



Monitoring SCC Performance During Production and Determining Adjustments

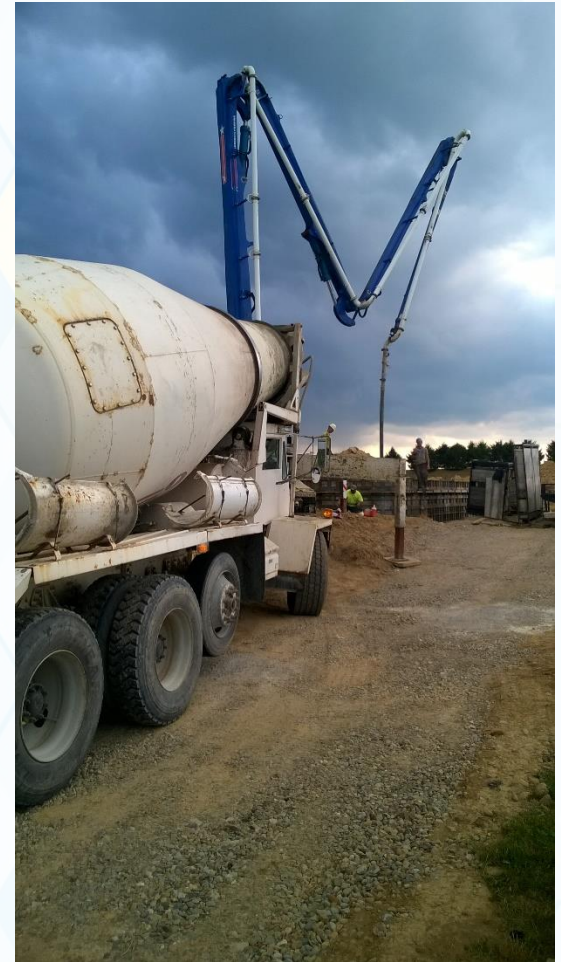
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Presentation Outline

- Mixture development process
 - Considerations
 - Testing
- Relationships between measured SCC properties
- Rheological impact of certain proportioning variables
- QC testing
- Adjusting

SCC Mixture Development Process

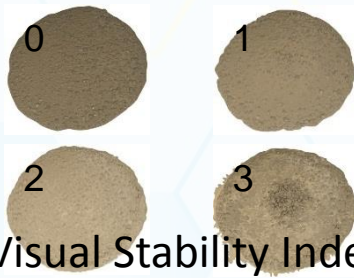
- **Project Details**
 - Job size
 - Hardened performance targets
 - Element characteristics
 - Placement technique
 - Delivery schedule, distance, timing
- **Laboratory & Field Trials**
 - Qualify performance
 - Establish QC parameters



