

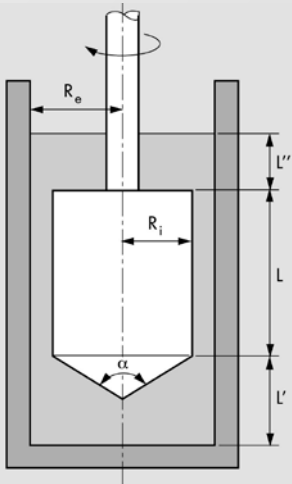
GTR: Practical Considerations for Cylinder System Measurements

**Asphalt Binder Expert Task Group
Fall River, MA
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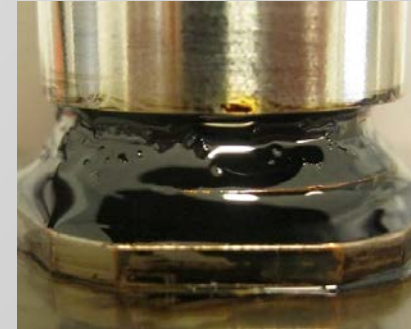
Why Cylinder over Plate/Plate?

5+ years ago the cylindrical measuring geometry was proposed to address the practical challenges associated with GRT modified binder measurements. The cylindrical measuring geometry eliminates edge effect inaccuracies associated with trimming, sagging (flow) of the sample and provides the truest rheological data.



Problem

- Swollen GTR particles impact results
- Reliable trimming and gap filling
 - More influence with small diameter plates
- Flow and sagging of sample out of the measuring gap

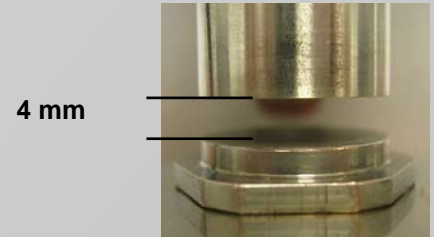
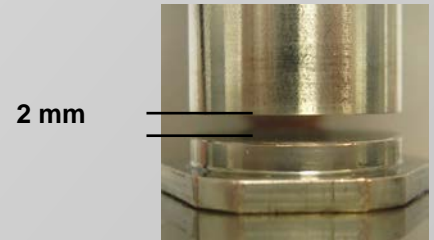
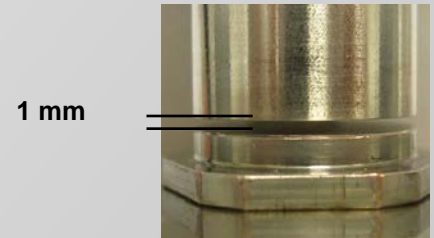


Problem

- Swollen GTR particles impact results
- Reliable trimming and gap filling
 - More influence with small diameter plates
- Flow and sagging of sample out of the measuring gap

Solution Approaches

- Increase the measuring gap
 - Plate-plate geometry with large gaps (up to 4mm)
- Concentric cylinder geometry



Considerations

- Heating temperature
 - A little higher than neat
- Loading the sample
 - Can be a little messy
 - Some skill needed to prevent air bubbles
- Correct volume (18 ml)
 - Simple determination with bob in measuring position and water



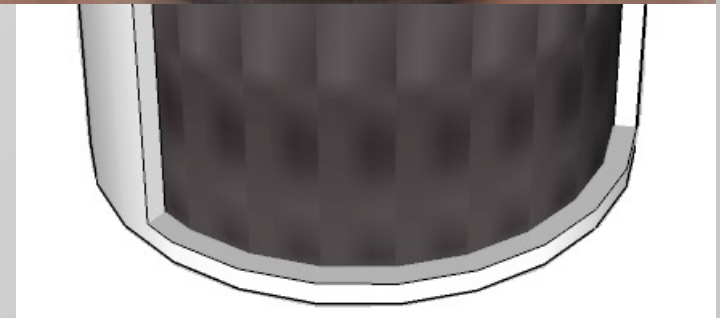
Nothing critical for Original and RTFO GRT Materials

