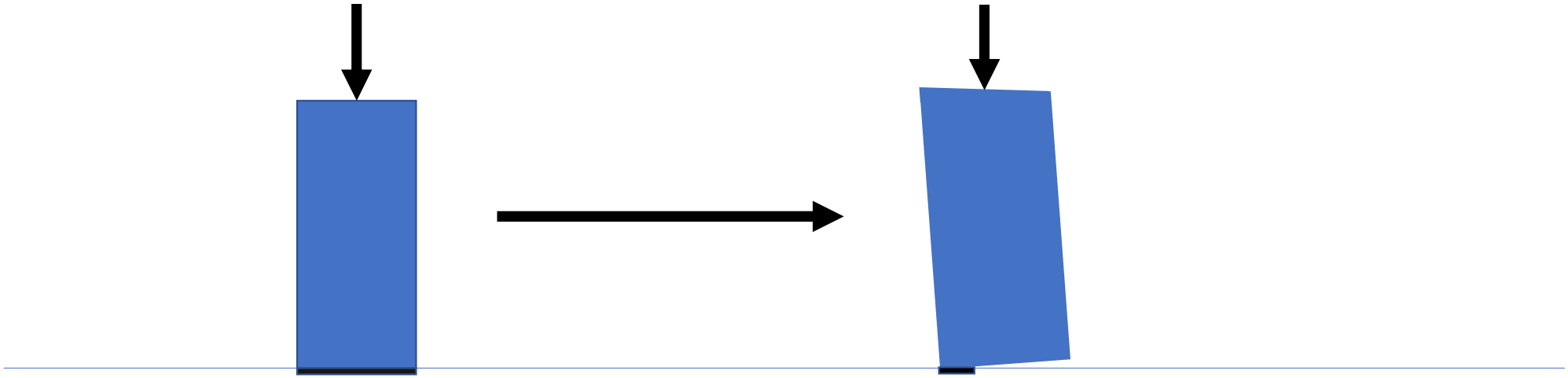
Project: Procedural Monitoring of Concrete Sample Testing

Problem: Test Cylinders were coming in with unlevel tops, This would lead to premature specimen failure that did not reflect the strength or breakage type of the material. Neoprene Pads used to correct these abnormalities only help to a limited extent.

Plan of Action: Use my knowledge of ANSYS to create a simple transient model that would reflect stress concentrations caused by shape abnormalities of test samples.

End Goal: Deduce shortcomings with current testing methods and use that knowledge to better inform clients

Considerations of the testing setup



Perfect Loading Case

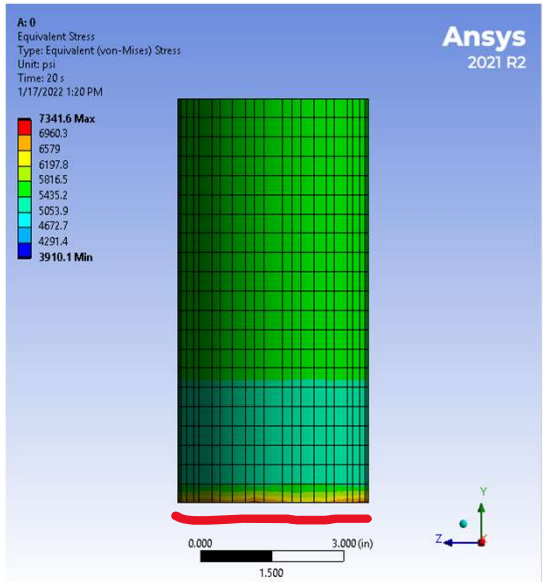
Commonly Observed Unlevel Loading Case

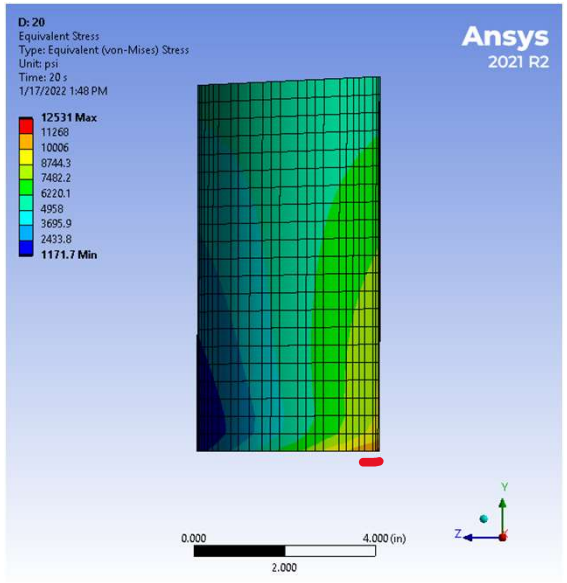
P = Force/Area

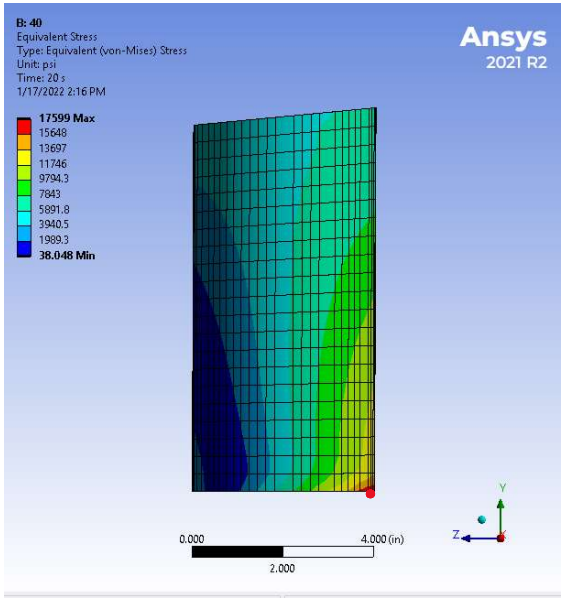
Using ANSYS to Produce a simple analysis

- **Assumptions:**
- Test is being conducted on a specimen with fully developed strength (concrete takes time to set), at a 28-day set time, with a design strength of 4500 psi.
- The test is conducted over a 20 second interval from 0 to 5500 psi with the load applied at the unlevel end for surface angles in the range of 0 to 40 degrees.
- The Neoprene pads on the top and bottom of the test cylinder are unable to completely correct the eccentricity of the specimen.

Results







Angle	0	10	20	30	40
Max Stress	~7350 psi	~9750 psi	~12550 psi	~14900 psi	~17600 psi

300 %

Final Considerations

- Several Solutions were determined for correcting specimens
- Procedural:
  - Check for surface angle greater than 20 degrees on test specimens
  - Ensure levelness before concrete is set in the field
  - Note any abnormalities in testing (i.e. unlevel specimen, tilted in testing rig)
- Physical:
  - Sulfur capping with asphalt shards
  - Form-fitting neoprene pads for different applications