As part of the Process We Test



Slump Flow and T 50



Visual Stability Index



V Funnel



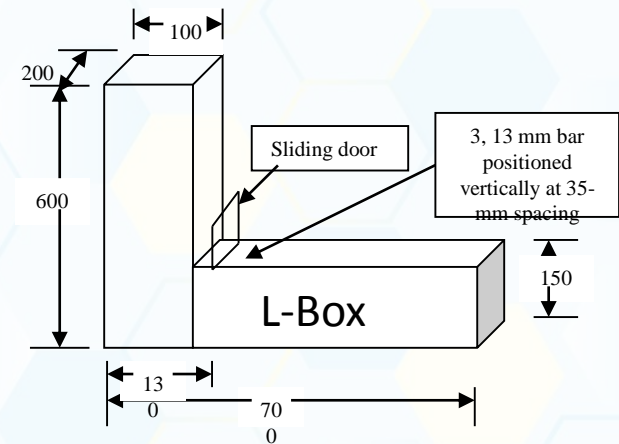
Column Segregation



Penetration Test

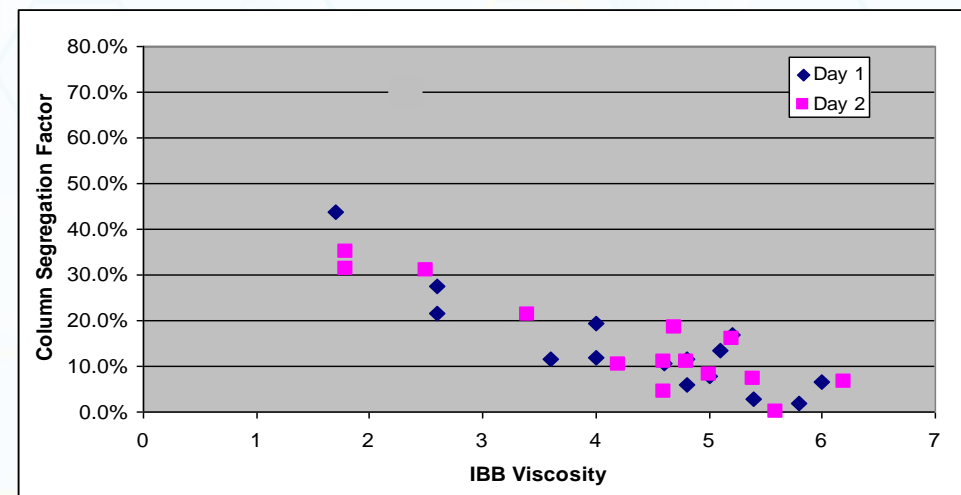
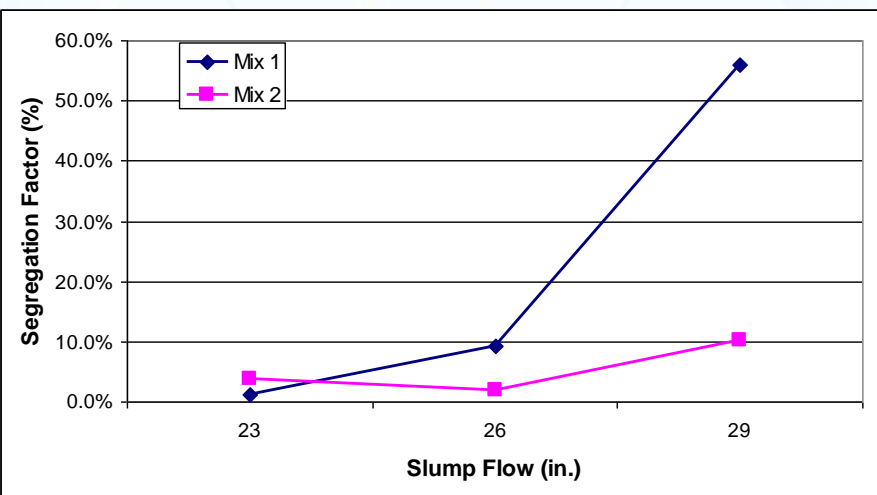