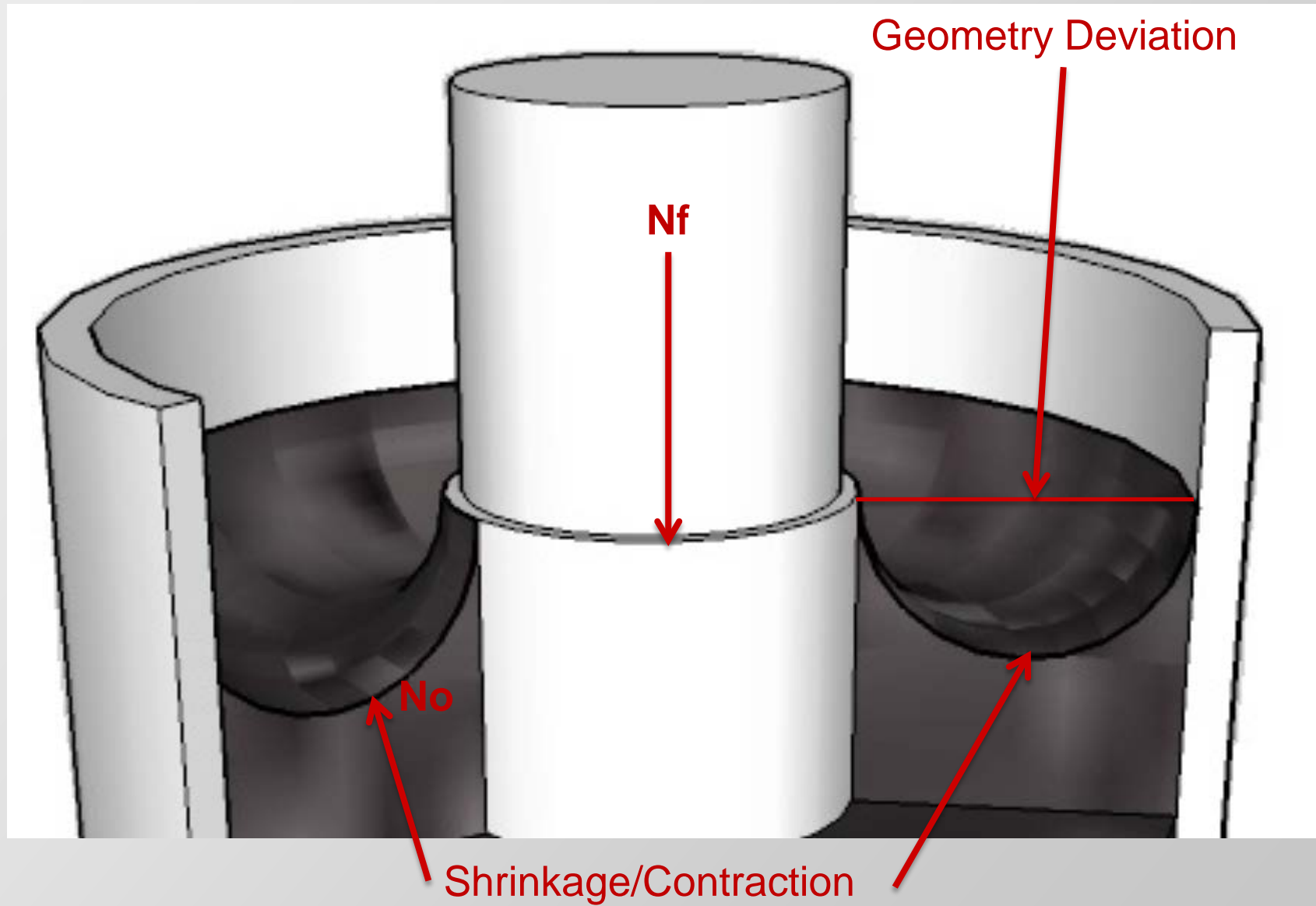
Considerations

- Temperature
- Loading the sample
 - Air bubbles
- Correct volume? (23 ml)

Volume

- Load at high temperature
- +100° Δ to test temperature
- Correct volume? **No**





