

Why do Basics Matter?

Back to Basics Workshop

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Jointly sponsored By VAA, VTRC and VDOT



My Background

- 9 (combined) years working at NCAT
 - Volumetric mix design, BMD, Friction, Field work
 - Training, training, training
- Not just “How?” but “Why?”



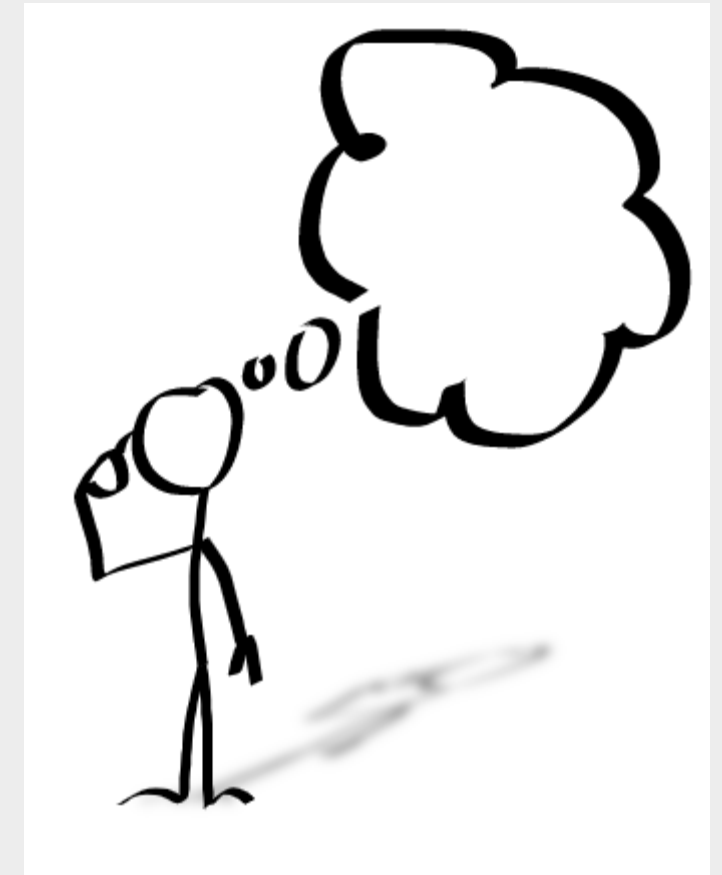
Objective

- Provide examples of the importance of “Basics”
 - Consequences of ignoring
 - Benefits of understanding
- Simple, but not always easy



Assumptions

- “This probably doesn’t matter... right?”
- You know what happens when you assume?

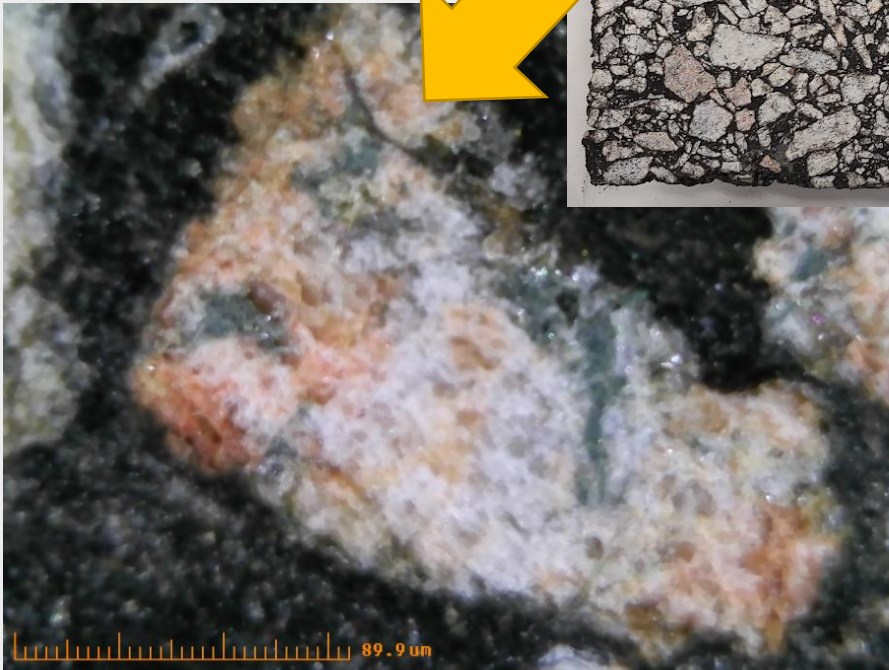


Example: G_{se} versus G_{sb}

- Using G_{se} in calculating VMA versus G_{sb}
 - This effectively assumes no binder absorption



