A Summary of Fly Ash Research at LTRC

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Outline

- Background
- Materials
- Test methods
- Current progress
- Preliminary results
- Acknowledgements
- Questions

Background

- Great body of knowledge
- Couple of "bad" projects per year where ash is blames as the culprit
  - Poor understanding of what ash is and how it affects performance and construction
  - Switch of sources mid stream without realizing it

Background

- These issues led to the start of an LTRC project
  - 09-1C: Evaluation of Fly Ash Quality Control Tools
  - 1 year study to finish 3-1-10
  - ~$109,000

Materials

- All class C fly ashes on the QPL
- Several exceptions
  - One high calcium class F fly ash
  - Couple of ashes not on the QPL
- Approximately 11 sources
- Sampling twice per week for ten weeks
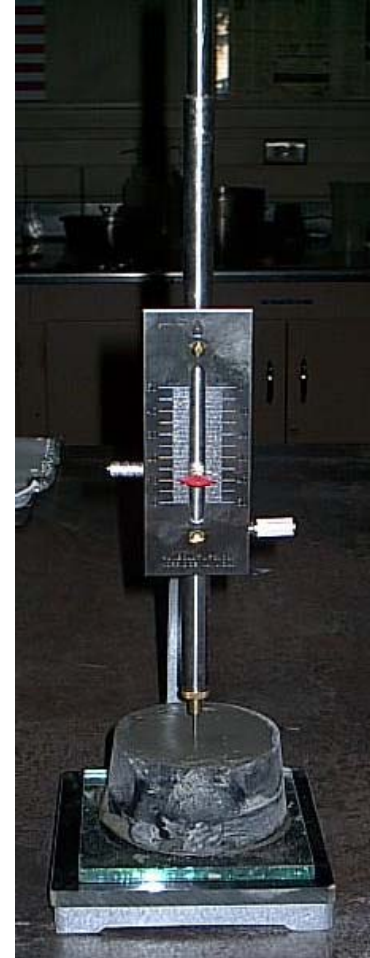 - Total (20) five gallon pails per source

Test Methods

- ASTM C 191
  - Set time using the Vicat needle
- ASTM C 266
  - Set time using the Gillmore needle
- Iowa Set Time Test
- Quick heat generation
  - Coffee Cup test
- Foam Index
- ASTM C 618
  - Chemical characterization of the ashes
  - Fineness

Test Methods

☐ Vicat Test
  ◘ Modified
  ◘ Penetration from 40 mm to no penetration
  ◘ Initial set = time to 25 mm penetration
  ◘ Final set = time to no penetration
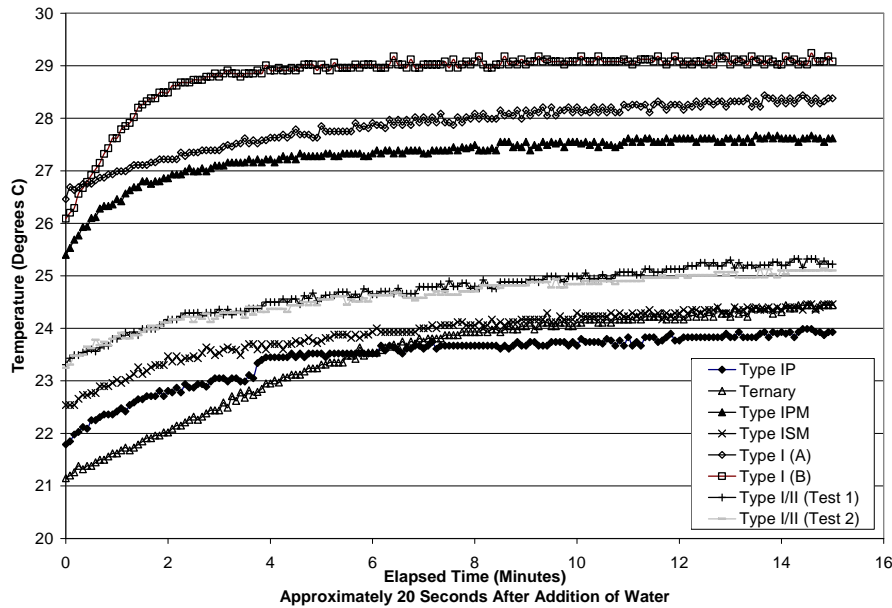
Test Methods

- Gillmore needle
  - Modified

Test Methods

- Iowa Set Time Test
  - 27.5% moisture
  - Measure resistance to penetration
  - Initial set = start to register resistance
  - Final set = 4.5 tsf

