

# Salt Scaling

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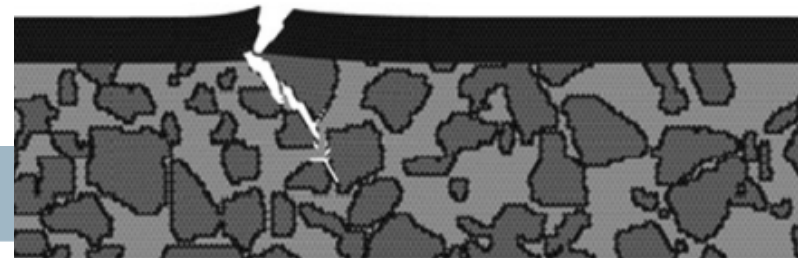


# Acknowledgment

- Portland Cement Association (PCA)
  - ✓ 5 Year Gleason Fellowship

# The Problem

- Loss of surface
  - ✓ Chips or flakes
- Causes are debated
  - ✓ Salt crystallization
  - ✓ Thermal shock
  - ✓ Osmosis
  - ✓ Glue spalling
  - ✓ Cryogenic suction
- Prevention is not guaranteed
- More of an issue in horizontal slabs than pavements



# Factors

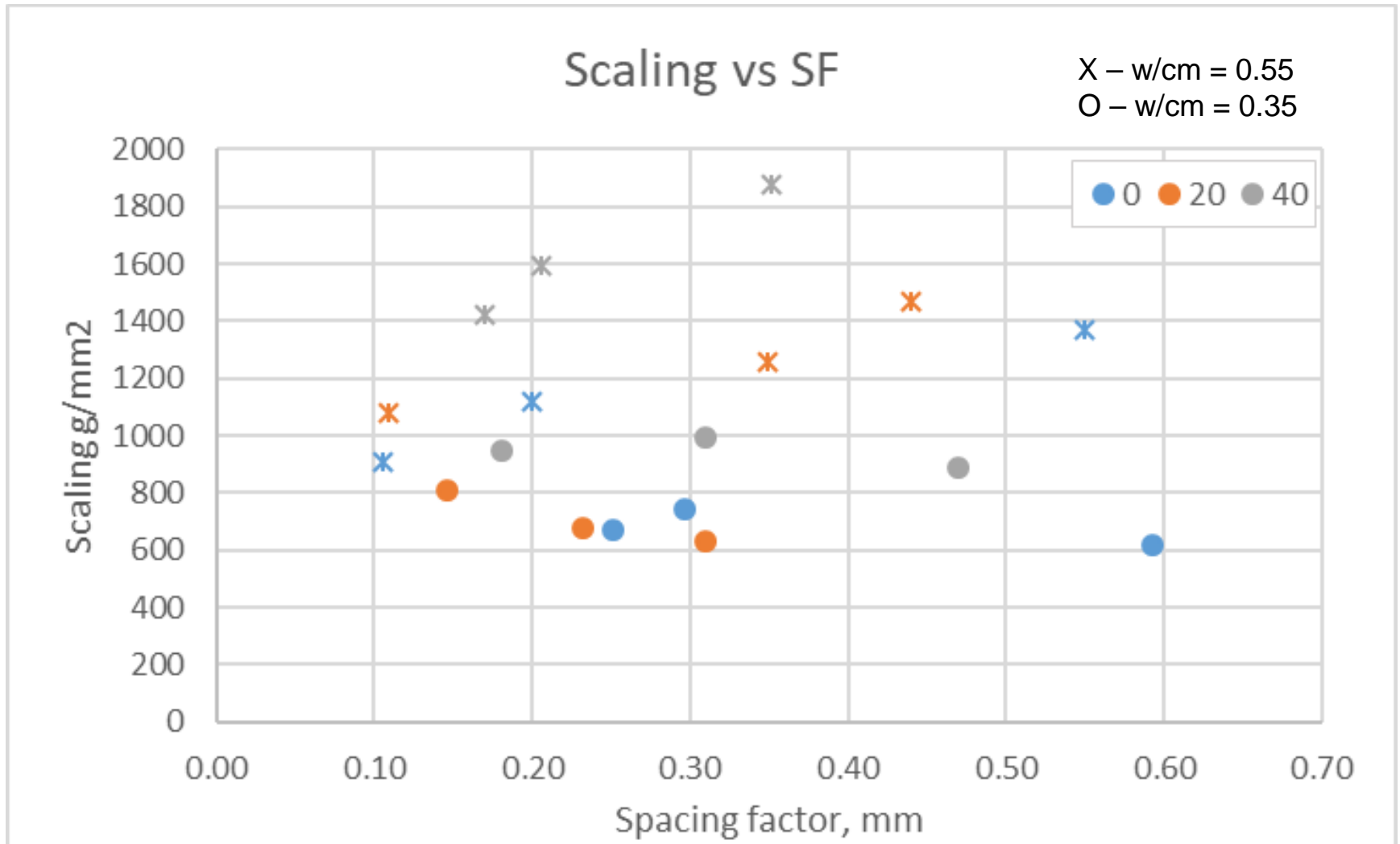
- Air void system
- w/cm
- System chemistry
- Finishing
- Curing