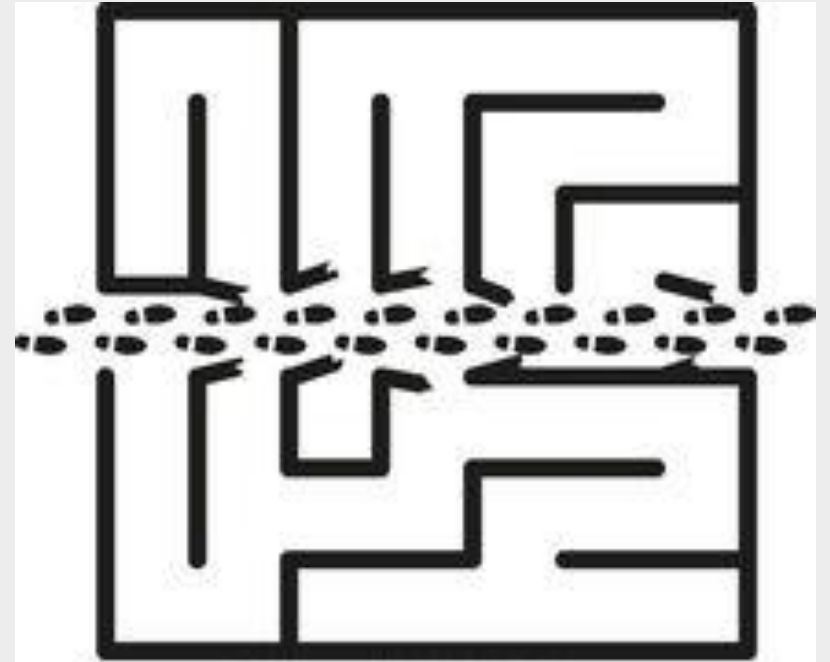
Binder absorption



Shortcuts

- Shortcuts in test methods can lead to disastrous results
- Shortcuts attempt to:
 - Save time, money, energy/effort
- “Shortcuts lead to long delays.”

