

MINUTES

ACI 237: Self-Consolidating Concrete

Monday, March 22, 2010 – 1:00 pm to 4:00 pm
Sheraton Chicago Hotel, Ontario Room, Chicago, IL

1. Welcome

The Chair, Kamal Khayat, opened the meeting at 1:05pm. All attendees introduced themselves. The following committee members and visitors attended this meeting:

Voting Members:

Peter Billberg
John Cook
Joe Daczko
Clarissa Ferraris
Dennis Graber
John Gruber
Lloyd Keller
Kamal Khayat (*Chair*)
Liberato Ferrara
Gary Knight
Eric Koehler
Mohamed Lachemi
Darmawan Ludirdja
Frank Nadeau
Celik Ozyildirim
Eric Peterson
Don Powell
Anton Schindler (*Secretary*)
Geert de Schutter
Qizhong Sheng
Mohammed Sonebi
Daniel St-Pierre
Caroline Talbot

Associate Members:

Carlos Aire
Mohamed Bassuoni
David Berg
Per Fidjestol
Tim Folks
Terry Harris
Berndt Kanduth
Warren McPherson
Pat O'Brien
Ketan Sompura
Ralph Tulis
Olafur Wallevik
Chuck Weiss
Joe Denny Wills

ACI TAC Representative:

None present.

Visitors:

Jeff Abbuhl (Euclid Chemical)
Hakim Abdelgader (Al Fateh University, Libya)
Bill Ciggelakis
George Charistou
Pete Claisie (Coventry University)
Jim Davy
BJ Eckholdt (Lafarge NA, Metairie, LA)
Lorena Garcia (Ellis Don)
Chetau Hazaree (ISU)
Gene Hightower (USA Ready Mix, B'ham, AL)
Joe Kelly (Sherman Indus., Birmingham, AL)
Mike Leongson (USACE)
Nathaniel Mohler (PCA)
Rob Quattrociocchi (Ellis Don)
Tarek Khan (BASF)
Zhngui Li (Yamaguchi Univ., Japan)
John Vaughan (IMI, Louisville, KY)
Hans-Werner Roeth
John Schemmel (eTEC)
Robert Sculthorpe
Ammar Yahia (University de Sherbrooke, CA)

2. Approval of Agenda for the Meeting

The Chair reviewed the agenda for the meeting. The committee adopted the proposed agenda.

3. **Approval of Minutes from the ACI Convention in New Orleans, LA**
 - Draft minutes of the meeting in San Antonio were reviewed. Corrections were made to the ACI status of some of those in attendance. Clarissa Ferraris requested correction to the fact that a Voting Member does not have to be an ACI Member; however, an Associate Member must be an ACI Member. These minutes were approved with these changes.

4. **Update on Membership Status**
 - The Chair provided an update on modifications made to the various membership types of ACI 237.
 - Status since the Spring 2010 Convention:
 - 30 voting members, 67 associate members, which produces 97 total members.

5. **Survey to move committee meeting time**
 - Anton Schindler provided a summary of the survey of times preferred by members of ACI 237. The two preferred times were as follows Mondays, 8 to 11 a.m. and Mondays, 1 to 4 p.m. A motion was made and seconded to move the meeting time to Mondays, 8 to 11 a.m. A corium was present and the motion passed with 11 in favor and 9 against the motion.
 - Future ACI 237 meetings will be conducted on Mondays, 8 to 11 a.m. and the chair will request this change from ACI Staff.

6. **TAC/ACI Updates**

The Chair provided the following updates from the technical chair meeting.

 - A) **Sustainability Initiative**
 - ACI 130 to provide definitions. New committee formed last year with 7 sub-committees
 - ACI called for technical committees to discuss how sustainability can be part of documents (materials, processing, performance (thermal insulation, internal curing, service life, structural system, etc.)
 - Example by ACI 343 Bridges: Sustainability issues in document review addresses in terms of concrete mixtures, use of recycled materials, corrosion issues (cover, cracking, corrosion inhibitors, etc.)
 - ACI providing publications: The Sustainability Concrete Guide: Strategies and Examples by Andrea Schokker, sponsored by U.S. Green Concrete Council
 - ACI committees can develop short TechNotes:
 - LEED-like classification on metrics specific to concrete industry
 - Publish info on use of SCMs to lower carbon emissions
 - Joint sustainability initiative with NRMCA, US Green Building Council
 - ACI may start a student competition on sustainability
 - B) **Fly Ash**
 - Forum 123 on Sunday night to discuss the possible classification of fly ash as hazardous material following Kingston TN impoundment accident
 - If classified as hazardous waste, issues with transport and handling, etc.
 - EPA still committed to use FA (18 M ton/yr)
 - C) **International Research Portal**
 - ACI has 23 international partners
 - Possible exchange and links to technical information
 - RILEM already gave access to technical documents to ACI members
 - D) **Nuclear Energy Standards**
 - No new nuclear plants were constructed since 1980 and many of the approximately 600 codes and standards related to concrete need to be updated.
 - The chair urged to committee to consider how ACI can contribute to this industry, especially in technologies that have evolved a lot since the 1980s, such as SCC.

