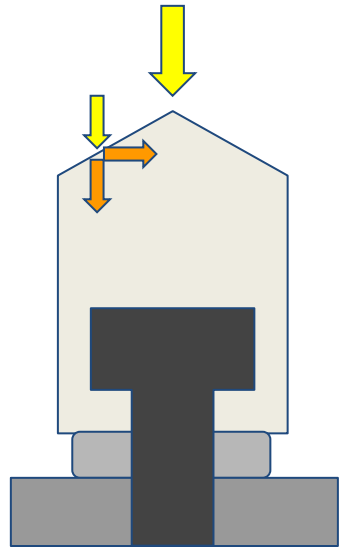
- Each knife edge support is mounted to the simple support steel bars with two force sensors in between the two bars.
- Requires new calibration due to:
  - Change in screw material
  - Distribution between two sensors



Calibration

- Through use of the Pulse Hammer, known forces can be applied to the support.

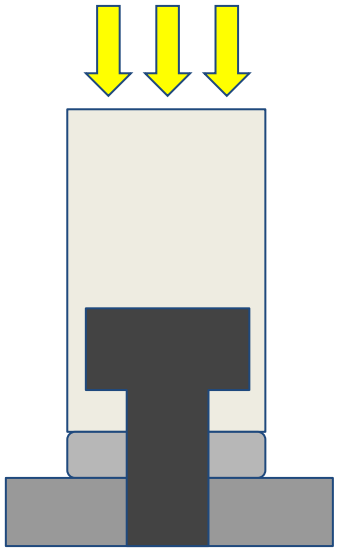
- Since the knife edge has a small apex for which the hammer strike, it is difficult to ensure consistency of direct (normal) forces to be measured. If the hammer was to strike the angled edge of the support, some shear stress would be experienced.



Solution

- A third support was created with a flat face instead of the angled knife edge.

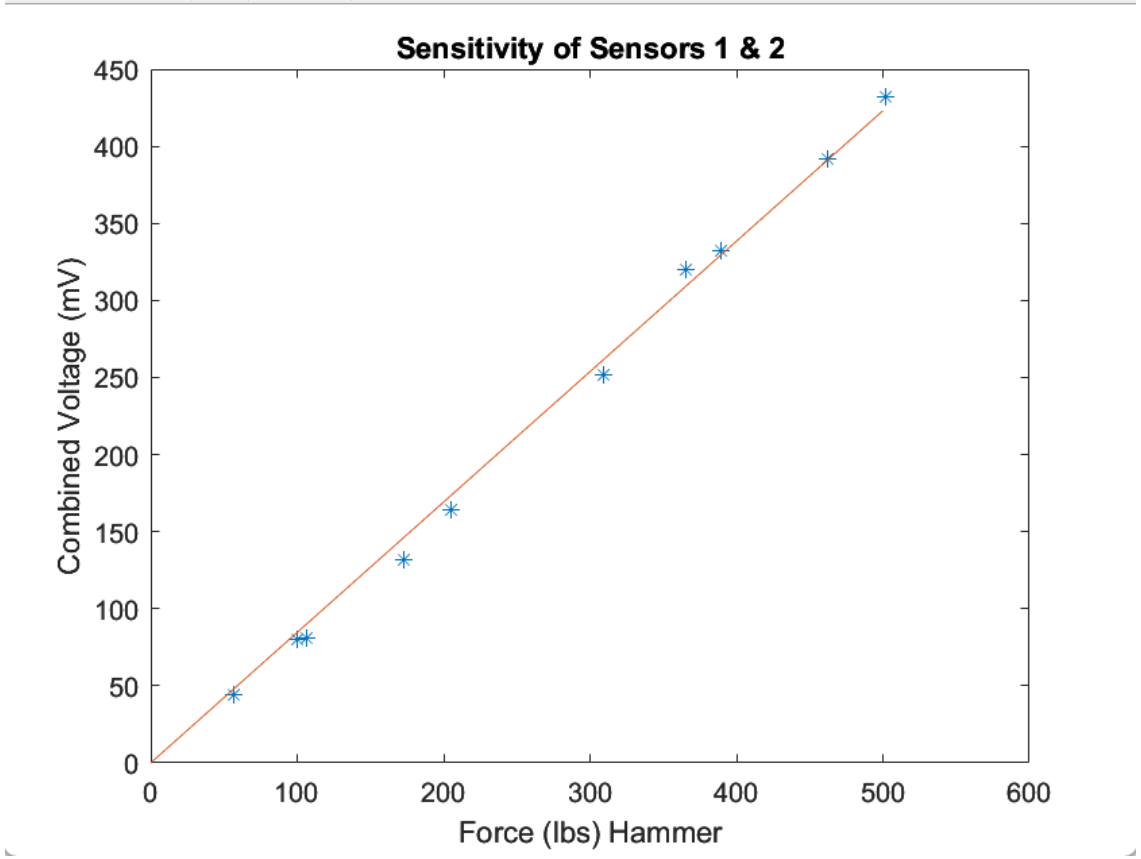
- This flat support was used in combination with the Impact Hammer to record voltage outputs from the hammer, and both sensors being tested.