Mike Rowe

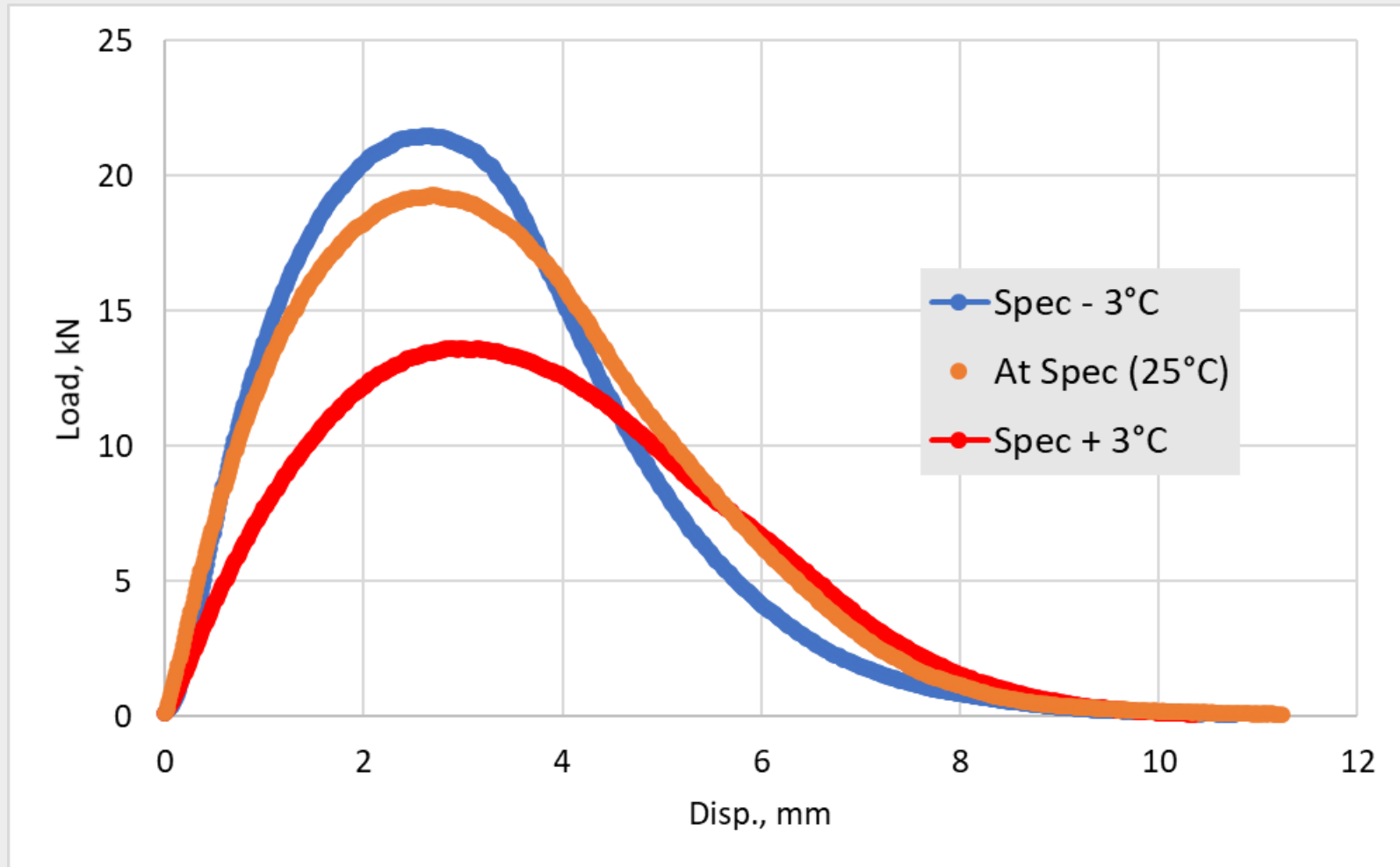


Shortcut – Saving Time

- “Time is money”
 - But so is having to redo a task...
- Not all shortcuts are bad but they