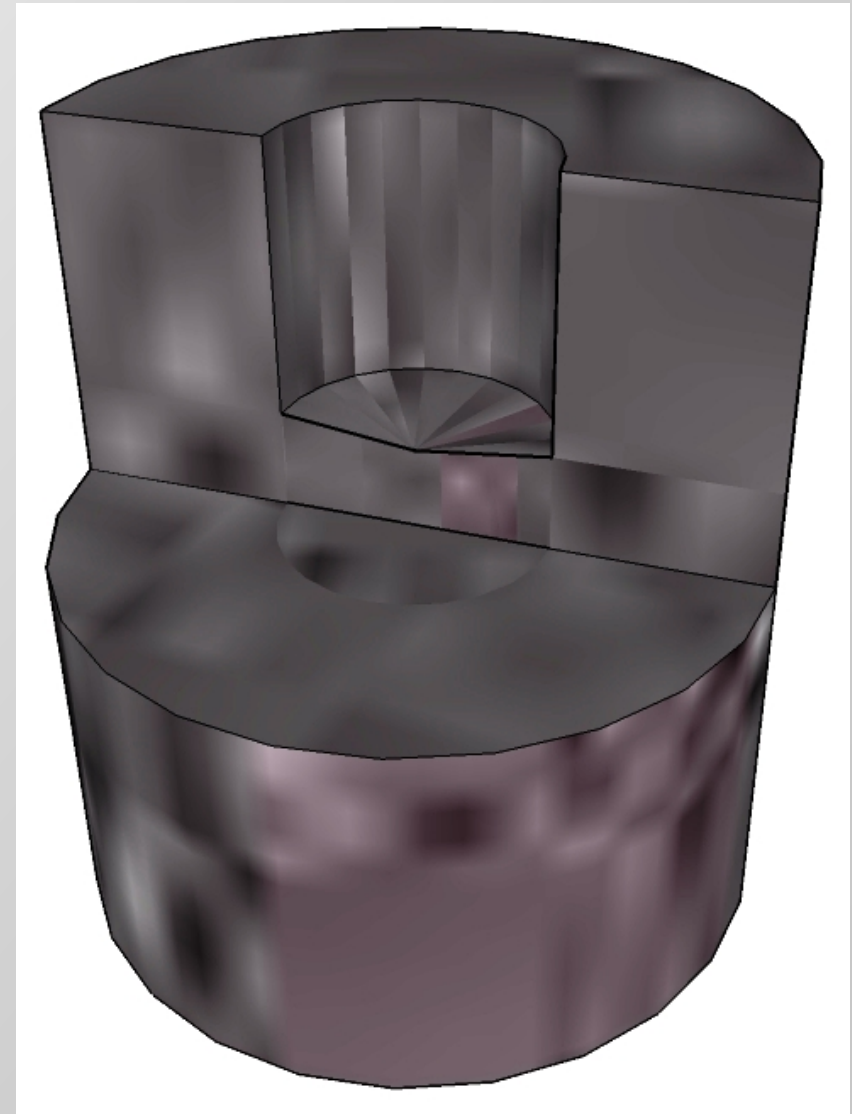
Possible Solution (Best?)

- Sample plug from mold
- Easier loading of sample in cup
- Best conditions for accurate fill
- Accommodating bob volume is best



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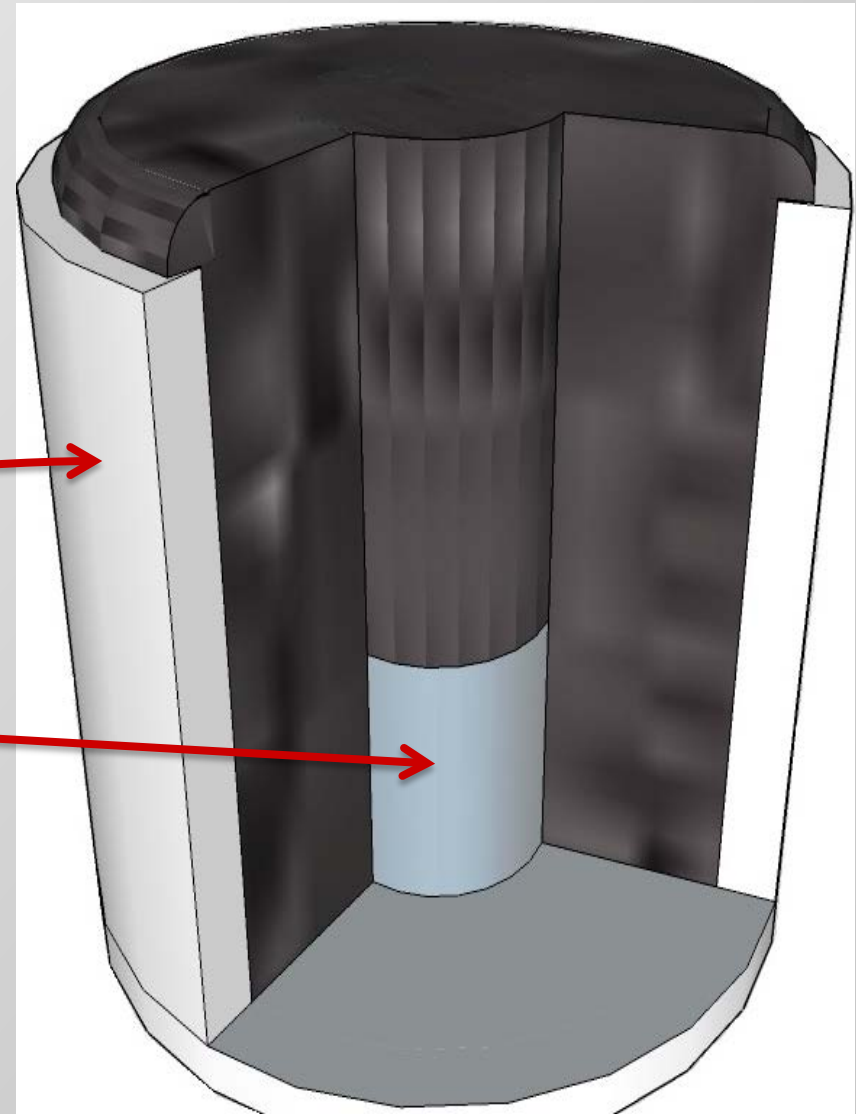
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Mold
(positive image of bob detail)