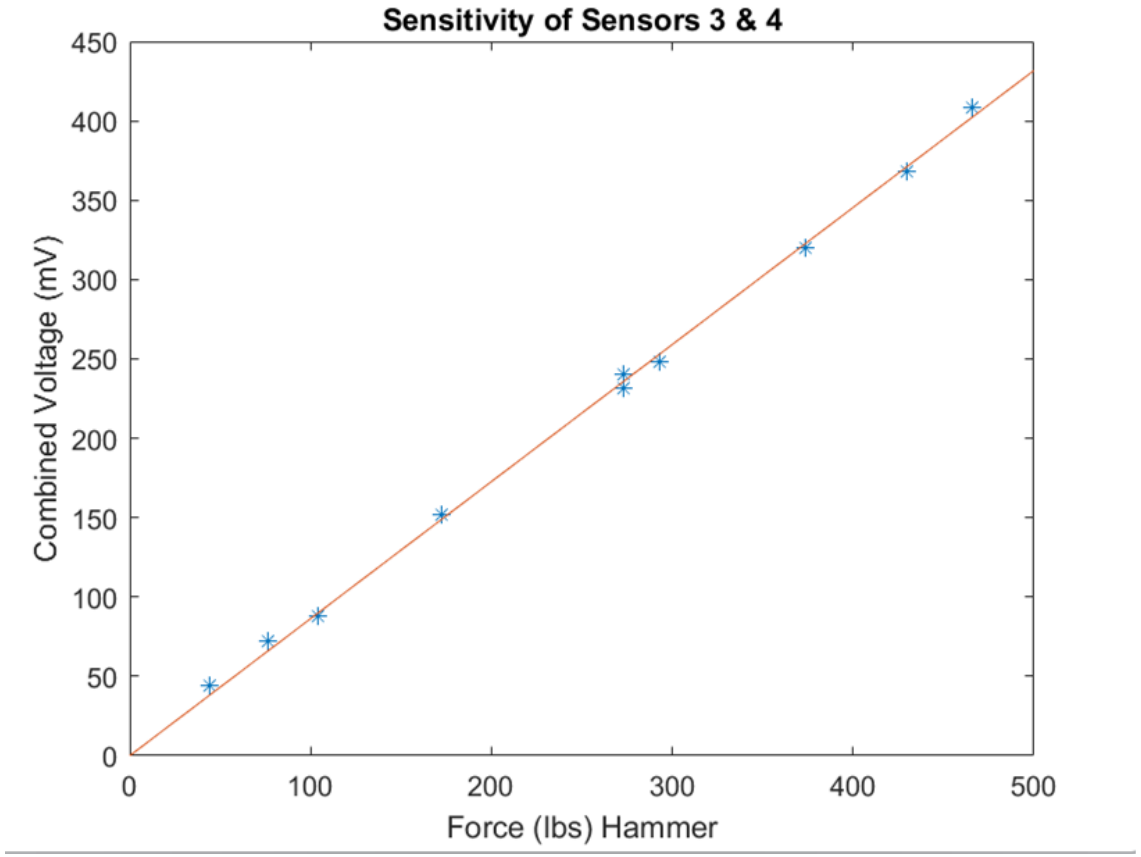
Procedure

- The Impact Hammer was used in it's full range from 0-500 lbs of force on the flat support.
- Two trials were conducted:
  - 1st: With Sensors 1 & 2
  - 2nd: With Sensors 3 & 4
- A total of 20 data points (10 data points per trial) were collected in the calibration procedure.
- MATLAB analysis
- Excel - Data analysis: Regression (with constant as zero)

Results



Sensitivity: 0.846138 mV/lb



Sensitivity: 0.863499 mV/lb