shouldn't conflict with quality



Example: Conditioning Time



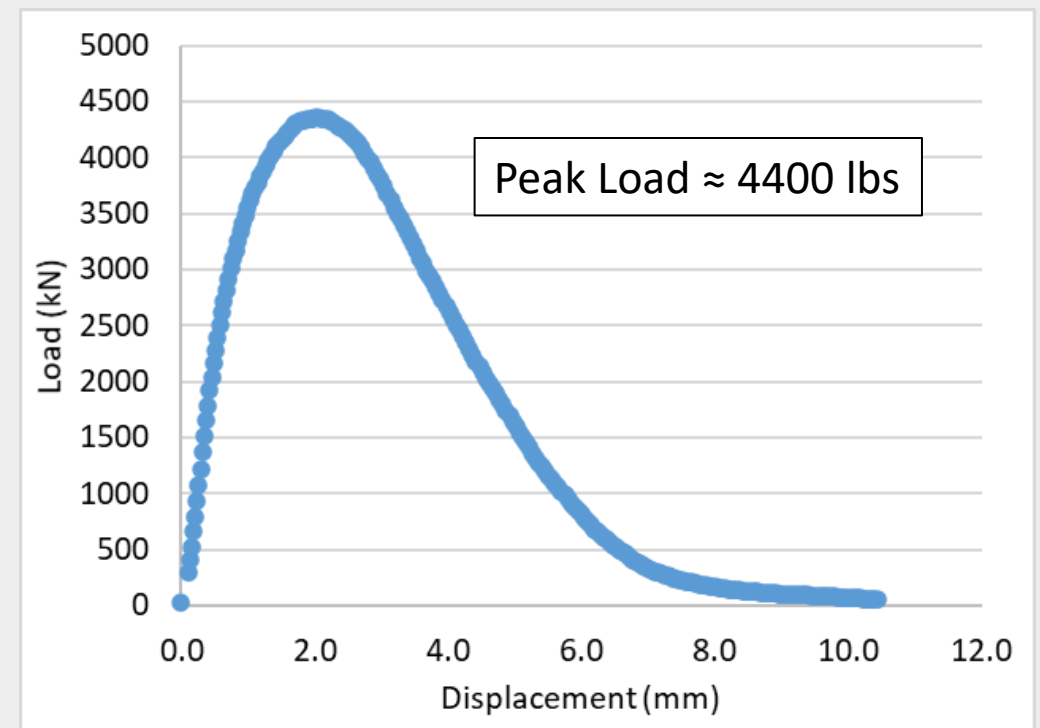
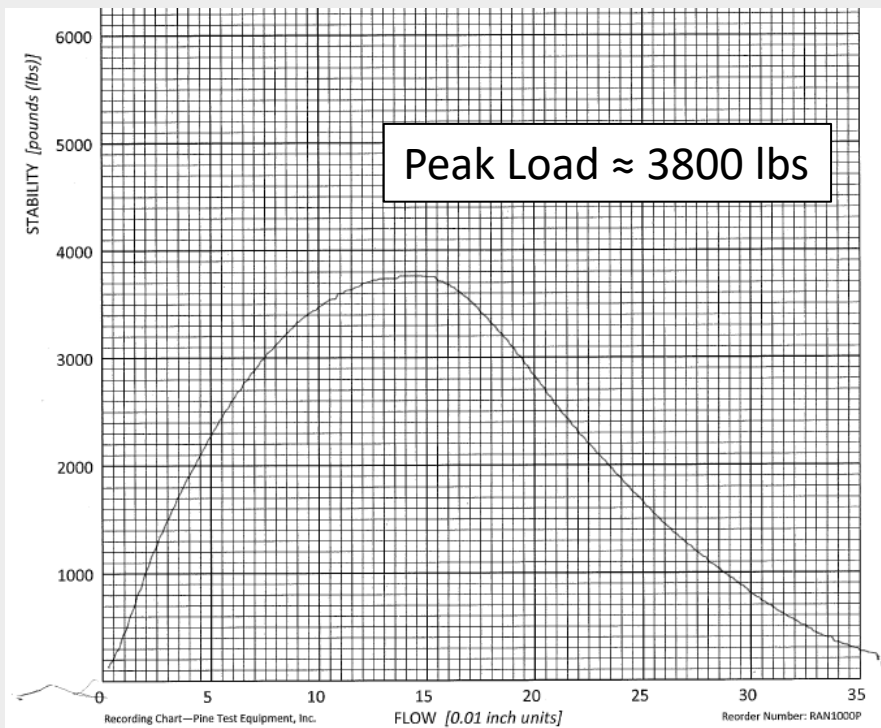
Shortcut – Saving Money