7. ACI E-Learning

- The task group formed at the last convention reported on their progress (members: Gary Knight, Joe Daczko, Eric Peterson). The task group needs to get more information on what can be done on the ACI website (Kamal Khayat to investigate). They ultimately want to have an extensive site, possibly including courses and certification. However, they plan to start with a Frequently Asked Questions (FAQ) section. **Members are asked to send questions and answers to Eric and Joe.**
- Other suggestions for the website were: posting of case studies (Caroline Talbot), message forum or blog (Lloyd Keller)
- Any information posted will need to be reviewed/endorsed by committee.

8. Super-Workable Concrete

- The committee discussed the definition and use of concrete in the “gray area” between vibrated concrete and SCC. A session was held on this topic at the Fall 2009 convention. This type of concrete is sometimes referred to as semi-flowable SCC, low slump flow SCC, highly flowable SCC, and high yield stress SCC. It is also covered in the State of the Art Report in the Specialty Concrete chapter.
- There is interest in providing a clearer, quantifiable definition for this concrete (for example, in terms of a minimum slump flow). The current ACI definition distinguishes SCC on the basis of not requiring vibration. There are several issues:
 - The need for vibration depends on the application
 - The need for vibration cannot be quantified by slump flow alone. For example, Olafur Wallevik pointed out that in Denmark “vibration free concrete” has relatively low slump flow but consolidates without vibration due to its low viscosity.
 - Differing amounts of vibration can be applied – light to full.
 - There is a need for better tests to determine impact of vibration or lack of vibration on hardened concrete performance
- Kamal Khayat will reach out to Clarissa Ferraris and Celik Ozyildirim to see if there can be any coordination with the consolidation committee
- A task group was formed to study this issue further. It will be led by Joe Daczko. Other members: Kamal Khayat, Celik Ozyildirim, and Ketan Sompura.

9. Formwork Pressure – Liaison with Committee 347 (Formwork)

- Lloyd Keller reported on the coverage of SCC formwork pressure at the ACI 347 meeting. The following four points were discussed.
 - i. Tests are now available to qualify a concrete mixture in order to predict formwork pressure.
 - ii. Concrete properties can change due to batching, delivery, and placement variations, resulting in formwork pressure outside the predicted range
 - iii. QC/QA measurements may be needed on each truck to ensure that the resulting formwork pressure will be within the expected range.
 - iv. More data need to be generated.

10. Update on State-of-the-Art Report

The plan is to ballot chapters individually, starting with Chapters 2, 3, and 4. These ballots will be used internally in committee and the individual chapters will not be submitted to TAC. Once all chapters are complete, the final combined document will be balloted prior to submission to TAC. A note will be added to the final ballot indicating that each chapter was already balloted individually.

The following decisions were made relative to each chapter:

Chapter 2 – Introduction

- Authors: Caroline Talbot, Roy Heaps, Tim Folks, Sonia Gagnon, Daniel St-Pierre
- Ballot before next meeting

- Caroline Talbot indicated that more case studies are needed. A minimum of 10 is needed.
- Neil Crockett volunteered to assist with Sect. 2.8 titled Selected case studies for various market segments.
- Caroline is to send Kamal final chapter for revision and balloting.

Chapter 3 – Qualification of constituent materials

- Authors: Don Powell, Berndt Kanduth, Caijun Shi, John Cook.
- This chapter is 90% complete and will be ready in 1 month.
- Ketan Sompura, David Berg, and Caroline Talbot volunteered to assist with this chapter once finalized.
- Don will send Kamal final chapter for revision and balloting.

Chapter 4 – Mix design considerations

- Authors: Gary Knight, Olafur Wallevik, John Cook, Eric Kohler, Darmawan Ludirdjad.
- This chapter is ready and will be balloted before the next meeting.
- Joe Daczko, Liberato Ferrara, Peter Billberg, and Ammar Yahia have volunteered to assist Gary in finalizing this chapter.
- Once done, Gary will send Kamal final chapter for revision and balloting.

Chapter 5 – Fresh properties

- Authors: Kamal Khayat, Keith Plemmons, Ronald Vaughn, Venkatesh Iyer, Wen-Chen Jau, Peter Billberg, Raissa Ferron.
- Mohammed Sonebi volunteered to assist with this chapter.
- This chapter needs more work.