# Test methods

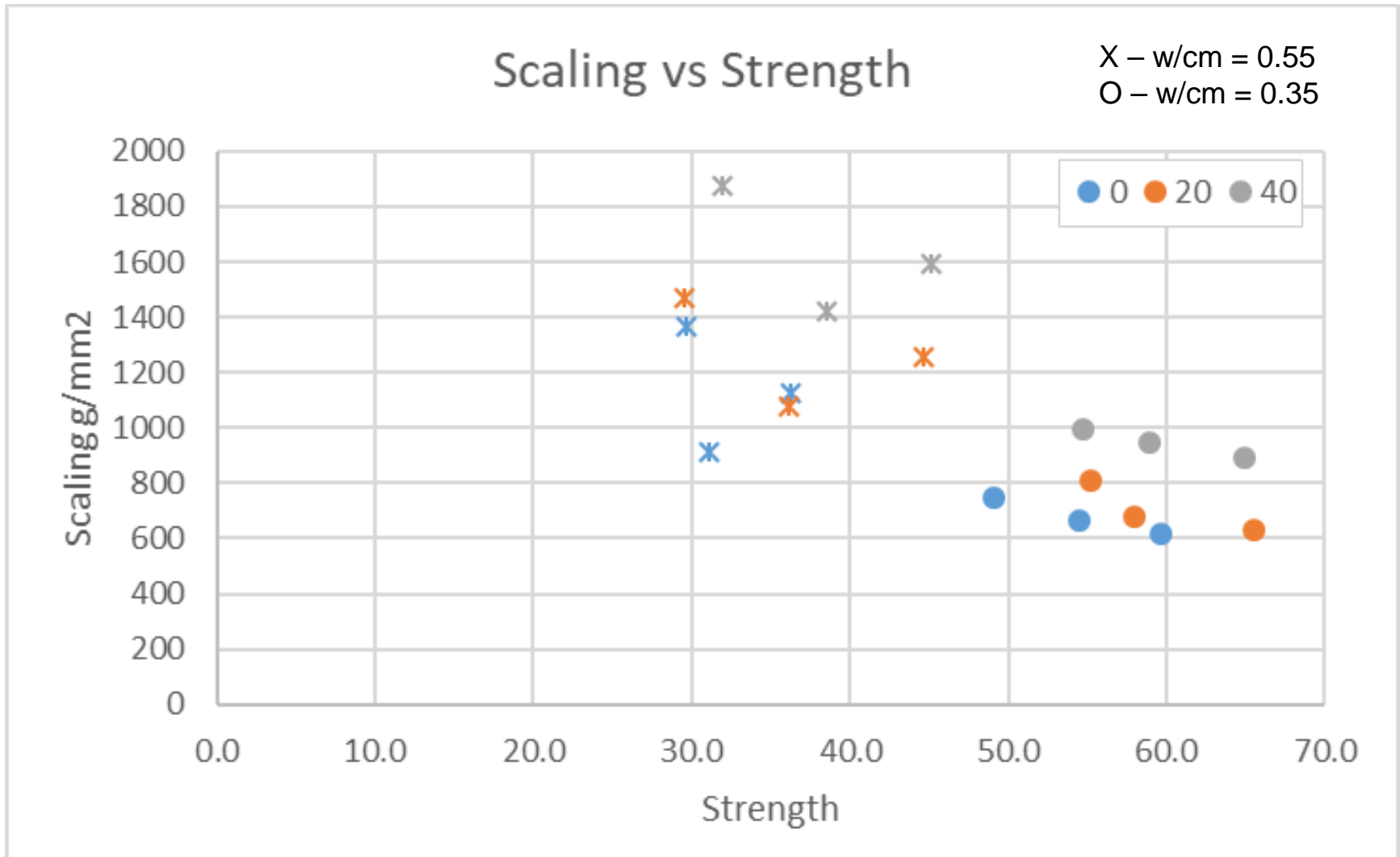
- Air void system – ASTM C 457
- Scaling - BNQ
  - ✓ Similar to ASTM C 672 except
    - Finishing is early & with a wooden ruler
    - Curing is longer
    - Presoaked in solution before cycling
- Abrasion
- Hardness
- Sorptivity
- Compressive strength



