ACI Committee 544
Fiber Reinforced Concrete

Minutes of Meeting held on Tuesday, October 26, 2010
Westin Convention Center Hotel, Room W-Allegheny 1
Pittsburgh, PA
3:30 - 6:00 P.M.

ATTENDANCE

Voting Members:
Mobasher, B., Chairman
Krstulovic, N., Secretary
MacDonald, C., Members. Secret.
Aldea, Corina-Maria
Arockiasamy, Madasamy
Batson, Gordon
Bindiganavile, Vivek S
Bischoff, Peter H
Destree, Xavier
Dubey, Ashish
Ekenel, Mahmut
Forgeron, Dean P.
Galvat, Mel
Gallovich, Antonio
Hoff, George
Jones, John
Kim, Jubum
Leppert, Mark
Mahoney, Michael
Mitchell, Nicholas
Novak, Jeff
Porter, Max
Shah, Suru
Sobolev, Konstantin
Tatnall, Peter C.
Toutanji, Houssam
Zhang, Lihe

Assoc. Members:
Allena, Srinivas
Annet, Bay
Bordelon, Amanda
Durning, Tim
Labbe, Carl
Morton, Gerald

Visitors:
Mussleman, Eric
Reddy, D. V.
Tonyan, Tim
Yland, Carla
Ballou, Mike
Biddle, Dan
Bowers, Daniel
Hart, Scott
McPhee, Mike
Milligan, Jimm
Schmidt, Sylvester
Shafer, Scott
Williams, Brett
Zerilla, Brandon

1. CALL TO ORDER AND APPROVAL OF AGENDA
The meeting was called to order by Chairman Mobasher at 3:30 PM. The meeting agenda was unanimously approved.

2. PREVIOUS MINUTES
Minutes from the previous meeting held on Tuesday March 23, 2010, in Chicago were approved unanimously.

3. ANNOUNCEMENTS
A) Upcoming and Recent Events
     Conference webpage: [www.sustainabilityconf.org](http://www.sustainabilityconf.org)
B) Future ACI Technical Sessions


4. MEMBERSHIP ATTENDANCE & VOTING RECORD

MacDonald reported on membership status. The voting membership is at 68 members, while Associate and Consulting memberships are at 53, and 23 members, respectively.

5. SUBCOMMITTEE REPORT

- **544-A FRC-Production and Applications (Speakman)** – Mahoney reported that the sub-committee is working on developing Technical Notes on the use of FRCs in shotcrete and precast concrete applications. All documents will be handled through the ACI website.

- **544-B FRC-Education (Bindiganavile)** - Bindiganavile reported that the sub-committee is reviewing its future goals and objectives. These include collecting the information on the 544 history, as well as streamlining publication of 544-B Power Point presentations on the ACI WebPages.

- **544-C  FRC-Testing (Forgeron)** - Forgeron reported that the sub-committee has finished populating the Sub-Committee website with records of previous ballots and other Sub-Committee materials. Work is also ongoing on addressing negatives from the recent “Testing of FRC” ballot. The ballot had 4 negative votes, with the major concern being that the document is not up to date. Input has been received from authors of negative ballots and the negatives will be re-ballot in the near future. The Sub-Committee plans to start its work on the next document revision as soon as current negatives are resolved and TAC accepts the final document.

- **544-D  FRC-Structural Uses (Massicotte)** – Mobasher reported that the sub-committee has balloted the document on "FRC Elevated Slabs." Total of 8 votes were negative, out of which 5 were technical and 3 editorial in nature. Presently, 5 negative votes have been withdrawn.

- **544-E  FRC-Mechanical Properties (Krstulovic-Opara)** – Krstulovic reported that the sub-committee completed the second ballot on "FRC Nomenclature and Acronyms". Most of the proposed text has been approved in the first ballot. Only limited changes were addressed in the second ballot (e.g., adding word “cement” to the word “composites,” “structural” to “cracking,” etc., as well as adding a commentary). Three negative ballots were cast by Banthia and one by Zollo. The committee has already developed a draft response and is currently working on closing resolutions to the negative votes.
The sub-committee has also developed the “Indirect Method for Obtaining a Model Stress-Strain Curve of Strain Softening FRCs” report. The document has been balloted once. Negatives and approved-with-comment votes are being addressed. Resolutions to negative votes have been developed in collaboration with authors of negative votes. Thanks to the significant effort by Mobasher, most of negative votes have been resolved, and are currently being processed.