- It's too expensive to be cheap!



Example: IDEAL-CT Machines

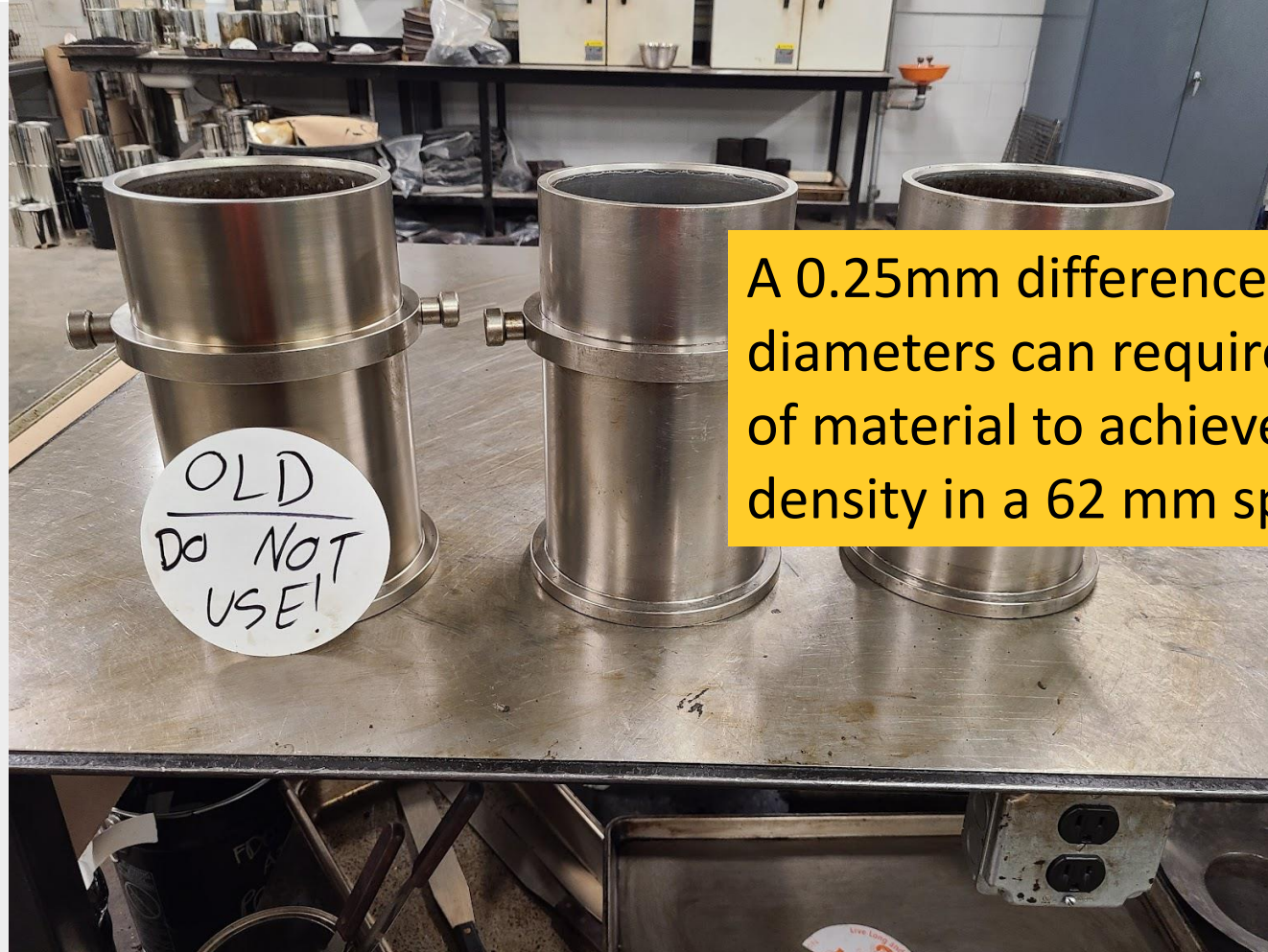
➤ Old style paper vs. digital recording



Example: Pinching Pennies



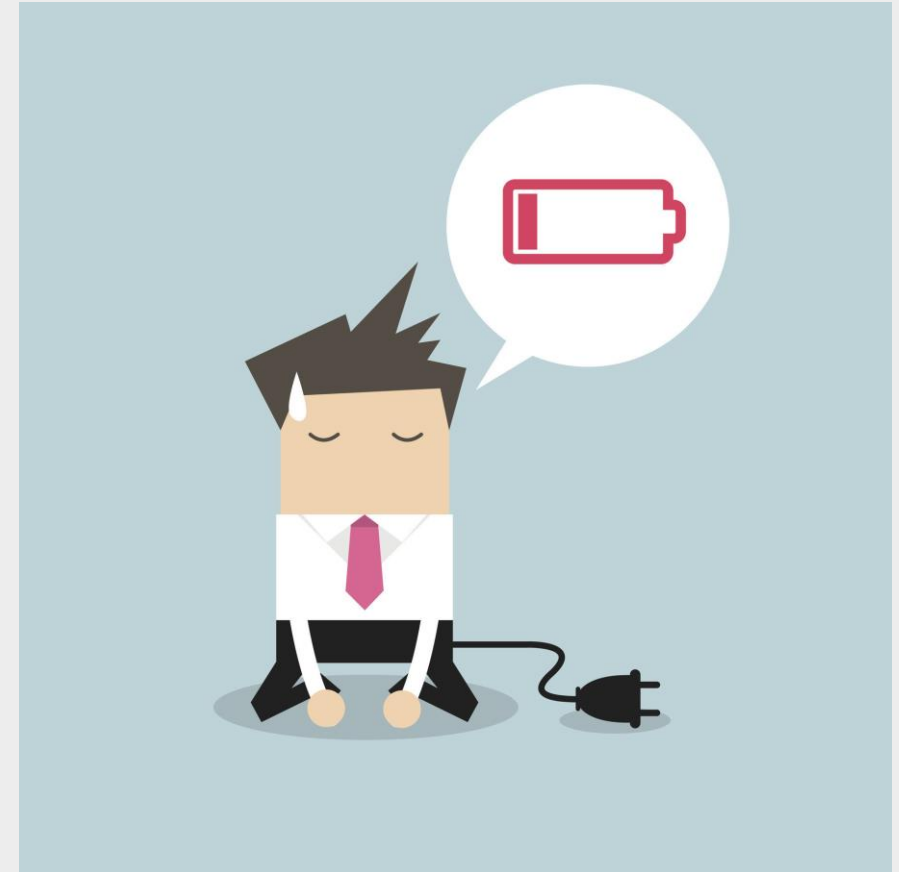
Example: Replacing Equipment



A 0.25mm difference in inside mold diameters can require ≈ 80 g more of material to achieve the same density in a 62 mm specimen!