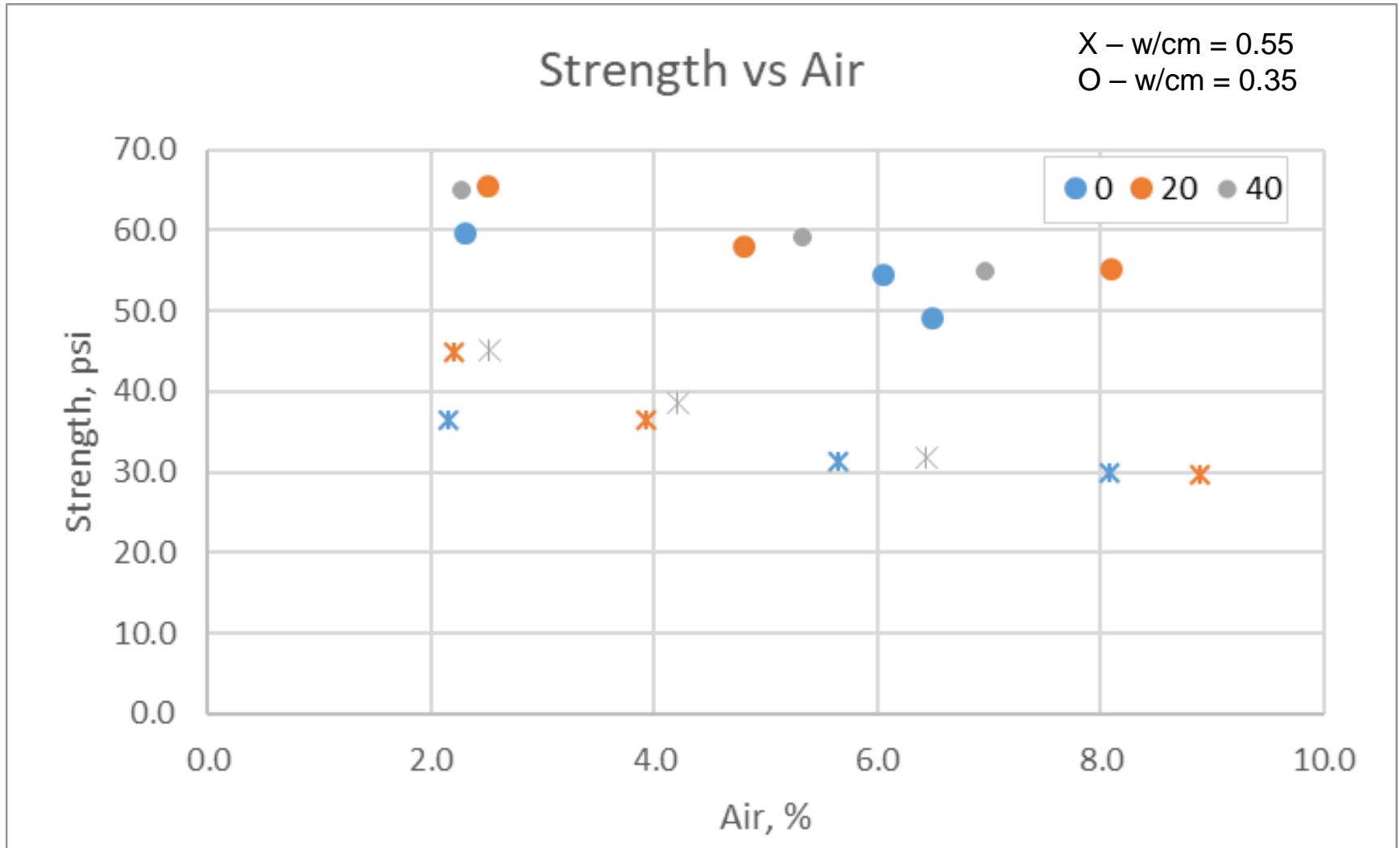
# Results



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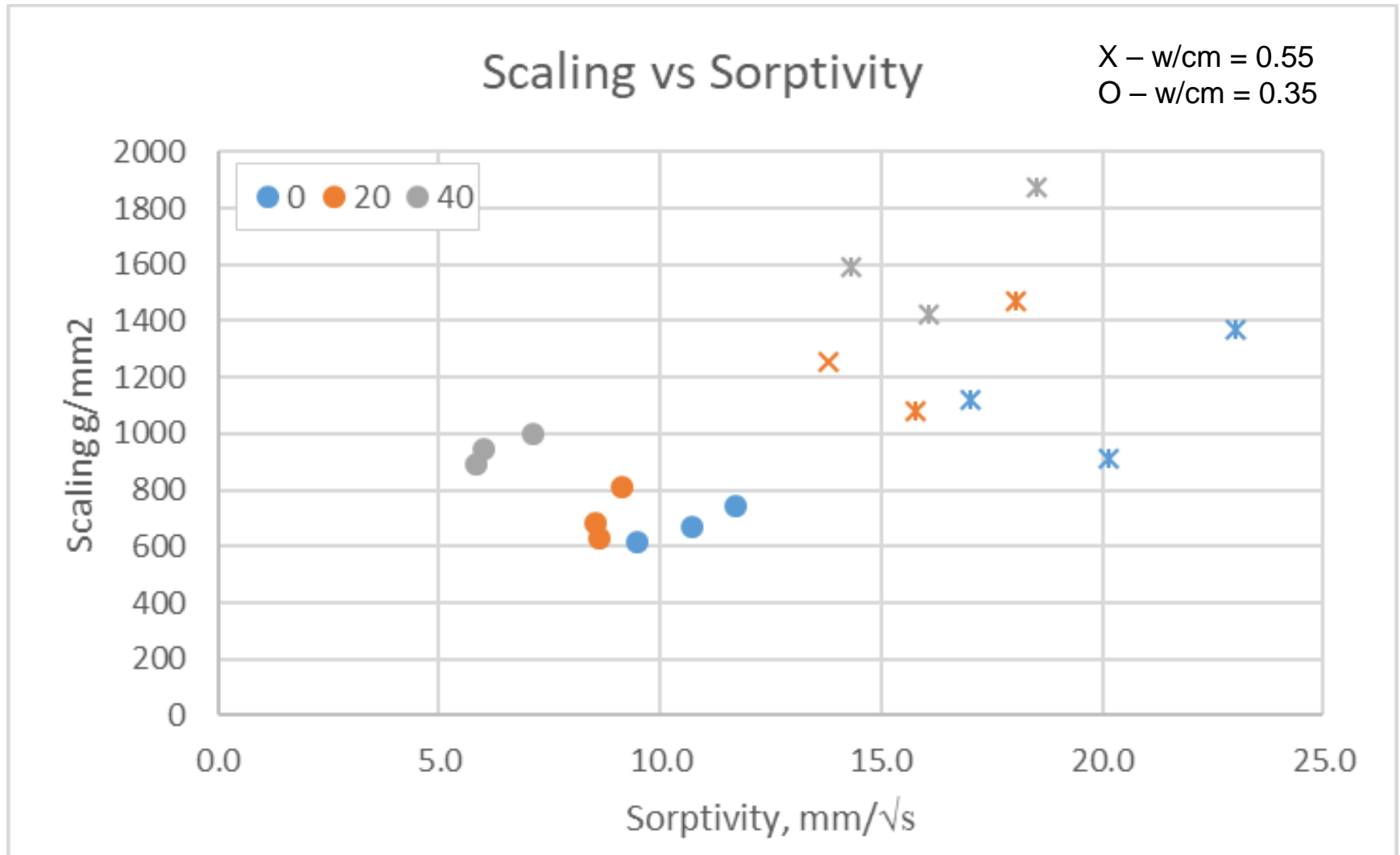