Chapter 6 – Test methods

- Authors: Kamal Khayat, Joe Daczko, Mohamed Sonebi, Raissa Ferron.
- Eric Koehler and Mohamed Lachemi volunteered to assist with this chapter.
- This chapter needs more work.

Chapter 7 – Production and placement of SCC

- Authors: Frank Nadeau, John Cook, Lloyd Keller, Wen-Chen Jau.
- Eric Peterson volunteered to assist with this chapter.
- Since a new chapter leader is needed, the Chair will identify one.
- This chapter needs more work.

Chapter 8 – Hardened properties

- Authors: Frank Nadeau, Kamal Khayat, David Lange, Anton Schindler, Caijun Shi, Mohamed Sonebi, Wen-Chen Jau, Antonios Kanellopoulos.
- Sid Freeman and Mohamed Lachemi volunteered to assist with this chapter.
- This chapter needs more work.

Chapter 9 – Durability of SCC

- Authors: Mohammed Sonebi, Joe Daczko, Kamal Khayat, Celik Ozyildirim, Antonios Kanellopoulos.
- Mohamed Bassuoni volunteered to assist with this chapter.
- This chapter is estimated to be 40% complete.
- This chapter was expanded to include the following:
 - 9.1 Microstructural considerations
 - 9.2 Transport properties
 - 9.3 Corrosion resistance
 - 9.4 Carbonation
 - 9.5 Air-void system
 - 9.6 Frost durability
 - 9.7 Fire Resistance
 - 9.8 Sulfate Attack
 - 9.9 Alkali-Silica Reaction

Chapter 10 – Economic considerations

- Authors: Kirk Deadrich, Victor Smith, John Gruber.
- This chapter has not been started.

Chapter 11 – Specialty SCC

- Authors: Jody Wall, Victor Smith, Caroline Talbot, Mohammed Sonebi, Denis Graber.
- Liberato Ferrara volunteered to assist with this chapter.
- This chapter needs more work.

11. Update on Sessions

Chicago, IL: (Spring 2010, Extreme Concrete)

- Durability and Long-Term Performance of SCC
 - Organized by Mohamed Sonebi
 - Topics for presentation include: transport properties of SCC, sulfate attack, frost durability, fire resistance.

Pittsburgh, PA: (Fall 2010 – Theme: Green Concrete in the Steel City)

- Mineral Fillers: Role in SCC
 - Organized by Berndt Kanduth and Caroline Talbot
 - The Final Session request will soon be submitted.

Tampa, FL: (Spring 2011 – Theme: Concrete—The Strength of Florida)

- Economics of SCC
 - Organized by John Gruber and Joseph Daczko. They will seek preliminary approval from ACI for this session.

Cincinnati, OH: (Fall 2011 – Bridging Theory and Practice)

- Prescription-to-Performance (P2P) with Relation to SCC
 - Organized by Daniel St-Pierre and Claude Bedard
- Early-Age Performance of SCC
 - Matt D'Ambrosia and Anton Schindler is organizing this session sponsored through ACI 231
 - A Call for Papers will be placed in Concrete International with the intent to develop a Special Publication of this session.

Dallas, TX: (Spring 2012)

- Quality Control Programs and Robustness of SCC
 - Organized by Joe Daczko and Peter Billberg
- Formwork Pressure
 - Organized by Kamal Khayat and Ralph Tulis
 - Maybe moved to Spring 2012

Kamal Khayat provided an update of SCC 2010 which will be held on September 26-29, 2010 in Montreal (www.SCC2010.org). This is the 6th International RILEM Symposium on SCC and 4th North American Conference on the Design and Use of SCC.

- 250 abstracts received
- 93 papers submitted for peer-reviewed for Springer Proceedings
- Expecting 175 papers presented over 3 days
- Post conference tour on Sept. 30 to University of Sherbrooke new Civil Engineering lab and scenic Eastern Townships.

General Topics for Future Sessions:

- How does SCC differ from conventional concrete in the hardened state? (Joe Daczko, Liberato Ferrara)
- Precast/Prestressed SCC (Alma Reyes)
- Reconciling the Art with the Science (James Aldred)
- Sustainability of SCC (jointly with ACI 130)
- SCC for architectural applications
- SCC in Repair Applications (Celik Ozyildirim)
- Case studies and learning ...
- Rheology of SCC (Olafur Wallevik)

12. New Business

- Liberato Ferrara reported back on the Fiber Reinforced SCC Session held in New Orleans. Liberato reported that the papers are being finalized after peer review. It is expected that the SP will be available in time for the Pittsburg convention.
- Certification – ACI C610 is waiting on all standards to be completed by ASTM. The certification process is being coordinated by ACI C610, with assistance as needed by ACI 237

13. Adjourn

There being no other business, the meeting adjourned at 3:55 pm.