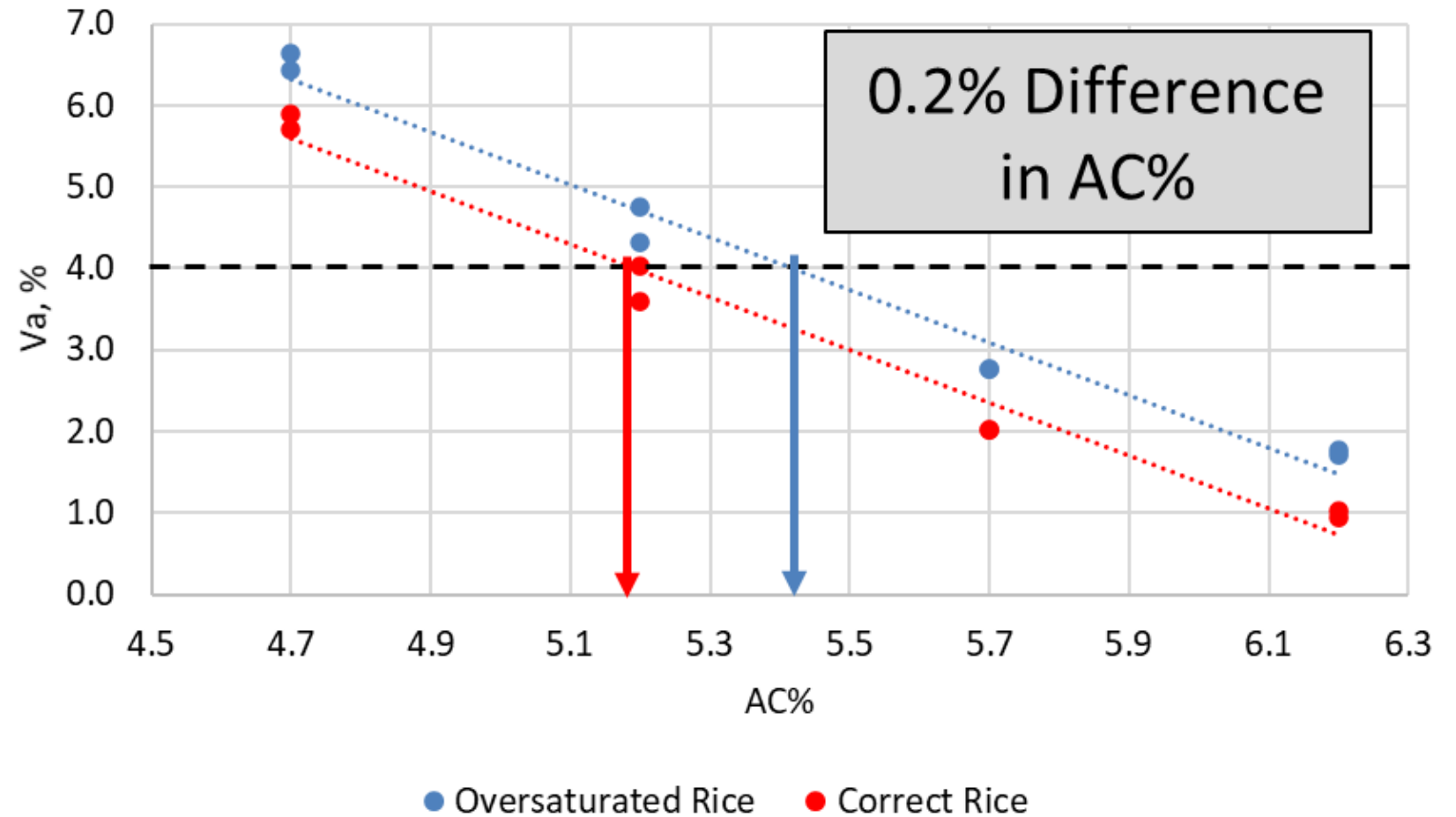
Shortcut – Saving Effort

- “I just wanna go home...”
 - Not cleaning equipment
 - Skipping steps
 - “I’ll just do that tomorrow...”



<https://www.health.harvard.edu/blog/dont-take-fatigue-lying-2017041411485>

Example: Different Gmm's



What can the basics do for you?

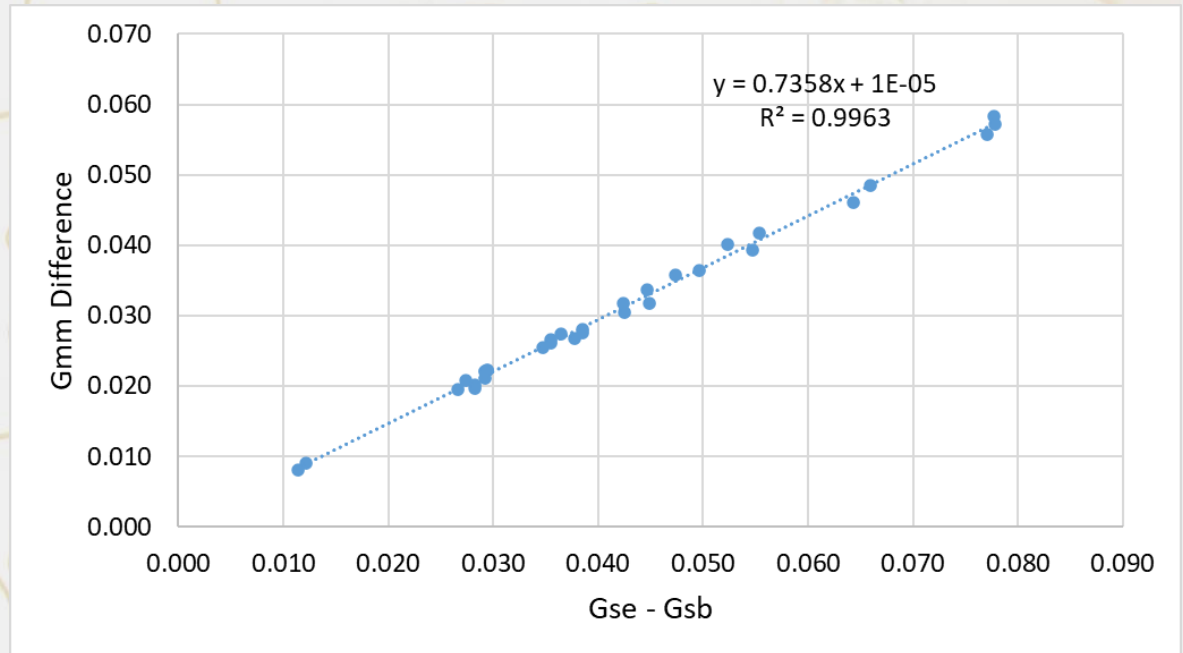
- There are MAJOR benefits of understanding the basics
 - Troubleshooting
 - Pattern recognition
- Combine “Why?” with “How?”
 - Understanding the big picture
 - Without losing sight of important details