# Results

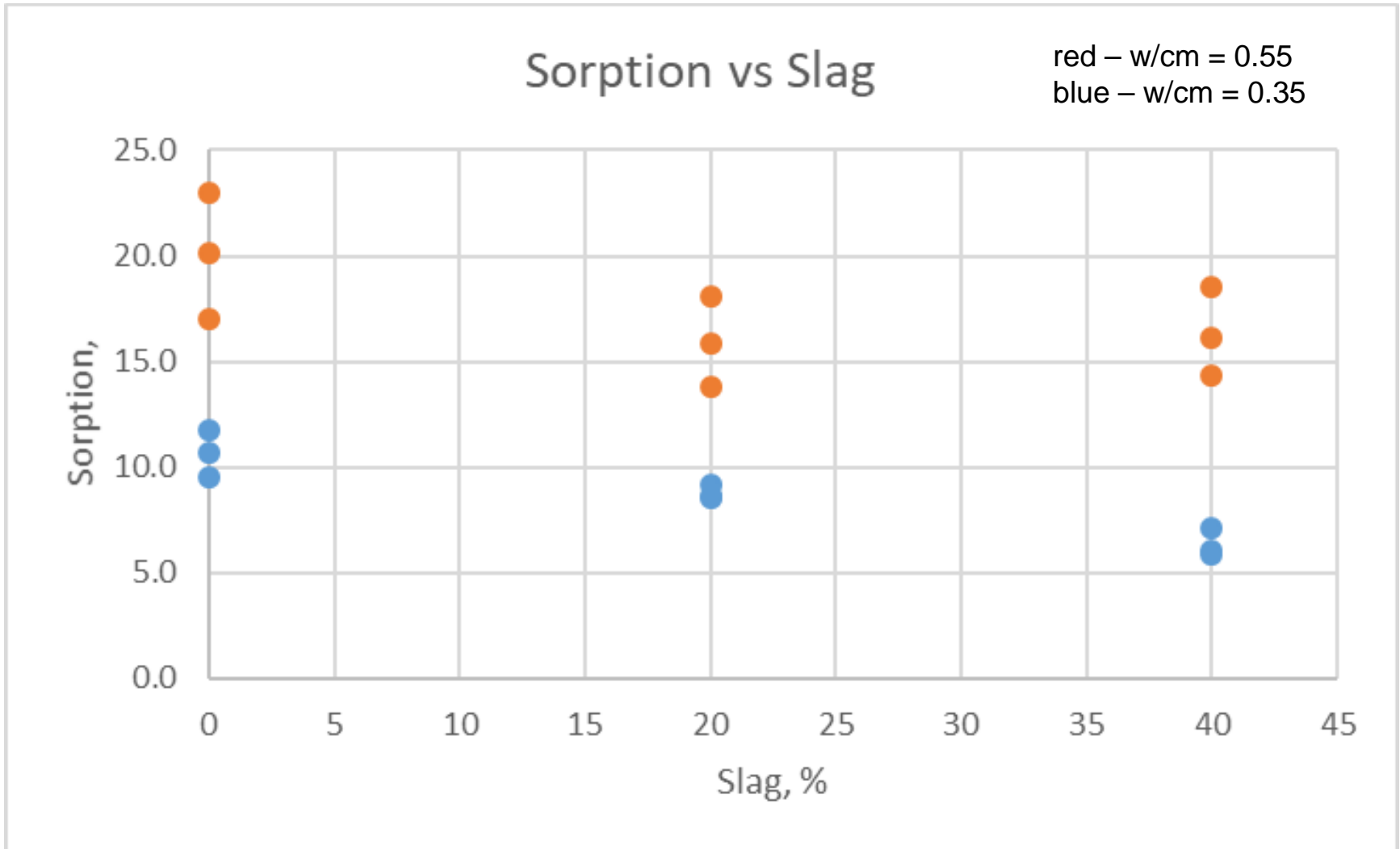




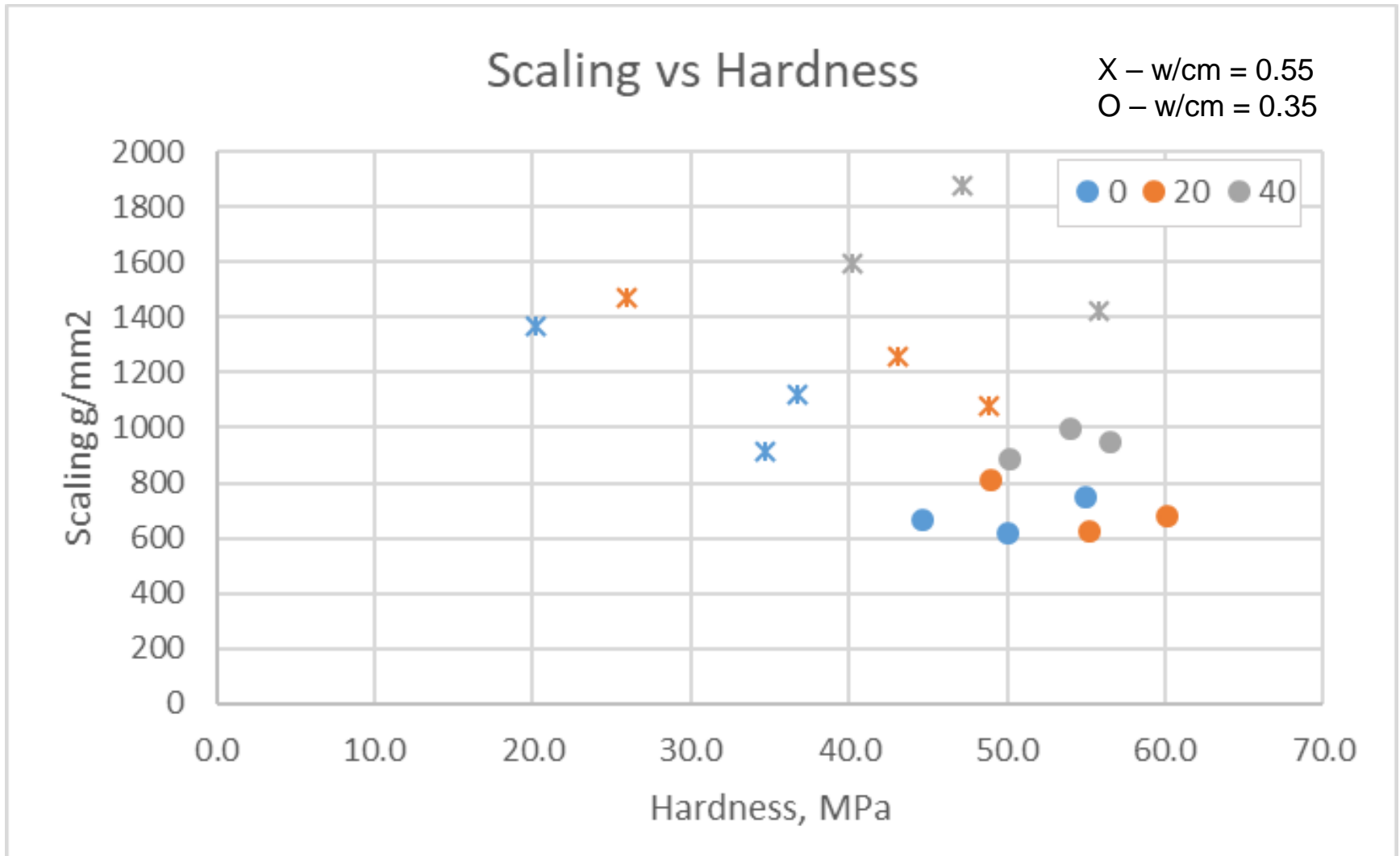
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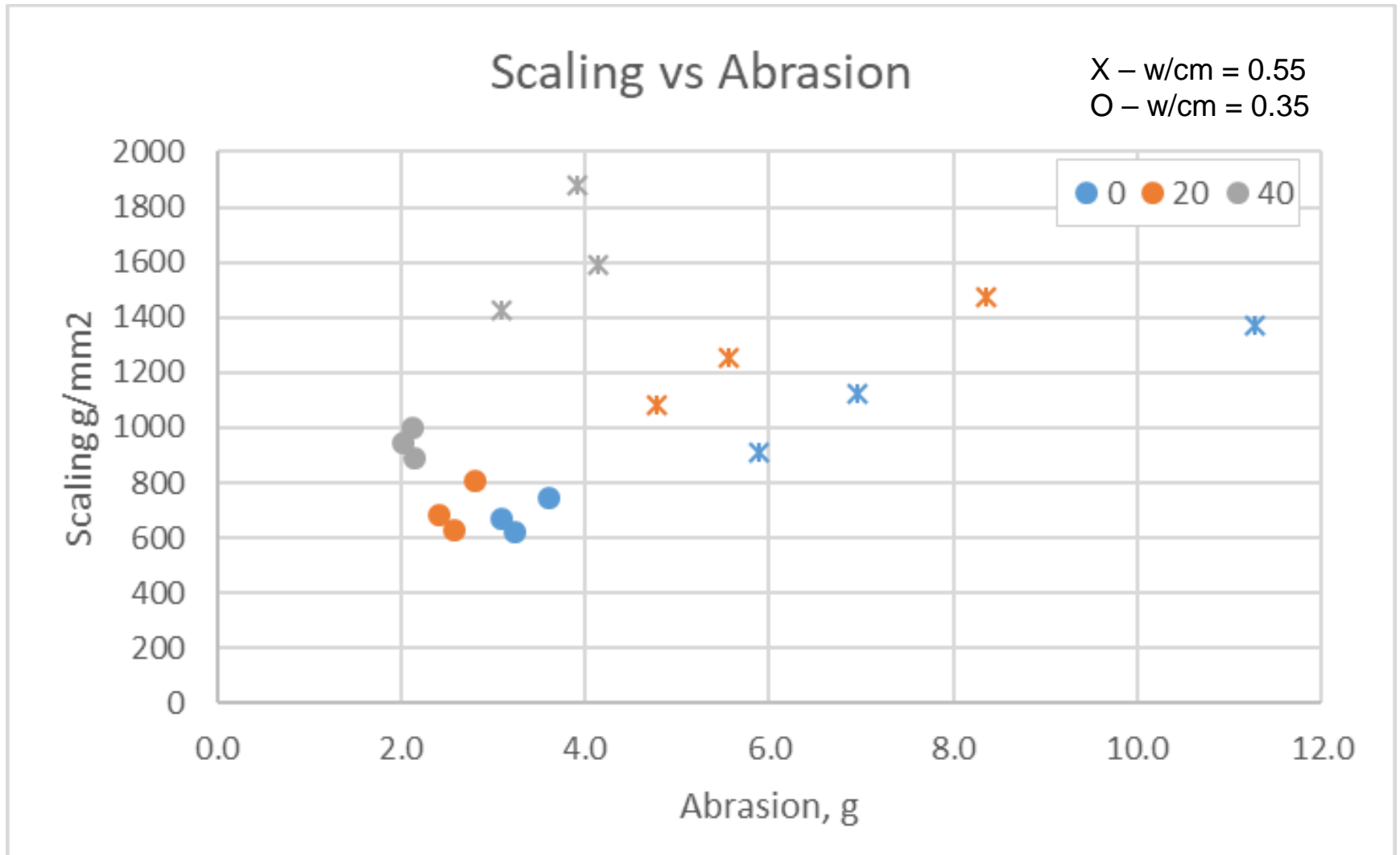
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