AGENDA
ACI 231: Properties of Concrete at Early Ages
Monday, October 22, 2012 – 2:00 to 3:30 pm
Conference Room C, Sheraton Centre, Toronto, ON, Canada

1. Welcome and Introductions
2. Update on Membership Status
3. Review and Approval of Minutes from the Meeting in Dallas, March 2012
4. Status of ACI 231 Technical Sessions

Toronto, Canada: (Fall 2012 – Forming Our Future)
- Title: The Economics, Performance, and Sustainability of Internally Cured Concrete
  - Session Organizers: Anton Schindler, George Grygar, and Jason Weiss.
  - Co-sponsored by ACI Committees 231, 213, and 130.
  - 3 × 2-hr technical sessions will be held in Toronto on Tuesday
  - ACI SP with 14 papers is available.

Minneapolis, MN: (Spring 2013 – Responsibility in Concrete Construction)
- Title: Early-Age Properties of Repair Binders (Lab, Field and Test Methods)
  - Session Organizer: Kyle Riding

Phoenix, AZ: (Fall 2013 – Innovation in Conservation)
- Dates: Preliminary approval = October 26, 2012 and final approval = April 19, 2013.
- Title: Innovation in Cooling Mass Concrete.
  - Session Organizers: Anton Schindler, Miguel Azenha, and John Gajda (207)
  - Speakers: 2 × U.S.A., Portugal, Brazil, and Japan

Reno, NV: (Spring 2014)
- Dates: Preliminary approval = April 19, 2013 and final approval = October 25, 2013.
- No sessions scheduled for this convention.

Washington, DC: (Fall 2014)
- Dates: Preliminary approval = October 25, 2013
- Title: Improving Early-Age Properties of Concrete with SCMs
  - Potential Organizers: Dale Bentz, Jussara Tanesi, and Kyle Riding
  - Potential co-sponsors: ACI 232 (Fly Ash and Natural Pozzolans in Concrete) and 212
    (Chemical Admixtures)
- Title: Interaction of Limestone Filler with SCMs
  - Potential co-sponsor: ACI 236 (Material Science of Concrete)
  - Tim Cost was suggested as a potential speaker for this session

Other Suggested Topics:
- Title: Test Methods for Measuring Early-Age Properties: Lab And In-Situ Monitoring
  - Suggested by Wayne Wilson
- Title: Early-Age Volume Change Effects
  - Potential Organizers: Jason Ideker and Gaurav Sant
  - Target 2014, i.e. either Reno or Washington
Future Conventions:

Kansas City, MO: (Spring 2015)  Denver, CO: (Fall 2015)
Preliminary session approval  Preliminary session approval
requests due: March 28, 2014  requests due: TBA

5. Development of ACI Committee 231 Report
   • Title: Prediction and Control of Thermal Effects at Early Ages
   • Report Outline: Refer to Attachment A

6. New Business

7. 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 Minneapolis, April 2013 (i.e. 18 months from meeting in Cincinnati). Chapters will be balloted individually.

REPORT OUTLINE
Last Updated on March 19, 2012

Chapter 1: Introduction
Lead authors: Anton Schindler and Will Hansen

Chapter 2: Hydration
Lead author: Wayne Wilson
Editorial committee: Dale Bentz, Anton Schindler, 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 author: Miguel Azenha

3.1 Introduction
   ▪ Cover why thermal properties are important
3.2 Thermal Conductivity
3.3 Specific Heat
3.4 Coefficient of Thermal Expansion (Ben Byard offered to supply data for this section)

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

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: Will Hansen)
5.2.5 4C-Temp and Stress (Anton Schindler will correspond with the developers)

Chapter 6: In-Situ Monitoring
Lead authors: Zach Grasley and Matt D’Ambrosia
Editorial committee: Anton Schindler and Kyle Riding

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: TBA

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