544-F FRC-Durability (Corina) – Chairwoman Corina reported that in addition to further development of the active ACI 544.5R-10 “Report on the Physical Properties and Durability of Fiber-Reinforced Concrete” document, the Sub-Committee is also developing the following new documents, Technical Notes, and Special Publications:

1) “Effect of Fibers on Shrinkage Cracking” (J. Nowak),
2) “Effect of Fiber on Freeze-Thaw Resistance” (C. MacDonald),
3) “Corrosion Resistance of FRC” (J. Barros),
4) “Permeability of FRC” (J.P. Charron),
5) “Blast Resistance of FRC” (L. Ferrara),
6) “Durability Enhancements in Concrete with Fiber Reinforcement” – The SP consists of six papers presented in both the 2008 Spring Convention held in Los Angeles and the 2009 Spring convention held in San Antonio. SP co-editors are Corina Aldea and Nur Yazdani. The SP editorial package will be discussed by TAC in Pittsburgh.
7) SP-274 – “Fiber Reinforced Self-Consolidating Concrete: Research and Applications” – The SP consists of eight papers presented in the 2009 Fall convention held in New Orleans. SP co-editors are Corina Aldea and Liberato Ferrara. The SP is available during the Pittsburgh convention.
8) “Advances in Fiber Reinforced Concrete Durability and Field Applications” – The preliminary SP request form was submitted in June 2010. The SP is planned to cover a total of twelve papers to be presented in during the 2011 Spring convention in Tampa. SP co-editors are Corina Aldea, Mahmut Ekenel and Cliff MacDonald. Publication of the SP is anticipated for the 2011 Spring convention. So far a total of six papers have been received. The peer review process is ongoing.

The Sub-Committee’s other activities include organizing the following sessions:

1) “Fiber Reinforced Self-Consolidating Concrete: Part 1 and Part 2,” was held during the 2009 Fall convention in New Orleans. Sessions were co-sponsored by ACI 544 FRC and 237 SCC and co-chaired by Corina Aldea and Liberato Ferrara. A total of 13 papers were presented.
2) “Advances in Fiber Reinforced Concrete Durability and Field Applications: Part 1 and Part 2,” to be held during the 2011 Spring Convention in Tampa. Sessions will be co-chaired by Corina Aldea, Mahmut Ekenel and Cliff MacDonald. A total of twelve presentations are planned for both sessions.
3) “Fiber Reinforced Concrete: Smart Materials and Sensors: Part 1 and Part 2,” to be held during the 2011 Fall Convention in Cincinnati. Sessions are co-sponsored by ACI committees 544 and 236, and will be co-chaired by Corina Aldea and Konstantin Sobolev. Call for papers was published in CI October 2010. A total of six paper have been comityed. Additional papers are being accepted. A preliminary request for SP has already been submitted.
4) “How do we use FRC?” sessions are being planned for the 2012 convention in Dallas.
5) Future session on the “FRC for sustainability” is currently being considered

The sub-committee is also collaborating with the E701 Materials for Concrete Construction committee to prepare a list of Q&A for the ACI online CEU program. A total of ten Q&A based on ACI 544.5R-10, Ch. 3 Physical properties of FRC, have been prepared and submitted by Corina Aldea and Jean-Philippe Charron.

6. LIAISON REPORTS

- ACI 360: McPhee reported that the ACI 360R-10 “Guide to Design of Slabs-on-Ground” document has been published. Chapter 11 of the document covers the design of FRC slabs on grade.
- ACI 440: Ekenel reported that the committee is working on the following documents:
1) 440L is developing an accelerated conditioning protocol and acceptance criteria for durability of internal and external FRP reinforcement of concrete. Document will be balloted at the Spring 2011 convention.

2) 440F is working on developing Seismic Design Guidelines for FRP strengthened structural members. It will be re-balloted at the Spring 2011 convention.

3) Development of Blast Resistance of FRP strengthened structures are underway. Document might be balloted at the Spring 2011 convention.

- ACI 506: Tatnall reported that committee is updating the 506.2 document on the Specification for Shotcrete. Remaining two negative votes have been resolved. The document will be released to TAC before the year end. The Sub-Committee on FRC Shotcrete, Chaired by J. Nowak, is currently developing a Technical Note on FRC shotcrete.

- ASTM C 09.42 on FRC: The committee is presently reviewing the C 1399 document on “Standard Test Method for Obtaining Average Residual-Strength of FRC.” The committee has also released the updated version of the “Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading).”

- ASTM C 13 – Nowak reported that the committee on Concrete Pipe is considering including FRC information in its documents.

- ASTM C 17 – Jones reported that in recent years the committee has published a document that covers FRCs. The document is presently being updated. Ongoing improvements include providing better definitions on cement bond and test method.

- RILEM and FIB 8.3: Mobasher reported that both committees are developing FRC design guidelines that will be compatible with Eurocode documents.

7. OTHER BUSINESS
- Chairman Mobasher introduced Mr. Kevin MacDonald as the new ACI 544 TAC contact.

8. ADJOURNMENT
The meeting was adjourned at 5:20 P.M.

Respectfully submitted,
Neven Krstulovic-Opara
Secretary, ACI 544