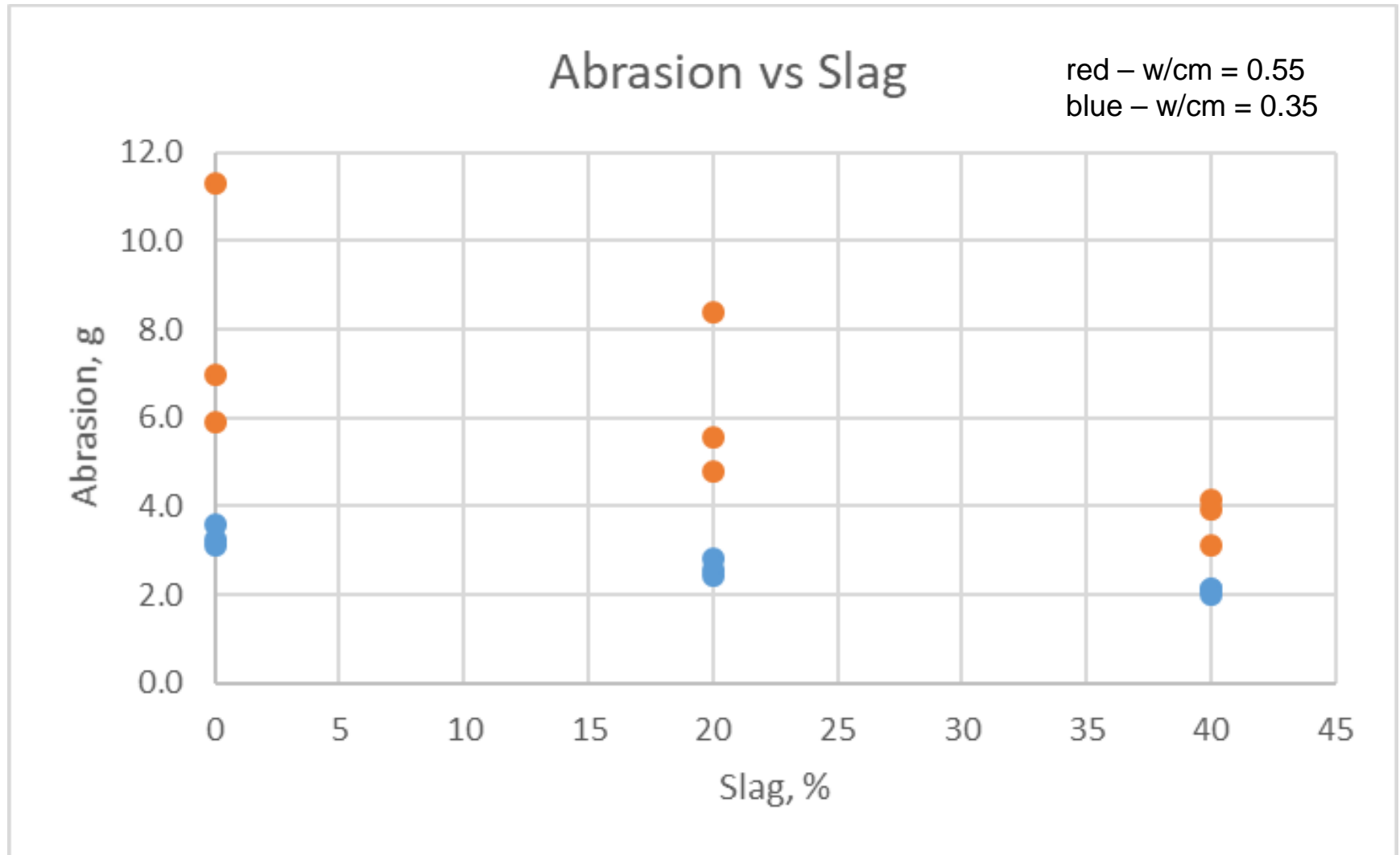
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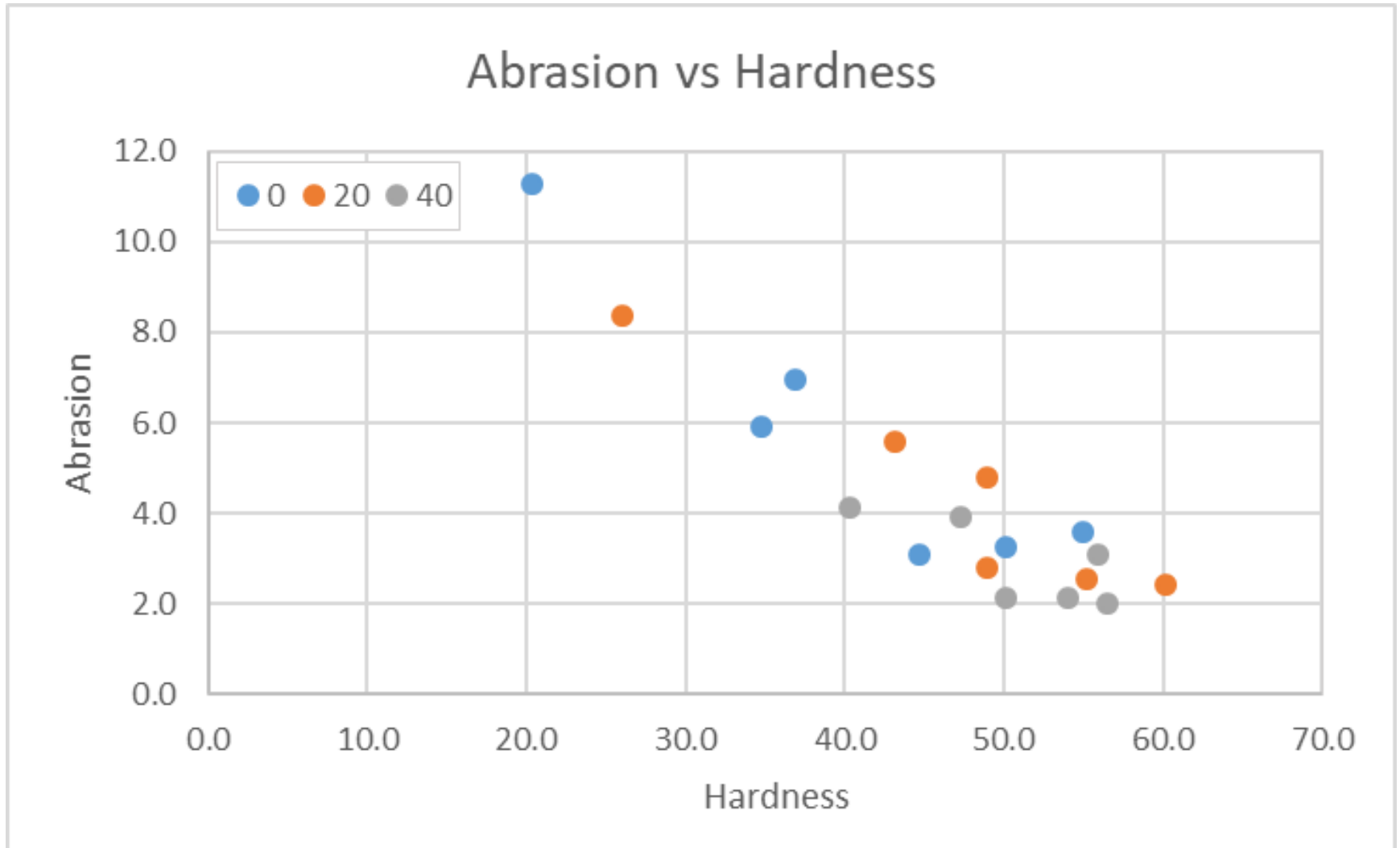
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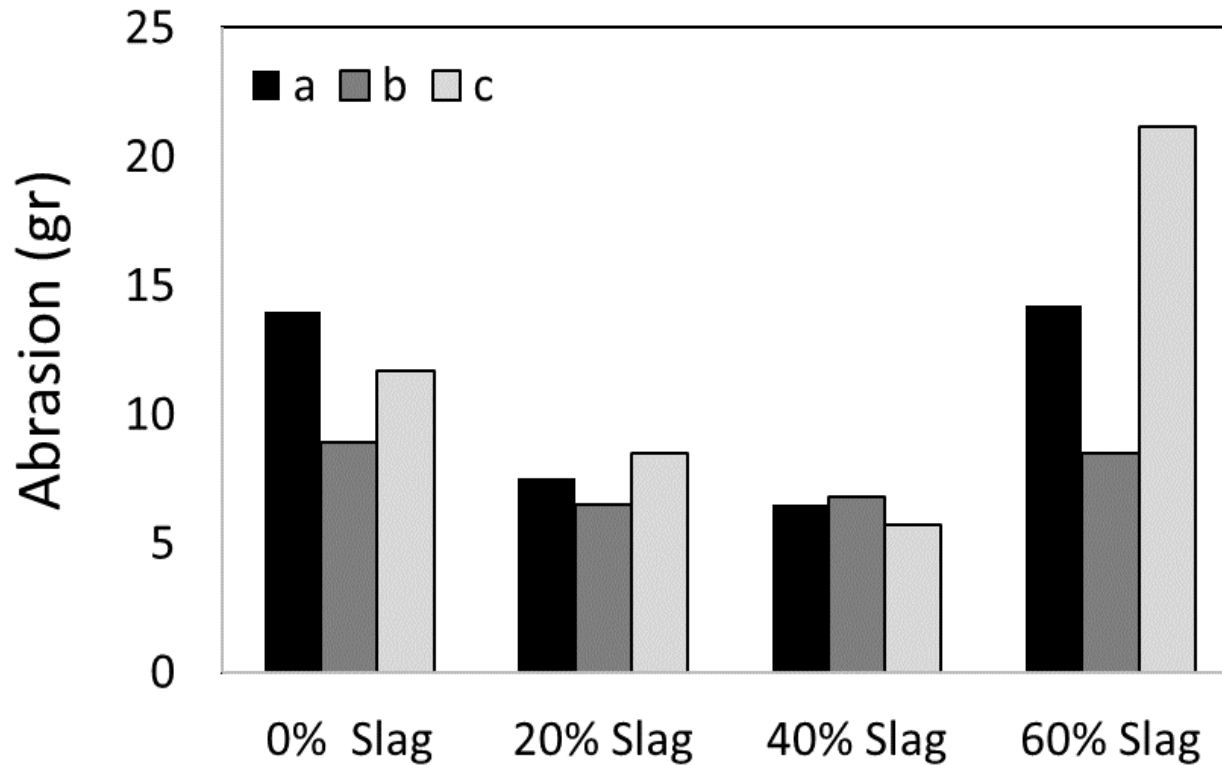