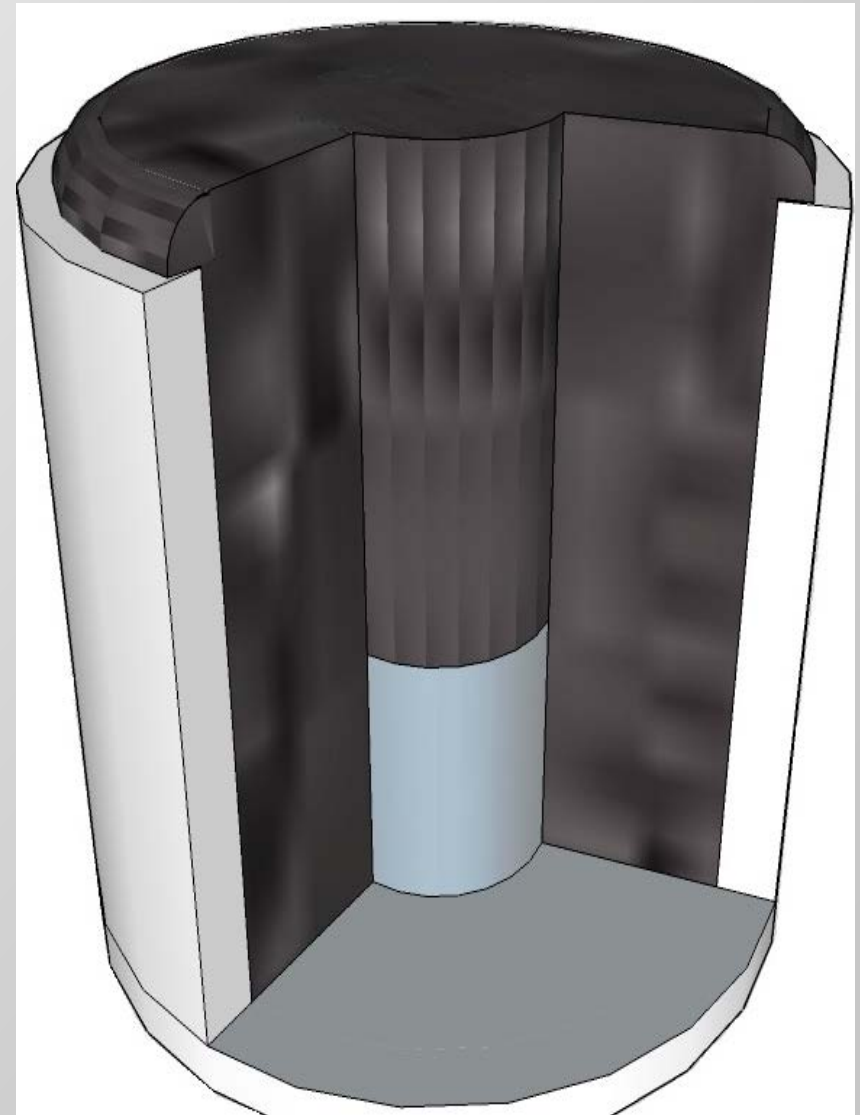
Cylinder Geometry Mold: Pros and Cons

Pros

- 👍 Well controlled sample volume
- 👍 Accommodates for volume change
- 👍 Conveniently create replicates

Cons

- 👎 Adds extra time to process



Conclusion

- Practical consideration for reproducible cup filling.
 - Addresses shrinkage/contraction of GTR PAV materials
 - Eliminates need to hastily load sample cup
 - Straight forward and easy
- Final steps – collaboration partners currently working on developing mold design and best practise for PAV materials



**Concentric
Cylinder**