J Ring

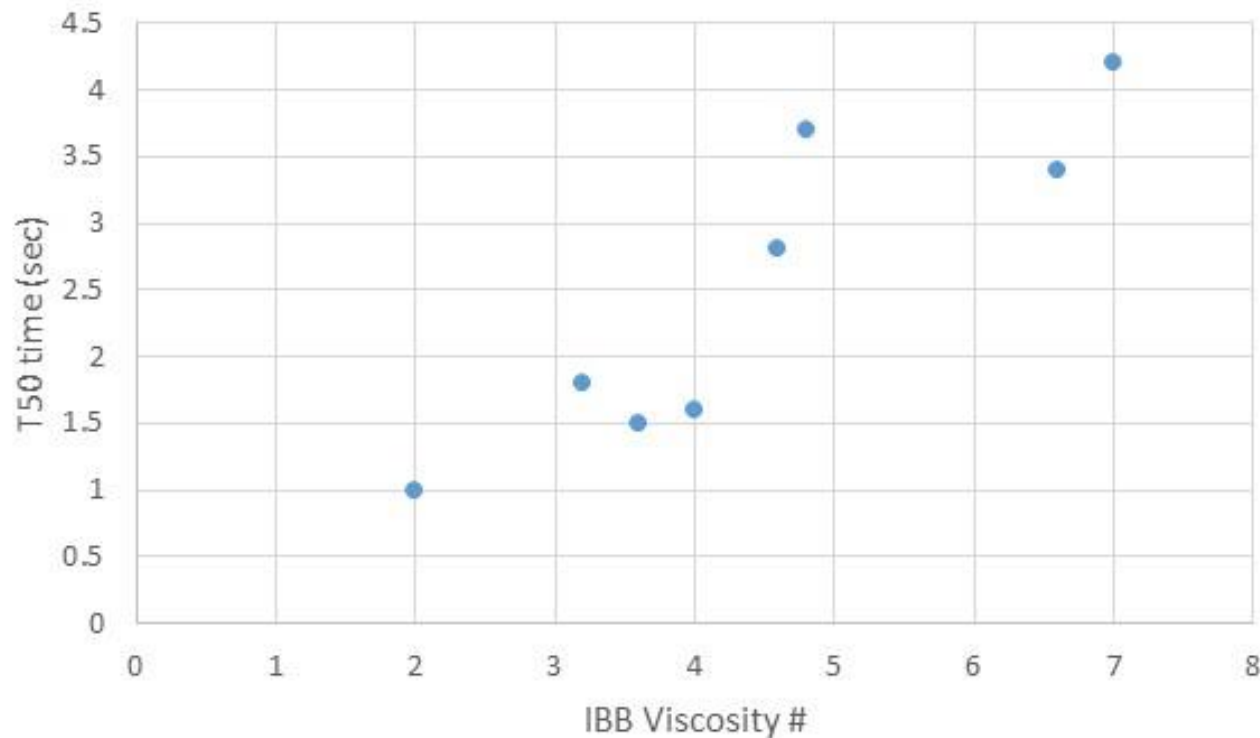


Relationships Exist Between SCC Properties

- **Stability in the Field**
 - As slump flow (fluidity) increases maintaining stability requires greater attention
 - As mixture viscosity increases, stability increases