Test Methods

- ☐ Coffee Cup Test
  - ◪ Measure change in temperature over time

Test Methods

- Foam Index Test
  - Uses a diluted AEA
  - Conventional blender
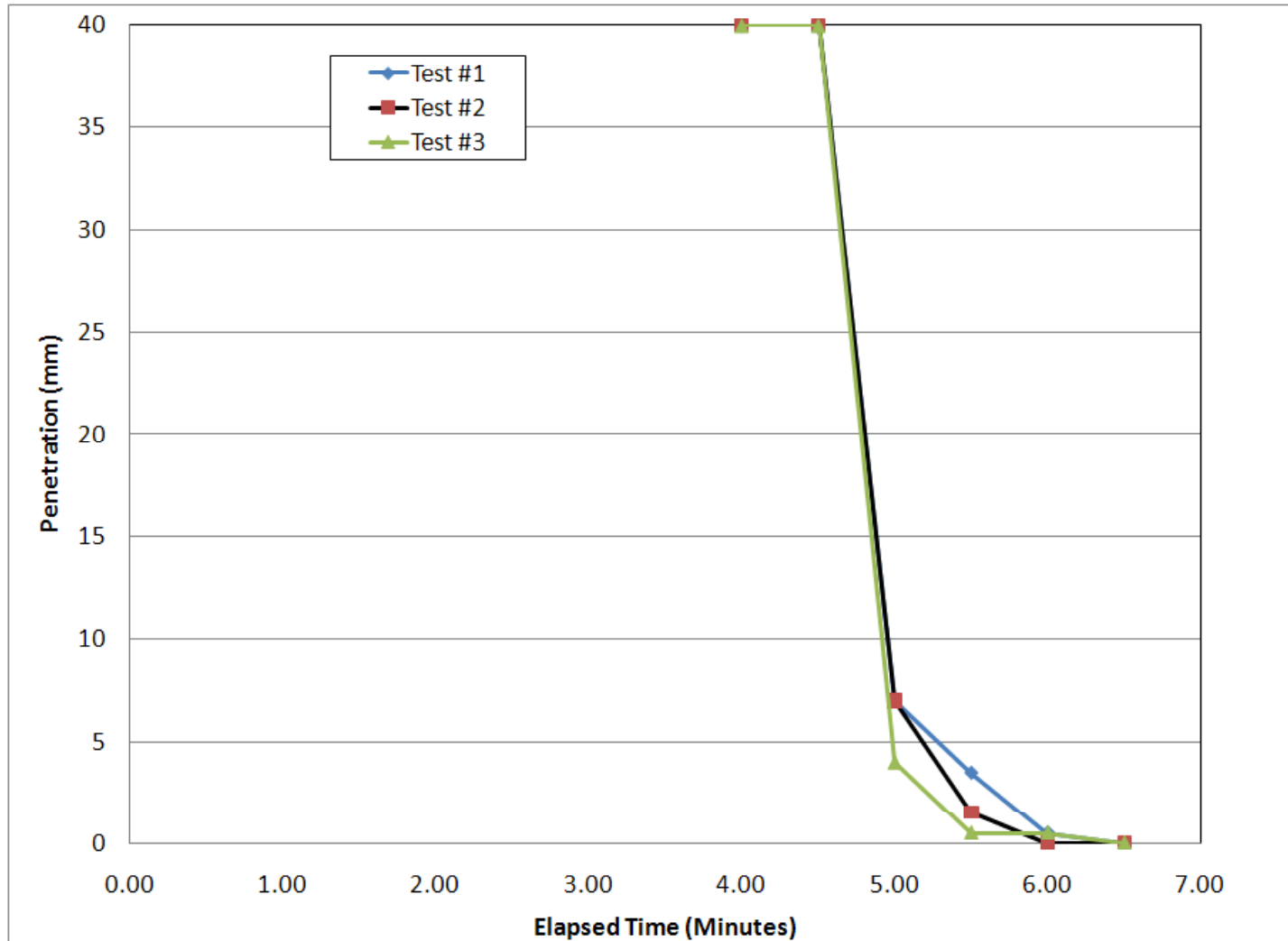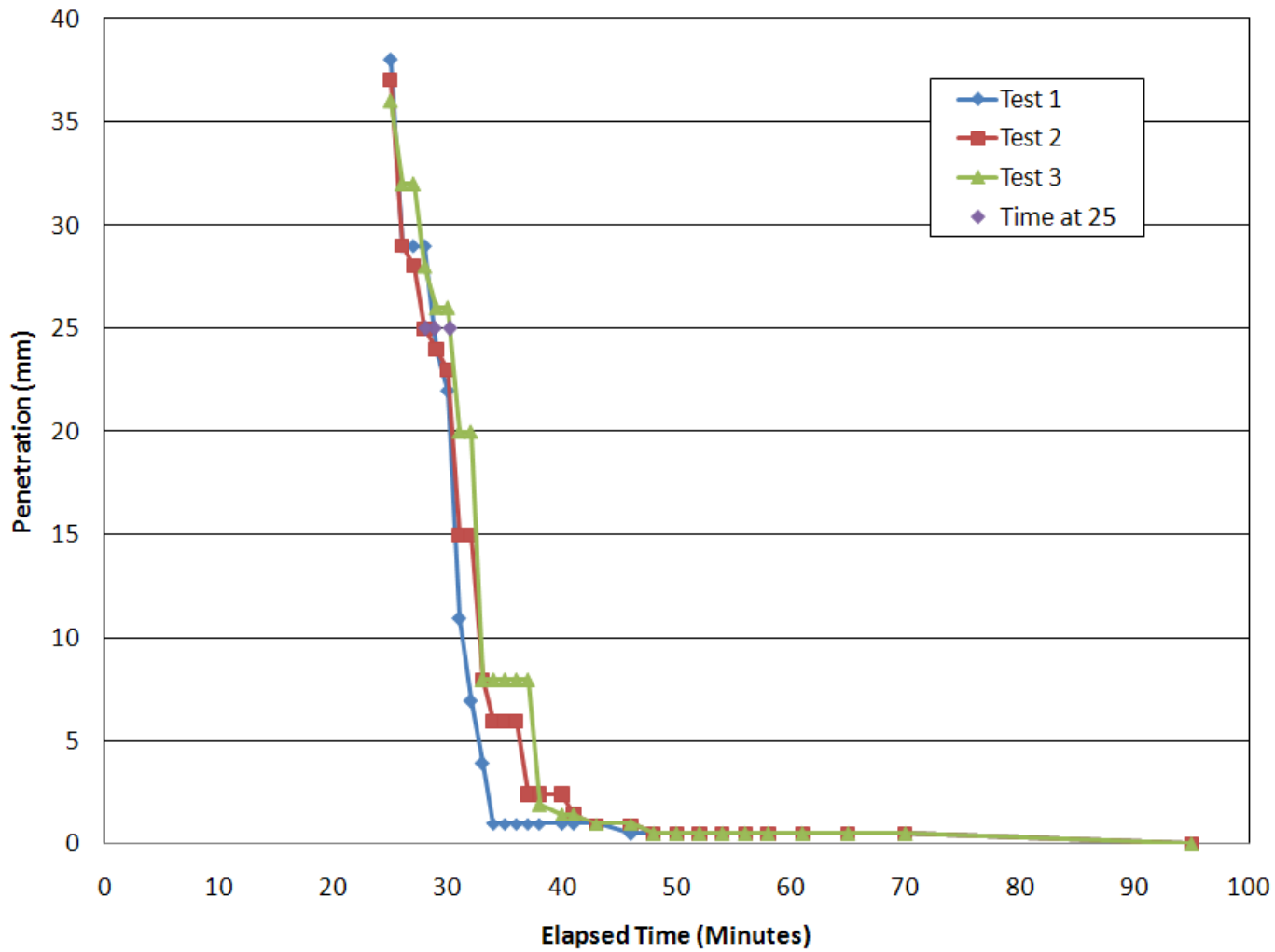 - Gives a measure of the stability of the air void system