Image source: <https://wishgroup.ca/work-hard-smart/>

Example: Mix Design Tools

- Quick G_{mm} estimator
 - Know your G_{sb} vs. G_{se}
 - Known G_{mm} OR AC%
- You should be able to estimate what the other should be
- Or figure out what went wrong!



Example: BMD Tools



Example: BMD Tools

- Trial Weight Estimation

$$M_{target} = \left(\frac{\left(\frac{100 - \text{Target } V_a}{100} \right) \times \text{Target Gmb}}{\text{CF}} \right) \times \frac{\pi}{4} \times D^2 \times H$$

Target Gmb

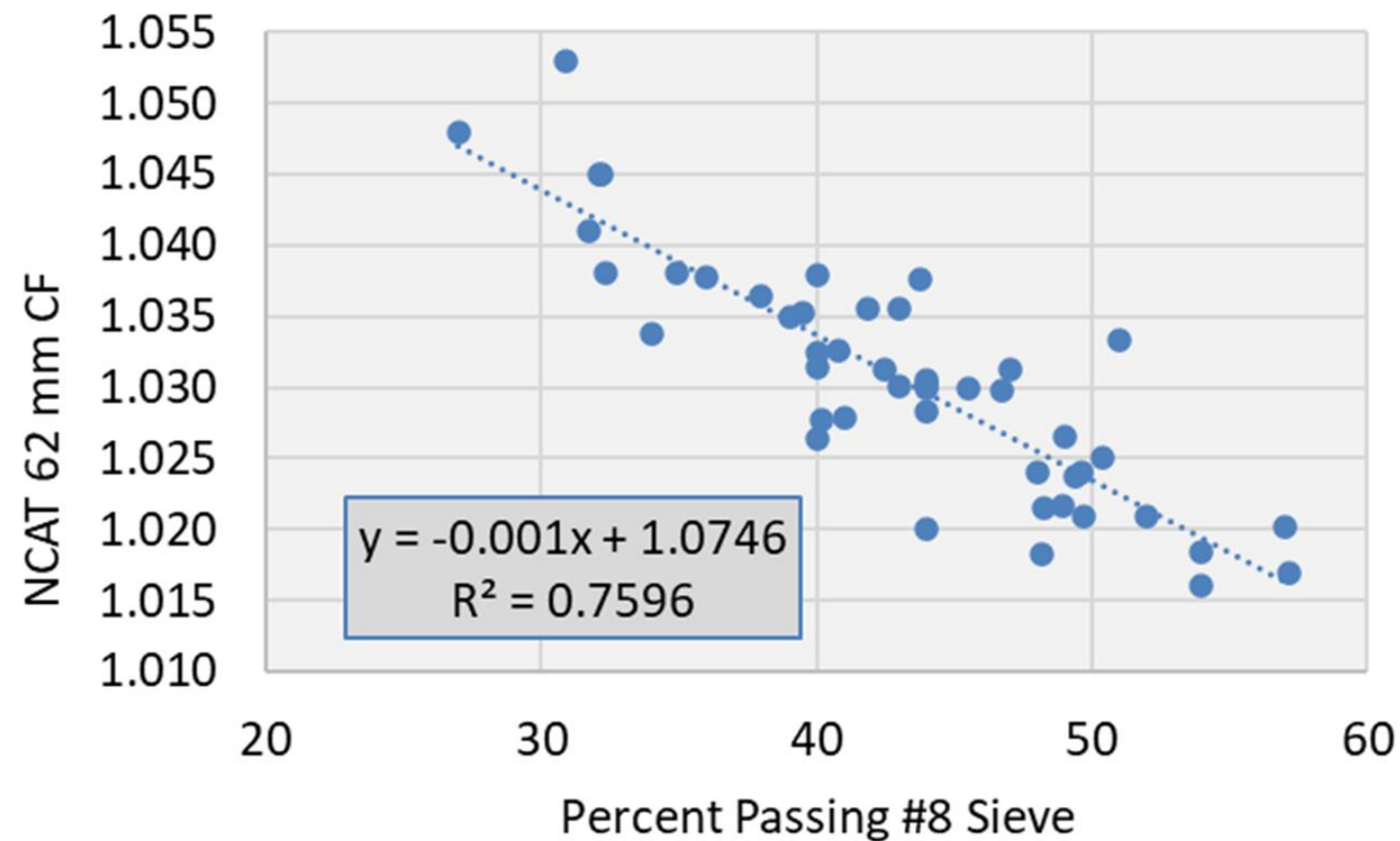
Target Volume

CF

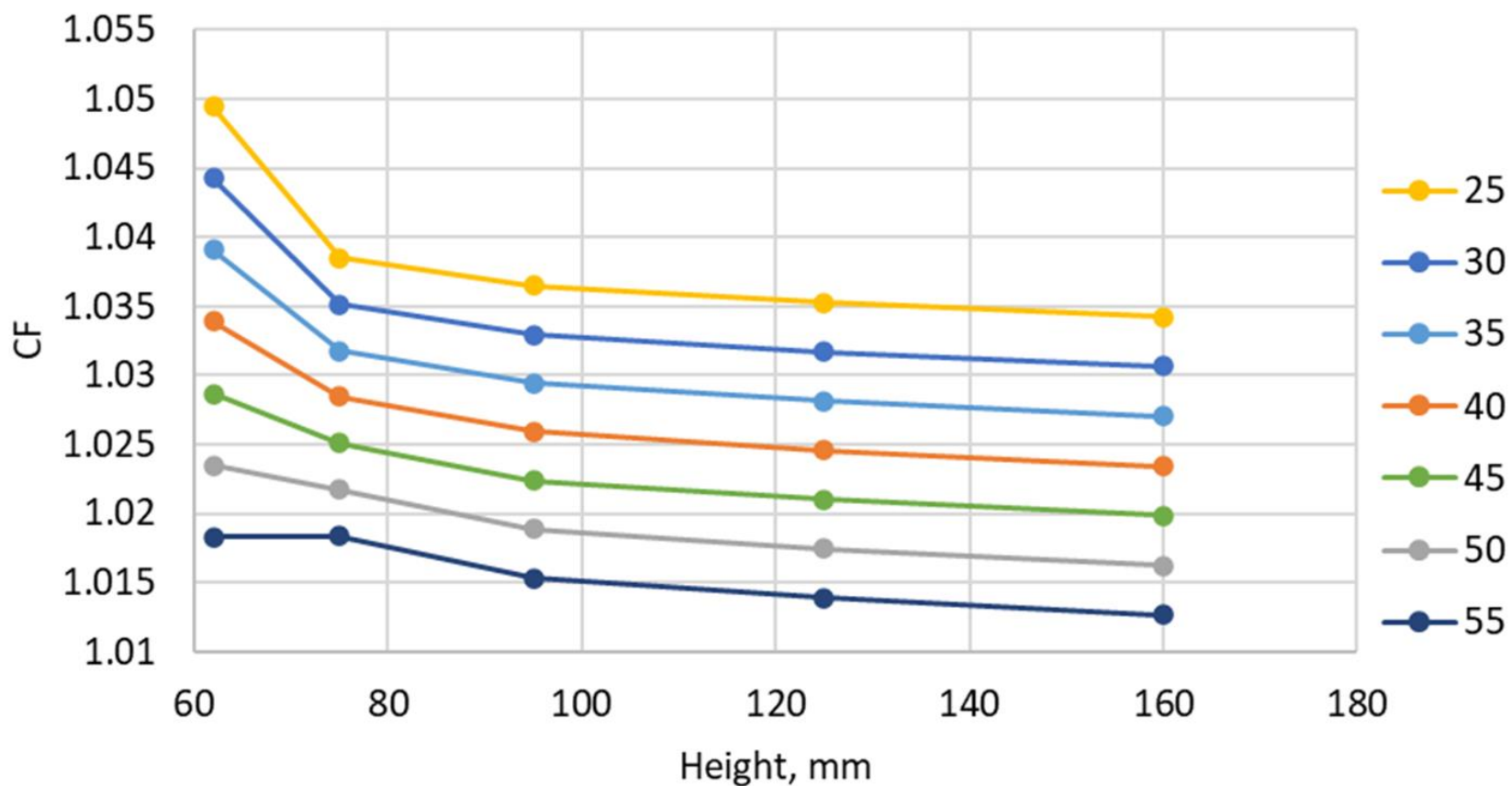
Volume Correction Factor

- For a 62 mm specimen, a range in CF from 1.015 to 1.045 translates to a 70 gram difference
 - 70 grams \approx 3-4% air void difference
 - More iterations/specimens were often required to zero in on the target

Example: BMD Tools



Example: BMD Tools



Link to Download



https://aub.ie/NCAT_Trial_Weight_Spreadsheet



Why Do Basics Matter?

- Solving problems requires understanding details
- Being cheap can be very expensive
- Never graduate beyond the basics
 - They will keep popping back up!





Thank you!

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