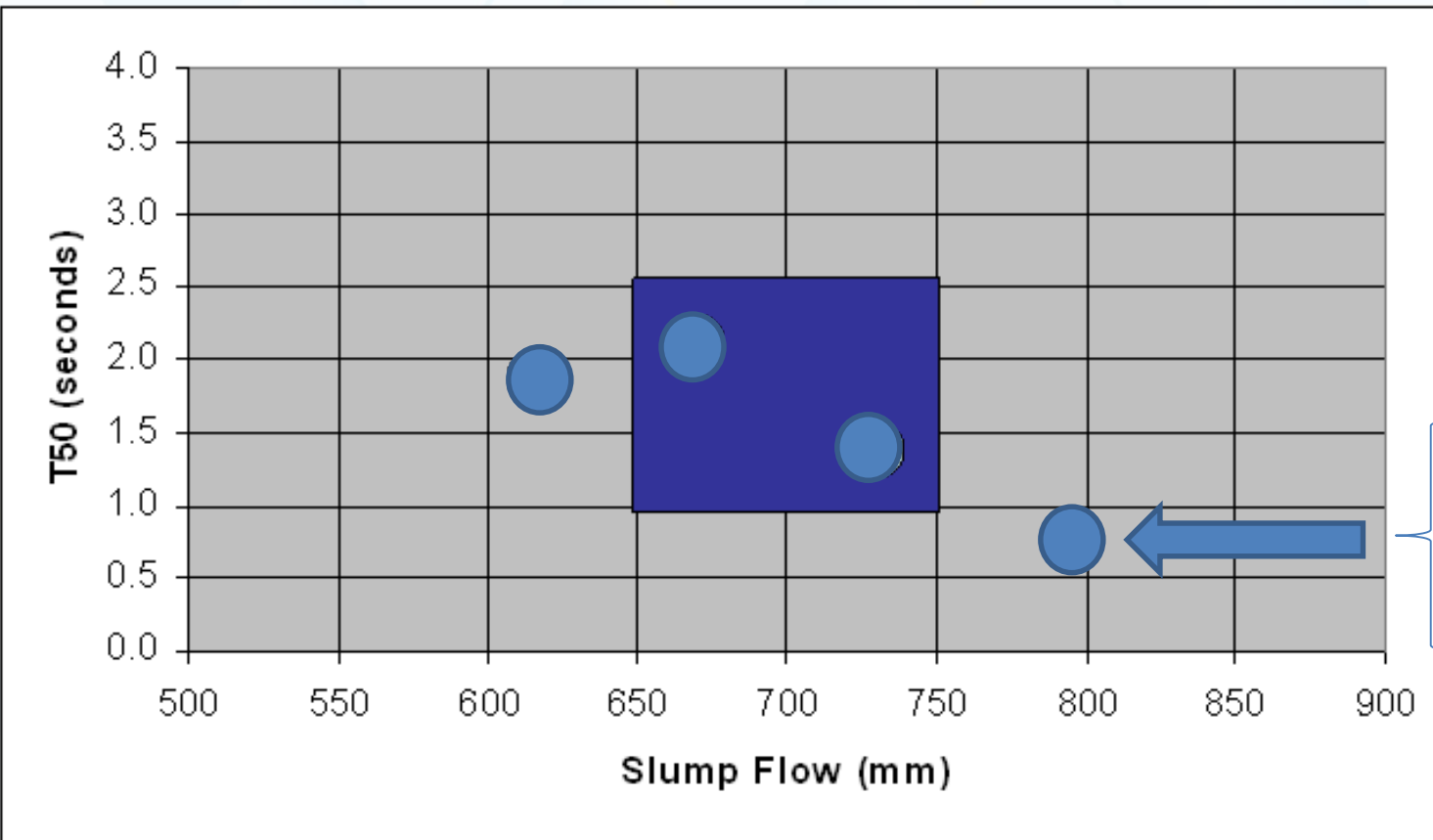


T50 time and Viscosity



- In a general sense slump flow and T50 time can give us insight into batch to batch stability
- For a given mixture as slump flow increases or as T50 decreases