Current Progress

- ASTM C 618
  - Completed
- Fineness testing
  - Completed
- Vicat, Gillmore, Pocket Penetrometer
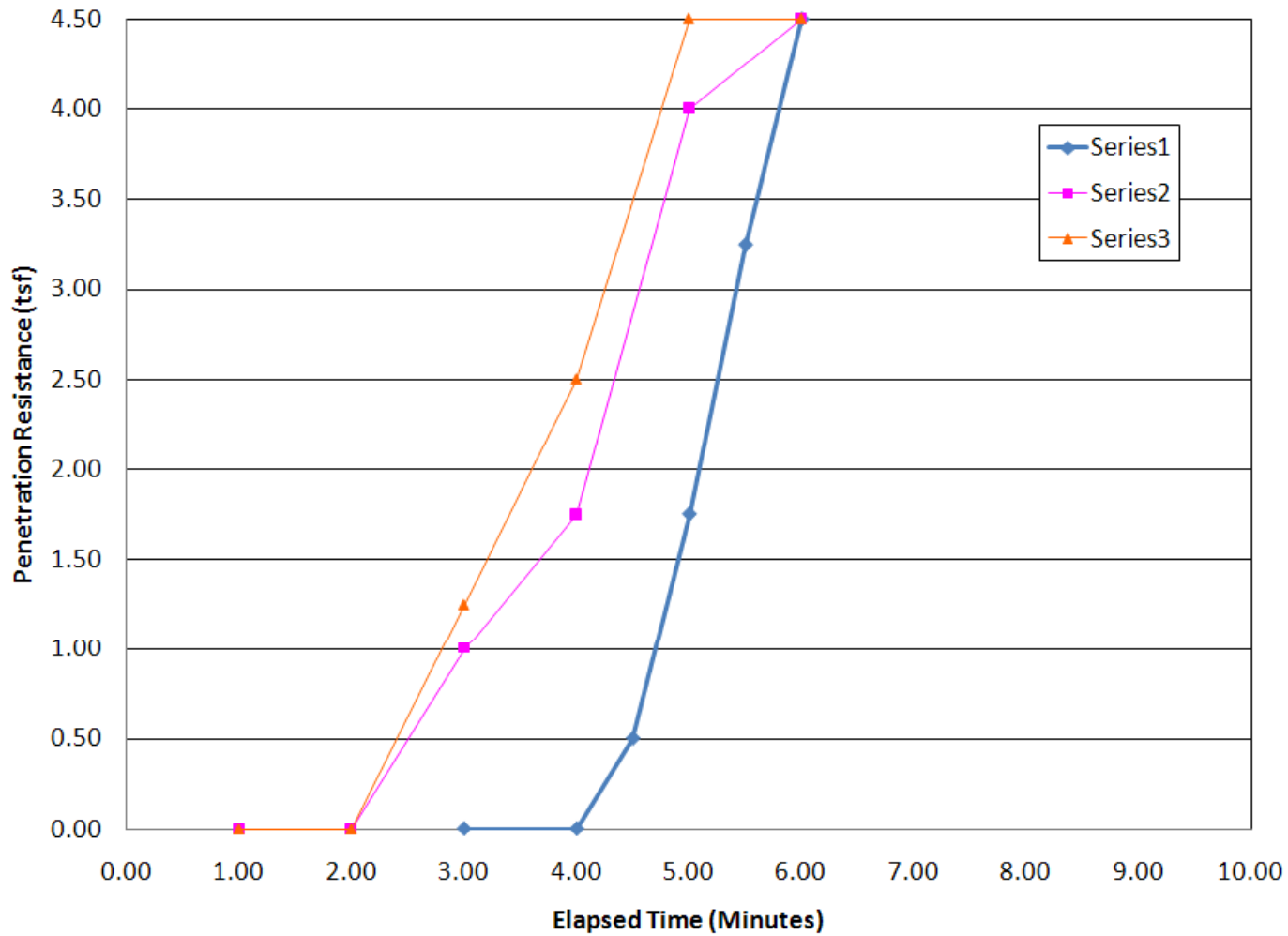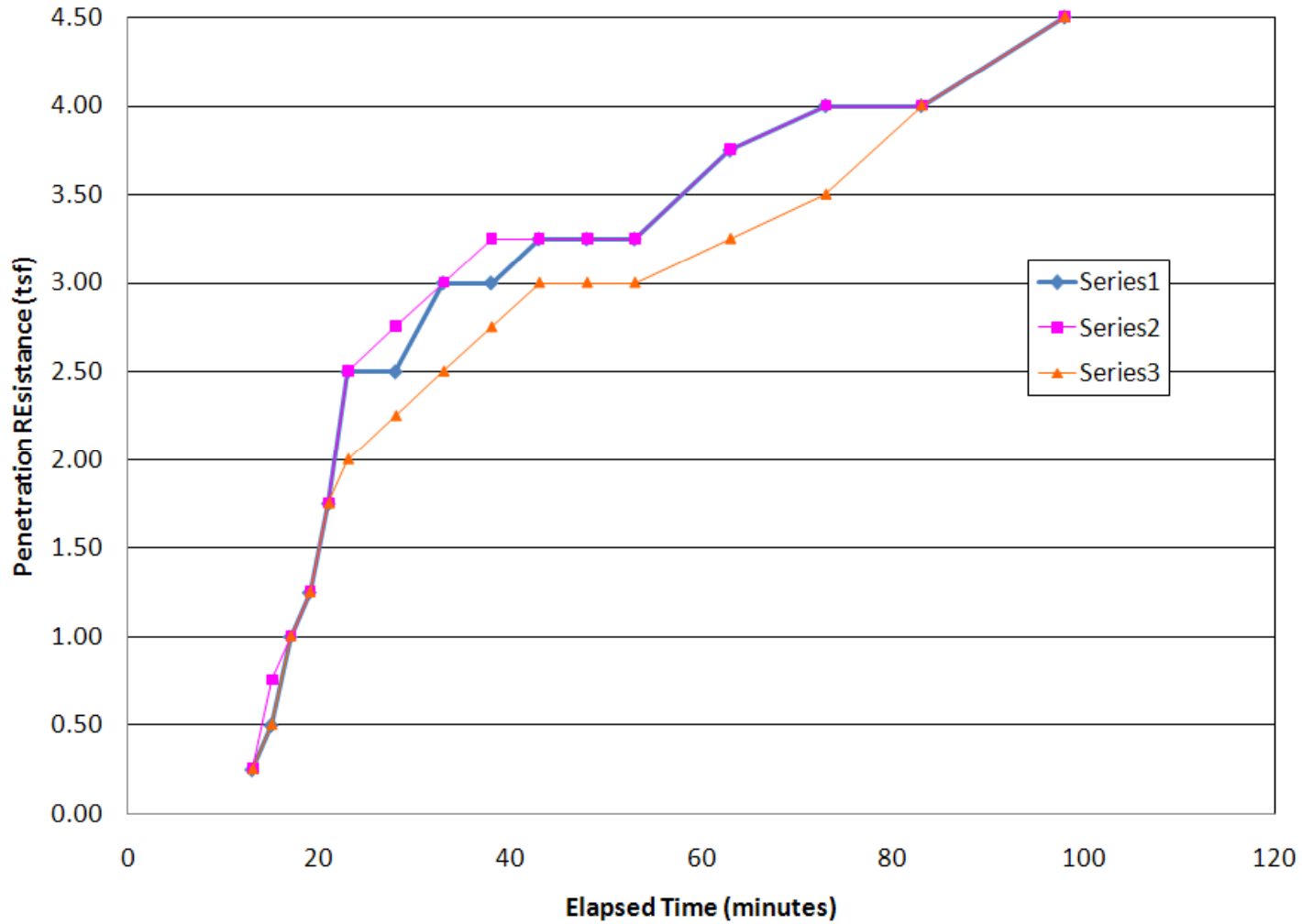 - Completed
- Foam index
- Coffee cup

