AGENDA
ACI 231: Properties of Concrete at Early Ages

Monday, March 24, 2014 – 2:00 to 4:00 pm
CASCADE 1, Grand Sierra Resort, Reno, Nevada

1. Welcome and Introductions
2. TAC Update
3. Review and Approval of Minutes from the October 2013 Meeting
4. Committee Membership Update
5. ACI 231 Technical Sessions

Reno, NV: (Spring 2014 – Concrete Endures)
- Title: Hydration of Low Portland Cement Binders: Part 1 and 2
  - Organizers: Jeff Bullard, Gaurav Sant, and Karthik Obla
  - Co-sponsors: ACI 231, 232, 233, and 236
  - Monday, March 24, 2014 8:30 - 9:00 am and 11:00 am - 1:00 pm
- Title: Delayed Ettringite: Causes, Evaluation of Existing Structures, and Prevention
  - Organizers: Oscar Antommattei and Kyle Riding
  - Co-sponsors: ACI 231 and 201
  - Monday, March 24, 2014 4:00 - 6:00 pm, CARSON 3

Washington, DC: (Fall 2014 – Spanning the Globe)
- Dates: Preliminary approval = October 25, 2013
  Final approval = March 28, 2014
- Title: Improving Early-Age Properties of Concrete with SCMs
  - Organizers: Wayne Wilson, Jussara Tanesi, and Dale Bentz
  - Potential co-sponsors: ACI 231, 232, and 212

Kansas City, MO: (Spring 2015 – Fountains of Concrete Knowledge)
- Dates: Preliminary approval = March 28, 2014
  Final approval = October 31, 2014

Denver, CO: (Fall 2015 – Constructability)
- Dates: Preliminary approval = October 2014
  Final approval = March 2015
- Title: Measurement Methods for Early-Age Deformations
  - Organizers: Jason Ideker and Gaurav Sant
  - Potential co-sponsors: ACI 231 and 236
  - An SP could be pursued.
Other Suggested Topics:
- Title: Test Methods for Measuring Early-Age Properties: Lab and In-Situ Monitoring
  - Organizers: by Wayne Wilson and Daniel Cusson
- Title: Influence of Chemical Admixtures on Early-Age Concrete Properties

6. Development of ACI Committee 231 Report

6.1 Review of Ballot Results
- Chapter 6: In-Situ Monitoring
  - Ballot closed on 3/21/2014
  - Thank you to Zach Grasley, Matt D’Ambrosia, and Kyle Riding for their hard work to develop this chapter

6.2 Update on Chapters
- Title: Prediction and Control of Thermal Effects at Early Ages
- Report Outline: Refer to Attachment A

7. New Business
- Congratulations to Jason Weiss who will become the new chair of ACI Committee 231 effective March 28, 2014

8. Adjourn
Attachment A: ACI Committee 231 Report

Title: Prediction and Control of Thermal Effects at Early Ages

Objectives: Provides guidance on the prediction and control of early-age thermal effects in concrete.

Completion: Finalize during ACI meeting in Denver, October 2015. Chapters will be balloted individually.

OUTLINE

Last Updated on February 2014

Chapter 1: Introduction
Lead authors: Anton Schindler and Will Hansen
Complete First Draft: August 2015 Ballot: Before Denver, October 2015

Chapter 2: Hydration
Lead authors: Wayne Wilson, Anton Schindler, and Jason Ideker
Editorial committee: Dale Bentz and Gaurav Sant

2.1 Hydration Kinetics
   2.1.1 Effect of Temperature
   2.1.2 Temperature Sensitivity (Activation Energy)
2.2 Factors Impacting Hydration
   2.2.1 Cement Chemistry (Including alkalinity)
   2.2.2 Cement Fineness
   2.2.3 Supplementary Cementing Materials (SCMs)
   2.2.4 Chemical Admixtures
   2.2.5 Potential Incompatibility Issues
2.3 Delayed Ettringite Formation (DEF)
2.4 Measurement Methods
2.5 Maturity Methods

Chapter 3: Thermophysical Properties
Lead authors: Miguel Azenha, Geert DeSchutter, and Anton Schindler
Completed in October 2013

3.1 Introduction
3.2 Density
3.3 Thermal Conductivity
3.4 Specific Heat
3.5 Coefficient of Thermal Expansion

Chapter 4: Mechanical Properties
Lead author: Geert De Schutter

4.1 Strength Development
4.2 Stiffness Development (Ben Byard offered assistance to add data for this section)
4.3 Creep and Relaxation (Ben Byard and Matt D’Ambrosia offered to help add data to this section)
4.4 Limiting Strain or Stress Capacity
Chapter 5: **Heat Transfer and Stress Analysis**  
Lead author: Kyle Riding  
Complete First Draft: August 2014  

5.1 Heat Transfer Fundamentals (Lead author: Miguel Azenha)  
- ACI 207.2R may be a good reference to cite  
- Manual methods (Schmidt method) should be mentioned  

5.2 Software Programs  
5.2.1 Introduction (what makes the software special is that they have the constitutive laws built in.)  
5.2.2 HIPERPAV (Lead author: Kyle Riding)  
5.2.3 ConcreteWorks (Lead author: Kyle Riding)  
5.2.4 FEMMASSE (Lead author: Kambiz Raoufi and Will Hansen)  
5.2.5 4C-Temp and Stress (Anton Schindler)

Chapter 6: **In-Situ Monitoring**  
Lead authors: Zach Grasley and Matt D’Ambrosia  
Editorial committee: Anton Schindler and Kyle Riding  
Ballot started in February 2014

6.1 Introduction  
6.2 Temperature and Relative Humidity  
6.2.1 Instrumentation Equipment  
   6.2.1.1 Strain Sensors  
   6.2.1.2 Thermocouples  
   6.2.1.3 Digital Temperature Sensors and Wireless Data Collection  
   6.2.1.4 Accuracy and Sources of Potential Error  
   6.2.1.5 Sensor Validation  
6.2.2 Relative Humidity  
6.3 Strength  
6.3.1 Maturity Meters  
6.3.2 In-Place Strength Tests

Chapter 7: **Control of Thermal Effects**  
Lead author: Kambiz Raoufi  
Complete First Draft: August 2015  
Ballot: Before Denver, October 2015

7.1 Introduction  
- Scope is limited to thermal effects which is only one component of strains that can lead to cracking—can reference earlier document for fibers and SRAs  

7.2 Placement Scheduling (Authors: Jan Olek and Anton Schindler)  
7.3 Fresh Concrete Temperature Control (Author: Maria Juenger)  
7.4 Control of Thermal Gradients (Author: Kamran Nemati and Miguel Azenha)  
   - Add Three Gorges Dam Data  
   - CI articles by Ric Maggenti about the use of cooling pipes by Caltrans may be useful.  
7.5 Mixture Modifications (Author: Maria Juenger)  
7.5.1 Use of SCMs (Author: Maria Juenger)  
7.5.2 Chemical Admixtures  
   - Contact Emmanuel Attiogbe to help develop this section  
7.5.3 Use of Aggregates (Authors: Ben Byard and Jason Weiss)  
   7.5.3.1 Normalweight Aggregates  
   7.5.3.2 Lightweight Aggregates  
   7.5.3.3 Fillers (Amal Jayapalan) [Perhaps part of 7.5.1 ?]  
7.5.4 Fibers (Jason Ideker)