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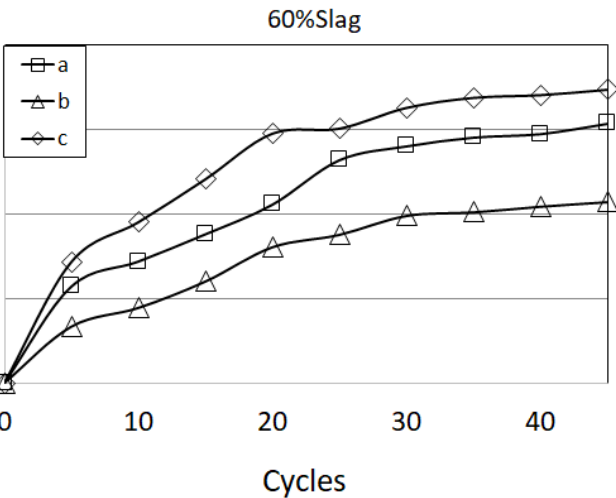
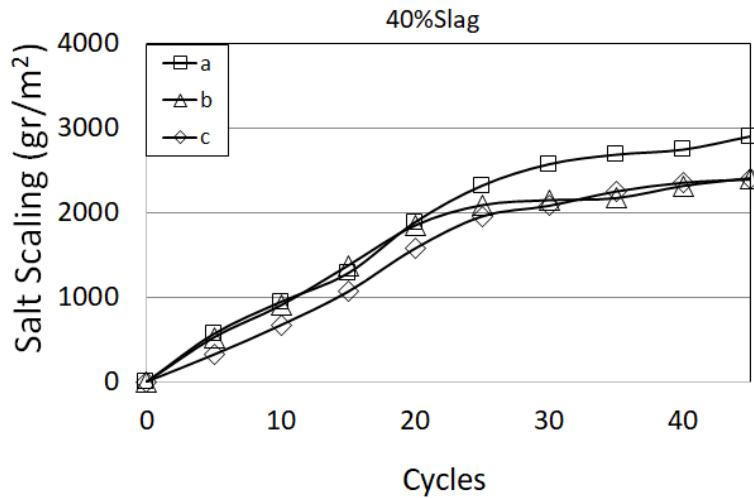
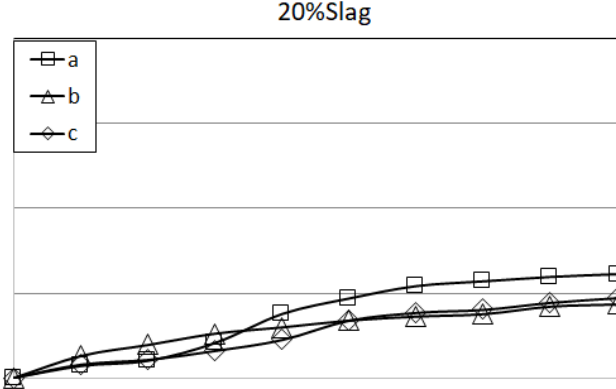
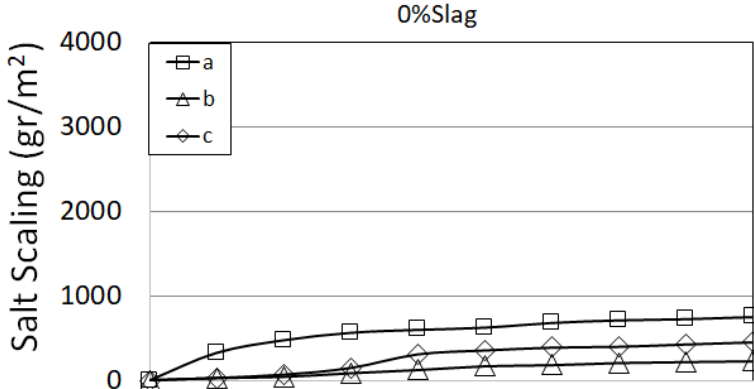