the mixture moves toward instability

Final stage of mixture develop – laboratory testing with QC process in mind



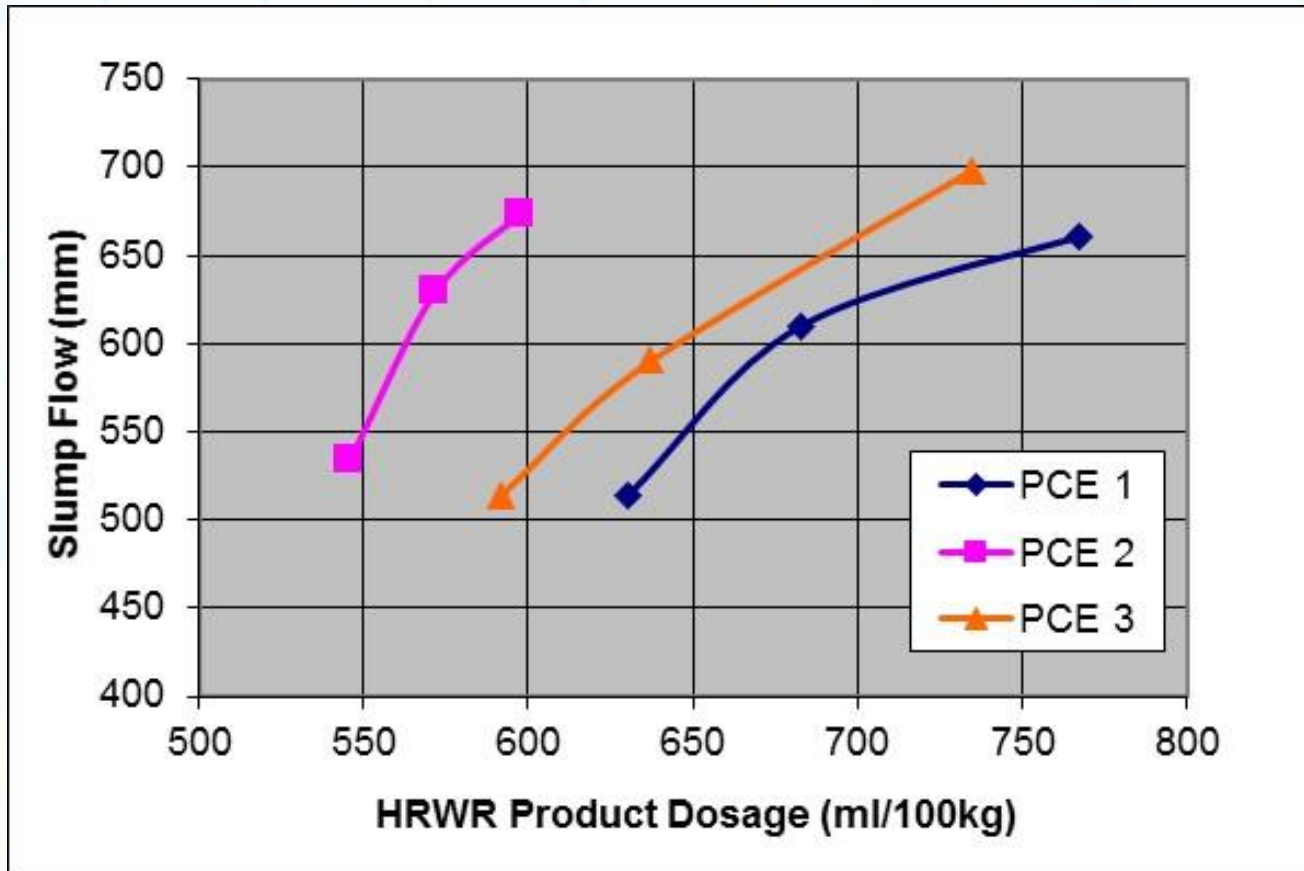
Run mixture with
 1 – More or less HRWR
 2 – More or less water

