Georgia Chapter ACI

September 2004 - Issue 7

NEWSLETTER

INSIDE THIS ISSUE:

PRESIDENT'S MEMO

Welcome back summer vacationers! The Summer Newsletter issue was a little late so y'all should be reading this issue "back-to-back". By the time you read this I will have given a guest seminar on fibrous concrete to a joint meeting of ACI and ASCE in New Orleans. There are some new and profound developments in the field of fibrous concrete and I don't want the Georgia Chapter members to be ignorant notwithstanding that our technical programs are already established for the balance of the year. As I alluded to last month, the immediate Past President becomes the Skipper Seminar Chairman and is responsible for the program content. I am envisioning an entire seminar on fibrous concrete! There is a lot of material to cover. Y'all are forewarned. In the interim, since we have no regular Chapter meeting program to report on, I am furnishing a synopsis of my New Orleans seminar in this issue. Remember, "progress through knowledge".

Mel Galinat

NEW MEMBERS

Please help us welcome the following new chapter members:

Mr. Steven R. Heeter MACTEC Engineering	**Mr. Adam Marr** S&ME, Inc.	**Mr. Charles G. Colson** Walker Concrete Company
Mr. Bo-Sijou Wei GA Tech, Student	**Mr. David Aucoin** GA Tech, Student	**Ms. Amanda Bezold** GA Tech, Student
Mr. Thomas Goetzinger GA Tech, Student	**Mr. Charles A. Smithers** GA Tech, Student	**Mr. Jia-Jing Tsai** GA Tech, Student
Mr. Craig Ramsey GA Tech, Student	**Mr. Robert A. Haines** GA Tech, Student	**Mr. Nicholas Haddad** GA Tech, Student
Mr. David Lorrorn GA Tech, Student	**Ms. Genique Nicholson** GA Tech, Student	**Mr. Oliver Lopez** GA Tech, Student
Ms. Giovanna Morris GA Tech, Student	**Mr. Adis Bojcic** GA Tech, Student	**Mr. Bradley W. Penar** GA Tech, Student
Mr. Dasheon Milling GA Tech, Student	**Mr. Richard G. Jennings IV** GA Tech, Student	
Mr. Biniam Ogubamichael Ghebreah GA Tech, Student		

UPCOMING EVENTS

ACI Chapter Luncheon Meeting
September 24 , 2004
Sheraton Buckhead Hotel
Atlanta, Georgia

Technical Forum on Construction Aggregates
September 29 , 2004
Marc Auditorium (101)- GA Tech
Atlanta, Georgia

ACI Golf Tournament
October 1, 2004
Conyers, Georgia

ACI Chapter Luncheon Meeting
October 22 , 2004
Sheraton Buckhead Hotel
Atlanta, Georgia

ACI Fall Convention
October 24– 28 , 2004
Hilton Hotel
San Francisco, CA

ACI /PCA Seminar
November 4, 2004
Sheraton Buckhead Hotel
Atlanta, Georgia

ACI Seminar Troubleshooting Concrete Construction
December 13 , 2004
Sheraton Buckhead Hotel
Atlanta, Georgia

Forum on Construction Aggregates.

Registration at 8:00 AM with the program from 8:30 AM - 12:00 PM.

The forum will be held in the MARC Auditorium (Room 101) on the Georgia Tech Campus, Atlanta, GA.

If you have any questions, please contact John Cardosa, Executive Director, Georgia Crushed Stone Association at jcardosa@gacsa.org or in the Association office at 678/473-0012.

"Discontinuous Tensile Reinforcement"

There are a few dozen commercial brands of concrete reinforcing fibers on the market currently and applications for fiber as discontinuous tensile reinforcement are growing. The ACI 318 Building Code **still** doesn't address fiber reinforcement so the prospective user of fiber reinforced concrete [FRC] should be more confused than ever. Now is the time for industry standards in FRC. Well, as John Kerry said, "help is on the way"!

For decades steel reinforcing fibers have been defined by ASTM A820 Standard Specification for Steel Fibers for Fiber Reinforced Concrete. The growth and development of steel fibers has been static whereas the technical progress has been seen in synthetic fibers. An ASTM Task Group has been working on a specification for synthetic reinforcing fibers and may have a document by 2005. This document will establish a minimum fiber tensile requirement and define configuration parameters such as micro, macro and fibrillation. This decade began with the introduction of **"structural"** synthetic fibers, the implication being that they provided more than plastic shrinkage crack control. This marketing ploy has been somewhat successful because it drew attention to higher fiber dosage rates and new applications. The downside of the use of the term "structural" was that fibers can replace structural steel reinforcement and this caused widespread confusion of prospective users of FRC.