# Results



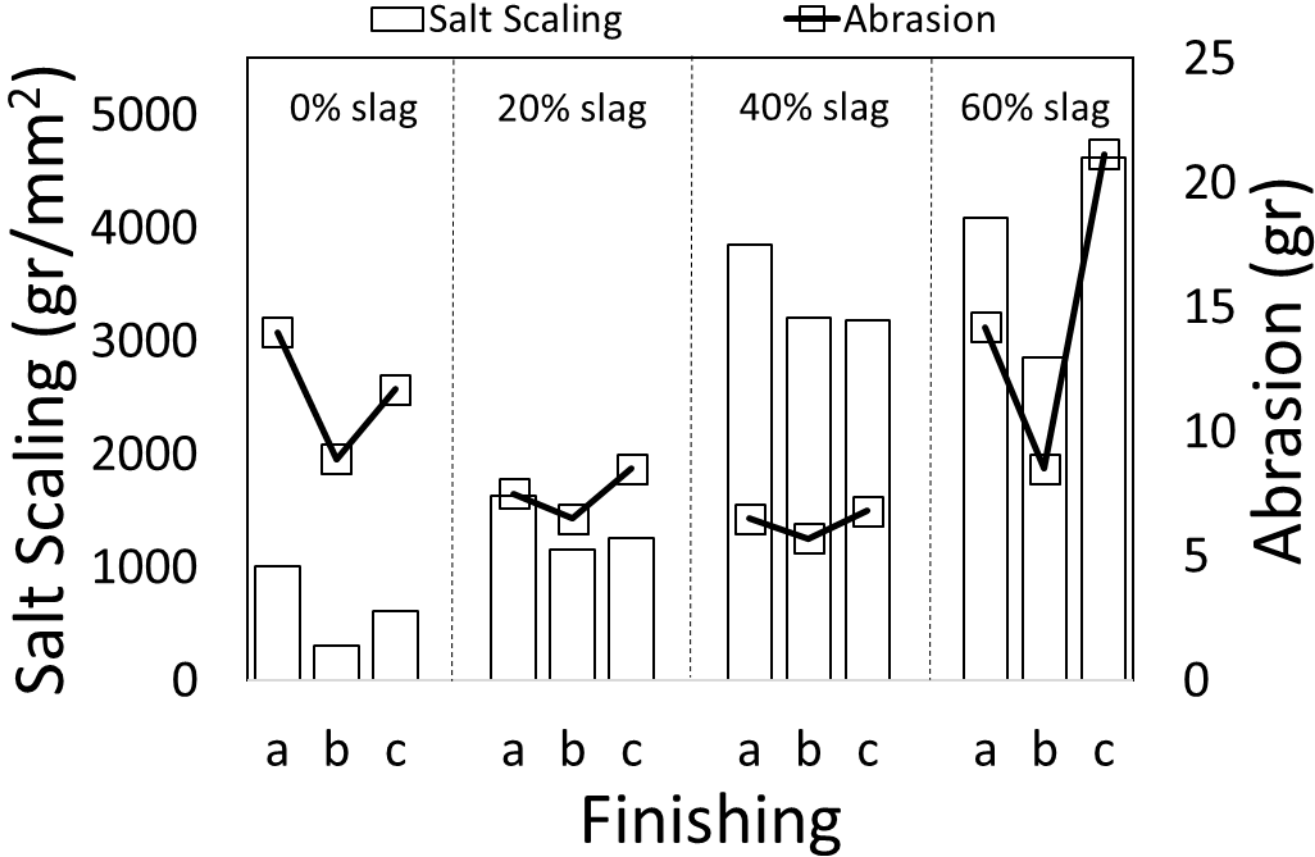
a	After fabrication
b	After bleeding slows down/stops
C	Initial setting