Tie to these points

- Column segregation
- VSI
- Penetration
- J-Ring
- Other

Source; Daczko, Joseph A., "Self-Consolidating Concrete: Applying What We Know"

How much of an adjustment do I make?



How Materials and Proportions Influence Rheology

Source; Wallevik, O. "Rheology: A Scientific Approach to Develop Self-Compacting Concrete"

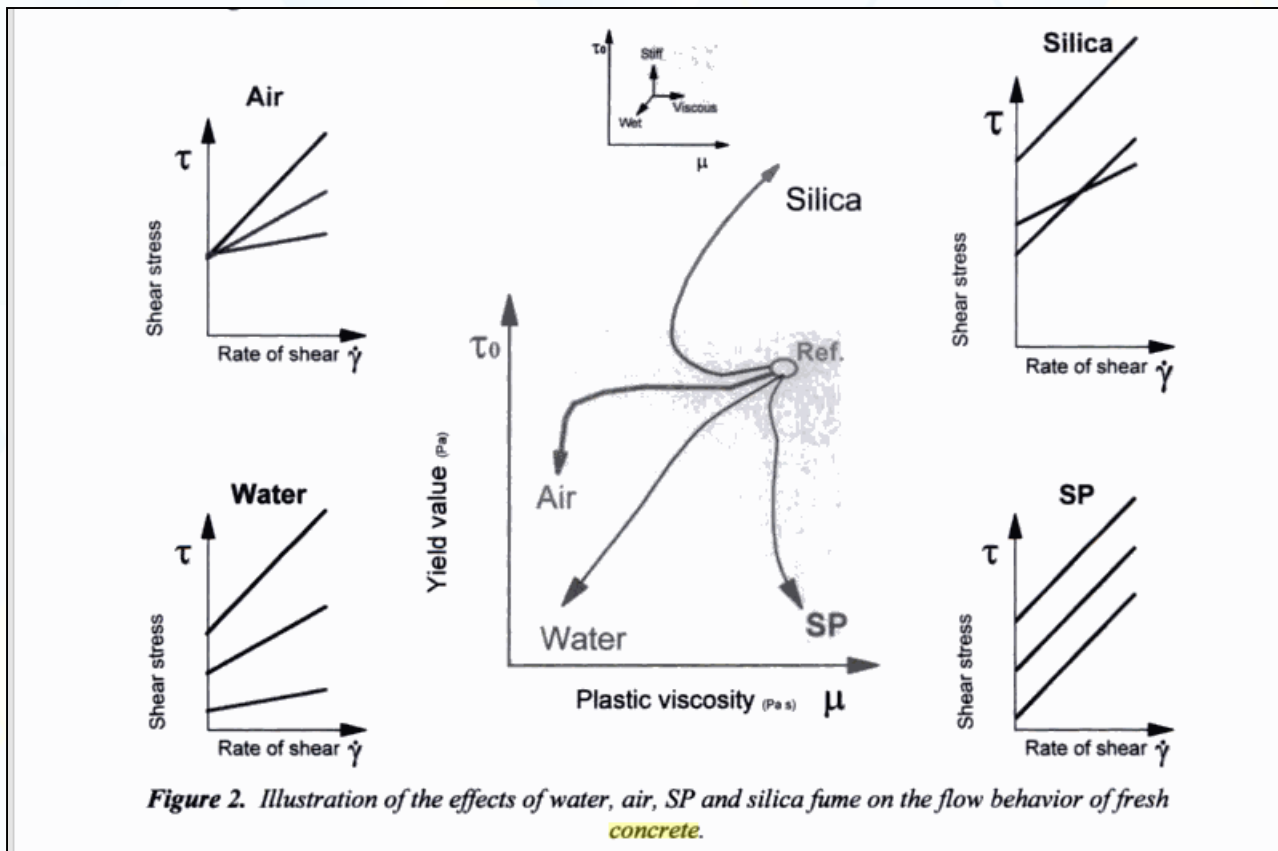
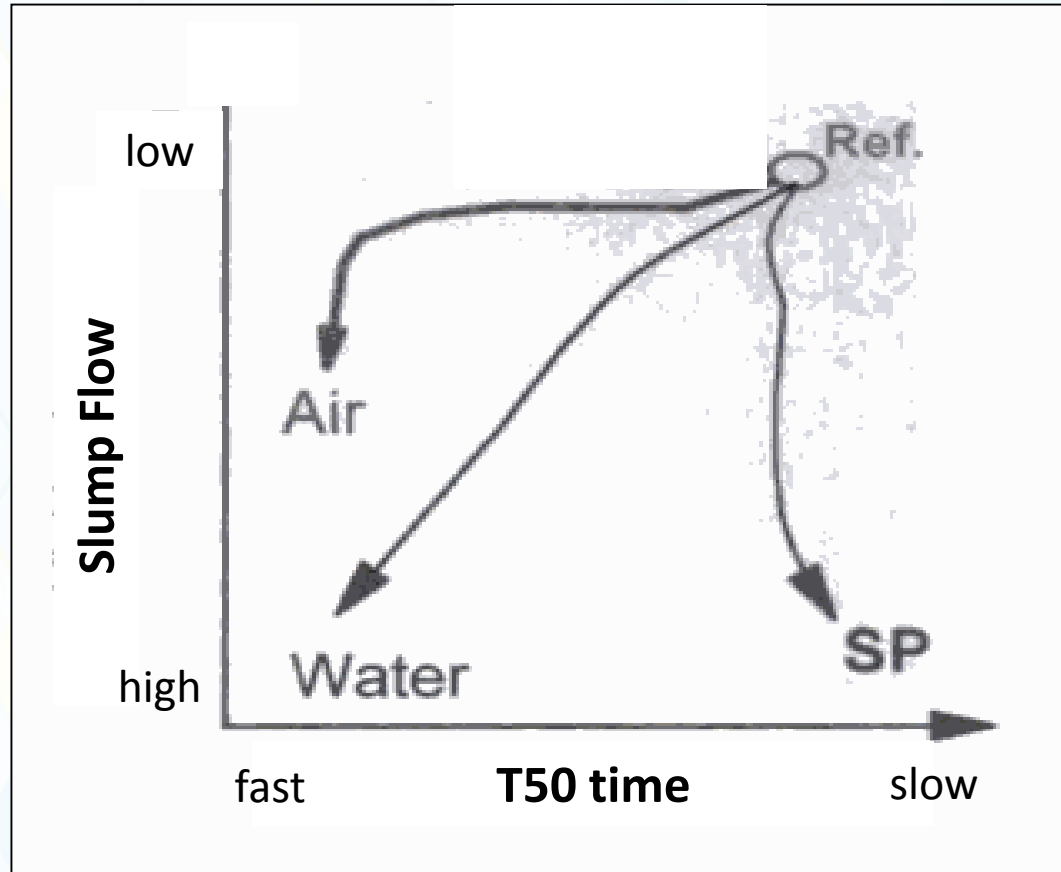
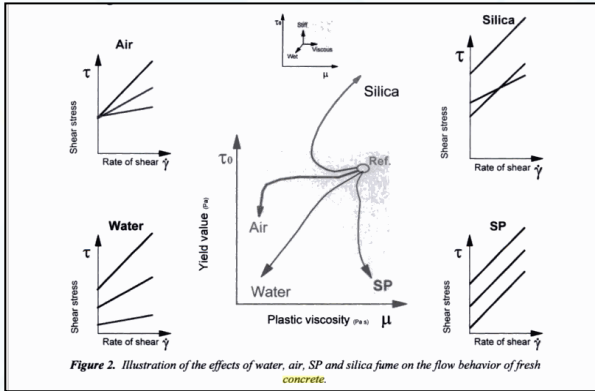
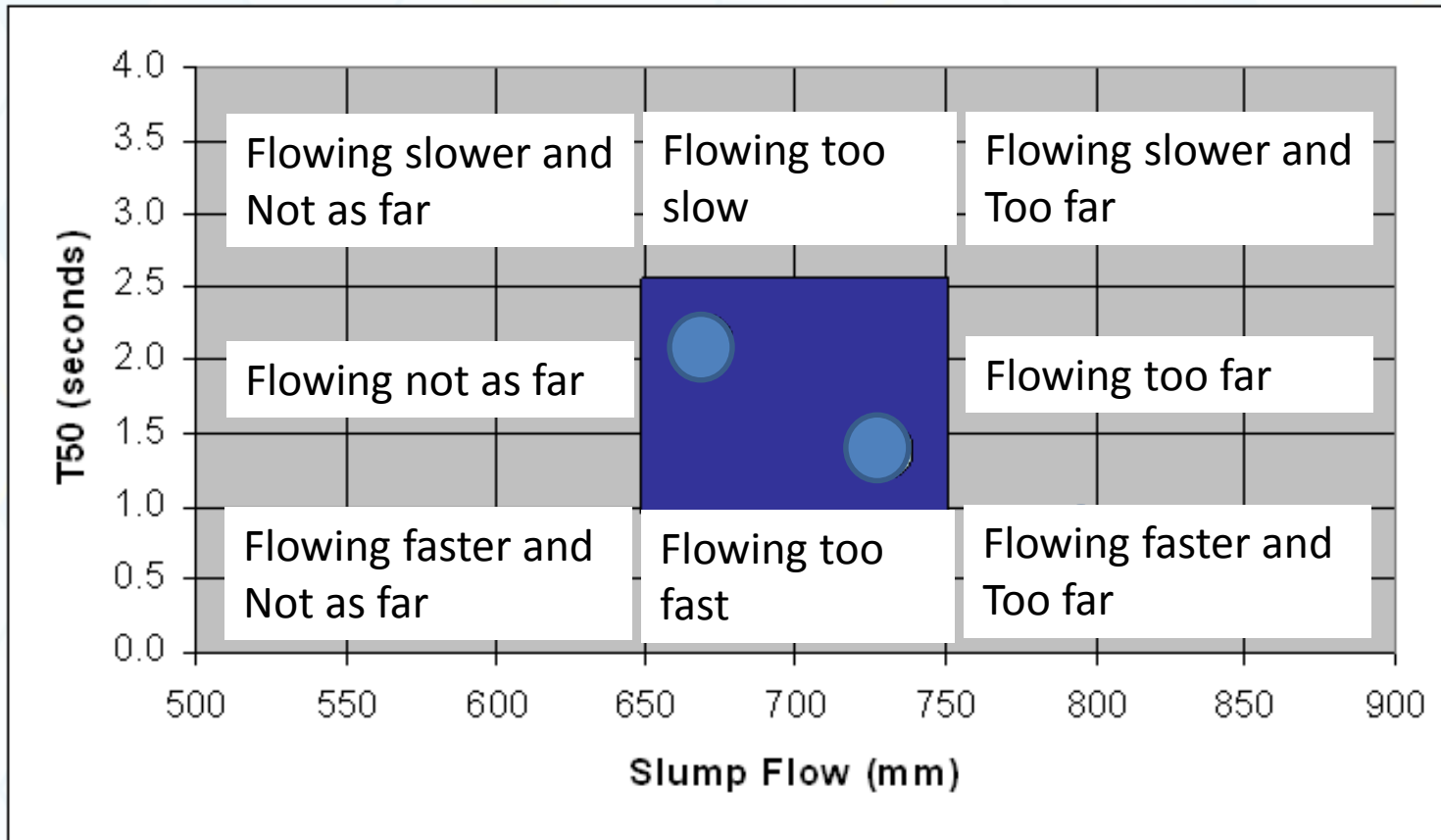