Results

Results
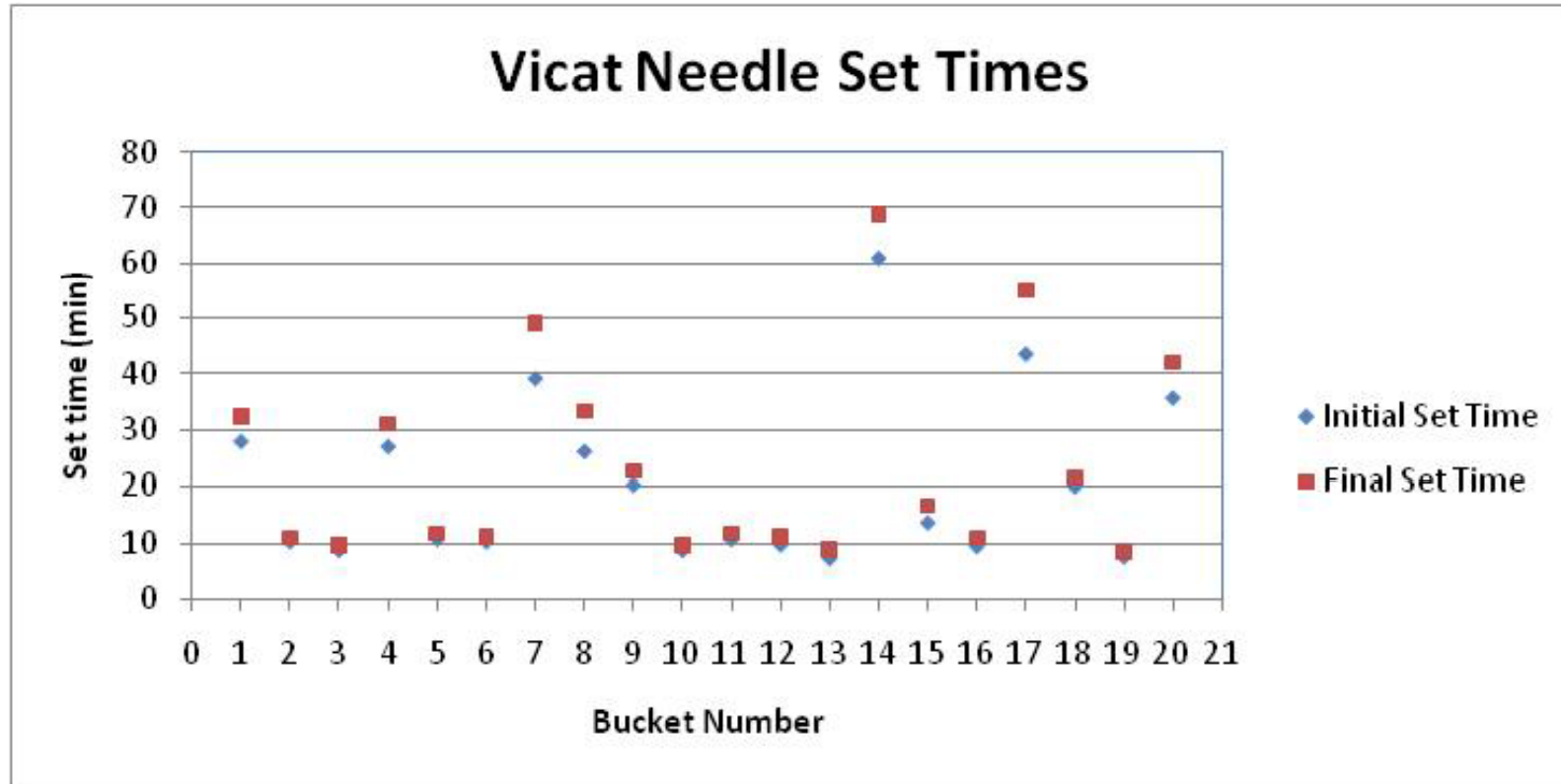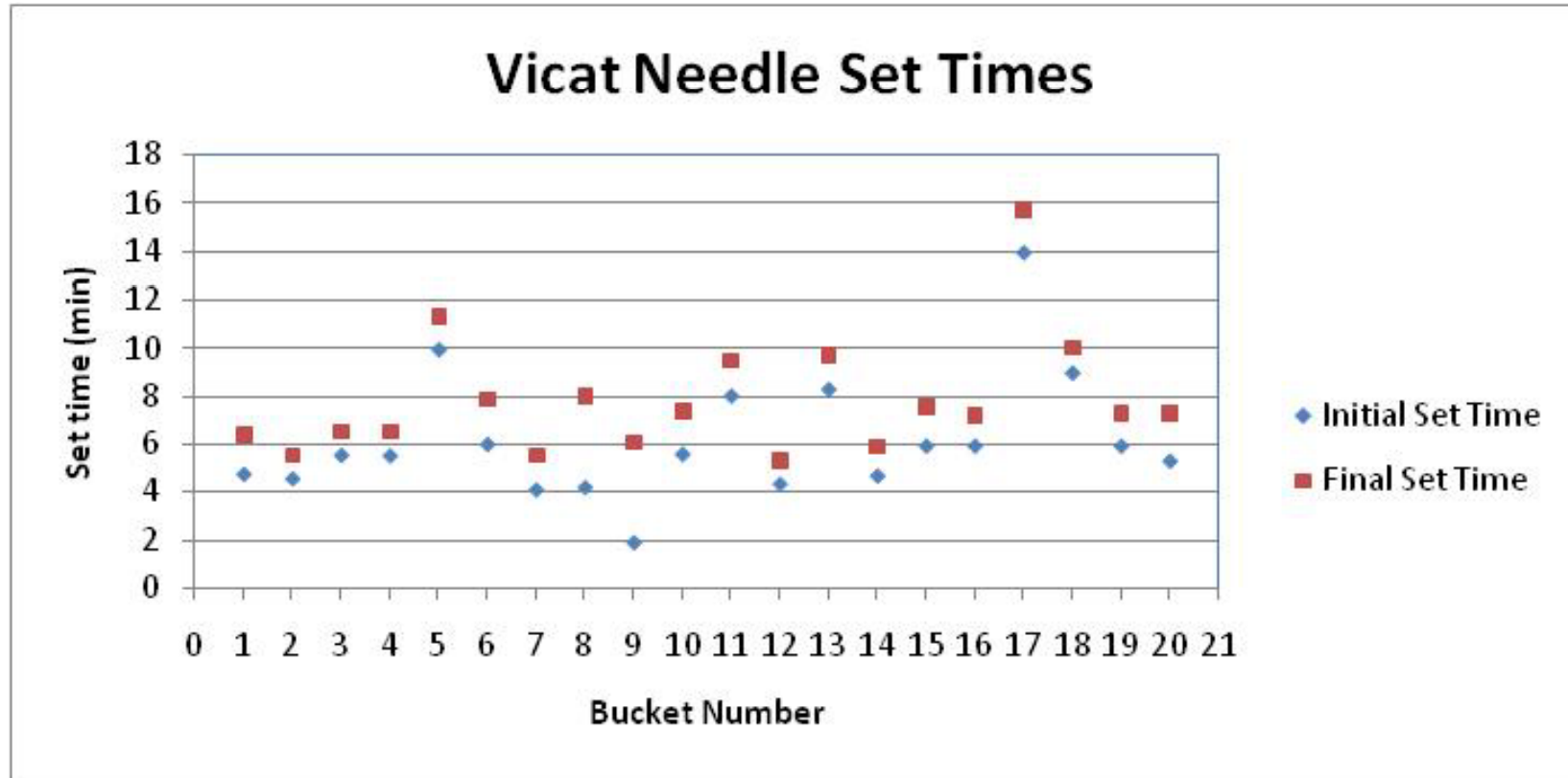
Results