# Results

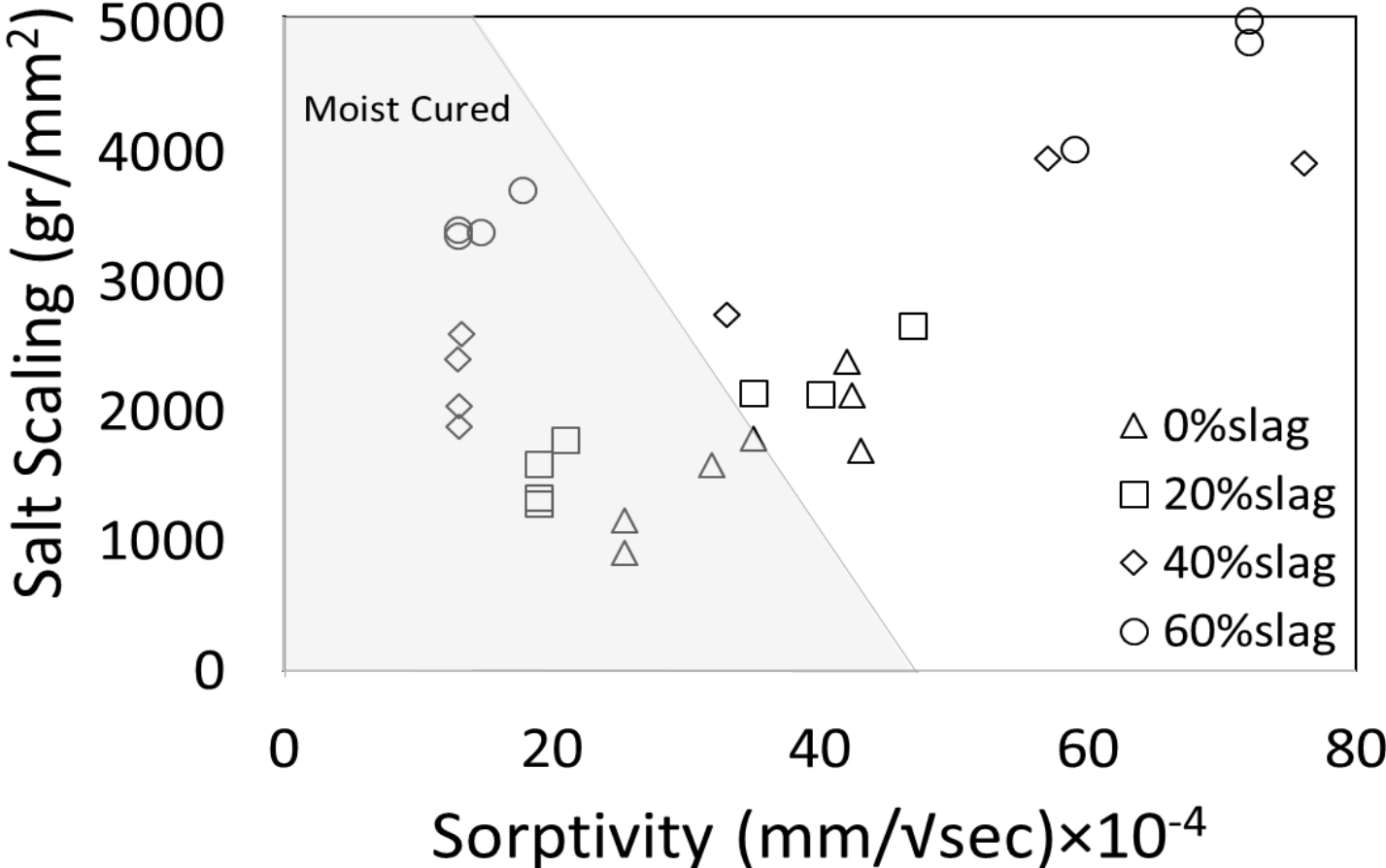




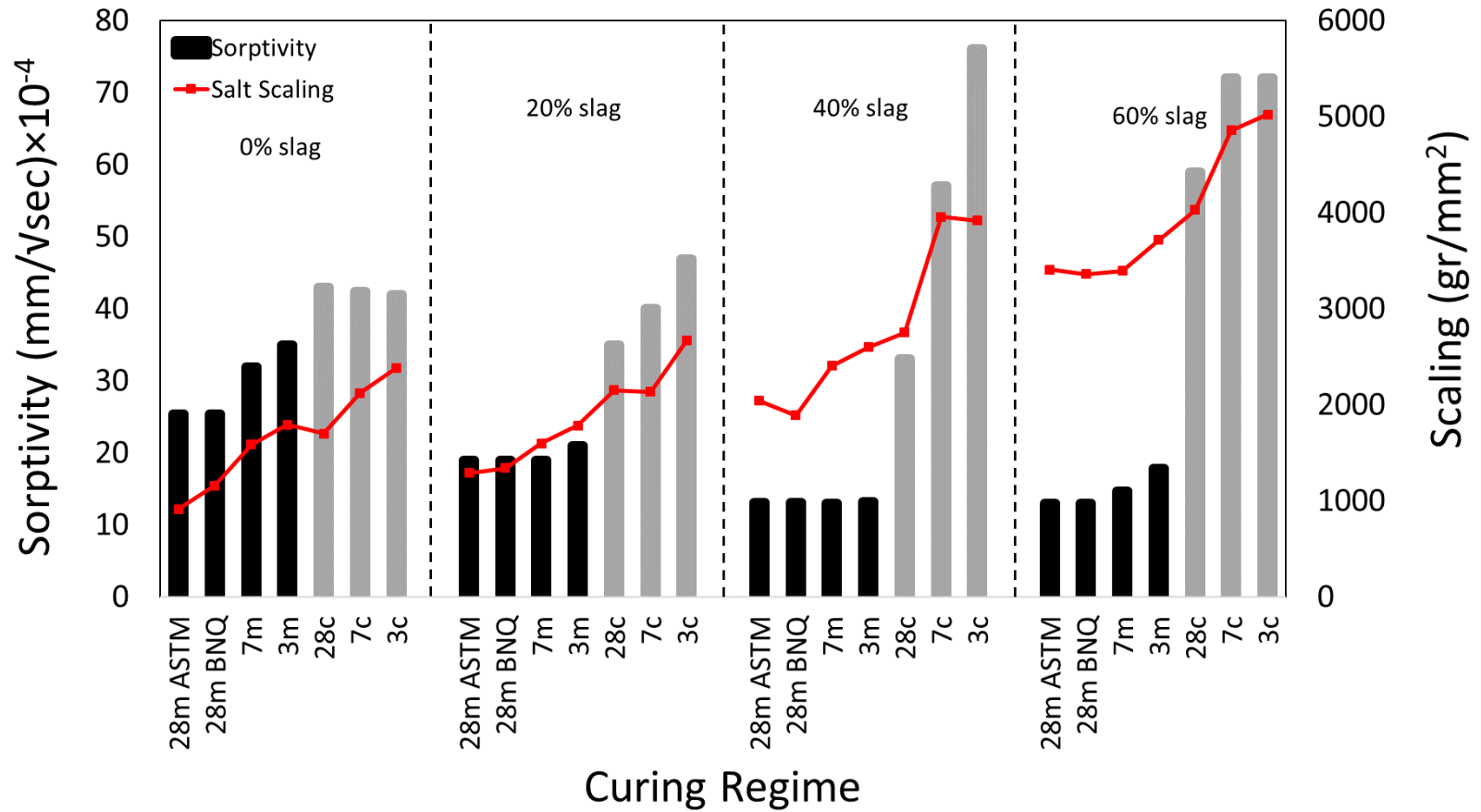
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# Summary

- At  $w/cm = 0.35$  – Effect of air was negligible.
- Spacing factor of less than  $200 \mu m$  does not guarantee scaling resistance.
- Salt-scaling is related to sorptivity and abrasion resistance.
- Finishing after bleeding is stopped was beneficial.
- Longer curing improved performance.

# Summary

- Seems that the effect of slag on scaling is not physical