Figure 2. Illustration of the effects of water, air, SP and silica fume on the flow behavior of fresh concrete.

Materials Influence SCC Test Results

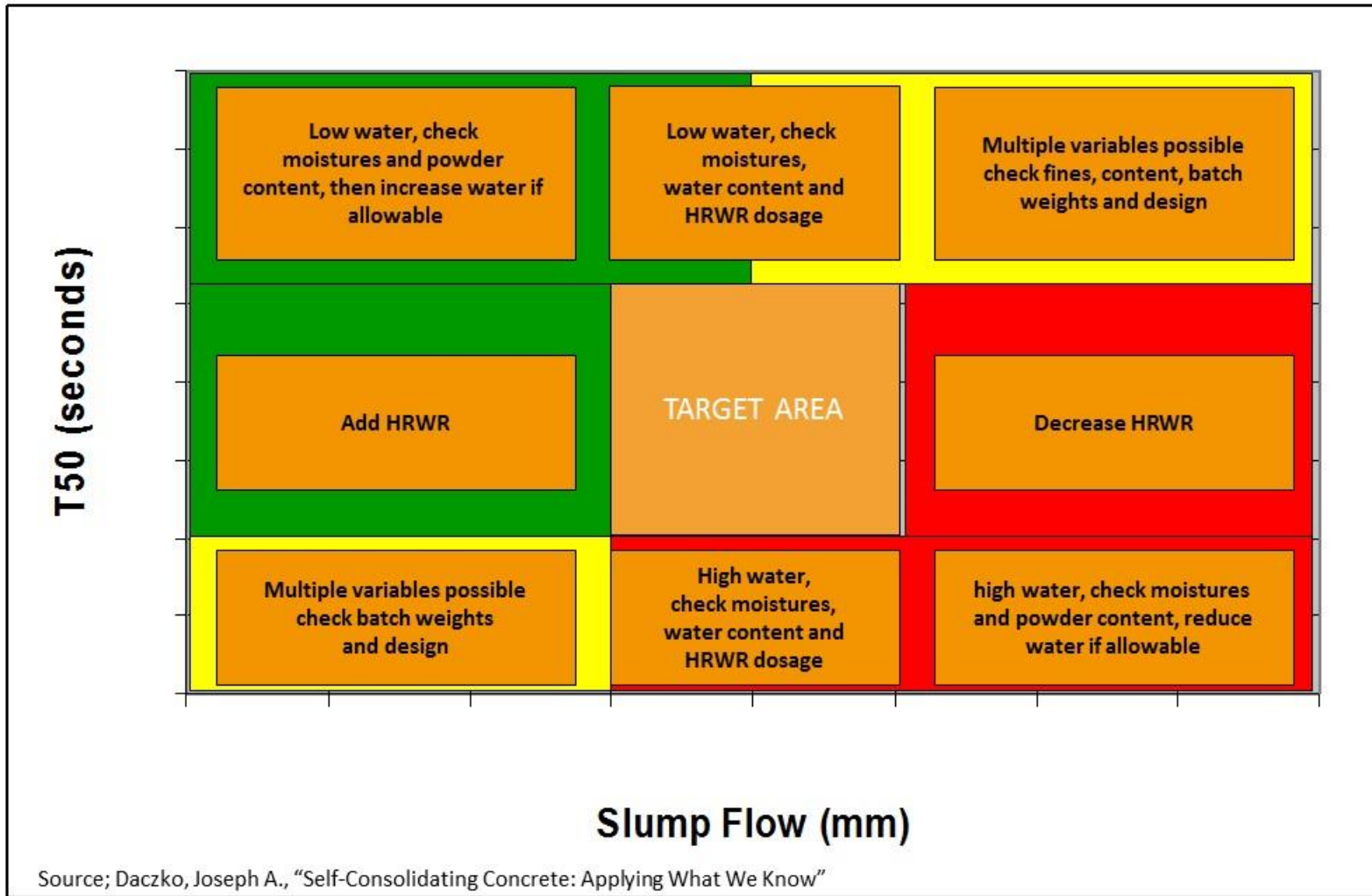


Practically Considering What Could Happen



Source; Daczko, Joseph A., "Self-Consolidating Concrete: Applying What We Know"

Use data leads to make adjustments



Conclusions

- During the mixture development process the QC plan and strategy is developed
- A producers ability to make adjustments depends on the data collected on site
- Water or admixture additions will be mix and material dependent