Results

Results

- Statistical analysis is currently underway
  - Preliminary results show promise
  - Low standard deviations
  - Low coefficient of variation between test samples
- Potential to predict set time based on chemistry
  - Will most likely include several variables in the final analysis
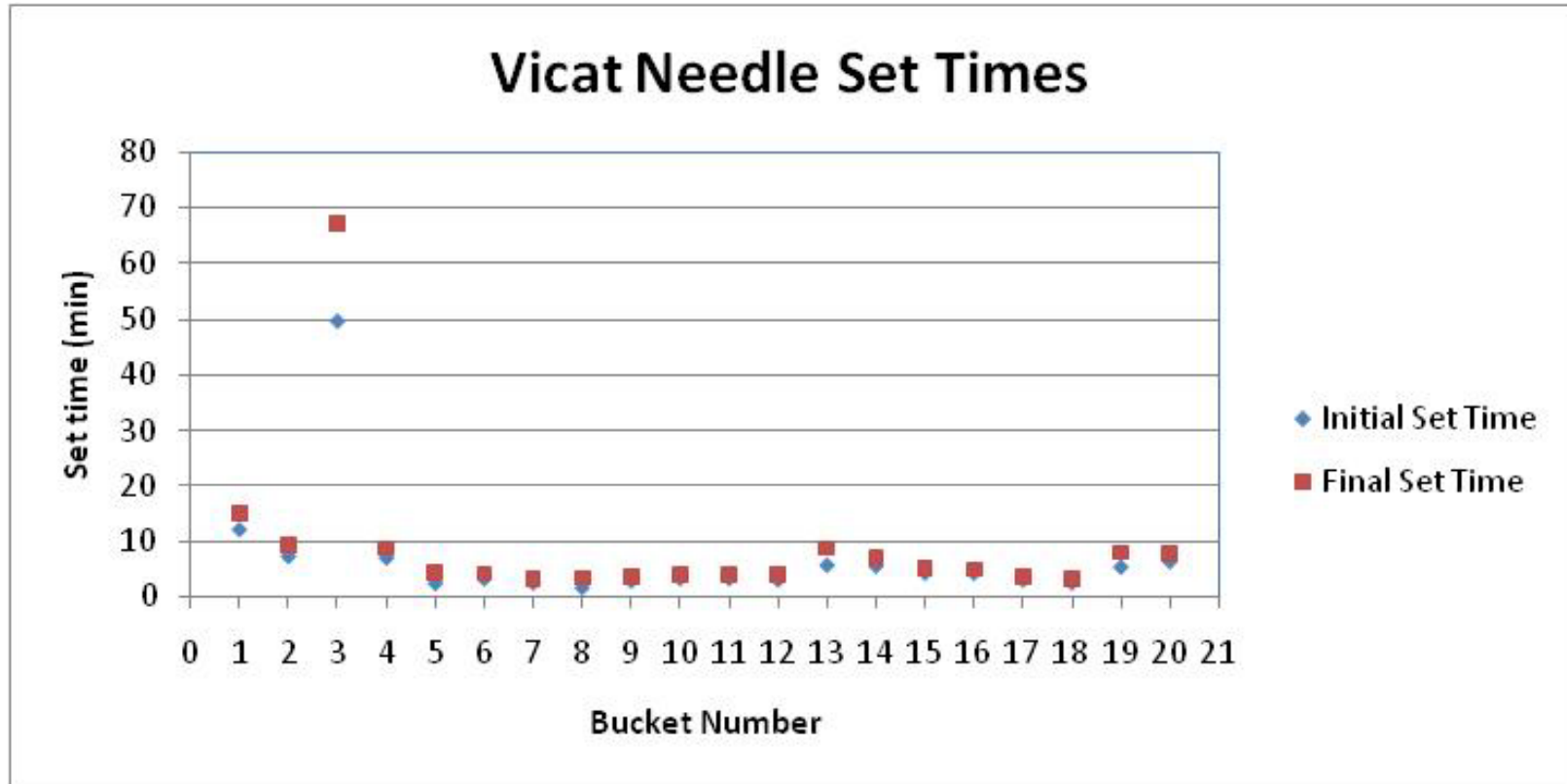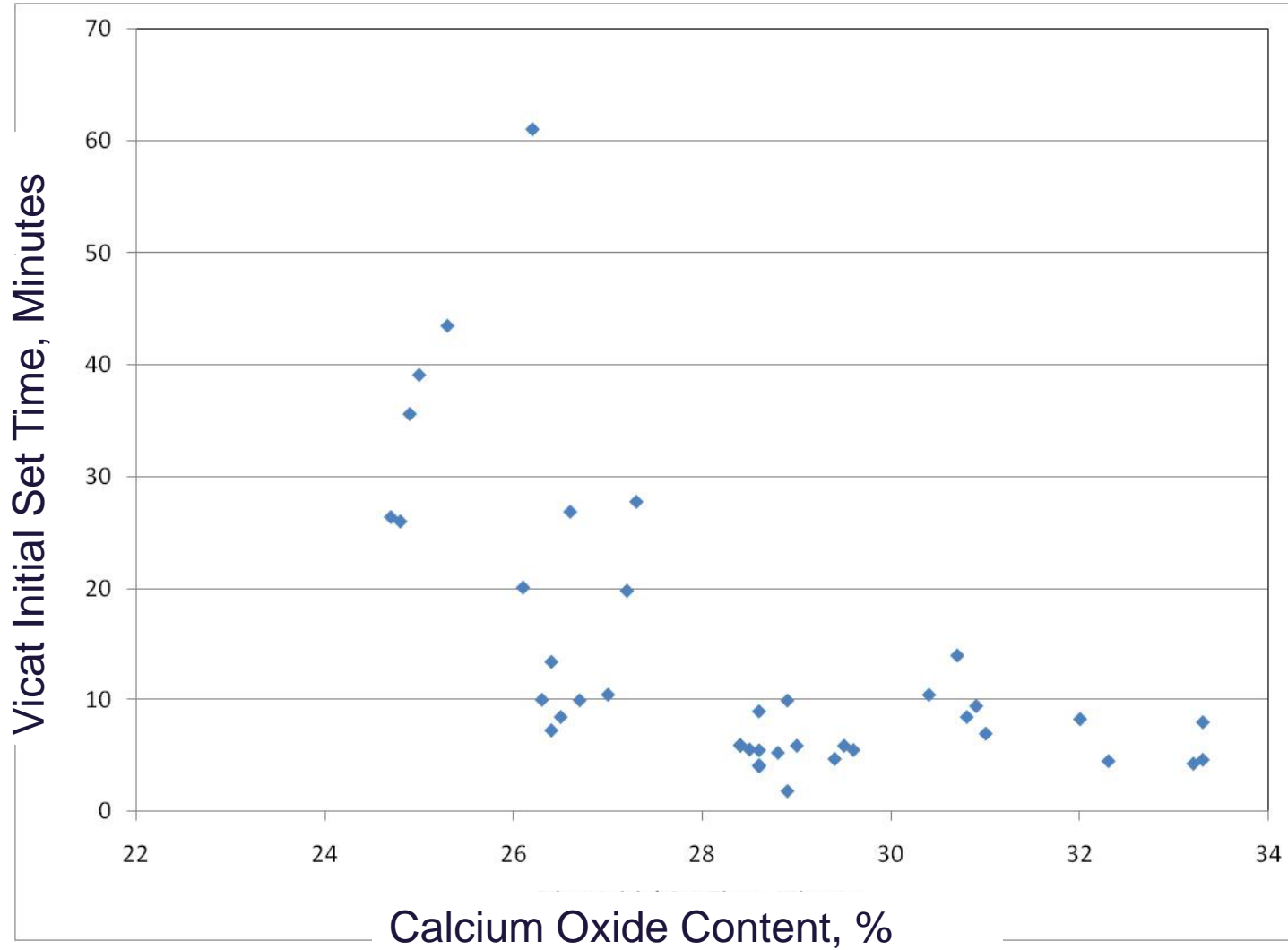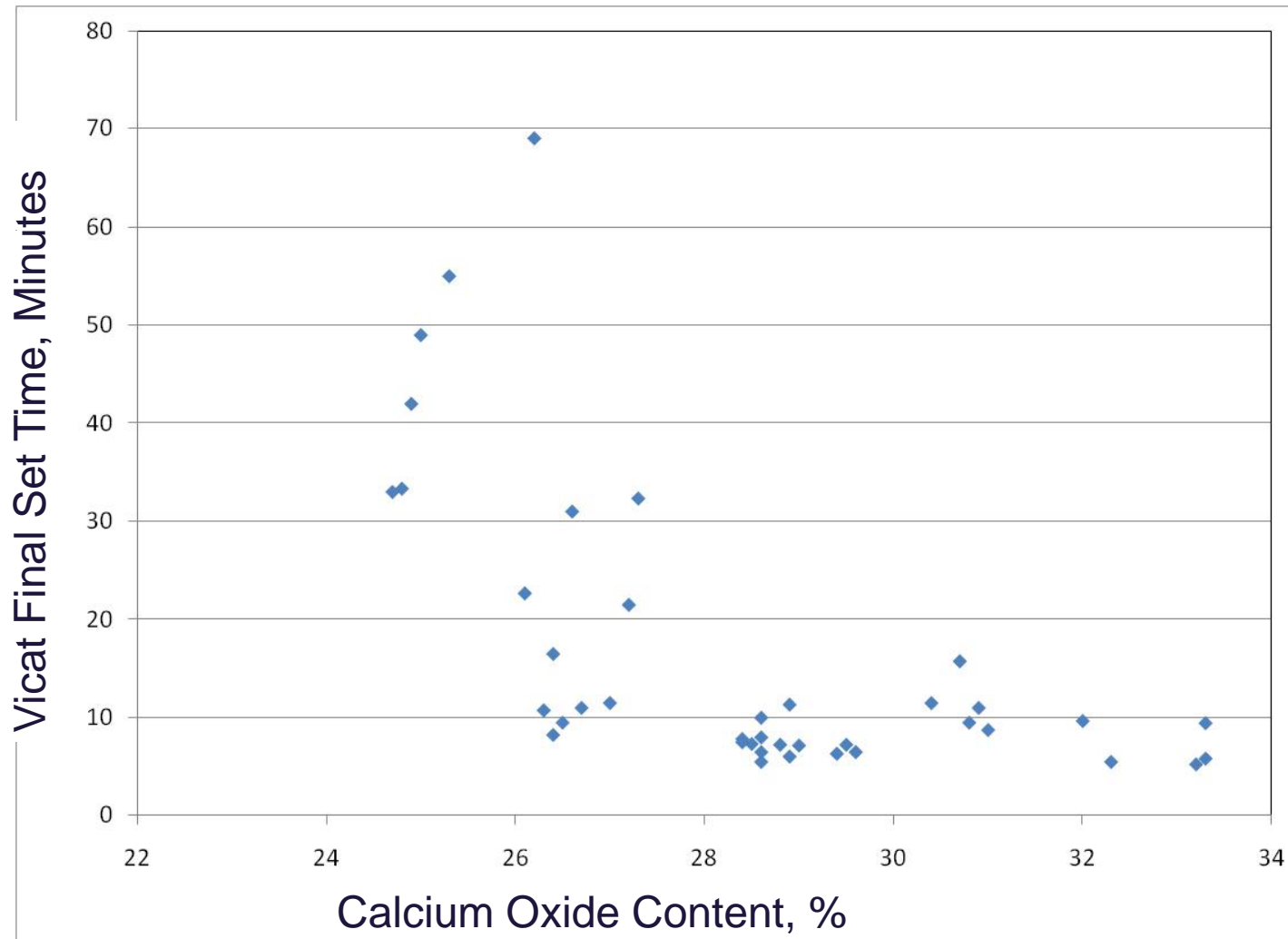
Results

Results

Results

Results

Results

Acknowledgements

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- Scott Reech

Questions