It is unfortunate that we find no technical definition of the term "structural" in ACI or ASTM documents that quantifies the level of reinforcement for structural applications. In 2002 research was conducted at Master Builders' concrete lab in Cleveland that revealed structural enhancement occurs at steel area ratios above 0.4 percent. The area ratio [AR] of continuous steel reinforcement to the gross area of a concrete structural member is the means of quantifying the level of reinforcement. A "structural" level of reinforcement can be defined as that level that produces an ultimate load [strength] greater than the cracking load [strength] of the concrete matrix. The load/deflection data from the Master Builders' study confirms the ultimate structural load exceeded the cracking load of the concrete in every instance where the AR exceeded 0.4 percent. This data also showed that fiber reinforcement could mimic structural reinforcement at volume proportions above 3.5 percent. With polypropylene fiber that is over 50 pounds per cubic yard, not an economical proportion.

If the foregoing establishes the upper limits for FRC it also confirms that fibers are not useful for structural reinforcement as defined. What are the lower limits? Traditionally the minimum reinforcement has been for temperature and shrinkage stress resistance. In terms of area ratio [AR] this has been quantified as 0.08 percent and fiber reinforcement proponents have claimed this region of the reinforcement spectrum for their products. The term "secondary" reinforcement was coined for fiber applications as opposed to "primary" reinforcement that was reserved for continuous steel and quantified by calculation.

The source of confusion has been a lack of a definition for the magnitude of reinforcement that is employed between "temperature/shrinkage" minimums and "structural" maximums, which in terms of AR covers 0.08 through 0.40 percent. This is a wide spread in the spectrum and many engineers consider for example, 0.20 percent "structural" when this amount will NOT provide an increase in load capacity beyond the cracking strength of the concrete. It is now suggested that this midrange of reinforcement be designated FLEXURAL reinforcement and that this range is where the "structural" fibers are applicable.

"Discontinuous Tensile Reinforcement" Continued

There is finally a consensus on the basis for determination of equivalent fiber reinforcement proportions for a given AR of continuous steel reinforcement. It is based on the bending moment resisted by the reinforcement. For conventional continuous steel the moment **M** is determined by $\mathbf{A_s f_y (0.4h)}$ Where:

A_s = area of steel (in2 / linear foot)

f_y = yield stress of steel (60,000 psi)

h = section thickness (inches) and the reinforcement is located in midsection

An international code, **International Association of Plumbing and Mechanical Officials** have established an equivalent moment for FRC determined from test values of ASTM C 1399 as $\mathbf{M = (f_t)[bh^2/6]}$ Where:

b = unit length of section (12 inches)

h = thickness of section (inches)

f_t = the average residual strength in psi from ASTM C 1399

From these two formulae we can determine an ASTM psi requirement for FRC from a given AR of conventional continuous reinforcement when it is positioned midsection. This is a beginning. Lab testing of various brands of synthetic fiber have determined that a fiber proportion of 5 to 10 pounds per cubic yard of concrete can provide equivalent continuous reinforcement in the FLEXURAL zone [AR's 0.08 to 2.0], which covers a multitude of current applications that have not accepted this alternative.

Mel Galinat, FACI

Fibrous Concrete Specialist

2004 MEMBERSHIP APPLICATION

Name: _____

Company: _____

Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Office Phone: _____

Office Fax: _____

Home Phone: _____

E-mail address: _____

Annual Dues: $25.00

You may use this form to sign up a new member!

Professional Category: (Check one)

- □ Architect
- □ Contractor
- □ Engineer
- □ Student - Name of School _____
- □ Affiliate
- □ Other: _____

Are you an ACI International Member: □ Yes □ No

If yes, date joined National: _____ If yes, Committee Membership: _____

Sponsored By: _____ Date Joined: _____

Please complete application and mail with your $25 check to :

Georgia Chapter, ACI
100 Crescent Centre Parkway, Suite 110
Tucker, Georgia 30084
(770) 621-9324

MEMBERS WANTED…

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Members! We need more members. One of the sections on the Annual Report covers points for membership. We did not lose any points for last year but we did not gain any. Ask your friends and fellow workers to join. We need to gain members this year.

Thank you.

Georgia Chapter ACI Newsletter

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We're on the web!
www.georgiachapteraci.org

SEPTEMBER MEETING

SPEAKERS:	**MR. NICK MALOOF, FACI** **GENERAL MANAGER OF TECHNICAL PROMOTIONS, THOMAS CONCRETE INDUSTRIES**
PROGRAM:	**"ISO 9001 WHAT IT IS……WHAT IT DOES"**
DATE:	*September 24, 2004*
TIME:	*11:45 a.m.—Registration* *12:15 p.m.—Luncheon*
LOCATION:	*Sheraton Buckhead Hotel , (See Reader Board)* *Atlanta, Georgia*
PRICE:	*$25.00 - Pre-registered* *$10.00 - Students* *$30.00 - Walk-ins and No-shows*
RSVP:	**To RSVP, please call "Sam" or Bebe at (770) 621-9324 BEFORE 4:30 pm on WEDNESDAY, September 22, 2004.**
PLEASE NOTE:	***If you fail to call in prior to the deadline, or do not show for the luncheon, you will be charged $30.00.***